

Institutional Accountability and Competition for Resources in Undergraduate
Education among U.S. Public Four-Year Institutions

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Dedication

This dissertation is dedicated to my family. My parents and siblings have always encouraged my desire to pursue a doctorate. To my partner, Torin, and children, Konner and Kaiden, thank you for joining me on this journey. Without your love and support, completing this doctoral journey would not have been possible.

Abstract

With a growing concern that society's needs are not being met, there are heightened expectations for accountability for public purposes. At the same time higher education institutions are experiencing increasing competition, as well as decreasing state support for public higher education. The concern is that competition for resources is overtaking accountability for public purposes.

Using an observational correlational research design, this study explored the relationships between institutional competition for resources and accountability for public purposes at the undergraduate level among 428 U. S. public four-year institutions. The study examined institutional competition organized around the four key markets that generate institutional revenues (student enrollment, research funding, public fiscal support, and private giving) and institutional accountability for public purposes defined by accountability measures most frequently included in state-level performance accountability systems (access, affordability, and completion). The relationship between institutional competition for resources and accountability for public purposes was also examined considering institutional fiscal health and market segment. The accountability triangle, resource dependency theory, and postsecondary market taxonomy provided a conceptual framework for the study.

The results of the study indicate a statistically significant relationship between institutional competition for resources and institutional accountability for public purposes. In particular, a negative relationship was observed between institutional competition and accountability for access ($R^2 = .16$) and affordability ($R^2 = .05$),

and a positive relationship was observed between institutional competition and accountability for completion ($R^2 = .09$). Institutional fiscal health was a statistically significant factor in only the relationship between institutional competition and accountability for access producing an increase in the predictive power of the model ($R^2 = .16$ to $R^2 = .18$). In addition, no differences were found in the nature of the relationship between institutional competition and institutional accountability for public purposes across the market segments of higher education.

Most importantly, this study provides empirical evidence of a relationship between the complicated constructs of institutional competition for resources and institutional accountability for public purposes at the undergraduate level within U.S. public four-year institutions. With the force of institutional competition likely to increase and the necessity for higher education to serve public purposes critical, additional research further exploring the relationships between institutional competition and institutional accountability at the undergraduate level is crucial.

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Chapter One: Introduction

Higher education institutions are facing increasing demands to be accountable for results that support public purposes while at the same time experiencing increasing competition for resources. The most recent *Measuring Up* National Report Card shows only small U. S. advances in improving college preparation, college access, and college graduation, which are being outpaced by other nations (The National Center for Public Policy and Higher Education, 2008a). The U.S. ranked 15th among 29 countries in college completion rates and slipped to 10th in the percentage of 25- to 34-year-olds who have an associate's degree or higher (Callan, 2008). The President of the National Center for Public Policy in Higher Education, Patrick Callan, summarizes that disparity in U.S. higher education performance "limit our nation's ability to advance the educational attainment of our workforce and citizenry—and thereby remain competitive globally" (Callan, 2008, p. 1).

The relationship between higher education institutions and their states is undergoing a profound shift as understandings of autonomy and accountability are redefined. The current higher education environment is characterized by reduced state appropriations, heightened levels of competition, hard-pressed public officials to drive educational, civic and economic development, and pressured institutions to educate more citizens (American Council on Education, 2004a). With a growing concern that higher education institutions are not meeting society's needs, there are amplified expectations of accountability for public purposes (Wellman, 2006).

At the same time, higher education institutions are experiencing increasing competition due to the emergence of for-profit institutions, information and communication technology, globalization of higher education, ratings and rankings, and public policies advancing market forces. The ability to compete for prestige and reputation has become a driving institutional strategic force that comes together in a competitive “winner-take-all” environment. In this environment, the concern is that competition for survival and prestige will overtake accountability for public purposes such as access, affordability, and degree completion (Eckel, 2008). Without appropriately balancing competition against the public good, higher education institutions will no longer be able to uphold their part of the social contract to produce a well-educated citizenry.

Can higher education institutions balance institutional accountability for public purposes and institutional competition? Previous studies have focused primarily on either higher education accountability or competition, but not explored these forces simultaneously. Research on higher education accountability has been approached mainly through an examination of the effectiveness of state-level performance accountability programs in advancing institutional accountability. The study of competition in higher education has emerged with an emphasis on the market-structure of higher education and aspects of the competitive higher education environment. Only a handful of essays and studies address the effects of the tandem forces of competition and accountability for public purposes on higher education institutions.

To begin, the work of Brewer, Gates, and Goldman (2002) explored institutional competition and strategy in higher education. Their work revealed institutions compete via investments in strategies focused on the pursuit of institutional prestige or reputation. Dill (2003), in an analysis of the findings of Brewer et al. (2002), mapped institutional investment behavior focused on the pursuit of prestige or reputation and suggested plausible negative consequences for public purposes. The Futures Project (Newman, Couturier, & Scurry, 2004), launched in 1999, investigated the emerging trend of competition and market-based values in higher education finding that “institutional leaders often feel compelled to chase revenues and rankings rather than concentrate on the public purposes of providing a high-quality education to an ever-expanding share of the population” (p. 7). The Futures Project was not alone in identifying the higher education market as a concern for the pursuit of public purposes. Eckel and King (2006), in a discussion of the current challenges confronting U.S. higher education, identified “the marketplace (not government) as the key external driver” of higher education while noting that as governmental support does not keep pace with educational expenditures “Administrators see little option except to respond to the marketplace” (p. 16). In 2002, after conducting a year-long agenda-setting initiative at the request of the U.S. Department of Education’s Office of Education Research and Improvement (OERI), the National Center for Postsecondary Improvement (NCPI) identified pressing issues confronting higher education and formulated a set of research priorities. Among the three research priorities recognized, NCPI identified “balancing market forces with

higher education's public purposes" noting the "increasing power of market forces to reshape institutional practices and priorities" (Gumport, 2002, p. 17).

The accountability triangle developed by Burke (2005a) provides a framework for considering the forces of institutional competition and accountability for public purposes in U.S. higher education. Building on the work of Clark's (1983) triangle regarding coordination of higher education systems, the accountability triangle posits state priorities, academic concerns, and market forces as the three forces or pressures most affecting U.S. higher education. State priorities reflect the public needs and desires or public purposes for higher education. Academic concerns incorporate the prestige driven issues and interests of the academic community. Finally, market forces capture the needs and demands of students, parents, businesses, and other clients of higher education. With the accountability triangle providing a framework, resource dependency theory provides explanatory power.

Within an open-systems perspective, resource dependency theory (Pfeffer & Salancik, 1978) posits that organizations survive to the extent they are effective, with effectiveness being determined by the interest groups that the organization relies upon for resources and support. Key to an organization's survival is the securing of resources in a network of interdependencies and social relationships, including financial, physical, and informational. The acquiring of resources creates organizational dependencies between the organization and the environment, enabling the environment to impose constraints on the organization and pushing the organization to act strategically in the management of resource dependencies.

Resource dependency theory also addresses the issue of competing environmental demands. Organizations confront competing demands when incompatible criteria are identified for evaluating organizational effectiveness. When faced with competing demands, the organization must decide what entity and criteria to attend to, at the risk of not attending to another entity's criteria and negatively affecting the organization's coalition of support. Therefore, organizations cannot survive by responding completely to one environmental demand while ignoring another. When resources are plentiful, the organization, through a differentiated, loosely coupled subunit structure, can attend to competing interests. However, this solution is dependent on the availability of slack resources (Pfeffer & Salancik, 2003).

Applied within the current higher education setting, resource dependency theory suggests that as resources become more constrained, institutions will be unable to support differentiated, loosely coupled structures that can simultaneously meet the interests of public purposes and competition. Using the accountability triangle as a conceptual framework illustrating the forces of accountability for public purposes and institutional competition coupled with resource dependency theory warrants further empirical investigation.

Purpose of the Study

The intent of this study was to explore the relationships between institutional accountability for public purposes and institutional competition at the undergraduate level among U. S. public four-year institutions. In greater detail, this study examined institutional competition organized around the four key markets that generate

institutional revenues (student enrollment, research funding, public fiscal support, and private giving) and institutional accountability for public purposes defined by accountability measures most frequently included in state-level performance accountability systems (access, affordability, and completion). The relationship between institutional competition and institutional accountability for public purposes was also explored considering institutional fiscal health. In addition, the relationship between institutional competition and institutional accountability for public purposes was explored across the market segments of postsecondary undergraduate education using Zemsky, Shaman, and Iannozzi's (1997) market taxonomy. Within the study, institutional characteristics such as institutional scope of degree offerings, proximity to other higher education institutions, and composition of the student body served as control variables. The accountability triangle (Burke & Associates, 2005) as a conceptual framework and resource dependency theory (Pfeffer & Salancik, 2003) were used to focus and frame the study of the following research questions:

- What is the relationship between institutional competition and institutional accountability for public purposes at the undergraduate level among U. S. public four-year institutions?
- To what extent does the relationship between institutional competition and institutional accountability for public purposes differ based on institutional fiscal health?

- To what extent does the relationship between institutional competition and institutional accountability for public purposes differ across the market segments of postsecondary undergraduate education?

Figure 1 provides an illustration of the simplified conceptual framework that guided the study.

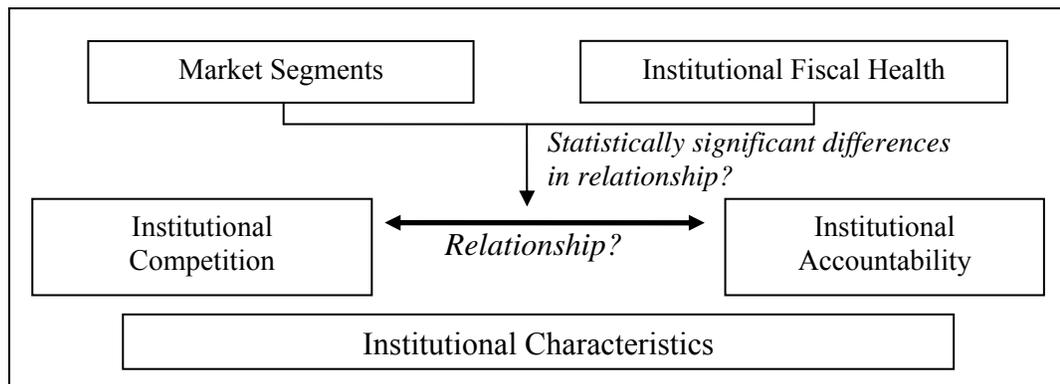


Figure 1. Research Questions: Simplified Conceptual Framework

A study of the relationship between institutional accountability for public purposes and institutional competition among U. S. public four-year institutions is important for several reasons. First, this study builds on and contributes to previous scholarly work. In particular, this study bridges work completed by The Futures Project (The Futures Project: Policy for Higher Education in a Changing World, 2004; Newman et al., 2004) that focused on assessing the thinking of the higher education community regarding increased competition in the higher education arena, Naughton's (2004) work that examined the differential responsiveness of institutions to state-level accountability programs based on institutional type and prestige, Brewer et al. (2002) examination of strategy and competition in U.S. higher education, and Dill's (2003)

analysis of institutional investments in prestige or reputation. Second, this study makes a conceptual contribution by examining the applicability of Burke's (2005) accountability triangle and resource dependency theory (Pfeffer & Salancik, 2003) in explaining the relationship between institutional accountability for public purposes and institutional competition. Third, this study provides insights into institutional competition and accountability for public purposes in a decentralized system of higher education. These insights can provide policymakers a better understanding of the reaches and limits of accountability for public purposes in light of institutional competition that can be used to improve current policy and develop more effective, integrated, and differentiated accountability systems that support a public agenda. Finally, this study can enlighten practice at the institutional level by providing institutional leaders an opportunity to reflect on institutional engagement in competition and accountability for public purposes.

Definitions of Terms

Accountability. "The requirement to demonstrate responsible actions to external constituencies" (Altbach, Berdahl, & Gumpert, 2005, p. 5).

Institutional accountability. Responsiveness for results (adapted from Ewell and Jones, 2006).

Institutional accountability for public purposes. Responsiveness for results that serve public purposes as identified by state legislatures (adapted from Ewell and Jones, 2006).

Institutional competition. The act of competing within the four key revenue markets of higher education (student enrollments, research, public fiscal support, and private giving) to generate revenues (adapted from Brewer et al., 2002).

Institutional competition for prestige. In the higher education context this occurs through the pursuit of strategies focused on internal values and goals needed to maintain perceived excellence (adapted from Brewer et al., 2002).

Institutional competition for reputation. In the higher education context this occurs through the pursuit of strategies focused on meeting the demands of customers (adapted from Brewer et al., 2002).

Institutional reputation. In the higher education context this is customer satisfaction based on an institution's ability to respond to the demands of customers (Brewer et al., 2002).

Public purpose. "Fundamental responsibilities to help ensure the continued well-being of the nation" (The National Center for Public Policy and Higher Education, 2008b).

Organization of Thesis Proposal

This dissertation is organized into five chapters. The first chapter provides an introduction to the research problem, conceptual framework, the study's purpose, and research questions. The second chapter presents literature that provides a foundation for and guides the examination of the relationships between institutional accountability for public purposes and institutional competition. The second chapter concludes with the accountability triangle (Burke & Associates, 2005) as a conceptual

framework for the study coupled with resource dependency theory (Pfeffer & Salancik, 2003). Chapter three reviews the research design, specification of study variables, data preparation techniques, and statistical methods employed. Chapter four presents the results from this study, and chapter five provides a discussion of the results in reference to the study's research questions, conclusions, and implications.

Chapter Two: Review of the Literature

This chapter presents literature that provides a foundation for and frames the examination of the relationship between institutional accountability for public purposes and institutional competition. The organization of the literature review takes an analytic approach, whereby the constituent parts of the research problem are broken apart, examined, and then brought together again. This approach provides an opportunity to gain new insights into the complex dynamics of the research problem. I will begin with a review of the history, urgency, dimensions, and previous research regarding accountability in U.S. higher education. Next, I will examine competition in U.S. higher education by considering its emergence, environmental features, key points, and previous research of competition in U.S. higher education. Last, I will bring together accountability and competition in a review of previous work that considers the implication of increasing competition on accountability for public purposes in U.S. higher education.

Accountability for Public Purposes in U.S. Higher Education

To provide an appropriate foundation for investigating institutional accountability for public purposes, I will begin with a review of the evolution of accountability in U.S. higher education. Second, I will discuss the urgency of higher education accountability today. Third, I will examine several key accountability dimensions including definitions, key questions, concepts and purposes. Finally, I will critique previous research examining accountability for public purposes.

The evolution of public accountability. The evolution of public accountability has been shaped by political, economic, and demographic forces altering its form, function, and purpose over time. To grasp the nature of the current tensions regarding public accountability, a review of the evolution of accountability in U.S. higher education is warranted.

Pre-1960s: Establishment of the public accountability relationship. The foundation for higher education public accountability dates back to the establishment of a relationship between higher education and the government, especially state government. The Morrill Land-Grant Act of 1862, allowing for the creative sale of land in exchange for the establishment of colleges, developed an implicit relationship between postsecondary institutions and their respective states (Geiger, 2005; McGuinness, 1995). This new government relationship was further reinforced in 1890 with the Second Morrill Act that provided annual federal aid to land-grant colleges (Brubacher & Rudy, 1997). In addition, as described by Brubacher and Rudy (1997), “these colleges stood pre-eminently for the principle...that every American citizen is entitled to receive some form of higher education” (p. 64). This principle of access and conception of higher education as a public good also was rooted into a social compact between society and higher education with the Servicemen’s Readjustment Act (GI Bill) of 1944 (Burke, 2005a).

Although this implicit relationship between higher education and the government laid out the groundwork for public accountability, the first form of higher education accountability began as a non-governmental activity. The practice of

accreditation began in 1885 with the establishment of “the New England Association of Schools and Colleges by institutions seeking some means of assuring inter-institutional quality” (Dickeson, 2006, p. 3). The involvement of higher education institutions in accreditation activity rapidly expanded and by 1923, a total of six regional associations had developed with criteria and requirements for institutional membership (Harclerod & Eaton, 2005). Accreditation was initiated as a “private, non-governmental, ‘self-regulation’ system for universities and colleges to assure that both public and private institutions of higher education...met acceptable levels of quality” (Schray, 2006, p. 2).

In 1952 the Department of Education established a formal relationship with accreditation in the passage of the Veterans Readjustment Act. This Act empowered the “commissioner of education to publish a list of accrediting agencies and associations that could be relied upon to assess the quality of training offered by educational institutions” (Harclerod & Eaton, 2005, p. 270). Since the passage of the Veterans Readjustment Act of 1952, accreditation has “evolved into a large and complex private-public system” (Schray, 2006, p. 2) “whereby accrediting organizations partner with the government and function as reliable authorities on academic quality” (Eaton, 2007, p. 2). However, the role of the federal government in directly administering higher education was limited given that the authority under the United States Constitution was not delegated to the federal government, and therefore under the Tenth Amendment was reserved for the states (Brubacher & Rudy, 1997; Harclerod & Eaton, 2005).

From the late-19th century to the mid-20th century the relationship between the government and higher education continued in a rather hands-off fashion. According to Trow (1993), the government was willing to “leave the money on the stump” (p. 2). When the government did intervene, its actions revolved around pressures related to access, economic advancement, and the development of a skilled citizenry (Gladieux & Hauptman, 1995).

1960-1970s: *The emergence of state-level public accountability.* State-level accountability for U. S. higher education formally emerged during the 1960s and 1970s (Ewell & Jones, 2006) with increasing demands on institutions to accommodate larger numbers of students and to expand their functions (Altbach, 2005). The focus of the state-level accountability movement was on ensuring institutions were in compliance with established regulations and that funds were spent for intended purposes. Ewell and Jones (2006) explain that “the task of the state was to ensure that public funds were spent efficiently and that the chance to benefit was available for all citizens” (p. 9). With the establishment of the Integrated Postsecondary Education Data System (IPEDS) under the Higher Education Act of 1965, accountability during this time period consisted of reporting regularly on measures of access and efficiency (e.g., student demographics, credit outputs in comparison to inputs) (Ewell & Jones, 2006). This era of accountability has been characterized as the “resource-and-reputation” era of institutional excellence and accountability (Astin, 1985).

The 1980s: The “new accountability” movement. The early 1980s marked the beginning of a “new accountability” movement, frequently referred to as the

accountability-for-results movement (Ewell, 1997). This new era began with an emphasis on student learning outcome assessment. The movement was supported by curriculum reform reports, the advancement of principles regarding good practice in undergraduate learning, and knowledge about student outcomes and experiences (Ewell, 2009). The foundation for present-day student learning assessment practices in higher education was set early by Alverno College, which initiated an interdisciplinary competency based curriculum, Northeast Missouri State University, which engaged in value-added assessment practices, and University of Tennessee Knoxville, which established a comprehensive department level assessment program (Ewell, 2008).

The “new accountability” movement of the 1980s was also supported by state government’s growing interest in the ability of higher education to demonstrate a return on investment (Ewell, 2009) as higher education was in competition for increasingly scarce public funds (Banta, 2006). The 1986 report of the National Governors’ Association Task Force on College Quality, *Time for Results*, is often credited as a catalyst for many states to mandate assessment (Burns, 1998; Ewell, 2008). This report in particular asserted that information about graduates’ knowledge and skills set the bar for evaluating the effectiveness of public investments in education (National Governors' Association, 1986). The lack of accepted, reliable, and valid methods to assess student learning complicated higher education’s ability to account for a return on investment. In 1987, the *Wingspread Principles for Good Practice in Undergraduate Learning* (Chickering & Gamson, 1987) encouraged the

use of indirect or proxy measures of student learning until reliable and valid direct measures were developed (Banta, 2006). In response, many states enacted mandates pushing institutions to examine higher education quality and to report, in particular, student learning results in the form of learning outcomes (Ewell & Jones, 2006).

These state-enacted mandates took on multiple forms. Some were based on the use of examinations (e.g., Florida), others relied on skills testing and standardized tests (e.g., Texas), and many (e.g., Virginia, Colorado, Missouri) adopted an institution-centered approach (Ewell, 2008). The institution-centered, process-focused approach that allowed institutions to establish their own student learning outcomes, select valid and reliable measures, and determine context specific methods was the format most frequently endorsed among the states that established assessment mandates (Ewell, 1992, 2008). As described by McGuinness (1995), the states' approach, "was decidedly on the side of internal improvement in contrast to what had been feared: high-stakes external reporting and comparison of institutions' performance" (p. 34).

In addition to enacting student learning assessment mandates, many states began shaping a portion of their higher education funding structure based on measurable outcomes (Burke, 1998; King, 2000; McGuinness, 1995). In 1978, Tennessee was the first state to address systemized accountability by establishing a series of performance or incentive funding initiatives (King, 2000). By 1985, Virginia, New Jersey, and Colorado joined Tennessee in enacting mandates for institutions to demonstrate student learning (Banta, 2006). According to Cress (1996), "In 1987, a study by the National Governor's Association showed that higher

education institutions in 22 states were developing comprehensive assessments of undergraduate learning, and 9 states provided institutions with financial incentives to improve undergraduate education. A year later, the National Governor's Association found that institutions in only 14 of the 50 states had not implemented some form of outcomes assessment” (1986, p. 40).

The 1990s: The financial crisis and performance measures. While the push by the states in the 1980s was strong, it was short-lived due to the recessionary downturn of the economy in the early 1990s, the piecemeal implementation approach used by the states, and the insufficient changes in the actual framework used to measure and hold institutions accountable (Ewell & Jones, 2006). Between 1989 and 1991 many states suspended or ended their quality initiatives (McGuinness, 1995).

During the downswing in state activity, the federal government provided leadership by exerting pressure on regional accreditation bodies. In the 1992 reauthorization of the Higher Education Act (HEA) of 1965, new provisions were established requiring regional accreditors to incorporate evidence of student academic achievement as part of criteria for institutional accreditation (Ewell, 2008). In addition, Congress established a new state enforcement system with the enactment of state postsecondary review entities (SPREs) (Harclerod & Eaton, 2005). However, the resulting outcry against the law led Congress to rescind the law by not providing funding in 1994-95, and the SPREs were eventually eliminated from the law in 1998 (Harclerod & Eaton, 2005). In response to the increasing pressures from the federal government, accreditation associations undertook large-scale assessment initiatives

and revamped accreditation standards incorporating the assessment of student learning (Lopez, 2002; Priddy, 2007).

As states emerged from the recession in the mid-1990s, the accountability movement initiated in the 1980s re-surfaced with a new urgency. While the institution-centered student learning assessment movement of the 1980s produced a flurry of activity, Banta and Borden wrote in 1994, “outcomes assessment...for the purpose of demonstrating institutional accountability has produced little information that external decision makers find helpful or satisfying” (p. 96). This sentiment was also apparent in the 1993 report of a Wingspread Conference of national leaders that criticized higher education and insisted that colleges and universities must educate more people and educate them better (Burke, 2002). The report “charged higher education with failing to meet societal needs, despite the series of demographic, economic, and technical changes that increased its importance for most Americans” (Burke, 2002, p. 8). As a result, McGuinness (1995) noted, “state officials seemed to lose faith that the largely internal process for quality improvement...were leading to tangible results. States began to contemplate exactly what colleges and universities had always feared: external reporting and comparisons according to standardized measures” (p. 35).

The use of performance measures became the touchstones of state-level accountability (Albright, 1998) and was heavily influenced by the total quality management trend that had impacted corporate America (Banta, 2006). As described by Burke and Minassians (2002a), this new management movement preached a creed

that “proclaimed that organizations not only could but also must improve quality while cutting cost and increasing productivity” (p. 5). With an emphasis on performance, it was believed goals of accountability and improvement could both be met (Burke & Minassians, 2002a). While the assessment movement of the 1980s focused on internal improvement, performance accountability of the 1990s changed the emphasis to external accountability without supposedly neglecting improvement. In state after state, the growing demands of accountability produced three performance-based initiatives: performance reporting, performance budgeting, and performance funding (Burke & Minassians, 2002a).

Unlike the institution-centered, process-focused student learning approach taken during the 1980s, performance reporting, budgeting, and funding employed mechanisms with teeth or consequences (Burke & Minassians, 2002a; McKeown, 1996). The budget crisis of the 1990s and the new programs of performance accountability merged in support of a paradigm shift in budgeting based on the new accountability (Burke, 2002). As described by Burke (2002), policymakers:

sought a policy that stressed improved performance, increased productivity, and contained costs. The policy had to conform to the new management mantra of centralized direction on the priority goals, objective measurement of performance results, and decentralized methods of goal achievement.

Performance funding and budgeting seemed a ready-made policy for the problems and politics of the period. (p. 18)

By 2000, 30 states had adopted policies of performance reporting, 28 had adopted performance budgeting, and 17 had adopted performance funding.

The 2000s: Responsiveness to public purposes and accountability

discontent. The use of performance reporting to support higher education responsiveness to public purposes was further reinforced in 2000 when The National Center for Public Policy and Higher Education, an independent, nonprofit, nonpartisan organization, issued the first in a series of reports known as the *Measuring Up* reports (The National Center for Public Policy and Higher Education, 2000). The *Measuring Up* report cards on higher education evaluated the performance of each State providing state leaders and the public, for the first time, information to compare the results of higher education on a state-by-state basis (Burke, 2002). The results of *Measuring Up* reports in 2000 and 2002 portrayed a picture of concern with college participation slipping and international comparisons indicating other countries were surpassing the U.S. (Callan, 2002).

The *Measuring Up* 2000 and 2002 report cards were just the first in a series of reports that identified troubling issues and set higher expectations for higher education in meeting public purposes. The Business Roundtable (2005) issued *Tapping America's Potential: The Education for Innovation Initiative* highlighting the declining state of adult literacy. The National Center for Education Statistics (2006) disseminated *The Condition of Education* that called attention to the increase needed in the production of science, technology, engineering, and mathematics graduates required by 2015 to remain internationally competitive.

Reports issued by the Business-Higher Education Forum (2004), the Council for Higher Education Accreditation (2003), and the Association of American Colleges and Universities (2008) called on higher education to take an active leadership role in meeting the demands of public accountability with increased reporting and transparency. Focusing squarely on accountability of higher education, the National Commission on Accountability in Higher Education issued *Accountability for Better Results: A National Imperative for Higher Education* summarizing the discontent with accountability from all sides:

Accountability for better results is imperative, but more accountability of the kinds generally practiced will not help improve performance. Our current system of accountability can best be described as cumbersome, over-designed, confusing, and inefficient. It fails to answer key questions, it overburdens policymakers with excessive, misleading data, and it overburdens institutions by requiring them to report it. (2005b, p. 4)

A key comprehensive report demanding accountability for higher education was the final report of the Commission on the Future of Higher Education, *A Test of Leadership: Charting the Future of U.S. Higher Education*, issued September 2006. In the Commission's report summary, the commission firmly states "Colleges and universities must become more transparent about...student success outcomes, and must be willing to share this information with students and families" (2006, p. 4). Higher education leaders responded to the Commission's report with "it is hard to disagree with the argument that colleges should be held publicly accountable for the

quality of education they provide and the careful assessment of what our students learn” (Hersch, 2007, p. 1). Out of concern that the government would impose an accountability system similar to that of No Child Left Behind, the higher education community initiated the development of voluntary systems of accountability (Fischer, 2007). The National Association of State Universities and Land-Grant Colleges and the American Association of State Colleges and Universities designed the Voluntary System of Accountability (VSA), a web-based accountability template composed of student and family information, student engagement scores, and student learning results (Fischer, 2007). In a similar effort, the National Association of Independent Colleges and Universities launched the University and College Accountability Network (UCAN), a web-based accountability template with an emphasis on admission, financial aid, student demographic, faculty background, and campus life information (Fischer, 2007).

In observing the current trends of accountability, Ewell and Jones (2006) suggest accountability in U. S. higher education is “on the edge of a transformation.” In particular, Ewell and Jones (2006) note five dimensions of transition: substance of accountability, unit of analysis, accountability as a policy tool, treatment of institutions, and institutional responsibility. Table 1 provides a summary of the five dimensions in transition.

Table 1

Five Dimensions of Transformation in Higher Education Accountability

	From	To
Substance of accountability	Resource use, institutional processes	Results
Unit of analysis	Public institutions	Society, polity
Accountability as a policy tool	Stand-alone	Integrated
Treatment of institutions	Uniform	Differentiated
Institutional responsibility	Compliance, reporting	Transparency, responsiveness

Note. Recreated from “State-level accountability for higher education: On the edge of a transformation,” by P.T. Ewell and D.P. Jones, 2006, *New Directions for Higher Education*, 135, 9-16. doi:10.1002/he.222. Copyright 2006 by John Wiley and Sons. Reprinted with permission.

One key observation made by Ewell and Jones (2006) is that accountability policy is being considered as a part of a coherent state policy or what is being called “a public agenda for higher education – a set of state policy goals that are systematically woven throughout finance, governance, and accountability policies” (p. 12). This transformation is being prompted by the convergence of economic, demographic, and political conditions.

The urgency of higher education accountability. The urgency of present day higher education accountability is most frequently attributed to two interacting conditions: the massification of higher education and declining public resources.

The massification of higher education characterizes the rapid enrollment growth in higher education over the past 30 years (King, 2000). Within the U.S., enrollment has increased 114 percent, from 8.5 million to 18.2 million between 1970 and 2007 (National Center for Education Statistics, 2009). This massification of higher education is also associated with investment in human capital and national economic growth, making it a high public priority. King (2000) explains, “state governments are placing an increasing burden on higher education to play a pivotal role in transforming the existing low-wage economic structures into high-performance, technology-based economies” (p. 1). Higher education is viewed as a necessary component in increasing the stock of human capital that enables more effective competition in world markets. From this perspective, higher education is seen as being too important to the country’s future economic well-being to be left to institutional purview alone through traditional forms of self-accountability and governance (King, 2000).

At a time when enrollments in higher education have increased dramatically, there has been a trend to limit public expenditures. In a review of public fiscal support for higher education, Lingenfelter (2008) painted an intriguing picture of state appropriations, federal student assistance, and net tuition revenue in light of complaints by higher education leaders of decreasing fiscal support. Lingenfelter (2008) explains the sentiment:

On a “per capita” basis, the nation has become richer and public spending for other purposes has grown faster than higher education spending over the past

35 years. In constant dollars (CPI), from 1970 to 2005, state and local government spending per capita (all purposes) grew by *103 percent*; personal income per capita grew by *66 percent*; and state support per FTE for higher education grew by *7 percent*. (p. 3)

Higher education during the past two decades has found itself in increasing competition with other state commitments such as health care, K-12 education, corrections, and welfare (Zumeta, 2000). Higher education, unlike the state's other commitments, has an alternative source of funds through student tuition and fees and other revenue sources. However, as higher education has increased tuition and fees faster than the rates of price inflation and middle- and working-class income gains, policymakers and consumers have asserted the need for greater efficiency. In addition, due to the collapse of the U.S. economy in 2009, from FY08-FY10 state fiscal support for higher education decreased 6.9 percent across the 50 states (Center for the Study of Education Policy, 2010). Forecasts suggest state revenues may not recover to pre-recession levels until at least 2013 (American Association of State Colleges and Universities, 2010).

Merging the two conditions, society needs more from higher education at a time when there are fewer resources available to support such an increase. Wellman (2006) summarizes well the imbalance in what the public needs from higher education and what is currently being produced:

The imbalance between production and need is quantitative (not enough students are going to and getting through college), qualitative (too many

students who do graduate have weak literacy, qualitative reasoning, and quantitative skills), occupational (the needs for skilled manpower are particularly acute in the science, engineering, and math disciplines and in several professional areas such as nursing and teaching), and socioeconomic (too few of the nation's Latino and African American students make it to or through college). (p. 113)

This imbalance between production and need, mixed with expectations of greater efficiency and performance, has resulted in increasing demands for higher education accountability.

In response, new accountability initiatives have emerged, layered upon previously established accountability programs. With institutions responding to numerous accountability programs, the present challenge is not the absence of accountability or the quantity of accountability. The National Commission on Accountability in Higher Education (2005a) contends, "The problem is a failure to develop and implement accountability approaches that help improve performance in a complex, decentralized system of higher education" (p. 11). Burke (2005a) draws a similar conclusion and suggests "the key is to clarify the reaches and limits of accountability and to develop effective and integrated systems of accountability" (p. 24). Prior to exploring previous research on accountability for public purposes a clarification of accountability dimensions is necessary.

Accountability dimensions: Definitions, questions, concepts, and purposes.

What does it mean for higher education to be accountable? Burke and Associates

(2005) assert, “Accountability is the most advocated and least analyzed word in higher education” (p. 1). Burke and Associates go on further to state, “Clearing up the confusion is critical, because the conflict over accountability is eroding what was once a national consensus – that higher education is a public good” (2005, p. 1). According to Altbach et al. (2005), accountability is “the requirement to demonstrate responsible actions to external constituencies” (p. 5). Trow (1996) defines external accountability as “the obligation to report to others, to explain, to justify, to answer questions about how resources have been used, and to what effect” (p. 2). Burke and Associates (2005) expand the definition of accountability as the requirement to meet six demands: 1) demonstrating proper use of powers, 2) displaying work toward the achievement of mission or priorities set for the organization, 3) reporting on performance, 4) making evident efficiency and effectiveness or accounting for the resources used and the outcomes created, 5) ensuring quality of the programs and services produced, and 6) showing that public needs are served. Lastly, Ewell and Jones (2006) advance the five dimensions of transformation in higher education accountability showing in Table 1 that institutional responsibility for accountability centers on transparency and responsiveness with the substance of accountability focused on results. In light of Ewell and Jones’ (2006) work, institutional accountability within the scope of this study focused on institutional responsiveness for results.

The aforementioned definitions of accountability raise several key questions illustrating the relative and contextually bound nature of accountability. Trow (1996) explains:

Accountability to others takes many forms in different societies, with respect to different actions and different kinds of support. The fundamental questions with respect to accountability are: who is to be held accountable, for what, to whom, through what means, and with what consequences. (p. 2)

Burke (2005a) also discusses the questions of who is accountable to whom, for what purposes, for whose benefit, by which means, and with what consequences. He explains that the pronouns “*who*, *whom*, and *whose* represent, respectively, the traditional trio of agent, principal, and beneficiary in political and organizational theory” (Burke, 2005a, p. 2). Thinking about the questions of *who*, *whom* and *whose* in the context of this study, the “who” is U.S. public four-year institutions, the accountable to “whom” is the respective institution’s state legislature, and the *whose* is the public at large.

Burke and Associates (2005) also define four concepts of accountability that represent different types of accountability connections between the principals and agents relative to higher education: upward accountability, downward accountability, inward accountability, and outward accountability. Upward accountability represents the traditional vertical form of accountability between a subordinate and supervisor. In the higher education context, this may be between a state legislature or board and an institution’s senior administrators. Downward accountability focuses on accountability between a manager and subordinates. Considering the professional nature of higher education organizations and strong value of shared governance, this concept takes on a collegial form. Inward accountability emphasizes agents acting in

manners endorsed by professional standards or norms. In the case of higher education, this takes on the form of professional accountability. Lastly, outward accountability consists of responding to external, stakeholder or client expectations. This encompasses for higher education the public at large, and more recently, this form has a stronger market-driven aspect. The primary focus in this study centers on upward and outward types of accountability with public four-year institutions being accountable to a state legislature and the public at large.

Finally, another dimension of accountability is its purpose. The purpose of accountability has shifted over time from the 1960s and 1970s with an emphasis on efficiency, to the 1980s with educational quality, to the 1990s with productivity and performance, to the present day with a focus on responsiveness to public priorities and market demands (Burke, 2005a). Interestingly, the shift in focus from one decade to the next does not excuse the previous, but rather builds from it. This has resulted in a notion of accountability with a complex “layered look” corresponding with the evolution of U.S. higher education (Ewell, 1992). In examining the evolution of U.S. higher education, Bogue and Aper (2000) observe that “the mission and purpose reveals a growing complexity, from the earlier singular mission of teaching in the colonial college to the more complex missions of advancing and applying knowledge in research and public service” (p. 33). In addition, Bogue and Aper (2000) cite the multiple stakeholders that have been given voice in higher education as another evidence of mission complexity. “While academic faculty and administrators remain the primary architects of collegiate mission, many other partners have taken a place at

the mission forum table – civic, political and economic leaders; state and federal government; and regional and national educational organizations” (p. 33). As a logical extension, it is not surprising that the purpose of accountability has become equally complex.

Through an investigation of the relationships between institutional competition, changing state funding, and institutional accountability for public purposes, this study hopes to illuminate the complexity of present day accountability for higher education.

Examining accountability for public purposes. The responsibility of providing sufficient policy direction to ensure the responsiveness of higher education to public needs is that of the states, with state governments being the primary authority governing public higher education. Three forms of performance accountability currently dominate state-level accountability policy at the institutional level: performance reporting, performance funding, and performance budgeting (Burke & Minassians, 2002a). All three programs share the purposes of demonstrating external accountability, improving institutional performance, and responding to state needs. In addition, performance funding and budgeting share an implied purpose of affecting state funding (Burke, 2005b). Reflecting state priorities for higher education, all three programs use performance indicators to measure the achievement of program goals. In a study of the most common indicators used in performance reporting and funding, Burke and Minassians (2002d) found that performance programs across states stress similar indicators such as graduation, transfer, job placement rates, and licensure test

scores. Performance reporting, in comparison to performance funding, stressed issues of access, diversity, and affordability (Burke & Minassians, 2002d).

Performance reporting, funding, and budgeting were developed via three initiation methods: mandated-prescribed, mandated-not prescribed, and non-mandated (Burke, 2005b). Mandated-prescribed is when state legislation mandates both the type of program and prescribes the performance indicators. Mandated-not prescribed is when state legislation mandates the type of program, but state coordinating agencies, usually in conjunction with higher education leaders, propose performance indicators. Finally, non-mandated is when state legislation is not involved, but state coordinating agencies, usually in conjunction with higher education leaders, develop and adopt the type of program and performance indicators. An annual survey of state higher education finance officers (SHEFOs) by Burke and Minassians (2003), found for performance funded programs 47 percent were mandated and 27 percent were mandated-prescribed. In addition, for performance budgeting programs 57 percent were mandated and 10 percent were mandated-prescribed. For performance reporting, 66 percent were mandated and less than 25 percent were mandated-prescribed.

Performance reporting was the first of the three state-level performance accountability programs to develop with a reliance on making information public to push institutions to improve performance and pursue state priorities. As described by Burke (2003), performance reporting “rests on the rationale that merely publishing the collective results of higher education and those of its colleges and universities on priority state indicators would improve performance” (p. 74). Unlike the student

learning assessment mandates of the 1980s, performance reporting generally includes comparability among institutions of similar types, provides additional direction to campuses but allows greater decentralization, and rests on the identification of common statewide performance indicators (Burke, 2003; Ruppert, 1994).

Performance reporting became a popular state-level policy choice and quickly spread. In the 1999 survey of SHEFOs conducted by Burke and Modarresi (2000), 28 states had adopted performance reporting. Three years later in the 2002 administration of the survey conducted by Burke and Minassians (2002b), 44 states reported the adoption of performance reporting. It was only a short period of time before performance reporting was taken one step further to performance funding and budgeting.

Performance funding connects institutional performance on a set of performance indicators with state funding. With a focus on the distribution of funds, institutions that achieve a particular performance target or improvement level receive a designated amount or percentage increase in state funds (Burke, 2005b). In performance funding “the relationship between funding and institutional performance is tight, automatic, and formulaic” (Burke, 2003, p. 76). In contrast, performance budgeting considers institutional performance on set performance indicators as a factor in the allocation of funds. Unlike performance funding, performance budgeting is focused on the budget preparation and presentation phases and ignores the distribution phase (Burke, 2005b). In performance budgeting, the allocation of additional funds is at the discretion or judgment of state officials (Burke, 2003). Both

performance funding and performance budgeting build on the rationale supporting performance reporting, “if what is publicized is what gets valued, what gets funded is even more prized” (Burke, 2003, p. 75). However, performance budgeting offers greater flexibility for state officials, and therefore, performance budgeting has political advantages over performance funding.

In comparison to performance reporting, performance funding and budgeting have not enjoyed wide-spread adoption. By 1997, only 10 states had adopted performance funding and 16 states had adopted performance budgeting (Burke & Minassians, 2003). Both programs hit their peak between 2000 and 2001, with performance budgeting peaking at 28 states in 2000 and performance funding peaking at 19 states in 2001 (Burke & Minassians, 2003). With the last administration of the annual SHEFO survey in 2003, Burke and Minassians (2003) found the number of states employing performance funding had dropped to 15 and the number of states employing performance budgeting had dropped to 21. The primary reason for abandoning or suspending performance funding and budgeting was attributed by finance officers to state budget challenges (Burke & Minassians, 2003). By 2003, it was clear that performance reporting was the preferred performance accountability approach.

Previous studies examining state-level performance accountability have identified a diminishing perception of policy impact, no significant effects, minimal improvement in institutional results, and influences differentiated by type and prestige of the institution. I will begin with studies that are broad in scope.

Burke and Minassians (2003), in their annual surveys of SHEFOs between 1997 and 2003, studied the perceived impact of performance funding, budgeting, and reporting on improving institutional performance in fifty states. With a 100 percent annual response rate, SHEFOs were asked to assess to what extent performance programs improved the performance of public colleges and universities in their respective states. The response options were great, considerable, moderate, minimal, no extent, or cannot judge the extent. None of the performance programs were perceived by SHEFOs to have a strong impact on performance improvement. The results indicate the impact of performance funding decreased from 2000 when 35 percent indicated performance funding improved performance a great or considerable extent, to 2003 when only 6.5 percent indicated performance improved a considerable extent. Performance budgeting also had a declining impact with 10 percent of the responses in 2001 indicating performance budgeting improved performance to a great extent, to 2003 with no responses indicating improved performance to a great or considerable extent. Finally, performance reporting had mixed results. In 2001, 13 percent indicated performance reporting improved performance to a considerable extent and in 2003, 8.5 percent indicated improved performance to a considerable extent and 2 percent to a great extent. However, the percentage of respondents indicating minimal, no extent or cannot judge increased from 51 percent in 2001 to 65.5 percent in 2003. This review of annual surveys provides an informative view of the perception of the effect of performance accountability programs on institutional performance over a seven-year period of time.

In a study focused on performance reporting, Burke and Minassians (2002c) surveyed governors' aides, legislative chairs of higher education committees or subcommittees, and the SHEFOs in 29 states. In addition, directors of institutional research from two- and four-year public campuses in California, Florida, South Carolina, Tennessee, Texas, and Wisconsin were surveyed. The overall response rate was 46 percent. The survey was composed of 57 items for SHEFOs and 56 for the other respondents mapping to eleven main questions for SHEFOs and ten questions for all others. The survey employed a five-point Likert scale of great, considerable, moderate, minimal, or no extent. The survey asked respondents about their familiarity with performance reports, their use in state and campus planning and policymaking, and their effect on the purposes of increasing accountability, improving performance, enhancing responsiveness to state needs, and raising state funding for public higher education. Examining the effect of performance reports on established purposes, all six states in the study ranked the achievement of purposes in the following order: (1) enhancing accountability, (2) increased responsiveness to state needs, (3) improved performance, and (4) increased state funding except for Wisconsin, which ranked improved performance second, followed by increased responsiveness to state needs. However, the highest mean score was moderate at 3.35 for enhancing accountability, followed by 2.79 for increased responsiveness, 2.71 for improved performance and 1.91 for increased state funding. This study indicates there was considerable agreement regarding the achievement of purposes of performance reporting; however, performance reporting was perceived to have only a moderate impact on enhancing

accountability and a minimal to moderate impact on increasing responsiveness to state needs.

In a similar effort to examine the performance and effect of performance funding, Burke and Associates (2005), administered the same survey tool described above to survey presidents, vice presidents, academic deans, and department chairs at all public two- and four-year institutions in Florida, Missouri, Ohio, South Carolina, and Tennessee. The overall response rate was 45 percent. Similar to the performance reporting survey, respondents ranked the achievement of purposes in the same order: (1) enhancing accountability, (2) increased responsiveness to state needs, (3) improved performance, and (4) increased state funding. The only variation in this survey was chairs of education committees that rated increased responsiveness to state needs first with enhancing accountability second. The results of this study, taken in conjunction with the previous study on performance reporting, indicates that regardless of performance program (reporting or funding), the perceived purposes and achievement of those purposes are similar.

To examine the relationships among changing state funding for public higher education, state-level performance accountability systems, and corresponding strategies undertaken by institutions to develop performance measures, Hendel, Bunton, Risbey, and Goldfine (2004) utilized case studies to categorize states (n=48) according to performance accountability strategies. Then a series of one way analysis of variance were used to test two sets of financial allocations and state performance using three sets of *Measuring Up* index scores as a function of accountability

strategies (internally initiated, externally initiated, and a combination). Hendel et al. (2004) found there was little support for the hypothesis that patterns in states' funding or performance were related to higher education accountability systems employed by states. This research further confirms the lack of difference between types of performance programs (reporting, funding, and budgeting) and impact. In addition, Hendel et al.'s study addresses a gap in the literature regarding the impact of programs on state funding and state performance beyond a "perceived" difference.

Focusing on the most commonly employed performance indicator in performance accountability systems, Woodley (2005) evaluated the effectiveness of performance funding and performance budgeting in positively influencing measures of graduation rates. The analysis consisted of categorizing 19 state systems into performance funding, performance budgeting, and neither; the identification of 30 separate clusters of universities based on the Benchmark Selection Model of the Kentucky Council on Postsecondary Education; and the statistical testing for differences in mean performance among the groups for three indicators (graduation rates in 1997, graduation rates in 2003, and percentage change in graduation rates from 1997 to 2003). Results showed that no differences in performance (on all three indicators) existed between states that have performance funding or performance budgeting and those that have neither. Based on the findings, Woodley (2005) identified the following factors that reduce the impact of performance systems: decision-making processes, governance structures and cultures, clarity of performance objectives, instability in the definition and use of performance measures, and

economic conditions. Similar to the work by Hendel et al. (2004), the research by Woodley (2005) further confirms that the effect of performance programs do not differ by type of program (reporting, funding, and budgeting). In addition, Woodley (2005) contributes implications that suggest institutional (decision-making process, governance structure, etc.) and economic factors may impact the effects of performance programs.

In a study of the efficacy of state higher education accountability programs, Naughton (2004) examined the impact of accountability programs in two states on public institutions that varied by type and prestige. A case study investigation using qualitative methods was employed with the selection of the state's capitol (state higher education coordinating board and the state legislature) and three institutions (high prestige, medium prestige, and low prestige) from Missouri's performance funding program and Virginia's performance reporting program. In Missouri the effects of performance funding on the high prestige institution were the least of any of the cases. The medium prestige campus strongly embraced the program and used it to align developing data-driven decision making processes. The low prestige campus was not responsive, indicating that the indicators of the performance funding program were not designed with its institutional mission in mind. In Virginia, the high prestige university saw the performance reporting program as "another unfunded state mandate that would do little to help the campus' effort to improve" (2004, p. viii). The medium prestige campus in Virginia, similar to Missouri, merged the programs' requirements within an already established culture of assessment and data-driven management. The

low prestige institution was the most responsive of all of the cases using the program to leverage campus change based on performance indicator results. In total, institutional responses in both states indicated institutional responses were more symbolic than substantial. This finding was particularly salient for high prestige institutions.

In summary, the studies examining performance reporting, budgeting, and funding collectively have several implications. First, studies evaluating the effect of performance programs based on perceived impact indicated a declining perception of impact. In addition, the studies suggested there was relative agreement about the purposes of such programs (i.e. enhancing accountability, increased responsiveness to state needs) and minimal to moderate achievement of those purposes. Second, the study by Hendel et al. (2004) and Woodley (2005) moved beyond perceived impact to actual impacts. Hendel et al. (2004) found there was little support for the hypothesis that patterns in states' funding or performance were related to higher education accountability systems employed by states. Woodley (2005) looking specifically at graduation rates further confirmed that the effect of performance programs do not differ by type of program (reporting, funding, and budgeting) and suggested the importance of institutional factors. The study by Naughton (2004) began to unpack the differential responsiveness of institutions based on type and prestige. Naughton's (2004) findings indicated that institutions with greater prestige and status are less responsive to performance accountability programs, making only symbolic changes.

In contrast, institutions with less prestige and status tended to make more substantial changes in response to performance accountability programs.

Collectively the findings suggest no difference in the impact of accountability programs on achieving the purposes or outcomes desired by such programs based on type of program or initiation method. In addition, accountability programs showed a diminishing impact was achieved regardless of the type of accountability program. The responsiveness of institutions to state-level accountability (keeping in mind responsiveness to state needs being a primary purpose) may have more to do with institutional (such as type or prestige) and economic factors. A key emerging force for higher education bridging both institutional and economic factors is competition. An examination of competition in U.S. higher education follows.

Competition in U.S. Higher Education

An examination of competition in U. S. higher education will begin with a discussion of the increasing force of competition in U.S. higher education. Second, the nature of the competitive higher education environment will be explored, followed by a discussion of the key points of institutional competition. Last, I will review key aspects of higher education competition examined in previous research.

The new competition in higher education. Competition is one of the distinctive characteristics of American higher education (Bok, 1986; Eckel & King, 2006). While competition for faculty, students, and funds has always been a vital aspect of U.S. higher education, the level of competition has dramatically increased during the past twenty years (Newman et al., 2004). A number of reasons are cited for

the increasing level of competition including for-profit institutions, new information and communication technology, globalization of higher education, ratings and rankings, and public policies advancing market forces.

The rapid expansion of for-profit institutions has changed the higher education landscape. Data from the National Center for Education Statistics, *Enrollment in Postsecondary Institutions, Fall 2008: Graduate Rates, 2002 and 2005 Cohorts; and Financial Statistics, Fiscal Year 2008* highlights the dramatic growth in for-profit student enrollment (Knapp, Kelly-Reid, & Ginder, 2010). While all sectors have increased student enrollment (10.5%) over the examined four-year time period (2004-2008), the for-profit sector increased 51.2 percent, followed by the public sector at 7.7 percent and the private sector at 7.1 percent. A large portion of the growth occurred during the most recent year for which records are available (2007-2008) with the for-profit sector increasing enrollment 21.4 percent, again followed by the public sector at 3.6 percent and the private sector at 2.5 percent. The dramatic up-tick of student enrollment, being mostly attributed to the economic recession, resulted in more than a third of students enrolling in higher education selecting for-profit institutions (Lederman, 2010). If there was any doubt that for-profit institutions would change the higher education terrain, that doubt has been erased in a dramatic competition for students.

Advancements in information and communication technology have also increased higher education competition primarily in the form of online education. Students are no longer geographically bound and utilize on-line information to seek

out higher education opportunities to meet their needs. In the 2006–07 academic year, 66 percent of the 4,160 two-year and four-year Title IV degree-granting postsecondary institutions in the nation offered college-level distance education courses with a total estimated 12.2 million enrollments (U.S. Department of Education, 2008). The increasing enrollment of students in online education has also translated into higher expectations for students in traditional campus settings. As students experience the 24 hour, 7 days a week service of online education, a corresponding increase in consumer-driven expectations for the on-campus experience results in demands for more amenities, better services, convenient course offerings, and competitive financial aid packages (Newman et al., 2004).

The globalization of higher education is expanding the field of competition with U.S. institutions going global and new higher education initiatives launching in other countries. Newman (2002) describes global institutions as institutions that conduct operations in multiple countries through the establishment of campuses and learning centers or the creation of alliances with local institutions. Frequently, institutions are offering course content via technology or are mixing virtual learning with short-term intensive on-campus or learning-center experiences (Newman, 2002). In addition, competition from higher education initiatives abroad is challenging U.S. higher education. Consider the rapid expansion of research universities by the Chinese government, Singapore’s intention to create a “Boston of the East,” or the European Union’s Bologna Process (Eckel, 2007). The expansion of global

institutions and international initiatives extends the previous boundaries of higher education competition.

The rating and ranking of higher education institutions has influenced not only the behavior of students and parents, but also policymakers, trustees, alumni, faculty, large donors, college presidents, provosts, and deans (Hazelkorn, 2009; Volkwein & Grunig, 2005). With an emphasis on academic reputation, size, and selectivity, publications such as *U.S. News & World Report* constitute what Volkwein and Grunig (2005) describe as “academic ‘beauty contests’ where looks count more than substance” (p. 260). Ratings and rankings such as *U.S. News* employ methodologies that reward institutions that generate large pools of applicants regardless of admissibility and use financial aid funds to buy talented students and penalize institutions that admit students from low-income, at-risk, and underserved populations, or reduce costs. In addition, these ratings and rankings do not reflect quality of the educational experience, but instead reflect market position (Volkwein & Grunig, 2005; Zemsky, 2005). With the attraction of simplistic ratings and rankings summarizing the “value” of higher education for stakeholders, ratings and rankings are a force that higher education institutions cannot ignore. Instead, it drives institutional actions in the quest to move up a tier, to be in the top ten, or to be number one.

Another factor increasing competition was initiated by public policies that establish new relationships between states and higher education and advance market forces as a means for making higher education more efficient and effective (American Council on Education, 2004b; Dill, 2003; Eckel, 2007). New relationships between

states and higher education are emerging in the form of decentralization, tuition deregulation, vouchers, public corporations or state enterprises, performance contracts, and negotiated statewide compacts (American Council on Education, 2004b; Eckel, 2007). As described by Eckel (2007), these new relationships reflect changing fiscal and regulatory policies and practices with common elements of greater market orientation encouraging entrepreneurial behavior, increased autonomy supporting institutional change in response to a rapidly changing environment, decreased or flat public funding, and additional accountability requirements. These actions, coupled with advancements in information and communication technology, dramatic growth in for-profit institutions, the globalization of higher education, and ratings and rankings, have changed the higher education competitive environment.

The competitive higher education environment. Higher education competition of the past was primarily described as largely benign, with institutions operating comfortably from within their own segments of higher education. However, the new competition of today crosses all segments and geographic areas of higher education impacting all institutions. Frank and Cook (1995) describe the new competitive higher education environment as the “winner-take-all” environment. Within this type of environment those at the top reap a disproportional share of the rewards. Eckel (2007) provides a succinct description:

This type of environment places particular constraints on institutions and creates dynamics that narrow their options and dictate their strategies. A primary characteristic of this environment is that small differences in

performance translate into large differences in rewards. In many instances only the ‘winners’ reap the benefits. Others walk away with nothing to show for their efforts....Furthermore, success is likely to come to those already successful or adept at the game (p. 83).

Succeeding in this type of environment is particularly challenging when success is determined by relative standing or measurement (Eckel, 2007). Brewer, Gates, and Goldman (2002) explain this aspect of competition in higher education as one of a rival good “wherein one individual’s (or institution’s) consumption of a unit of a good precludes another from enjoying that particular unit” (p. 30). This positional aspect of competition can be clearly seen in institutional ratings and rankings. As one institution moves up within a ranking, another institution must move down. This same competitive aspect is also present in the “positional” grading system of the *Measuring Up* report card. As Volkwein and Tandberg (2008) explain, “grading on a curve” places the performance of each state relative to that of other states. This aspect of competition is particularly salient for accountability for public purposes, given that some of the institutional behaviors that are encouraged by the ratings and rankings methodology are counter to serving public purposes.

Rewards in the “winner-take-all” environment are highly visible, encouraging lower ranked institutions to compete with institutions established in the top positions. However, these institutions compete from a disadvantage, and as Frank and Cook (1995) explain, too many institutions overestimate their chances of winning and become consumed by a competition that only pays for a few institutions at the top.

Further, when too many institutions try and compete over the same markers of prestige, unproductive patterns of consumption and spending emerge as institutions try to “one-up” others to gain competitive advantage (Eckel, 2007). This leads to behavior that Winston (2003) refers to as the “arms race” to the top. Eckel (2007) describes the end result as “all contestants run harder to stay in place and those that choose not to play the game quickly slip behind” (p. 84).

The work of Brewer et al. (2002) expands the understanding of competition in higher education with the addition of a more tangible non-rival good that they call reputation. Brewer et al. defines an institution’s reputation as being “based on its ability to respond to the demands of customers and demonstrate that it is meeting those demands” (p. 28). This definition of reputation aligns with Burke’s (2005a) conception of market forces. Within the Accountability Triangle, market forces capture the needs and demands of students, parents, businesses and other clients of higher education. Pulling together the two concepts of prestige and reputation (or as Burke would define market forces) is what Brewer et al. (2002) find to be crucial in understanding the sources of institutional competitiveness.

Also key to the competitive higher education environment is information asymmetry and understandings of quality. Dill and Soo (2004) describe how information asymmetries develop, from an economic perspective, when a producer of a good or service has knowledge about its product that is not readily known by the consumer. Applied to higher education, information asymmetry can be understood as a principal-agent problem or a consumer protection problem (Dill & Soo, 2004). The

state as the primary authority for higher education, being unable to directly determine or assess the quality of higher education, may pay more than needed to support higher education. From a consumer perspective, parents and students unable to readily determine the quality or value of an educational experience in advance of purchasing that experience may overpay. Since clear markers are not readily available in higher education, proxies such as prestige and reputation stand in and by default become the defining markers of quality (Dill & Soo, 2004). Therefore, from a competitive perspective, quality is focused primarily on input measures such as the status and credentials of faculty, the number of federal and private grants and contracts awarded, or the entry scores of students. Conversely, quality in the public purpose domain is concerned with outputs such as the ability of graduates to find employment and the preparation of graduates to address state-wide needs (Eckel, 2007). The differing criteria for quality place institutional actions that support being competitive at odds with being accountable for public purposes.

Key points of competition. Within the competitive higher education environment, institutions compete for prestige and reputation in four primary revenue markets: student enrollments, private giving, research funding, and public fiscal support (Brewer et al., 2002; Couturier, 2005; Dill, 2003). Competition in these markets is a vehicle for securing revenue that an institution can then allocate toward investing in prestige, reputation, endowments (savings), or extra consumption (above-market wages, lower teaching loads, smaller class sizes, etc.) (Brewer et al., 2002).

Student enrollment revenue is the financial backbone for most higher education institutions particularly as public fiscal resources have comparatively declined. In 2006-07 student tuition and fees of institutions of higher education totaled over \$104 billion (National Center for Education Statistics, 2010). Within the student enrollment market, there has been a significant increase in tuition discounting and merit-based aid as a competitive weapon to attract the best-prepared and wealthier students (Couturier, 2005; Heller & Rasmussen, 2001).

To support institutional tuition discounting and merit-aid, institutions are investing heavily in marketing efforts to boost fundraising (Couturier, 2005). Both the work of Hoxby (1997), analyzing competition within the baccalaureate student market, and Winston (2003) in the development of a theory of cost, tuition, and competition, suggest that fundraising is the prime fund source used to support tuition discounting, merit-aid, or in their terms “peer wages.” While private gifts and grants is the smallest of the four revenue markets, it has increased dramatically. In 1965-66 voluntary support totaled just over \$1 billion in revenue for institutions of higher education, compared to 2007-08 when voluntary support totaled over \$31 billion (National Center for Education Statistics, 2010).

Research funding is the third largest revenue market of institutions of higher education. Institutions engage in applied and basic research, sponsored by federal, state and local government, philanthropic organizations, and private profit-making institutions. Within this revenue market, federal government research funding dominates (Brewer et al., 2002). Couturier (2005) notes that in 1996-97 of “the top

ten institutions receiving the most current fund revenue from the federal government, seven are private; the top five are all private” (p. 88).

Finally, public fiscal support in the form of state appropriations, beyond student tuition and fees, is the primary source of funding for many public institutions. However, the percentage of an institution’s budget supported by public fiscal funds can range tremendously, from over 60% to under 10% (Eckel, 2007). Following the collapse of the U.S. economy, state fiscal support for higher education decreased 6.9 percent across the 50 states from 2008-2010 (Center for the Study of Education Policy, 2010).

Outside of the four main revenue markets, institutions do generate revenue through sales and services of educational activities, hospitals, auxiliary enterprises, and independent operations (Brewer et al., 2002). After removing revenue generated from hospitals, auxiliary enterprises, and independent operations, institutions generated approximately \$24 billion in 2006-07 (National Center for Education Statistics, 2010).

Examining competition in higher education. Previous research on competition in higher education is limited given the recent development of competition as an increasingly salient force. I will begin by reviewing work conducted by Zemsky et al. (1997) that establishes a market-structure taxonomy of the four-year and two-year higher education market. Then, I will move to research focused on dynamics of national competition (i.e. Brewer et al., 2002; Marginson, 2006).

Zemsky et al. (1997), working for the National Center for Postsecondary Improvement, established a market-structure taxonomy of the four-year and two-year higher education market. An analytic framework based on market position and product was established based on four sets of information (admit and yield rates, percentage of freshmen who graduate with a BA or BS in five years, percentage of undergraduate enrollment that is part-time, and the ratio of the number of BA/BS degrees awarded to total undergraduate enrollment). Institutions were divided into seven market segments by a calculated “demand score” for the four-year higher education market. Figure 2 provides a visualization of the seven segment market structure.

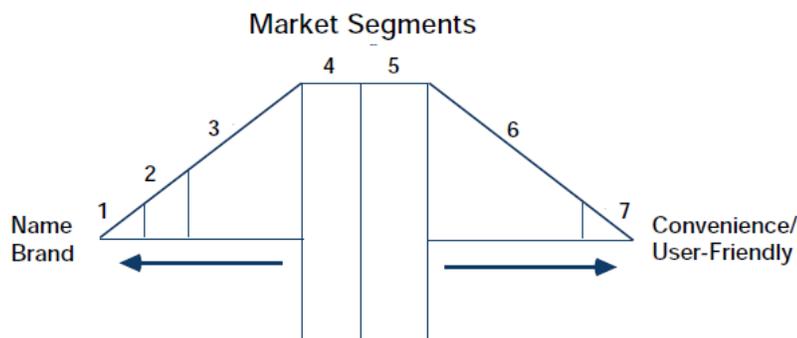


Figure 2. The Shape of the Postsecondary Market. Recreated from “In search of strategic perspective: A tool for mapping the market in postsecondary education,” by R. Zemsky, S. Shaman, and M. Iannozzi, 1997, *Change*. Copyright 1997 by Heldref Publications.

Segments 1 and 2 represent the name brand part of the market that serve the “traditional” student in preparation for graduate and professional education. Segment 3 contains the bulk of name-brand selective institutions and is hypothesized as the

segment that is the most competitive between public and private institutions. Segments 4 and 5 represent the core of the market with most institutions serving local or metropolitan markets. Segment 4 favors the name-brand style of programs while segment 5 tilts toward the convenience/user-friendly part of the market. Segments 6 and 7 represent the convenience/user friendly part of the market characterized by institutions that serve a large number of part-time and intermittent students. In the development of the taxonomy for two-year institutions, three segments (8, 9, and 10) were added extending the convenience/user friendly part of the market. In testing the taxonomy, Zemsky et al. (1997) found that characteristics such as cost, price and the nature of the educational program map onto the market structure. In addition, the results demonstrated that the boundaries between the major market segments (name-brand, core, and user-friendly/convenience) are coterminous with structural features of the market and explained 85 percent of the variance in the tuition rates of public and private institutions. This work of Zemsky et al. (1997) made an important exploratory contribution to market-structures in higher education.

Guided by an industry study perspective, Brewer et al. (2002) examined institutional competition and strategy in higher education. The examination of strategy and competition was organized around the four key markets that generate revenues (student enrollment, research funding, public fiscal support, and private giving) for institutions and was based on an analysis of the results of site visits to twenty-six diverse institutions across the U.S. Two concepts, reputation and prestige, emerged as key to understanding institutional position and strategy. Further, Brewer

et al. (2002) mapped institutional stocks of reputation and prestige to three primary institutional strategy types: prestige (P), prestige-seeking (PS), and reputation (R). P institutions were focused on internal values and goals needed to maintain perceived excellence. PS institutions were fixated on becoming a P institution and engaged in activities that might propel them into prestige status. Both P and PS institutions operated in positional markets dominated by subjective measures of quality. In contrast, R institutions did not have a high level of prestige and were not trying to acquire it. R institutions were focused on meeting the demands of customers. In examining the investment strategy of P, PS, and R institutions and the four key markets that generate revenue (student enrollment, research funding, public fiscal support, and private giving) Brewer et al. (2002) found that institutions used funds to support basic operating costs and investments in prestige, reputation, endowments, or extra consumption. Of interest, the classification system of P, PS, and R in this study roughly maps onto the classification system of Zemsky et al. (1997) with P equating to market segments 1 & 2, PS equating to market segments 3 & 4, and R equating to market segments 5 through 10. The work of Brewer et al. (2002) extends the work of Zemsky et al. (1997) by specifically examining market-structure from a higher education industry perspective and expanding the scope to include all institutions that award two-year, four-year, and/or graduate degrees. Most importantly, the work of Brewer et al. (2002) suggests institutions along the market structure continuum perceive of and engage differently in competition. The findings also have important implications for how competition for prestige and reputation may impact institutional

accountability for public purposes that I will explore further in my discussion below of *Accountability for Public Purposes and Competition in U.S. Higher Education*.

The work of Marginson (2006) explores the dynamics of competition in higher education at the national and global level focusing primarily on research-intensive universities and the experience of Australian higher education. Marginson conceives of higher education as operating in a complex combination of global flows and networks, national higher education systems, and individual institutions operating at a local, national, and global level. Within this perspective, zones of national and global competition are distinct but flow into each other. In a review of national competition, Marginson concludes similar to Frank and Cook (1995) that higher education produces “positional goods” (Hirsch, 1976) and the focus of research institutions is to maximize their status as producers of position goods via student selectivity and research performance. Also similar to the work of Brewer et al. (2002), Marginson contends that competition bifurcates between what he labels as elite institutions and mass institutions with elite institutions pursuing prestige and mass institutions “place-filling” customers. Considering global competition, a similar split develops between elite institutions and mass institutions. Marginson (2006) found that in global competition elite institutions pursue prestige that rests primarily on research reputation and mass institutions pursue revenue through commercialization. The work of Marginson (2006) makes important contributions to the understanding of national and global competition.

Bringing together the work conducted by Zemsky et al. (1997), Brewer et al. (2002) and Marginson (2006) paints a consistent picture regarding institutional competition as illustrated in Figure 3. The market taxonomy developed by Zemsky et al. (1997) maps onto the framework of Prestige, Prestige-Seeking, and Reputation institutional strategy types developed by Brewer et al. (2002). In addition, the institutional investment behaviors described by Brewer et al. (2002) is further demonstrated in the work of Marginson (2006) highlighting the nature of national competition differentiating between elite and mass institutions.

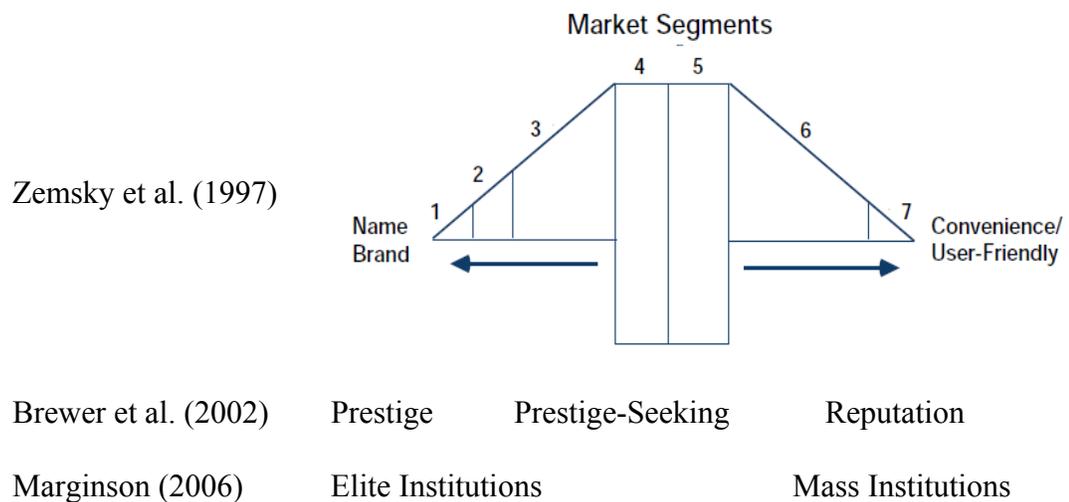


Figure 3. Institutional Competition in Undergraduate Education. Adapted from “In search of strategic perspective: A tool for mapping the market in postsecondary education,” by R. Zemsky, S. Shaman, and M. Iannozzi, 1997, *Change*. Copyright 1997 by Heldref Publications.

Considering the work of Zemsky et al. (1997), Brewer et al. (2002) and Marginson (2006) collectively also reinforces the understanding that institutions depending upon their market position will engage in competition seeking different

outcomes. Name brand, prestige, prestige-seeking, or elite institutions compete to maintain or develop prestige, whereas convenience, reputation, or mass institutions compete to maintain or develop reputation. Does the competitive higher education environment, market structures and dynamics of competition for prestige and reputation have implications for institutional accountability for public purposes?

Accountability for Public Purposes and Competition in U.S. Higher Education

The findings of Brewer et al. (2002) suggest the possibility of competition that produces potentially negative outcomes for public purposes. Considering the three primary institutional strategy types: prestige (P), prestige-seeking (PS), and reputation (R), the investment preferences of each type (i.e. prestige, prestige-seeking, and reputation respectively), and the four revenue markets (i.e. student enrollment, research funding, private giving, public fiscal support) suggests the possibility of different outcomes in the accountability for public purposes. Dill (2003), in an application of the findings of Brewer et al.(2002) projects the prestige or reputation investments institutions will make as a way of buffering competitive forces. Table 2 presents investment behaviors for each type of institution (P, PS, R) in the student enrollment and research funding revenue markets.

From Dill's (2003) analysis, R institutions seek to increase their market share of students by investing in activities that will attract and meet the needs of consumers. In other words, R institutions will invest in activities that market forces will reward.

Table 2

Student and Research-Related Investments by Prestige, Prestige-Seeking and Reputation Oriented Institutions.

Student Market		Research Market
P/PS invest in:	R invest in:	PS invest in:
-Improving admissions selectivity*	-Research on local business community; nature of student and labor market demand; and means of program improvement	-PHD programs
-Lowering student acceptance/yield rates*	-Convenient course scheduling	-Laboratories/libraries/computer facilities
-Student consumption benefits (dormitories, eating facilities, fiber optic computer networks)*	-Student services	-Research management
*college ranking measures		-Attracting research-oriented faculty
		-Grant-matching funds

Note. Recreated from “Allowing the market to rule: The case of the United States,” by D.D. Dill, 2003, *Higher Education Quarterly*, 57(2), p. 136-157. doi:10.1111/1468-2273.00239. Copyright 2003 by John Wiley and Sons. Reprinted with permission.

At times, these market forces may overlap with public purposes, but not always. P and PS institutions seek to increase prestige by investing in activities that will strengthen their perceived prestige such as increasing admissions selectivity, lowering student acceptance/yield rates, providing costly student benefits, running research laboratories, and attracting research-oriented faculty. P and PS investments do not overlap with public purposes. Dill’s analysis reinforces the question: Can institutions balance institutional competition and institutional accountability for public purposes?

To investigate the emerging trend of competition and market-based values in higher education, The Futures Project (2004), under the direction of the late Frank Newman, was established in 1999. In conjunction with Public Agenda, the Futures

Project assessed the thinking of the higher education community regarding the response to vastly increased competition in the higher education arena (Immerwahr, 2002). This joint initiative conducted seven group interviews with 47 individuals (state legislators, presidents of research I universities, presidents of regional universities in New England, presidents of regional universities in the western states, presidents of community colleges, and faculty members from a variety of institutions) between November 2001 and May 2002. Six main themes emerged: (1) growing awareness of competition, (2) caught in the squeeze, limited state revenues and new competitors, (3) academics versus legislators on the need for greater flexibility and autonomy, (4) controversy about assessment and accountability, (5) competition for the best students, and (6) disadvantaged students left behind. Within the six themes the notion of increased competition, competition for the best students (a marker of prestige) and disadvantaged students left behind (a marker of public purposes) emerged reinforcing the question of institutional ability to balance institutional competition and accountability for public purposes.

In summary, the work of Brewer et al. (2002) contributes an important understanding of institutional competition in that competition occurs not only for prestige but also reputation. In addition, Brewer et al. (2002) highlights the investment behaviors of institutions as they pursue strategic goals focused on increasing prestige or reputation. Dill (2003) illuminates the findings of Brewer et al.(2002) in an application of investment behaviors focused on prestige and reputation demonstrating that investment behavior focused on prestige and reputation may be

counter to advancing public purposes. The Futures Project (2004) identified implications of the competitive higher education environment suggesting a bifurcating force pushing institutions to pursue actions such as competing for the best students versus serving disadvantaged students, reinforcing that institutional behavior centered on institutional competition may be counter to advancing public purposes.

In conclusion, reflecting on the literature concerning institutional accountability, one of the primary purposes of state-level accountability is increased responsiveness to state needs, with states being the primary entity responsible for ensuring the responsiveness of higher education to public needs. However, as discussed, previous studies examining state-level accountability show a diminishing impact of current accountability programs regardless of program type or initiation method. In addition, the research suggests responsiveness to state-level accountability may have more to do with institutional (such as type or prestige) and economic factors. Research focused on institutional competition illustrates the nature of competition bifurcating between prestige and reputation across the market-segments of higher education. Finally, research considering the influence of institutional competition on institutional accountability in tandem, further reinforces the question of institutional ability to balance institutional competition and accountability for public purposes. Merging the literature and previous research together suggests an intriguing relationship between institutional competition and accountability for public purposes worthy of further study.

The Accountability Triangle, Postsecondary Market, and Resource Dependency Theory

The accountability triangle (Burke, 2005a), postsecondary market (Zemsky et al., 1997), and resource dependency theory (Pfeffer & Salancik, 1978) provide an illustrative framework and theory for considering the relationship between institutional accountability for public purposes and competition. I will begin by discussing the accountability triangle followed by the shape of the postsecondary market, and then focus on resource dependency theory. Last, I will discuss the application of the conceptual framework to the study's research questions and outline expected relationships.

The accountability triangle. The accountability triangle developed by Burke (2005a) provides a framework for viewing the complexity of accountability in U.S. higher education. Building on the work of Clark's (1983) triangle regarding coordination of higher education systems, the accountability triangle posits state priorities, academic concerns, and market forces as the three forces or pressures most affecting U.S. higher education (see Figure 4). State priorities reflect the public needs and desires or public purposes for higher education. Academic concerns incorporate the issues and interests of the academic community. Finally, market forces capture the needs and demands of students, parents, businesses, and other clients of higher education.

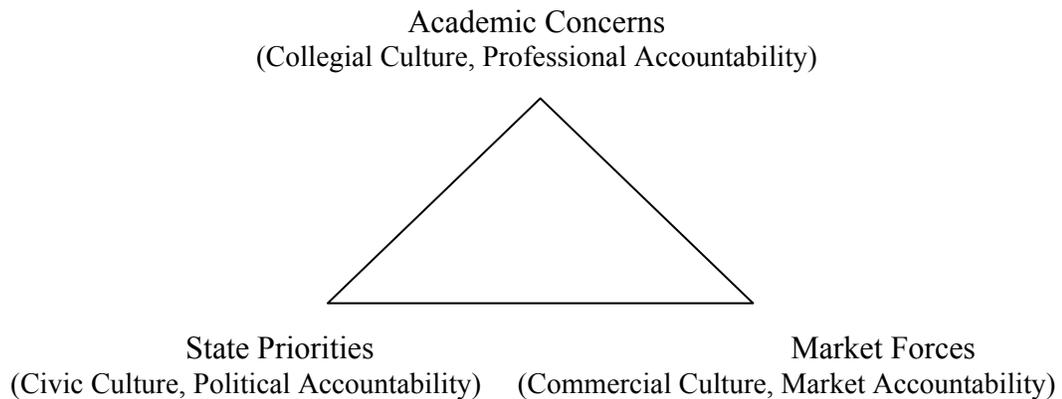
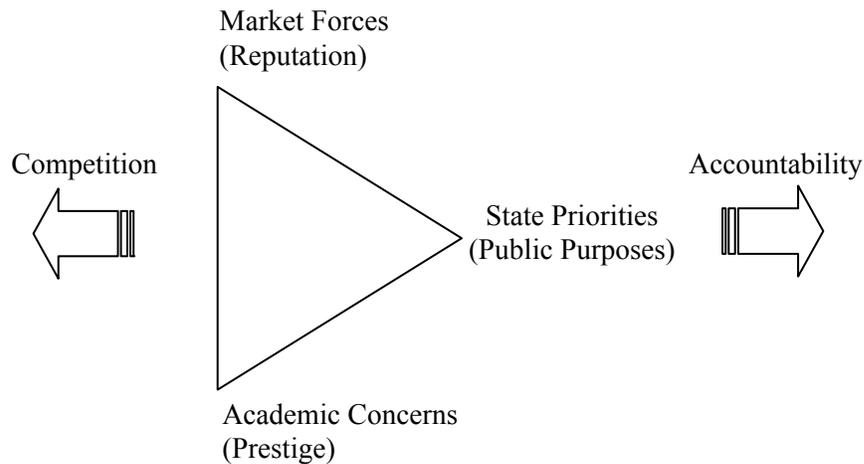


Figure 4. The Accountability Triangle. Adapted from “The many faces of accountability,” by J.C. Burke, 2005, *Achieving accountability in higher education: Balancing public, academic, and market demand*, pp. 1-24. Copyright 2005 by John Wiley and Sons. Reprinted with permission.

The three corners of the accountability triangle, state priorities, academic concerns and market forces, also reflect, respectively, the civic, collegial, and commercial cultures influencing higher education (Burke, 2005a). Each of the cultures reflected in the triangle advances a preferred form of accountability. The collegial culture in the accountability triangle preferences professional accountability, the civic culture, political accountability, the commercial culture, and market accountability (Burke, 2005a). The three corners represent the demands placed on higher education, the cultures supporting those demands, and the preferred models for demonstrating accountability. Higher education in being accountable must balance the competing interests of the accountability triangle corners without succumbing to any of the corners. Burke (2005a) states that “being accountable means balancing the response to ensure service without subservience to public priorities, academic concerns, and market forces” (p. 23).

Similar to the need for higher education to balance its responsiveness to all three corners of the triangle, the most effective accountability system also needs to strike a similar balance. Burke (2005a) advocates the center of the accountability triangle as the ideal spot for an accountability system given the importance of all three pressures (state priorities, academic concerns, and market forces) in influencing U.S. higher education. Burke (2005a) summarizes that “effective accountability systems must include enough market pressure to ensure reaction to external demands and sufficient policy direction to ensure responsiveness to public needs while considering legitimate academic concerns” (p. 17).

In considering institutional competition and accountability for public purposes, the accountability triangle provides a helpful illustration of the aforementioned forces. As shown in Figure 5, the state priorities corner of the triangle reflects the pressures to serve the public purposes or priorities of higher education. The academic concerns corner of the triangle captures the resource and reputation model of excellence that can view quality primarily based on inputs such as the brightest students, faculty stars, and extravagant research facilities in the pursuit of prestige. Lastly, the corner of market forces reinforces meeting the needs of customers that may encourage pursuing commercial schemes or consumer fads in the acquisition of reputation. The force of competition pulls on the academic concerns and market forces side of the triangle while accountability pulls on the corner of state priorities.



*Figure 5. The Accountability Triangle and Accountability for Public Purposes and Competition. Adapted from “The many faces of accountability,” by J.C. Burke, 2005, *Achieving accountability in higher education: Balancing public, academic, and market demand*, pp. 1-24. Copyright 2005 by John Wiley and Sons. Reprinted with permission.*

The postsecondary market. Exploring the relationship between institutional accountability for public purposes and institutional competition also requires consideration of the shape of the postsecondary market. As discussed previously, the market taxonomy developed by Zemsky et al. (1997) maps onto the framework of prestige, prestige-seeking and reputation institutional strategy types developed by Brewer et al. (2002) and the work of Marginson (2006) focused on national competition that differentiates between elite and mass institutions as illustrated in Figure 6. Recalling the work of Marginson (2006) and Zemsky et al. (1997), competition among name brand institutions in market segments 1 and 2 is dominated by the pursuit of prestige, and competition among convenience/user-friendly institutions in market segments 6 and 7 is dominated by expanding reputation.

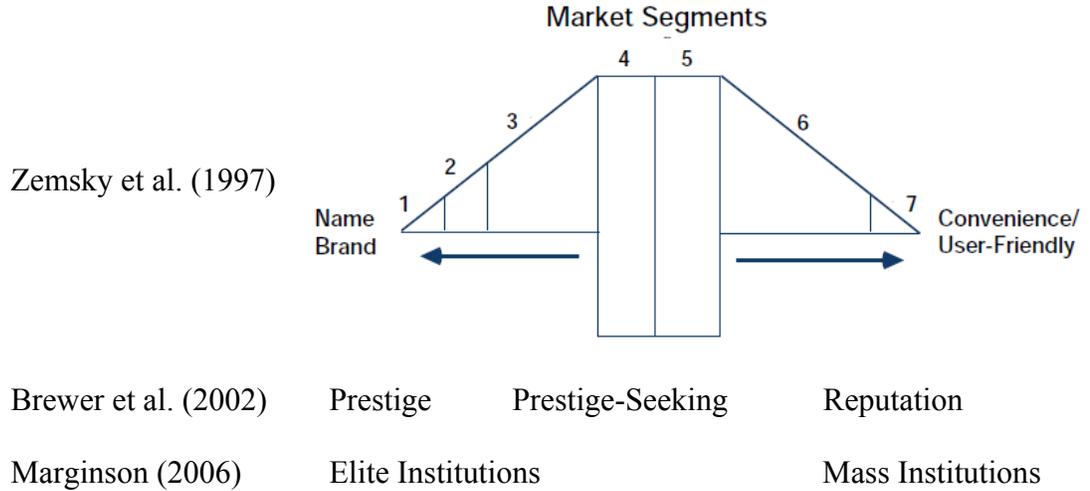
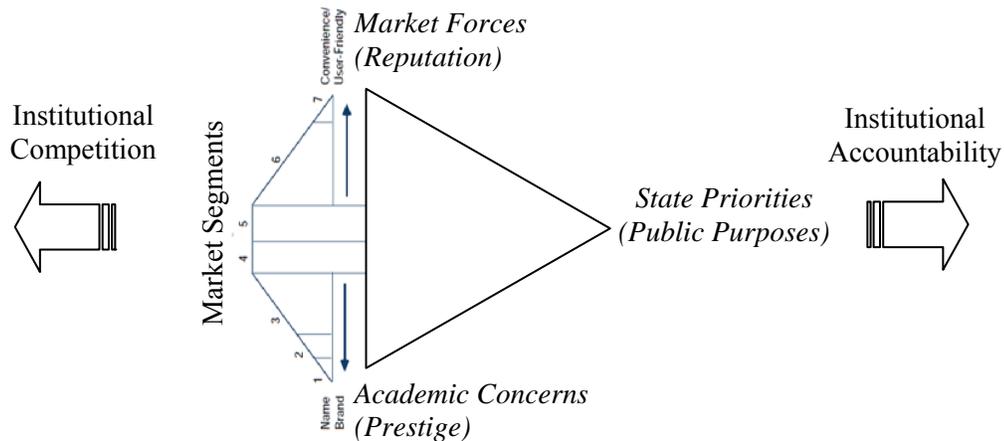


Figure 6. Institutional Competition in Undergraduate Education. Adapted from “In search of strategic perspective: A tool for mapping the market in postsecondary education,” by R. Zemsky, S. Shaman, and M. Iannozzi, 1997, *Change*. Copyright 1997 by Heldref Publications.

The collective work of Marginson (2006), Zemsky et al. (1997), and Brewer et al. (2002) suggests that institutions will compete differently across the market segments of higher education. Therefore, to gain insight into the relationship between institutional accountability for public purposes and competition, the conceptual framework guiding this study must recognize the changing nature of institutional competition (i.e. prestige, reputation) across the market segments of postsecondary education.

Merging Figure 5, illustrating the forces of institutional accountability for public purposes and institutional competition, with Figure 6, depicting the shape of the postsecondary market and the nature of competition across the market, provides a

richer framework for considering the relationship between institutional accountability for public purposes and institutional competition as shown in Figure 7.



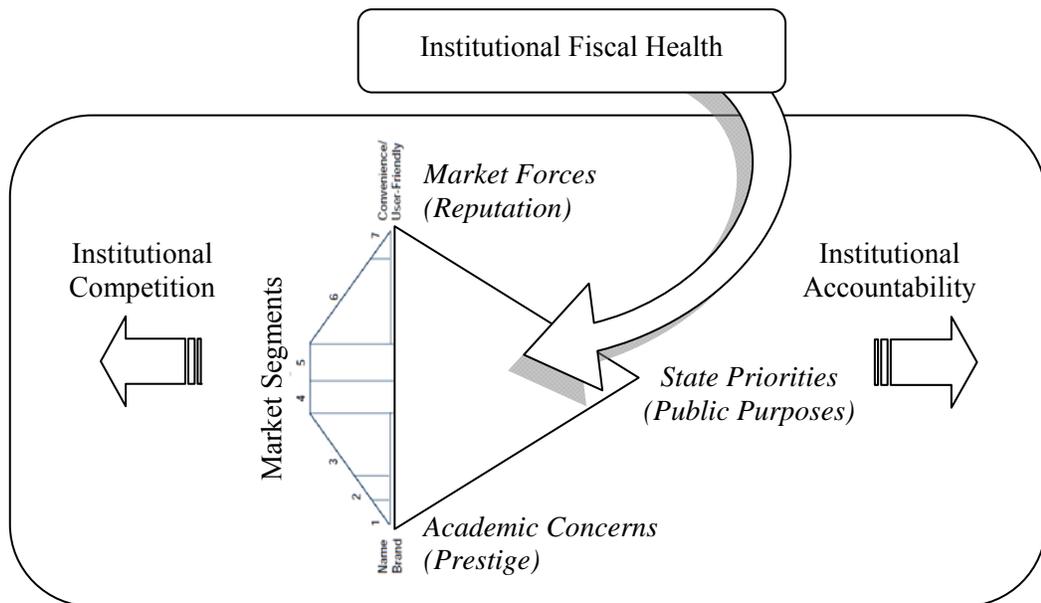
*Figure 7. Institutional Accountability for Public Purposes and Competition. Adapted from “In search of strategic perspective: A tool for mapping the market in postsecondary education,” by R. Zemsky, S. Shaman, and M. Iannozzi, 1997, *Change*. Copyright 1997 by Heldref Publications. Adapted from “The many faces of accountability,” by J.C. Burke, 2005, *Achieving accountability in higher education: Balancing public, academic, and market demand*, pp. 1-24. Copyright 2005 by John Wiley and Sons. Reprinted with permission.*

The explanatory power of resource dependency theory. Resource dependency theory (Pfeffer & Salancik, 1978) also provides insight into the forces of institutional accountability for public purposes and institutional competition in higher education. Within an open-systems perspective, resource dependency theory posits that organizations survive to the extent they are effective, with effectiveness being determined by the interest groups that the organization relies upon for resources and support. Key to an organization’s survival is the securing of resources in a network of interdependencies and social relationships. The acquiring of resources creates organizational dependencies between the organization and the environment enabling

the environment to impose constraints on the organization and pushing the organization to act strategically in the management of resource dependencies.

Resource dependency theory also addresses the issue of competing environmental demands. Organizations confront competing demands when incompatible criteria are identified for evaluating organizational effectiveness. When faced with competing demands, the organization must decide what entity and criteria to attend to, at the risk of not attending to another entity's criteria and negatively affecting the organization's coalition of support. Therefore, organizations cannot survive by responding completely to one environmental demand while ignoring another. When resources are plentiful, the organization, through a differentiated, loosely coupled subunit structure, can attend to competing interests. This solution, however, is dependent on the availability of slack resources (Pfeffer & Salancik, 2003).

Based on resource dependency theory, as resources become more constrained, institutions are unable to support differentiated, loosely coupled structures that can simultaneously meet competing demands. To the extent that the demands of institutional accountability for public purposes and competition are conflicting, as suggested by Brewer et al. (2002), Dill (2003), and The Futures Project (2004), the ability of an institution to meet the conflicting demands will become increasingly compromised as the institution's resources become more constrained. As shown in Figure 8, an institution's financial resources influence the relationship between institutional accountability for public purposes and institutional competition.



*Figure 8. Resource Dependency and Institutional Accountability for Public Purposes and Competition. Adapted from “In search of strategic perspective: A tool for mapping the market in postsecondary education,” by R. Zemsky, S. Shaman, and M. Iannozzi, 1997, *Change*. Copyright 1997 by Heldref Publications. Adapted from “The many faces of accountability,” by J.C. Burke, 2005, *Achieving accountability in higher education: Balancing public, academic, and market demand*, pp. 1-24. Copyright 2005 by John Wiley and Sons. Reprinted with permission.*

Application of the conceptual framework and expected relationships.

Applying the conceptual framework using the accountability triangle to represent the forces of institutional accountability for public purposes and institutional competition in combination with resource dependency theory to the research questions guiding this study illuminate several expected relationships.

First, the work completed by Dill (2003), Brewer et al. (2002) and The Futures Project (2004), considering the implications of institutional competition on institutional accountability for public purposes at the undergraduate level among U.S.

public four-year institutions in light of the accountability triangle, which implies that the demands of accountability to state priorities (public purposes) must be balanced against the demands of academic concerns (prestige) and market forces (reputation), suggests a relationship. Given this previous research and literature reviewed, I expect that institutional competition will be associated with institutional accountability for public purposes.

Next, the work of Zemsky et al. (1997), Marginson (2006), and Brewer et al. (2002) stress the varying nature of institutional competition across the postsecondary market with competition among name brand or elite institutions dominated by the pursuit of prestige and competition among convenience/user-friendly or mass institutions dominated by expanding reputation. Combining this nature of the competition with Dill's (2003) analysis of institutional competitive behaviors and implications for public purposes supports an expectation that differences in institutional market segments will be associated with statistically significant differences in the relationship between institutional competition and institutional accountability for public purposes. Building specifically off of Dill's (2003) analysis, I expect that market segments dominated by the pursuit of prestige (segments 1, 2, and 3) will have a negative relationship with institutional accountability for public purposes, and market segments dominated by the pursuit of expanding reputation (segments 6 and 7) will have a positive relationship with institutional accountability for public purposes.

Resource dependency theory posits that organizations survive to the extent that they are effective, with effectiveness being determined by the interest groups that the organization relies upon for resources and support. When faced with competing demands, an organization with ample resources can attend to competing interests through a differentiated, loosely coupled subunit structure. Given constrained resources, however, an organization is unable to support differentiated, loosely coupled structures that can simultaneously meet competing demands of resource dependencies. I expect that differences in institutional fiscal health will be associated with statistically significant differences in the relationship between institutional competition and institutional accountability for public purposes. In particular, I expect that as institutional fiscal health decreases, institutional accountability for public purposes will decrease.

Chapter Three: Methodology

The design of this study is that of an observational correlational study with a focus on examining the relationship between institutional competition and institutional accountability for public purposes at the undergraduate level among U. S. public four-year institutions. To examine the relationship between these variables, data sources from the Integrated Postsecondary Education Data System (IPEDS), Council for Aid to Education, and U.S. Census Bureau were utilized. In presenting the overall research design I will begin by discussing the population of interest, identifying the eligible study participants, and describing the final study sample. Next I will provide a description of the variables that were employed in the study, along with the data sources for each variable. Third, I will review the statistical methods used to address the research questions guiding this study. Last, I will discuss the procedures that were used to address missing data and prepare data for statistical analysis.

The Population and Sampling

The population of interest for this study is U.S. public four-year institutions and is limited to U.S. public four-year institutions for a number of reasons. First, the focus of institutional accountability within the U.S. has centered predominantly on undergraduate education. Given that institutional accountability for public purposes in this study is defined as “responsiveness for results focused on meeting public purposes as identified by state legislatures” and that state legislatures have focused on undergraduate education within existing accountability programs, it seems inappropriate to evaluate the responsiveness of institutions that are not primarily four-

year or above institutions. Second, private institutions are not included in the study population as private institutions have not historically fallen under the purview of state legislatures and therefore have not been held accountable in a similar fashion as public institutions for meeting public purposes. While it is acknowledged that private institutions do serve public purposes, it would not be appropriate to measure the responsiveness of private institutions for results focused on meeting public purposes as identified by state legislatures.

The IPEDS Data Center was used to identify institutions classified as U.S. public four-year or above based upon the Center's 2009-2010 data collection. The initial data inquiry used "U.S. only" and "sector – public 4-year or above" as the selection variables, and produced a list of 676 institutions. In examining the characteristics of the initial 676 institutions, the need for additional criteria became apparent. The following six additional criteria were added:

- Institutional category: primary or secondary public control-state. With accountability for public purposes defined as "responsiveness for results focused on meeting public purposes as identified by state legislatures," the inclusion of institutions not falling under the control of states was undesirable. The collection of data for institutional control at the level of "primary or secondary public control-state" began with the 2004 IPEDS survey. Adding the criteria of "primary or secondary public control-state" for institutions between 2004 and 2009 resulted in 40 institutions falling under the control of

city, school district, special district, federal, territorial, or other entity being removed from the study.

- Institutional category: primarily baccalaureate or above. Considering the focus of accountability measures have been at the undergraduate level and the use of graduation rates as a dependent variable in this study, it was not desirable to include in the study four-year institutions that do not confer primarily baccalaureate degrees or above. With the inclusion of “institutional category: primary baccalaureate or above” as a selection criteria, an additional 87 institutions were removed from the study.
- Carnegie classification 2005: basic and Carnegie classification 2000. With the application of “Carnegie classification basic: 2005,” 71 additional institutions were removed for falling into the categories of primarily associates, not accredited, not classified, historically black colleges and universities, or special focus institutions. Reviewing the classification of institutions prior to 2005 using the Carnegie classification 2000, seven more institutions were removed from the study. In a final review, two additional institutions, the Citadel Military College of South Carolina and the Virginia Military Institute, were removed from the study.
- Enrollment of first-time, first-year students. Several dependent variables in the study measuring institutional accountability for public purposes (access, affordability, and graduation rates) capture data concerning the characteristics of first-time, first-year students. Therefore, 17 institutions that did not enroll

first-time, first-year students every year between the fall of 1998 and 2009 were removed from the study.

- Public four-year or above from 1998 to 2009. The initial data request used to identify institutions was based upon an institution's sector for the 2009-2010 data collection. In examining the institutional sector reported for each of the institutions over the timeframe of the study (1998 to 2009), Louisiana State University at Alexandria was removed from the study due to its status as a public two-year institution prior to 2002.
- Active status. In a similar fashion to examining sector, the status of each institution was reviewed to ensure the institution was active or open during the entire timeframe of the study. Four institutions did not meet this criterion and were removed from the study: California State University-Channel Islands, Nevada State College, New College of Florida, and San Diego State University-Imperial Valley Campus.

After the application of the above six criteria to the initial selection criteria of "U.S. only" and "sector – public 4-year or above" a total of 447 institutions met the criteria for participation in the study.

During the collection of data for the study I found that several university systems elect to submit financial data to IPEDS as a singular entity. Efforts to collect the necessary financial data needed for the study directly from institutions and systems were successful with the exception of the Penn State system and Rutgers University. The Penn State system, accounting for 16 institutions, and Rutgers University,

accounting for three institutions, were excluded from the sample. Table 3 contains a summary of characteristics for the 428 institutions included and 19 institutions excluded from the study sample.

Table 3

Characteristics of Institutions Included and Excluded From Study

Characteristics of Institutions	Count of Institutions	
	Included	Excluded
Geographic Region of Institution		
Far West AK CA HI NV OR WA	49	
Great Lakes IL IN MI OH WI	64	
Mid East DE DC MD NJ NY PA	55	19
New England CT ME MA NH RI VT	30	
Plains IA KS MN MO NE ND SD	48	
Rocky Mountains CO ID MT UT WY	27	
Southeast AL AR FL GA KY LA MS NC SC TN VA WV	108	
Southwest AZ NM OK TX	47	
Carnegie Classification 2005: Basic		
Baccalaureate Colleges-Arts & Sciences	18	4
Baccalaureate Colleges-Diverse Fields	41	9
Baccalaureate/Associate's Colleges	1	2
Doctoral/Research Universities	23	
Master's Colleges and Universities (larger programs)	144	
Master's Colleges and Universities (medium programs)	51	1
Master's Colleges and Universities (smaller programs)	21	
Research Universities (high research activity)	71	1
Research Universities (very high research activity)	58	2

Specification of Data Sources and Variables

To explore the relationship between institutional competition and institutional accountability for public purposes at the undergraduate level among U.S. public four-year institutions required the utilization of three data sources and specification of several variables. The primary source of data for the study was the U.S. Department of Education, National Center for Education Statistics, IPEDS Surveys. IPEDS gathers information from every college, university, and technical and vocational institution that participates in the federal student financial aid programs (IPEDS Data Center, 2011). Table 4 describes seven of the nine surveys conducted annually by IPEDS that were utilized in this study.

In addition to IPEDS, the Council for Aid to Education's (CAE) Data Miner interactive database was used to collect information regarding private giving. The CAE is a national non-profit organization and the nation's primary source of empirical data on private giving as collected annually through the Voluntary Support of Education survey (CAE, 2011). Finally, data was collected from the U.S. Census Bureau (2011). The data collected for each variable utilized in the study is presented in detail beginning with independent variables, then dependent variables, and then finally control variables. In addition each variable is summarized visually within the conceptual framework in Figure 9.

Table 4

Integrated Postsecondary Data System Surveys Used as Data Sources

Survey	Description
Institutional Characteristics (IC)	Institutional Characteristics for 4-year Institutions.
Degree Completions (DC)	Completions for all institutions.
12-Month Enrollment (E12)	12-month Enrollment for 4-year institutions.
Fall Enrollment (FE)	Fall Enrollment for 4-year degree granting institutions.
Finance (FI)	Finance for degree granting public institutions using GASB Reporting Standards.
Graduation Rates (GR)	Graduation Rates for 4-year institutions reporting on a fall cohort.
Student Financial Aid (SFA)	Student Financial Aid for public institutions reporting on a fall cohort.

Independent variables. There are seven independent variables: five supporting the construct of institutional competition, one for market segment, and one for institutional fiscal health.

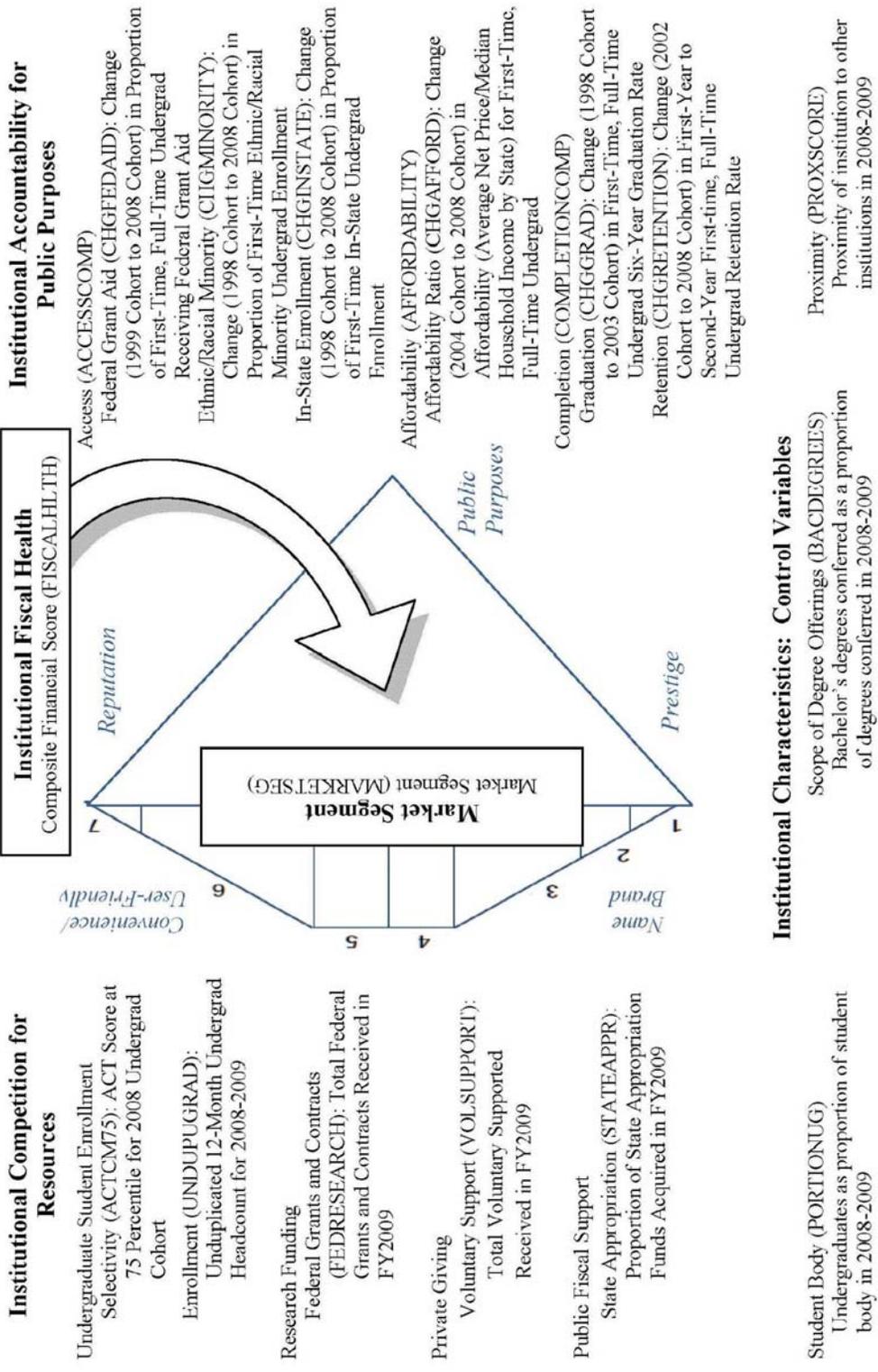


Figure 9. Conceptual Framework with Variables

Institutional competition. The construct of institutional competition is composed of the four primary revenue markets within which higher education institutions compete: student enrollments, private giving, research funding, and public fiscal support (Brewer et al., 2002; Couturier, 2005; Dill, 2003). Competition in these markets is a vehicle for securing revenue that an institution can then allocate toward investing in prestige, reputation, endowments (savings), or extra consumption (above-market wages, lower teaching loads, smaller class sizes, etc.) (Brewer et al., 2002). The identification of appropriate measures for each of the four primary revenue markets was informed in general by a review of the literature (Marginson, 2006; Winston, 2003; Zemsky et al., 1997) and in particular by the technical papers supporting the research of Brewer et al. (2001). For each of the four primary revenue markets, variables were identified that would: (a) best capture the outcome of an institution competing within that specific revenue market; (b) where applicable, be inclusive of both competition for prestige (e.g., student quality) and reputation (e.g., student numbers); and (c) when appropriate, represent the relative competitiveness of an institution within each market in relation to other institutions.

Institutional competition: Undergraduate student enrollment. The undergraduate student enrollment competitive revenue market was represented by two variables. The first variable was selectivity. Student selectivity is a hallmark indicator of institutional competitiveness, particularly with regard to institutional prestige, within the student enrollment market (Brewer et al., 2001; Marginson, 2006; Winston, 2003). The composite ACT admissions test score at the 75 percentile

reported by each institution for entering students in fall 2008 were used as a proxy for institutional selectivity. The use of ACT/SAT test scores to operationally define institutional selectivity is commonly employed (Pascarella et al., 2006). While the median composite ACT score for each institution would be the preferred measure, data for median composite ACT score for each institution are not publicly available. Therefore, the composite ACT score at the 75 percentile for each institution in the sample was collected from the IPEDS, Fall 2008, Institutional Characteristics component.

The second variable was enrollment. Undergraduate student enrollment captures institutional competitiveness, particularly with regard to institutional reputation, which centers on expanding and generating increased student enrollment or what Marginson (2006) calls “place-filling customers” (p. 2). To capture a complete picture of undergraduate student enrollment for each institution, the unduplicated 12-month headcount for each institution for the 2008-2009 academic year was collected from the IPEDS, Fall 2009, 12-month Enrollment component.

Institutional competition: Research funding. Research funding is the third largest revenue market for higher education institutions. Institutions engage in applied and basic research sponsored by federal, state, and local government, philanthropic organizations, and private profit-making institutions. Within this revenue market, federal government research funding dominates (Brewer et al., 2002). Therefore, the amount of federal operating grants and contracts received by an institution was used to represent institutional competition within the research-funding revenue market.

Institutional revenue from federal operating grants and contracts for the 2009 fiscal year was collected from the IPEDS, Winter 2009-10 and Spring 2010, Finance component.

Institutional competition: Private giving. Private giving, while the smallest of the four revenue markets, is gaining importance within the competitive student market as a means for supporting tuition discounting or merit-aid (Hoxby, 1997; Winston, 2003). To measure an institution's success within the private giving market, the total amount of voluntary support raised by an institution during fiscal year 2009 was collected from the Council for Aid to Education (CAE), Voluntary Support of Education Report for FY2009 (CAE, 2010).

Institutional competition: Public fiscal support. Beyond student tuition and fees, public fiscal support in the form of state appropriations is the primary source of funding for many public institutions (Brewer et al., 2002). Institutional competition within the public fiscal support revenue market was based on the proportion of annual state appropriations available in fiscal year 2009 acquired by each institution. To calculate the proportion of state appropriations for each institution in the sample, the amount of state appropriations received by an institution in fiscal year 2009 collected from the IPEDS, Winter 2009-10 and Spring 2010, Finance component was divided by the amount of state appropriations distributed by the institution's state in fiscal year 2009 as collected from the IPEDS, 2009, State Data Center Custom Data Tables.

Table 5 provides the specific data sources and measurement methods used for each of the independent variables for institutional competition.

Table 5

Specification of Independent Variables – Institutional Competition

Independent Variable	Source
Selectivity	
The composite ACT admissions test score reported by each institution at the 75th percentile.	2008 IPEDS IC Survey: ACTCM75
Enrollment	
The unduplicated 12-month headcount for undergraduate enrollment at each institution for the 2008-2009 year.	2009 IPEDS E12 Survey: UNDUPUG
Research Funding	
The amount of federal operating grants and contracts received by an institution in FY2009.	2009 IPEDS FI Survey: F1A_F1B02
Private Giving	
The amount of total voluntary support reported by the institution in FY2009.	2009 CAE Voluntary Support of Education Survey: GRAND_TOTAL
Public Fiscal Support	
The proportion of annual state appropriations available in FY2009 acquired by each institution.	2009 IPEDS FI Survey: F1A_F1B11 divided by 2009 IPEDS State Level Data: F1B11

Market segment. An institution's market segment was determined by using the market taxonomy of Zemsky et al. (1997). Zemsky et al.'s (1997) market taxonomy was designed to focus on the market structure at the undergraduate level, making it well suited for a study focused on accountability for public purposes at the undergraduate level. The market taxonomy uses an analytic framework based on an institution's market demand and product to determine market position. The selection of a taxonomy that utilizes both demand and product was critical in determining market position, as the nature of institutional competition differentiates based on market position as seen in the work of Brewer et al. (2002) and Marginson (2006). To determine an institution's placement within the market structure, data for each institution was collected from IPEDS. The collection of a complete set of data for each variable frequently required the use of multiple survey years as an institution can identify the year of data it is reporting for each administration of the survey. Table 6 provides a summary of the data collected along with identification of the corresponding source.

The data collected was used to calculate each institution's market demand and product using the market segment worksheet developed by Zemsky et al. (1997) as illustrated in Appendix A. After each institution's market segment was identified, the number of institutions contained within each segment was reviewed. Considering the population of interest for this study was limited to U.S. public four-year institutions, it was anticipated that a limited number of institutions might fall into the extreme market segments such as 1, 2, or 7.

Table 6

Data Collected and Sources for Independent Variable – Market Segment

Data Collected	Source
Number of Applications	
The number of first-time, degree/certificate-seeking undergraduate students who applied to the institution for fall 2008 including early decision, early action, and students who began studies during the summer prior to the fall.	2008 IPEDS IC Survey: APPPATE and APPLCN or 2009 IPEDS IC Survey: APPPATE and APPLCN
Number of Admitted Students	
The number of first-time, degree/certificate-seeking undergraduate students who were admitted by the institution for fall 2008, including early decision, early action, and students who began studies during the summer prior to the fall.	2008 IPEDS IC Survey: APPPATE and ADMSSN or 2009 IPEDS IC Survey: APPPATE and ADMSSN
Number of Fall 2008 Freshman	
The number of first-time, degree/certificate-seeking undergraduate students who enrolled (full or part time) at the institution for fall 2008, including early decision, early action, and students who began studies during the summer prior to the fall.	2008 IPEDS IC Survey: APPPATE and ENRLT or 2009 IPEDS IC Survey: APPPATE and ENRLT

--Table 6 continued--

Table 6 (continued)

Data Collected	Source
Five-Year Graduation Rates	
The percentage of full-time, first-time students seeking a bachelor's or equivalent degree from the institution's 2003 entering cohort completing a bachelor degree or equivalent within 5 years.	2009 IPEDS GR Survey: GBA5RTT
Full-Time Undergraduate Enrollment	
The number of full-time (12 or more semester credits, or 12 or more quarter credits, or 24 or more contact hours a week each term) undergraduate students registered for fall 2008.	2008 IPEDS FE Survey: EFFT
Part-Time Undergraduate Enrollment	
The number of part-time (11 semester credits or less, or 11 quarter credits or less, or less than 24 contact hours a week each term) undergraduate students registered for fall 2008.	2008 IPEDS FE Survey: EFPT
Total Undergraduate Enrollment	
The number of total undergraduate students registered for fall 2008.	2008 IPEDS FE Survey: EFTOTAL
Number of Bachelor Degrees Awarded	
The number of bachelor degrees awarded between July 1, 2008 and June 30, 2009.	2009 IPEDS DC Survey: BASDEG

As anticipated, a limited number of institutions did fall into segments 1, 2, and 7 as shown in Table 7. As indicated in Table 7, segments 1, 2, and 3 were combined and segments 6 and 7 were combined.

Table 7

Distribution of Institutions by Market Segment Before and After Combining

Before Combining		After Combining	
Market Segment	Number of Institutions	Market Segment	Number of Institutions
Segment 1	1	Segments 1, 2, 3	48
Segment 2	4	Segment 4	86
Segment 3	43	Segment 5	227
Segment 4	86	Segments 6, 7	67
Segment 5	227		
Segment 6	63		
Segment 7	4		

Institutional fiscal health. The measurement of institutional fiscal health in this study was based upon the composite financial ratio analysis methodology employed by the Ohio Board of Regents (Ohio Board of Regents, n.d.). The current Ohio financial ratio analysis, established in fiscal year 2002, was designed to increase financial accountability of state colleges and universities by using a standard set of measures to monitor the fiscal health of a campus. The Ohio financial ratio analysis method was selected for this study due to its similarity with other commonly

employed financial ratio analyses, such as the Higher Learning Commission’s Composite Financial Index, and its reliance on publicly available data. The Ohio financial ratio analysis consists of three ratios (viability ratio, primary reserve ratio, and net income ratio) from which three sub-scores and one composite score are generated. Table 8 summarizes the data retrieved for each institution from the IPEDS, Winter 2009-10 and Spring 2010, Finance component and measurement methods.

Table 8

Data Collected and Sources for Independent Variable – Institutional Fiscal Health

Data Collected	Source
Expendable Net Assets	
The sum of unrestricted net assets and restricted expendable net assets.	2009 IPEDS FI Survey: F1A.F1A15 plus F1A.F1A17
Plant Debt	
Total long-term debt (including the current portion thereof), including but not limited to bonds payable, notes payable, and capital lease obligations.	2009 IPEDS FI Survey: F1A.F1A07 plus F1A.F1A10

--Table 8 continued--

Table 8 (continued)

Data Collected	Source
Total Revenues	
Total operating revenues, plus total non-operating revenues, plus capital appropriations, capital grants and gifts, and additions to permanent endowments.	2009 IPEDS FI Survey: F1A.F1D01
Total Operating Expenses	
Total operating expenses, plus interest on long-term debt.	2009 IPEDS FI Survey: F1A.F1D02
Total Non-Operating Expenses	
All expenses reported as non-operating with the exception of interest expenses.	2009 IPEDS FI Survey: F1A.F1C161 plus F1A.F1C181
Change in Total Net Assets	
Total revenues (operating and non-operating), less total expenses (operating and non-operating).	2009 IPEDS FI Survey: F1A.F1D01 minus the sum of F1A.F1D02, F1A.F1C161 and F1A.F1C181

The methodology used for calculating the three ratios were as follows:

- *Viability ratio.* Expendable net assets divided by plant debt. (Note: if plant debt is zero, then the viability ratio is not calculated and a viability score of 5 was automatically assigned.)
- *Primary reserve ratio.* Expendable net assets divided by total operating expenses.
- *Net income ratio.* Change in total net assets divided by total revenues.

Based on the calculations described above, each ratio was assigned a score ranging from zero to five according to the criteria listed in Table 9. A score of 5 indicated the highest degree of fiscal strength in each category.

Table 9
Assignment of Ratio Scores

Ratio	Ratio Scores					
	0	1	2	3	4	5
Viability Ratio	< 0	0 to .29	.30 to .59	.6 to .99	1.0 to 2.5	> 2.5 or N/A
Primary Reserve Ratio	< -1	-.1 to .049	.05 to .099	.10 to .249	.25 to .49	.5 or greater
Net Income Ratio	< -.05	-.05 to 0	0 to .009	.01 to .029	.03 to .049	.05 or greater

Based on the ratio scores, a summary score termed the “composite financial score” was determined and used as the primary indicator of fiscal health. The composite score equals the sum of the assigned viability score multiplied by 30%, the assigned primary reserve score multiplied by 50%, and the assigned net income score

multiplied by 20%. Within the Ohio accountability system, a composite score of or below 1.75 for two consecutive years would result in an institution being placed on fiscal watch. The highest composite score possible is 5.00.

Dependent variables. There were six dependent variables used in the study to measure institutional accountability for completion, access, and affordability.

Institutional accountability for public purposes. The construct of institutional accountability for public purposes was built around the definition of accountability for public purposes. As defined within this study, accountability for public purposes is responsiveness for results that serve public purposes as identified by state legislatures (adapted from Ewell and Jones, 2006). As discussed within the literature review, institutions have been held accountable by state legislatures primarily via performance accountability initiatives such as performance funding, budgeting, and reporting. All three programs share the purposes of demonstrating external accountability, improving institutional performance, and responding to state needs (Burke, 2005b). In addition, all three programs use performance indicators to measure the achievement of program goals. In a study of the most common indicators used in performance reporting and funding, Burke and Minassians (2002d) found that performance programs across states stress similar indicators such as graduation, transfer, job placement rates, and licensure test scores. Performance reporting, in comparison to performance funding, stressed issues of access, diversity, and affordability (Burke & Minassians, 2002d). In selecting the indicators to be used within this study as dependent variables to measure institutional accountability for public purposes, two criteria were used: (a) indicators

that are most frequently cited in performance-accountability programs and (b) indicators for which publicly available and comparable data across institutions exist. Considering this criteria, completion, access, and affordability were selected.

The methods used to operationalize the dependent variables (completion, access, and affordability) in the study focused on measuring change over time. This approach for the dependent variables was taken for two reasons. First, measuring each of the dependent variables over time provides a means for examining institutional accountability or responsiveness for results. To be responsive implies reaction or action. Taking a singular measurement in time would not aptly capture institution responsiveness. Therefore, to more fully capture responsiveness for results, percent change in dependent variables was appropriate. Second, institutional levels of performance for each of the dependent variables used within the study have been shown in previous research to be heavily influenced by institution and state-specific factors (Asmussen, 2009; Callan, 2001; Heller, 2001; Usher & Steele, 2006; Woodley, 2005) making a comparison of institutional levels of performance across institutions invalid. By using percent change as the basis for measuring each dependent variable, comparisons between institutions were based on a measurement of each institution's ability to change its performance versus its level of performance. To measure change over time, data for each of the dependent variables was collected at two points in time. When possible, a ten-year period of time was allowed to elapse between measures. Due to the availability of some data, however, this was not possible for all measures. Each of the dependent variables used within the study are explained in detail below.

Institutional accountability: Completion. Completion was supported by two indicators. The first indicator was the change in first-to-second year retention for first-time, full-time undergraduate students. To calculate the percent change, two measurements of first-to-second year retention were collected for each institution. The first measurement was based on the percentage of the institution's fall 2003 cohort of first-time, full-time undergraduate students who returned in fall 2004. The second measurement was based on the percentage of the institution's fall 2008 cohort of first-time, full-time undergraduate students who returned in fall 2009. The change in first-to-second year retention rate for first-time, full-time undergraduate students was then calculated for each institution by subtracting the 2003 to 2004 retention rate from the 2008 to 2009 retention rate. Data to support the calculations for this indicator were retrieved from the IPEDS, Spring 2004, Enrollment component and IPEDS, Winter 2009-10 and Spring 2010, Fall Enrollment component.

The second indicator was the change in the rate of first-time, full-time undergraduate students completing a bachelor's degree within six years of college entrance. Similar to the persistence indicator, to calculate the change in six-year graduation rates, two measurements were collected for each institution. The first six-year graduation rate was collected for the fall 1998 bachelor's cohort as reported in the IPEDS, Spring 2004, Graduation rate component, and the second six-year graduation rate was collected for the fall 2003 bachelor's cohort as reported in the IPEDS, Spring 2010, Graduation rate component. The change in the rate of first-time, full-time students completing a bachelor's degree within six years of college entrance was then

calculated for each institution by subtracting the 2004 reported six-year graduation rate from the 2010 reported six-year graduation rate. The data retrieved for each institution and measurement methods are summarized in Table 10.

Table 10

Specification of Dependent Variable – Completion

Data Collected	Source
Change in First-to-Second Year Retention	
The change in the first-to-second year retention between the 2003 cohort and the 2008 cohort of first-time, full-time degree-seeking undergraduate students for each institution.	2009 IPEDS EF Survey: D_RET_PCF minus 2003 IPEDS EF Survey: D_RET_PCF
Change in Six-Year Graduation Rate	
The change in the six-year graduation rate between the 1998 bachelor cohort and the 2003 bachelor cohort of first-time, full-time degree-seeking undergraduate students for each institution.	2009 IPEDS GR Survey: GBA6RTT minus 2003 IPEDS GR Survey: GBA6RTT

To create a summary measure for completion, each of the indicators (change in first-to-second year retention rate for first-time, full-time undergraduate students and change in the rate of first-time, full-time students completing a bachelor’s degree

within six years of college entrance) was transformed through standardization into a standard score by placing both of the indicators on a common scale (Howell, 2010). Using the standard score for each indicator, the average was then calculated for each institution and used as the summary variable for completion.

Institutional accountability: Access. A defining element of educational opportunity is access or as Callan (2001) states it, “which individuals and groups are included and which excluded” (p. 93). More broadly, Usher and Steele (2006), define access as “the ability of people from all backgrounds to obtain the education they desire” (p. 10). Many enrollment indicators are frequently employed to measure access including: low-income, adult (over age of 25), first-generation, ethnic/racial minority, state of residence, and young adult (age 18-24). Three indicators (low-income, ethnic/racial minority, and state of residence) were used to measure access in this study.

The first indicator was the change in the proportion of full-time, first-time low income students enrolled at the undergraduate level. The percentage of undergraduate students receiving federal grant aid was used as a proxy for low income. The use of federal grant aid as a proxy for low income is commonly employed (Engle & O'Brien, 2008). To calculate the change in the proportion of low income students enrolled at the undergraduate level for each institution in the study, the percentage of undergraduate students receiving federal grant aid in 1999-2000 was subtracted from the percentage of undergraduate students receiving federal grant aid in 2008-2009 as

collected from the IPEDS, Spring 2001, Student Financial Aid component and the IPEDS, Spring 2010, Student Financial Aid component respectively.

The second indicator was the change in the proportion of first-time ethnic/racial minority students enrolled at the undergraduate level. To calculate the change in the proportion of ethnic/racial minority students enrolled at the undergraduate level for each institution in the study, the percentage of ethnic/racial minority first-time undergraduate students enrolled fall 1998 was calculated and then subtracted from the calculated percentage of ethnic/racial minority first-time undergraduate students enrolled in fall 2008 as collected from the IPEDS, Spring 1999, Fall Enrollment component and the IPEDS, Winter 2008-09 and Spring 2009, Fall Enrollment component respectively.

Lastly, the third indicator was the change in the proportion of first-time degree-seeking in-state students enrolled at the undergraduate level. To determine the change in the proportion of first-time degree-seeking in-state students enrolled at the undergraduate level for each institution in the study, the percentage of in-state first-time degree-seeking undergraduate students enrolled in fall 1998 was calculated and subtracted from the calculated percentage of in-state undergraduate students enrolled in fall 2008 as collected from the IPEDS, Spring 1999 Fall Enrollment component and the IPEDS, Winter 2008-09 and Spring 2009, Fall Enrollment component respectively. The data retrieved for each institution and measurement methods are summarized in Table 11.

Table 11

Specification of Dependent Variable – Access

Data Collected	Source
Change in Low Income Enrollment	
The change in the percentage of students receiving federal grant aid between fall 1999 and fall 2008 for first-time, full-time undergraduate students.	2009 IPEDS SFA Survey: FGRNT_P minus 1999 IPEDS SFA Survey: FGRNT_P
Change in Ethnic/Racial Minority Enrollment	
The change in the percentage of ethnic/racial minority students between fall 1998 and fall 2008 for first-time undergraduate students.	2008 IPEDS FE Survey: ANREFRACE (18 + 19 + 20 + 21) divided by ANREFRACE (24 - (17 + 23)) minus 1998 IPEDS FE Survey: ANREFRACE (18 + 19 + 20 + 21) divided by ANREFRACE (24 - (17 + 23))

--Table 11 continued--

Table 11 (continued)

Data Collected	Source
Change in In-State Undergraduate Enrollment	
The change in the percentage of in-state students between fall 1998 and fall 2008 for first-time undergraduate students.	2008 IPEDS FE Survey: C.EFCSTATE divided by CEFRES01 minus 1998 IPEDS FE Survey: C.EFCSTATE divided by CEFRES01

To create a summary measure for access, the three indicators for access (change in the proportion of full-time, first-time low income students enrolled at the undergraduate level, change in the proportion of first-time ethnic/racial minority students enrolled at the undergraduate level, and change in the proportion of first-time degree-seeking in-state students enrolled at the undergraduate level) were transformed through standardization into a standard score placing all of the indicators on a common scale (Howell, 2010). Using the standard score for each indicator, the average was calculated for each institution and used as the summary variable for access.

Institutional accountability: Affordability. When measuring educational affordability researchers generally take one of two courses: compare either the “raw” costs or compare the costs expressed as a percentage of some form of income (Heller, 2001; Usher & Cervenak, 2005; Usher & Steele, 2006). However, expressing the

price of college in relation to student's ability to pay is a more meaningful measure of college affordability (Heller, 2001). When examining affordability across jurisdictions, such as states, considering ability to pay (ATP) becomes even more important. Usher and Cervenak (2005) assert that "expressing 'affordability' solely in terms of costs appears nonsensical given inter-jurisdictional differences in income; the only meaningful way to approach the concept is to include both costs and resources" (p. 11). Usher and Cervenak (2005) highlight four possible types of indicators that can be used to measure affordability. These are as follows:

- *Costs as a fraction of ability to pay.* This is a simple calculation of costs – tuition (including all mandatory fees), education costs (tuition plus books and materials), living expenses (room and board), and total costs (education costs plus living expenses) expressed as a function of an ATP measure.
- *Support/ATP.* This takes into account the various forms of government support provided to students. One way of measuring affordability through an examination of support is to measure Grants, Loans and Tax Expenditures per student, all of which can all be expressed as a fraction of ATP.
- *Support/Costs.* Another way to look at affordability is to measure government support as a fraction of the costs students face (e.g., Grants as a % of Total Costs).
- *Cost minus support/ATP.* A final way to measure affordability is to calculate various forms of "net" costs (i.e. costs minus subsidies) or "out-of-pocket" costs (costs minus all government assistance) as a fraction of ATP.

The measure of “cost minus support/ATP” is considered the most meaningful and inclusive means for measuring affordability (Usher & Steele, 2006), and was therefore adopted for the purposes of this study. In particular, the affordability ratio used within this study was calculated by taking the average net price for full-time, first-time degree/certificate-seeking undergraduates paying the in-state or in-district tuition rate who received grant or scholarship aid (federal, state, or local governments, or the institution) divided by median household income by state. Similar to the other institutional accountability measures within this study, change in performance over time was determined by examining the change in affordability. Due to the availability of data, the first measure of institutional affordability was based on the 2006-2007 cohort of full-time, first-time degree/certificate-seeking undergraduate students and the second measure was based on the 2008-2009 cohort. Average net price data for each institution was collected from the IPEDS, Spring 2010, Student Financial Aid component. Median household income by state was collected from the U.S. Census Bureau (2011). The data retrieved for each institution and measurement methods are summarized in Table 12.

Table 12

Specification of Dependent Variable – Affordability Ratio

Data Collected	Source
Affordability Ratio	
The change in the affordability ratio between fall 2006 and fall 2008 for full-time, first-time undergraduates.	2009 IPEDS SFA Survey: NPIST0 divided by U.S. Census Bureau 2009 Median household income by state minus 2009 IPEDS SFA Survey: NPIST2 divided by U.S. Census Bureau 2007 Median household income by state

Control variables. Scope of degree offerings, proximity, and student body served as control variables within the study.

Scope of degree offerings. Institutional accountability for public purposes under the direction of state legislatures has focused predominately on undergraduate education. However, the mission of institutions represented under the direction of public accountability systems developed at the state level are very diverse. To control for the diversity of institutional scope of degree offerings, the proportion of bachelor’s degrees conferred by each institution between July 1, 2008 and June 30, 2009 as collected from the IPEDS, 2009 Completions component was used as a control variable.

Proximity. The proximity of an institution to other higher education institutions was found by Brewer et al. (2001) to impact the intensity of institutional competition. Given the sample for this study ranges in the location and proximity of institutions to other higher education institutions, proximity to other institutions was employed as a control variable. To measure the proximity of an institution in the study to another institution in the study, Core Based Statistical Area (CBSA) and Combined Statistical Area (CSA) were used. As defined by IPEDS (2011):

A Combined Statistical Area is a geographic entity consisting of two or more adjacent Core Based Statistical Areas (CBSAs). A Combined Statistical Area may comprise two or more Metropolitan Statistical Areas, a Metropolitan Statistical Area and a Micropolitan Statistical Area, two or more Micropolitan Statistical Areas, or multiple Metropolitan and Micropolitan Statistical Areas that have social and economic ties as measured by commuting, but at lower levels than are found among counties within Metropolitan and Micropolitan Statistical Areas. (p. 1)

Each institution in the study was assigned a proximity score using the count of institutions within the study that fall within the same CBSA/CSA. For example, an institution assigned a proximity score of 0, would have no other higher education institutions in the study that reside within that institution's CBSA/CSA. The CBSA/CSA information for each institution in the study was retrieved from the IPEDS, Fall 2009, Institutional Characteristics component.

Student Body. As previously noted, the focus of state-level accountability initiatives have centered almost exclusively on undergraduate education. However, 411 out of the 428 institutions included in the study sample provide graduate level education in addition to undergraduate. To control for this institutional characteristic, the proportion of undergraduates that comprise an institution’s student body was used as a control variable. To calculate the proportion of the student body that was enrolled at the undergraduate level for each institution, the 12-month unduplicated headcount for undergraduate students enrolled for credit during the 2008-2009 academic year was divided by the 12-month unduplicated headcount for all students enrolled for credit during the 2008-2009 academic year as reported and retrieved from the IPEDS, Fall 2009, 12-month Enrollment component.

Table 13 provides the specific data sources and measurement methods used for each of the control variables in the study.

Table 13

Specification of Control Variables

Control Variables	Source
Scope of Degree Offerings	
The proportion of bachelor’s degrees conferred between July 1, 2008 and June 30, 2009.	2009 IPEDS DC Survey: BASDEG divided by A.CTOTALT

--Table 13 continued--

Table 13 (continued)

Control Variables	Source
Proximity	
The physical proximity of an institution in the study to another institution in the study.	2009 IPEDS IC Survey: CSA and CBSA
Student Body	
The proportion of undergraduates that comprise an institution’s study body.	2009 IPEDS E12 Survey: UNDUPUG divided by UNDUP

Data Preparation for Statistical Methods

The first step in preparing to conduct the statistical analysis was to examine the data using summary statistics and graphs to check for missing data and data entry errors. Summary statistics (minimum, maximum, median, and mean) were used to review each variable looking for missing values, unusual values, and proper coding of variables.

Estimating missing values. In reviewing the data, missing values were noted for several variables. As mentioned previously, it was discovered that some institutions, particularly those within a system, reported financial data to IPEDS as a singular entity. The practice of joint reporting was relatively new in some cases such as West Virginia University reporting with West Virginia University Institute of Technology and University of Washington – Seattle Campus reporting with University

of Washington – Bothell Campus and University of Washington – Tacoma Campus. In other cases, such as institutions within the Rutgers, Penn State, and University of California systems, the practice of submitting financial data jointly was long standing. With the exception of the Rutgers and Penn State systems, it was possible to impute the missing data using methods that will be discussed in detail below.

Beyond joint reporting, an additional complication resulted from institutions using different accounting standards to report financial information. In general, private institutions use standards established by the Financial Accounting Standards Board (FASB) and public institutions use standards established by the Governmental Accounting Standards Board (GASB). Since the population for the study was limited to public four-year institutions, all but 17 institutions (16 institutions from the Penn State system and Temple University) reported IPEDS finance data using GASB. While the 16 institutions that are a part of the Penn State system were removed from the study due to the singular reporting described above, the data for Temple University was cross-walked from FASB to GASB. The remaining missing data issues within the study were isolated to particular institutions and variables. The methods used to impute data for each of the variables with missing data will be discussed beginning with the independent variables and then dependent variables. There was no missing data contained within the control variables.

Estimating missing values for composite ACT score. Composite ACT scores at the 75 percentile were missing for 72 institutions in the study. However, for 44 of those 72 institutions, SAT scores were reported. ACT-SAT concordance tables were

used to impute data for the missing ACT composite scores at the 75 percentile. For the remaining 28 institutions, missing ACT data was located by searching each institution's web site. Frequently the data needed was reported as a part of the institution's Common Data Set and published by the institution's institutional research unit. Using this method, data were located for fall 2008 for 17 institutions, fall 2009 for five institutions, fall 2010 for four institutions, fall 2007 for one institution and fall 2006 for one institution.

Estimating missing values for research funding. Federal grants and contracts data were missing for four institutions in the study. For three institutions, West Virginia University Institute of Technology, West Virginia University, and the University of Washington – Seattle Campus, missing data was due to joint reporting of financial data to IPEDS. West Virginia University Institute of Technology and West Virginia University began reporting as a joint entity in fiscal year 2008. To impute missing data for fiscal year 2009, the proportion of federal grants and contracts revenue received by each institution in fiscal year 2007 was used to divide the joint amount reported in fiscal year 2009. The University of Washington – Seattle Campus began reporting joint financial data with the University of Washington – Bothell Campus and University of Washington – Tacoma Campus in fiscal year 2009. To impute the missing fiscal year 2009 data for the University of Washington – Seattle Campus, the proportion of federal grants and contracts revenue received by each institution in fiscal year 2008 was used to divide the joint amount reported in fiscal year 2009. One additional institution, Appalachian State University, was missing data

for fiscal year 2009. Federal grants and contracts data reported by Appalachian State University in fiscal year 2008 was imputed for the missing data.

Estimating missing values for private giving. Data for private giving was collected from the Voluntary Support of Education Survey that is conducted annually by the CAE. Reviewing the Voluntary Support of Education Report for FY2009, 277 institutions from the study reported total voluntary support acquired in fiscal year 2009 (CAE, 2010). Total voluntary support acquired in fiscal year 2008 was imputed for five institutions and total voluntary support acquired in fiscal year 2010 was imputed for 13 institutions (CAE, 2011, 2009). To estimate missing data for the remaining 133 institutions, a simple regression analysis was performed based on the 295 institutions that had complete data for total voluntary support and reported institutional gifts received in fiscal year 2009 to IPEDS. The resulting prediction formula for total voluntary support was $VOLSUPPORT = 6.183e+06 + 1.829(GIFTS)$ with an effect size of $R^2 = .786$ ($F_{(1, 293)} = 1075$, $p < .001$). The VOLSUPPORT amounts were rounded to the nearest dollar to be consistent with the reported VOLSUPPORT amounts.

Estimating missing values for public fiscal support. Fifteen institutions were missing data for state appropriations acquired by the institution in fiscal year 2009. Missing data for West Virginia University Institute of Technology, West Virginia University, and the University of Washington – Seattle Campus was due to joint reporting of financial data to IPEDS. Data was imputed for these three institutions using the same method as described for research funding. The remaining 12

institutions, all from the state of Colorado, reported receiving no state appropriations in fiscal year 2009, yet the state of Colorado reported a total of \$705,965,059 as being allocated. Exploring this oddity further, it was found that in fiscal year 2006 the form of the state appropriation, from state to institution, was dramatically changed in Colorado. Allocations that were previously made as a unitary appropriation were separated into two parts, with one part known as the College Opportunity Fund (COF) and the other as a Fee for Service (FFS) (Tracking State Appropriations, 2011). To impute data for the 12 institutions from the Colorado state system, the sum of COF and FFS funding for each of the institutions in fiscal year 2009 was retrieved from the Colorado Department of Higher Education (2011).

Estimating missing values for market segment. Fall 2008 number of applications and admitted students data that was required to calculate an institution's market segment was missing for 43 institutions. It was noted that missing application and admission data was common for institutions with an open admissions policy. For 18 institutions, missing data was imputed from IPEDS data that were reported for fall 2007 and for one institution from IPEDS data reported for fall 2009. For the remaining 25 institutions, data was located by searching each institution's web site. Frequently the data needed was reported as a part of the institution's Common Data Set and published by the institution's institutional research unit. Using this method, data was located for fall 2008 for 16 institutions, fall 2007 for one institution, fall 2006 for one institution, fall 2009 for three institutions, and fall 2010 for three institutions.

Estimating missing values for fiscal health. Missing data to calculate an institution's fiscal health was limited to West Virginia University Institute of Technology, West Virginia University, and the University of Washington – Seattle Campus due to joint reporting of financial data to IPEDS. Data was imputed for these three institutions using the same method as described for research funding.

Estimating missing values for in-state enrollment. One institution, Minnesota State University, Moorhead, was missing 1998 cohort data for first-time in-state undergraduate enrollment. Prior to 2000, Minnesota State University, Moorhead, reported in-state undergraduate enrollment as “state unknown.” Data reported for the 2000 fall cohort was imputed for the missing 1998 cohort data.

Estimating missing values for first-year retention rates. First-year to second-year first-time, full-time undergraduate retention rates were first collected as a part of the IPEDS 2003 Fall Enrollment survey. Within the survey institutions were allowed to indicate the year of the cohort for which the data is being reporting. Within the IPEDS 2003 Fall Enrollment survey, 275 institutions reported the first-year to second-year retention rate for the 2002 cohort. First-year to second-year retention rate data for the 2003 cohort was reported by the remaining 153 institutions in the study. For these institutions, the 2003 cohort data was imputed for the missing 2002 cohort data.

Statistical Methods

The general approach to the statistical analyses used to address the research questions guiding the study was multiple regression analysis. As described by Tabachnick and Fidell (2007), “The primary goal of regression analysis is to

investigate the relationship between a DV and several IVs” (p. 118). Within this study three DVs (i.e. access, affordability, and completion) were examined using separate multiple regression models. While the DVs in this study could have been incorporated into a multivariate multiple regression analysis, that approach was not taken for the following two reasons: the theoretical framework guiding the study did not suggest the need to examine the DVs simultaneously, and the correlations among the DVs were very small (i.e. -0.12, 0.06, 0.03); therefore, there was not a data-driven reason to examine the DVs simultaneously.

The basic approach to conducting the multiple regression analyses for each research question included four steps: (a) preliminary screening of assumptions (ratio of cases to IVs, outliers, and absence of multicollinearity and singularity), (b) fit the preliminary multiple regression model, (c) conduct regression diagnostics (error assumptions, model adequacy, and unusual observations), and (d) re-fit the regression model as suggested by regression diagnostics. In addition, the multiple regression approach employed utilized a sequential method, whereby the results of the analysis conducted to address the first research question were then utilized in the examination of the second research question. Extending this approach, the results of the analysis conducted to address the second research question were then utilized in the examination of the third research question. A review of the analyses conducted in addressing each research question is outlined below followed by a discussion of the evaluation of assumptions for each analysis.

Research question 1. The first research question guiding this study examined the relationship between institutional competition and institutional accountability for public purposes at the undergraduate level among U.S. public four-year institutions controlling for scope of degree offerings, institutional proximity, and student body. The focus of the analysis for this research question was to determine if there was a significant relationship between institutional competition and institutional accountability for public purposes.

Model development. To begin, the CVs for the study were entered into a model for each DV establishing the initial multiple regression equations for the study. Regression diagnostics were conducted and each DV model was re-fit as needed. The omnibus F -test for the null hypothesis ($H_0: \beta_{\text{BACDEGREES}} = \beta_{\text{PROXSCORE}} = \beta_{\text{PORTIONUG}} = 0$) for each DV were then evaluated. Next, the block of institutional competition IVs were entered into the model, regression diagnostics were conducted, and each DV model was re-fit as needed. The omnibus F -test for the null hypothesis ($H_0: \beta_{\text{ACTCM75}} = \beta_{\text{UNDUPUGRAD}} = \beta_{\text{STATEAPPR}} = \beta_{\text{FEDREAEARCH}} = \beta_{\text{VOLSUPPORT}} = 0$) for each DV were then evaluated. When the omnibus F -test null hypothesis was rejected, the specific t -test for each variable was used to evaluate the specific null hypothesis $H_0: \beta_k = 0$, where β_k is a given regression weight, in assessing the importance of each IV in the equation.

Model comparison. A model comparison for each DV was then performed to evaluate the significance of the addition of the block of institutional competition IVs to each model established with only the CVs. The test statistic for the model comparison was the generalized F statistic defined as

$$F = \frac{\left[\frac{RSS_w - RSS_\Omega}{df_w - df_\Omega} \right]}{\frac{RSS_\Omega}{df_\Omega}}$$

where $df_w = n - (q + 1)$ and $df_\Omega = n - (p + 1)$ with q equal to the number of predictors in the reduced model, p equal to the number of predictors in the full model, and n the sample size. The null hypothesis for the model comparison was $H_0: \beta_{ACTCM75} = \beta_{UNDUPUGRAD} = \beta_{STATEAPPR} = \beta_{FEDRESEARCH} = \beta_{VOLSUPPORT} = 0$.

Research question 2. The second research question guiding the study examined the extent to which the relationship between institutional competition and institutional accountability for public purposes changed with the addition of institutional fiscal health as an IV.

Model development. The institutional fiscal health variable was added to the final regression model for each DV from the first research question. Regression diagnostics were conducted and each DV model was re-fit as needed. After the regression assumptions were satisfied, the omnibus F -test for the full model was interpreted. The omnibus null hypothesis for each DV model was $H_0: \beta_{ACTCM75} = \beta_{UNDUPUGRAD} = \beta_{STATEAPPR} = \beta_{FEDRESEARCH} = \beta_{VOLSUPPORT} = \beta_{FISCALHLTH} = \beta_{BACDEGREES} = \beta_{PROXSCORE} = \beta_{PORTIONUG} = 0$. When the omnibus F -test null hypothesis was rejected, the specific t -test for each IV was used to evaluate the specific null hypothesis $H_0: \beta_k = 0$, where β_k is a given regression weight, in assessing the importance of each IV in each DV equation.

Model comparison. A nested model comparison was then used to determine if there was evidence that the institutional fiscal health IV contributed significantly to

each DV model established in research question one. The generalized F statistic was used to evaluate the null hypothesis that the coefficient for the institutional fiscal health IV was zero or $H_0: \beta_{\text{FISCALHLTH}} = 0$.

Testing for interaction effects. Interaction terms were then introduced into the full model to evaluate if the nature of the relationship between institutional competition and institutional accountability varied depending on institutional fiscal health. Model comparison using the generalized F statistic was used to test the null hypothesis that there is no interaction effect or $H_0: \beta_{\text{ACTCM75}*\text{FISCALHLTH}} = \beta_{\text{UNDUPUGRAD}*\text{FISCALHLTH}} = \beta_{\text{FEDRESEARCH}*\text{FISCALHLTH}} = \beta_{\text{STATEAPPR}*\text{FISCALHLTH}} = \beta_{\text{VOLSUPPORT}*\text{FISCALHLTH}} = 0$.

Research question 3. The third research question guiding the study examined the extent to which the relationship between institutional competition and institutional accountability for public purposes differs across the market segments of postsecondary undergraduate education.

Model development. The market segment variable was added to the final regression model for each DV from the second research question. Regression diagnostics were conducted and each DV model was re-fit as needed. When the regression assumptions were satisfied, the omnibus F -test for the full model was interpreted. The omnibus null hypothesis for each DV model was $H_0: \beta_{\text{ACTCM75}} = \beta_{\text{UNDUPUGRAD}} = \beta_{\text{STATEAPPR}} = \beta_{\text{FEDRESEARCH}} = \beta_{\text{VOLSUPPORT}} = \beta_{\text{FISCALHLTH}} = \beta_{\text{MARKETSEG}} = \beta_{\text{BACDEGREES}} = \beta_{\text{PROXSCORE}} = \beta_{\text{PORTIONUG}} = 0$.

Model comparison. A nested model comparison was then used to determine if there was evidence that the market segment IV contributed significantly to each DV model established in research question two. The model comparison used the generalized F statistic to evaluate the null hypothesis $H_0: \beta_{\text{MARKETSEG}} = 0$.

Testing for interaction effects. Interaction terms were then introduced into the full model to evaluate if the nature of the relationship between institutional competition and institutional accountability varied by market segment. Model comparison using the generalized F statistic was used to test the null hypothesis that there was no interaction effect.

Evaluation of Assumptions

The evaluation of several regression analyses assumptions were addressed both prior to running the regression analyses and after.

Ratio of cases to IVs. The number of cases required to support sufficient power within a regression analysis can vary; however, Tabachnick and Fidell (2007) provide a simple rule of thumb being $N \geq 50 + 8m$ (where m is the number of IV) for testing the multiple correlation and $N \geq 104 + m$ for testing individual predictors. With 13 IVs contained in the study (including three dummy variables for the market segment IV), the 428 cases included in the study sample are sufficient to meet the suggested ratio of cases to IVs.

Outliers. Reviewing the data collected prior to analysis for univariate outliers is important due to the influence that extreme scores can have on the calculation of means. Univariate outliers are cases that have a value for a variable that has a very

large standardized score and is disconnected from other z scores. As a general guideline, Tabachnick and Fidell (2007) identify cases with a z score in excess of ± 3.29 as likely extreme outliers and recommend that outliers be deleted, rescored, or the variable transformed. To examine the data for outliers, both descriptive statistics including mean, median, skew, and kurtosis, as well as plots including histograms, density plots, box plots, and Q-Q plots were used. Upon examining the descriptive statistics and plots, one of three actions was taken. First, if the distribution of the variable appeared fairly normal but contained disconnected outliers, the scores for the outliers were changed to a value that was just above or below the most deviant non-disconnected outlier. This type of change allowed the case to still be deviant, but not as extreme. Second, if the distribution of the variable appeared non-normal and contained disconnected outliers, the scores for the disconnected outliers were changed to a value that was just above or below the most deviant non-disconnect outlier. Again, this type of change allowed the case to still be deviant, but not extreme. Alternatively, if the distribution of the variable appeared non-normal and the outliers were not disconnected, transformations of the variable were considered to bring the distribution closer to normal and reduce the impact of outliers.

Absence of multicollinearity and singularity. Multicollinearity or collinearity occurs when variables are too highly correlated (Tabachnick & Fidell, 2007). In particular, with multicollinearity the variables are very highly correlated (.90 and above) and with singularity the variables are redundant. The inclusion of highly correlated variables into the regression model produces large standard errors

and small t -test values (Howell, 2010). Tabachnick and Fidell (2007) recommend reconsidering the inclusion of two variables in a regression analysis with a bivariate correlation of .90 or more. To evaluate the conditions for multicollinearity prior to statistical analysis, a correlation matrix was examined for the predictor variables contained in the study.

Normality, linearity, and homoscedasticity of residuals. Core assumptions for multiple regression analysis include normality, linearity, and homoscedasticity. In particular: (a) response variables and residuals (errors of prediction) are normally distributed, (b) there is homogeneity of variance over values of the predictors, and (c) there is a linear relationship between the predicted response and the errors of prediction. Prior to running the preliminary regression analyses associated with each research question, the normality of the response variables were evaluated. When moderate to extreme deviation from normality was found, transformations of the response variables were considered. In addition, Tabachnick and Fidell (2007) suggest that the linearity of the relationship between the predicted response and the errors of predication can be improved when the distribution of predictor variables is normal. Prior to running the preliminary regression analyses associated with each research question, the normality of continuous predictor variables was evaluated. When moderate to extreme deviation from normality was detected, transformations of the predictor variables were considered. Following the fitting of the preliminary regression models associated with each research question, regression diagnostics were employed to evaluate error assumptions for normality and constant variance. In

addition, regression diagnostics were used to evaluate model adequacy and unusual observations. Changes that were suggested based on diagnostics were considered and the models were refit as needed.

Chapter Four: Results

The purpose of this study was to examine the relationship between institutional competition and institutional accountability for public purposes at the undergraduate level among U.S. public four-year institutions. This chapter first presents the results of the evaluation of pre-analysis assumptions, and then presents the results for each research question focusing on each dependent variable (i.e. access, affordability, completion). Finally a summary of the findings for each research question is provided.

Evaluation of Pre-Analysis Assumptions

Prior to conducting the analyses to examine each of the research questions guiding the study, several pre-analysis assumptions were addressed including univariate outliers, normality of distributions, and multicollinearity and singularity.

Univariate outliers. Prior to running the regression analyses, each of the variables was examined for univariate outliers. Distribution statistics, in particular skew and kurtosis, and distribution plots including histograms, density plots, and box plots were reviewed. Tukey's method as outlined by Howell (2010), where upper and lower outer fences for each variable is determined as $1.5 \times \text{IQR}$, was used to identify mild outliers. In addition, to identify extreme outliers, z-scores were calculated for the values of each variable and reviewed for z-scores in excess of ± 3.29 standard deviations as recommended by Tabachnick and Fidell (2007). Extreme outliers and mild outliers identified for each variable that were disconnected from the distribution were changed to a value just above or below the most-deviant non-disconnected value.

Mild outliers that were not disconnected from the distribution were not changed. Given the nature of the variable, PROXSCORE, representing the proximity of an institution to another institution, no values were altered. Prior to the application of the procedures to address outliers, measures of skew ranged from a low of 0.06 to a high of 3.99 and kurtosis ranged from a low of 0.18 to a high of 19.83. After the procedures, skew ranged from 0.08 to 2.87 and kurtosis ranged from 0.02 to 7.90. Table 14 provides a summary of the distribution statistics for each variable prior to addressing univariate outliers, and Table 15 provides a summary of the distribution statistics after outliers were addressed.

Normality of distributions. The normality of the distributions for each variable was also reviewed prior to conducting regression analyses. An assumption of multiple regression is that the dependent or response variable is normally distributed. In addition, Tabachnick and Fidell (2007) suggest that model performance and conformance to regression assumptions is also improved when predictor or independent variables are also normally distributed. To evaluate the extent of the deviation of variable distributions from normality, the skew, kurtosis, and Q-Q plots were reviewed for each variable. When evidence of non-normal distributions was noted, common transformations (i.e. log, square root, and inverse) were applied to each variable. A review of the dependent variables in the study did not demonstrate distributions with extreme deviations from normality; however, several of the independent and control variables were of concern.

Table 14

Summary of Variable Distributions with Univariate Outliers

Variable	Mean	SD	Range		Distribution	
			Min	Max	Skew	Kurt
ACCESSCOMP	0.00	0.67	-2.34	3.10	0.32	2.01
<i>Federal Grant Aid</i>	<i>-0.12</i>	<i>9.85</i>	<i>-46.00</i>	<i>31.00</i>		
<i>Ethnic/Racial Minority</i>	<i>4.33</i>	<i>4.37</i>	<i>-10.06</i>	<i>33.00</i>		
<i>In-State Enrollment</i>	<i>-1.38</i>	<i>7.16</i>	<i>-26.07</i>	<i>25.78</i>		
COMPLETIONCOMP	0.00	0.74	-3.01	3.07	-0.06	1.91
<i>Graduation Rate</i>	<i>2.89</i>	<i>4.93</i>	<i>-15.00</i>	<i>20.00</i>		
<i>Retention Rate</i>	<i>1.18</i>	<i>4.25</i>	<i>-17.00</i>	<i>18.00</i>		
AFFORDABILITY	-0.02	0.03	-0.23	0.09	-1.00	6.95
ACTCM75	24.53	2.55	18.00	32.00	0.47	0.18
UNDUPUGRAD	13,299.13	9,442.41	1,051	59,211	1.17	1.58
FEDRESEARCH	44,408,431	100,241,793	0.00	830,839,259	3.99	19.83
STATEAPPR	0.08	0.11	0.00	0.65	2.48	6.42
VOLSUPPORT	24,967,921	49,742,190	94,509	3,516,888,985	3.88	17.05
FISCALHLTH	2.84	1.13	0.00	5.00	-0.34	-0.53
PORTIONUG	80.97	10.12	38.93	100.00	-0.39	0.88
BACDEGREES	0.73	0.13	0.18	1.00	-0.29	0.58
PROXSCORE	2.86	6.03	0.00	26.00	2.87	7.90

Note. Information in italic (Federal Grant Aid, Ethnic/Racial Minority, In-State Enrollment, Graduation Rate, and Retention Rate) is included in the table to provide additional detail regarding the data composing the composite variables of ACCESSCOMP and COMPLETIONCOMP.

Table 15

Summary of Variable Distributions Adjusted for Univariate Outliers

Variable	Mean	SD	Range		Distribution	
			Min	Max	Skew	Kurt
ACCESSCOMP	0.00	0.63	-1.48	1.56	0.15	0.28
COMPLETIONCOMP	0.00	0.68	-1.60	1.61	0.08	-0.02
AFFORDABILITY	-0.02	0.03	-0.09	0.04	-0.27	0.21
ACTCM75	24.50	2.47	19	30	0.34	-0.22
UNDUPUGRAD	13,184	9,049	1,051	38,238	0.89	0.09
FEDRESEARCH	39,966,369	77,693,977	0.00	340,000,000	2.59	6.09
STATEAPPR	0.08	0.10	0.00	0.40	2.06	3.30
VOLSUPPORT	20,823,989	31,608,723	94,509	130,000,000	2.25	4.05
FISCALHLTH	2.84	1.13	0.00	5.00	-0.34	-0.53
PORTIONUG	81.07	9.82	55.00	100.00	-0.14	-0.02
BACDEGREES	0.73	0.12	0.43	1.00	-0.07	-0.24
PROXSCORE	2.86	6.03	0.00	26.00	2.87	7.90

Table 16 provides a summary of the skew and kurtosis statistics for each variable of concern in its original form and when restated with a transformation. The transformation that provided the greatest improvement in the normality of each distribution was used in the regression analyses. When two different transformations produced similar results, the skew statistic was given more consideration than the kurtosis statistic as the criterion statistic in determining the transformation used in the

regression analyses. Tabachnick and Fidell (2007) suggest that for large samples ($n > 200$), skew should be given greater weight in evaluating normality than kurtosis.

Table 16

Normality Statistics and Common Transformations

Variable	Unadjusted		Square Root		Log		Inverse	
	Skew	Kurt	Skew	Kurt	Skew	Kurt	Skew	Kurt
UNDUPUGRAD	0.89	0.09	0.27	-0.71	-0.48	-0.36	2.25	7.72
FEDRESEARCH	2.59	6.09	1.62	1.80	-2.82	9.87	4.70	20.11
STATEAPPR	2.06	3.30	1.34	0.99	0.35	-0.52	1.96	4.35
VOLSUPPORT	2.25	4.05	1.58	1.55	0.32	0.05	15.14	274.21
PROXSCORE	2.87	7.90	2.00	3.42	1.24	0.35	-0.54	-1.46

Note. Boxed values indicate the best fit for meeting the assumption of normality.

Multicollinearity and singularity. To examine the collinearity of the independent and control variables within the study a correlation matrix was reviewed. As shown in Appendix B, several of the variables were moderately correlated. Tabachnick and Fidell (2007) recommend that when variables have a bivariate correlation of .90 or more, one of the variables should be removed from the model. None of the bivariate correlations exceeded .90, with the highest being .75 for the correlation between federal research funding (sqrtFEDRESESRCH) and private giving (logVOLSUPPORT). In addition, to test for multicollinearity, the tolerance statistic and variance inflation factor (VIF) was checked for each variable. Tabachnick and Fidell (2007) recommend that variables with tolerance values below .20 be considered for removal from the study. All of the variables had tolerance values that exceeded .20. Considering VIF values, Tabachnick and Fidell (2007) suggest values greater

than 10 should be of concern. The largest VIF value for a variable in the study was 3.49.

Results for Research Questions

Three research questions guided this study:

- 1) What is the relationship between institutional competition and institutional accountability for public purposes at the undergraduate level among U. S. public four-year institutions?
- 2) To what extent does the relationship between institutional competition and institutional accountability for public purposes differ based on institutional fiscal health?
- 3) To what extent does the relationship between institutional competition and institutional accountability for public purposes differ across the market segments of postsecondary undergraduate education?

The results from the multiple regression analyses and model comparisons conducted for each research question are reviewed below according to dependent variable (i.e., affordability, access and completion). Following a review of the results for each dependent variable, a summary is provided for each research question.

Research question 1. The first research question guiding the study examined the relationship between institutional competition and institutional accountability for public purposes. The focus of the analysis was to determine if there was a significant relationship between institutional competition and institutional accountability.

Affordability. In step 1 of the analysis, the three control variables (i.e. logPROXSCORE, BACDEGREES, and PORTIONUG) were used to establish the preliminary model for affordability as follows:

$$\text{Affordability} = \beta_0 + \beta_{\text{BACDEGREES}}\text{BACDEGREES} + \beta_{\text{logPROXSCORE}}\text{logPROXSCORE} + \beta_{\text{PORTIONUG}}\text{PORTIONUG} + \epsilon$$

After the preliminary model was generated, regression diagnostics were used to evaluate error assumptions, linearity, and influential observations. Residual plots were used to evaluate the error assumptions of constant variance and normality. The plot of residuals against the fitted values did not show a dramatic departure from constant variance. In addition, the Non-Constant Variance Score Test was not significant, $X^2(1, n = 428) = 1.24, p = .27$, providing additional evidence that the constant variance assumption was not violated. Inspecting the Q-Q plot of the residuals did not reveal a dramatic deviation from the assumption of normality of errors. The residual plot, a scatterplot matrix of the residuals against each predictor, and partial residual plots were used to evaluate model adequacy and the assumption of linearity. A smoothed (best-fitting) line and regression line were superimposed on each graph to evaluate adequacy and the assumption of linearity. All of the graphs illustrated linear near-flat lines providing evidence of adequacy and linearity. Lastly, influential observations were evaluated using Cook's D, leverage, and the Bonferroni Outlier Test, which was not significant, $t(423) = 2.80$, Bonferroni $p > .05$. With the multiple regression assumptions evaluated, the result of the omnibus F -test for the multiple regression model was reviewed. The omnibus F -test for the step 1 model for affordability with

the three control variables was statistically significant, $F(3, 424) = 2.98, p = .03$. The multiple R-squared was small at .02 for the model.

In step 2, the block of institutional competition variables (ACTCM75, sqrtUNDUPUGRAD, sqrtFEDRESEARCH, logSTATEAPPR, and logVOLSUPPORT) were added to the control model developed in step 1. Similar to step 1, after the preliminary model was generated, regression diagnostics were used to evaluate error assumptions, linearity, and influential observations. The residual plot did not indicate a dramatic departure from constant variance, and the Non-Constant Variance Score Test was not significant, $X^2(1, n = 428) = 0.02, p = .89$, providing evidence that the constant variance assumption was not violated. The Q-Q plot of residuals did not reveal a dramatic deviation from a normal distribution, and the residual plot, scatterplot matrix of the residuals against each predictor, and partial residual plots did not indicate a violation of the assumptions of normality or linearity. Influential outliers were reviewed and the Bonferroni Outlier Test was not significant, $t(418) = 2.83, \text{Bonferroni } p > .05$.

After consideration of the multiple regression assumptions, the result of the omnibus F -test for the multiple regression model null hypothesis $H_0: \beta_{\text{ACTCM75}} = \beta_{\text{sqrtUNDUPUGRAD}} = \beta_{\text{logSTATEAPPR}} = \beta_{\text{sqrtFEDRESEARCH}} = \beta_{\text{logVOLSUPPORT}} = \beta_{\text{BACDEGREES}} = \beta_{\text{logPROXSCORE}} = \beta_{\text{PORTIONUG}} = 0$ was reviewed. The omnibus F -test for the step 2 model for affordability with the institutional competition variables entered as a block into the model was statistically significant, $F(8, 419) = 3.05, p < .01$. Reviewing the specific tests for the model, state appropriation (logSTATEAPPR) was statistically

significant, ($\beta = -8.56e-03$, $p = .02$), and student enrollment (sqrtUNDUPUGRAD) was statistically significant, ($\beta = 8.83e-05$, $p = .04$), when added to the model with student selectivity (ACTCM75), research funding (sqrtFEDRESEARCH), and private giving (logVOLSUPPORT). The multiple R-squared for the model was .05.

Model comparison was used to evaluate the contribution the institutional competition variables made to the model above and beyond the control variables. The test statistic for the model comparison was the generalized F statistic defined as

$$F = \frac{\left[\frac{RSS_w - RSS_\Omega}{df_w - df_\Omega} \right]}{\frac{RSS_\Omega}{df_\Omega}}$$

where $df_w = n - (q + 1)$ and $df_\Omega = n - (p + 1)$ with q equal to the number of predictors in the reduced model, p equal to the number of predictors in the full model, and n the sample size. The null hypothesis for the model comparison was $H_0: \beta_{ACTCM75} = \beta_{sqrtUNDUPUGRAD} = \beta_{logSTATEAPPR} = \beta_{sqrtFEDRESEARCH} = \beta_{logVOLSUPPORT} = 0$. The model comparison was statistically significant, $F(5, 419) = 3.04$, $p = .01$, supporting a rejection of the null hypothesis and providing evidence that the full model with the institutional competition variables was more plausible than the reduced model with only the control variables in the population. Table 17 provides a summary of the regression coefficients and multiple R-squared for each of the models.

Table 17

Regression Coefficients and Multiple R-Squared for Control and Institutional Competition Models

Variable	Dependent Variables					
	Affordability		Access		Completion	
	R^2	b	R^2	b	R^2	b
Step 1	.02*		.00		.02*	
Control Variables ^a						
Step 2	.05**		.16***		.09***	
ACTCM75		-1.27e-03		-5.37e-02***		6.34e-02***
sqrtUNDUPUGRAD		8.83e-05*		2.95e-03**		1.96e-03
sqrtFEDRESEARCH		7.83e-08		1.79e-05		5.84e-06
logSTATEAPPR		-8.56e-03*		-5.47e-01***		2.83e-02
logVOLSUPPORT		1.79e-04		-2.09e-02		-1.13e-01

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

^aControl variables included in all models consisted of BACDEGREES, PORTIONUG, and logPROXSCORE.

Access. In step 1 of the analysis, the three control variables (i.e. logPROXSCORE, BACDEGREES, and PORTIONUG) were used to establish the preliminary model for access as follows:

$$\text{Access} = \beta_0 + \beta_{\text{BACDEGREES}}\text{BACDEGREES} + \beta_{\text{logPROXSCORE}}\text{logPROXSCORE} + \beta_{\text{PORTIONUG}}\text{PORTIONUG} + \epsilon$$

After the preliminary model was generated, regression diagnostics were used to evaluate error assumptions, linearity, and influential observations. The plot of residuals against the fitted values did not show a dramatic departure from constant variance. In addition, the Non-Constant Variance Score Test was not significant,

$X^2(1, n = 428) = 0.58, p = .45$, providing additional evidence that the constant variance assumption was not violated. Inspecting the Q-Q plot of the residuals indicated minimal to moderate deviation from a normal distribution, but not extreme. The residual plot, a scatterplot matrix of the residuals against each predictor, and partial residual plots were used to evaluate model adequacy and the assumption of linearity. All of the graphs illustrated linear near-flat lines providing evidence of adequacy and linearity. Lastly, influential observations were evaluated using Cook's D, leverage, and the Bonferroni Outlier Test. The Bonferroni Outlier Test was not significant, $t(423) = 2.60$, Bonferroni $p > .05$. With the multiple regression assumptions evaluated, the result of the omnibus F -test for the multiple regression model was reviewed. The omnibus F -test for the step 1 model for access with the three control variables was not statistically significant, $F(3, 424) = .818, p = .48$.

In step 2 the block of institutional competition variables (ACTCM75, sqrtUNDUPUGRAD, sqrtFEDRESEARCH, logSTATEAPPR, and logVOLSUPPORT) were added to the control model developed in step 1. Similar to step 1, after the preliminary model was generated, regression diagnostics were used to evaluate error assumptions, linearity, and influential observations. The residual plot did not indicate a dramatic departure from constant variance and the Non-Constant Variance Score Test was not significant, $X^2(1, n = 428) = 1.54, p = .21$, providing evidence that the constant variance assumption was not violated. The Q-Q plot of residuals did not reveal a dramatic deviation from a normal distribution and the residual plot, scatterplot matrix of the residuals against each predictor, and partial

residual plots did not indicate a violation of the assumptions of normality or linearity. Influential outliers were reviewed and the Bonferroni Outlier Test was not significant, $t(418) = 3.23$, Bonferroni $p > .05$.

The result of the omnibus F -test for the multiple regression model null hypothesis $H_0: \beta_{ACTCM75} = \beta_{\text{sqrt}UNDUPUGRAD} = \beta_{\text{log}STATEAPPR} = \beta_{\text{sqrt}FEDRESEARCH} = \beta_{\text{log}VOLSUPPORT} = \beta_{BACDEGREES} = \beta_{\text{log}PROXSCORE} = \beta_{\text{PORTIONUG}} = 0$ was then reviewed. The omnibus F -test for the step 2 model for access with the institutional competition variables entered as a block into the model was statistically significant, $F(8, 419) = 9.76$, $p < .001$. Reviewing the specific tests for the model, public fiscal support ($\text{log}STATEAPPR$) was statistically significant, ($\beta = -5.47\text{e-}01$, $p < .001$), student enrollment ($\text{sqrt}UNDUPUGRAD$) was statistically significant, ($\beta = 2.95\text{e-}03$, $p = .004$), and student selectivity ($ACTCM75$) was statistically significant, ($\beta = -5.37\text{e-}02$, $p < .001$), when added to the model with research funding ($\text{sqrt}FEDRESEARCH$) and private giving ($\text{log}VOLSUPPORT$). The multiple R-squared for the model was .16.

Model comparison was used to evaluate if the institutional competition variables contributed above and beyond the control variables to the model. The test statistic for the model comparison was the generalized F statistic. The null hypothesis for the model comparison was $H_0: \beta_{ACTCM75} = \beta_{\text{sqrt}UNDUPUGRAD} = \beta_{\text{log}STATEAPPR} = \beta_{\text{sqrt}FEDRESEARCH} = \beta_{\text{log}VOLSUPPORT} = 0$. The model comparison was statistically significant, $F(5, 419) = 15.05$, $p < .001$, supporting a rejection of the null hypothesis and providing evidence that the full model with the institutional competition variables

was more plausible than the reduced model in the population. Table 17 provides a summary of the regression coefficients and multiple R-squared for each of the models.

Completion. In a similar fashion to the analyses for affordability and access, the three control variables (i.e. logPROXSCORE, BACDEGREES, and PORTIONUG) were entered into the preliminary model for completion as follows:

$$\text{Completion} = \beta_0 + \beta_{\text{BACDEGREES}}\text{BACDEGREES} + \beta_{\text{logPROXSCORE}}\text{logPROXSCORE} + \beta_{\text{PORTIONUG}}\text{PORTIONUG} + \epsilon$$

After the preliminary model was generated, regression diagnostics were used to evaluate error assumptions, linearity, and influential observations. The residual plot of residuals against the fitted values did not show a dramatic departure from constant variance. However, the Non-Constant Variance Score Test was significant, $X^2(1, n = 428) = 7.12, p = .008$, providing some evidence that the constant variance assumption may be violated. While a violation of the assumption of constant variance weakens the analysis, it is not fatal to an analysis of ungrouped data (Tabachnick & Fidell, 2007). Inspecting the Q-Q plot of the residuals indicated some deviation from a normal distribution, but not extreme. The residual plot, a scatterplot matrix of the residuals against each predictor, and partial residual plots were used to evaluate model adequacy and the assumption of linearity. All of the graphs illustrated linear near-flat lines, providing evidence of adequacy and linearity. Lastly, influential observations were evaluated using Cook's D, leverage, and the Bonferroni Outlier Test, which was not significant, $t(423) = 2.56$, Bonferroni $p > .05$. The result of the omnibus F -test for

the multiple regression model was then reviewed. The omnibus F -test for the step 1 model for completion was statistically significant, $F(3, 424) = 2.69, p = .04$.

In step 2, the block of institutional competition variables (ACTCM75, sqrtUNDUPUGRAD, sqrtFEDRESEARCH, logSTATEAPPR, and logVOLSUPPORT) were added to the control model developed in step 1. Similar to step 1, after the preliminary model was generated, regression diagnostics were used to evaluate error assumptions, linearity, and influential observations. The residual plot did not indicate a dramatic departure from constant variance and the Non-Constant Variance Score Test was not significant, $X^2(1, n = 428) = 0.001, p = .98$, providing evidence that the constant variance assumption was not violated. The Q-Q plot of residuals did not reveal a dramatic deviation from a normal distribution and the residual plot, scatterplot matrix of the residuals against each predictor, and partial residual plots did not indicate a violation of the assumptions of normality or linearity. Influential outliers were reviewed and the Bonferroni Outlier Test was not significant, $t(418) = 2.85, \text{Bonferroni } p > .05$.

The result of the omnibus F -test for the multiple regression model null hypothesis $H_0: \beta_{\text{ACTCM75}} = \beta_{\text{sqrtUNDUPUGRAD}} = \beta_{\text{logSTATEAPPR}} = \beta_{\text{sqrtFEDRESEARCH}} = \beta_{\text{logVOLSUPPORT}} = \beta_{\text{BACDEGREES}} = \beta_{\text{logPROXSCORE}} = \beta_{\text{PORTIONUG}} = 0$ was then reviewed. The omnibus F -test for the step 2 model for completion was statistically significant, $F(8, 419) = 5.01, p < .001$. Reviewing the specific tests for the model, only student selectivity (ACTCM75) was statistically significant, ($\beta = 6.34e-02, p < .001$), when added to the model with public fiscal support (logSTATEAPPR), student enrollment

(sqrtUNDUPUGRAD), research funding (sqrtFEDRESEARCH), and private giving (logVOLSUPPORT). The multiple R-squared for the model was low at .09.

Model comparison was used to evaluate if the institutional competition variables contributed above and beyond the control variables in the model. The test statistic for the model comparison was the generalized F statistic. The null hypothesis for the model comparison was $H_0: \beta_{\text{ACTCM75}} = \beta_{\text{sqrtUNDUPUGRAD}} = \beta_{\text{logSTATEAPPR}} = \beta_{\text{sqrtFEDRESEARCH}} = \beta_{\text{logVOLSUPPORT}} = 0$. The model comparison was statistically significant, $F(5, 419) = 6.31, p < .001$, supporting a rejection of the null hypothesis and providing evidence that the full model with the institutional competition variables was more plausible than the reduced model in the population.

Focused on exploring the relationship between institutional competition and institutional accountability, the results of the analyses for research question one provides some initial insights. First, for all three dependent variables, the block of institutional competition variables of student selectivity, student enrollment, research funding, private giving, and public fiscal support, while controlling for student body, scope of degree offerings and proximity, produced a statistically significant result indicting the predictors contributed to predicting each of the dependent variables in the population. For all three models, the amount of variance observed in each of the dependent variables that was explained by the model of predictors was modest (5% for change in affordability, 16% for change in access, and 9% for change in completion). Within the model for affordability two predictors were statistically significant, with student enrollment having a positive relationship and public fiscal support a negative

relationship. Within the model for access, there were three significant predictors. Student selectivity and public fiscal support had a negative relationship, whereas student enrollment had a positive relationship with access. Lastly, considering the model for completion, only one variable, student selectivity, had a statistically significant relationship, which was positive. Considering all three models, student enrollment and public fiscal support were significant predictors for both affordability and access. In addition, student selectivity was a significant predictor for both access and completion.

Research question 2. The second research question focused on the extent to which the relationship between institutional competition and institutional accountability for public purposes changed with the addition of institutional fiscal health. In other words, (a) is institutional fiscal health a significant predictor in the model for each of the DVs, (b) does the DV model with the inclusion of institutional fiscal health predict over and above the DV model without institutional fiscal health, and if so, (c) does the slope of the regression line for the DV model change based on the value of institutional fiscal health. To evaluate the significance of the contribution that institutional fiscal health makes to each DV model, the final DV model developed in step 2 for research question one was used to conduct model comparisons.

Affordability. The model for affordability developed in step 2 for research question one was as follows:

$$\text{Affordability} = \beta_0 + \beta_{\text{BACDEGREES}}\text{BACDEGREES} + \beta_{\log\text{PROXSCORE}}\log\text{PROXSCORE} + \beta_{\text{PORTIONUG}}\text{PORTIONUG} +$$

$$\beta_{\text{ACTCM75}}\text{ACTCM75} + \beta_{\text{sqrtNDUPUGRAD}}\text{sqrtNDUPUGRAD} +$$

$$\beta_{\text{sqrtFEDRESEARCH}}\text{sqrtFEDRESEARCH} + \beta_{\text{logSTATEAPPR}}\text{logSTATEAPPR} +$$

$$\beta_{\text{logVOLSUPPORT}}\text{logVOLSUPPORT} + \epsilon$$

The institutional fiscal health variable (FISCALHLTH) was added to this model to establish a preliminary model for affordability. Regression diagnostics were used to evaluate the model for conformance to multiple regression assumptions. Residual plots were used to evaluate the error assumptions of constant variance and normality. The residual plot of residuals against the fitted values did not show a dramatic departure from constant variance. In addition, the Non-Constant Variance Score Test was not significant, $X^2(1, n = 428) = 0.043, p = .84$, providing additional evidence that the constant variance assumption was not violated. Inspecting the Q-Q plot of the residuals did not reveal a dramatic deviation from the assumption of normality of errors. The residual plot, a scatterplot matrix of the residuals against each predictor, and partial residual plots were used to evaluate model adequacy and the assumption of linearity. A smoothed (best-fitting) line and regression line were superimposed on each graph to evaluate adequacy and the assumption of linearity. All of the graphs illustrated linear near-flat lines providing evidence of adequacy and linearity. Lastly, influential observations were evaluated using Cook's D, leverage, and the Bonferroni Outlier Test, which was not significant, $t(417) = 2.82$, Bonferroni $p > .05$. With the multiple regression assumptions addressed, the result of the omnibus F -test for the multiple regression model was reviewed. The omnibus F -test for the model was statistically significant, $F(9, 418) = 2.73, p = .004$. The multiple R-squared was .06

for the model. It was also noted that public fiscal support (logSTATEAPPR) had a statistically significant specific test result, ($\beta = -8.49e-03$, $p = .02$), as well as student enrollment (sqrtUNDUPUGRAD), ($\beta = 8.71e-05$, $p = .04$), when all of the other variables were included in the model.

Model comparison was used to evaluate if the institutional fiscal health variable contributed above and beyond the reduced model with the institutional competition variables. The test statistic for the model comparison was the generalized F statistic. The null hypothesis for the model comparison was $H_0: \beta_{\text{FISCALHLTH}} = 0$. The model comparison was not statistically significant, $F(1, 418) = 0.20$, $p = .65$. The null hypothesis was not rejected indicating that there is some evidence that institutional fiscal health is not a significant predictor of institutional affordability.

To examine if the slope of the regression line for the DV model changed based on the value of institutional fiscal health, interaction terms were introduced into the full model. Model comparison was then used to evaluate the presence of interaction effects. The test statistic for the model comparison was the generalized F statistic. The null hypothesis for the model comparison was $H_0: \beta_{\text{ACTCM75*FISCALHLTH}} = \beta_{\text{sqrtUNDUPUGRAD*FISCALHLTH}} = \beta_{\text{sqrtFEDRESEARCH*FISCALHLTH}} = \beta_{\text{logSTATEAPPR*FISCALHLTH}} = \beta_{\text{logVOLSUPPORT*FISCALHLTH}} = 0$. The model comparison was not statistically significant, $F(5, 413) = 0.74$, $p = .65$. The null hypothesis was not rejected indicating there is some evidence that the relationship between institutional competition and institutional affordability does not change based on the value of institutional fiscal health. Table

18 provides a summary of the regression coefficients and multiple R-squared for each of the models.

Table 18

Regression Coefficients and Multiple R-Squared for Control, Institutional Competition and Institutional Fiscal Health Models

Variable	Dependent Variables					
	Affordability		Access		Completion	
	R^2	b	R^2	b	R^2	b
Research Q1: Step 1	.02*		.00		.02*	
Control Variables ^a						
Research Q1: Step 2	.05**		.16***		.09***	
ACTCM75		-1.27e-03		-5.37e-02***		6.34e-02***
sqrtUNDUPUGRAD		8.83e-05*		2.95e-03**		1.96e-03
sqrtFEDRESEARCH		7.83e-08		1.79e-05		5.84e-06
logSTATEAPPR		-8.56e-03*		-5.47e-01***		2.83e-02
logVOLSUPPORT		1.79e-04		-2.09e-02		-1.13e-01
Research Q2:	.06**		.18***		.09***	
ACTCM75		-1.25e-03		-5.03e-02**		6.20e-02***
sqrtUNDUPUGRAD		8.71e-05*		2.73e-03**		2.04e-03
sqrtFEDRESEARCH		7.57e-08		1.75e-05		6.03e-06
logSTATEAPPR		-8.49e-03*		-5.34e-01***		2.31e-02
logVOLSUPPORT		-1.20e-04		-7.54e-02		-9.04e-02
FISCALHLTH		5.17e-04		9.41e-02***		-3.84e-02

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

^aControl variables included in all models consisted of BACDEGREES, PORTIONUG, and logPROXSCORE.

Access. The model for access developed in step 2 for research question one was as follows:

$$\begin{aligned} \text{Access} = & \beta_0 + \beta_{\text{BACDEGREES}}\text{BACDEGREES} + \beta_{\log\text{PROXSCORE}}\log\text{PROXSCORE} + \\ & \beta_{\text{PORTIONUG}}\text{PORTIONUG} + \beta_{\text{ACTCM75}}\text{ACTCM75} + \\ & \beta_{\text{sqrtNDUPUGRAD}}\text{sqrtNDUPUGRAD} + \beta_{\text{sqrtFEDRESEARCH}}\text{sqrtFEDRESEARCH} + \\ & \beta_{\log\text{STATEAPPR}}\log\text{STATEAPPR} + \beta_{\log\text{VOLSUPPORT}}\log\text{VOLSUPPORT} + \epsilon \end{aligned}$$

The institutional fiscal health variable (FISCALHLTH) was added to this model to establish a preliminary model for access. Regression diagnostics were used to evaluate the model for conformance to multiple regression assumptions. Residual plots were used to evaluate the error assumptions of constant variance and normality. The residual plot of residuals against the fitted values did not show a dramatic departure from constant variance. In addition, the Non-Constant Variance Score Test was not significant, $X^2(1, n = 428) = 0.86, p = .35$, providing additional evidence that the constant variance assumption was not violated. Inspecting the Q-Q plot of the residuals did not reveal a dramatic deviation from the assumption of normality of errors. The residual plot, a scatterplot matrix of the residuals against each predictor, and partial residual plots were used to evaluate model adequacy and the assumption of linearity. A smoothed (best-fitting) line and regression line were superimposed on each graph to evaluate adequacy and the assumption of linearity. All of the graphs illustrated linear near-flat lines providing evidence of adequacy and linearity. Lastly, influential observations were evaluated using Cook's D, leverage, and the Bonferroni Outlier Test, which was not significant, $t(417) = 3.32$, Bonferroni $p > .05$. With the

multiple regression assumptions addressed, the result of the omnibus F -test for the multiple regression model was reviewed. The omnibus F -test for the model was statistically significant, $F(9, 418) = 10.37, p < .001$. The multiple R-squared was .18 for the model. Reviewing the specific tests for the model, public fiscal support (logSTATEAPPR) was statistically significant, ($\beta = -5.34e-01, p < .001$), student enrollment (sqrtUNDUPUGRAD) was statistically significant, ($\beta = 2.73e-03, p = .007$), student selectivity (ACTCM75) was statistically significant, ($\beta = -5.03e-02, p = .001$), and institutional fiscal health (FISCALHLTH) was statistical significant, ($\beta = 9.41e-02, p < .001$), when in the model with research funding (sqrtFEDRESEARCH) and private giving (logVOLSUPPORT).

Model comparison was used to evaluate if the institutional fiscal health variable contributed above and beyond the reduced model with the institutional competition variables. The test statistic for the model comparison was the generalized F statistic. The null hypothesis for the model comparison was $H_0: \beta_{\text{FISCALHLTH}} = 0$. The model comparison was statistically significant, $F(1, 418) = 12.99, p < .001$. The null hypothesis was rejected and the model comparison provides evidence that the institutional fiscal health variable is a significant predictor of institutional access.

To evaluate if the relationship (i.e. the slope of the regression line) between institutional competition and institutional access changed based on the value of institutional fiscal health, interaction terms were introduced into the model. Model comparison using the generalized F statistic was used to test the null hypothesis that there is no interaction effect or $H_0: \beta_{\text{ACTCM75}*\text{FISCALHLTH}} = \beta_{\text{sqrtUNDUPUGRAD}*\text{FISCALHLTH}} =$

$$\beta_{\text{sqrtFEDRESEARCH}*\text{FISCALHLTH}} = \beta_{\text{logSTATEAPPR}*\text{FISCALHLTH}} = \beta_{\text{logVOLSUPPORT}*\text{FISCALHLTH}} = 0.$$

The model comparison was not statistically significant, $F(5, 413) = 1.51, p > .05$, indicating there is evidence that the nature of the relationship between institutional competition and institutional access does not change based on institutional fiscal health. Table 18 provides a summary of the regression coefficients and multiple R-squared for each of the models.

Completion. The model for completion developed in step 2 for research question one was as follows:

$$\begin{aligned} \text{Completion} = & \beta_0 + \beta_{\text{BACDEGREES}}\text{BACDEGREES} + \\ & \beta_{\text{logPROXSCORE}}\text{logPROXSCORE} + \beta_{\text{PORTIONUG}}\text{PORTIONUG} + \\ & \beta_{\text{ACTCM75}}\text{ACTCM75} + \beta_{\text{sqrtNDUPUGRAD}}\text{sqrtNDUPUGRAD} + \\ & \beta_{\text{sqrtFEDRESEARCH}}\text{sqrtFEDRESEARCH} + \beta_{\text{logSTATEAPPR}}\text{logSTATEAPPR} + \\ & \beta_{\text{logVOLSUPPORT}}\text{logVOLSUPPORT} + \epsilon \end{aligned}$$

The institutional fiscal health variable (FISCALHLTH) was added to this model to establish a preliminary model for completion. Regression diagnostics were used to evaluate the model for conformance to multiple regression assumptions. Residual plots were used to evaluate the error assumptions of constant variance and normality. The residual plot of residuals against the fitted values did not show a dramatic departure from constant variance. In addition, the Non-Constant Variance Score Test was not significant, $X^2(1, n = 428) = 0.042, p = .84$, providing additional evidence that the constant variance assumption was not violated. Inspecting the Q-Q plot of the residuals did not reveal a dramatic deviation from the assumption of normality of

errors. The residual plot, a scatterplot matrix of the residuals against each predictor, and partial residual plots were used to evaluate model adequacy and the assumption of linearity. A smoothed (best-fitting) line and regression line were superimposed on each graph to evaluate adequacy and the assumption of linearity. All of the graphs illustrated linear near-flat lines providing evidence of adequacy and linearity. Lastly, influential observations were evaluated using Cook's D, leverage, and the Bonferroni Outlier Test, which was not significant, $t(417) = 2.78$, Bonferroni $p > .05$. With the multiple regression assumptions addressed, the results of the omnibus F -test for the multiple regression model were reviewed. The omnibus F -test for the model was statistically significant, $F(9, 418) = 4.65$, $p < .001$. The multiple R-squared was .09 for the model. It was also noted that student selectivity (ACTCM75) was the only variable with a specific test result that was statistically significant, ($\beta = 6.20e-02$, $p < .001$), when all of the other variables were included in the model.

Model comparison was used to evaluate if the institutional fiscal health variable contributed above and beyond the reduced model with the institutional competition variables. The test statistic for the model comparison was the generalized F statistic. The null hypothesis for the model comparison was $H_0: \beta_{\text{FISCALHLTH}} = 0$. The model comparison was not statistically significant, $F(1, 418) = 1.62$, $p = .20$. The null hypothesis was not rejected, indicating that there is some evidence that institutional fiscal health is not a significant predictor of institutional completion.

To examine if the slope of the regression line for the DV model changed based on the value of institutional fiscal health, interaction terms were introduced into the

full model. Model comparison was then used to evaluate the presence of interaction effects. The test statistic for the model comparison was the generalized F statistic. The null hypothesis for the model comparison was $H_0: \beta_{\text{ACTCM75}*\text{FISCALHLTH}} = \beta_{\text{sqrtUNDUPUGRAD}*\text{FISCALHLTH}} = \beta_{\text{sqrtFEDRESEARCH}*\text{FISCALHLTH}} = \beta_{\text{logSTATEAPPR}*\text{FISCALHLTH}} = \beta_{\text{logVOLSUPPORT}*\text{FISCALHLTH}} = 0$. The model comparison was not statistically significant, $F(5, 413) = 1.84, p = .07$. The null hypothesis was not rejected indicating there is some evidence that the relationship between institutional competition and institutional completion does not change due to the value of institutional fiscal health. Table 18 provides a summary of the regression coefficients and multiple R-squared for each of the models.

The emphasis in research question two was on the impact that institutional fiscal health had on each of the DV models. In particular, the analyses examined (a) if institutional fiscal health was a significant predictor in the model for each of the DVs, (b) if the DV model with the inclusion of institutional fiscal health performed over and above the DV model without institutional fiscal health, and if so, (c) does the slope of the regression line for the DV model change based on the value of institutional fiscal health. For both affordability and completion, institutional fiscal health was not a significant predictor. In addition, for both affordability and completion, the inclusion of institutional fiscal health in the model did not significantly improve the models. In the case of access, institutional fiscal health was a significant predictor with a positive relationship. The model for access with institutional fiscal health included as a predictor was statistically a stronger model than the model without institutional fiscal

health. However, there was only a 1% increase in the amount of variance accounted for in change in access for the model that included institutional fiscal health in comparison to the model without institutional fiscal health. For all three models no interaction effects were found providing evidence that the relationship between institutional competition and institutional accountability does not change based on the value of institutional fiscal health.

Research question 3. The third research question guiding the study examined the extent to which the relationship between institutional competition and institutional accountability for public purposes differs across the market segments of postsecondary education. In other words, (a) is market segment a significant predictor in the model for each of the DVs, (b) to what extent are there significant mean differences between market segments, and (c) to what extent does the nature of the relationship (i.e. slope of the regression lines) differ among market segments. To evaluate the significance of the contribution that institutional market segment makes to each model, the final DV model developed in research question two was used to conduct model comparisons.

Affordability. The model for affordability developed in research question two was as follows:

$$\begin{aligned} \text{Affordability} = & \beta_0 + \beta_{\text{BACDEGREES}}\text{BACDEGREES} + \\ & \beta_{\log\text{PROXSCORE}}\log\text{PROXSCORE} + \beta_{\text{PORTIONUG}}\text{PORTIONUG} + \\ & \beta_{\text{ACTCM75}}\text{ACTCM75} + \beta_{\text{sqrtNDUPUGRAD}}\text{sqrtNDUPUGRAD} + \\ & \beta_{\text{sqrtFEDRESEARCH}}\text{sqrtFEDRESEARCH} + \beta_{\log\text{STATEAPPR}}\log\text{STATEAPPR} + \\ & \beta_{\log\text{VOLSUPPORT}}\log\text{VOLSUPPORT} + \epsilon \end{aligned}$$

The institutional market segment variable (MARKETSEG) was added to this model to establish a preliminary model for affordability. Since market segment was a factor variable, dummy variables were also created and added to represent each market segment in the model. Regression diagnostics were used to evaluate the model for conformance to multiple regression assumptions with grouped data. Residual plots were used to evaluate the error assumptions of constant variance. The residual plot of residuals against the fitted values within each group did not show a dramatic departure from constant variance. In addition, Levene's Test for Homogeneity of Variance was not significant, $F(3,424) = 0.86, p = .46$, providing further evidence of homogeneity of variance. The residual plots, a scatterplot matrix of the residuals against each predictor, and partial residual plots were used to evaluate model adequacy and the assumption of linearity. Lastly, influential observations were evaluated using Cook's D, leverage, and the Bonferroni Outlier Test. With the multiple regression assumptions addressed, the result of the omnibus F -test for the multiple regression model was reviewed. The omnibus F -test for the model was statistically significant, $F(11, 416) = 2.26, p = .01$. The multiple R-squared was still modest at .06 for the model.

Model comparison was used to evaluate if the addition of the institutional market segment variables added significant predictive power to the model and if mean differences existed in change in affordability between market segments. The test statistic for the model comparison was the generalized F statistic. The null hypothesis for the model comparison was $H_0: \beta_{\text{MARKETSEG}} = 0$. The model comparison was not

statistically significant, $F(3, 416) = 0.20, p = .90$. The null hypothesis was not rejected providing evidence that the model with institutional market segment and the model without institutional market segment have equal fit in the population and providing evidence that there were no mean differences in change in affordability between the different market segments when controlling for all of the other variables contained in the model.

To examine if the relationship between institutional competition and institutional affordability changed based on market segment, interaction terms were introduced into the full model. Model comparison was then used to evaluate the presence of interaction effects. The test statistic for the model comparison was the generalized F statistic. The null hypothesis for the model comparison was $H_0: \beta_{\text{ACTCM75} * \text{MARKETSEG}} = \beta_{\text{sqrtUNDUPUGRAD} * \text{MARKETSEG}} = \beta_{\text{sqrtFEDRESEARCH} * \text{MARKETSEG}} = \beta_{\text{logSTATEAPPR} * \text{MARKETSEG}} = \beta_{\text{logVOLSUPPORT} * \text{MARKETSEG}} = 0$. The model comparison was not statistically significant, $F(18, 401) = 1.06, p = .39$. The null hypothesis was not rejected indicating there is some evidence that the relationship between institutional competition and institutional affordability does not change based on institutional market segment. Table 19 provides a summary of the regression coefficients and multiple R-squared for the models.

Table 19

Regression Coefficients and Multiple R-Squared for All Models

Variable	Dependent Variables					
	Affordability		Access		Completion	
	R^2	b	R^2	b	R^2	b
Research Q1: Step 1	.02*		.00		.02*	
Control Variables ^a						
Research Q1: Step 2	.05**		.16***		.09***	
ACTCM75		-1.27e-03		-5.37e-02***		6.34e-02***
sqrtUNDUPUGRAD		8.83e-05*		2.95e-03**		1.96e-03
sqrtFEDRESEARCH		7.83e-08		1.79e-05		5.84e-06
logSTATEAPPR		-8.56e-03*		-5.47e-01***		2.83e-02
logVOLSUPPORT		1.79e-04		-2.09e-02		-1.13e-01
Research Q2:	.06**		.18***		.09***	
ACTCM75		-1.25e-03		-5.03e-02**		6.20e-02***
sqrtUNDUPUGRAD		8.71e-05*		2.73e-03**		2.04e-03
sqrtFEDRESEARCH		7.57e-08		1.75e-05		6.03e-06
logSTATEAPPR		-8.49e-03*		-5.34e-01***		2.31e-02
logVOLSUPPORT		-1.20e-04		-7.54e-02		-9.04e-02
FISCALHLTH		5.17e-04		9.41e-02***		-3.84e-02
Research Q3:	.06*		.19***		.09***	
ACTCM75		-1.02e-03		-4.42e-02*		5.84e-02**
sqrtUNDUPUGRAD		8.99e-05*		2.82e-03**		1.90e-03
sqrtFEDRESEARCH		1.32e-07		1.40e-05		7.92e-06
logSTATEAPPR		-8.56e-03*		-5.09e-01***		9.71e-03
logVOLSUPPORT		1.07e-04		-7.07e-02		-1.11e-01
FISCALHLTH		NC ^b		8.73e-02**		NC ^b
		μ		μ		μ
MARKETSEG 1,2,3		-.033		.963		-1.75
MARKETSEG 4		-.030		.785		-1.65
MARKETSEG 5		-.029		.960		-1.76
MARKETSEG 6 & 7		-.027		.909		-1.75

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

^aControl variables included in all models consisted of BACDEGREES, PORTIONUG, and logPROXSCORE.

^bThe institutional fiscal health variable (FISCALHLTH) was not contained in the model due to the non-significant result of the model comparison in the analyses for research question 2.

Access. The model for access developed in research question two was as follows:

$$\begin{aligned} \text{Access} = & \beta_0 + \beta_{\text{BACDEGREES}}\text{BACDEGREES} + \beta_{\log\text{PROXSCORE}}\log\text{PROXSCORE} + \\ & \beta_{\text{PORTIONUG}}\text{PORTIONUG} + \beta_{\text{ACTCM75}}\text{ACTCM75} + \\ & \beta_{\text{sqrtNDUPUGRAD}}\text{sqrtNDUPUGRAD} + \beta_{\text{sqrtFEDRESEARCH}}\text{sqrtFEDRESEARCH} + \\ & \beta_{\log\text{STATEAPPR}}\log\text{STATEAPPR} + \beta_{\log\text{VOLSUPPORT}}\log\text{VOLSUPPORT} + \\ & \beta_{\text{FISCALHLTH}}\text{FISCALHLTH} + \epsilon \end{aligned}$$

The institutional market segment variable (MARKETSEG) was added to this model to establish a preliminary model for access. Regression diagnostics were used to evaluate the model for conformance to multiple regression assumptions with grouped data. Residual plots were used to evaluate the error assumption of constant variance. The residual plot of residuals against the fitted values showed some departure from constant variance. In addition, Levene's Test for Homogeneity of Variance was significant, $F(3,424) = 2.68, p = .05$, providing further evidence that the assumption of homogeneity of variance may be violated. Tabachnick and Fidell (2007) recommend that homogeneity of variance be assessed with F_{max} in conjunction with sample-size ratios, as tests of homogeneity of variance can be too strict. F_{max} is calculated as the ratio of the largest cell variance to the smallest. An F_{max} as great as 10 is acceptable, with sample sizes ratios of 4 to 1 or down to an F_{max} of 3 with a sample size ratio of 9 to 1. For the access sample in this study, $F_{max} = 2.03$ with a sample size ratio of 4.71 to 1, falling within the acceptable guidelines. The residual plots, a scatterplot matrix of the residuals against each predictor, and partial residual plots were used to evaluate

model adequacy and the assumption of linearity. Lastly, influential observations were evaluated using Cook's D, leverage, and the Bonferroni Outlier Test. With the multiple regression assumptions addressed, the result of the omnibus F -test for the multiple regression model was reviewed. The omnibus F -test for the model was statistically significant, $F(12, 415) = 8.30, p < .001$. The multiple R-squared value for the model was .19.

Model comparison was used to evaluate if the inclusion of the institutional market segment variables added significant predictive power to the model. The test statistic for the model comparison was the generalized F statistic. The null hypothesis for the model comparison was $H_0: \beta_{\text{MARKETSEG}} = 0$. The model comparison was not statistically significant, $F(3, 415) = 1.91, p = .13$. The null hypothesis was not rejected indicating there is evidence that the model with institutional market segment and the model without institutional market segment have equal fit in the population and providing evidence that there were no significant mean differences in change in access between market segments when controlling for all of the other variables contained in the model.

To examine if the relationship between institutional competition and institutional access changed based on market segment, interaction terms were introduced into the full model. Model comparison was then used to evaluate the presence of interaction effects. The test statistic for the model comparison was the generalized F statistic. The null hypothesis for the model comparison was $H_0: \beta_{\text{ACTCM75*MARKETSEG}} = \beta_{\text{sqrtUNDUPUGRAD*MARKETSEG}} = \beta_{\text{sqrtFEDRESEARCH*MARKETSEG}} =$

$\beta_{\log\text{STATEAPPR}*\text{MARKETSEG}} = \beta_{\log\text{VOLSUPPORT}*\text{MARKETSEG}} = \beta_{\text{FISCALHLTH}*\text{MARKETSEG}} = 0$. The model comparison was not statistically significant, $F(21, 397) = 1.18, p = .27$. The null hypothesis was not rejected indicating there is some evidence that the relationship between institutional competition and institutional access does not change based on institutional market segment. Table 19 provides a summary of the regression coefficients and multiple R-squared for the models.

Completion. The model for completion developed in research question two was as follows:

$$\begin{aligned} \text{Completion} = & \beta_0 + \beta_{\text{BACDEGREES}}\text{BACDEGREES} + \\ & \beta_{\log\text{PROXSCORE}}\log\text{PROXSCORE} + \beta_{\text{PORTIONUG}}\text{PORTIONUG} + \\ & \beta_{\text{ACTCM75}}\text{ACTCM75} + \beta_{\text{sqrtNDUPUGRAD}}\text{sqrtUNDUPUGRAD} + \\ & \beta_{\text{sqrtFEDRESEARCH}}\text{sqrtFEDRESEARCH} + \beta_{\log\text{STATEAPPR}}\log\text{STATEAPPR} + \\ & \beta_{\log\text{VOLSUPPORT}}\log\text{VOLSUPPORT} + \epsilon \end{aligned}$$

The institutional market segment variable (MARKETSEG) was added to this model to establish a preliminary model for completion. Regression diagnostics were used to evaluate the model for conformance to multiple regression assumptions with grouped data. Residual plots were used to evaluate the error assumptions of constant variance. The residual plot of residuals against the fitted values showed some departure from homogeneity of variance. The Levene's Test for Homogeneity of Variance was significant, $F(3,424) = 2.85, p = .04$, providing further evidence that the assumption of homogeneity variance may be violated. As suggested by Tabachnick and Fidell (2007) the F_{max} ratio was reviewed in conjunction with the sample-size ratio. For the

completion sample in this study, $F_{max} = 2.57$ with a sample size ratio of 4.71 to 1, falling within the acceptable guidelines. The residual plot, a scatterplot matrix, and partial residual plots were used to evaluate model adequacy and the assumption of linearity. Lastly, influential observations were evaluated. With the multiple regression assumptions addressed, the result of the omnibus F -test for the multiple regression model was reviewed. The omnibus F -test for the model was statistically significant, $F(11, 416) = 3.78, p < .001$. The multiple R-squared was .09 for the model.

Model comparison was used to evaluate if the addition of the institutional market segment variables added significant predictive power to the model and if significant mean differences in change in completion existed between market segments. The test statistic for the model comparison was the generalized F statistic. The null hypothesis for the model comparison was $H_0: \beta_{\text{MARKETSEG}} = 0$. The model comparison was not statistically significant, $F(3, 416) = 0.66, p = .68$. The null hypothesis was not rejected indicating there is evidence that the model with institutional market segment and the model without institutional market segment have equal fit in the population and that there were no significant mean differences in change in completion between market segments. In addition, the inclusion of institutional market segment in the model did not increase the predictive power of the model.

To examine if the relationship between institutional competition and institutional completion changed based on market segment, interaction terms were

introduced into the full model. Model comparison was then used to evaluate the presence of interaction effects. The test statistic for the model comparison was the generalized F statistic. The null hypothesis for the model comparison was $H_0: \beta_{\text{ACTCM75} * \text{MARKETSEG}} = \beta_{\text{sqrtUNDUPUGRAD} * \text{MARKETSEG}} = \beta_{\text{sqrtFEDRESEARCH} * \text{MARKETSEG}} = \beta_{\text{logSTATEAPPR} * \text{MARKETSEG}} = \beta_{\text{logVOLSUPPORT} * \text{MARKETSEG}} = 0$. The model comparison was not statistically significant, $F(18, 401) = 1.55, p = .07$. The null hypothesis was not rejected indicating there is some evidence that the relationship between institutional competition and institutional completion does not change due to institutional market segment. Table 19 provides a summary of the regression coefficients and multiple R-squared for the models.

The third research question guiding the study examined the extent to which the relationship between institutional competition and institutional accountability for public purposes differed across the market segments of postsecondary education. In particular the analyses focused on examining (a) if an institution's market segment was a significant predictor in the model for each of the DVs, (b) to what extent were there significant mean differences between market segments, and (c) to what extent does the nature of the relationship between institutional competition and institutional accountability differ among market segments.

In all three models the inclusion of institutional market segment did not improve the predictive models nor were there any significant mean differences in change in affordability, access, or completion found between market segments. In addition, for all three models no interaction effects were found providing evidence that

the relationship between institutional competition and institutional accountability does not change based on institutional market segment.

To aid in interpretation of the results and in preparation for a discussion of the results, the partial regression coefficients for the institutional competition variables examined in research question one that were transformed to better conform with multiple regression assumptions were restated in the metric of the dependent variables as shown in Table 20.

Table 20

Restated Regression Coefficients for Institutional Competition Models

Variable	Dependent Variables					
	Affordability		Access		Completion	
	R^2	b	R^2	b	R^2	b
Research Q1: Step 1	.02*		.00		.02*	
Control Variables ^a						
Research Q1: Step 2	.05**		.16***		.09***	
ACTCM75		-1.27e-03		-5.37e-02***		6.34e-02***
UNDUPUGRAD		4.00e-05*		1.00e-05**		3.81e-06
FEDRESEARCH		6.13e-15		3.20e-10		3.41e-11
STATEAPPR		-4.00e-03*		-2.00e-03***		1.22e-04
VOLSUPPORT		7.04e-07		-9.03e-05		-4.88e-04

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

^aControl variables included in all models consisted of BACDEGREES, PORTIONUG, and logPROXSCORE.

A full discussion of the results from research question one, as well as research question two and three along with implications for theory, policy and practice will be provided in chapter 5.

Chapter Five: Discussion and Implications

The purpose of this study was to explore the relationship between institutional accountability for public purposes and institutional competition at the undergraduate level among U.S. public four-year institutions. In particular, this study focused on examining institutional competition organized around the four key markets that generate institutional revenues (student enrollment, research funding, public fiscal support, and private giving) and institutional accountability for public purposes defined by accountability measures most frequently included in state-level performance accountability systems (access, affordability, and degree completion).

Reflecting on the literature concerning institutional accountability, one of the primary purposes of state-level accountability is increased responsiveness to state needs, with states being the primary entity responsible for ensuring the responsiveness of higher education to public needs. Interestingly, this focus on state-level accountability has increased during a decade in which state funding for public higher education has decreased. However, previous studies examining state-level accountability showed a diminishing impact of current accountability programs regardless of program type or initiation method (Burke & Minassians, 2003, 2002c; Hendel et al., 2004). The research also suggested responsiveness to state-level accountability may have more to do with institutional factors (such as type or prestige) and economic factors (Naughton, 2004; Woodley, 2005). Research focused on institutional competition illustrated the nature of competition differs between prestige and reputation across the market-segments of higher education (Brewer et al., 2002;

Marginson, 2006; Zemsky, 1997). In addition, research that considered in tandem the influence of institutional competition on institutional accountability, further reinforced the question of institutional ability to balance institutional competition and accountability for public purposes (Dill, 2003; The Futures Project, 2004). Merging the literature and previous research suggested an intriguing relationship between institutional competition for resources and accountability for public purposes worthy of further study.

The accountability triangle (Burke, 2005a), resource dependency theory (Pfeffer & Salancik, 1978), and the postsecondary market taxonomy (Zemsky et al., 1997) provided a framework and theory for considering the relationship between institutional competition for resources and accountability for public purposes in an examination of the following research questions:

- 1) What is the relationship between institutional competition and institutional accountability for public purposes at the undergraduate level among U. S. public four-year institutions?
- 2) To what extent does the relationship between institutional competition and institutional accountability for public purposes differ based on institutional fiscal health?
- 3) To what extent does the relationship between institutional competition and institutional accountability for public purposes differ across the market segments of postsecondary undergraduate education?

Discussion of Results for Research Question 1

The work completed by Dill (2003), Brewer et al. (2002), and The Futures Project (2004), which considered the implications of institutional competition on institutional accountability for public purposes at the undergraduate level among U.S. public four-year institutions in light of the accountability triangle, implied that the demands of accountability for state priorities (public purposes) must be balanced against the demands of academic concerns (prestige and quality) and market forces (reputation). Given the previous research and literature, I expected that institutional competition would be associated with institutional accountability for public purposes.

For all three public purposes (affordability, access, and completion) the block of institutional competition variables produced a model that was statistically significant. A negative relationship between institutional competition and institutional accountability was observed for public purposes such as access and affordability. However, a positive relationship between institutional competition and institutional accountability was observed for the public purpose of completion. The institutional competition variables, with the control variables also included in the model, accounted for .05 of the variance in change in affordability, .09 of the variance in change in completion, and .16 of the variance in change in access. Examining the statistically significant specific tests for each model provides further insights into the relationship between institutional competition and institutional accountability.

Examining affordability as the dependent variable, public fiscal support had a statistically significant negative relationship and student enrollment had a statistically

significant positive relationship. Within the context of the conceptual framework, the findings suggest that as the proportion of state allocation funds acquired by an institution increased, an institution's responsiveness or change in affordability decreased, and as undergraduate student enrollment at an institution increased, an institution's responsiveness to affordability increased. While these relationships were statistically significant, it is also important to consider practical significance. The partial regression coefficient indicated that an increase in one undergraduate student enrolled, while holding all other variables constant, would produce a .00004% increase in affordability. Similarly, a 1% change in the proportion of state allocation funds acquired by an institution would produce a .004% decrease in affordability. While each of the variables was statistically significant, the practical implication was modest.

Considering completion as the dependent variable, the only variable with a statistically significant effect was student selectivity as measured by an institution's composite ACT score at the 75 percentile. Within the context of this study, the finding indicates that as the student selectivity of an institution increased, the institution's responsiveness to completion increased. In other words, the higher the institution's undergraduate composite ACT score at the 75th percentile for the fall of 2008, the greater the improvement in degree completion between 1998 and 2008. The strong relationship between student academic test scores, such as the ACT composite score, and degree completion has been well documented (Asmussen, 2010). The findings from this study further confirm the relationship between student selectivity

and degree completion. The partial regression coefficient for student selectivity indicated that a one unit change in ACT composite score at the 75th percentile, while holding all other variables constant, would produce a .06 increase in composite completion score. So for example, if the ACT composite score at the 75th percentile for an incoming cohort of undergraduate students increased from 23 to 24, an institution's composite completion score (combined first-year to second-year retention rate and six-year graduation rate) would increase .06.

Lastly, three variables had statistically significant specific tests in the model for access as the dependent variable. First, student selectivity was statistically significant with a negative relationship; therefore, as an institution's undergraduate composite ACT score at the 75th percentile increased, the institution's responsiveness to access decreased. Second, student enrollment had a positive relationship; therefore, as an institution's undergraduate student enrollment increased, the institution's responsiveness to access increased. Third, public fiscal support had a negative relationship, indicating that as the proportion of state allocation acquired by an institution increased, the institution's responsiveness to access decreased. Reviewing the partial regression coefficients, an increase in one undergraduate student enrolled, while holding all other variables constant, would produce a .00001 increase in an institution's composite access score. A 10% increase in the proportion of state allocation funds acquired by an institution would produce a .02 decrease in composite access score, and a one point increase in the ACT composite score at the 75th percentile would produce a .05 decrease in composite access score.

Reflecting on the collective results from all three models, some of the relationships and tensions suggested by the accountability triangle (Burke & Associates, 2005) and literature are observed. The adapted accountability triangle within the conceptual framework for this study proposes a basic tension between institutional competition and accountability for public purposes. In particular, the conceptual framework suggests that as institutional competitiveness increases, accountability for public purposes decreases. In the regression models for access and affordability, as the proportion of state funding acquired by an institution increased, responsiveness to access and affordability decreased. So, the more successful an institution was in acquiring state funds, the less responsive an institution was in improving access or affordability. Why would this be the case?

The work of Brewer et al. (2002) and Dill (2003) suggests that institutions that are competing for prestige will use resources to make investments that maintain or generate additional prestige in an effort to sustain or increase one's competitive position. Dill (2003) projected, for example, that institutions seeking prestige in the undergraduate student enrollment market would use resources to make investments such as increasing student quality or selectivity. The results of the models for access and affordability provide support for Brewer et al. (2002) and Dill's (2003) concern. In both of the models for access and affordability, as an institution acquired additional resources (e.g., increase in the proportion of state funding acquired) responsiveness to access and affordability decreased. As the competitive position of an institution

increased in acquiring funding, the resources acquired did not result in an increase in access or affordability.

Dill (2003) further conjectured that in some situations institutional investment behaviors would support responsiveness to public purposes. Within the models for access and affordability, as undergraduate student enrollment increased, the responsiveness or amount of positive change in affordability and access increased. In addition, as institutional student selectivity increased, the responsiveness or amount of positive change in degree completion increased. Interestingly, the same variable, student selectivity, which has a strong positive relationship with degree completion, has an almost equally strong negative relationship with access. This finding reinforces that not only can institutional competition be in tension with institutional accountability for public purposes, but that certain public purposes (access) can be in tension with other public purposes (completion).

Also intriguing are the variables that did not demonstrate statistically significant relationships within the sample for any of the models. Neither research funding, as measured by the total amount of federal grants and contracts acquired by an institution, nor private giving, as measured by total voluntary support acquired by an institution, were significant in any of the models. The non-significance of research funding and private giving may be a reflection of the relative importance of the two revenue markets in comparison to student enrollment and public fiscal support. Brewer et al. (2002) found that the revenue markets of student enrollment and public fiscal support were prominent within U.S. higher education.

Considering the effect size and adequacy of the models is also important. The model for affordability produced an effect size of .05, explaining 5% of the variance observed for change in affordability in the sample. The effect size of the model for degree completion explained 9% of the variance observed. Finally, the effect size of the model for access was the largest out of all three models at .16, explaining 16% of the variance observed in institutional responsiveness to access. The models developed provide an initial step toward explaining the variance observed in change in affordability, completion and access. However, there still remains an ample amount of variance in affordability, access, and completion that is not explained by the models that needs to be further examined.

In conclusion, the analysis for research question one suggests that there is a statistically significant relationship between institutional competition and institutional accountability for public purposes at the undergraduate level among U.S. public four-year institutions. Most salient to the relationship between institutional competition and institutional accountability for public purposes were the variables of public fiscal funds, student selectivity, and student enrollment. The framework established through a merger of the previous research literature and the accountability triangle provides an initial explanation for the observed relationships between institutional competition and institutional accountability for public purposes.

Discussion of Results for Research Question 2

The focus of research question two was on the importance of institutional fiscal health in the relationship between institutional competition and institutional

accountability for public purposes. Institutional fiscal health was operationally defined as an institution's composite financial score generated from three financial ratios (viability ratio, primary reserve ratio, and net income ratio). The examination of the impact of institutional fiscal health was driven by resource dependency theory (Pfeffer & Salancik, 2003). Resource dependency theory posits that organizations survive to the extent that they are effective, with effectiveness being determined by the interest groups that the organization relies upon for resources and support. When faced with competing demands, an organization with ample resources can attend to competing interests through a differentiated, loosely coupled subunit structure. Given constrained resources, however, an organization is unable to support differentiated, loosely coupled structures that can simultaneously meet the competing demands of resource dependencies. Applying resource dependency theory, I expected that differences in institutional fiscal health would be associated with statistically significant differences in the relationship between institutional competition and institutional accountability for public purposes. In addition, I expected that as an institution's fiscal health decreased, institutional accountability for public purposes would decrease.

Model comparisons were used to examine the importance of institutional fiscal health in all three of the models (affordability, access, and completion) that were established in examining research question one. For both affordability and completion there was evidence based on the sample data that institutional fiscal health did not make a significant contribution to the model, and therefore the relationship between

institutional competition and institutional accountability for public purposes was not associated with institutional fiscal health in the population. For access, however, institutional fiscal health did make a meaningful contribution to the model. When institutional fiscal health was added to the model for access, with the institutional competition variables and control variables, the new model explained over and above the model without institutional fiscal health. The model for access with institutional fiscal health explained 18% ($R^2 = .18$) of the variance observed in change in access, in comparison to the model without institutional fiscal health that explained 16% ($R^2 = .16$) of the variance observed in change in access. In addition, the specific test for institutional fiscal health was statistically significant with a positive relationship. Therefore, when institutional fiscal health increased, institutional responsiveness to access also increased.

The results for the access model are in line with what was expected in the application of resource dependency theory. However, the results for the completion and affordability model are not as expected. Two alternative explanations could possibly explain the institutional fiscal health findings for completion and affordability.

One aspect of resource dependency theory is the ability of an organization to respond to competing demands. In examining the model for completion, only one variable had a statistically significant relationship with completion, and the relationship was positive. As an institution's composite ACT score at the 75th percentile increased, the greater the improvement in degree completion. Increasing an

institution's student selectivity, by increasing the ACT score of students, would support both institutional prestige and the public purpose of completion. Therefore, within the model for completion there does not appear to be a situation of competing demands that requires an organization to support differentiated, loosely coupled structures. Within the model for affordability, student enrollment had a statistically significant positive relationship and public fiscal funds had a statistically significant negative relationship. However, the partial regression coefficients were small for both variables. Again, a situation of competing demands within the model for affordability appears to be minimal.

Another aspect of resource dependency theory is constrained resources. Considering the findings of institutional fiscal health for completion and affordability, an alternative explanation is that institutions still had sufficient resources during the time period of the study (between fall 1998 and spring 2009) to support the loosely coupled subunit structures necessary to support conflicting demands. In the Digest for Education Statistics (2010), total revenue for public four-year institutions increased steadily between fiscal year 2006 and fiscal year 2008. The first decrease in total revenue and total revenue per FTE student was noted in fiscal year 2009 when total revenue dropped from \$223,566,529 in fiscal year 2008 to \$216,432,317 in fiscal year 2009, and total revenue per FTE student dropped from \$28,823 to \$26,831.

Discussion of Results for Research Question 3

The work of Zemsky et al. (1997), Marginson (2006), and Brewer et al. (2002) stresses the varying nature of institutional competition across the postsecondary

market with competition among name brand or elite institutions being dominated by the pursuit of prestige, and competition among convenience/user-friendly or mass institutions being dominated by expanding reputation. In this study an institution's market segment was determined using the market taxonomy of Zemsky et al. (1997). The framework is based on market position and product, and was established from four sets of information including: (a) admit and yield rates, (b) percentage of freshmen who graduate with a BA or BS in five years, (c) percentage of undergraduate enrollment that is part-time, and (d) the ratio of the number of BA/BS degrees awarded to total undergraduate enrollment.

Dill's (2003) analysis of institutional competitive behaviors and implications for public purposes supported an expectation that differences in institutional market segments would be associated with statistically significant differences in the relationship between institutional competition and institutional accountability for public purposes. Building on Dill's (2003) analysis, I expected that market segments dominated by the pursuit of prestige (segments 1, 2, and 3) would have a negative relationship with institutional accountability for public purposes, and market segments dominated by the pursuit of expanding reputation (segments 6 and 7) would have a positive relationship with institutional accountability for public purposes.

Model comparisons were first used to examine the importance of institutional market segment in all three of the models (affordability, access, and completion) that were established in examining research question two. For all three models the addition of institutional market segment did not significantly add to the model above

and beyond the model without institutional market segment. In addition, no significant mean differences in change in affordability, access or completion were observed between market segments when institutional market segment was added into the models with the institutional competition and control variables.

To explore the nature of the relationship between institutional competition and institutional accountability, interactions between the market segment variable and all other variables were introduced into the models. No significant interactions were found providing evidence that the relationship between institutional competition and institutional accountability for public purposes did not differ based on market segment. This finding suggests that the nature of the relationship between institutional competition and institutional accountability remains the same across both forms of competition (prestige and reputation).

The finding that institutional market segment was not a significant variable in the relationship between institutional competition and institutional accountability for public purposes was surprising. A possible explanation could be related to the recent development of institutional competition as a salient force coupled with decreasing fiscal resources. The time frame for the study going from the fall of 1998 to spring 2009, may have been too early to capture the differentiation of impact of institutional competition across the market segments of higher education.

Implications for Theory, Policy, and Practice

The results of this study have implications for theory, policy and practice. I will discuss the implications for theory first.

Implications for theory. The conceptual framework for this study brought together the accountability triangle (Burke and Associates, 2005), resource dependency theory (Pfeffer & Salancik, 1978), and the postsecondary market taxonomy developed by Zemsky et al. (1997) to examine the relationships between institutional competition for resources and institutional accountability for public purposes. While aspects of the merged model could be applied in discussing some of the research findings, particularly for access, the model needs further development to more fully explain the relationships observed between institutional competition for resources and institutional accountability for public purposes. For all three of the institutional accountability multiple regression models, ample observed variance in institutional responsiveness to affordability, access, and degree completion remains unexplained. For both the completion and affordability models resource dependency theory was not applicable, and no findings supported the application of the market taxonomy.

The design of this study bridged work completed by the Future's Project (Newman et al., 2004; *The Futures Project: Policy for Higher Education in a Changing World*, 2004) that focuses on assessing the thinking of the higher education community regarding increased competition in the higher education arena, Naughton's (2004) work that examines the differential responsiveness of institutions to state-level accountability programs based on institutional type and prestige, Brewer et al's. (2002) examination of strategy and competition in U.S. higher education, and Dill's (2003) analysis of institutional investments in prestige or reputation. Unlike previous

related research that has employed only qualitative methods, this study sought to examine institutional competition for resources and institutional accountability for public purposes in tandem using quantitative methods. The model developed within this study provides an initial “footprint” for future modification, development, and research.

Further development of the measures used for the variables contained in the study would improve the goodness of the model. Limitations in the data that is systematically collected and publicly available impacted the measurement of some variables. For example, within the completion variable, the change in retention rate and graduation rate was limited to full-time students. A more thorough measure would also consider the retention rate and graduation rate for part-time students. Considering the undergraduate student enrollment selectivity measure, using ACT composite scores, the median composite ACT score for each institution would have been the preferred measure. However, data for median composite ACT score for each institution was not publicly available. While many variables could be measured using the indicators desired, the time-period of measurement for some had to be shortened. For example, the data to develop the affordability ratio was first collected by IPEDS beginning in fiscal year 2004. Therefore, the percent change in affordability was only examined between fiscal year 2004 to fiscal year 2009, versus the desired fiscal year 1999 to fiscal year 2009. Lastly, variables such as private giving, suffered from missing data, and required the use of imputation techniques to estimate missing values.

Implications for policy. The results of this study have several policy implications. First, the results reinforced the contention that the relationship between institutional competition and institutional accountability for public purposes is not consistent across public purposes. As demonstrated in the model results, institutional competition had a positive relationship with degree completion, but a negative relationship with access. Public policy must recognize this tension and reinforce institutional investment behaviors that support public purposes (e.g., access) that will not be incentivized through institutional competition. As suggested by Dill (2003) and Eckel and King (2006), the results from this study support the concern that institutional competition alone, or the marketplace, will not be sufficient or supportive of institutional accountability for public purposes such as access.

Focusing on completion and the positive relationship with student selectivity, a key question coming away from the study is completion for whom? The study indicates that institutions that have been the most responsive at improving degree completion are those serving the best academically prepared students. This is troubling given the negative relationship demonstrated between student selectivity and access. Finding ways to increase the enrollment and success of low-income students, first generation students, and students of ethnic or minority racial backgrounds are critical challenges facing higher education (Eckel & King, 2006). Within the 2020 college completion goals set by President Obama, access for low-income students and under-represented minorities is key to increasing the U.S. college degree attainment rate from 40% to 60% by the year 2020 (Kanter, Ochoa, Nassif, & Chong, 2011).

Second, the model for access was the strongest model developed in the study with the block of institutional competition variables explaining 16% of the variance in responsiveness to access. The model suggests that institutions that have been more competitive in acquiring state fiscal support and student selectivity have been less responsive to increasing access. The ability of our nation to remain competitive globally by advancing the educational attainment of our citizens requires that more students of diverse socioeconomic and ethnic and racial backgrounds have access to higher education and complete degrees (Callan, 2008). Further troubling within the model for access is the relationship with institutional fiscal health. During a time period of decreasing revenue for higher education, given the positive relationship between access and institutional fiscal health, measures to support and assure institutional fiscal health are prudent.

Finally, institutional competition explained the least with regards to the variance observed in change in affordability. The policy stance that institutional competition will support increased affordability by employing market forces is not apparent within the study results.

Implications for practice. The results from this study also have implications for institutional leaders as they navigate the forces of institutional competition and institutional accountability for public purposes. The findings indicated that while institutional competition and institutional accountability for access have a negative relationship, there are also some public purposes that are in tension with other public purposes (e.g., access and completion). Therefore, institutional leaders must be

cognizant of and intentional in not only balancing the forces of competition with accountability, but the contrary forces within accountability for public purposes.

Validity, Delimitations and Limitations of the Study Design

Issues of validity, delimitations and limitations of the study design are presented, beginning with a discussion of validity.

Validity. A primary form of validity evidence that requires consideration within this study is statistical conclusion validity (Creswell, 2009). There are a number of practical difficulties in using multiple regression as noted by Faraway (2005). First, the inferential methods of multiple regression assume normality and random sampling. Second, the range and choice of the predictors can lead to misinterpretation of relationships. Third, multiple regression can be prone to model misspecification. Fourth, publication and experimenter bias can lead to misinterpretation. Finally, both practical and statistical significance need to be considered.

To address statistical conclusion validity a number of strategies were employed within this study. First, each of the dependent variables was examined with regards to the assumption of normality. Next, regression diagnostics (error assumptions, model adequacy and unusual observations) were used to fit, and re-fit as needed, models within the analysis for each research question. Third, a review of literature, previous research, and theory guided the choice and measurement of variables. Fourth, the evaluation of variables and specification of models was done using a confirmatory approach guided by the study's research questions and expected relationships. Finally,

the results of the statistical methods performed were interpreted considering both practical and statistical significance.

Within correlational research it is impossible to account for all of the possible important independent variables making observational research prone to the lurking variable problem (Faraway, 2005). In any multiple regression situation derived from observational data there can be an unaccounted for variable that accounts for the relationship between the dependent and independent variable. Faraway (2005) makes several recommendations that can support stronger conclusions in multiple regression analysis based on observational studies: (a) try to include all of the relevant variables, (b) use non-statistical knowledge, and (c) try a variety of models and look for consistence of effects. Considering Faraway's recommendations, this study employed a review of literature, previous research, theory, and an examination of models using a confirmatory approach to support stronger conclusions.

Another form of validity evidence that was of importance within this study was construct validity. Issues of construct validity occur when investigators use inadequate definitions and measures of variables (Creswell, 2009). To address issues of construct validity, literature focused on institutional accountability, and institutional competition was used to define and determine appropriate measures for each variable. Previous research regarding institutional accountability and institutional competition, in particular, was used to guide the selection of appropriate measures.

Delimitations. There are several delimitations for this study that must be noted. First, the sampling design employed within this study limits the interpretation

of results to U.S. public four-year institutions. It would not be appropriate to extend the interpretation beyond four-year institutions to institutions that are private, for-profit, two-year, or outside the United States. Second, the study was limited to the examination of institutional competition and accountability for public purposes at the undergraduate level and did not address, for example, relationships at the graduate level. Finally, the focus of institutional competition is in regard to national competition. Research conducted by Marginson (2006) has suggested the nature of institutional competition differs between the national and global context. An examination of institutional competition at the global level was beyond the scope of this study.

Limitations. The research design selected for this study is a limitation. Correlational studies are “often referred to as ‘exploratory’ because they suggest relationships between variables that need additional study before claims of cause-and-effect relationships can be made” (Lodico, Spaulding, & Voegtle, 2006, p. 225). This limitation of the research design was accepted given the focus of the study was to explore the relationships between institutional accountability for public purposes and institutional competition at the undergraduate level among U. S. public four-year institutions, and not to make claims of cause-and-effect.

Opportunities for Future Research

The literature review and results of this study suggest several opportunities for future research.

Tensions between public purposes. One of the findings of this study was the tension observed between serving multiple public purposes. In particular, the same competitive behavior, increasing student selectivity, had opposite results for degree completion and student access. Considering degree completion and access are commonly identified accountability measures and critical public purposes for the future wellbeing of the country. Additional research is needed to explore the tensions and relationships between public purposes.

Private and for-profit institutions and public purposes. The focus of this study was limited to considering the relationship between institutional competition and institutional accountability for public purposes among four-year public institutions in the U. S. As private and for-profit institutions seek to secure additional resources, an alternative line of research could examine the extent to which public, private, and for-profit institutions have different relationships between institutional competition and institutional accountability for access.

International competition. As globalization continues, an increasing number of institutions are concerned with institutional competition not only at the national level, but also internationally. The work of Marginson (2006) suggests the nature of competition at the international level differs from the national level. Examining the implications of institutional competition at the international level for institutional accountability for public purposes would be a new contribution to the literature.

Institutional competition and accountability for public purposes at the graduate level. An area relatively unexplored is the nature of institutional

competition and accountability for public purposes at the graduate level. With the historical focus of accountability at the undergraduate level, research focused at the graduate level is virtually untapped.

Closing

Higher education institutions are facing increasing demands to be accountable for results that support public purposes, while at the same time experiencing increasing competition for resources, as well as decreasing state support for public higher education. This study explored the relationship between institutional competition for resources and institutional accountability for public purposes at the undergraduate level among four-year public institutions. The accountability triangle, resource dependency theory, and the postsecondary market taxonomy resulted in a conceptual framework that offered explanatory power. The findings of the study indicated both positive and negative relationships between the four key markets that generate institutional revenues (student enrollment, research funding, public fiscal support, and private giving) and institutional accountability for public purposes defined by accountability measures most frequently included in state-level performance accountability systems (access, affordability, and degree completion). However, no differences were found in the nature of the relationship between institutional competition and institutional accountability for public purposes across the market segments of higher education. In addition, the findings suggest tensions between the commonly employed institutional accountability measures of student access and completion. Most importantly, this study provides empirical evidence of a

relationship between the complicated constructs of institutional competition for resources and institutional accountability for public purposes at the undergraduate level within four-year public institutions. With the force of institutional competition likely to increase and the necessity for higher education to serve public purposes critical, additional research further exploring the relationships between institutional competition and institutional accountability at the undergraduate level is essential.

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Appendix A

Market Segment Worksheet

Institutional data retrieved from IPEDS:

Number of applications for fall 2008 Freshman Class. _____ (A)

Number of admitted students for fall 2008 Freshman Class. _____ (B)

Number of fall 2008 Freshman. _____ (C)

Percentage of 2003 Freshmen who graduated with a BA or BS by Fall 2008. _____

(D)

Full-time undergraduate enrollment, fall 2008. _____ (E)

Part-time undergraduate enrollment, fall 2008. _____ (F)

Total undergraduate enrollment, fall 2008. _____ (G)

Number of bachelor degrees awarded in 2008-2009. _____ (H)

Calculations:

Admit Rate (B/A) = _____ (J)

Yield (C/B) = _____ (K)

Percentage of part-time students (F/G) = _____ (N)

BAs awarded to enrollment ratio (H/G) = _____ (P)

For computing S, T and W below: L = 1, M = 2

Admit (J) x Yield (K) = _____ (R)

Excess Applicants (L/R) = _____ (S)

1 – Admit Rate (L - J) = _____ (T)

(1 – Admit Rate) + Yield (T + K) = _____ (V)

Competitive Score (V/M) = _____ (W)

Demand Score (S x W) = _____ (Z)

Step 1: Determine institution’s left-edge score

Compare 5-year graduation rate (D) and demand score (Z) with the column and row labels in the table below. Select the first column for which the demand score (Z) meets the criteria; then find the first row for which the 5-year graduate rate (D) meets the criteria. The cell at the intersection of the selected column and row contains the left-edge score.

5-Year Graduation Rate (D)		Demand Score (Z)			
		Greater than or Equal to 4.0	Greater than or Equal to 1.5	Greater than or Equal to 1.0	Less than 1.0
Greater than or Equal to	90%	1	2	3	4
Greater than or Equal to	85%	2	2	3	4
Greater than or Equal to	64%	3	3	3	4
Greater than or Equal to	50%	4	4	4	4
Less than	50%	5 or higher	5 or higher	5 or higher	5 or higher

Step 2: Determine institution’s right-edge score

Compare bachelor’s degrees to undergraduate enrollment (P) and percentage of part-time students (N) with the column and row labels in the table below. Select the first column for which the percentage of part-time students (N) meets the criteria; then find the first row for which the value of bachelor’s degrees to undergraduate enrollment (P) meets the criteria. The cell at the intersection of the selected column and row contains the right-edge score.

Bachelor’s Degree to Undergraduate Enrollment (P)		Percentage of Part-Time Students (N)		
		More than 35%	More than 25%	Less than or Equal to 25%
Less than or Equal to	10%	7	6	5 or lower
Less than or Equal to	15%	6	6	5 or lower
Greater than	15%	5 or lower	5 or lower	5 or lower

Step 3: Determine institution’s market segment

- If the left-edge score is “5 or higher,” then the segment is determined by the right-edge score.
- If the right-edge score is “5 or lower,” then the segment is determined by the left-edge score.
- If the right-edge score is “5 or lower,” and the left-edge score is “5 or higher”, the segment is 5.
- If the right-edge score is 6 or 7, and the left-edge score is 4 or less, then the institution is placed in segment 6 or 7.

(recreated and adapted from Zemsky et al. (1997))

Appendix B

Correlation Matrix for Quantitative Independent and Control Variables

Variables	Variables									
	ACT CM75	Sqrt UNDUP UGRAD	Sqrt FED RESEARCH	Log STATE APPR	Log VOL SUPPORT	FISCAL HLTH	PORTION UG	Log PROX SCORE	BAC DEGREES	
ACTCM75	-	0.410	0.636	0.463	0.606	0.128	-0.237	-0.011	-0.111	
sqrtUNDUPUGRAD	0.410	-	0.629	0.513	0.621	0.198	-0.336	-0.156	-0.285	
sqrtFEDRESEARCH	0.636	0.629	-	0.668	0.754	0.219	-0.445	0.008	-0.323	
logSTATEAPPR	0.463	0.513	0.668	-	0.581	0.147	-0.367	-0.124	-0.321	
logVOLSUPPORT	0.606	0.621	0.754	0.581	-	0.298	-0.376	-0.124	-0.289	
FISCALHLTH	0.128	0.198	0.219	0.147	0.298	-	-0.151	-0.149	-0.070	
PORTIONUG	-0.237	-0.336	-0.445	-0.367	-0.376	-0.151	-	-0.134	0.642	
logPROXSCORE	-0.011	0.156	0.008	-0.124	-0.095	-0.149	-0.134	-	-0.105	
BACDEGREES	-0.111	-0.285	-0.322	-0.321	-0.290	-0.070	0.642	-0.105	-	