THE CONTRIBUTION OF INSTITUTIONAL CHARACTERISTICS, STATE SUPPORT, AND ALTERNATIVE REVENUE TO THE SURVIVAL OF HIGHER EDUCATION INSTITUTIONS

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ABSTRACT

Amid declining state funding, do public universities seek alternative revenue streams to keep tuition and fees down? Is such diversification only a public university phenomenon? If both private and public schools are seeking new sources of revenue, then state appropriations may not be the impetus. Instead, institutional characteristics may have a greater influence. In addition, would those higher education institutions (HEIs) with a greater propensity to generate alternative revenue have a greater rate of survival? I examine HEIs by sector using the Integrated Postsecondary Education Data System (IPEDS) from fiscal years 2003–2004 through 2016–2017 and provide future researchers with guidance on its use. Controlling for different states' policies, politics, and fiscal health, I find that institutional characteristics influence certain HEIs to seek alternative revenue streams and that these characteristics often strengthen the relationship between state appropriations and alternative revenue sources. Furthermore, the findings suggest that generating alternative revenue, as I define it, may play a role in the survival of HEIs.

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CHAPTER 1

FRAMING THE INVESTIGATION

Research Motivation

Many policy makers in state governments seek to balance state budgets each year, in fact, most states, unlike the U.S. federal government, require a balanced budget. When balancing their budgets, legislators often cut funding for some programs while increasing money for others. Consistent with this truism, Zumeta (2012, p. 31) stated that "higher education is among the most likely targets for budget cutters…" Although taxpayers often elect representatives who promise to lower taxes, they still expect their state governments to maintain service quality in health and welfare programs, education, infrastructure maintenance, and police protection. As shown in Figure 1, state appropriations have increased on average since recovering from the Great Recession funding drop of 2008. Furthermore, in New Jersey, outgoing Republican governor Chris Christie increased funding to state universities only to have incoming Democratic governor Phil Murphy eliminate the increased appropriations in his proposed 2019 budget. The state universities successfully petitioned the legislators to reinstate the original increased funding to the budget.

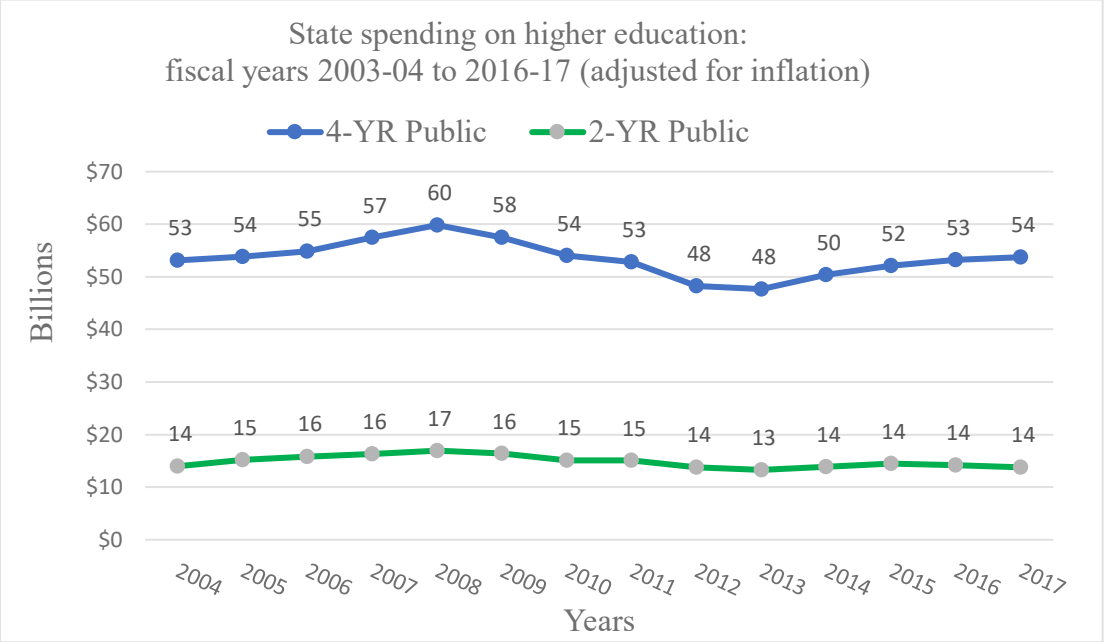

Figure 1. Source: Integrated Postsecondary Education Data System. Annual. *Finance Survey Data.* Washington, D.C.: U.S. Department of Education.

Many public Higher Education Institutions (HEIs) cannot survive without state funding, which is an essential stream of revenue. Nevertheless, alternative revenue sources have steadily increased for four-year public and four-year private HEIs over the last decade, as reflected in the IPEDS data plotted in Figure 2. IPEDS is a data collection system consisting of annual surveys required from institutions receiving Title IV federal financial aid.

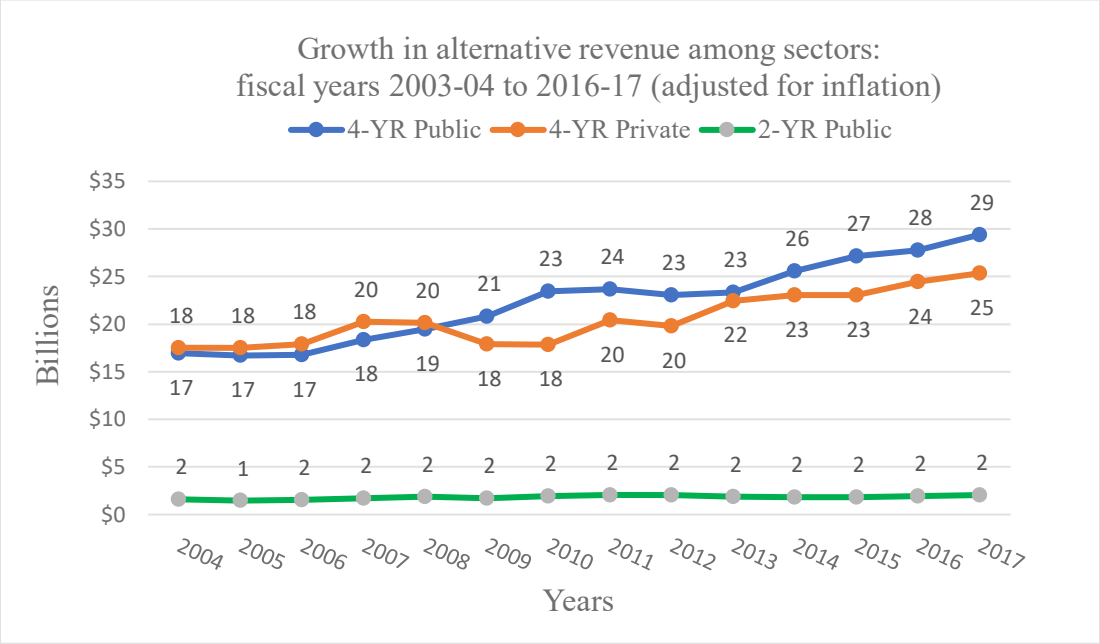

Figure 2. Source: Integrated Postsecondary Education Data System. Annual. *Finance Survey Data.* Washington, D.C.: U.S. Department of Education.

Resource dependence theory posits that organizations seek to reduce dependence on disappearing resources. According to Pfeffer and Salancik (2003), "The key to organizational survival is the ability to acquire and maintain resources" (p. 2). In other words, when an organization's main revenue stream is threatened, it will seek other forms of revenue to survive. Froelich (1999, p. 263) acknowledges that, "as nonprofits strive to reduce their vulnerability to income uncertainties and the influence of resource providers, they have moved away from concentrated dependence on a single revenue strategy". For example, Stockton University purchased the Seaview Hotel and Golf Club in 2010, which provided a hands-on learning environment for students in the Hospitality and Tourism Management program in addition to generating alternative revenue. School officials summarized the strategy in a 2010 NJ.com article, stating, "profits from operating the resort will create a new source of revenue for the college as state funding continues to

decline" (Heyboer, 2010). In Stockton's financial statements and submission to IPEDS, this activity is reported as an independent operation, which is an alternative revenue stream distinct from its core revenue, such as tuition and fees.

In light of these trends, this dissertation aims to explore the relationship between state appropriations and a public institution's propensity to seek alternative revenue sources, addressing the research question: Which universities are more or less inclined to pursue alternative operations and seek new revenue sources? By comparing alternative revenue sources between public and private HEIs, I will analyze whether state appropriations affect schools' tendency to generate alternative revenue streams. Private institutions, unlike public institutions, do not receive state funding for tuition support, and thus provide a point of reference when examining the role that both state appropriations and institutional characteristics play in public HEIs seeking new revenue sources and the ultimate effect on survival. Furthermore, many small private institutions have endured financial distress in recent years, and many have taken large measures to avoid closures. For example, Georgian Court University, known as a women's college, opened its doors to male students in 2013 as a way to increase enrollment (Grasgreen, 2012). Commenting on this sector of institutions, Richard Ekman, president of the Council of Independent Colleges, was quoted in a 2017 *Inside Higher Ed* article saying that, "There are a small number of colleges that are in very serious trouble, but there are also a significant number of small colleges, 20 percent of them, that are just soaring" (Seltzer, 2017). Examining new revenue sources for these private institutions will also assist in answering the questions posed in this study.

I also study 2-year public HEIs due to the considerable state support they receive. Simply put, "…associate's colleges may have the most reliable support from their states due to their open access, relatively inexpensive cost of instruction, and overall dependence on public revenues for survival" (Weerts & Ronca, 2012, p. 167).Notably, the current political climate appears to favor free community college, given that New York adopted this position in April 2017 (Levine, 2017), and New Jersey rolled out its pilot program in January 2019 at 13 community colleges with the expansion to the remaining six community colleges in April 2019 (Johnson, 2019).

Our knowledge of the relationship between state appropriations and alternate revenue sources is limited. Prior research has examined the difference in state support across states, sectors, and institutions (Weerts & Ronca, 2012), the relationship of state support and contributions (Cheslock & Gianneschi, 2008), differences in state support for research institutions (Weerts & Ronca, 2006), an examination of conditions that contribute to state appropriation funding cuts (Li, 2017), the relevance of institutional characteristics on alternative resources in Portuguese public universities (Teixeira et al., 2014), and how legal changes in Portugal affect alternative revenue sources in HEIs (Teixeira & Koryakina, 2013). My study builds upon prior research and seeks to fill a knowledge gap about the extent to which U.S. HEIs seek alternative resources and its effect on their ultimate survival.

In addition to alternative revenue and institutional characteristics, funding cuts may be detrimental to the survival of public universities. State appropriations is a line item in governments' budgets, and to assist in addressing the financial challenges posed

by state funding cuts, it is important to understand how much state appropriations matter in encouraging HEIs to acquire new revenue sources, along with the extent to which this has changed over time. In contrast, the focus for survival in private institutions would be alternative revenue and institutional characteristics, since only a handful receive state appropriations. In fact, some schools' survival situations are so dire that they are at the point of selling off their assets and closing their doors. For example, Upsala College in East Orange, New Jersey, a 102-year-old private institution, ceased operations in 1995 (Goodnough, 1996). Could this have been avoided with alternative revenue streams?

By exploring the relevance of various institutional characteristics on the relationship between state appropriation changes and new revenue sources, we can garner insight into the importance of such factors as the institutions' size and selectivity. The results of this research can suggest initiatives for both public and private HEIs and policymakers throughout the country to consider strategies that would enhance their fiscal and management alternatives.

In addition, this study examines the extent to which alternative revenue sources contribute to the success or failure of HEIs. Although the main sources of revenue (e.g., tuition and fees, endowments, grants, and research) clearly affect the success or failure of institutions, research has not shown whether other sources of revenue, such as independent operations or sales and services of educational activities, have a commensurate effect. The results from my study indicate that independent operations are important to 4-year private institutions; thus, could a decline in this source cause their demise? Do closures and mergers affect public institutions, too? The results suggest that

alternative revenue and certain institutional characteristics affect survivals, closures, and mergers differently for each sector. Governments and communities, as stakeholders, benefit from an educated society, through both revenue producing taxpayers and their innovative capacity. Insights from my research may prompt governments to provide positive incentives for HEIs to seek alternative revenue and prevent HEIs' closures.

An Introduction to U.S. Higher Education

U.S. institutions of higher learning were first established to educate the clergy and the New World's leaders along the lines of England's Cambridge and Oxford colleges. Harvard (1636) and Yale (1701) were established to inculcate Puritan ideals, The College of William and Mary (1693) for Anglican theology, and The College of New Jersey (1746, now Princeton) for Presbyterians. Over the next 133 years, five other schools, King's College (1754, now Columbia), The College of Philadelphia (1740, now University of Pennsylvania), The College of Rhode Island (1764, now Brown University), Queen's College (1766, now Rutgers University) and Dartmouth College (1769), were founded not only for various religious denominations, but also for the benefit of society in producing political leaders. As Rudolph (1962, p. 6) puts it, "in the future the state would need competent rulers, the church would require a learned clergy, and society itself would need the adornment of cultured men".

Rudolph (1962) found that the lines between church and state were blurred for some of these original nine "Colonial Colleges." Harvard received donated land in addition to state support through a tax levy. After Harvard was closed for a year under its first administrator, the "General Court" designated Charlestown Ferry rents as a source of

revenue for the school. The College of William and Mary received funding from taxes on tobacco, skins and furs, and peddlers. Students who enrolled at Yale were exempt from taxes and military service. Some states, due to budget constraints, allowed colleges to operate lotteries. For example, Princeton was permitted to do so in New Jersey, Pennsylvania, and Connecticut. In addition to receiving state support, these institutions were creative in generating revenues by other means. In the early 1800s, institutions sold a "perpetual scholarship" which, for about $500 or around $10,000 in today's dollars (Alioth Finance), would allow one person to attend the institution in perpetuity, tuition free. Other institutions kept their doors open using more immoral means by today's standards with ties to slavery. For example, Georgetown University received donated slaves whom they sold in 1838. These 272 slaves were grandparents, pregnant mothers, protective fathers, children, and babies who were traded by the Jesuit priests for close to $3.3 million in today's dollars to pay off the University's debt and cover operating expenses (Swarns, 2016).

Other support came from the federal government. With the passage of the Morrill Land-Grant Act of 1862, federal land was granted to states to sell and use the funds to support agriculture and mechanical education. Due to the lack of direction in the Act, most states utilized the funds to create new state schools (e.g., Massachusetts with MIT), whereas other states supported existing schools (e.g., New Jersey with Rutgers). The distinction between public and private schools emerged so that "Everywhere spurned by government, the old colleges discovered the principle of the independent, self-reliant, private college" (Rudolph, 1962, p. 254). In 1890, a second Morrill Act was passed to

address race discrimination. To emphasize, "…the act stipulated that no appropriations would go to states that denied admission to the colleges on the basis of race unless they also set up separate but equal facilities" (Rudolph, 1962, p. 254). Additional relevant federal legislation through the years were the Smith-Hughes Act (1917), which provided federal aid for vocational education programs, the GI bill (1944) which authorized aid to veterans, the Higher Education Act (1965), which authorized most of the federal student assistance programs offered today and the Bayh-Dole Act (1980), which allowed universities' patent rights to their intellectual property developed in federally funded research programs. More recently, the American Reinvestment and Recovery Act of 2009 dedicated funds to research and education to help the economy recover from the Great Recession that began in late 2007.

Literature Review

Alternative Revenue Sources

Alternative revenue is defined differently across disciplines. Table 1 summarizes the definitions and measures for different fields of study. Chang and Tuckman (1994) view it from both an economic and financial perspective. Economically, revenue diversification fulfills a non-profits' mission without any budget constraints, and financially, alternative revenues create financial stability by varying revenue streams. Chang and Tuckman found that non-profits with multiple revenue streams were stronger financially than non-profits with single revenue sources. They used a Herfindahl-Hirschman Index method to compute a diversification index (DI) based on revenue data compiled from various non-profit types. The mean DI for over 15,000 HEIs was 0.67,

where a DI of 1.00 signifies a single revenue stream. The data was from 1986 and does not specify the educational sector (private, public, community colleges).

Table 1. Definitions and Measures of a Key Construct, Alternate Revenue Sources

Definition	Disciplines	Measures	Data Source	Authors
Revenue from sources other than from students, parents, or the government, for example revenue generated in which the university sells or leases university assets, contract research, or offering high demand non-credit bearing courses.	Higher Education in developing countries	Citing previous research	Narrative, literature review	Johnstone, D. Bruce, 2002
An organization not relying on a single revenue source.	Non Profits	The authors use a diversification index based on the Herfindahl-Hirschman Index by looking at the number of revenue sources and the extent to which the revenue is distributed across those sources for various tax exempt entities.	Federal form 990's filed in 1986 with the IRS by 501(c)(3) charitable non-profits. The authors utilized the IRS' Statistics of Income (SOI) data base.	Chang, Cyril F., and Howard P. Tuckman, 1994
Alternative funding sources and structure. The author specifically defines it for purposes of her study as "A diversified tax structure consists of relatively equal reliance on revenue generated from property taxes, personal and corporate income taxes, general sales taxes, motor fuel taxes and all other taxes." (Carroll, 2005, p.612)	State Government	The author uses a diversification index based on the Herfindahl-Hirschman Index modified to include five categories of revenue sources.	Literature review. Also, the author utilized multiple federal and state databases, such as U.S.Census Bureau and World Tax Database from the University of Michigan Business School Office of Tax Policy Research.	Carroll, Deborah A., 2005
New revenue sources has been defined as the generation of revenue beyond government appropriation through the commercialization of research, technology transfer, consulting, lifelong learning and customized courses, in addition to the generation of funds from assets, and adjustments in financial decision making and management, among other activities. (Teixeira et al., 2014, p.399)	Higher Education in Portugal	Focus is on a random effects panel data model in order to account for variances over time for the same institutions in addition to variances between institutions. Dependent variables are tuition fees and earned income for two subsectors, public universities and public polytechnics. Explanatory variables consist of undergraduate and post-graduate enrollment, number of academic staff with a PhD, and regional location.	Tuition fees and revenue from the Ministry of Finance, enrolled students and academic staff data from the Ministries of Education and Science, and regional population and purchasing power from the National Statistical Office.	Teixeira et al., 2014
Alternative revenue is normally defined as the generation of revenue beyond government appropriation. This can be achieved through activities such as the commercialization of research, technology transfer, consulting, lifelong learning and customized courses, generating funds from assets and alterations in financial decision-making and management, as well as other activities. (Teixeira, P., & Koryakina, T., 2013, p. 175)	Higher Education & Portugal Legislature	Relative weight of different types of income of public universities 1998-2009	Planning and Statistics Office – GPEARI from the Ministry of Science, Technology and Higher Education.	Teixeira, P., & Koryakina, T. (2013)
These other forms of income include all the incidental income raised by an institution, but do not include traditional revenue from government, tuition, endowment, and traditional operations such as dormitories. (NEA, 2004, Volume 10, #2, p. 3)	U.S. Higher Education & State Government	Growth in non-traditional revenue among higher education institutions: 1992–93 to 2000–01	Integrated Postsecondary Education Data System (IPEDS)	National Education Association. (2004)
…the amount of external funds institutions may generate, particularly through fees; … engaging in contractual services with their local community that would enhance their relationship and understanding of local needs (Albrecht et al., 1992 p. 39). …while diversifying their activities to engage in profit making activities with their local industrial and commercial communities (p.51).	Higher Education in developing countries	Discussion paper	Narrative, literature review Country analysis	Albrecht, D., & Ziderman, A. (1992)

The basic definition of alternative revenue sources for higher education comes from the National Education Association (NEA, 2004, p. 3), which states that "other forms of income include all the incidental income raised by an institution, but do not include traditional revenue from government, tuition, endowment, and traditional operations such as dormitories." For this study, I define alternative revenue sources as other operating income, other non-operating income, and independent operations as reported by institutions on the IPEDS finance survey (see Table 2). Some examples of alternative revenue included in my study are sales and services of educational activities and rentals to students, staff, and faculty of the institution as well as individuals outside of the HEI. Harvard Business Publishing is a good example of revenue generated from publications reported as other revenue on Harvard University's financials. Other revenue is an income stream which I include in my definition of alternative revenue sources.

Table 2. Definitions of State Appropriation and Revenue Categories Comprising Alternate Revenue Sources

State appropriation	Definition (NCES National Center for Education Statistics. 2017-18 Survey Materials: Glossary)	Definition (NACUBO National Association of College and University Business Officers: Financial Accounting and Reporting Manual for Higher Education (FARM))
State appropriation	Revenues received by an institution through acts of a legislative body, except grants and contracts. These funds are for meeting current operating expenses and not for specific projects or programs. The most common example is a state's general appropriation. Appropriations primarily to fund capital assets are classified as capital appropriations.	The government appropriations categories include all appropriations from, or made available to, an institution by legislative acts of the federal, state or local governments or by a local taxing authority. Appropriations for operating purposes, either restricted or unrestricted, are recorded as nonoperating revenues. Appropriations for capital purposes are recorded as capital appropriations. Many independent institutions receive appropriations from governmental units, especially state governments. These appropriations often are determined by a formula based on the number of in-state students the independent institutions is currently serving. (FARM ¶363.3, ¶463.3)

Alternate Revenue Sources	Definition (NCES National Center for Education Statistics. 2017-18 Survey Materials: Glossary)	Definition (NACUBO National Association of College and University Business Officers: Financial Accounting and Reporting Manual for Higher Education (FARM))
Independent operation revenue	Revenues associated with operations independent of or unrelated to the primary missions of the institution (i.e., instruction, research, public service) although they may contribute indirectly to the enhancement of these programs. Generally includes only those revenues associated with major federally funded research and development centers. Net profit (or loss) from operations owned and managed as investments of the institution's endowment funds is excluded.	The independent operations category includes all revenues of operations that are independent of or unrelated to the institution but may enhance its primary missions of instruction, research, and public service. Revenues associated with federally funded research laboratories and other operations that are not considered an integral part of the institution's educational, auxiliary enterprise, or hospital activities fall under the independent operations category. This category does not include the net profit (or loss) from operations owned and managed as investments of the institution's endowment funds. (FARM ¶368, ¶468)
Other operating revenue	Other sources of revenues not covered elsewhere in the collection of IPEDS Finance data from schools reporting under the pre GASB 34/35 Standards. Examples are interest income and gains (net of losses) from investments of unrestricted current funds, miscellaneous rentals and sales, expired term endowments, and terminated annuity or life income agreements, if not material. Also includes revenues resulting from the sales and services of internal service departments to persons or agencies external to the institution (e.g., the sale of computer time).	Many institutions have an "other" category to reflect any exchange revenues not considered elsewhere. Examples are miscellaneous rentals and sales, miscellaneous fees, and items that are not material enough to warrant separate disclosure. (FARM ¶375, ¶475)
Other nonoperating revenue	GASB requires that revenues and expenses be separated between operating and nonoperating. Operating revenues and expenses result from providing goods and services. Nonoperating activities are those outside the activities that are part of the operating activities of the institution. Most government appropriations are nonoperating because they are not generated by the operations of the institution. Investment income is nonoperating in most instances because institutions are not engaged in investing as an operating activity. Gifts are defined as nonoperating. Nonexchange transactions generate nonoperating revenues.	Revenues are reported in the statement of revenues, expenses, and changes in net position and are classified as either operating or nonoperating. Operating revenues are generally those that are classified as operating cash inflows in the statement of cash flows in accordance with SGAS 9. Nonoperating revenues generally are those derived from nonexchange transactions or those that are not reported as resulting from operating activities in the statement of cash flows. (FARM ¶205.51)

Weerts and Ronca (2012) studied the differences in state support for HEIs and found that there was little variation among HEIs within a state. The biggest variation they found was between states as well as variation within HEIs over time. “In other words, the funding patterns for doctoral/research universities and associates colleges in the same state are more similar than the funding patterns for two doctoral/research institutions in two different states” (Weerts & Ronca, 2012, p. 170). The variation of state support can be attributed to factors like each state’s financial health, political party, and funding priorities (Weerts & Ronca, 2008, 2012; Archibald & Feldman, 2006; Li, 2017; Cheslock & Hughes, 2011). To control for these factors, I include the state governor’s political party affiliation from the Council of State Governments Book of States database and the state’s unemployment rate from the U.S. Bureau of Labor, local area unemployment statistics. By conducting a longitudinal study over 13 years, I can analyze data for each sector (public, private, and associate HEIs), thereby controlling for the large variation in states’ support of HEIs.

As mentioned earlier, previous studies explored HEIs’ revenue streams. Cheslock and Gianneschi (2008) studied the effect of state appropriations on donation income as an alternative source of revenue. They found that among schools, the level of inequality in donations is greater than the level of inequality in state appropriations. Selective schools with higher rankings receive more donations, which drives the disparity. The authors explain this as the “Matthew Effect” (Merton, 1968, 1988), in which money goes to money, perpetuating the advantage. Their research also found a positive correlation between donations and state appropriations. For most nonprofits, the inverse is true. “In

general, past research has found that government funding crowds out private donations for nonprofit organizations" (Cheslock & Gianneschi, 2008, p. 224). However, HEI donors are motivated to contribute to their alma mater, to a specific program of study, or for access to the arts or athletics. Thus, the amount of state appropriations a HEI receives does not reduce the donor's desire to donate.

Teixeira et al. (2014) studied Portuguese HEIs over a six-year period looking at the importance of institutional characteristics on a HEI's ability to generate other income. Similar to U.S. schools, Portuguese HEIs are feeling the constraints from a decrease in public funding. They found that the qualifications of the academic staff had the greatest impact on a university's ability to generate revenue from fees and other nonpublic sources, such as research. The other explanatory variables in their study were the size and type of enrollment and the HEIs' location, with the location having the least effect.

Jaquette and Curs (2015) researched the relationship between state appropriations at public universities and nonresident freshman enrollment. They hypothesized that the decline in state funding drives public universities to increase out-of-state tuition with the growth of nonresident, including international, students. State policy will usually control tuition increases each year for resident students at public institutions, but is silent regarding tuition increases for out-of-state students. The study found a negative relationship between state appropriations and nonresident freshman enrollment. These results reinforce the notion that public institutions will minimize their dependency on a diminishing resource. In this case, in response to a decline in state funding, HEIs increase tuition revenue through the growth of nonresident enrollment.

Closures and Mergers

The majority of studies analyzing HEI closures and mergers focus on private institutions. Stowe and Komasara (2016) studied the external and internal factors that impact failures in both nonprofit and for-profit institutions between 2000 and 2015, excluding public HEIs. They found that external factors such as location did not influence school closures and neither did middle- or lower-income brackets of residents surrounding a school; however, certain high-income brackets were found to be more common around schools that closed. The authors suggested that this association may be due to more affluent parents sending their children to larger, more selective schools. In contrast, the study found that internal factors such as low enrollment and high total expenses per student were common among closed institutions. Instructional expenses per student were also higher in closed schools, however the average faculty salary was lower. The low enrollment is driving instructional and total expenses to increase per student, in other words because of a lack of economies of scale.

In a time-series study from 1960 to 1994, Bates and Santerre (2000) observed the influence of tuition rates, faculty salaries, enrollment, and mission (religious affiliation) on the closure and merger of private HEIs. Their findings suggest that faith-based institutions and HEIs with large student enrollment have a lower rate of closure and mergers, whereas a decrease in the tuition rate and increase in faculty salaries intensify closures and mergers. They also compared private HEI closures to businesses during the same time period and found that businesses closed more often and at a higher rate than private institutions.

Skodvin (1999) studied HEI mergers in the U.S., Australia, and a few Western European countries and found that successful mergers involve institutions that are close geographically, but whose particular strengths are distinctly different. His study also revealed that having fewer resources is a driving force for mergers between two HEIs.

Porter and Ramirez (2009) ran a quantitative analysis using IPEDS that explored both selectivity as an institutional characteristic and geography as a control variable. Similar to past research, they focused on private institutions "because college failure is a relatively rare event, and almost never occurs for public institutions" (Porter & Ramirez, 2009, p. 6). This may not be true in today's strained state budgetary environment, especially given the recent July 2019 article in *The Chronicle of Higher Education* regarding the State of Alaska cutting the University of Alaska's budget by 41%. In response, the University of Alaska announced, to the dismay and concern of faculty and students, the urgent financial need to make cuts to its programs, as well as reductions in faculty and staff (Mangan, 2019). In addition, Porter and Ramirez found that enrollment size and endowment wealth are significant to a HEIs survival. They also found that selectivity and religious affiliation increase survival chances, suggesting for the latter that donors come to the aid of a failing religious institution.

Unlike previous research, I intend to include public HEIs to understand the relationship of state appropriations, institutional characteristics, and alternative revenue on closures and mergers. Table 3 presents the composition of my sample by survivals, closures, and mergers for all sectors. As evidenced by the small number of observations for public institutions, it may be difficult to determine with any confidence the effect of

this relationship on closures. However, the importance of including public institutions is relevant in today's climate where budgetary spending cuts to education are common. To my knowledge, this is the first study to include public HEIs, but similar to Porter and Ramirez (2009), I intend to include both closures and mergers.

Conceptual Model and Hypotheses

I build upon theories from the governmental, nonprofit, and higher education literature to develop my hypotheses. In particular, I aim to identify which types of HEIs seek alternative revenue sources more and determine the roles that state appropriations and institutional characteristics may play. Certain HEI attributes have a direct positive affect on both public and private HEIs seeking new revenue sources. For example, Teixeira et al. (2014) found that institutional characteristics were important determinants of alternative revenue resources for HEIs in Portugal. I anticipate this to be the same for U.S. HEIs. Some of the distinguishing traits that I analyze are the size of the institution based on enrollment, the number of tenured and tenure-track faculty (e.g., measure of instructor quality), and the HEI's "selectivity" measured as the institution's selection of students (percentage of students admitted) and the student's selection of the institution (percentage of admitted students enrolled).

Teixeira et al. (2014) also found that institutional enrollment and faculty academic qualifications helped explain an institution's propensity to seek new revenue. I expect that student selectivity and prestige will also provide HEIs an advantage in generating alternative revenue streams. I measure selectivity and prestige with scales utilized by Bowman and Bastedo (2009), who investigated the relationship between an institution's

rankings and admissions indicators. As previously mentioned, an institution's "selectivity" is reflected by the ratio of students admitted at the institution to student applicants, where smaller ratios indicate more selective schools. Additionally, I measure an institution's prestige based on their total instructional expenditures. There is a perceived quality in the amount of expenditures an institution commits to student instruction. For example, *U.S. News and World Report* utilizes academic salary as a metric in their college rankings. An institution that commits more resources to instruction clearly delineates the importance of its mission to research and education and in the case of public institutions, its utilization of state funding dollars. These various institutional characteristics provide HEIs with the ability to achieve alternative revenue sources. As Teixeira et al. (2014, p. 398) state, "…it seems that a kind of 'Matthew effect' (Merton 1973) comes into play, with the strongest institutions being the most successful in attracting additional nonpublic revenues".

Hypothesis 1: Institutional characteristics have a positive association with alternate revenue sources for HEIs.

Organizations will find new revenue to survive when they feel that their income streams are threatened. This suggests that decreases in state funding would be a catalyst for increases in alternative revenue. I originally believed that HEIs' inclination to find alternative revenue sources would increase in response to state funding cuts in order to reduce their reliance on state appropriations. However, Figure 2 shows a steady incline in alternative revenue for both public and private institutions suggesting that the decline in funding was not the initial factor driving many HEIs to diversify.

Another possible explanation for the increased diversification is the desire to seize upon favorable circumstances to achieve full potential. In the long term, an increase in state appropriations can complement alternative revenue sources. As HEIs adopted innovative ways to generate revenue, the slow rebound in state funding became a supplement to meet their goals. The increase in state appropriations and alternative revenue is reflected in Figures 1 and 2. Elaborating on this, Teixeira and Koryakina (2013) write that "…those additional revenues were not replacing public funding, but complementing it" (p. 178). In the long run, there is a positive correlation between state appropriations and alternative revenue sources.

Furthermore, this relationship between state appropriations and alternative revenue sources is strengthened by institutional attributes. These institutional attributes not only directly affect alternative revenue, but they also have a positive influence on the relationship between state funding and alternative revenue in public HEIs.

Hypothesis 2: Institutional characteristics strengthen the positive correlation between state appropriations and alternate revenue sources.

Central to my research is the belief that schools that develop alternative revenue sources are more likely to survive. I want to explore and better understand the relationships among institutional characteristics, state support, and alternative revenue for HEIs that have closed during the time period from fiscal year 2003–2004 through 2016–2017. In this paper, I treat mergers similar to closed institutions. I use the acronym "CMs" to refer to both, as some of my analyses compares survivals to CMs. My rationale for including mergers is summed up in the following quote, "Affiliations and consortia

…involve sharing facilities, teaching and learning resources…They do not have a merger's irreversible totality -- the legal death of one or both parties in the creation of a new one. It is a drastic act" (Bugliarello & Urrows, 1976, p. 102). In IPEDS, once the institution is acquired in a merger, IPED's unique identification number (unitid), should no longer exist, analogous to a closed institution. However, a merger between two institutions may not indicate that either institution is on the verge of failure. For example, Clarkson University and Union Graduate College, both private HEIs in New York state, aligned in 2016 to become Clarkson University. In an article in *The Chronicle of Higher Education*, both presidents stressed that although their institutions were financially stable, joining together would allow their individual strengths to benefit the other in the long term (Carlson, 2015). By including mergers, I expect to capture the trends of state institutions, since closures, as previously mentioned, are somewhat rare for public HEIs.

Institutional characteristics play a role in generating alternative revenue sources, and an institution's ability to generate alternative revenue makes survival more likely.

Hypothesis 3: HEIs that develop alternative revenue sources are more likely to survive.

The hypotheses are summarized in the Conceptual Model outlined in Figure 3.

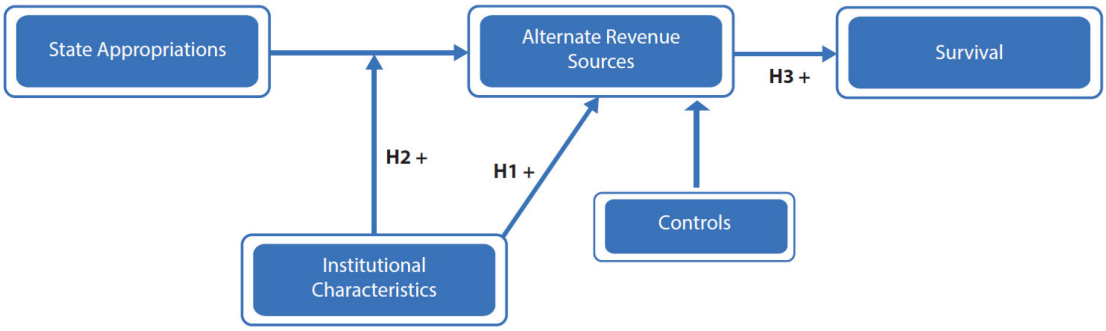

Figure 3. Conceptual Model

Methodology

Constructs and Measures

This section operationalizes the constructs of state appropriations, institutional characteristics, and alternate revenue sources, and defines the measures used for analysis. Unless otherwise noted, the data are drawn from IPEDS. Exact definitions for alternative revenue and state appropriations are provided in Table 2.

Alternate Revenue Sources (ARS)

ARS is my dependent variable and is measured as the sum of other operating income, other non-operating income, and independent operations as a percentage of total revenue for each institution by year. When conducive to the analysis, I separate ARS into three specific groups—the first includes independent operations, the second consists of sales and services of educational activities, and the third is "other revenue". Due to the limitations of the IPEDS data collection form, these three categories were chosen because of the ease of using them to extract and compare data. I discuss the rationale further in chapter two.

State Appropriations

State appropriations is an independent variable and is measured as the percentage of total revenue made up of state appropriations for each institution by year. In studying the relationship between state appropriations and alternative revenue sources, I apply a one-year time delay: For example, the changes in state appropriations in year zero are expected to influence institutional decisions to pursue alternative revenue in year one.

Institutional Characteristics

Certain HEI characteristics will have both a direct effect on ARS (H1) and a moderating effect on the relation between state appropriations and ARS (H2). I use a one-year time delay for the following institutional characteristics:

Size (Teixeira et al., 2014). Larger institutions are better equipped to seek alternate revenue sources. An institution's size is a categorical variable determined by fall student full-time equivalent enrollment with a census date of October 15. The more students enrolled, the larger is the institution. A category of 5 denotes 20,000 students or more, 4 signifies 10,000 to 19,999 students enrolled, 3 is equivalent to 5,000-9,999 students, 2 represents an enrollment range of 1,000-4,999 students, and 1 is less than 1,000 students.

Selectivity (Bowman & Bastedo, 2009). Selectivity is measured using two ratios, one in which the school does the selecting and the other in which the student does the selecting. The first ratio is the percentage of student applicants admitted, (smaller ratios indicate a more selective HEI), and whereas the second ratio is the percentage of admitted students enrolled, (larger ratios indicate a more selective HEI).

Prestige (Bowman & Bastedo, 2009). This is a ratio of instructional expenses to total core expenses. Total core expenses include instructional costs as well as such costs as academic support, institutional costs, plant and maintenance, research, and depreciation. The greater the ratio, the greater is the instructional prestige of the institution.

Excellence. In addition to the above published representations of an institution's prestige, I utilize instructional expenses to institutional expenses as a proxy for excellence. Historically, faculty have performed many administrative duties and top management have been hired from the pool of faculty (Ginsberg, 2011); in contrast, the current norm is for individuals to be hired from industries outside of academia to manage the institution. Larger ratios of instructional to administrative costs indicate greater perceived educational excellence of the institution due to a focus on instruction.

Research (Porter and Ramirez, 2009). Research is measured as the percentage of research expenses divided by total expenses. This ratio provides additional insight into how dependent an institution is on research grants. Due to the difficulty in retrieving research grant revenue, expenditures are used as a proxy.

Instructional expenses to net tuition and fees. *The Chronicle of Higher Education* published a ranking of public and private schools based on the amount they spent on instruction compared to tuition and revenue received. HEIs that ranked the lowest had instructional expenses greater than tuition and fee revenue; in other words, the students paid less than the cost of the instruction they were receiving (*The Chronicle* list, 2019). Similar to their analysis, I measure instructional expenses as a percentage of net tuition and fee revenue. Ratios of less than one suggests that students pay more for the instruction than its actual cost. There is a mark-up, a difference between the selling price of a service and its direct cost, to cover indirect costs and make a profit.

Institutional expenses to net tuition and fees. Along the same lines as the previous ratio, I seek to analyze the institutional expenses for every dollar of net tuition and fee

revenue. The source of funding for every purchase made by state institutions is derived mainly from student tuition dollars or from state and federal taxpayer dollars. In the case of this ratio and the previous one, it is difficult to isolate which revenue inflows pay for which expense outflows. Ceteris paribus, a ratio of institutional expenses to net tuition and fees greater than one suggests administrative and facilities costs exceed student tuition dollars. In analyzing the results, a HEI would want this ratio to be less than the previous ratio which calculates instructional expenses to net tuition and fees because it reflects a greater emphasis on education.

Instructional expenses to state appropriations (instrsap) and *Institutional expenses to state appropriations* (instisap). I analyze these two in conjunction with each other to determine what taxpayers may be supporting with their dollars at public institutions. In other words, the percentages provide an understanding of whether tax money is going to instructional expenses or institutional expenses based on each dollar of state appropriation funding. A higher "instrsap" percentage in comparison to "instisap" percentage would imply a greater emphasis of the use of taxpayer dollars on instruction.

Endowment (Porter and Ramirez, 2009). Endowment is a ratio that measures the change in endowment value by taking the ending value less beginning value divided by beginning endowment value. The change in endowment is also known as the net flow rate and includes additions to the endowment in the form of donations, decreases in the form of a spending rate, and gains and losses of the underlying investments. IPEDS defines endowments to include temporarily restricted funds which have a time or purpose stipulation before being expended. It also includes permanently restricted funds that are

held in perpetuity, however the spending rate or interest earned on these funds can be expended by the HEIs. As mentioned previously, Porter and Ramirez (2009) found that endowment wealth is important for a HEI's survival. I also evaluate how endowments affect the need for alternative revenue sources, and hence, survival.

Geographical location (Teixeira et al., 2014). IPEDS utilizes a two-digit code ranging from a "large city" to a "rural" area based on a method developed by the U.S. Census Bureau. The assigned code is determined from the institution's physical address, and the smaller the number, the more urban is the area. Branch campuses are counted separately if they are reported as such by the institution. Otherwise, HEIs report data to IPEDS as one unit, which includes main and branch campuses. The alternative revenue opportunities available to schools primarily located in an urban area are likely greater than those in a rural environment.

National Collegiate Athletic Association (NCAA) member. This binary variable will assess the importance of athletics to the relationship between state appropriations and alternate revenue as well as determining its impact directly on ARS. IPEDS assigns a "1" to institutions responding in the affirmative. This variable is likely to capture alumni donations that are often weighted towards successful NCAA athletic programs in addition to generating other income in the form of summer athletic camps offered to secondary school students. The revenue and expenses of athletic programs that are self-supporting are categorized as auxiliary on the institution's financials, otherwise they are included as student services or other operating. The NCAA categorizes institutions into three

divisions, but these details are not available from IPEDS nor the Urban Institute website explained further in chapter two.

Tenured and tenure-track faculty (Teixeira et al., 2014). This ratio is developed from data on the number of tenured and tenure track faculty divided by total full-time instructional staff. Tenure is a practice of granting faculty permanent position "to make them independent of thought control" (Barzun, 1968, p. 59). I use this metric to capture the importance of a qualified academic staff because data on the number of doctoral faculty at an HEI is not available. However, at most research universities, only doctoral faculty can be tenure track or tenured; therefore, this measure is likely highly correlated with the proportion of doctoral faculty at many HEIs.

Control Variables

I include the following control variables in my model.

Sector. A classification designating whether an institution is operated by public or private officials and whether the institution's main source of funds is from public or private sources. The classification includes categories for four-year and two-year institutions. I am interested in four-year public (4YP) HEIs denoted in IPEDS as "1", four-year private non-profit (4YPv) HEIs labeled "2", and two-year public (2YP) HEIs represented as "4".

Carnegie (Weerts & Ronca, 2012). The Carnegie classification includes all degree-granting institutions in the United States which are accredited according to the U.S. Secretary of Education. For example, this classification will distinguish associate colleges, bachelor/masters' institutions, and doctoral/research institutions with category

levels ranging from a "60" for tribal colleges to "40" for associates to "15" for doctorate. A detailed list is provided under the results section in Figure 7.

Political Party Affiliation (Archibald & Feldman, 2006; Weerts & Ronca, 2012). Using the Council of State Governments Book of States database, I control for the influence of a governor's political affiliation in my conceptual model. The extant literature found a positive correlation between Democratic governors and state appropriations. However, not all studies have found this same relationship, as other factors such as legislature control may also play a part. A numeric value of "1" is given to a Republican governor, with "0" for all other parties.

State Unemployment Rate (Weerts & Ronca, 2012). Accessing the U.S. Bureau of Labor local area unemployment statistics database, the unemployment rate in a state is used to define the state's fiscal health. The smaller the number, the healthier a state is fiscally. The percentages are available starting in 1998.

Tuition and Fees. Much of the literature suggests that a decline in resources brings about an increase in tuition. I control for this variable in my research by analyzing both public and private institutions' propensity to seek ARS in lieu of increasing tuition and fees. The ratio calculates the percentage change in net tuition and fees between the prior year and the current year.

Tuition is defined in IPEDS as "the amount of money charged to students for instructional services. Tuition may be charged per term, per course, or per credit" (NCES National Center for Education Statistics. 2017-18 Survey Materials: Glossary). Per the *Financial and Accounting Reporting Manual for Higher Education*, paragraph 460.3 and

360.3, respectively for private and public institutions, "the tuition and fees category includes all tuition and fees assessed for educational purposes." This consists of credit bearing and non-credit bearing courses, in addition to tuition and fees for undergraduate, graduate, doctoral, international programs, and branch campuses. As an example, I retrieved Temple University's 2017 audited financials from its website[1]. In the footnotes, Temple describes its business operations with eight campuses across Pennsylvania and internationally in Italy and Japan. I confirmed applicable revenue numbers reported in IPEDS with its financials, such as, tuition and fees, state appropriations, sales of educational activities, and total revenue. Interestingly, Temple University is a public institution that reports according to FASB (Financial Accounting Standards Board) pronouncements and therefore, completes the IPEDS data form used by private HEIs.

Tuition and Fees to Total Revenue (Porter and Ramirez, 2009). This ratio serves as a control and also as a measure of survival. As a means of control, I seek to enhance the testing of H1 and H2 as the previous tuition ratio has limitations. This change in tuition year over year is driven not only by price, but also by changes in enrollment. Therefore, tuition and fees to total revenue will enhance the testing of H1 and H2 by providing an additional control in my model. As a measure of survival in testing H3, the results of this ratio could be used to quantify how well a HEI diversifies its revenue streams. Per a Forbes 2019 article grading colleges' financial health, a ratio greater than 60% is deemed a "tuition-dependent school" and considered to be at a higher risk for potential financial distress (Coudriet & Schifrin, 2019).

[1] https://finance.temple.edu/general-accounting/audited-financial-statements

Finally, the following are used in addition to the above in analyzing survivals, closures, and mergers in HEIs with a one-year time delay.

Survival. The IPEDS variable denoted as "ACT" codes the status of an institution. There are thirteen codes for a HEIs' status. For example, an A would signify open or active, a D means deleted, or the institution is out of business, an M signifies the HEI is closed in the current year with active data, and a C denotes the institution was combined with another. Any HEIs in my database with a C, D, or M designation were coded as "0" for closed or merged. A code of "1" means survival. I cross-checked any institution with a C, D, or M with the IPEDS variable "DEATHYR". Any institution with a year for "DEATHYR" indicates it was deleted from IPEDS in that year and thus had a code of C, D, or M. As another way to verify the closed and merged institutions, I searched each one for news or announcements regarding their closure or merger.

Merged. This code denotes whether the inactive institution is closed or merged. A "1" signifies merged and would be those HEIs with an "ACT" code of C, whereas a "0" means the HEI is closed with "ACT" codes of D and M.

Hospital. This ratio will assist in evaluating how hospital and medical school revenue affect the likelihood of closures and mergers. The ratio calculates the percentage of hospital revenue to total revenue. In addition, IPEDS will designate a HEI as having a hospital based on its reporting of hospital revenue or expenses with a designation of "1" signifying "yes". It is interesting that none of the closed institutions had a hospital, however eight of the merged institutions did and therefore, reported hospital revenue.

Population (Stowe and Komasara, 2016). Including population density of an institutions' surrounding community will assist in understanding its influence on closures and mergers. This is the population of the county in which the institution is located and was retrieved for survivals, closures, and mergers. For 2004 through 2009, data is retrieved from the 2000 U.S. Census and for years 2010 to current, the data is retrieved from the 2010 U.S. Census. Access to population by zip code is available from a database that estimates 2015 population from exemptions reported on IRS tax returns. The zip code database was not used for this purpose, since it may understate counts, as some individuals are not required to file tax returns. In addition, utilizing estimated 2015 population for earlier years, such as 2004, would not be helpful.

Geographical Proximity. HEIs compete for resources and students. How would the geographical proximity of other institutions affect the closing and merging of HEIs? IPEDS provides the longitude and latitude for institutions through 2009. Using the Haversine formula (Chopde & Nichat, 2013, p. 299), the location of the closed or merged institutions was used to calculate land miles to the surviving institutions. This variable provides a count of the number of HEIs within the geographical proximity of the closed or merged institution. My analysis does not consider for-profit institutions within the area of the merged or closed school. In addition, according to the U.S. Census Bureau, the average commute time to work is 26.4 minutes. Considering the distance traveled in that span of time would vary if navigating through a city compared to a rural location, I apply the distance of 10 miles for those institutions within a city locale and 25 miles otherwise. I discuss steps taken with this variable in greater detail in chapter two.

Data Collection

This study analyzes data by sector and includes year fixed effects regression analysis. It includes only those HEIs in the sectors of interest (four-year publics, four-year privates, and two-year publics). Table 3 describes the sample. The variables were predominantly derived from IPEDS. Table 4 lists the variables, their definitions, and data sources used in studying the determinants, H1, H2, and H3.

Table 3. Sample

	Full Data Set	Sector 1 4-Year Publics (4YP)	Sector 2 4-Year Privates (4YPv)	Sector 4 2-Year Publics (2YP)
Total observations in IPEDS 2004-17	48575	9887	23398	15290
Adjusted for:				
One year lag	-3367	-734	-1659	-974
Child record	-1837	-500	-749	-588
Subtotal	43371	8653	20990	13728
Adjusted for:				
Child record added back, no data except for closure designation	6	1	5	-
Final sample	43377	8654	20995	13728
Composition of Sample by:				
Survivals	42992	8603	20777	13612
Closures	158	5	145	8
Mergers	227	46	73	108
Final sample	43377	8654	20995	13728

Table 4. Variables, Definitions, and Sources

Variable Name	Description	Operationalization	Data Source	Type of Variable	Format
UNITID	Unique Identification Number of the Institution	Utilized to link data from the various databases to applicable institutions	IPEDS varname: UNITID	Identifier	categorical
ARS	Alternate Revenue Sources	$\frac{\text{OOI + ONOI + IO}}{\text{Total Revenue}}$	IPEDS varname: F2D11, F2D14, F2D15, F1B07, F1B08, F1B18, F1B23, F1B26, F2D16, F1B25 survey: Finance	Dependent	continuous y_t
SAP	State Appropriation	$\frac{\text{State Appropriation}}{\text{Total Revenue}}$	IPEDS varname: F2D03, F1B11, F2D16, F1B25 survey: Finance	Independent	continuous x_{t-1}
INSTSIZE	Size of Institution □	Institutional size based on total students enrolled for credit in the fall	IPEDS varname: INSTSIZE survey: Fall Enrollment	Moderator	continuous x_{t-1}
SELCTV	Selectivity Based on Percent Admitted	$\frac{\text{\# Students Admitted}}{\text{\# Students Applied}}$	IPEDS varname: DVADM01; DVIC01(2004-2013) survey: Admissions	Moderator	continuous x_{t-1}
SELCTV2	Selectivity Based on Percent Enrolled	$\frac{\text{\# Students Enrolled}}{\text{\# Students Admitted}}$	IPEDS varname: DVADM04; DVIC04(2004-2013) survey: Admissions	Moderator	continuous x_{t-1}
LOCALE	Geographical Location	Two digit locale code identifies the geographical status ranging from "large city" to "rural".	IPEDS varname: LOCALE survey: Institutional Characteristics	Moderator	categorical x_{t-1}
NCAA	NCAA Member	If the institution is a member of National Collegiate Athletic Association (NCAA) "1" if yes, "0" if no	IPEDS varname: ASSOC1 survey: Institutional Characteristics	Moderator	categorical x_{t-1}
TENURE	Tenured and Tenure Track	$\frac{\text{Tenured Total + Tenure Track Total}}{\text{Total Full Time Instructional Staff}}$	IPEDS varname: SISCAT; codevalue: 0=All FT instructional staff, 200=Tenured total, 300=Tenure track total survey: Fall Staff	Moderator	continuous x_{t-1}
PRESTIGE	Instructional Expenses to Core Expenses	$\frac{\text{Instructional Expenses}}{\text{Core Expenses}}$	IPEDS varname: F1INSTPC, F2INSTPC survey: Finance	Moderator	continuous x_{t-1}
EXCELLENCE	Instructional to Institutional Expenses	$\frac{\text{Instructional Expenses}}{\text{Institutional Expenses}}$	IPEDS varname: F2E011, F1C011, F2E061, F1C071 survey: Finance	Moderator	continuous x_{t-1}

Table 4. Variables, Definitions, and Sources (continued)

Variable Name	Description	Operationalization	Data Source	Type of Variable	Format
RESEARCH	Research Expenses to Core Expenses	$\frac{\text{Research Expenses}}{\text{Core Expenses}}$	IPEDS varname: F2E021, F1C021, F2E131, F1C191 survey: Finance	Moderator	continuous x_{t-1}
INSTRTF	Instructional Expenses to Net Tuition and Fees	$\frac{\text{Instructional Expenses}}{\text{Net Tuition and Fees}}$	IPEDS varname: F2E011, F1C011, F2D01, F1B01 survey: Finance	Moderator	continuous x_{t-1}
INSTRSAP	Instructional Expenses to State Appropriations	$\frac{\text{Instructional Expenses}}{\text{State Appropriation}}$	IPEDS varname: F2E011, F1C011, F2D03, F1B11 survey: Finance	Moderator	continuous x_{t-1}
INSTITTF	Institutional Expenses to Net Tuition and Fees	$\frac{\text{Institutional Expenses}}{\text{Net Tuition and Fees}}$	IPEDS varname: F2E061, F1C071, F2D01, F1B01 survey: Finance	Moderator	continuous x_{t-1}
INSTISAP	Institutional Expenses to State Appropriations	$\frac{\text{Institutional Expenses}}{\text{State Appropriation}}$	IPEDS varname: F2E061, F1C071, F2D03, F1B11 survey: Finance	Moderator	continuous x_{t-1}
ENDWMT	Change in Endowments	$\frac{\text{Ending Bal - Beg Bal}}{\text{Beginning Balance}}$	IPEDS varname: F2H02, F1H02, F2H01, F1H01 survey: Finance	Moderator	continuous x_{t-1}
SECTOR	Sector of Institution	Data classification designating whether the institution is public or private, two year or four year.	IPEDS varname: SECTOR ; 1=4 year public, 2=4 year private, 4=2 year public survey: Institutional Characteristics	Control	categorical
CARNEGIE	Carnegie Class	The Carnegie classification distinguishes associate colleges, bachelor/masters institutions, and doctoral/research institutions.	IPEDS varname: CARNEGIE survey: Institutional Characteristics	Control	categorical
GOVPRT	Political Party Affiliation of the Governor	"1" if republican, "0" if otherwise. This is an alpha indicator variable taking on a numeric value.	Book of States-Council of State Governments varname: Name and Party chapter: State Executive Branch-The Governors	Control	x_{t-1} categorical x_{t-1}
UERATE	Unemployment Rate	State fiscal health based on unemployment rate. The lower the percentage the more fiscally healthy the state.	U.S. Bureau of Labor Statistics varname: Rate Local area unemployment statistics	Control	continuous x_{t-1}
TUITION	Percentage Change in Tuition and Fees	Percentage change year over year of tuition and fees, after deducting discounts and allowances	IPEDS varname: F2D01, F1B01 survey: Finance	Control	continuous x_t
TUITION2	Net Tuition and Fees to Total Revenue	$\frac{\text{Net Tuition and Fees}}{\text{Total Revenue}}$	IPEDS varname: F2D01, F1B01, F2D16, F1B25 survey: Finance	Control	continuous x_{t-1}

Table 4. Variables, Definitions, and Sources (continued)

Survival Measures					
Variable Name	**Description**	**Operationalization**	**Data Source**	**Type of Variable**	**Format**
SURVIVAL	Survival of Institution	Data classification designating whether the institution survived. 1 = survival, 0 = closed or merged	IPEDS varname: ACT code of C, D, M survey: Finance	Control	categorical x_t
MERGED	Closed or Merged	Data classification designating whether the inactive institution is closed or merged 1 = merged, 0 = closed	IPEDS varname: ACT code of C, D, M survey: Finance	Control	categorical x_t
HOSPITAL	Hospital Revenue to Total Revenue	$\frac{\text{Hospital Revenue}}{\text{Total Revenue}}$	IPEDS varname: F2D13, F1B06, F2D16, F1B25 survey: Finance	Moderator	continuous x_t
POPULATION	Population	Population of County in which institution is located	U.S. Census Bureau varname:2000 & 2010 Census AmericanFactFinder population by county	Moderator	continuous x_t
GEOPROX	Geographical Proximity	Number of institutions within a 10 mile radius (city), 25 miles (other) for institutions that have closed or merged	IPEDS varname: longitud, latitude survey: Institutional Characteristics	Moderator	continuous x_t
Notes:					
t = year					
Integrated Postsecondary Education Data System (IPEDS) - collecting data since 1980					
U.S. Bureau of Labor Statistics, Local area unemployment statistics - data since 1998					
Book of States - Council of State Governments - collecting data since 1935					
U.S. Census Bureau - data since 1790					

I used IPED's unique ID number, unitid, to identify observations for the same HEI beginning with fiscal year 2003-04 to 2016-17. The most recent final data available on IPEDS is fiscal year 2017. Any finance information for 2018 is provisional and will be finalized around February 2021 and therefore, is not being included.

I begin my research with fiscal year 2004 because both the Governmental Accounting Standards Board (GASB) and IPEDS implemented major changes to financial reporting prior to 2004, which creates difficulties in comparing institutions. For GASB, significant changes to governmental accounting are due to the issuance of Statements 34 and 35 with GASB 35 amending GASB 34 to include public educational institutions. Some of the requirements dictated in these standards include the transition to full accrual accounting from modified accrual in the financial statements. Modified accrual allows revenues to be recorded when available and expenses to be recorded when they are actually paid; this is in contrast to accrual accounting in which revenue is recorded when earned and expenses are recorded when incurred. Another change in GASB 35 required public HEIs to recognize revenue net of discounts. For example, tuition revenue was previously reflected as gross tuition. GASB 35 changed this to require the reporting of tuition revenue net of scholarship discounts. An additional major change in the GASB pronouncements was the requirement for public HEIs to record depreciation expense and infrastructure assets, such as buildings. To alleviate the burden on adopters, implementation was phased in over a three-year period ending with full adoption by all state institutions in fiscal year 2004. This transition period makes it difficult to determine which HEIs adopted early and which did not, therefore, any

adjustments to their IPEDS reporting could only be achieved with an analysis of their individual financial statements and footnotes.

For IPEDS, the major change involved updates to the reporting form to accommodate the new GASB pronouncements, for example, as mentioned above, the reporting of net tuition and fees instead of gross tuition. Also, optional for fiscal year 2003, but mandatory for fiscal year 2004, both GASB and FASB entities were required to report beginning and ending market values for endowment assets. Furthermore, IPEDS reporting forms have evolved to the most recent "aligned" form which became mandatory for both private and public institutions in 2010. Prior to 2010, both public and private HEIs had their own specific reporting forms. However, unlike FASB reporting institutions which utilized the same form from 1997 to 2009, GASB institutions were able to use two variations until 2004. As explained in greater detail in chapter two, certain adjustments to my data have been made for both the accounting differences between GASB and FASB, as well as the differences due to the IPEDS reporting forms. With the above in mind, my research begins with fiscal year 2004 to increase comparability among public and private institutions.

CHAPTER 2
OPTIMIZING IPEDS FOR ANALYSIS

Adjustments for Comparability and Data Clean-up

I sought to make the basic data comparable over time and across states. IPEDS provides a "Parent_Child" indicator to identify and eliminate the possibility of including duplicate financial information. An example of a "child" institution is a branch campus, which will have its data reported by the main campus, known as a "parent" institution. The IPEDS variable, "prch_f", identifies the reporting structure. For instance, a "2" designates that the child record data associated with that unitid is reported with the parent campus. To avoid duplication of data, the information reported by this "child" is eliminated from my sample as listed in Table 3.

A "partial" parent_child reporting structure features a child reporting revenue, expenses, and endowment information separately, but assets (other than endowment values) and liabilities are reported with the parent. Because of this, I carefully selected ratios that did not commingle revenue and expenses with balance sheet items. Under these circumstances, a debt to endowment ratio is not achievable as the parent may report all debt, whereas the parent and child separately report endowment values. Regardless, these remained in my sample, because the child is reporting separately and there would not be duplication of data among revenue, expenses, and endowment values. A partial child record is denoted as a "prch_f" of 3.

With regard to the parent_child structure for surveys other than finance, I was unable to find any guidance from IPEDS as to whether this reporting is consistent across

all surveys. In my study, I retrieve faculty counts from the IPEDS Human Resource survey and enrollment numbers from the Admissions survey. The IPEDS tip sheet, *Updated Finance Reporting Solutions for Jointly Audited Institutions*, indicates that institutions under a separate Program Participation Agreement (PPA) filed with the Department of Education, are required to report separately. I am unsure if this treatment is consistent with the other IPEDS surveys and how the faculty and enrollment numbers are reported for a partial parent_child structure. I include these partial "prch_f" codes of 3 in my database and in reviewing them, some of these institutions are reporting faculty and enrollment and others are not. This limits the generalizability of my study, as those institutions that report revenue, expenses, and endowment values separate from their parent, may or may not have tenure, percent admitted, and percent enrolled ratios available for analysis.

Also, in contrast to previous studies, I do not scale based on full-time equivalent enrollment (FTE). The use of FTE as a denominator may falsely present a school as exceling when in fact it may be in distress. For example, a high ratio of instructional expenses per student gives the appearance of a HEI that invests in its mission of education. However, a struggling institution may also reflect a high ratio. Instructional expenses divided by a decreasing FTE denominator would return a high ratio and falsely give the appearance of an institution that is investing in its mission of education. Stowe and Komasara (2016) found that high total expenses per student were common among soon-to-be-closed institutions. I did not utilize FTE as a measure of scale in any metrics.

To validate the expenses being reported before calculating ratios, I checked the sum of instructional, institutional, and research expenses against the total expenses for each institution. Total expenses should be equal to or greater than the sum of the three. Two institutions, both 2YP, failed the test with their total expenses being less than the sum of the three categories of expense. Since financials were not available to verify the discrepancy, the total expense amount was adjusted to equal the sum of instructional, institutional, and research expenses. Total expenses of an institution is the denominator for the "Prestige" and "Research" ratios.

Finally, in cleaning data for consistency, I adjusted specific variables as follows:

Categorical variables (NCAA, Institution size, Locale, and Carnegie classification): Observations with a "-2" or "-3" for "not applicable" were replaced with a "0" and any variable observation with a "-1" for "not reported" was removed to reflect missing data. I then sorted the data by institution and analyzed whether any blank cell could be populated from existing data across years.

Beginning with 2005, IPEDS provides a variable named "instsize" based on the number of students enrolled for the fall. As previously mentioned, the category ranges from a 1 denoting less than 1,000 students to 5 denoting 20,000 students or more. To populate my database for 2004, I used an institution's total fall enrollment numbers, (IPEDS variable "enrtot"), to code the institution's size with the corresponding range from 1 to 5.

The variable adjusted the most was the Carnegie classification as I was able to look up institutions on the Carnegie website[2] and populate my database accordingly. If nothing was retrieved from the Carnegie website, I searched the applicable institution's website for programs of study to determine classification. In addition, instead of assuming Sector 4, (2YP), were automatically a Carnegie classification of "40", (associate colleges), these 2YPs were researched for their correct Carnegie classification and some were identified as specialized institutions, such as tribal colleges, health profession, and faith-based associate colleges. In this process, I found several schools that closed, and interestingly, I also found schools that started out as community colleges and then became four-year institutions. These schools are reflected in the early years as a sector 4 (2YP) and then in more recent years as a sector 1 (4YP), however, IPEDS has their Carnegie classification as a code of 40 (associate colleges) for all applicable years.

Alternative revenue: One outlier, a 4-year private institution incorrectly reported revenue for 2008; their website provided audited financial statements, and I updated my data with the correct information. A number of institutions reported negative total revenue, which indicates that the value of investments may have decreased substantially. Colgate University was one such institution whose financial statements were available to verify this assumption. The loss on investments was so substantial during the Great Recession that they recognized negative total revenue in 2009. I did not adjust the reported revenue data for these institutions. In addition, it was interesting to find that neither 4YP nor 2YP reported negative total revenue, it seems to be isolated to 4YPv.

[2] http://carnegieclassifications.iu.edu/

This could be due to stricter investment policies for public institutions that would require them to invest in low risk securities.

Instructional expense to institutional expense: 20 institutions had ratios warranting analysis as outliers, (seven 4YP, four 4YPv, nine 2YP). In handling any outlier, I examined the institution's trend in reporting data in IPEDS. If audited financials were not available for a particular year, I adopted the following conservative approach for treating inconsistent data:

- If the institution did not report data for prior years or there was no consistency in reporting, the amount was removed and treated as missing.
- If there was consistent data the year before and the year after, an average was calculated with those two years.
- If consistent data was reported for multiple years except for the one in the beginning year of the data trend or ending year of the data trend, a five-year average was calculated based on the consistent data.
- If inconsistent data for multiple years was intermittent between consistent data, a rolling average was used.

Instructional Expenses to Net Tuition and Fees & Institutional Expenses to Net Tuition and Fees: In analyzing results for these two ratios, eleven institutions merited further examination due to high ratios. Using the approach mentioned above for inconsistent data, I felt confident to adjust six of the eleven HEIs' tuition and fees, consisting of one 4YP, four 4YPv, and one 2YP. In addition, later in this chapter, I

discuss adjustments made to net tuition and fees due to the different accounting treatment for Federal Pell grants.

Instructional Expenses to State Appropriations & Institutional Expenses to State Appropriations: For these two ratios, eighteen institutions were analyzed as possible outliers. Using the approach mentioned above, one 4YP and one 2YP, were adjusted because of their unusually low reported amounts for state appropriations.

Percentage Change in Endowments: In calculating the change, if both the current year and prior year were zero, the calculation returned zero. If only the prior year was zero, the formula calculated a 100% increase, otherwise the percentage change was calculated. Nine institutions, (three 4YP, three 4YPv, three 2YP), were analyzed due to high ratios. It is reasonable for these percentages to be large as the change could be due to a substantial donation in a particular year. Financials were available for four of the institutions of which two were adjusted to correctly reflect their ending endowment value in millions instead of thousands. Another was adjusted for an amount that was reflected in their ending value, but subsequently reduced the following year from their beginning value. The draw was for construction. This amount was eliminated from the percentage calculation as their intent was obvious by the immediate reduction on day one of the following year. Both the financials and federal form 990 for the fourth institution were available, which confirmed receipt of a million dollars. This institution's ratio remained as reported. The other five institutions that were analyzed were adjusted utilizing the approach as mentioned previously.

Percentage Change in Tuition: In calculating the change year over year, if both the current year and prior year were zero, I had the calculation return zero. If only the prior year was zero, the formula calculated a 100% tuition increase, otherwise the percentage change between the years was calculated. There were 27 institutions with percentage changes greater than 1,000 (sixteen 4YPv, eleven 2YP). The same approach as above was taken for these and of which, two of the institution's financial statements were available to correct the tuition amounts reported. I took care to review the financial statements to determine if the HEIs combined tuition, room, and board was one inclusive amount. I revised institutions' reported IPEDS tuition number only if auxiliary revenue was reflected separately on the financials. IPEDS requires institutions that charge an all-inclusive rate to allocate their revenue to the categories of tuition, room, and board on the IPEDS data form.

Location: 2004 categories in the IPEDS data collection form were different from the other years. For 2004, location codes of 1-9 were replaced with the current location codes of 11-43.

Closed or Merged: In confirming the list of closed and merged institutions externally to publicly broadcasted news announcements, only one code was changed from a closed to a merged. On June 28, 2012, the New Jersey state legislature adopted a bill entitled, The New Jersey Medical and Health Sciences Education Restructuring Act[3] under which the University of Medicine and Dentistry of New Jersey (UMDNJ) merged its campuses with Rutgers and Rowan. IPEDS reflected UMDNJ as being closed when

[3] ftp://www.njleg.state.nj.us/20122013/AL12/45_.pdf

the actual objective of the state of New Jersey was to combine or merge most of its campuses with Rutgers University and its School of Osteopathic Medicine with Rowan University. The code was adjusted to correctly reflect a merger.

Another interesting merger occurred on July 1, 2017 between Philadelphia University and Thomas Jefferson University, two 4YPv institutions (Spinelli Jr., 2018). This merger is not coded as such in IPEDS, as the institutions must have requested all historical data be combined under one unitid. In other words, even though this merger occurred effective for fiscal year 2018, the data downloaded from IPEDS for 2004 through 2017 reflect one combined institution, which erased any possibility of analysis.

In addition, six institutions that were eliminated in the database because of the "parent_child" indicator, were added back to the database. Any revenue or expense ratio would be zero because the "parent" would be reporting in total for the "child". These six were included because non-financial measures, such as geographical proximity or population, may also affect survival.

Finally, in combining the survival measures into one file, 490 institutions were blank for population, geographical proximity, survival, and merged designations. Some of these were HEIs with just one year of data while others may have not reported for a year. Therefore, when combining these variables with a lag year, there was no data with which to associate. I populated these four variables for the 490 institutions based on the year available. I was comfortable adjusting the data in this manner, since these four non-financial variables would be static for the institution.

Hospital Revenue to Total Revenue: Only one HEI, a 4YPv had a ratio greater than 100 percent. In researching the institution's 2009 financials, this percentage was correct due to the investment losses incurred, causing total revenue to be less than hospital revenue.

Population & Geographical Proximity: IPEDS provides the county code, county name, and coordinates, longitude and latitude, for institutions starting with fiscal year 2009. The county code and name were necessary to retrieve population numbers from the U.S. Census and the coordinates were needed to calculate the distance of other HEIs from each closed and merged school. In order to populate my database prior to 2009, I had to first convert zip codes to a five digit number to eliminate any additional four digit extension. I then used the U.S zip code website[4] to retrieve, in groups, the county name, and longitude and latitude coordinates for that particular zip code. Once my database was populated with these variables, I was then able to use the state and county name to retrieve the applicable county code and county population from the U.S. Census database. Because there are similar names for counties in different states, I used both state and county name to retrieve the correct information for a particular institution.

Research Recommendations

The limitations in utilizing the IPEDS database have been previously documented. Jacquette and Parra (2014) guide researchers with information to understand parent/child issues, handling mergers, and limitations with the Delta Cost Project (DCP).

[4]https://www.unitedstateszipcodes.org/zip-code-database/

The DCP was commissioned to create a database that would smooth out variations and limitations found in IPEDS. One advantage of their database is the use of advanced imputation methods for missing data. I chose not to use the DCP database as some of my variables of interest were not offered. Also, with my experience working for both public and private HEIs, I am familiar with FASB and GASB accounting and each particular nuance in the IPEDS data collection forms. I knew exactly which part and line of the IPEDS form I wanted to retrieve for inclusion in my database. Like Jacquette and Parra (2016), I disagree with the DCP's grouping of parent_child institutions in which they consolidate all observations of the HEI and its branch campuses across years. I included partial child reporting to better observe branch closures or mergers. A collapsing of parent and child into one institution would not afford me with that insight. In addition, Jacquette and Parra (2016) recommend not using the DCP database for studies that compare public and private HEIs because the collapsing of parent_child institutions is more likely to occur with public institutions.

The Urban Institute Education Data Explorer is another data source available for researchers. It pulls data from various sources, such as IPEDS and the Department of Education's Federal Student Aid and College Score Card databases. Relevant to future research and as a measure of distressed institutions is the financial responsibility composite score retrievable by unitid for Fall 2006 through 2016. In addition, similar to the source for my study, the website makes available geographic variables from the 2000 and 2010 US Census. Endowment data that are available through IPEDS can be found on this site, such as endowment income from 1986-1995 and endowment values beginning

with 2004. Beneficial to researchers is the site's plan to continually update existing data, in addition to adding more data, in the future.

I next discuss adjustments made to my IPEDS data for comparability due to differences in FASB and GASB accounting. Keep in mind that the parent_child structure is considered throughout these adjustments and data is pulled from the applicable IPEDS data collection form that would allow, if applicable, both the HEI and its branch campuses to be reflected separately.

The first adjustment is in evaluating expenses. The American Institute of Certified Public Accountants (AICPA) directs not-for-profit organizations, such as private HEIs, to allocate certain expenses among the functional categories of instruction, institution, etc. and not report these specific expenses separately. These other expenses are depreciation, interest expense, and occupancy and maintenance of property (O&M). In contrast, governmental organizations, such as public HEIs, were not required to allocate these expenses, hence they are reported as separate functional categories on the financial statements. When comparing instructional, research, and institutional expenses between public and private HEIs, the private institutions' functional categories will be higher due to these other expenses being allocated to them. IPEDS accommodated for this starting with a mandatory allocation by public institutions on the IPEDS collection form, part C, for fiscal year 2010 and optional for fiscal years 2008 and 2009. This change made expenses comparable for fiscal years 2010 to 2017. In order to adjust for years before 2010, I retrieved from IPEDS the amounts private institutions reported on the FASB data collection form, part E, for O&M, depreciation, and interest and deducted each from

instructional, research, institutional, and total core expenses reported for each of the six years from 2004 to 2009. The following template provides the IPEDS variable identification name to ease replication:

	Total - O&M - Depreciation - Interest
Instruction Expense	F2E011 - F2E014 - F2E015 - F2E016
Research Expense	F2E021 - F2E024 - F2E025 - F2E026
Institutional Expense	F2E061 - F2E064 - F2E065 - F2E066
Total Core Expense	F2E131 - F2E134 - F2E135 - F2E136

In addition, due to the phase-in period allowed to public institutions for fiscal years 2008 and 2009, if amounts were reported on part C of their form for O&M, depreciation, and interest, these amounts were deducted from the appropriate functional expense totals, similar to the methodology presented above. The template below provides the IPEDS variable identification name for public institutions to ease replication:

	Total - O&M - Depreciation - Interest
Instruction Expense	F1C011 - F1C016 - F1C014 - F1C017
Research Expense	F1C021 - F1C026 - F1C024 - F1C027
Institutional Expense	F1C071 - F1C076 - F1C074 - F1C077
Total Core Expense	F1C191 - F1C081 - F1C194 - F1C197

This adjustment allows for the comparison of expenses for public and private HEIs across years, albeit, functional expenses are generally higher for years 2010 to 2017 as O&M, depreciation, and interest were allocated to the categories, in contrast to years 2004 to 2009, in which those costs were deducted out for comparability.

The accounting for Pell grants between FASB and GASB institutions poses another situation of incompatibility specifically affecting net tuition revenue, but not total revenue. Governmental organizations, such as public HEIs, treat Pell grants as a nonexchange transaction with a reporting on the financial statements as non-operating federal grant revenue. The institution reports tuition revenue when billing the student and non-operating revenue when receiving the Pell grant. When the institution applies the grant funds to the student account, it will record a scholarship discount expense. In the accounting records, the institution is showing net tuition along with non-operating Pell grant revenue. In contrast, private institutions generally treat Pell grants as a pass through, which means when the funds are received from the federal government for Pell grants, revenue is not recorded and instead it is applied to the student account similar to a student making a payment. The only revenue the private institution will record is tuition revenue when billing the student. In comparing the tuition for the two institutions, one has tuition net of Pell grants and the other does not, which causes the one school to show less tuition revenue than the other school. To adjust for this, Pell grant amounts are retrieved from IPEDS and deducted from tuition for those schools that treat Pell grants as a pass through.

Under FASB guidance, an institution may report Pell grants as either a pass through or as a federal grant. Institutions following GASB are not provided an option and are required to report Pell grants as a federal grant. Since the optional accounting treatment exists for FASB schools, IPEDS has a question on the FASB collection form, variable name F2PELL, which asks whether the institution accounts for Pell grants as a

pass through or as federal grant revenue. IPEDS began asking the question in fiscal year 2005, hence for any year prior to, it may be difficult to discern and make the adjustment. Since this involved only one year, 2004, for my study, I was comfortable in utilizing 2005 responses to populate one year back. Also, since the question is only asked on the FASB form, any public institution will reflect a code of "not applicable". However, the importance of this question cannot be underestimated. For instance, we cannot ignore all public (4YP and 2YP) institutions from this adjustment. Public HEIs can opt to follow FASB guidance. Temple University and the University of Delaware are two such public institutions that have opted to do so. Therefore, it is important to understand how they treat Pell grants in order to make the data comparable. In fact, both Temple University and University of Delaware treat Pell grants as a pass through, so unlike other public institutions, Pell grant amounts will be deducted from their tuition numbers. Understanding the treatment of Pell grants for these public institutions that adhere to FASB guidance is imperative for comparability.

The first step in adjusting for Pell grants is to download from IPEDS the response to the question, F2PELL, along with the sector code, net tuition and fees (F1B01 and F2D01), and Pell grants (F1E01 and F2C01). In comparing the responses to the question with the amounts reported, an analysis should be completed as follows:

- Generally, sector 1 (4YP) and sector 4 (2YP) should have a "-2" not applicable response. Those that do not would be the state institutions following FASB guidelines as mentioned above. These institutions' tuition will be adjusted.

- For a code of "3, does not award Pell grants" and a code of "-1, not reported" there should be 0 reported in the Pell amount fields of F1E01 and F2C01, however, just because they did not respond to the question ("-1"), it cannot be assumed they do not have Pell. For these institutions, I compare consistency in reporting across years.

In my database, I found five 4YPv that reported an amount for Pell grants and yet responded with a code of "3", meaning that they do not award Pell grants. I changed the code for four of them. I did not change the code for the fifth institution, but instead ignored the reported Pell amount of $14k. For the "-1" code, I compared 62 4YPv across years, of which the majority of codes were changed, and tuition adjusted.

- For those HEIs with a code of "1, pass through", subtract the reported Pell amounts (F2C01) from the reported net tuition (F2D01).

In my study, the adjustment to tuition was necessary for 1,476 unique HEIs, of which ten were 4YP, fifteen were 2YP, and the remainder were 4YPv.

The next step is to examine the adjusted net tuition to confirm that the calculation did not create a negative net tuition when subtracting Pell. This involved 64 HEIs whose records were analyzed and adjusted using the approach for treating inconsistent data mentioned under the previous section. Of interest were some institutions that, according to their financials, do not charge students tuition. One such institution, reported Pell amounts in IPEDS, however their financial statement footnotes did not disclose any mention of receiving Pell grants, nor undergoing a Uniform Guidance Audit. Under the federal Office of Management and Budget (OMB), recipients of federal funds greater

than $750,000 are required to undergo an OMB Uniform Guidance audit separate from the audit of their financial records. Since there was no mention of a Uniform Guidance audit for this institution, I did not adjust their net tuition for the amount reported as Pell.

Researchers using ratios based on net tuition and fees should be aware that, as mentioned above, some schools do not charge tuition, such as Webb Institute, Ingram State Technical College, and Navajo Technical University. A better metric may be to use gross tuition and fees, however depending on the specifics of the study, this too can be flawed as it would not control for the tuition discounting by some institutions.

Some other limitations to using IPEDS include difficulties in breaking out the alternative revenue streams as evident in the third “other revenue” category of my study which includes all other operating income and non-operating income. The reason for combining these two sources, operating and non-operating, is that IPEDS requires public HEIs that follow GASB to report operating and non-operating separately, however the data collection form for HEIs that follow FASB, which are typically 4YPv, are required to report operating and non-operating revenue combined as “other revenue”. Also, sales and services of educational activities were not separately reported before 2008 on the collection form for GASB institutions, but this source was both analyzed as a distinct category and combined into the third category with the operating and non-operating income. Since GASB schools pre-2008 were not required to report sales and services separately, they would have reported this income as part of "other sources”, also known as other operating. For my research, I include these revenue streams into one category,

termed “other revenue”, to provide a gauge in comparing to the “sales and services of educational activities” category because of the change in the data collection form in 2008.

Also, I would have liked to capture other statistics for each institution, but IPEDS makes it infeasible. For example, it is difficult to capture the effect of endowment and investment income on alternative revenue sources. The value of endowments is consistently reported across sectors, accounting, and years in IPEDS. HEIs are required to report their beginning-of-year and end-of-year value even if the endowments are reported on an affiliate organization’s financials. For example, Stockton University (SU) has a separate component unit, Stockton University Foundation, to manage its endowments. SU is required to report this endowment value on its IPEDS data collection form even though they are not recorded in their financials. This is the same for private institutions that may also have affiliate organizations. Endowment value can easily be captured for the time period of my study and I use the change in endowment value (ending value less beginning value) divided by beginning endowment value in my study. The difficulty is with capturing the return on endowments and investments.

Investment income reported in IPEDS is difficult to analyze across sectors, accounting, and years. Investment income in IPEDS includes the return on investments (unrestricted) and the return on endowments (nonexpendable). In other words, investment income also includes endowment income for those HEIs that own their endowments and do not have a separate affiliate organization owning those endowments. The HEIs that own their endowments will report greater investment income during market increases and less during market downturns than those HEIs that do not own their endowments.

Complicating this inference is the question IPEDS asks which prompts the reporting of endowment value. The question does not provide any insight on whether a HEI has an affiliate organization or not. The IPEDS question for both public and private institutions is as follows, "Does this institution or any of its foundations or other affiliated organizations own endowment assets?" A yes response is a qualifier to complete the endowment value section of IPEDS. It provides no understanding as to who owns the endowment assets. An enhancement to IPEDS would be an elaboration on the question to identify the owner of the endowments. This additional data along with a deconstruction of the change in endowments would be helpful. For example, identifying the amount of endowment earnings, spending, donations, etc., that comprise the change in the endowments for the year would provide relevant data to assist in assessing an institution's financial health. With this information, researchers could feasibly identify the amount of endowment earnings reported under investment income by HEIs that own their own endowments.

This brings me back to the Delta Cost Project (DCP), which has a variable entitled "PIE" that attempts to capture private grants, investment returns, and endowment income. In light of my previous discussion on investment returns, I feel the variable falls short of its purpose. The intent is to capture endowment income from an affiliate organization in the form of its spending rate. Institutions will set a spending rate policy that tries to mimic a conservative long-term rate of return for their endowments. This calculation is used to determine the amount of scholarships to award from the endowments. HEIs that do not own their endowments will receive from their affiliate

organizations this scholarship amount. Upon receipt, they will record it as part of their private grant income. By including private grants and investment income as one variable, endowment income is being captured for those institutions that own their own endowments as well as those institutions that do not. I believe this variable will be skewed towards those institutions that own their endowments. They will be recording the highs and lows of the market, whereas the HEIs with an affiliate organization owning the endowments will reflect a constant rate of return due to the spending rate.

In addition, the DCP is not considering the accounting treatment for payments received by third parties. Accounting rules state that when an institution receives payments directed toward a specific student, those payments are to be treated as a pass through. This means that there is no recording of revenue. Hence, if the affiliated organization awards a specific student a scholarship, when those funds are received by the HEI, they will not be recorded as private gifts and grant revenue and therefore, will not be included in the "PIE" variable as suggested by the DCP. Because of these issues, I do not recommend the use of this variable in comparing institutions across sectors.

A more recent limitation in the IPEDS database relates to the GASB accounting pronouncements numbered 68 and 75 on pensions and other post-employment benefits (OPEB). For public institutions following GASB, these pronouncements created an accounting expense and liability rather than a legal liability, as the responsibility to pay future benefits to an employee lies with the applicable state. Public institutions were required to record huge pension expense costs which were allocated to the functional categories, such as instructional and institutional expenses. The expense ratios in my

database will reflect greater expenses for public HEIs due to GASB 68. Both Moody's and Fitch rating agencies exclude this accounting treatment when considering a HEI's financial health. However, starting with fiscal year 2018, IPEDS implemented a change to the GASB form to exclude GASB 68 expenses. For fiscal years 2015 through 2017, it is impossible to extract these numbers from any analysis. As a result, the expenses for these years will be higher for public institutions than private HEIs.

GASB 75 was implemented in fiscal year 2018 and led to the recording of large OPEB costs. IPEDS had the foresight to request that public institutions exclude the expense from the amounts reported on their data collection forms. However, if a special funding situation was determined by the state, HEIs would record revenue equivalent to the amount of OPEB expense, instead of a liability. This is the case for public institutions in the state of New Jersey. Therefore, for NJ public institutions, other nonoperating revenue reported on IPEDS would include OPEB. In summary, any public institution in a state that determined OPEB to be a special funding situation will reflect more revenue reported than other HEIs. IPEDS did not provide a line on the data collection form to isolate and remove these amounts as they did for the corresponding OPEB expense.

IPEDS tempers their data requests to minimize the burden of reporting on HEIs. However, as the controller of a HEI, having accurate information reflected about my institution is important, especially when accessing data to present to top management. For example, improvements to the data collection form that would involve minimal effort is in the instance of GASB 68. When the IPEDS form was changed in fiscal year 2018,

HEIs could have easily provided the exclusion data for at least the prior year, fiscal year 2017, especially since the form reflects prior year data.

Another enhancement to data collection would be the use of artificial intelligence (AI) to populate parts of the data collection form from a HEIs' financials. Currently IPEDS provides error checks that reconciles the data entered before the form can be submitted. Blank entries or invalid numbers, such as negative total income, would be a trigger for the participant to correct or provide comments explaining the perceived discrepancy. Utilizing AI would provide validity to the database while streamlining the process of data collection. These upgrades would not only assist HEIs or researchers accessing the database, but they would also benefit parents and students when accessing the various reports IPEDS makes available regarding college decision making and affordability.

CHAPTER 3

RESULTS AND DISCUSSION

Data Analysis and Results

I used Statistical Package for Social Sciences (SPSS), version 25.0, to analyze the data. To account for any potential time-varying effects, for example recessions or structural changes such as tenured to non-tenured shifts, dummy variables for each year were included in the regression analysis with 2004 as the reference year. Listwise deletion is the default in SPSS, however pairwise deletion is allowed for some procedures, such as correlations and multiple regressions. I begin with a discussion of the results reported in Tables 5 and 6.

Percent of alternative revenue: Four-year public HEIs generate more alternative revenue than private HEIs. A few institutions reported negative total revenue, which was due to a large decrease in investment returns for that year as described in the Data Cleanup section above. There was a significant difference in the percentage of alternative revenue for 4YP (M=5.64, SD=7.83) compared to 2YP (M=3.54, SD=6.55); $p < 0.001$ and a significant difference in comparing 4YP (M=5.64, SD=7.83) to 4YPv (M=5.00, SD=14.34); $p < 0.001$. These results suggest that 4YP are generating more alternative revenue than 2YP and 4YPv. The higher standard deviation (SD) for 4YPv indicates a greater spread among them, meaning that there are some 4YPv generating a lot of alternative revenue and some very little.

When analyzing the specific streams of ARS, 4YPv (M=0.82, SD=5.41) generate significantly more alternative revenue from independent operations than 4YP (M=0.21, SD=1.69); $p < 0.001$. For 2YP, alternative revenue from independent operations is expectedly close to non-existent. For sales and services of educational activities, even though the category is not available for 4YP before 2008, these institutions still generate more revenue from sales and services of education than 4YPv. Sales and services of educational activities include testing services, film rental revenue, and sales of publications. The "other revenue" category reflects 4YP (M=5.42, SD=7.57) significantly generating more revenue than 4YPv (M=4.34, SD=21.75); $p < 0.001$.

Percent of state appropriations: I expected 2YP state appropriations to be greater than 4YP due to the general belief of governments' greater support for 2YP, but I found no difference on average. State appropriation to 4YPv include such institutions as Cornell University, Drexel University, University of Miami, and Stevens Institute of Technology. The percentage of state appropriations is statistically significantly higher for 2YP (M=28.94, SD=16.32) than 4YP (M=28.12, SD=13.38); $p < 0.001$. Although the economic difference seems small, this supports the general belief of governments' providing more aid to two-year publics and community colleges.

Institution size: Public institutions educate more students on average. Size was an important variable in Teixeira et al. (2014) and my descriptive statistics suggest that public institutions are generally larger than private institutions. A graph of the number of institutions by sector in each of the designated IPEDS categories is represented in Figure 4. The four-year privates are mainly small institutions with enrollment less than 5,000.

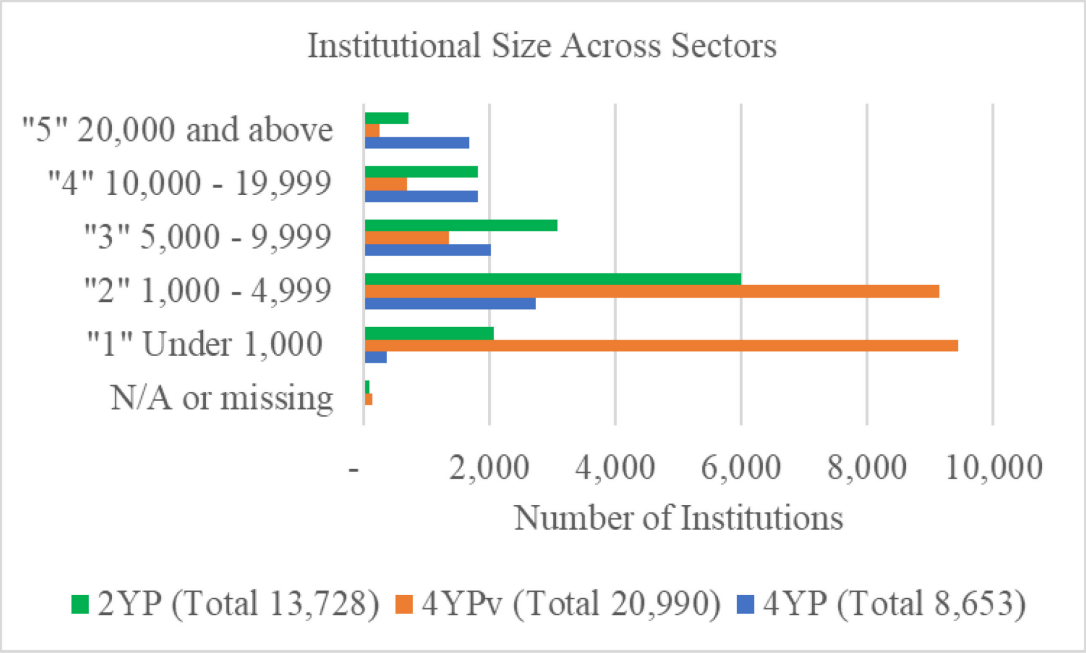

Figure 4. Institutional size across sectors

Percent admitted: The percentage of admitted students for 4YPv was less than 4YP by only two percent. I was expecting the ratio for 4YPv to be substantially less than 4YP due to my perception of 4YPv being more selective. The denominator in this ratio is the number of students who applied and so, the greater this number is, the smaller will be the percentage. These results should be interpreted keeping in mind how easily students can now apply to HEIs by using the Common Application or the Coalition Application.

Percent enrolled: This is the percentage of students enrolled over students admitted or what is known by practitioners as "yield". Again, I would expect 4YPv to have the highest percentage due to the view that they are more selective, but this is not the case, as public institutions on average are higher. Most interesting is that 2YP yields are close to double that of four-year HEIs, both public and private. The intent of this ratio is to capture a school's selectivity and is a popular metric for numerous lists ranking

HEIs, such as *U.S. News & World Report*. For 2YP, this ratio is capturing the educational path choice of these students. It is less about the school being selective and more about the economic intent of the student when applying. For example, constraints, such as location and finances play a role in student decisions. Also, to consider with this ratio is the trade-off or zero-sum game between the 4-year schools recruiting in (inter)national markets. When a student accepts one school, the other admitting schools lose.

Location: Location was another important variable in Teixeira et al. (2014). To further understand the composition of my data, a graph of the number of institutions by sector in each of the designated IPEDS location categories is represented in Figure 5. The four-year privates and publics are mainly located in cities and suburban areas. More 2YP HEIs are found in a town or rural setting than their 4-year counterparts.

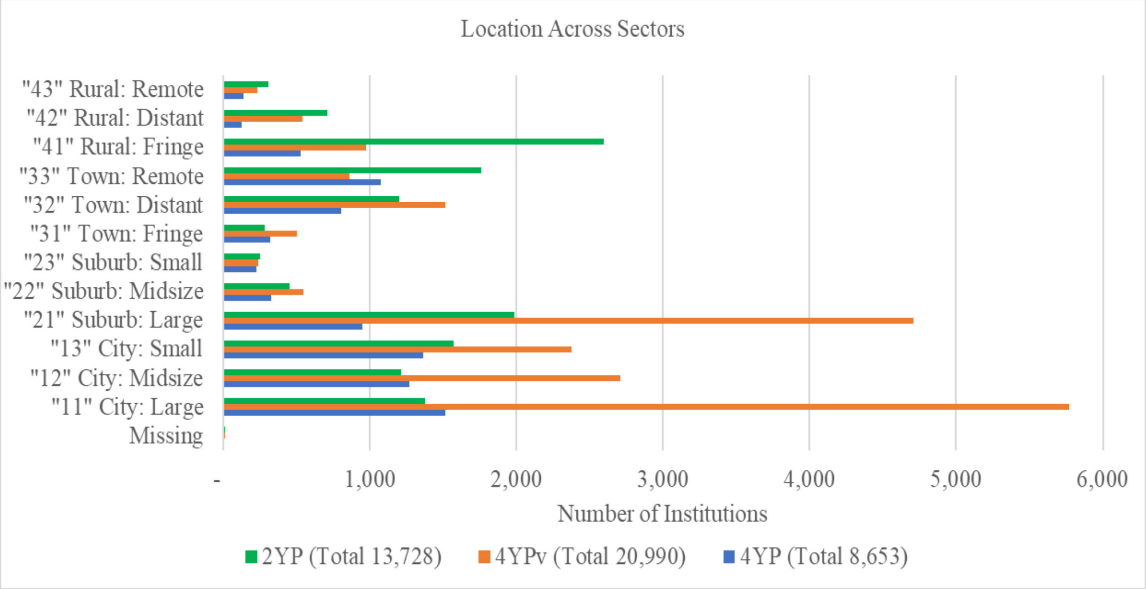

Figure 5. Location across sectors

NCAA member: The results indicate that 4YP HEIs are more involved in NCAA athletics than 4YPv or 2YP. Accordingly, the mean percentage for NCAA membership is significantly higher for 4YP than both 4YPv and 2YP.

Percent tenure: Tenure refers to the permanence of a position. This ratio is utilized in lieu of any available information on the number of doctoral faculty per institution. I expected 4YPv to have a greater percentage of tenured or tenure-track faculty, however 4YP are about twenty percent higher than 4YPv and twenty-three percent higher than 2YP. Further analysis is needed into whether these results are the effect of greater unionization in public institutions or 4YPv running leaner organizations due to less state funding. Correspondingly, the mean tenure percentage is significantly higher for 4YP than both 2YP and 4YPv.

Percent of instructional expenses to total (Prestige): 2YP spend more on instruction than 4-year HEIs, suggesting that the former devote few resources to research while the latter spend on both research and instruction. Further analysis is warranted.

Percent of instructional to institutional expenses (Excellence): The findings suggest that public HEIs spend more on instructional than on institutional outlays, in contrast to 4YPv. Institutional costs consist of administration such as, legal, finance, and operational support for the institution. Institutional advancement expenses for fundraising and alumni relations are also captured as an institutional function. It is likely that 4YPv spend more in this area due to the lack of state funding. Costs for additional amenities that students at private institutions expect in return for the higher tuition price, such as technology, campus and recreational centers, including workout gyms and climbing

walls, would be captured as a function of student support services instead of institutional. Hence, the mean percentage of instructional to institutional expenses is significantly higher for 4YP than both 2YP and 4YPv.

U.S. News & World Report publish an annual college ranking based on eight categories, one of which measures educational expenses per student with a weight of 10% and another measures faculty resources with a weight of 20% comprised of elements such as faculty salary and class size (Morse & Brooks, 2018). I have previously noted that measuring educational costs per student can be flawed in that the smaller the denominator (e.g., drop in the number of students), the greater the instructional expenses will be for each student, which gives a false sense of academic excellence. Comparing their rankings to the results of my "prestige" percentage and "excellence" percentage would not be equivalent due to their weights, categories, and methodology. For example, the 2017 *U.S. News & World Report* ranked Princeton and Harvard first and second (Bowerman, 2016). However, out of 1,663 4YPv from my database for the same year, Princeton is ranked 1,192 for "prestige" and 298 for "excellence" and Harvard is ranked 1,296 for "prestige" and 881 for "excellence". Schools ranked highest in my sample are the non-research intensive HEIs, specifically the specialized 4YPv and 2YP, such as health professional institutions, teaching colleges, and theological seminaries. HEIs like Princeton and Harvard have greater total expenses because of the inclusion of research, which would cause them to have smaller ratios than institutions without these expenses. The ratios in my study are attempting to capture institutional characteristics and are not meant to provide a ranking, as there are limitations to these measures. Further complicating this

comparison is that schools are not required to complete the *U.S. News & World Report* survey; however, any institution eligible for federal financial aid (Title IV funds such as Pell grants), must complete the IPEDS survey.

Percent of research expenses to total expenses: The results indicate that 4YP spend more on research expenses than their counterparts, both privates and 2YP. This coincides with the results of the Carnegie classification explained later in that a greater number of doctoral/research institutions are 4YP.

Instructional expenses to net tuition and fees & Institutional expenses to net tuition and fees: An analysis of these two ratios together suggests that HEIs in all three sectors are spending student tuition dollars more on instruction than on institutional costs.

Instructional expenses to state appropriations & Institutional expenses to state appropriations: The focus of these two ratios are for public institutions receiving state appropriations. Like the analysis with tuition and fees, the results suggest that both 4YP and 2YP use state taxpayer funds more on instructional expenses than administrative.

Percentage change in endowments: The results suggest that the percentage change in endowments for 4YP and their affiliates, if applicable, is higher on average than their counterparts, even though the average ending balance is higher for 4YPv by $49 million. In addition, 2YP reflect a greater change than the 4YPv. This may suggest it is not about the size of endowment, but more about the intention of the investment strategy, spending policy, and donations. The change in endowment is a combination of these three, which makes it difficult to identify the specific driver of that change. A graph of the distribution of endowment ending values as of fiscal year 2017 by sector is

presented in Figure 6. Figure 6 reflects the small number of institutions with large endowments found in all sectors.

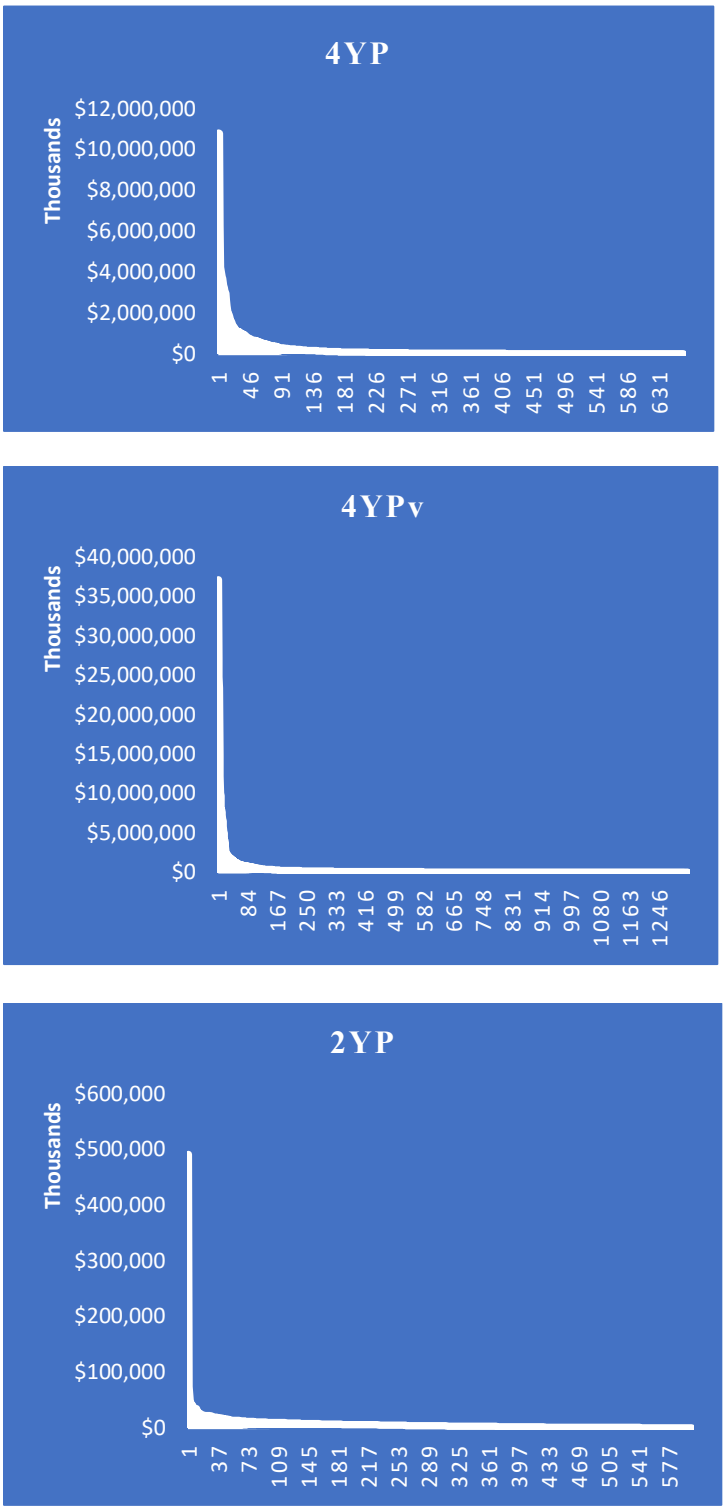

Figure 6. Distribution of endowment funds by size as of fiscal year 2017

Carnegie classification: The results reflect more doctoral institutions represented within the 4YP category than the 4YPv; however, specialized institutions such as professional schools of engineering, business, art and music, law and teachers' colleges are greater in the 4YPv sector. A graph of the number of institutions by Carnegie classification is represented in Figure 7.

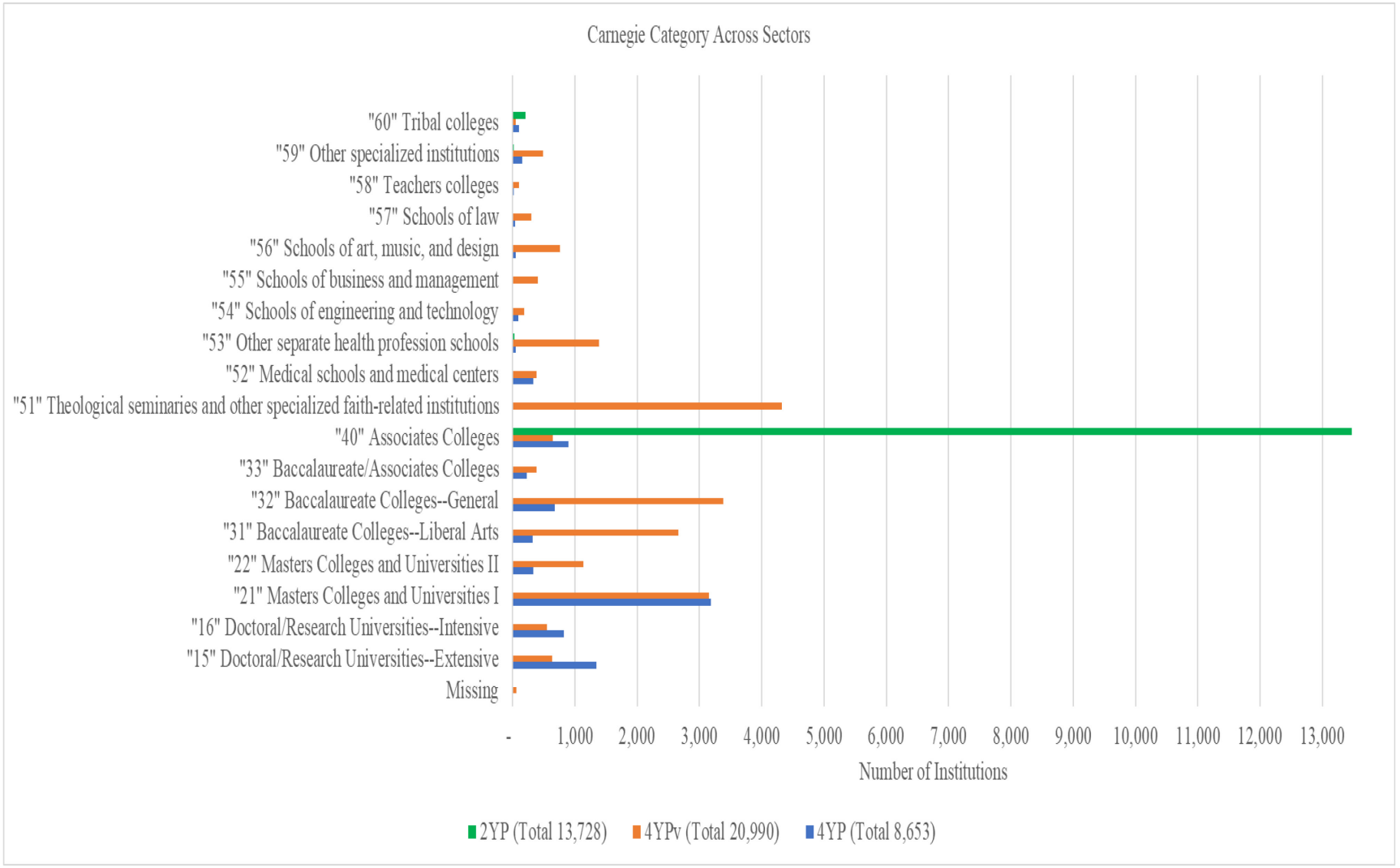

Figure 7. Carnegie category across sectors

Republican governors: All three sectors are similar in the proportion of Republican governors in office. However, when analyzing the political affiliation of each state along with the number of institutions by sector in each state, 4YPv are predominately in non-Republican or "neutral" states as reflected in Figure 8. Any state with 60% or greater Republican governors over the years is reflected with a state abbreviation in red font, any state with 40% or less Republican governors is in blue, and any state with more than 40% but less than 60% Republican governors is considered "neutral" with neither color.

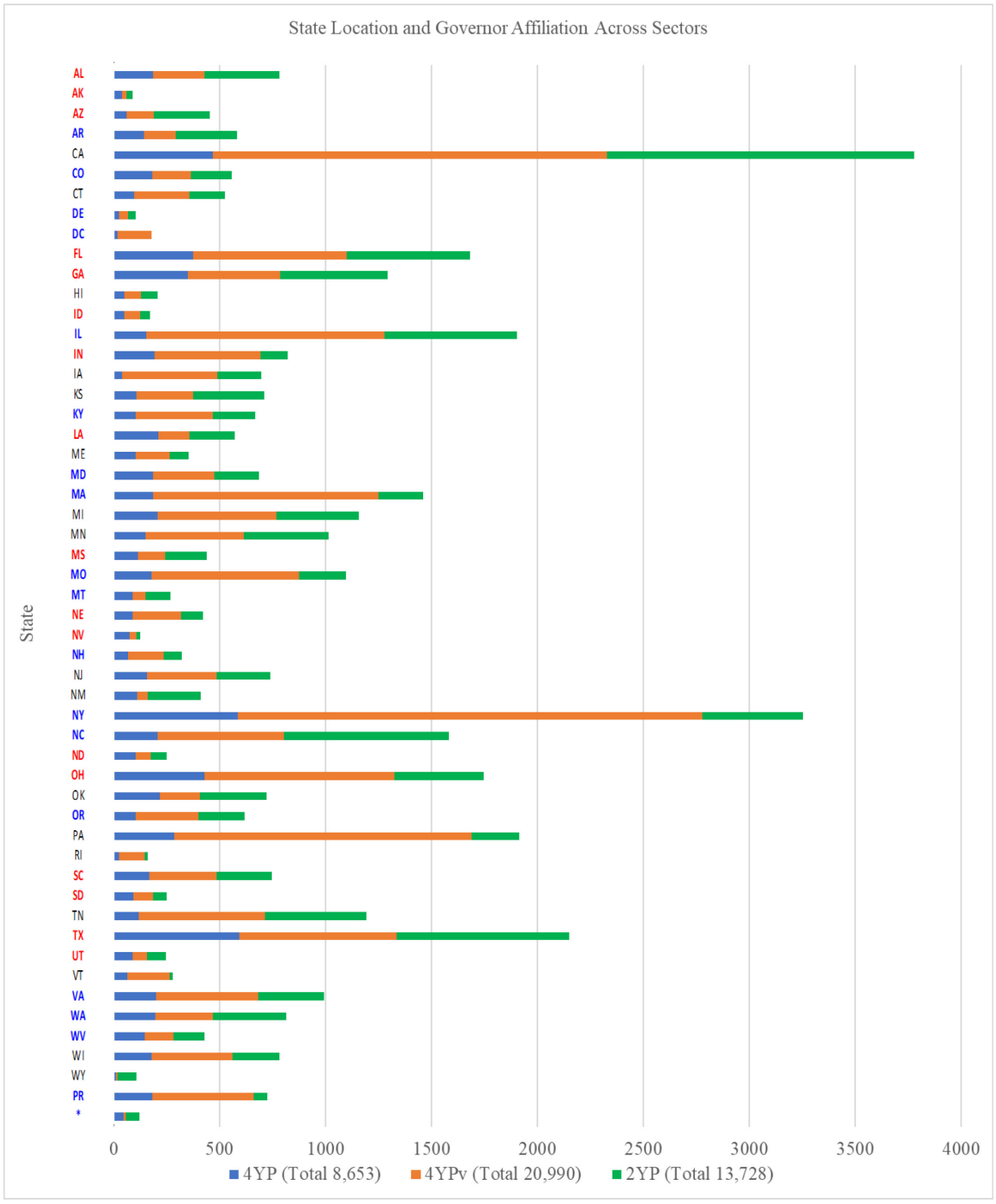

Figure 8. State location and governor affiliation across sectors
"*" Denotes other U.S. Territories except Puerto Rico, which is separately reflected. State abbreviations in red are predominantly led by Republican governors, those in blue are predominantly non-Republican.

Unemployment rate: The unemployment rate in an institution's state location is comparable across sectors.

Percent change in tuition: The percent increase in tuition is similar across sectors. 2YP are slightly higher and may indicate that these schools seek additional revenue amid budget cuts through increases in tuition. Other factors that may affect this ratio include enrollment growth and what is known as the Bennett Hypothesis. The Bennett Hypothesis is named after William Bennett, the Secretary of Education under President Reagan, who stated that more student aid leads to higher tuition. Evidence to support this is varied with the greatest indication found at for-profit institutions (Lucca et al., 2018).

Percent of tuition and fees to total revenue: There was a significant difference in the percentage for 4YP (M=25.04, SD=13.37) compared to 2YP (M=16.77, SD=11.71); $p < 0.001$ and a significant difference in comparing 4YP (M=25.04, SD=13.37) to 4YPv (M=47.94, SD=64.58); $p < 0.001$. As a measure of tuition dependency, these results suggest that 4YPv are more tuition dependent than their counterparts. A surprising finding is with the 2YP as I was expecting them to be more tuition dependent. Analyzing this percentage in conjunction with the percentage of state appropriations indicates that public HEIs can reduce tuition dependency with support from the state, and in essence, keep tuition and fees down.

I next summarize the pairwise correlations reported in Table 7. Unless otherwise noted, the correlations discussed below are statistically significant at the 0.01 level. For 4YP and 2YP, state appropriations and alternative revenue in the short term are

negatively correlated at -0.172 and -0.106, respectively. This supports my original belief that a decline in state funding is the catalyst for institutions to seek alternative revenue.

Also reflected in the results and expected, the unemployment rate and the percentage of students admitted is negatively correlated at -0.153 and -0.068, respectively for both 4YP and 4YPv, but for 2YP it is barely positive at 0.016. This suggests that four-year HEIs are more selective in admission due to the greater number of student applications as unemployment increases.

In addition, the percent enrolled and state appropriations for 4YP are positively correlated at 0.164, which suggests that when state funding increases for a HEI, the yield or percentage of students selecting an institution will also increase. This correlation for 2YP is -0.121. The findings also reflect a positive correlation of alternative revenue with the percentage of instructional to institutional expenses for both four-year public and private institutions. The correlation is stronger for 4YP at 0.111 in contrast to 4YPv at 0.041. This suggests that alternative revenue increases as more funds are allocated to instructional over institutional costs.

An interesting finding is that research expenses are positively correlated to ARS for all sectors, with 4YP strongest at 0.225 and specifically for alternative revenue from sales and services of education at 0.233, in contrast to 4YPv at 0.095 and 0.073 respectively. This suggests that alternative revenue increases as more funds are expended for research. In addition, for both public and private four-year institutions, there is a negative correlation between research expenses and location, suggesting that research expenses increase in a city environment. Research is also negatively correlated with

instruction expenses in four-year institutions, which indicates there may be a trade-off between instruction and research.

There were also no significant correlations with the change in endowments; in fact, there is a negative correlation across all sectors with ARS. This result contrasts with Cheslock and Gianneschi (2008), who found a positive correlation between donations and alternative revenue. To effectively compare the results, an exploration into the change in endowments by donations, spending rate, and earnings is necessary, but as noted previously, this information is not available through IPEDS.

The results of testing Hypotheses 1 and 2 are presented in Table 8. Model 1 includes the variables that do not directly impact state appropriations, such as location, NCAA membership, Carnegie classification, political party, and the unemployment rate. Model 2 adds institutional characteristics that may be affected by state appropriations, while Model 3 assesses H_2 by introducing the interactions between the institutional characteristics and state appropriations. Fourteen additional variables are computed by taking the product of state appropriations and each of the institutional characteristics to determine the moderating effect of the institutional variables on the relationship between state appropriations and alternative revenue. In applying the hierarchical multiple regression in this manner, my three-model approach evaluates the impact of all variables instead of systematically choosing only those that are a better fit based on their adjusted R^2. My predictions for the coefficients are shown in Table 8. State appropriations by itself is included as a test variable. Some variables were dropped by SPSS to avoid a multicollinearity problem with other variables. They are denoted with the letter d.

A few of the Model 1 coefficients are different than predicted. I had anticipated NCAA membership to have a positive effect on generating ARS, however the coefficients are negative for 4-year institutions. This may imply that with a focus on sports, resources are funneled to athletic programs instead of towards generating independent operations or sales and services of education. In other words, NCAA membership may help in generating auxiliary revenue and not the revenue streams as defined in my study for ARS. The coefficients for Carnegie classification and unemployment rate, as control variables, are also different from expected for all sectors except 4YP and 4YPv, respectively. The correlation between the Carnegie classification and the independent variable, state appropriations, is inverse to the correlation between the Carnegie classification and the dependent variable, ARS. This may be the cause for the unexpected coefficients. Further analysis is needed for the unemployment rate, as the correlation to state appropriation and ARS is varied among the sectors.

A regression of alternative revenue on institutional characteristics in Model 2 without the interaction terms finds statistical significance for the full model ($F(32, 20268) = 20.46$, $p < 0.001$, adjusted $R^2 = 2.99\%$). Model 3's inclusion of the interaction terms is also significant, ($F(44, 20256) = 16.23$, $p < 0.001$, adjusted $R^2 = 3.19\%$). Model 2 with the institutional characteristics accounts for more of the variance than the baseline Model 1 (R^2 change = 2.69%, $p < 0.001$). Model 3 explains more variance in alternative revenue than Model 2 (R^2 change = 0.28%, $p < 0.001$), indicating a significant moderation on the relationship between state appropriations and alternative revenue.

The effect of the moderating variables is statistically significant in each sector except for two-year public institutions, as indicated by the following for four-year public institutions (R^2 change = 2.93%), four-year private institutions (R^2 change = 1.64%), and two-year public institutions (R^2 change = 2.53%). For sector 1 (4-year public HEIs), the coefficient for state appropriations went from a highly significant negative -0.10 in Model 1 to a highly significant positive 0.18 in Model 3. This suggests that although the overall effect of state appropriations is negative (Model 1), most of it arises from the interactions that moderate the relationship between state appropriations and alternative revenue, and after controlling for these effects, 4YP complement their state funding by seeking alternative revenue (Model 3). In contrast, the coefficient for state appropriations in 2-year publics went from a statistically significant negative -0.04 in Model 1 to a statistically insignificant negative -0.05 in Model 3. This suggests that as state appropriations decrease for two-year publics, there is an increase in alternative revenue streams, both before and after accounting for mediating (Model 2) and moderating (Model 3) variables. The pooled correlations between alternative revenue and state appropriations support a negative relationship, which contrasts with the positive trends for the variables observed in Figures 1 and 2 and the positive regression results for 4YP. The regression results also reflect high statistical significance in Model 3 for 4-year publics and 4-year privates with the interactions for ‘state appropriations x NCAA membership’, ‘state appropriations x percentage of instructional expenses to institutional expenses’, and ‘state appropriations x percentage of research expenses’.

An interpretation of the magnitude of the Model 3 coefficients may be helpful to understand their importance due to their low coefficient values with significant *p*-values. The absolute values of the standardized coefficient or beta of 'state appropriations x NCAA membership' in 4YP and 4YPv, is 11% and 21%, respectively. These standardized coefficients reflect the effect of one standard deviation change in ARS. In 4YP and 4YPv, for 'state appropriations x percentage of instructional expenses to institutional expenses', the beta is 22% and 43%, for 'state appropriations x percentage of research expenses' the beta is 11% and 24%, and for research expenses it is 16% and 7%.

Table 9 compares the means of HEIs across sectors for survivals less CMs, (closures and mergers). Due to the small number of CMs, I also analyze the descriptive statistics for survivals, closures, and mergers separately, which are presented in Table 10. I ran a logistic regression to understand the relationship between individual variables and the likelihood to survive. These variables were selected from analyzing the summary statistics. In addition, a dummy variable for the categorical NCAA membership is included in the model to contrast against the majority non-NCAA member group. The results are presented in Table 11. I also ran a logistic regression to determine the relationship between individual variables and the likelihood to merge with results presented in Table 12. In running the logistic regressions, I examined Cook's distances for cases greater than one and it did not appear that the identified twenty institutions would disproportionately influence the results.

The following is a summary of the results for the *t*-test in Table 9 and the logistic regression in Table 11 for survivals versus CMs. The mean differences for survivals less

CMs for state appropriations, institution size, NCAA membership, change in endowment value, the percentage of research expenses to total, the percentage of instruction to tuition and fees, and the percentage of tuition and fees to total revenue are significant across all sectors. The mean difference for ARS is significant for 4YPv and 2YP, and specifically for 4YP in sales and services of education. However, there were no significant relationships between ARS and survival in the logistic regression. Coefficients that were significant ($p < 0.01$) include institution size for 4YPv, with an odds ratio of about 8.6 times more likely to survive, and NCAA membership for 4YP, with an odds ratio of about 25.6 times more likely to survive. A coefficient that was significant at $p < 0.05$ is NCAA membership for 4YPv with an odds ratio of about 3.93 times more likely to survive. Notably, although the difference in means for the percentage of enrolled was predicted to be positive, the results are negative across all sectors, meaning that CMs have a greater percentage of enrolled than survivals. The difference in means for the percentage of tenure in 4YP survived (M=52.62, SD=29.50) to CMs (M=57.36, SD=20.93) was also not as expected, as it suggests more tenured or tenure-track faculty can be found in closed or merged 4YP institutions. This finding is different in comparison to 4YPv and 2YP. Finally, as predicted, the difference in means for Carnegie classifications in four-year institutions is negative. The Carnegie classification codes are smaller for research/doctoral institutions. Hence, the results suggest that CMs are more likely to involve those institutions that are specialized, schools of business, law, teachers and tribal colleges.

The Nagelkerke's R^2 suggests that the logistic model explains about 42.1% of the variance for 4YP, 21.9% of the variance for 4YPv, and 99.9% for 2YP. These R^2 values should be evaluated with the number of cases included in the analysis, as some of the HEIs are missing data. SPSS does provide an option for pairwise deletion when performing a logistic regression. For the full data set, 20,274 or 46.7% of the cases are included in the analysis; for 4YP, 6,036 or 69.7% of the cases; for 4YPv, 13,714 or 65.3%; and for 2YP, 524 or 3.8% of the cases are included. The small number of cases in 2YP is due to missing data in some of the variables, such as NCAA, tenure, and hospital. In addition, there was a slight change in the classification accuracy from the baseline for 4YP from 99.8% to 99.7% and for 2YP from 99% to 100%.

The following is a summary of the results for the mean and standard deviation for survivals, closures, and mergers in Table 10 and the logistic regression in Table 12 for closures and mergers. In Table 10, the mean for ARS in public institutions is higher for merged institutions than for those that closed. This is the opposite for 4YPv in which ARS is greater for closed institutions than merged. On average, state appropriations for 4YP are similar for closures and mergers. However, for 2YP, state appropriations for merged HEIs are higher than closed HEIs. Examining 2YP HEIs that closed, only two received state appropriations in the prior year. This may indicate that state governments chose to close these institutions. Conversely, unaware of a pending closure, the state may have failed to fund these institutions. Further analysis is warranted to examine these institutions and their state funding policy. In addition, the inclusion of 2020 data in future studies will reveal states' intent on 2YP closures and mergers, as government officials

grapple with the effects of COVID-19. Pennsylvania Republicans are projecting mergers and closures of public HEIs because of the effects of the virus on the economy and the state's budget. In contrast, however, the state's Chancellor of Higher Education is emphatically rejecting the idea, touting the importance of HEIs as a major employer to the local community as well as educating the new workforce (McGoldrick, 2020). How this plays out in the coming months will assist future research in the survival of HEIs.

The results are also interesting for hospital revenue, as it appears to affect whether HEIs merge or close. For both public and private four-year institutions, hospital revenue exists for mergers, whereas for closures it does not. This may be a conscious decision by government officials to continue supporting university hospitals located in rural areas. Further analysis is needed. However, as expected, 2YP do not generate revenue from hospitals. For population, the results vary across sectors and in 4YP, the average county populations are smaller surrounding schools that closed. This is the opposite for 2YP, where the population is greater surrounding closures than survivals. The logistic regression on closed and merged institutions support these results and reflect insignificant negative associations in 2YP for population and geographical proximity. 2YP located in less populous counties with fewer HEIs within their geographical proximity are more likely to merge. The Stowe and Komasara (2016) study on private and for-profit institutions found that the surrounding population was the same for open and closed institutions. This agrees with my results for 4YPv, in that the population around survived, closed, and merged are similar. Further analysis is necessary to understand the reason for the varied results in population density across sectors. Also, surprising and warranting

further study are the means for certain variables in 4YPv and 2YP which are greater in closed than in merged institutions, such as the percentage of instruction to total, the percentage of instruction to institution, the percentage of instruction to tuition and fees, and the percentage of tuition and fees to total revenue. Focusing on the latter percentage, a greater percentage of tuition and fees to total revenue may suggest that the year before closure, 4YPv and 2YP are tuition dependent and not generating revenue from any other sources. Regarding the other percentages related to instruction, Stowe and Komasara (2016) similarly found that instructional expenses per student were higher in closed schools, but in contrast to their study, my variables are not scaled by student. Further analysis is necessary.

Another variable that is not consistent across sectors is geographical proximity, which captures other institutions near closed and merged schools. For 2YP on average, the logistic regression results suggest there are fewer schools near mergers. In contrast, however, for both public and private four-year institutions, there are more schools in the vicinity of mergers than closures. I was expecting uniformity across all sectors with the competition from other schools driving closures more so than mergers. However, like the results in Skodvin (1999), which found that successful mergers are among institutions that are geographically close to each other, the results may indicate that four-year institutions build alliances with institutions in their area.

Finally, the multiple and logistic regression analyses were run on an unadjusted database to evaluate whether the data adjustments improved the tests. In the hierarchical multiple regression, the total degrees of freedom in the full data set went from 20,301 in

the adjusted database to 8,106 in the unadjusted database. There were major decreases in the degrees of freedom for all sectors except for the 4YP. The decrease in 4YPv was the greatest, with a drop from 13,721 to 1,300. The effect of the moderating variables in Model 3 is statistically insignificant for all sectors, except for 4YP as reflected by the following R^2 change of 6.15%, 0.09%, and 0.75% for 4YP, 4YPv, and 2YP, respectively, and for the full database with an insignificant R^2 change of 0.0%. Interestingly, the coefficient for state appropriations went from a negative in Model 1 to a positive in Model 3 for both 4YP and 2YP. This result is different in the adjusted database in that the coefficient for state appropriations in 2YP negatively increased from Model 1 to Model 3.

In the logistic regression of survivals to CMs, the percentage of selected cases included in the analysis decreased by about 3% on average for all sectors. Like the adjusted database there were no significant relationships between ARS and survival. Significant ($p < .01$) associations in the unadjusted database include institution size for 4YPv and NCAA for 4YP. In contrast to the result in the adjusted database, NCAA was insignificant for 4YPv in the unadjusted database. The classification accuracy increased by 0.1% in the full dataset, otherwise there were no changes from the baseline for all sectors.

Overall, this analysis provides face validity for the adjustments that were made to the database for comparability and cleanup. The results suggest that most adjustments were made to 4YPv in the form of data cleanup, such as the Carnegie classification. and in comparability to 4YP and 2YP because of different reporting standards.

Discussion

This study analyzes the importance of institutional characteristics both directly and as a moderator to the relationship between state appropriations and alternative revenue. The results are consistent with the findings in Teixeira et al. (2014) and adds additional characteristics to the model for U.S. HEIs. This study builds on previous research and to my knowledge, is the first to examine the effect of institutional characteristics on the longitudinal relationship between state support and alternative revenue. My findings emphasize the importance of institutional characteristics in generating alternative revenue. Specifically, in Model 3, for 4YP, tenure, research, and percentage of tuition and fees to total revenue are statistically significant with absolute value standardized coefficients (beta) of 6%, 16%, and 11%, respectively. For 4YPv, statistically significant coefficients are found in percentage enrolled, research, and percentage of tuition and fees to total revenue with a beta of 6%, 7%, and 4%, respectively. For 2YP, percentage enrolled and tenure were statistically significant with a beta of 21% and 23%, respectively. In Model 3 the percentage of instructional to institutional expenses (excellence) had a beta of 23% for 4YP. It was surprising to find the negative correlation across all sectors between ARS and change in endowment as I had expected the correlation to be positive. I believed that HEIs that generate ARS, such as independent operations or sales and services of education, would have more public service exposure, and hence, be more likely to receive donations. In contrast, the findings indicate that as ARS increases, the change in endowment decreases. In addition, the state

appropriation coefficient in Model 1 is negative for public HEIs and remains negative in Model 2, however in Model 3, 4YP institutions contrast with 2YP in that the coefficient becomes positive.

In testing H3 with the logistic regression, there is no statistical significance to support the claim that ARS has a positive effect on survival. However, the *t*-test finds a statistical significance of ARS on 4YPv and 2YP survivals. It also found a statistical significance of sales and services of education in 4YP survivals. Due to the small sample size for closed and merged HEIs, the results are difficult to assess with any confidence. Future studies may want to increase the sample size by defining failures to include HEIs based on various measures of financial distress, such as increases in debt to endowment or multiple years of losses.

The effect of hospital revenue on the likelihood of closures and mergers was interesting, as the study does reflect a higher presence of hospital revenue among mergers than closures. The difference in means for the percentage of enrolled for survival less CMs was surprising and contradicted my prediction. For the percentage of enrolled, the higher the percentage is, the greater the number of students that choose to attend the school, therefore I had expected CMs to have a lower rate, hence a positive difference in means. Instead, the findings reflect, across all sectors, higher percentages of enrolled for CMs than for survivals producing a negative difference in means. These results may suggest that because HEIs know their situation is dire, they offer greater enticements for students to enroll. The difference in means for tenure in 4YP survival versus CMs was also opposite of my positive prediction. Like the results from the first study, greater

unionization in 4YP may play a role in these results. 4YPv and 2YP are already running lean operations, but the 4YP, when in distress, may eliminate all adjuncts and non-tenured faculty, hence relying on tenured or tenure-track faculty to teach the remaining students. The results for the Carnegie classification imply that research intensive HEIs are more likely to survive and therefore, research grants and patent royalties could be important to survival. The percentage of research expenses is used as a proxy for research grant revenue and likewise supports this suggestion as the mean is higher for survived institutions across all sectors. In analyzing population size and geographical proximity, further analysis is necessary as the results are unique across sectors.

These results provide HEIs with data to petition their legislators for continued support of their mission. For governments charged with the welfare of their constituents and the local economy, reducing support of education remains devastating. At the core is the belief that college education improves and advances citizens' stature in the community. Whenever economic tides change, for example a shift in manufacturing moves firms out of a state or technology replaces the workforce, those individuals that survive are the ones retooling themselves and seeking an education. Enrollment increases during times of high unemployment (Schmidt, 2018). At these critical junctures, HEIs must be prepared to educate a society's workforce, thereby affording individuals the opportunity to improve their self-worth and financial security. By generating alternative revenue, institutions provide evidence of their committed match to the state's support of education.

My mom was nine when she came to America. As a young girl, she was in Italy during the time of Mussolini's reign. I asked her how she felt about this dictator. She became quiet and almost ashamed of what she was going to tell me. "He brought education to every small town, even mine, and I was able to go to school." She had nothing disparaging to say about him because he invested in her. He knew the power of an education. In competing in the global arena, it is imperative for both emerging and developed countries to have an educated populace. Governments must encourage institutions to diversify, not penalize them by reducing funding if they seek ARS.

In addition, the descriptive statistics for the percentage of tuition and fees to total revenue indicate less tuition dependency and greater diversification for public HEIs. Focusing on 2YP, this reduction in tuition dependency may be explained by the greater percentage of state appropriations to total revenue. For 2YP, the results indicate an ability to reduce tuition dependency with the support from the state.

Furthermore, the results of my study reflect a positive correlation for all sectors between ARS and research expenses. The analysis also finds that research expenses are greater in city and suburban environments. Four-year institutions benefit from this as more 4YP and 4YPv are in cities and suburbs, but the majority of 2YP are in towns and rural areas, which suggests fewer research opportunities or less research investment. Additionally, research expenses are higher for survivals for all sectors. Governments could implement and promote research opportunities for 4YP, 4YPv, and 2YP, especially those in rural and town settings to encourage institutions' diversifying efforts.

Likewise, the results relating to NCAA membership are notable. For instance, the mean percentage for NCAA is significantly higher in 4YP, in addition to a statistical significance in Model 3 for 4YP with the interactions for state appropriations x NCAA membership. The NCAA *t*-test results for survivals less CMs is significant for all sectors, whereas the NCAA coefficients in the logistic regression are significant in both 4YP and 4YPv. The findings suggest the importance of NCAA membership on the relationship of state appropriations and ARS, in addition to the role it may play on survival.

An American tradition involving NCAA college basketball are the championships which are held every spring, known as "March Madness". In *The Chronicle of Higher Education*, Bauman and Davis (2018) list the amount of cash paid to participating schools from the revenue generated by the NCAA. The NCAA earned over one billion in revenue in 2017 with cash payments made to the member institutions in the millions, for example $788 million in 2016. In addition to the NCAA cash inflow, athletics provides added benefits in the form of alumni "ownership", "contributing to the reputation of the institution," and the promoting of "school spirit" (Feezell, 2009, p. 65).

The importance of ARS in higher education will be salient in the audited financials for fiscal year 2020 as the current COVID-19 pandemic takes effect. With fear of the disease spreading, college campuses have sent students home to complete their coursework on-line. March Madness was cancelled. In the fallout of COVID-19, most HEIs will realize a decrease in parking revenue, a decrease in room and board revenue due to refunds to students, they may incur a potential decrease in state support with governments freezing funding dollars, they may recognize investment losses due to

market declines, and for applicable NCAA institutions, the fallout will most likely includes lost NCAA revenue, in addition to the other streams of revenue associated with athletics. “Fund-raising, marketing and sponsorships, ticket sales, merchandising, all are buckets in addition to conference revenue. All will be affected” (Jensen, 2020). COVID-19 will transform HEIs across all sectors including those with hospitals as the more lucrative elective surgery is put on hold. Immediate countermeasures to the lost revenue will be cuts in spending to reduce expenses, which may include faculty and administrative salaries. Additional actions may involve cuts to unsustainable academic programs, as well as to sport and athletic programs. The pandemic has disrupted the higher education industry and in order to survive, HEIs will execute prompt cost reduction strategies and implement innovative plans to replace the lost revenue streams with alternative revenue sources.

Limitations and Future Research

As with any study, there are limitations that provide opportunities for future research. The first limitation relates to the adjusted R^2. In the full data set and individual sectors, my model explains a small part of the variation in alternative revenue sources. Additionally, R^2 is a measure of the goodness of fit and the small R^2 in my hierarchical multiple regression model indicates that other characteristics might explain a greater portion of the variation in alternative revenue. This suggests a future opportunity to evaluate other institutional characteristics.

A second limitation is the definition of alternative revenue. There are other revenue categories satisfying the alternative revenue definition that could be included,

such as investments, private grants, and endowments. Gathering this data over the years for both public and private schools would be a challenge due to the change in the IPEDS data collection form. However, there is extant literature laying the foundation for further studies in endowments as Cheslock and Gianneschi (2008) examined the effect of state appropriations on donation income. I investigated a few institutions' financial statements due to their reported negative total revenue. A surprising finding was that the negative total revenue was not a misreporting, but rather due to the institution's large negative investment returns during the Great Recession. As discussed previously, capturing this data through IPEDS is unachievable, but analyzing individual financials is possible.

A third limitation is the nature of the percentage change in tuition, specifically for four-year privates and two-year publics due to the large standard deviation. Further evaluation of this variable is needed perhaps by examining those schools in the database that had zero tuition which suggests these schools may not charge their students tuition. The data for future studies is accessible through IPEDS.

In addition, IPEDS had numerous data irregularities, specifically with the categorical variables. For example, 12 percent of my database was missing a Carnegie classification that IPEDS could populate by linking to the Carnegie website. I also found that institutions were inconsistent in reporting from year to year. For example, a school would report a locale code in one year, then report "0" or missing the next year, followed with the original locale code in subsequent years. I spent numerous hours cleaning the data before re-running the analyses. The changes in the data collection form over the years is a challenge when performing a time-series study comparing HEIs.

Finally, the small sample size for closed and merged HEIs may support a more in-depth case study analysis instead of the methodology presented here. For example, a time-series examination of the financial statements for Philadelphia University and Thomas Jefferson University to understand their merger would be relevant. Another example would be a time-series evaluation of the University of Alaska and the effect of the financial exigency announcement. And of course, future research in to the fallout of COVID-19 on the survival of institutions. HEIs are unique and a comprehensive case study evaluation of institutions' financial statements may provide greater insight.

Financial analysis cannot fully capture an institution or its mission, as it is difficult for metrics to accurately quantify the power of an institution's donor base that rally upon hearing their institution is in financial distress or the adaptability of an institution's president in tackling industry challenges or the innovative capacity of top management in generating alternative revenue. These difficult to measure intangibles play a role in the survival of HEIs.

CHAPTER 4

CONCLUSIONS

Implications

This study has relevant implication for practice. HEIs can focus on various institutional characteristics to affect the creation of alternative revenue, such as the quality of their faculty, emphasis on research, and NCAA membership.

HEIs have many stakeholders, such as students, parents, faculty, communities, employers, and taxpayers. The results of this study provide governments a better understanding of "how the decreasing purchasing power of state appropriations influences the total amount of resources available to specific public institutions…" (Cheslock & Gianneschi, 2008, p. 225). My findings indicate that 4YP constantly seek ARS, but 2YP only seek ARS as state appropriations decrease. Furthermore, the ARS generated by public institutions may not be a dollar for dollar equivalent to the decrease in state funding. Legislation to promote sales and services of educational activities, independent operations, or research will assist in bridging the gap. Governments can provide incentives for both public and private universities to seek alternative revenue.

Similar in concept to the federal Bayh-Dole Act of 1980, which allowed universities to patent their intellectual property developed in federally funded research programs, states can implement laws to motivate universities to seek new sources of revenue. With alternative sources, universities can minimize their dependency on their primary sources of revenue, such as tuition and fees.

In addition to state appropriations, free community college is currently being touted by politicians, but it remains unclear how many students truly benefit from these programs. For example, in New Jersey, this benefit is only extended to families that earn a maximum of $45,000 (Johnson, 2019). Per the U.S Census Bureau, 33.9% of NJ's total households earned $49,999 or less in 2017 inflation adjusted dollars with the median household income at $76,475. Community college programs are a benefit for those who are the least able to afford college, but they may exclude middle income families.

Keeping education affordable has a direct impact on students and parents. This research can interest a broader audience in that education spurs innovation and benefits humanity. “Indeed, Harvard, Yale, and Columbia could not have survived the colonial period without support of the state” (Rudolph, 1962, p. 6). All institutions strive to survive by seeking new sources of revenue and institutional characteristics have a positive effect in HEIs achieving new revenue streams. Consistent with this, “…institutions of higher education perform multiple missions and wish to outperform their peers in numerous activities, so their desire for resources may be insatiable, and they may aggressively seek additional resources regardless of the magnitude of governmental funding” (Cheslock & Gianneschi, 2008, p. 225). The decline in state appropriations may have spurred public HEIs to seek other revenue streams in the early years of state budget cuts, since universities, like other organizations, strive to survive. Both public and private institutions will continue to seek and develop innovative ways to generate revenue to guarantee their future existence and with the assistance from the government in the form of legislative incentives, generating ARS can be amplified.

Furthermore, my study of closures and mergers is different from previous research in that I include public institutions. Separating my database into two groupings, HEIs that have survived and HEIs that have closed or merged, allows me to compare the statistics from both groups by sector. This study can spur HEIs' executives to recognize distinct institutional characteristics in generating alternative revenue as a means of survival, such as with an increase in research, tenured or tenure-track faculty, or NCAA membership.

My study is also unique in its definition of ARS. The core revenue of an institution consists largely of tuition and fees, endowments, grants, and research. My study examines whether HEIs can survive by generating revenue through independent operations, sales and services of educational activities, and other operating and non-operating revenue. The existing literature has analyzed the major streams of revenue, such as tuition and fees and donations; however, to my knowledge, this is the first study to explore the effect of alternative revenue, as I define it, on the survival of private and public HEIs.

My results may prompt initiatives to encourage research in HEIs with the passage of legislation. Moreover, understanding why certain institutions close or merge is vital to society. School closures or mergers creates disruption to the state and local economies with lost jobs, businesses, and tax revenues. By exploring the effects of ARS on closures and mergers, we can ensure that the doors to higher education stay open.

Contributions

Although generally accepted accounting principles strive to standardize accounting, there will always be industry nuances, and in the case of higher education, distinctions between public and private institutions. The difficulties of capturing the similarities and differences between the two is evident with the IPEDS database. IPEDS has compiled a wealth of data over the years striving to smooth out the differences between the two while accommodating each new accounting pronouncement. Researchers build upon each other's knowledge and, with chapter two, I provide guidance on how to navigate through the maze of IPEDS changes and accounting promulgations. I hope this guidance will assist future researchers in the use of the IPEDS database.

Budget cuts, alternative revenue sources, and survival have mattered for HEIs throughout their existence. From Harvard receiving ferry rental revenue as a source of income to Princeton operating a lottery due to budget constraints, HEIs, like other organizations, struggle to endure. Generating alternative revenue is especially relevant in today's COVID-19 environment which is testing HEIs survival skills. Those institutions that can quickly adapt with remote learning and innovative ideas for generating ARS, such as dorm rentals to hospitals, providing online tutoring services, and establishing publishing or testing services, will be better prepared to survive. The findings of my study suggest that ARS may play a role in the survival for 4YPv and 2YP and specifically sales and services of education in the survival of 4YP. The ability of HEIs to survive by generating alternative revenue is as important today as it was in the seventeenth century.

Pratt (2003) argued that tax increases are never favorable for people who are directly affected or to politicians' careers. Hence, spending cuts to balance the budget may well translate to less funding for education. HEIs can in turn increase tuition to replace the lost revenue or they may lower academic standards by hiring part-time faculty. However, raising taxes, increasing tuition, or lowering academic standards are not good long-term solutions. Education benefits society by elevating taxpayers from low-income to high-income status, thereby increasing tax revenue. Education can be gained from a four-year research institution, a faith-based school, or a community college specializing in a trade or skill. Regardless, "Education remains a key tool to individual economic success and employment" (Goodman, 2009, p.14). My hope is that in examining alternative revenue sources, state funding, and institutional characteristics, I have built on past research to better understand the role each plays in keeping an institution's doors open.

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APPENDIX A

TABLES

Table 5: Descriptive Statistics

	2004-2017		Sector 1		Sector 2		Sector 4	
	Full Data Set		4-Year Public (4YP)		4-Year Private (4YPv)		2-Year Public (2YP)	
Variable	Mean	SD	Mean	SD	Mean	SD	Mean	SD
% of Alternative Revenue	4.67	11.22	5.64	7.83	5.00	14.34	3.54	6.55
% of Alternative Revenue-Independent Operations	0.44	3.85	0.21	1.69	0.82	5.41	0.00	0.00
% of Alternative Revenue-Sales & Services Education	0.74	4.73	0.97	2.48	0.92	6.55	0.30	1.04
% of Alternative Revenue-Sales & Services Education and Other Revenue including non-operating	4.29	15.94	5.42	7.57	4.34	21.75	3.51	6.51
% of State Appropriations	14.84	18.00	28.12	13.38	0.14	1.61	28.94	16.32
Institution Size	2.25	1.15	3.19	1.21	1.71	0.82	2.49	1.07
% Admitted	66.39	20.11	67.62	18.23	65.51	20.66	73.83	24.43
% Enrolled	43.36	23.20	43.34	17.34	41.99	24.63	77.11	19.58
Location	22.09	10.98	21.53	10.53	19.47	9.77	26.44	11.65
NCAA Member	0.32	0.47	0.69	0.46	0.38	0.49	0.00	0.06
% Tenure	35.85	35.09	52.63	29.48	33.59	34.82	29.14	35.43
% of Instructional Expenses to Total	40.98	12.47	40.47	10.38	39.50	13.80	43.56	11.04
% of Instructional to Institutional Expenses	283.78	288.58	375.96	255.16	202.49	235.55	349.96	342.65
% Research Expenses to Total	1.88	5.53	5.75	8.57	1.46	4.92	0.08	0.66
% of Instructional to Tuition and Fees	262.18	2866.28	203.15	591.49	131.28	829.38	499.59	4960.14
% of Instructional to State Appropriations	729.06	9434.30	282.05	10167.35	1102.52	10618.73	439.69	6573.65
% of Institutional to Tuition and Fees	120.66	1147.62	85.76	1125.06	97.19	527.78	178.56	1712.56
% of Institutional to State Appropriations	330.68	3856.95	98.20	2434.25	555.56	5163.91	133.31	1529.22
% Change in Endowment	11.59	164.72	17.79	233.48	9.66	120.49	10.64	170.72
Carnegie Classification	36.14	12.19	26.44	12.11	37.38	13.79	40.36	2.60
Republican Governors	0.51	0.50	0.56	0.50	0.48	0.50	0.53	0.50
Unemployment Rate	6.67	2.40	6.60	2.41	6.70	2.33	6.69	2.51
% Change in Tuition and Fees	6.11	30.58	6.45	17.47	5.72	31.64	6.50	35.15
% Tuition and Fees to Total Revenue	33.51	47.97	25.04	13.37	47.94	64.58	16.77	11.71

Table 6: Mean Difference and Independent Samples *T*-Tests

Variables	4-Year less 2-Year Public		4-Year Public less 4-Year Private	
	Mean Difference	*t*-statistic	Mean Difference	*t*-statistic
% of Alternative Revenue	2.11	20.81	0.64	4.92
% of Alternative Revenue-Independent Operations	0.21	11.47	-0.61	-14.64
% of Alternative Revenue-Sales & Services Education	0.67	23.77	0.05	0.90
% of Alternative Revenue-Sales & Services Education and Other Revenue including non-operating	1.91	19.4	1.08	6.33
% of State Appropriations	-0.82	-4.11	27.98	193.88
Institution Size	0.70	44.11	1.48	104.39
% Admitted	-6.21	-6.01	2.11	7.44
% Enrolled	-33.77	-40.16	1.35	4.56
Location	-4.91	-32.58	2.06	15.61
NCAA Member	0.69	137.96	0.31	51.42
% Tenure	23.49	51.51	19.05	45.71
% of Instructional Expenses to Total	-3.09	-21.13	0.97	6.61
% of Instructional to Institutional Expenses	26.00	6.48	173.48	54.40
% Research Expenses to Total	5.68	61.55	4.30	43.79
% of Instructional to Tuition and Fees	-296.44	-6.92	71.87	8.40
% of Instructional to State Appropriations	-157.64	-1.28	-820.47	-6.23
% of Institutional to Tuition and Fees	-92.80	-4.89	-11.43	-0.91
% of Institutional to State Appropriations	-35.11	-1.20	-457.36	-10.34
% Change in Endowment	7.15	2.46	8.13	3.08
Carnegie Classification	-13.92	-105.40	-10.94	-67.79
Republican Governors	0.02	3.47	0.07	11.69
Unemployment Rate	-0.09	-2.69	-0.10	-3.24
% Change in Tuition and Fees	-0.05	-0.14	0.72	2.50
% Tuition and Fees to Total Revenue	8.26	47.22	-22.91	-48.91

Table 7. Correlations

Full Data Set Correlations 2004-2017

	% of ARS-Independent Operations	% of ARS-Sales & Services Education	% of ARS-Sales & Services Education and Other Revenue including non-operating	% of State Appropriations	Institution Size	% Admitted	% Enrolled	Location	NCAA Member	% Tenure	% of Instructional Expenses to Total	% of Instructional to Institutional Expenses	% Research Expenses to Total	% of Instructional to Tuition and Fees	% of Instructional to State Appropriations	% of Institutional to Tuition and Fees	% of Institutional to State Appropriations	% Change in Endowment	Carnegie Classification	Republican Governors	Unemployment Rate	% Change in Tuition	% Tuition and Fees toTotal Revenue
% of Alternative Revenue	**0.329****	**0.409****	**0.618****	**-0.059****	**-0.014****	**-0.023****	**0.049****	**-0.033****	0.006	**-0.013****	**-0.074****	**0.029****	**0.124****	0.006	*-0.011**	**0.013****	**0.026****	-0.001	**0.016****	0.004	*-0.010**	**0.019****	**-0.041****
% of Alternative Revenue-Independent Operations		**0.019****	**0.023****	**-0.081****	**-0.057****	**0.023****	0.009	**-0.046****	0.002	**-0.029****	**-0.038****	**-0.025****	**0.051****	0.000	**0.028****	0.002	**0.069****	-0.003	**-0.021****	-0.007	**0.014****	0.000	*-0.011**
% of Alternative Revenue-Sales & Services Education			**0.281****	**-0.044****	0.007	**-0.045****	-0.005	**-0.033****	**0.025****	-0.002	0.001	**0.018****	**0.097****	-0.003	**0.017****	-0.002	**0.020****	0.001	-0.007	0.008	0.008	0.007	0.009*
% of Alternative Revenue-Sales & Services Education and Other Revenue including non-operating				**-0.025****	-0.002	0.001	**0.050****	**-0.013****	0.001	0.007	**-0.036****	**0.024****	**0.073****	0.005	0.001	0.009	0.001	-0.001	*0.012**	0.001	*-0.012**	*0.010**	**-0.024****
% of State Appropriations					**0.313****	**0.036****	**0.095****	**0.211****	**-0.117****	**0.035****	**0.127****	**0.199****	0.007	**0.055****	**-0.530****	**0.024****	**-0.061****	*0.010**	**-0.091****	**0.068****	**-0.034****	**0.020****	**-0.253****
Institution Size						**-0.091****	**-0.226****	**-0.163****	**0.343****	**0.191****	**0.128****	**0.196****	**0.308****	**-0.019****	*0.012**	**-0.045****	-0.005	0.007	**-0.518****	**0.025****	**0.033****	*-0.010**	**0.074****
% Admitted							**0.103****	**0.068****	**-0.122****	**-0.039****	0.002	**0.037****	**-0.139****	**-0.046****	**-0.024****	**-0.048****	**-0.018****	0.009	**0.089****	0.008	**-0.080****	*0.015**	**0.029****
% Enrolled								**0.025****	**-0.481****	**-0.300****	**-0.050****	**0.082****	**-0.047****	**0.197****	**-0.024****	**0.152****	**-0.026****	*0.017**	**0.442****	-0.009	**0.068****	**0.082****	**-0.096****
Location									**-0.093****	**-0.043****	**-0.021****	**-0.017****	**-0.155****	**0.028****	**-0.026****	**0.025****	**-0.026****	-0.001	**0.031****	**0.022****	**-0.042****	0.000	**-0.098****
NCAA Member										**0.320****	**0.030****	**0.017****	**0.281****	**-0.038****	**0.032****	**-0.047****	**0.028****	0.001	**-0.670****	**-0.016****	**-0.055****	**-0.022****	**0.095****
% Tenure											**0.080****	**0.034****	**0.104****	0.006	**0.028****	-0.003	**0.024****	**-0.013****	**-0.300****	**-0.018****	**-0.047****	**-0.058****	**-0.029****
% of Instructional Expenses to Total												**0.408****	**-0.164****	**0.021****	**0.029****	**-0.033****	0.004	-0.002	**-0.086****	**-0.019****	**0.018****	**-0.025****	**0.085****
% of Instructional to Institutional Expenses													**0.098****	**0.017****	**0.013****	**-0.024****	**-0.018****	0.000	**-0.082****	0.006	0.003	0.003	**-0.048****
% Research Expenses to Total														-0.005	**0.032****	0.001	**0.028****	-0.001	**-0.314****	0.000	0.009	**0.013****	**-0.053****
% of Instructional to Tuition and Fees															-0.001	**0.867****	-0.002	-0.002	**0.030****	*0.010**	0.008	**0.106****	**-0.038****
% of Instructional to State Appropriations																-0.002	**0.870****	-0.003	**-0.025****	**-0.028****	0.003	-0.006	**0.017****
% of Institutional to Tuition and Fees																	0.001	-0.002	**0.055****	0.006	0.009	**0.123****	**-0.044****
% of Institutional to State Appropriations																		-0.003	-0.008	**-0.038****	-0.004	-0.006	**0.018****
% Change in Endowment																			-0.004	-0.002	-0.003	-0.001	-0.004
Carnegie Classification																				**-0.027****	**0.024****	*0.010**	**-0.034****
Republican Governors																					**-0.133****	0.000	**-0.027****
Unemployment Rate																						**0.015****	0.003
% Change in Tuition and Fees																							**-0.034****

****. Correlation is significant at the 0.01 level (2-tailed).**

**. Correlation is significant at the 0.05 level (2-tailed).*

Table 7. Correlations (continued)

Sector 1 (4-Yr publics) Correlations 2004-2017

	% of ARS-Independent Operations	% of ARS-Sales & Services Education	% of ARS-Sales & Services Education and Other Revenue including non-operating	% of State Appropriations	Institution Size	% Admitted	% Enrolled	Location	NCAA Member	% Tenure	% of Instructional Expenses to Total	% of Instructional to Institutional Expenses	% Research Expenses to Total	% of Instructional to Tuition and Fees	% of Instructional to State Appropriations	% of Institutional to Tuition and Fees	% of Institutional to State Appropriations	% Change in Endowment	Carnegie Classification	Republican Governors	Unemployment Rate	% Change in Tuition	% Tuition and Fees toTotal Revenue
% of Alternative Revenue	**0.251****	**0.334****	**0.975****	**-0.172****	**0.085****	**0.097****	**-0.071****	**-0.080****	0.017	**-0.053****	**-0.134****	**0.111****	**0.225****	**0.057****	-0.005	0.010	-0.004	-0.001	**-0.041****	**0.050****	*-0.023**	**0.039****	**-0.106****
% of Alternative Revenue-Independent Operations		-0.007	**0.035****	**-0.072****	-0.008	*0.030**	**-0.035****	**-0.036****	**-0.037****	**-0.030****	*-0.026**	0.020	**0.054****	0.010	-0.002	0.000	-0.003	-0.006	**0.059****	0.010	**-0.039****	0.011	**-0.079****
% of Alternative Revenue-Sales & Services Education			**0.347****	**-0.212****	**0.120****	**0.111****	**-0.086****	**-0.071****	**0.049****	**0.053****	0.015	**0.113****	**0.233****	-0.015	-0.002	-0.013	-0.008	0.014	**-0.080****	**0.056****	**0.039****	-0.013	-0.002
% of Alternative Revenue-Sales & Services Education and Other Revenue including non-operating				**-0.155****	**0.093****	**0.092****	**-0.066****	**-0.074****	**0.029****	**-0.049****	**-0.120****	**0.113****	**0.221****	**0.058****	-0.005	0.011	-0.003	0.000	**-0.058****	**0.048****	-0.016	**0.038****	**-0.087****
% of State Appropriations					**-0.121****	**-0.089****	**0.164****	**0.049****	**-0.085****	**0.048****	**0.147****	*-0.024**	**-0.207****	**0.031****	**-0.035****	-0.020	**-0.054****	-0.002	**-0.049****	-0.003	**0.065****	**0.049****	**-0.183****
Institution Size						-0.001	**-0.249****	**-0.369****	**0.490****	**0.044****	**0.039****	**0.222****	**0.366****	**-0.123****	0.009	**-0.060****	-0.012	-0.018	**-0.628****	*0.028**	*0.025**	0.006	**0.165****
% Admitted							-0.006	**0.093****	**-0.053****	**0.035****	**0.054****	**0.133****	**-0.038****	**-0.145****	-0.007	**-0.136****	-0.010	0.008	**-0.100****	**0.035****	**-0.153****	0.001	**0.246****
% Enrolled								**0.064****	**-0.319****	**-0.101****	**-0.088****	0.013	**-0.069****	**0.294****	**0.036****	**0.197****	**0.038****	0.020	**0.288****	**0.033****	**0.083****	0.023	**-0.228****
Location									**-0.072****	0.017	**0.037****	**-0.103****	**-0.244****	*-0.027**	-0.009	-0.006	0.011	0.000	**0.105****	-0.016	**-0.044****	-0.008	**0.053****
NCAA Member										**0.182****	0.007	**0.084****	**0.180****	**-0.142****	0.007	**-0.052****	-0.009	-0.002	**-0.636****	**-0.060****	**-0.068****	-0.015	**0.132****
% Tenure											**0.190****	0.007	-0.009	**-0.038****	0.014	*-0.025**	-0.004	-0.018	**-0.153****	**-0.038****	**-0.076****	**-0.103****	**0.064****
% of Instructional Expenses to Total												**0.279****	**-0.378****	**-0.035****	-0.008	**-0.067****	**-0.037****	0.011	-0.016	**-0.029****	**0.046****	**-0.082****	**0.370****
% of Instructional to Institutional Expenses													**0.160****	-0.002	0.005	**-0.042****	-0.014	0.005	**-0.140****	0.006	**-0.057****	0.001	**0.062****
% Research Expenses to Total														**0.031****	0.019	0.010	0.009	-0.013	**-0.292****	*0.026**	-0.003	**0.032****	**-0.212****
% of Instructional to Tuition and Fees															0.020	**0.906****	0.018	-0.005	**0.176****	0.004	**0.052****	**0.111****	**-0.223****
% of Instructional to State Appropriations																0.002	**0.931****	-0.001	-0.004	-0.016	0.018	-0.007	-0.012
% of Institutional to Tuition and Fees																	0.006	-0.002	**0.074****	0.012	0.008	**0.062****	**-0.073****
% of Institutional to State Appropriations																		-0.001	*0.025**	*-0.026**	0.011	-0.014	*-0.023**
% Change in Endowment																			0.005	0.011	-0.013	-0.002	0.006
Carnegie Classification																				-0.013	*0.026**	-0.004	**-0.228****
Republican Governors																					**-0.120****	*0.026**	**0.029****
Unemployment Rate																						0.018	**-0.059****
% Change in Tuition and Fees																							**-0.103****

****. Correlation is significant at the 0.01 level (2-tailed).**

**. Correlation is significant at the 0.05 level (2-tailed).*

Table 7. Correlations (continued)

Sector 2 (4-Yr privates) Correlations 2004-2017

	% of ARS-Independent Operations	% of ARS-Sales & Services Education	% of ARS-Sales & Services Education and Other Revenue including non-operating	% of State Appropriations	Institution Size	% Admitted	% Enrolled	Location	NCAA Member	% Tenure	% of Instructional Expenses to Total	% of Instructional to Institutional Expenses	% Research Expenses to Total	% of Instructional to Tuition and Fees	% of Instructional to State Appropriations	% of Institutional to Tuition and Fees	% of Institutional to State Appropriations	% Change in Endowment	Carnegie Classification	Republican Governors	Unemployment Rate	% Change in Tuition	% Tuition and Fees toTotal Revenue
% of Alternative Revenue	**0.357****	**0.438****	**0.563****	0.008	**-0.026****	**-0.049****	**0.074****	**-0.019****	**-0.053****	**-0.045****	**-0.058****	**0.041****	**0.095****	**0.055****	*0.016**	**0.052****	**0.031****	-0.003	**0.061****	0.007	-0.007	**0.027****	**-0.057****
% of Alternative Revenue-Independent Operations		*0.015**	**0.022****	-0.003	-0.009	**-0.066****	*0.021**	**-0.029****	**-0.023****	**-0.036****	**-0.032****	-0.002	**0.073****	**0.022****	**0.032****	*0.014**	**0.070****	-0.003	**0.018****	-0.003	**0.026****	0.001	**-0.041****
% of Alternative Revenue-Sales & Services Education			**0.282****	0.012	**.0019****	**-0.091****	*0.019**	*-0.017**	*-0.015**	**-0.023****	0.000	*0.018**	**0.073****	0.003	**0.018****	0.003	**0.020****	-0.002	**0.023****	-0.006	0.000	0.011	-0.006
% of Alternative Revenue-Sales & Services Education and Other Revenue including non-operating				0.005	**-0.021****	**-0.021****	**0.074****	-0.004	**-0.035****	-0.005	**-0.025****	**0.025****	**0.042****	**0.033****	0.002	**0.033****	0.002	-0.003	**0.044****	0.002	-0.013	0.013	**-0.027****
% of State Appropriations					**0.035****	**-0.033****	-0.014	*-0.017**	0.011	0.013	**-0.019****	0.003	**0.128****	0.004	0.000	0.002	0.001	-0.002	-0.002	-0.013	**0.020****	0.001	**0.023****
Institution Size						**-0.250****	**-0.330****	**-0.083****	**0.518****	**0.190****	**0.234****	**0.122****	**0.266****	**-0.044****	**0.080****	**-0.088****	**0.052****	0.000	**-0.626****	**-0.019****	**0.025****	*-0.014**	**0.073****
% Admitted							**0.124****	**0.044****	**-0.159****	**-0.088****	-0.013	**-0.038****	**-0.288****	**-0.060****	**-0.028****	**-0.040****	-0.016	0.012	**0.176****	-0.005	**-0.068****	0.016	**0.036****
% Enrolled								**-0.023****	**-0.526****	**-0.378****	**-0.078****	**0.059****	**-0.035****	**0.166****	**-0.038****	**0.144****	**-0.032****	*0.019**	**0.518****	*-0.019**	**0.039****	**0.098****	**-0.080****
Location									**0.068****	**0.044****	**-0.061****	**-0.036****	**-0.120****	*-0.014**	**-0.024****	-0.010	**-0.025****	0.000	**-0.077****	**0.042****	**-0.065****	-0.005	**-0.026****
NCAA Member										**0.358****	**0.159****	**0.049****	**0.112****	**-0.055****	**0.052****	**-0.088****	**0.036****	*-0.014**	**-0.618****	-0.008	**-0.077****	**-0.035****	**0.032****
% Tenure											**0.116****	-0.009	**0.041****	-0.013	**0.045****	-0.013	**0.041****	*-0.018**	**-0.311****	**0.023****	**-0.043****	**-0.068****	**-0.042****
% of Instructional Expenses to Total												**0.441****	**-0.088****	**0.037****	**0.039****	**-0.077****	*0.017**	-0.013	**-0.160****	**-0.049****	**0.023****	**-0.022****	**0.122****
% of Instructional to Institutional Expenses													**0.070****	**0.021****	**0.021****	**-0.054****	-0.001	-0.007	**-0.046****	**-0.038****	0.013	0.004	**0.027****
% Research Expenses to Total														**0.026****	**0.063****	**0.030****	**0.055****	-0.004	**-0.156****	**-0.039****	**0.028****	0.011	**-0.060****
% of Instructional to Tuition and Fees															-0.001	**0.719****	0.002	-0.003	**0.064****	-0.007	0.007	**0.077****	**-0.057****
% of Instructional to State Appropriations																-0.005	**0.923****	-0.004	**-0.051****	**-0.046****	-0.003	-0.006	0.005
% of Institutional to Tuition and Fees																	0.004	-0.003	**0.095****	-0.009	0.013	**0.139****	**-0.078****
% of Institutional to State Appropriations																		-0.004	**-0.027****	**-0.048****	-0.010	-0.006	0.002
% Change in Endowment																			0.004	0.002	-0.004	0.003	-0.006
Carnegie Classification																				**-0.019****	**0.033****	*0.016**	**-0.033****
Republican Governors																					**-0.166****	-0.005	*-0.018**
Unemployment Rate																						*0.017**	**0.022****
% Change in Tuition and Fees																							**-0.028****

****. Correlation is significant at the 0.01 level (2-tailed).**

**. Correlation is significant at the 0.05 level (2-tailed).*

Table 7. Correlations (continued)

Sector 4 (2-Yr publics) Correlations 2004-2017

	% of ARS-Independent Operations	% of ARS-Sales & Services Education	% of ARS-Sales & Services Education and Other Revenue including non-operating	% of State Appropriations	Institution Size	% Admitted	% Enrolled	Location	NCAA Member	% Tenure	% of Instructional Expenses to Total	% of Instructional to Institutional Expenses	% Research Expenses to Total	% of Instructional to Tuition and Fees	% of Instructional to State Appropriations	% of Institutional to Tuition and Fees	% of Institutional to State Appropriations	% Change in Endowment	Carnegie Classification	Republican Governors	Unemployment Rate	% Change in Tuition	% Tuition and Fees toTotal Revenue
% of Alternative Revenue	-0.003	**.0141****	**0.999****	**-0.106****	**-0.089****	**-0.143****	0.071	**0.026****	0.005	**0.031****	**-0.055****	0.002	**0.050****	-0.004	-0.003	-0.004	-0.008	-0.004	**0.060****	**-0.038****	-0.010	-0.005	**-0.031****
% of Alternative Revenue-Independent Operations		-0.002	-0.004	0.003	-0.004	**c.**	**c.**	-0.004	0.000	**c.**	0.000	0.001	-0.001	-0.001	0.000	-0.001	-0.001	0.002	-0.001	0.008	-0.005	-0.015	*0.020**
% of Alternative Revenue-Sales & Services Education			**0.143****	**0.051****	**-0.136****	*0.087**	-0.067	0.009	-0.016	**-0.026****	**0.126****	**0.083****	0.010	0.006	**0.048****	0.003	**0.031****	-0.008	0.006	**0.115****	**0.049****	0.003	0.016
% of Alternative Revenue-Sales & Services Education and Other Revenue including non-operating				**-0.097****	**-0.079****	**-0.140****	0.068	**0.026****	0.005	**0.032****	**-0.041****	0.002	**0.050****	-0.004	-0.002	-0.005	-0.007	-0.003	**0.061****	**-0.041****	-0.012	-0.005	**-0.026****
% of State Appropriations					**-0.103****	**0.163****	**-0.121****	**0.066****	-0.002	**-0.057****	**0.069****	**-0.038****	**-0.088****	**0.037****	**-0.085****	**0.025****	**-0.104****	0.007	**-0.192****	**0.079****	**-0.125****	*0.019**	**-0.220****
Institution Size						**0.222****	**-0.146****	**-0.428****	**0.039****	**0.140****	-0.005	**-0.033****	**-0.085****	**-0.042****	-0.010	**-0.049****	-0.005	0.011	**-0.182****	*-0.017**	**0.084****	**-0.032****	**0.044****
% Admitted							*-0.101**	**0.119****	**c.**	*0.099**	*-0.099**	0.027	-0.040	-0.031	0.027	-0.035	0.033	-0.023	**-0.231****	-0.019	0.016	0.031	**-0.174****
% Enrolled								0.040	**c.**	**-0.175****	**0.127****	0.032	-0.075	**0.164****	0.065	**0.132****	0.055	-0.003	**-0.113****	**-0.191****	**0.123****	0.014	*-0.086**
Location									**-0.048****	**-0.130****	**-0.127****	**-0.112****	**0.049****	**0.026****	*-0.020**	**0.039****	-0.001	-0.002	**0.126****	-0.012	*-0.018**	0.000	**-0.111****
NCAA Member										**0.057****	0.010	-0.009	-0.006	0.003	-0.002	0.003	-0.002	0.000	-0.008	**-0.035****	*0.021**	-0.014	**-0.035****
% Tenure											0.007	*0.020**	-0.001	**0.025****	*0.022**	*0.018**	*0.019**	*-0.020**	**-0.089****	**-0.096****	**-0.031****	**-0.041****	*-0.018**
% of Instructional Expenses to Total												**0.437****	**-0.086****	0.016	**0.054****	*-0.019**	*0.018**	0.002	**-0.173****	**0.025****	-0.004	*-0.021**	**0.272****
% of Instructional to Institutional Expenses													**-0.038****	0.006	**0.051****	*-0.021**	-0.005	-0.007	**0.025****	0.008	**0.029****	-0.005	**0.131****
% Research Expenses to Total														0.000	0.007	0.012	**0.032****	0.001	**0.251****	**-0.027****	**0.091****	**0.030****	*-0.022**
% of Instructional to Tuition and Fees															0.000	**0.958****	-0.001	-0.002	**0.023****	0.015	0.009	**0.146****	**-0.075****
% of Instructional to State Appropriations																-0.002	**0.782****	-0.002	*0.021**	0.012	0.000	-0.003	**0.056****
% of Institutional to Tuition and Fees																	0.001	-0.002	**0.073****	0.010	0.009	**0.155****	**-0.082****
% of Institutional to State Appropriations																		-0.001	**0.070****	-0.001	-0.003	-0.002	**0.034****
% Change in Endowment																			0.003	*-0.021**	0.006	-0.005	0.007
Carnegie Classification																				-0.011	**-0.064****	**0.027****	**-0.075****
Republican Governors																					**-0.093****	-0.002	-0.001
Unemployment Rate																						0.014	**-0.111****
% Change in Tuition and Fees																							**-0.096****

****. Correlation is significant at the 0.01 level (2-tailed).**

**. Correlation is significant at the 0.05 level (2-tailed).*

c. Cannot be computed because at least one of the variables is constant.

Table 8: Hierarchical Multiple Regression

2004-2017	Prediction	Full Data Set			Sector 1			Sector 2			Sector 4		
					4-Year Public (4YP)			4-Year Private (4YPv)			2-Year Public (2YP)		
Variable		Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Intercept	+	5.14***	6.15***	6.53***	11.77***	9.77***	5.05***	4.01***	6.34***	5.19***	0.83	9.23	12.17
		(0.61)	(0.81)	(0.88)	(0.76)	(1.20)	(1.44)	(0.90)	(1.21)	(1.21)	(5.00)	(6.90)	(8.11)
% of State Appropriations (SAP)	-	-0.03***	-0.04***	-0.01	-0.10***	-0.08***	0.18***	0.07	-0.03	2.27***	-0.04**	-0.03**	-0.05
		(0.00)	(0.01)	(0.03)	(0.01)	(0.01)	(0.04)	(0.08)	(0.08)	(0.70)	(0.02)	(0.02)	(0.11)
SAP x Institution Size	-			-0.00			-0.01*			**d.**			0.01
				(0.01)			(0.01)						(0.02)
SAP x % Admitted	+			**d.**			**d.**			-0.17***			**d.**
										(0.01)			
SAP x % Enrolled	-			**d.**			**d.**			**d.**			**d.**
SAP x Location	+			-0.00			0.00			0.23***			-0.00
				(0.00)			(0.00)			(0.02)			(0.00)
SAP x % in NCAA	-			0.05***			0.05***			2.41***			**d.**
				(0.01)			(0.02)			(0.31)			
SAP x % Tenure	-			0.00			-0.00***			-0.05***			-0.00
				(0.00)			(0.00)			(0.01)			(0.00)
SAP x % of Instructional to Total Expense	-			-0.00			-0.00***			-0.06***			0.00
				(0.00)			(0.00)			(0.01)			(0.00)
SAP x % of Instructional to Institutional Expense	-			-0.00***			-0.00***			0.02***			-0.00
				(0.00)			(0.00)			(0.00)			(0.00)
SAP x % Research	-			-0.00***			-0.00***			-0.11***			-0.01
				(0.00)			(0.00)			(0.01)			(0.03)
SAP x % of Instructional to Tuition and Fees	-			-0.00			0.00			0.01***			0.00***
				(0.00)			(0.00)			(0.00)			(0.00)
SAP x % of Instructional to State Appropriations	-			0.00***			0.00***			-0.00***			-0.00
				(0.00)			(0.00)			(0.00)			(0.00)
SAP x % of Institutional to Tuition and Fees	+			0.00			-0.00			-0.00***			-0.00**
				(0.00)			(0.00)			(0.00)			(0.00)
SAP x % of Institutional to State Appropriations	+			-0.00***			-0.00***			0.00***			-0.00
				(0.00)			(0.00)			(0.00)			(0.00)
SAP x % Change in Endowment	-			0.00			-0.00			-0.03***			-0.00
				(0.00)			(0.00)			(0.00)			(0.00)
Institution Size	+		-0.17*	-0.23*		0.04	0.25		0.02	0.13		-0.33	-0.00
			(0.09)	(0.14)		(0.12)	(0.24)		(0.21)	(0.21)		(0.32)	(0.64)
% Admitted	-		-0.01*	-0.00		0.05***	0.04***		-0.02***	-0.01		-0.03**	-0.07***
			(0.00)	(0.00)		(0.01)	(0.01)		(0.01)	(0.01)		(0.01)	(0.02)
% Enrolled	+		0.02***	0.01***		-0.05***	-0.03***		0.02**	0.04***		0.03	0.07**
			(0.00)	(0.00)		(0.01)	(0.01)		(0.01)	(0.01)		(0.02)	(0.03)
Location	-	-0.02***	-0.01	-0.01	-0.05***	-0.02*	-0.02	-0.02	-0.01	-0.03*	0.01	0.01	0.05
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)	(0.03)	(0.05)

Table 8: Hierarchical Multiple Regression (continued)

2004-2017	Prediction	Full Data Set			Sector 1			Sector 2			Sector 4		
					4-Year Public (4YP)			4-Year Private (4YPv)			2-Year Public (2YP)		
Variable		Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
NCAA Member	+	0.24	0.30	-0.23	-0.82***	-0.41	-1.62***	-0.67**	-0.28	0.42	**d.**	**d.**	**d.**
		(0.23)	(0.24)	(0.30)	(0.28)	(0.29)	(0.62)	(0.32)	(0.35)	(0.35)			
% Tenure	+		-0.00	-0.00		-0.01***	0.02**		-0.01*	-0.00		0.01	0.04**
			(0.00)	(0.00)		(0.00)	(0.01)		(0.00)	(0.00)		(0.01)	(0.02)
% of Instructional Expenses to Total	+		-0.06***	-0.06***		-0.06***	-0.09***		-0.06***	-0.05***		-0.05	-0.06
			(0.01)	(0.01)		(0.01)	(0.02)		(0.01)	(0.01)		(0.03)	(0.05)
% of Instructional to Institutional Expenses	+		0.00***	0.00***		0.00***	0.01***		0.00***	0.00		0.00	0.00*
			(0.00)	(0.00)		(0.00)	(0.00)		(0.00)	(0.00)		(0.00)	(0.00)
% Research Expenses to Total	+		0.23***	0.29***		0.10***	0.15***		0.23***	0.21***		0.39	0.62
			(0.02)	(0.02)		(0.01)	(0.03)		(0.03)	(0.03)		(0.45)	(0.55)
% of Instructional to Tuition and Fees	+		-0.00	0.00***		0.00***	0.00***		0.00***	-0.00		0.00	-0.01***
			(0.00)	(0.00)		(0.00)	(0.00)		(0.00)	(0.00)		(0.00)	(0.00)
% of Instructional to State Appropriations	+		-0.00***	-0.00***		0.00	-0.00		-0.00***	-0.00***		0.00	0.00
			(0.00)	(0.00)		(0.00)	(0.00)		(0.00)	(0.00)		(0.00)	(0.00)
% of Institutional to Tuition and Fees	-		0.00	-0.00		-0.00***	-0.00***		0.00	0.00*		-0.00	0.01***
			(0.00)	(0.00)		(0.00)	(0.00)		(0.00)	(0.00)		(0.00)	(0.00)
% of Institutional to State Appropriations	-		0.00***	0.00***		-0.00	0.00		0.00***	0.00***		-0.00	-0.00
			(0.00)	(0.00)		(0.00)	(0.00)		(0.00)	(0.00)		(0.00)	(0.00)
% Change in Endowment	+		-0.00	-0.00		0.00	0.00		-0.00	-0.00		-0.00	0.00
			(0.00)	(0.00)		(0.00)	(0.00)		(0.00)	(0.00)		(0.00)	(0.01)
Carnegie Classification	-	0.02**	0.02**	0.02**	-0.05***	-0.02*	-0.00	0.05***	0.04***	0.01	0.09	-0.03	-0.15
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.11)	(0.13)	(0.14)
Republican Governors	+	0.17	0.13	0.17	0.75***	0.69***	0.50**	0.21	0.31	0.45	-0.46	-0.26	-0.03
		(0.16)	(0.16)	(0.16)	(0.20)	(0.20)	(0.20)	(0.25)	(0.25)	(0.25)	(0.58)	(0.60)	(0.61)
Unemployment Rate	+	-0.05	-0.11**	-0.10**	-0.10	-0.08	-0.08	0.02	-0.03	-0.04	-0.09	-0.14	-0.19
		(0.05)	(0.05)	(0.05)	(0.06)	(0.06)	(0.06)	(0.08)	(0.08)	(0.08)	(0.16)	(0.17)	(0.17)
% Change in Tuition	-		0.00*	0.01*		0.00	0.00		0.01*	0.00		-0.00	0.00
			(0.00)	(0.00)		(0.01)	(0.01)		(0.00)	(0.00)		(0.01)	(0.01)
% Tuition and Fees to Total Revenue	-		-0.01***	-0.01***		-0.06***	-0.07***		-0.01***	-0.01***		-0.03	-0.04
			(0.00)	(0.00)		(0.01)	(0.01)		(0.00)	(0.00)		(0.03)	(0.03)
N Observations		20301	20301	20301	6045	6045	6045	13721	13721	13721	535	535	535
Adj. R^2		0.004	0.030	0.032	0.040	0.116	0.144	0.004	0.027	0.042	-0.014	-0.008	-0.003
F		5.01***	20.46***	16.23***	15.10***	25.80***	24.08***	4.05***	12.83***	14.84***	0.55	0.87	0.96

***p < .01; **p < .05; * p < .10; Standard errors in parentheses.

d. Excluded from the model.

+ Positive Prediction; - Negative Prediction

Year fixed effects

Table 9: Mean Difference and Independent Samples *T*-Tests – Survival less CMs

	Prediction	Full Data Set-Survival less CMs		4 YP-Survival less CMs		4YPv-Survival less CMs		2YP-Survival less CMs	
		Mean Difference	*t*-statistic	Mean Difference	*t*-statistic	Mean Difference	*t*-statistic	Mean Difference	*t*-statistic
% of Alternative Revenue	+	2.19	5.03	2.00	1.64	1.97	2.81	2.66	12.45
% of Alternative Revenue-Independent Operations	+	-0.07	-0.31	0.09	1.02	-0.04	-0.12	0.00	1.11
% of Alternative Revenue-Sales & Services Education	+	0.17	1.35	0.60	6.44	0.27	1.32	-0.16	-1.12
% of Alternative Revenue-Sales & Services Education and Other Revenue including non-operating	+	2.36	6.13	1.92	1.62	2.22	3.64	2.67	12.38
% of State Appropriations	+	9.64	13.39	13.76	5.81	0.12	6.86	18.06	9.70
Institution Size	+	1.35	29.80	1.61	7.67	0.90	25.81	1.69	18.87
% Admitted	-	-1.28	-0.40	-1.72	-0.36	0.12	0.03	-8.44	-0.49
% Enrolled	+	-15.03	-4.10	-14.16	-2.59	-11.73	-2.60	-22.28	-19.50
Location	-	0.51	0.90	1.56	1.05	0.65	0.97	-1.03	-0.96
NCAA Member	+	0.28	24.18	0.53	10.16	0.35	25.43	0.00	6.49
% Tenure	+	18.74	7.96	-4.74	-1.06	22.65	8.56	18.71	4.69
% of Instructional Expenses to Total	+	24.68	21.99	18.56	5.43	22.52	14.92	30.97	16.70
% of Instructional to Institutional Expenses	+	179.76	15.15	185.98	5.08	120.60	10.07	241.80	8.85
% Research Expenses to Total	+	1.39	10.22	3.44	4.46	1.13	7.85	0.08	13.33
% of Instructional to Tuition and Fees	+	188.17	11.22	92.93	3.38	69.28	4.78	418.37	9.29
% of Instructional to State Appropriations	+	616.73	8.36	222.11	2.01	958.68	7.66	368.13	5.71
% of Institutional to Tuition and Fees	+	69.03	4.12	47.71	2.73	32.14	1.16	146.23	9.14
% of Institutional to State Appropriations	+	280.08	8.97	81.05	3.06	493.41	8.82	92.22	3.85
% Change in Endowment	+	11.11	11.14	14.70	3.72	9.59	8.38	10.53	7.10
% Hospital Revenue to Total Revenue	+	0.18	0.72	-1.60	-0.89	0.49	8.901	-	-
Population	+	71375.63	0.89	-72446.54	-0.55	-43628.36	-0.33	488640.92	16.26
Carnegie Classification	-	-5.91	-10.60	-11.07	-5.28	-6.97	-8.32	0.25	2.17
Republican Governors	-	-0.13	-5.19	-0.23	-3.92	-0.02	-0.45	-0.31	-9.24
Unemployment Rate	-	-0.19	-1.31	-0.01	-0.05	0.35	2.38	-1.25	-3.62
% Change in Tuition and Fees	+	93.81	36.54	99.35	19.33	88.04	23.51	106.79	357.26
% Tuition and Fees to Total Revenue	+	16.60	12.12	13.29	5.96	24.22	11.18	10.58	8.99
N Observations - survivals		42992		8603		20777		13612	
N Observations - CMs		385		51		218		116	
+ Positive Prediction; - Negative Prediction									

Table 10. Distinctive Variables on Survivals, Closures, and Mergers

	Survivals		Closures		Mergers	
Four Year Public Institutions:	Mean	SD	Mean	SD	Mean	SD
% of Alternative Revenue	5.59	7.77	0.60	1.34	3.91	9.07
% of Alternative Revenue-Independent Operations	0.22	1.74	0.00	0.00	0.14	0.68
% of Alternative Revenue-Sales & Services Education	0.86	2.35	0.00	0.00	0.29	0.67
% of Alternative Revenue-Sales & Services Education and Other Revenue including non-operating	5.38	7.51	0.63	1.41	3.76	8.85
% of State Appropriations	28.20	13.32	14.00	28.00	14.48	15.87
Institution Size	3.20	1.20	1.00	1.41	1.61	1.47
% Enrolled	43.31	17.32	0.00	0.00	57.47	21.15
NCAA Member	0.69	0.46	0.50	0.58	0.13	0.34
% Tenure	52.62	29.50	0.00	0.00	57.36	20.93
% of Instructional Expenses to Total	40.58	10.16	11.75	23.50	22.91	24.26
% of Instructional to Institutional Expenses	377.04	254.77	70.75	141.50	201.52	264.12
% Research Expenses to Total	5.77	8.58	2.00	4.47	2.37	5.61
% of Instructional to Tuition and Fees	203.70	593.02	49.40	110.46	117.43	197.46
% Change in Endowment	17.88	234.16	3.40	7.60	3.15	22.72
% Tuition and Fees to Total Revenue	25.11	13.31	2.00	4.47	12.89	16.35
% Hospital Revenue to Total Revenue	2.34	9.93	0.00	0.00	4.37	13.51
Population Size	554,776	1,155,096	246,631	324,524	668,591	973,264
Geographical Proximity			2.80	3.83	8.72	10.10
N Observations	8603		5		46	

Table 10. Distinctive Variables on Survivals, Closures, and Mergers (continued)

	Survivals		Closures		Mergers	
Four Year Private Institutions:	Mean	SD	Mean	SD	Mean	SD
% of Alternative Revenue	5.12	14.59	3.88	11.87	1.56	5.52
% of Alternative Revenue-Independent Operations	0.81	5.38	1.19	6.53	0.02	0.11
% of Alternative Revenue-Sales & Services Education	0.96	6.62	0.67	3.02	0.72	2.89
% of Alternative Revenue-Sales & Services Education and Other Revenue including non-operating	4.52	22.02	2.69	9.98	1.56	5.57
% of State Appropriations	0.14	1.61	0.00	0.00	0.04	0.35
Institution Size	1.72	0.82	0.83	0.45	0.77	0.59
% Enrolled	41.96	24.61	56.23	30.98	46.11	22.33
NCAA Member	0.39	0.49	0.01	0.12	0.08	0.28
% Tenure	33.69	34.82	9.30	24.81	15.70	27.54
% of Instructional Expenses to Total	39.73	13.50	19.08	21.36	13.63	23.16
% of Instructional to Institutional Expenses	203.71	235.79	106.26	204.25	39.36	74.41
% Research Expenses to Total	1.47	4.94	0.34	2.11	0.36	1.99
% of Instructional to Tuition and Fees	132.01	833.44	64.90	206.00	57.75	179.06
% Change in Endowment	9.75	121.11	0.39	7.36	0.71	14.82
% Tuition and Fees to Total Revenue	48.19	64.79	27.03	32.04	18.03	29.49
% Hospital Revenue to Total Revenue	0.53	5.20	0.00	0.00	0.14	1.06
Population Size	1,074,773	1,856,094	1,125,679	2,031,722	1,119,113	1,828,164
Geographical Proximity			15.74	18.89	18.22	22.64
N Observations	20777		145		73	

Table 10. Distinctive Variables on Survivals, Closures, and Mergers (continued)

	Survivals		Closures		Mergers	
Two Year Public Institutions:	Mean	SD	Mean	SD	Mean	SD
% of Alternative Revenue	3.52	6.68	0.38	1.06	0.89	2.28
% of Alternative Revenue-Independent Operations	0.00	0.05	0.00	0.00	0.00	0.00
% of Alternative Revenue-Sales & Services Education	0.27	0.99	0.00	0.00	0.46	1.57
% of Alternative Revenue-Sales & Services Education and Other Revenue including non-operating	3.53	6.67	0.42	1.19	0.90	2.30
% of State Appropriations	29.09	16.20	2.25	4.17	11.69	20.54
Institution Size	2.50	1.06	0.57	0.53	0.83	0.94
% Enrolled	76.92	19.55	98.00	2.83	100.00	0.00
NCAA Member	0.00	0.06	0.00	0.00	0.00	0.00
% Tenure	29.21	35.44	25.00	50.00	9.12	24.39
% of Instructional Expenses to Total	43.82	10.56	26.50	30.81	11.83	18.73
% of Instructional to Institutional Expenses	352.01	342.33	503.50	936.19	81.07	149.45
% Research Expenses to Total	0.08	0.67	0.00	0.00	0.00	0.00
% of Instructional to Tuition and Fees	503.12	4981.07	164.63	207.32	78.83	149.86
% Change in Endowment	10.73	171.44	0.00	0.00	0.21	2.29
% Tuition and Fees to Total Revenue	16.86	11.66	15.25	30.34	5.62	10.24
% Hospital Revenue to Total Revenue	0.00	0.00	0.00	0.00	0.00	0.00
Population Size	692,294	1,624,560	815,946	445,448	158,299	212,739
Geographical Proximity			23.88	14.19	3.52	4.72
N Observations	13612		8		108	

Table 11: Logistic Regression – Survival versus CMs

2004-2017	Full Data Set		Sector 1		Sector 2		Sector 4	
			4-Year Public (4YP)		4-Year Private (4YPv)		2-Year Public (2YP)	
Variable	B	Odds Ratio	B	Odds Ratio	B	Odds Ratio	B	Odds Ratio
Constant	4.72***	112.19	11.02***	61026.51	16.64	1.68E+07	-117.11	0.00
	(0.78)		(3.27)		(1072.36)		(15119.67)	
% of Alternative Revenue	-0.09	0.92	0.66	1.94	0.05	1.05	-22.84	0.00
	(0.51)		(1.03)		(0.66)		(12347.68)	
% of Alternative Revenue-Independent Operations	0.04	1.04	-0.86	0.42	-0.10	0.90	-134.66	0.00
	(0.51)		(1.10)		(0.65)		59249.96	
% of Alternative Revenue-Sales & Services Education	-0.02	0.98	-0.03	0.97	-0.02	0.98	-7.95	0.00
	(0.04)		(0.23)		(0.05)		(2999.85)	
% of Alternative Revenue-Sales & Services Education and Other Revenue including non-operating	0.07	1.07	-0.71	0.49	-0.07	0.93	23.53	1.66E+10
	(0.51)		(1.04)		(0.66)		(12230.17)	
% of State Appropriations (SAP)	-0.03**	0.97	-0.07*	0.94	3.45	31.42	1.41	4.08
	(0.01)		(0.04)		(9.88)		(114.24)	
Institution Size	0.32	1.38	-0.39	0.68	2.15***	8.61	43.89	1.15E+19
	(0.22)		(0.44)		(0.59)		(2070.24)	
% Enrolled	-0.01	0.99	-0.03	0.97	0.01	1.01	0.28	1.32
	(0.01)		(0.02)		(0.01)		(115.73)	
NCAA Member	2.23***	9.26	3.24***	25.65	1.37**	3.93		
	(0.50)		(0.87)		(0.69)			
% Tenure	0.00	1.00	-0.02	0.98	0.01	1.01	-0.08	0.92
	(0.00)		(0.02)		(0.01)		(33.71)	
% of Instructional Expenses to Total	0.00	1.00	-0.11**	0.90	0.01	1.01	1.41	4.08
	(0.01)		(0.04)		(0.02)		(112.97)	
% of Instructional to Institutional Expenses	0.00	1.00	0.00	1.00	0.00	1.00	0.01	1.01
	(0.00)		(0.00)		(0.00)		(1.18)	
% Research Expenses to Total	0.02	1.02	0.03	1.03	0.00	1.00	-17.67	0.00
	(0.04)		(0.08)		(0.05)		(7850.53)	
% of Instructional to Tuition and Fees	0.00*	1.00	0.02*	1.02	0.01	1.01	0.00	1.00
	(0.00)		(0.01)		(0.00)		(0.24)	
% Change in Endowments	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
	(0.01)		(0.00)		(0.01)		(4.57)	
% Tuition and Fees to Total Revenue	0.00	1.00	0.04	1.04	0.00	1.00	0.09	1.09
	(0.00)		(0.05)		(0.00)		(54.30)	
% Hospital Revenue to Total Revenue	6.90	990.33	4.25	70.18	5.86	350.51		
	(133.64)		(131.13)		(153.10)			
Population	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00
	(0.00)		(0.00)		(0.00)		(0.01)	
X^2	107.51, df = 29, p <0.01		87.47, df = 29, p <0.01		100.01, df = 29, p <0.01		56.47, df = 27, p <0.01	
Nagelkerke R^2	14.8%		42.1%		21.9%		99.9%	
Hosmer and Lemeshow Test	p = .742		p = 1.000		p = .916		p = 1.000	
Classification Accuracy	99.7%		99.7%		99.8%		100.0%	
***p < .01; **p < .05; * p < .10; Standard errors in parentheses.								
Positive prediction expected for all variables								
Year fixed effects								

Table 12: Logistic Regression – Merged versus Closed

2004-2017	Full Data Set		Sector 1		Sector 2		Sector 4	
			4-Year Public (4YP)		4-Year Private (4YPv)		2-Year Public (2YP)	
Variable	B	Odds Ratio	B	Odds Ratio	B	Odds Ratio	B	Odds Ratio
Constant	0.85* (0.44)	2.34	10.96 (8899.43)	57490.88	-0.35 (0.65)	0.71	94.50 (29676.40)	1.10E+41
% of Alternative Revenue	-0.04** (0.02)	0.96	9.80 (483.69)	18067.98	-0.04 (0.02)	0.97	0.69 (8507.26)	1.98
% Hospital Revenue to Total Revenue	13.36 (1121.16)	632239.03	-15.88 (146.21)	0.00	17.84 (7856.80)	56229552.95		
Population	-0.00 (0.00)	1.00	0.00 (0.02)	1.00	-0.00 (0.00)	1.00	-0.00 (0.01)	1.00
Geographical Proximity	-0.02** (0.01)	0.98	191.48 (1723.33)	1.44E+83	0.01 (0.01)	1.01	-1.57 (301.48)	0.21
X^2	48.6, *df* = 16, *p*<0.01		32.7, *df* = 16, *p*<0.01		19.1, *df* = 16, *p=0* .262		58.2, *df* = 15, *p*<0.01	
Nagelkerke R^2	16.0%		99.9%		11.7%		99.9%	
Hosmer and Lemeshow Test	*p* = 0.061		*p* = 1.000		*p* = 0.217		*p* = 1.000	
Classification Accuracy	64.9%		100.0%		67.4%		100.0%	
Classification Accuracy-Baseline	59.0%		90.2%		66.5%		93.1%	
***p < .01; **p < .05; * p < .10; Standard errors in parentheses.								
Positive prediction expected for all variables								
Year fixed effects								