

**A Longitudinal Relationship Between Resource Allocation and Student Performance in
Postsecondary Education**

by

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Abstract

Amidst increased enrollment, economic recession, and state budget cuts to postsecondary education over the past two decades, two and four-year colleges and universities have employed a multitude of different approaches to managing resource allocation. At the crux of this issue is the internal struggle each institution faces: improving the level of success and the overall experience of each enrolled student while also trying to keep costs down. Meanwhile, institutions must also ensure that each dollar spent contributes to the overall success and mission of the institution. This study examined adjustments in two and four-year institutions' categorical FTE expenditures over a ten-year period and subsequent increases or decreases in graduation rates during that time-period.

The results of this study indicated that a significant relationship existed between alterations in categorial expenditure patterns and improved graduation rates at both two-year colleges and four-year colleges and universities. Additional expenditures towards instruction and academic support at four-year institutions consistently shared a strong relationship with improved four-year graduation rates and a more modest relationship with improved six-year graduation rates. At two-year colleges, additional expenditures towards academic support were found to have a significant but modest negative relationship with improved three-year graduation rates. Multiple regression analyses revealed that resource allocation adjustments accounted for the largest amount of variance (14.4%) in four-year graduation rates at four-year colleges and universities. This study also noted that institutional selectivity at four-year institutions influences this relationship at four-year institutions.

The primary objective of this study was to add a new layer and new perspective to the existing body of literature surrounding resource allocation; change over time. The findings of

this study may have important implications for the trajectory of postsecondary education funding, investments in student level cohort tracking, and resource allocation priorities in the future as colleges and universities enter a competitive era resulting from the demographic shifts during the great recession.

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CHAPTER 1: INTRODUCTION

Background

Access to and enrollment in postsecondary education has reached historic highs in the twenty-first century, with sixty-seven percent of high school graduates immediately enrolling in college as of 2017 (United States Department of Education, 2018). The level of expectation that working adults should obtain some level of postsecondary education has also never been higher, with sixty-five percent of jobs expected to require some degree of postsecondary education in 2020 (Carnevale, Strohl, & Melton, 2013; Erickson & Kelchen, 2020). Yet, providing a quality college education at an affordable rate for the public has become an increasingly difficult task for many institutions as funding has undergone seismic changes in recent years (Desrochers & Hurlburt, 2014; Immerwahr, 2008; Weertz & Ronca, 2012). Congress and as well as non-profit organizations have noted and lamented the fact that increases in the price of college have drastically outpaced both inflation and increases in family income since the 1980s (Baum, Libassi, Ma, & Matea, 2019; Boehner & McKeon, 2003; National Center for Public Policy and Higher Education, 2002; Singell & Stone, 2007; Snyder & Dillow, 2010). College and university presidents have largely framed this issue as a result of decreased state funding (Immerwahr, 2008).

States have historically provided the bulk of funding for postsecondary institutions. However, states have significantly decreased funding for postsecondary education over the past two decades (Li, 2017; Oliff, Palacios, Johnson, & Leachman, 2013; Snyder, 1993). Federal funding, while important, has historically been a secondary contributor to institutional budgets. From 1987 to 2012, states provided an annual average of sixty-five percent more funding for higher education than the federal government (Pew, 2015). However, since the financial crisis of

2008, almost all fifty states have made drastic cuts to education budgets (Oliff, Palacios, Johnson, & Leachman, 2013).

Postsecondary institutions have supplemented this loss in state funding through increased demands from the federal government and tuition increases. Mitchell, Leachman, and Masterson (2016) noted that in 2013, federal funding of postsecondary education exceeded state funding for the first time. This trend has continued in subsequent years (Fethke & Policano, 2013; Fowles, 2014; Mitchell et al., 2016). Alongside the increased federal role in funding, tuition spikes at both two and four-year colleges and universities are significantly outpacing rises in average income (Desrochers & Hurlburt, 2014; Immerwahr, 2008; Weertz & Ronca, 2012).

These funding cuts have come at a unique time in the history of postsecondary education in America, as lawmakers are cutting funding while institutions simultaneously face increased demands for evidence of improved student performance (Promades, 2012). As enrollment has grown in higher education, graduation and persistence rates have been inconsistent (Astin & Oseguera, 2005; Bound, Lovenheim, & Turner, 2010).

Gansemer-Topf and Schuh (2003) suggested that resource allocation decisions may have tangible impacts on student graduation. Since 2003, several researchers have analyzed the relationship between resource allocation and student performance. Collectively, the majority of these researchers have found that resource allocation does have a relationship with student performance. However, prior researchers have found mixed results regarding which expenditure categories have the strongest relationship with student performance. Instructional expenditures have been the most consistently identified significant variable in this relationship (Abouzeida, 2014; Gansemer-Topf & Schuh, 2003; Promades, 2012; Ryan, 2004; Siniard, 2018; White, 2018). Following instructional expenditures, multiple researchers have reported a significant

relationship between academic support expenditures (Abouzeida, 2014; Gansemer-Topf & Schuh, 2003; Marsh, 2014; Ryan, 2004; Siniard, 2018) or student services expenditures (Ehrenberg & Webber, 2010; Promades, 2012; Umfress, 2010; White, 2018). Collectively, prior studies appear to indicate that predictive relationships between expenditure and student success depend on a variety of institutional and student characteristics. Studies thus far at the regional and national levels have examined the relationship between resource allocation and student performance within a particular academic year.

Problem Statement

While prior studies have examined the relationship between overall categorical expenditures and student performance in a cross-sectional approach, earlier studies of this relationship did not have enough years of national data available within The Integrated Postsecondary Education Data System (IPEDS) to examine this relationship over a longer period of time. There is a need to examine the statistical influence of changes in resource allocation over the past decade and a half to assess tangible gains or losses in student performance over time.

Purpose of the Study

The purpose of this quantitative, non-experimental study was to address a gap in knowledge in the relationship between resource allocation and student performance; change over time. This study may significantly contribute to the existing literature on this relationship by providing a new point of view for institutions and stakeholders to make data-driven decisions to best fit their student and institutional needs. This study seeks to examine the longitudinal relationship between changes in categorical institutional expenditures and subsequent increases

or decreases in graduation rates at two and four-year colleges and universities. This study also examined the extent to which the standardized test scores of incoming students influenced this relationship at four-year colleges and universities.

Research Questions

This study addressed the following research questions to assess the relationship between changes in resource allocation and subsequent changes in student performance:

- 1) How have two and four-year colleges and universities adjusted their resource allocation (functional category expenditure per FTE headcount) within the most recent ten-year span of graduating cohorts?
- 2) What is the relationship between adjustments in resource allocation at two and four-year institutions (functional category expenditure per FTE headcount) and increases or decreases in graduation rates during these time-periods?
- 3) To what extent, if any, do incoming student cohorts' standardized test scores impact the relationship between adjustments in resource allocation (functional category expenditure per FTE headcount) and increases or decreases in graduation rates at four-year institutions during this time-period?

Significance of the Study

In building upon the work of prior researchers, the retrospective, longitudinal model of this study will provide a different perspective and may provide new insight into this relationship. Institutions may use the results of this study to inform their resource allocation decisions based on empirical evidence of past results at institutions that share similar spending patterns and incoming student achievement levels. The results of this study may help administrators more

successfully navigate future years of decreased state funding for postsecondary education. This study may be particularly valuable in the near future as colleges and universities prepare to absorb large enrollment decreases in the second half of the 2020s (Selingo, 2017).

Definition of Terms

The following terms were used as defined below:

Academic Support:

A functional expense category that includes expenses of activities and services that support the institution's primary missions of instruction, research, and public service (National Center for Education Statistics, 2019). Sub-categories include (1) educational materials such as libraries, museums, and galleries, (2) services that directly assist the academic functions of the institution, (3) media and technology support, (4) academic administration, academic advising, academic personnel development, and (5) course and curriculum development.

Instruction:

A functional expense category that includes expenses of the colleges, schools, departments, and other instructional divisions of the institution and expenses for departmental research and public service that are not separately budgeted (National Center for Education Statistics, 2019).

Includes general academic instruction, occupational and vocational instruction, community education, preparatory and adult basic education, and regular, special, and extension sessions.

Student Services:

A functional expense category that includes expenses for admissions, registrar activities, and activities whose primary purpose is to contribute to students emotional and physical well-being and to their intellectual, cultural, and social development outside the context of the formal instructional program. (National Center for Education Statistics, 2019). Examples include

student activities, cultural events, student newspapers, intramural athletics, student organizations, supplemental instruction outside the normal administration, and student records.

Institutional Support:

A functional expense category that includes expenses for the day-to-day operational support of the institution. Includes expenses for general administrative services, central executive-level activities concerned with management and long-range planning, legal and fiscal operations, space management, employee personnel and records, logistical services such as purchasing and printing, and public relations and development. . (National Center for Education Statistics, 2019).

Graduation Rate-Bachelor Degree within 4 Years, Total:

4-year graduation rate of the subcohort of full-time, first-time students seeking a bachelor's or equivalent degree - 2012 Bachelors subcohort (4-year institutions) This rate is calculated as the total number of students completing a bachelor degree or equivalent within 4-years (100% of normal time) divided by the revised bachelor subcohort minus any allowable exclusions.

(National Center for Education Statistics, 2019).

Graduation Rate-Bachelor Degree within 6 Years, Total:

6-year graduation rate of the subcohort of full-time, first-time students seeking a bachelor's or equivalent degree - 2012 Bachelors subcohort (4-year institutions) This rate is calculated as the total number of students completing a bachelor degree or equivalent within 6-years (150% of normal time) divided by the revised bachelor subcohort minus any allowable exclusions.

Graduation rate - degree/certificate within 150% of normal time:

Degree/certificate within 150% of normal time (two-year and less-than-two year institutions)

The number of students from the adjusted degree/certificate-seeking cohort, who completed a

program within 150 percent of normal time divided by the adjusted degree/certificate-seeking cohort. Note: Adjusted Cohort is the revised cohort minus exclusions as reported by the institution as of 150 percent of normal time.

Assumptions

This study assumed that each institution correctly reported their financial and student performance data to the National Center for Education Statistics. More specifically, this study assumed that each institution used the same criteria to define each expenditure and student performance category, as outlined in the National Center for Education Statistic's annual survey guidelines.

Limitations

Institutions that reported incomplete data to the National Center for Education Statistics were removed from this study. The researcher limited the study to two and four-year, public institutions. Prior research indicates that the primary revenue sources of an institution impact how and where that institution allocates its resources (Fowles, 2013; Leslie, Slaughter, Taylor, & Zhang, 2012). Since private institutions do not receive state funding, their budget and subsequent resource allocation decisions may look quite different from public colleges and universities. The results of this study may not necessarily apply to private institutions, whether they are for-profit or non-profit, tribal colleges, or special focus institutions. Additionally, the IPEDS survey measures only first-time, full-time, degree-seeking students (Cook & Pullaro, 2010). Students who enroll mid-year or mid-semester are not included in these metrics (Cook & Pullaro, 2010). Notably, twenty-five percent of community college students enroll mid-year (Cook & Pullaro, 2010).

Summary

As institutions across the country seek to improve student performance and the overall student experience, administrators and stakeholders need every available resource to assist them in making data-driven decisions that will benefit their unique student populations in the areas of greatest need. This study aimed to examine the relationship between changes in resource allocation and subsequent increases or decreases in graduation rates. These results can help educators continue to effectively implement plans for student success in an era of continual budget cuts and increased demands for institutional efficiency. In chapter 2, the researcher provided an overview of the history and prior research related to access, funding, costs, and resource allocation as a means of improving student performance metrics. In chapters 3, 4, and 5 the researcher outlined the statistical methods and procedures, presented statistical findings, and discussed the results, conclusions and implications, and suggestions for future research.

CHAPTER 2: REVIEW OF LITERATURE

Introduction

Human capital theory suggests that investing in postsecondary ultimately pays off throughout the lifetime of the learner, both for the individual and society (Toutkoushian & Paulsen, 2016). Educational attainment on a national scale can help ameliorate societal issues and improve overall quality of life (Baker, Leon, Smith-Greenway, Collins, Movit, 2011; Bowen, 2018; Erickson & Kelchen, 2020). On a personal level, it is well documented that postsecondary education attainment consistently provides additional opportunities for social mobility, personal development, and fulfillment (Baker, Leon, Smith-Greenway, Collins, Movit, 2011; Erickson & Kelchen, 2020; Tandberg & Laderman, 2018). Postsecondary education has increasingly become a requirement for most career opportunities. Throughout the 2010s, both the Bureau of Labor Statistics and the Center on Education and the Workforce at Georgetown University projected that by 2020, sixty-five percent of jobs in America will require at least some form of postsecondary degree or certificate, compared to fifty-nine percent in 2010 and just twenty-eight percent in 1973 (Carnevale et al., 2013; Erickson & Kelchen, 2020).

Despite increased enrollment since the 1970s, traditional performance indicators in postsecondary education, graduation rates, have not improved simultaneously. Pre-1990 college graduation rates can be difficult to quantify since public institutions were not required to report graduation rates in their current form until the late twentieth century. However, the National Center for Education Statistics has conducted five longitudinal studies of high school graduating classes since 1972. These studies include eight-year graduation rates for the 1972, 1982, 1992, and 2004 graduating high school cohorts. In analyzing the 1972 and 1992 cohorts, Bound, Lovenheim, and Turner (2010) found that graduation rates declined from fifty-one percent to

forty-six percent. The most recent eight-year graduation rates published by the National Center for Education Statistics in 2012 indicate that graduation rates have dropped from forty-six percent to forty-two percent between the 1992 and 2004 high school graduation classes.

In addition to increased enrollment and inconsistent performance indicators, the past quarter-century in higher education has also been marked by decreased state funding, increased institutional expenditures, and rising tuition rates. If continued improvement in retention and graduation is a primary goal of postsecondary institutions, then understanding how to effectively distribute institutional resources may play an important role in the future of postsecondary education (Gansemer-Topf & Schuh, 2003).

Chapter 2 provides an overview of the literature surrounding resource allocation and institutional performance, organized by the following primary sub-topics:

- 1) Impact of postsecondary education
- 2) Postsecondary education settings, access, and historic enrollment
- 3) Modern and future postsecondary enrollment
- 4) Funding for postsecondary education
- 5) Shifting funding models in postsecondary education
- 6) Institutional expenditures in postsecondary education
- 7) Performance indicators in postsecondary education
- 8) Does resource allocation influence student success?

Purpose of the Study

The purpose of this quantitative, non-experimental study was to examine the relationship between adjustments in resource allocation and increases or decreases in student performance. This study sought to examine the longitudinal relationship between changes in categorical institutional expenditures over ten years and subsequent changes in graduation rates at two and four-year colleges and universities. This study also examined the extent to which the

standardized test scores of incoming student cohorts influenced this relationship at four-year colleges and universities.

Research Questions

This study addressed the following research questions to assess the relationship between changes in resource allocation and subsequent changes in student performance:

- 1) How have two and four-year colleges and universities adjusted their resource allocation (functional category expenditure per FTE headcount) within the most recent ten-year span of graduating cohorts?
- 2) What is the relationship between adjustments in resource allocation at two and four-year institutions (functional category expenditure per FTE headcount) and increases or decreases in graduation rates during these time periods?
- 3) To what extent, if any, do incoming student cohorts' standardized test scores impact the relationship between adjustments in resource allocation (functional category expenditure per FTE headcount) and increases or decreases in graduation rates at four-year institutions during this time-period?

Impact of Postsecondary Education

The value of postsecondary education to individuals and society has been clearly identified by prior research. Increased educational attainment produces both economic and other benefits to individuals and society as a whole. For individuals, on average, there is a long-standing, well-documented linear relationship between educational attainment and increased earnings (Erickson & Kelchen, 2020). Each level of added postsecondary education correlates with increased average earnings, from less than a high school diploma to a doctoral or professional degree (Belfield & Levin, 2007; Torpey, 2018). Simply attending a two or four-year

college results in statistically higher earnings, though actual degree completion results in a much stronger correlation at both the two and four-year levels (Torpey, 2018). Despite public concerns about the perceived declining value of postsecondary education, the earnings gap between those with postsecondary credentials and those with just a high school diploma has grown wider over the years (Rose, 2013; Snyder, 1993). The average earnings gap between bachelor degree holders and those with just a high school diploma grew from forty percent in 1980 to eighty percent by 2000 (Rose, 2013). By 2011, this gap had grown to eighty-six percent (Carnevale et al., 2013).

Beyond the frequently cited statistics highlighting the economic benefits of postsecondary education, there is also evidence of a variety of less tangible benefits of education beyond high school. Trostel (2015) found that among those with postsecondary education, the “likelihood of reporting health to be very good or excellent is forty-four percent greater” (p. 2). Job safety is also significantly higher among Americans with some college education (Trostel, 2015). Sasson (2016) found that for each level of increase in educational attainment, life expectancy increased.

Societal Impact

At the societal level, educational attainment correlates positively with overall economic growth (Erickson & Kelchen, 2020; Hanushek & Woessman, 2010). Prior studies at the national level around the world have demonstrated that government expenditure for postsecondary education is positively correlated with economic growth (Curs & Steiger, 2011). Trostel (2015) reported that increased levels of postsecondary education in society can positively influence the economic situation of everyone, even those without a postsecondary degree or certificate. The average college graduate pours roughly \$355,000 more back into society than the average citizen without any postsecondary education (Trostel, 2015). Direct tax revenue resulting from the

increased earnings of citizens with postsecondary education is six times higher than the initial government investment in a college degree, with an average annual rate of return of just over ten percent (Trostel, 2010).

In addition to improving job prospects and employability, the benefits of postsecondary education flow back into the community in the form of increased civic participation and effectiveness, and in preparing citizens for future success in an interconnected society (Dee, 2004; Erickson & Kelchen, 2020; Weertz, 2014). Voting and political involvement are much higher among those with some college education (Dee, 2004; Erickson & Kelchen, 2020; Trostel, 2015; Weertz, 2014). Participation in school, community service, or philanthropic organizations is almost twice as high among those with some college education (Weertz, 2014). Those with a two or four-year degree hold leadership roles within the aforementioned service realms at three times the rate of those with just a high school diploma (Trostel, 2015).

Future Context

Postsecondary education, in all forms, is poised to be an even more important factor in the future of the workforce. The Georgetown Center on Education and the Workforce reported that twenty percent of the rising demand for college-educated workers stems from the shift in economic consumption from “less education intensive goods production to more education intensive services, from high-school educated blue-collar workers in industries like manufacturing to college-educated workers in industries like finance, information technologies, health-care, business services, education, and government” (Carnevale & Rose, 2015, p. 12). Carnevale and Rose (2015) also noted that amidst the shift from a manufacturing to a service-based economy, even mid-skill jobs have increased educational requirements, shifting from high school graduates to industrial technicians and service workers with at least some college. From

1967 to 2011, roughly eighty-two million new jobs were created in America, overwhelmingly in the service industry with most requiring postsecondary education (Carnevale & Rose, 2015). The Department of Education and the White House noted this trend in the mid to late 2000s, calling for the United States to become the global leader in the proportion of college graduates by 2020 (Kelly, 2010; Geiger, 2014).

Postsecondary Settings, Access, and Historic Enrollment

Since the late 19th century, America has been among the global leaders in providing public education at all levels. The United States was the first nation to offer publicly funded elementary schooling (Rose, 2013; Thattai, 2001). By the early 20th century, this expanded to include secondary education as well, resulting in a high school graduation rate of over 50 percent by 1940 (Rose, 2013; Thattai, 2001). Postsecondary education in America can trace its roots back even further to 1636, when Harvard College opened its doors in Cambridge, Massachusetts as the first of the colonial colleges (Geiger, 2014). In colonial times, colleges could not operate without an official charter from the King of England (Baker et al., 1994). Although this regulation was not always followed, the American revolution officially gave authority over colleges to the individual states (Baker et al., 1994). State control remained until the Dartmouth College Case ruling provided institutions with independent status; once chartered, colleges were bound by the terms of their incorporation and were no longer solely accountable to the state (Alexander & Solomon, 1972). Following the Dartmouth ruling, colleges and universities flourished and multiplied (Baker et al., 1994). States had an incentive to establish colleges to advance their reputation as educated and refined (Baker et al., 1994). Towns and cities established colleges to “provide evidence, along with the museum, library, opera house, and symphony band shell, of its cultural state” (Baker et al., 1994, p. 6). Westermeyer (1997) also

noted that the proliferation of postsecondary education also stemmed from ideals expressed in the Declaration of Independence, notably the belief that “progress is possible rather than just maintenance of the status quo, that the general good is best served by allowing each man to work first for his own good, that all men are capable of reason and that environment (especially education) influences the use of reason” (p. 23). The colonial colleges bore little resemblance to modern four-year colleges and universities. Colonial colleges were initially heavily connected to churches, largely focused on training young ministers, and reflected the “demographic and religious character of its surroundings” (Geiger, 2015, p. 33).

A hallmark of American postsecondary education has been the “multiple avenues of public access to education at all levels” (Baker et al., 1994, p. 3). Unlike other national systems where postsecondary education remains “neatly divided into a binary system of universities and technical colleges” (p. 3), American postsecondary education has remained flexible and “committed steadfastly to inventing courses of study, educational programs, or even those institutions dedicated to the needs and expectations of a particular sector of society” (Baker et al., 1994, p. 3). However, this versatility in American postsecondary education took time to evolve. The first institutions resembling modern community colleges did not open their doors until the turn of the 20th century, with Decatur Baptist College opening in 1897 and Joliet Junior College opening in 1901 (Westmeyer, 1997). Community colleges provide an important function in postsecondary education; serving many students who may not have otherwise enrolled in a college or university (Cohen and Brawer, 1989). Baker et al., (1994) noted that community colleges “stands between secondary and higher education, between adult and higher education, between industrial training and formal technical education” (p. 3). Access to community colleges has remained largely unrestricted by admissions exams, standardized tests, or high school grades

(Baker et al., 1994). Community colleges have consistently provided access, “pragmatic curricular diversity” (p. 4) and have met regional and local needs throughout the growth of postsecondary education (Baker et al., 1994).

This versatility in American postsecondary education, particularly within community and technical colleges, has long been noted for the critical role that it plays in promoting an educated society and fulfilling workforce needs. Shortly after World War II, George Zook specifically noted this importance in a full report on the state of education in the United States, the first of its kind, that he drafted for President Truman (Palmadessa, 2014). In addition to addressing the overall state of two and four-year institutions, Zook specifically highlighted the tremendous value of adult education in America (Zook, 1947). Zook (1947) lamented that colleges across the country do not always recognize adult education as their “potentially greatest service to democratic society” (p. 96). In the committee’s year-long investigation into the state of education in the United States, they also noted the unique nature of adult learners and the necessity that adult education “cease to be campus bound” (Zook, 1947).

Adult Learning and Emerging Adults

The methods, student needs and motivations, and outcomes of different educational settings vary considerably. Adult education teachers in the 1920s quickly learned that the pedagogical model, specifically "the transmittal of knowledge and skills" posed several problems in working with adult learners (Knowles, 1980, p. 40). Traditional lecture and recitation, drill, quizzes, and memorization produced unenthusiastic adult learners who were significantly more likely to drop out (Knowles, 1980; Lindeman, 1926). After years of adult education teachers creatively working around these differences without the support of theory, Houle and Tough laid the groundwork for a theoretical approach to helping adults learn (Knowles, 1980). European

adult educators felt the need for a label for this new theoretical model that would enable them to “talk about it in parallel with pedagogy” (Knowles, 1980, p. 42). They coined the term andragogy (Knowles, 1980).

One can define andragogy as the art and science of helping adults learn, though Knowles (1980) noted that he viewed andragogy as a "model of assumptions" that provides an alternative to the model of pedagogy (p. 43). Andragogy diverges from the pedagogical model in many ways. Adult learners are more self-directed and therefore may require less direction but more collaboration with the instructor (Knowles, 1980). This contrasts significantly from pedagogical models, where the teacher assumes full responsibility for determining "what is to be learned, when it is to be learned, how it is to be learned, and if it has been learned" (Knowles, 1980, p. 43). Adult learners also differ from children in their readiness to learn. Children may be able to move through the educational system in a cohort-like manner since there is a commonly agreed-upon set of information and standards that they all must progress through. However, adult learners require more specifically tailored programs that align with unique real-life tasks and problems (Knowles, 1980).

Adult learners and children also differ tremendously in the amount of life experience that they bring to the learning environment. With a vast reservoir of real-world experiences to pull from, adult learners have a greater need for experiential learning as opposed to traditional memorization and recitation that may suffice when children are learning in primary and secondary school (Knowles, 1980). Similarly, since adults do have more life experience and have a thirst for applicable, experiential learning, Knowles (1980) noted that adult learners often have different perceptions about the application of new knowledge. Whereas a child in primary or secondary school may be content with learning factual knowledge that they may pull from

selectively later in life, adult learners have a desire for immediate applicability of what they are learning.

Andragogy provides a viable alternative to pedagogy when working with self-directed learners. While the two models do not always provide a clean, seamless transition from pedagogy to andragogy, Knowles (1980) addresses this by noting that a learner may very well be self-directed in some areas of high interest, while remaining more of a dependent learner in other areas. As Knowles (1980) noted, the two models "are probably most useful when seen not as dichotomous but rather as two ends of the spectrum" (p. 43).

For a majority of eighteen- to twenty-five-year-old emerging adult learners, immediately continuing their education in a brick-and-mortar college or university is now seen as a clear next step (United States Department of Education, 2018). While adult education can and does take place in traditional, degree-granting institutions, the scope of this sector of education can also stretch beyond these boundaries. Knowles (1980) noted that education is a lifelong process of continuing inquiry and that the most important learning is "learning how to learn, the skills of self-directed inquiry (p. 41).

While this notion has always been true, future demographic and workplace trends suggest that lifelong learning may be even more critical in the years that lie ahead. With an ever-increasing need for workers to obtain new skills and training to remain competitive in the market, the need for continuing education is significant (Merriam and Brockett, 2011). For working adults to continue their education, or to transition into new positions, they need adequate training and learning opportunities. As average life expectancy increases, working Americans are also adapting their conceptions of work and retirement. Fifty percent of working adults report that they wish to continue working after retirement, for an average of nine years

(Boveda & Metz, 2016). Two-thirds of those that wish to continue working plan to change their line of work in retirement (Boveda & Metz, 2016).

Merriam and Brockett (2011) noted that employment needs were the primary motivation for working adults choosing to participate in continuing education. This need also applies to working adults who already have two or four-year degrees. Irby (1999) reported that employability is driving the demand for professional adult education beyond the traditional bachelor degree. At the turn of the century, there were over 2,000 post-baccalaureate certificate programs in the United States (Irby, 1999). This need is likely to intensify in the future as North America continues to move from an industrial to a service and information-based economy (Merriam and Brockett, 2011). Training and educational programs that are outside of, within, and even beyond traditional degree programs all provide efficient ways to train and retrain the future workforce to meet societal demands as Americans continue to rethink traditional learning ages and their conceptions of education and retirement. While community colleges and universities are but one piece of the puzzle, they are well-suited to be a driving force in fitting continuing and evolving educational needs of emerging adult learners and adult learners alike due to their accessibility and versatility.

Postsecondary Enrollment

National education enrollment statistics were not uniform until the mid-twentieth century (Leslie, Slaughter, Taylor, & Zhang, 2012; Snyder, 1993). Furthermore, the Census Bureau did not begin officially tracking postsecondary educational attainment until 1940 (Ryan & Bauman, 2016). However, through careful examination and conglomeration of historic records at individual institutions, researchers have been able to identify general trends in early American education. Multiple researchers have found, with slight differences in overall numbers, that

enrollment in postsecondary education was extremely limited until the mid-nineteenth century (Donovan & Herrington 2019; Gasman & Thelin, 2010; Thelin, 2011). From 1700 and 1900, between four and five percent of the eighteen to twenty-two-year-old emerging adult population enrolled in postsecondary education (Gasman & Thelin, 2010; Thelin, 2011).

Expanding Enrollment

During the second half of the nineteenth century, postsecondary education did experience significant enrollment increases. However, much of this increase in enrollment was simply due to overall population growth in the United States during this time (United States Census Bureau, 1975; Snyder, 1993). For example, while overall postsecondary enrollment grew by 278 percent between 1869 and 1899, students as a percent of the eighteen to twenty-four-year-old population remained relatively stable (Snyder, 1993). Between 1860 and 1900, several historically excluded populations such as women, African Americans, and Native Americans did gain some access to postsecondary education, albeit in separate institutions (Komives & Woodard, 2003). By the late nineteenth century, female-only academies and seminaries were granting bachelor degrees in a variety of disciplines (Komives & Woodard, 2003). Funding for many of today's historically black colleges and universities began with private gifts and donations from churches and non-profit organizations, with state and federal funding following. Some HBCUs, such as Tuskegee Institute in Tuskegee, Alabama, began as secondary institutions before expanding their curriculum to include college-level coursework (Komives & Woodard, 2003). Open and equitable access to postsecondary institutions did not occur on a large scale until the 1960s.

Even as the pace of annual population growth in the United States slowed in the early 20th century, enrollment in postsecondary education continued to climb (Donovan & Herrington, 2019; Gasman & Thelin, 2010; Snyder, 1993). Between the first and second World War, the

percentage of emerging adults enrolled in postsecondary education increased from five percent to twenty percent (Gasman & Thelin, 2010). The pace of enrollment and attainment increases picked up considerably after World War II (Donovan & Herrington, 2019). Bachelor's degree attainment among twenty-three-year-olds increased by eleven percent from 1945 to 1948 (Donovan & Herrington, 2019). This drastic enrollment growth coincided with an influx of new federal funding for postsecondary education. Specifically, the introduction of the Servicemen's Readjustment Act of 1944, which helped fund college education for returning veterans (Goldin & Katz, 1999; Snyder, 1993; Thelin, 2011).

In the wake of the post-war boom in postsecondary enrollment, President Truman commissioned George Zook to chair the 28-member Presidential Commission on Higher Education in 1946 (Gilbert & Heller, 2013). Truman specifically asked the group to investigate the state of higher education's "objectives, methods, and facilities; and in the light of the social role it has to play" (Brubacher & Rudy, 1997, p. 234). The final report was published in six volumes from December 1947 to February 1948 (Brubacher & Rudy, 1997). In addition to providing a full report on facilities, methods, and curriculum, the report called for increased funding and access to postsecondary education. Specifically, the report noted the vital importance of community colleges as well as the need for more equal enrollment opportunities. The committee expressed that they were "opposed to the continuation of college admissions policies which result in discrimination against students on grounds of race, religion, color, sex, or national origin. And we urge an immediate and voluntary abandonment of discriminatory practices" (Zook, 1947, p. 68). The majority of black troops returning from World War II matriculated at historically black colleges and universities (Haynes, 2006). Herbold (1994) found

that in 1947, the percentage of veterans at historically white institutions grew by thirty percent, as opposed to fifty percent at historically black colleges and universities.

The Truman report marked a turning point in the history of education in America, as the federal government began to assume partial responsibility and oversight of postsecondary education in America for the first time (Brubacher & Rudy, 1997; Hutcheson, 2007; Palmadessa, 2014). Alongside continued federal funding, enrollment continued to expand in the post-World War era, growing an additional forty-nine percent in the 1950s (Snyder, 1993).

While the Truman report initiated federal involvement in two and four-year colleges and universities, higher education was not debated in a presidential campaign until 1960 (Palmadessa, 2017). Palmadessa (2017) noted that this increased focus on higher education was “bred out of the Civil Rights Movement, which called for equality and was reflected in education policy over the next two decades” (p. 55). Coyne (2019) surmised that the Civil Rights Act of 1964 and the Higher Education Act of 1965 are “deeply and philosophically connected” (p. 28). The Higher Education Act of 1965 built upon the concepts of the Truman report to “address financial constraints and lack of facilities as fundamental limitations of access” (Coyne, 2019, p. 28).

The 1950s and 1960s were volatile and dynamic times in American postsecondary education. While enrollment increased significantly in the 1950s, attending college was still not seen as the next step for a majority of high school graduates (Baum et al., 2013). American factories were strong and high school graduates still had a reasonable expectation of a steady job capable of providing for a family and purchasing a home (Baum et al., 2013). However, by 1960, forty-five percent of high school graduates were immediately enrolling in some form of postsecondary education (Snyder & Dillow, 2012).

Female and minority student enrollment also increased significantly in the 1960s. For much of the early history of education in America, males outnumbered females in postsecondary institutions (Schofer & Meyer, 2005; Snyder, 1993; Thattai, 2001). Enrollment expansions following World War II increased this gap in the short term (Schofer & Meyer, 2005). During the 1970s, female enrollment in higher education began to close the gender gap (Schofer & Meyer, 2005; Snyder, 1993). Female college students have outnumbered male students since the mid-1980s (Goldin & Katz, 1999; NCES, 2030)

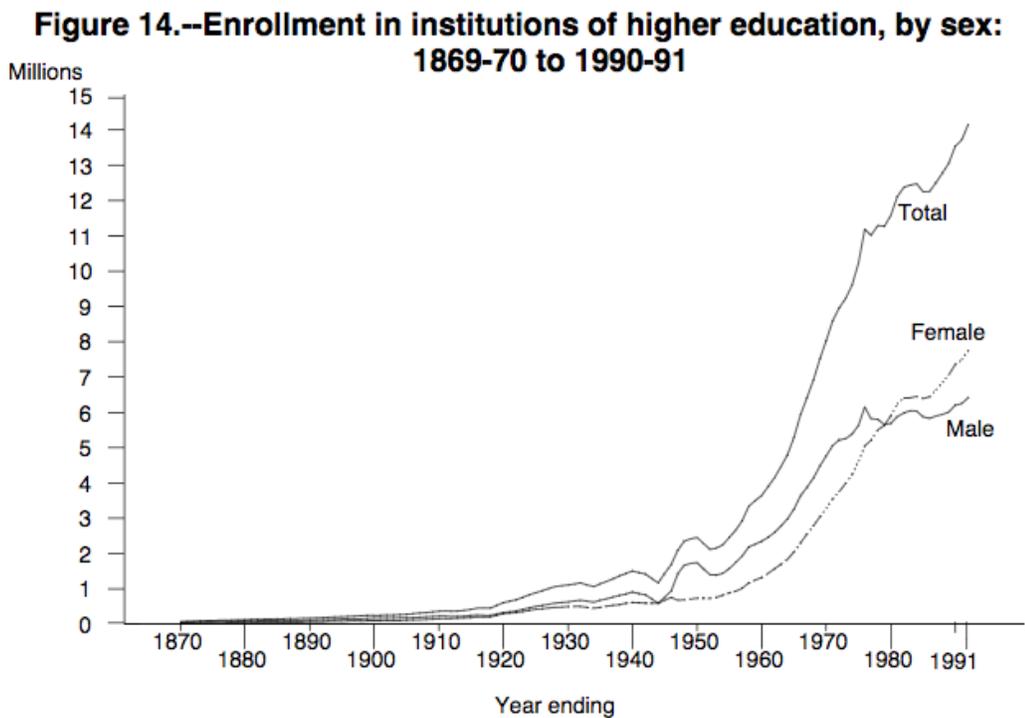


Figure 1: Postsecondary education enrollment 1870-1991

Stabilization and Growth of For-Profit Postsecondary Education

Overall enrollment in postsecondary education slowed substantially during the 1980s and stabilized from 1992 to 1998 (NCES, 2020; Snyder, 1993). Undergraduate enrollment has

increased considerably in the twenty-first century, though this increase primarily reflects the surge of college enrollment during the Great Recession. In total, postsecondary enrollment increased by thirty-five percent from 2000 to 2010 (NCES, 2020). Notably, enrollment at for-profit colleges increased four-hundred percent, from one million to four million, during this time-period (NCES, 2020). Of the students who attended private four-year institutions in 2012, almost one-third were enrolled at a for-profit institution (Baum et al., 2013). Community college enrollment also surged dramatically during the recession (Juszkiewicz, 2017). However, enrollment increases at four-year non-profit colleges were much more modest (NCES, 2020).

Since 2010, college enrollment has been steady, with slight declines in overall enrollment in the wake of the Great Recession (NCES, 2020). This drop is “due primarily to enrollment decreases in for-profit and public 2-year institutions” (p. 3) since their peak in fall 2010 (Juszkiewicz, 2017). Public non-profit four-year institutions have experienced modest increases in enrollment since 2010 (Juszkiewicz, 2017). Collectively, sixty-seven percent of young adults now pursue some form of education after graduating from high school (United States Department of Education, 2018).

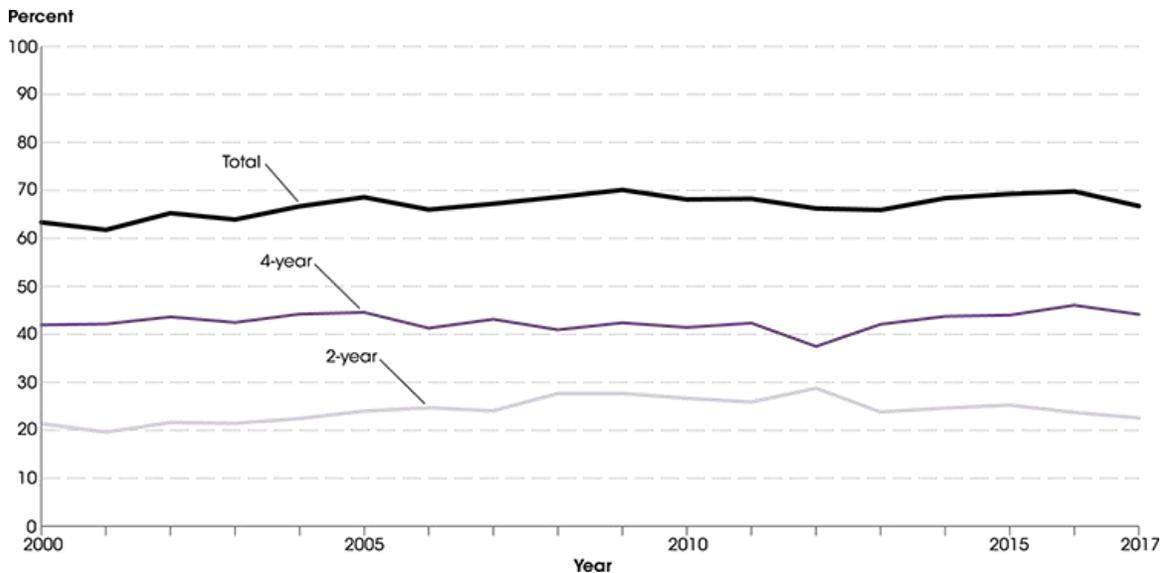


Figure 2: Postsecondary education enrollment since 2000

Modern and Future Postsecondary Enrollment

Although the landscape of postsecondary education, at least in terms of enrollment, has steadied in the years since the great recession, volatile and unprecedented changes and challenges lie ahead. The number of college-bound high school graduates is expected to drop by fifteen percent between 2025 and 2029, with a few more percentage points likely to fall in the years following 2029 (Barshay, 2018). When the financial uncertainty of the 2008 recession hit, people responded by having few children. The number of children born between 2008 and 2011 fell drastically short of previous years (Barshay, 2018). This severe reduction in the number of traditional college-aged students will begin impacting colleges and universities in the coming years. Although economic conditions improved considerably throughout the 2010s, birth rates did not return to their previous levels (Barshay, 2018). Even in the years preceding the economic uncertainty caused by the coronavirus pandemic, the Centers for Disease Control and Prevention reported new all-time lows in birth rates (Martin et al., 2018). This marks a continued trend; a decade of decreased family sizes and quite possibly a new baseline moving forward. Economist Nathan Grawe (2018) noted that the recession will cost America about 650,000 children of

college-age in the mid-2020s. (Grawe, 2018). At the current rate of college attendance for recent high school graduates, sixty-five, this means about 450,000 fewer college applicants in the mid-2020s (Grawe, 2018).

Not all colleges and universities are expected to feel this shock equally. While overall demand for postsecondary education is expected to plummet, demand for top 100 institutions is not expected to fall off nearly as much (Barshay, 2018). According to Barshay (2018), demand for elite institutions may even be significantly higher in 2029 than it was in 2012. Different regions may also feel these effects differently. In the northeastern United States, where a disproportionately high number of America's colleges and universities are located, institutions are expected to be hit the hardest (Grawe, 2018). Many small, private liberal arts schools are expected to close permanently (Eide, 2018). Conversely, institutions in the mountain west may see increases in demand, reflecting a separate, decades-long trend of migration away from the northeastern part of the United States (Grawe, 2018).

However, economists predicted a similar decline in postsecondary education enrollment following the baby boom generation (Barshay, 2018). This prediction did not ultimately come to pass, as college enrollment instead surged. Enrollment rates were buoyed by increases in female student enrollment and overall increased demand for a college education as it became increasingly difficult to earn a high-paying job with just a high school diploma (Barshay, 2018). While Grawe (2018) asserts that it would be very risky for college administrators to bank on another generational enrollment percentage increase to offset these looming demographic trends, the makeup of postsecondary education is once again changing. The number of adults returning to college to pursue their first degree or to continue their education has increased in recent years (Giles, 2012). Adult students between the ages of 25-34 accounted for the highest percentage

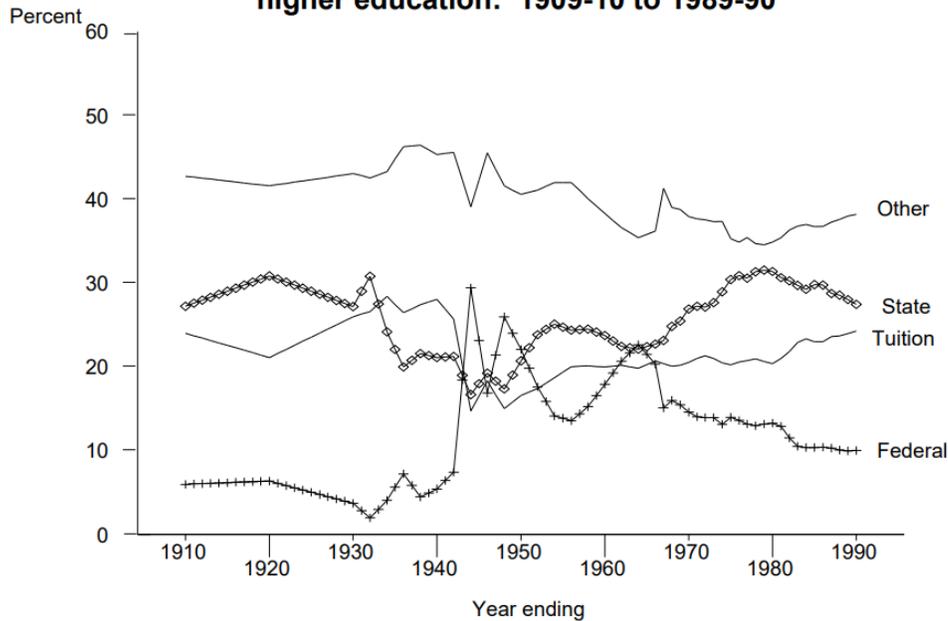
enrollment increase following the great recession (National Center for Education Statistics, 2014).

With researchers predicting and anticipating that an increasing percentage of jobs will require education beyond high school, working adults and those beyond the traditional college-aged, emerging adult cohort will also have a strong need for postsecondary education to earn new credentials or to transition into new positions, (Merriam and Brockett, 2011). As the evolution of the economy, conceptions of work and retirement, and what constitutes traditional learning ages continues, postsecondary education at both two-year and four-year institutions will likely play a critical role in preparing and reshaping the workforce (Merriam and Brockett, 2011).

Funding for Postsecondary Education

As enrollment has increased and the overall student body has evolved, the costs of providing postsecondary education to the general public also increased significantly. Federal funding, while important, has historically been a secondary contributor to institutional budgets (Li, 2017, State Higher Education Executive Officers, 2013). During the twentieth century, with the exception of the Great Depression and the World Wars, state funding for higher education consistently provided more revenue than federal funding or tuition and fees (Snyder, 1993). State appropriations for postsecondary education increased steadily from the 1890s to the 1940s (Goldin & Katz, 1999). While the instability of the 1940s produced volatile dips in state appropriations, from the 1950s through the 1990s state appropriations generally returned to their former place as the largest source of revenue for higher education (Snyder, 1993). Federal funding did spike in the 1960s and nearly caught pace with state appropriations, but this change quickly subsided.

Figure 20.--Sources of current-fund revenue for institutions of higher education: 1909-10 to 1989-90



SOURCE: U.S. Department of Education, National Center for Education Statistics, *Annual Report of the Commissioner; Biennial Survey of Education in the United States; Financial Statistics of Institutions of Higher Education; Digest of Education Statistics, 1992;* and unpublished data.

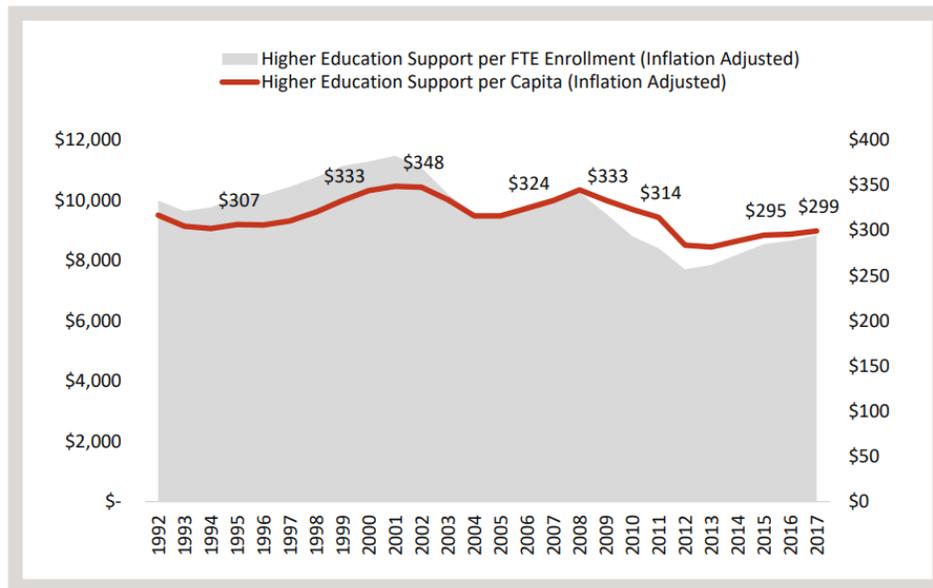
Figure 3: Sources of postsecondary funding 1909 to 1989

While state funding rose across the board during the first half of the twentieth century, funding levels varied considerably by region. Rural states have generally devoted much larger percentages of their state budgets toward higher education. Goldin and Katz (1999) noted that the greatest levels of state budgetary support are found in the Pacific, Mountain, and West North Central states while the lowest levels of state support are found in New England and the Middle Atlantic states. This state funding gap is largely tied to population density and overall tax revenue. Wyoming, Idaho, and other rural states have frequently allocated over twenty percent of their state budgets on higher education, while states with high population densities such as Massachusetts and Vermont often spend less than three percent of their annual budget on higher education (National Association of State Budget Officers, 2013). However, Goldin and Katz (1999) also found a significant correlation between a state’s date of admission to the union and education funding, with newer states allocating more money for postsecondary education.

Impact of Economic Recession on Postsecondary Funding

In recent decades state funding for higher education has decreased significantly and consistently. From 1987 to 2012, states provided an annual average of sixty-five percent more funding for higher education than the federal government (Pew, 2015). Since the financial crisis of 2008, almost all fifty states have made drastic cuts to education budgets (Mitchell, et al., 2017; Rizzo, 2006). (p. 1). Rizzo (2006) noted that funding dropped across the board, with little difference between states that traditionally funded higher education well and states that typically funded higher education poorly. From the fiscal year 2008 through the fiscal year 2013, state support per full-time equivalent student fell twenty-eight percent, or \$2,353 per student on average (Oliff et al., 2013).

In 2013, FTE state appropriations increased for the first time since the Great Recession (Desrochers & Hurlburt, 2016). While total state appropriations did eventually pass pre-recession levels in 2016-2017, funding remained woefully below inflation-adjusted levels (Tandberg & Laderman, 2018; Doyle & Zumeta, 2014). Thus, the overall effect was still far less money spent per student. Mitchell, Leachman, and Masterson (2017) reported that with two-year colleges included, “overall state funding for the 2017 academic year was nearly \$9 billion below its 2008 level, after adjusting for inflation” (p. 1). Across all types of postsecondary institutions in 2016, state and local funding per student remained twenty to thirty percent lower than in 2008 (Desrochers & Hurlburt, 2016).



NOTES:

1. Higher education support is state and local tax and nontax support for public and independent higher education, including special purpose appropriations for research-agricultural-medical.
2. Full-time equivalent enrollment equates student credit hours to full-time, academic year students.
3. Inflation adjusted by SHEEO Higher Education Cost Adjustment (HECA).

Sources: State Higher Education Executive Officers; Population data from the U.S. Department of Commerce, Bureau of Economic Analysis, Regional Income Division.

Figure 4: State and local FTE support

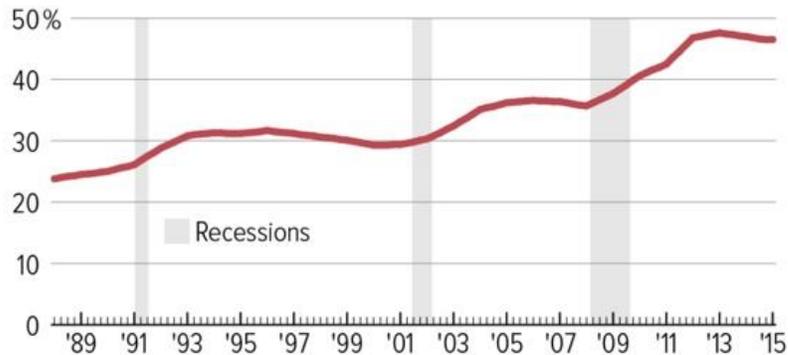
The recession exacerbated an already growing trend of state budget cuts to postsecondary education. Rizzo (2006) reported that after controlling for inflation, higher education institutions receive 50% less in state appropriations than they did in 1977. Mortensen (2012) predicted that state funding would disappear completely by 2059, “sooner in some states and later in others” (p. 27) if this trend continues at the current pace. State funding for postsecondary education has decreased during each economic recession (Doyle & Delaney, 2009). Furthermore, the length of time it has taken for state funding to recover from a recession has increased with each economic downturn since 1979 (Quinterno, 2011). Barr and Turner (2013) noted that while demand for many goods and services tends to decline during a recession, “demand for postsecondary education tends to increase” (p. 168). Weak market conditions during the recession encouraged college applications, as overall enrollment increased by 15.4% between fall 2007 and fall 2010 (Barr & Turner, 2013).

Balance Wheel

States, with the exception of Vermont, are subject to balanced-budget rules which prohibit borrowing to fund their annual budget (Jonas, 2012). Following the state financial crisis of the 1840s, where the federal government declined to intervene amid excessive capital spending, states have largely avoided defaults (Jonas, 2012). Without the option to borrow, states almost uniformly made the difficult decision to drastically cut funding to select agencies during the recession (Doyle & Delaney, 2009; Li, 2017; Mitchell et al., 2017). Harold Hovey, a state-budget analyst with the National Center for Public Policy and Higher Education, described postsecondary education as the balance wheel for state budgets (Doyle & Delaney, 2009). Hovey stated that when times are bad, “legislators target higher education for larger budget cuts than other state services” (Doyle & Delaney, 2009, p. 60). Hovey identified two primary reasons for this trend. First, institutions have the ability to generate revenue in the form of tuition (Doyle & Delaney, 2009; Li, 2017). Additionally, Hovey noted that legislators do not see postsecondary education as the highest priority, since “allocations are for services to a clientele that consists of many middle and even upper-income citizens” (Doyle & Delaney, 2009, p. 60). Delaney and Doyle (2011) investigated this phenomenon and reported that “higher education is cut more than other major spending categories in bad times” (p. 363) and receives larger increases in good times. In analyzing state budgets from 1976 to 2004, Tandberg (2010) theorized that postsecondary education is “particularly susceptible to budgetary trade-offs and funding cuts during economic decline because of its ability to generate income from sources other than state government” (p. 763).

Students Funding Larger Share of Education Funds After Recessions

Tuition as a percent of “total educational revenue,” 1988 -2015



Source: State Higher Education Financing FY2015, State Higher Education Executive Officers Association. Total educational revenue is the sum of educational appropriations and net tuition revenue excluding any tuition revenue used for capital and debt service. It measures the amount of revenue available to public institutions to support instruction (excluding medical students).

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Figure 5: The effect of economic recession on higher education funding and tuition

Shifting Funding Models in Postsecondary Education

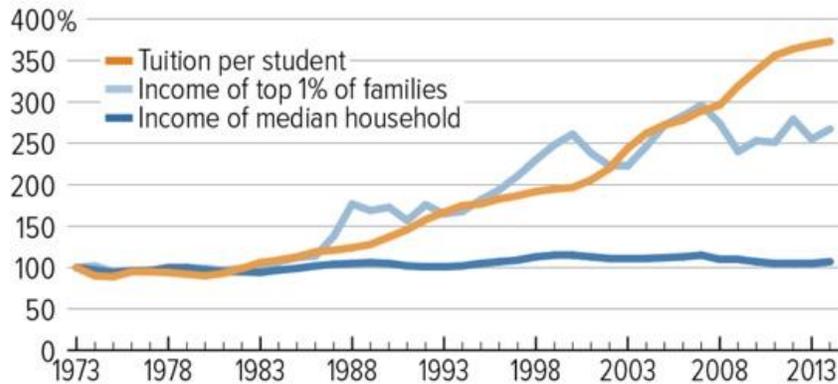
The American Recovery and Reinvestment Act helped states maintain working budgets in the short term during the Great Recession, covering over one-half of state deficits in 2011 (Jonas, 2012). Even in the midst of federal stimulus support, states still made massive cuts to higher education funding (Doyle & Delaney, 2009; Li, 2017; Mitchell et al., 2017). In line with Hovey’s balance wheel theory, educational institutions have largely supplemented this loss in state funding through increased demands from both the federal government and tuition increases. In total, tuition fees as a percent of overall postsecondary education funding increased from 35.8 percent in 2008 to 47.8 percent in 2013 (Doyle & Zumeta, 2014). In 2013, federal funding of postsecondary education exceeded state funding for the first time in a half-century (Mitchell et al., 2017). Even as the economy has rebounded since the recession, the percentage of budgetary reliance on tuition fees has decreased only slightly from its all-time high in 2013 (Doyle & Zumeta, 2014).

Privatization of Postsecondary Education

Collectively, at four-year universities, tuition increased by 112 percent from 1990 to 2010 (Weertz et al., 2012). Community colleges have not been immune to this trend. Weertz et al., (2012) reported that two-year schools have increased tuition rates by 71 percent during this same time period. Desrochers and Hurlburt (2014) noted that the recession hit community colleges the hardest, on a per-student basis. Since community colleges experienced historic enrollment increased during the economic downturn, they "suffered the deepest cuts in state and local appropriations per student in 2010, with funding reduced by approximately \$1,000 per student" (Thelin, 2014, p. 322). Meanwhile, the median inflation-adjusted household income in America has increased by just 2.1 percent from 1990 to 2010 (Weertz et al., 2012). McLendon, Hearn, and Mokher (2009) framed the steep rise in tuition levels during the twenty-first century as the privatization of higher education. Curs and Jaquette (2015) also noted the trend toward the privatization of education. Specifically, Curs and Jaquette (2015) found that many colleges and universities have shifted their enrollment priorities in favor of admitting more out-of-state students to increase tuition revenue.

Tuition Growth Has Vastly Outpaced Income Gains

Inflation-adjusted average tuition and fees at public four-year institutions and income for select groups (1973 = 100%)



Source: Center on Budget and Policy Priorities based on the College Board and Census Bureau. Tuition per student and income levels, adjusted for inflation, as a percentage of 1973-1974 price levels. Years shown and income data are for the calendar year. Tuition data cover the school year beginning in the calendar year.

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Figure 6: Tuition and income growth in the United States

For every one-thousand dollars in state FTE (full-time equivalent) cuts, the average college student pays an extra two-hundred and fifty-seven dollars in tuition and fees (Tandberg, 2018). Desrochers and Hurlburt (2016) found that the share of educational costs paid by student tuition increased an “approximate 10 percentage points” (p. 5) at public institutions from 2008 to 2013. While the Great Recession has highlighted this issue, relative college costs for the average American family have risen since the 1960s (Immerwahr, 2008). As a result of state cuts to education, Kirshstein (2012) reported that “public four-year tuition represented only 4 percent of the median family income in 1970, but reached 11% by 2010” (p. 2). For families with lower incomes, the situation is far more precarious. Immerwahr (2008) illustrated that for families in the bottom 20% of income brackets, “the share of family income required to pay for a year's tuition at a four-year public institution doubled since 1960, from 13% to 27%” (p. 1). This trend has continued, with the severity of growth varying by geographic region. According to the

National Center for Higher Education Management Systems (2013), the percentage of annual income required to afford tuition at a local two-year institution for the lowest quartile families varied from 26% in Wyoming to 63% in New York.

Student Loan Borrowing

Emerging adult students and their families have offset these increased costs through increased borrowing. State-sponsored financial aid programs have grown from 3.5 billion to 10.8 billion from 1990 to 2010, with a specific emphasis on merit-based aid (Quinterno, 2011). Tuition increases have easily outpaced increases in available financial aid (Boehner & McKeon, 2003). According to Alacbay and Barden (2017), even with the maximum level of federal financial aid, "the net price of college at 70% of universities is unaffordable for working and middle-class students" (p. 7).

The combination of rising tuition costs and slowed growth of need-based financial aid has resulted in a 450 percent increase in student debt from 1999 to 2010 (Quinterno, 2011). Rose (2013) reported that, in the wake of the Great Recession, Americans' collective student debt outpaced credit card debt for the first time in American history. The percentage of students graduating with student loan debt has increased rapidly in the past two decades. From 2004 to 2012, the percentage of twenty-five-year old's carrying student debt increased from twenty-seven percent to forty-four percent (Brown, Haughwout, Lee, Scally, & Van Der Klaauw, 2015). Seventy-four percent of college graduates with student loan debt report living paycheck to paycheck after graduation (Berg-Cross & Green, 2009).

Context of Postsecondary Education Costs

Even after controlling for decreases in state appropriations, the cost of higher education has still increased at a much higher rate than most products (Powell, Gilleland, & Pearson,

2012). This phenomenon is not limited to the cost of education itself but appears to include even the goods and services that institutions purchase. Since 1961, the Higher Education Price Index (HEPI) has measured changes in the costs of goods and services that postsecondary institutions frequently consume. After comparing the Higher Education Price Index to the Consumer Price Index (CPI) in similar goods and services, Powell et al., (2007) found that "HEPI has exceeded CPI in all but 11 of the 48 years it has been calculated, and in some years it has more than doubled the CPI" (p. 103).

The price of higher education has also significantly outpaced growth in average income in the United States since the 1980s (Gordon & Hedlund, 2016). In recent years, this disparity in growth has resulted in many families choosing to forego secondary education for financial reasons (Boehner & McKeon, 2003). A 2003 congressional report on rising tuition noted that "cost factors prevent 48 percent of college-qualified high school graduates from attending a four-year institution, and 22 percent from attending any college at all" (Boehner & McKeon, 2003, p. 1). Boehner and McKeon (2003) also reported that higher education was "in crisis" (p. 1) due to "uncontrolled cost increases that are pushing the dream of a college degree further out of reach for needy students" (p 1). This report did not assign specific blame for rising tuition levels but did note that the crisis has persisted in both good and bad economic times (Boehner & McKeon, 2003). The report also noted that the growth in the disparity between average income and tuition rates began before the massive string of state budget cuts to higher education during the 1990s and 2000s (Boehner & McKeon, 2003).

In 1987, Former Secretary of Education William Bennet asserted that increasing federal support for higher education enables colleges and universities to raise tuition to higher levels than they normally would (Singell & Stone, 2007). Epple et al., (2013), Martin and Gillen

(2011), Singell & Stone (2007), and Vedder (2004; 2007) have all published findings supporting Bennet's hypothesis, to varying degrees, since 1987. In a nationwide analysis of Bennet's theory, Singell and Stone (2007) found that increases in federal aid do significantly correlate with increased tuition at private universities. At public universities, Singell and Stone (2007) identified a correlation between increased aid and out-of-state tuition, but no correlation with in-state tuition. Epple et al., (2013) also found that private institutions raise tuition levels in response to increased federal aid. Martin and Gillen (2011) and Cellini and Goldin (2014) studied for-profit institutions in particular, noting a strong correlation between increased aid and increased tuition.

Cost Disease

However, using a Granger causality test, Archibald and Feldman (2011) found "no significant pattern of causality running from Pell Grant support to list-price tuition changes for public universities" (p. 205). Archibald and Feldman (2011) proposed that the unique increases in the price of education after controlling for decreased appropriations and administrative growth are due to cost disease. In essence, cost disease is the increase in the price of services, such as education, that have little or no potential for productivity growth. William Baumol and William Bowen first introduced this concept in 1966 to describe the service sector of the economy as a whole. To illustrate their point, Baumol and William (1967, p. 416) famously provided the following, partially tongue-in-cheek example:

"a half-hour horn quintet calls for the expenditure of 2.5 man-hours, and any attempt to increase productivity here is likely to be viewed with concern by critics and audiences alike" (Archibald & Feldman, 2011, p. 416).

In this scenario, productivity improvement—more music per minute or the same music performed by a smaller number of musicians—would not yield the same service for the audience (Archibald & Feldman, 2011). There is little or no potential for productivity growth in heavily service-based professions, such as live musical performances, since the human service cannot be easily replicated at a cheaper price (Archibald & Feldman, 2011). Yet, each year the musicians would command higher salaries as productivity growth influences and increases costs in the surrounding economy. To maintain a high-quality staff, service industries' costs also rise along with the rest of the economy, without the ability to offset inflation with productivity growth. For cost disease to affect an enterprise, it is not necessary for there to be zero productivity growth. Rather, cost disease impacts an enterprise to the extent that the enterprise's productivity growth is slower than the average productivity growth for the economy as a whole (Archibald & Feldman, 2011). Vedder et al., (2014) also proposed that the lack of productivity growth in higher education is a primary reason for increased costs. Vedder et al., (2014) noted that unlike other for-profit industries, where increased demand may result in increased supply, educational institutions have an incentive to hold supply constant. By turning away students, institutions can appear more selective and exclusive in the admissions process (Thelin, 2011; Vedder et al., 2014).

In their analysis of different types of industries, Archibald and Feldman (2011) reported that higher education “has experienced cost disease along with other similar service industries” (p. 41). This principle has held true even with multiple segments of the same industry. For example, the price of automobile repairs has risen over four times as fast as the price of automobiles (Archibald & Feldman, 2011). This discrepancy is largely because productivity growth, in the form of technological innovation, can reduce the price of making an automobile at

a much faster rate than the service sector can reduce the price of maintenance. Archibald and Feldman (2011) argue that the effect of cost disease is even more prevalent in higher education due to the percentage of workers with advanced degrees as compared to other industries, thus driving up expenditures without the ability to increase productivity.

Institutional Expenditures in Postsecondary Education

College and university budgets have been a moving target throughout the history of education in the United States. Although changes in definitions and data collection procedures can complicate direct comparisons, it is clear that administrative expenditures increased consistently throughout the twentieth century. Meanwhile, instructional expenditures saw sharp decreases in the early twentieth century and then modest decreases in the latter half of the century (Snyder, 1993). Generally, researchers define administrative costs as the combination of institutional support, academic support, and student services (Leslie & Rhoades, 1995). Commonly, but not always, the cost of libraries is excluded from the academic support category in a total administrative calculation (Leslie & Rhoades, 1995).

From 1929 to 1989, administrative expenditures, as a percentage of the average total college budget, increased from eight to fourteen percent (Snyder, 1993). Meanwhile, instructional expenditures decreased from forty-four percent to thirty-one percent during this same time frame (Snyder, 1993). This trend continued into the twenty-first century (Alacbay & Barden, 2017; Leslie & Rhoades, 1995). In a nationwide analysis of 198 leading public and private colleges and universities between 1993 and 2007, Alacbay and Barden (2017) found that instructional spending per student increased 39%, while total administrative spending increased 61% per student.

Resource Allocation During the Recession

The 2010s were marked by instability and variance in resource allocation. Notably, institutions navigated the Great Recession in a wide variety of different ways. Desrochers and Hurlburt (2014) reported that collectively, four-year institutions scaled back institutional support spending in an effort to preserve funding for instruction during the recession. However, the results of this effort were mixed (Desrochers & Hurlburt, 2014). Public master and bachelor degree-granting institutions increased the share of instructional spending by one percent during the recession (Desrochers & Hurlburt, 2014). However, on average, public research universities continued to decrease instructional expenditures (Desrochers & Hurlburt, 2014). Community colleges were the only institutions to "cut spending in nearly every expense category, including instruction, student services, academic support, and overhead functions" (Whissemore, 2013, p. 10). As a result, community college students "continued to pay a smaller share of expenses than students at other postsecondary institutions" (Whissemore, 2013, p. 10) All institutional groups experienced a net decrease in total staff per 100 FTE students from 2001 to 2009 (Zaback, 2011). Thus, these changes in resource allocation do not merely represent uncontrolled growth in a particular area. Rather, they demonstrate a multitude of approaches to educate "more students with fewer staffing resources" (Zaback, 2011, p. 4).

Shifting Funding Priorities

In addition to navigating the deep cuts of the recession, there is also evidence of institutions shifting their funding priorities to match revenue streams and address public concerns. In an analysis of the revenue and expenditure patterns of research institutions from 1998-2009, Fowles (2013) reported that collectively, public research universities increased expenditures on instruction and student services as a percentage of their overall institutional expenditures by roughly four percent. While this figure seems to contradict the findings of the

Delta Cost Project that reported decreases in instructional spending at research universities during the recession, Fowles' study reflects a larger, decade-long trend in resource allocation. Fowles (2013) suggested that this shift away from research and public service may be a result of decreased state appropriations and increased public scrutiny of performance indicators; graduation and retention rates. Fowles (2013) noted that as institutions collect a larger percentage of their revenue from student fees, the "strings attached to new funding steers faculty and administrators in new directions that are potentially at odds with institutional missions, at least as these core missions have been defined historically" (p. 284). Thus, universities may feel less obligated to allocate resources toward endeavors that, in theory, directly benefit the state as a whole, and more likely to allocate resources that address current institutional priorities or matters of public opinion and perception (Fowles, 2013). Leslie et al., (2012) found this concept to be accurate, at least in research universities. Leslie et al., (2012) found that the source of revenue largely guided resource allocation at doctoral-granting research universities. For each dollar increase through tuition, public institutions spent almost 46 cents on instruction, compared to just one-third of government appropriations that are used for instruction. (Leslie, et al., 2012). Increased private gifts and federal grants are associated with higher research expenditures (Leslie, et al., 2012).

Institutional size and Carnegie classification also have a large impact on instructional spending (Alacbay and Barden, 2017). In a national analysis of the administrative to instructional spending patterns at four-year institutions in the 2015 fiscal year, Alacbay and Barden (2017) found that smaller institutions were much more likely to allocate a larger percentage of their budget to administration. Additionally, Alacbay and Barden (2017) reported that baccalaureate and master's degree-granting institutions, on average, spend a far greater percentage of their

budget on administration than doctoral-granting institutions. Thus, small baccalaureate colleges have the highest average expenditure ratio of administration to instruction, while large doctoral-granting universities typically have the lowest administration to instruction expenditure ratios (Alacbay and Barden, 2017).

The tremendous challenges inflicted by the Great Recession have provided an opportunity for colleges and universities to “reevaluate how they allocate resources and rethink how to manage costs and improve student outcomes” (Desrochers & Hurlburt, 2016, p. 5). A large and ever-increasing share of future jobs will require college-educated workers. How institutions use the increasingly diminished resources they receive will have tangible effects on the development of the skilled workforce needed to fill these positions in the future (Oliff et al., 2013).

Performance Indicators in Postsecondary Education

Measuring student success at the institutional level in postsecondary education is a complex undertaking. The most common metrics of student progress and success center around student retention and degree completion. Tight (2020) summarized this in noting that “Institutions of higher education, their component schools and departments, and individual academics have long been concerned with trying to ensure that students, once enrolled, remain and successfully complete their studies, and that they get as much out of them as they can” (p. 689). In addition to tracking graduation rates, institutions, and external researchers, continue to prioritize student retention as a metric of progress.

Retention and student engagement are connected in literature (Tight, 2020). The narrative has shifted over the years from being focused primarily on the student to emphasizing the role of colleges and universities in promoting student engagement and retention (Tight, 2020). Tight

(2020) noted that measuring student retention, as opposed to engagement, is the “older of the two concerns, at least in research terms, and was formerly also known by other, more negative, synonyms, such as student withdrawal, attrition and dropout” (p. 689). Contemporary research on student retention has focused more on how institutions may increase engagement among undergraduate students, as opposed to placing the onus solely on individual students. Wolf-Wendel et al., (2009) stated “the concept of student engagement represents two key components. The first is the amount of time and effort students put into their studies and other activities that lead to the experiences and outcomes that constitute student success. The second is how institutions of higher education allocate their human and other resources and organize learning opportunities and services to encourage students to participate in and benefit from such activities” (pp. 412-413). Tight (2020) summarized the drastic shift in literature from retention to student engagement by noting “a common theme that has been emerging, however, is that the response should not be about helping students to better adapt to the higher education institution they are studying at or with, but about the institution adapting to the students it admits” (p. 693). Despite increased attention and research over the past several decades, Caruth (2018) noted that persistence rates have not improved considerably over the past 20 years.

Graduation Rates

In assessing the overall progress of higher education, the Department of Education has prioritized improving graduation rates, specifically in closing the widening degree attainment gap between the United States and other nations (Kelly, 2010; Geiger, 2014). While measures of student graduation may seem like a basic metric of success, the measurement of graduation rates in postsecondary education is a relatively new endeavor, at least at the federal level. Before 1985, no national-level institutional data on graduation rates existed (Cook & Pullaro, 2010). The

Department of Education did not begin officially tracking graduation rates until 1996 (Cook & Pullaro, 2010). The majority of reported college graduation rates prior to 1990 come from analyses of high school graduating classes. Comparing the high school classes of 1972 and 1992, Bound et al., (2010) found a decline in college completion rates. Specifically, national four-year college completion rates dropped from 45 percent in 1970 to 40 percent in 1990 (Bound et al., 2010). Decreasing completion rates have not been uniform across demographics. Despite increased female enrollment in college, the decrease in completion rates has been “almost entirely concentrated among men” (Bound et al., 2010, p. 3).

One consistent issue with using graduation rates as the ultimate measure of institutional success is that some institutions routinely prioritize enrolling emerging adult students with much stronger educational backgrounds, providing these colleges and universities with a considerable built-in advantage in achieving high levels of aggregate student achievement that may or may not have much to do with their own effectiveness in educating students (Clotfelter, 2013). Clotfelter et al., (2013) stated “This worry is especially acute for community colleges. Compared to 4-year colleges and universities, community colleges serve a more diverse population with many students attending part-time and trying to balance school, family, and work obligations. Community colleges also provide a wider variety of educational programs than do most 4-year institutions” (p. 807). Clotfelter et al., (2013) noted that it is clear that “community college students have high dropout rates, low graduation rates, and long periods for completing degrees” (p. 807). Clotfelter et al., (2013) noted that it is important to keep in mind that colleges who appear to be the most successful in helping their students graduate “may be the ones who enroll the best prepared students, rather than those that educate students the most effectively” (p. 808).

Indeed, students enrolled at less selective four-year institutions and community colleges experienced the most drastic declines in completion rates from 1970 to 1990 (Bound et al., 2010). During this same time, completion rates rose at private colleges and universities as well as public institutions ranked in the top 50 nationally (Bound et al., 2010). Astin and Oseguera (2005) also reported a decline in degree completion from 1989 to 1998 among public institutions, while private colleges and universities experienced completion rate increases. Collectively, students enrolling in a four-year public institution during the 1995-1996 academic year were “no more likely to complete a bachelor’s degree in five years than their peers who enrolled in 1989-1990” (Reason, 2009, p. 659).

At two-year colleges, completion rates are significantly lower. According to the Department of Education, the completion rate of the 2013 cohort at public two-year colleges was just over twenty-five percent (Ginder et al., 2017). However, the National Student Clearinghouse reports more positive completion rates at two-year schools. Since many students enroll in two-year colleges with intentions to ultimately transfer to another institution, the NCS tracks students’ graduation over six years across institutions. For the 2013 cohort, the NCS noted that within six years, “39.3% of the community college students completed a program either at the starting institution or a different institution” (Juszkiewicz, 2017, p. 5).

Iron Triangle

In the view of many college presidents, the three main factors in higher education—cost, access, and quality exist in an iron triangle (Immerwahr, 2008). Most presidents believe that moving any one of these variables must impact the other two (Immerwahr, 2008). In other words, if one wants to improve performance indicators in higher education, one must either increase funding or be prepared to make higher education less accessible (Immerwahr, 2008).

However, with clear evidence that state appropriations are not returning to their pre-recession levels, Doyle and Delaney (2009) suggested that “institutions and state systems of higher education need to adapt to the new reality of state spending” (p. 62). With decreasing levels of funding and increasing levels of volatility, institutions must seek the most efficient use of resources in educating their students (Mitchell, et al., 2017).

Does Resource Allocation Influence Student Success?

If improving retention and graduation rates is a goal of many institutions, Gansemer-Topf and Schuh (2003) hypothesized that understanding how to effectively distribute institutional resources may improve graduation rates. Over the past two decades, researchers have analyzed the correlation between institutional expenditures and graduation rates at both two and four-year colleges and universities. Collectively, these researchers have identified a consistent relationship between resource allocation and student performance. However, the researchers have found mixed results regarding which independent variables have the greatest correlation with student performance.

Prior Studies Assessing Resource Allocation and Student Performance

Gansemer-Topf and Schuh (2003) studied the impact of two independent variables, instructional expenditures and academic support expenditures, on two dependent variables, graduation rates and retention rates at doctoral-granting institutions. Gansemer-Topf and Schuh (2003) reported that increased expenditures in both instruction and academic support correlate positively with improved graduation and retention rates. Ryan (2004) also found a significant positive relationship between expenditures towards both instruction and academic support and improved six-year graduation rates at Carnegie-classified Baccalaureate I and II institutions.

In an analysis of four-year institutions across the United States, Ehrenberg and Webber (2010) found that student services expenditures correlate with increased retention and graduation rates. However, Ehrenberg and Webber (2010) noted that the effect was not the same across all institutions. Institutions with lower standardized test scores and a higher percentage of pell-grant recipients showed greater improvements in retention rates and graduation rates as a result of increased student services spending. Nationally, lower standardized test scores and high percentages of pell-grant recipients correlate strongly with lower graduation and retention rates (Ehrenberg and Webber (2010).

In essence, Ehrenberg and Webber (2010) found that increased student services expenditures matter “more for schools that have lower graduation and persistence rates than they do for schools that have higher graduation and persistence rates” (p. 936). Umfress (2010) reported that increased student services/student affairs spending correlated on a national level with increased student retention, when institutional selectivity, institutional control, and non-student-services spending were controlled. Umfress' (2010) study did not seek to measure graduation rates or comparisons of student services spending to other expenditure categories. In a study of all public four-year institutions in the United States, Marsh (2014) found that academic support expenditures were the strongest predictor of increased retention rates. While several of the aforementioned studies found instructional and student services expenditures to be strong predictors of increased graduation rates, Marsh (2014) found that neither category was a statistically significant predictor of improved retention rates. Marsh (2014) opined that this lack of significance was among "the most surprising results of the study, as each of these categories included expenses seen as more directly related to students" (p. 146).

Peerenboom (2012) examined the relationship between expenditure patterns and four-year and six-year graduation rates at public four-year colleges and universities. Peerenboom (2012) found a significant negative relationship between expenditures towards research and improved graduation rates. Collectively, Peerenboom (2012) concluded that “institutional expenditures do have an effect on graduation rate, albeit limited in scope and influence.” (p. 74)

Not all studies have identified significant independent variables. In a nationwide study of all public four-year institutions, Cantrell (2006) investigated whether institutions' six-year graduation rates had a significant relationship with expenditure patterns during the first year of the 2004 graduating cohort. Cantrell (2006) examined ten independent variables, including categories such as mandatory and non-mandatory transfers that were not included in other studies. Cantrell's (2006) study did not seek to identify a predictive formula for expenditures. Rather, Cantrell (2006) first grouped institutions in those with low, medium, and high six-year graduation rates. Within these groups, Cantrell (2006) then examined expenditure patterns to identify potential correlations. Cantrell (2006) found no significance in any of the independent variables' impact on six-year graduation rates.

Promades (2012) evaluated the impact of institutional expenditures on influencing six-year graduation rates at private colleges and universities in the New England area. Promades (2012) found that instructional expenditures (non-personnel) and student services (personnel) were a significant predictor of increased graduation rates. Promades (2012) did not find any statistical correlation, positive or negative, between academic support expenditures and improved student performance.

Abouzeida (2014) expanded upon the work of prior researchers by exploring the possibility of a predictive relationship between expenditure and student performance on a

national scale at multiple levels. Abouzeida (2014) found that instructional and academic support expenditures were the greatest predictor of increased graduation and retention rates, followed by research and student services expenditures. Abouzeida (2014) noted that institutional support expenditures “contributed negatively” to graduation rates in regression models (p. 81).

Siniard (2018) analyzed the impact of instructional and academic support expenditure patterns on three-year graduation rates at over 300 two-year colleges in the United States. Siniard (2018) found a positive correlation between increased instruction and academic support expenditures and three-year graduation rates. Siniard’s study did not seek to differentiate between larger and smaller two-year colleges. White (2018) examined the predictive relationship between institutional expenditures and graduation and retention rates in two-year colleges in Alabama. White found that student services spending correlated with increased performance; graduation and retention rates, in programs of one to two years in length. However, White (2018) found that in programs of just one year in length, increased instructional spending was predictive of improved student performance. White (2018) noted that these findings were at times both “supportive and contradictory” (p. 66) of prior studies.

Summary

The benefits of postsecondary education attainment and its necessity for both the individual and for a thriving society moving forward are all well established. The wage premium for post-secondary education has skyrocketed, reaching eighty-six percent by the 2010s (Carnevale et al., 2013). Two-year and four-year colleges and universities have navigated decades of state budget cuts, largely through increased reliance on the federal government and tuition revenue; a phenomenon that McLendon et al., (2009) have referred to as the privatization of higher education. In reflecting on historic trends in enrollment, funding, and revenue in

postsecondary education, the upcoming decades appear primed to be a continuation of decreased levels of state funding and increased calls for accountability that marked the first decade of the new century. As Doyle and Delaney (2009) opined, “institutions need to adapt to the new reality” (p. 62) of state funding for postsecondary education. With each economic downturn, it has taken longer for states to return higher education funding to their pre-recession levels, and they nearly never catch up to inflation-adjusted needs (Quinterno, 2011).

In reality, funding concerns in postsecondary education are poised to become far more complicated in the next two decades. By 2030, colleges and universities around the United States are going to struggle to maintain their enrollment (Silingo, 2017). Experts predict that postsecondary enrollment will decrease by roughly fifteen percent between 2025 and 2029 (Silingo, 2017). This decrease is largely due to demographic changes. In the wake of the Great Recession, Americans had far fewer children (Silingo, 2017). Although this effect will not be felt equally throughout the nation, the larger postsecondary landscape will collectively struggle to attract students and maintain funding (Grawe, 2018). With decreased state funding and, for many institutions, decreased future tuition revenue, the value of each dollar spent is critical. Two-year and four-year colleges and universities are simultaneously facing increased demands for proof of improved student performance amidst rising public costs and tuition fees (Fowles, 2013; Promades, 2012). If continued improvement in retention and graduation is a primary goal of postsecondary institutions, then understanding how to effectively distribute institutional resources may play a critical role in the future of postsecondary education (Gansemer-Topf & Schuh, 2003). Several researchers have examined predictive relationships between resource allocation and common measures of aggregate student success. Prior research has indicated a significant positive relationship between institutional expenditure and student performance

(Abouzeida, 2014; Ehrenberg & Webber, 2010; Gansemer-Topf & Schuh, 2003; Marsh, 2014; Promades, 2012; Ryan, 2004; Siniard, 2018; White, 2018).

In analyzing the relationship between expenditure patterns and student success, the most reported result has been a positive correlation between instructional expenditures and improved graduation rates (Abouzeida, 2014; Gansemer-Topf, 2003; Promades, 2012; Ryan, 2004; Siniard, 2018; White, 2018), followed by a positive correlation between academic support expenditures and graduation rates (Abouzeida, 2014; Gansemer-Topf & Schuh, 2003; Ryan, 2004; Siniard, 2018). Ehrenberg and Webber (2010) also reported a positive relationship between student services and improved graduation rates at less selective universities. Ehrenberg and Webber (2010) noted that this relationship was much weaker at more selective institutions. Promades (2012) and White (2018) also noted the correlation between student services expenditures and improved graduation rates.

Collectively, prior studies indicate that predictive relationships between expenditure and student success depend on a variety of institutional and student characteristics. Prior studies thus far at the regional and national level have examined the relationship between expenditure and student performance within a particular year or graduating cohort. However, to further enhance existing knowledge on this topic, there is a need for a retrospective longitudinal study to examine change over time in both the independent and dependent variables in this relationship.

CHAPTER 3: METHODS

Introduction

This study was conducted to further investigate the relationship between changes in resource allocation and student performance in postsecondary education. Specifically, this study sought to measure change over time in institutional categorical expenditure patterns and subsequent changes in student graduation rates at two-year and four-year institutions. Institutional categorical expenditure data and graduation rates were retrieved for 724 two-year institutions and 368 four-year institutions from The Integrated Postsecondary Education Data System (IPEDS). The researcher examined descriptive statistics along with executing independent samples t-tests and multiple regression analyses to assess a longitudinal relationship between resource allocation and graduation rates.

Purpose of the Study

The purpose of this quantitative, non-experimental study was to address a gap in knowledge in the relationship between resource allocation and student performance; change over time. This study may significantly contribute to the existing literature on this relationship by providing a new point of view for institutions and stakeholders to make data-driven decisions to best fit their student and institutional needs. This study seeks to examine the longitudinal relationship between changes in categorical institutional expenditures and subsequent increases or decreases in graduation rates at two and four-year colleges and universities. This study also examined the extent to which the standardized test scores of incoming students influenced this relationship at four-year colleges and universities.

To assess the extent to which incoming standardized test scores of first-year students at four-year institutions influences the relationship between changes in resource allocation and

gains or losses in student performance, the researcher used ACT Composite 75th percentile scores of incoming students at each institution, averaged from 2002 to 2012. The researcher used descriptive statistics, Independent Samples t-test, and stepwise multiple regression analyses to address the following research questions:

Research Questions

This study addressed the following research questions to assess the relationship between changes in resource allocation and subsequent changes in student performance:

- 1) How have two and four-year colleges and universities adjusted their resource allocation (functional category expenditure per FTE headcount) within the most recent ten-year span of graduating cohorts?
- 2) What is the relationship between adjustments in resource allocation at two and four-year institutions (functional category expenditure per FTE headcount) and increases or decreases in graduation rates during these time-periods?
- 3) To what extent, if any, do incoming student cohorts' standardized test scores impact the relationship between adjustments in resource allocation (functional category expenditure per FTE headcount) and increases or decreases in graduation rates at four-year institutions during this time-period?

Data Overview

All data for this study was obtained through The Integrated Postsecondary Education Data System (IPEDS). All institutions that receive federal student aid are required by law to provide annual data to IPEDS in accordance with the amended Higher Education Act of 1965 (U.S. Department of Education, 2020). IPEDS is considered to be the most comprehensive source of aggregate data on postsecondary education in the United States (Iwamasa & Thrasher,

2019). Since prior studies have consistently indicated that expenditure in instruction, academic support, student services, and institutional support may have significant relationships with student performance, the researcher included only these four categories of functional expenditure as independent variables.

Data Collection

To address the research questions, the following data were collected from the Integrated Postsecondary Education Data System (IPEDS):

Table 1:

Data retrieved from IPEDS

Institution Type	Data	Years
Four-year, public	Graduation rate within 100% of normal time	2006, 2016
Four-year, public	Graduation rate within 150% of normal time	2008, 2018
Four-year, public	Expenditures per FTE in the following categories: <ul style="list-style-type: none"> • Instruction • Academic Support • Student Services • Institutional Support 	2002-2006 2012-2016
Four-year, public	ACT Composite 75 th Percentile	2002-2012
Two-year, public	Graduation rate within 150% of normal time	2008, 2018
Two-year, public	Expenditures per FTE in the following categories: <ul style="list-style-type: none"> • Instruction • Academic Support • Student Services 	2006-2008 2016-2018

- Institutional Support

This study analyzed both two and four-year public institutions. Only four-year institutions with complete data sets from the 2002 and 2012 cohorts were included in the study. Only two-year institutions with complete data sets from the 2006 and 2016 cohorts were included in the study. All private institutions, whether they are designated for-profit or non-profit, were excluded from the study because prior research indicates that the unique funding models of private institutions have a significant impact on resource allocation decisions and priorities (Fowles, 2013). In total, 368 four-year institutions were included in the study, since they provided complete data sets for the needed years. In addition, 322 four-year institutions provided complete ACT data, to be assessed for research question #3. A total of 724 two-year institutions provided complete data sets and were included in the study. The difference in the years analyzed between two and four-year institutions was based solely on differences in available data between two and four-year institutions. This approach also allowed the researcher to analyze the most recent possible cohort data since the 150% normal time graduation of two-year institutions only necessitates three years of data beyond an incoming cohort's first year.

Table 2:

Institution types and sample sizes

Institution Type	Sample Size (N)
Public, Four-Year	368
Public, Two-Year	724

Data Preparation

The researcher used Microsoft Excel to identify the average annual FTE expenditure for each functional category to reflect the amount that was spent during the 2002 and 2012 first-year

student cohorts at four-year institutions and the 2006 and 2016 first-year student cohorts at two-year institutions. The researcher then used Microsoft Excel to calculate increases or decreases in the amount of FTE expenditure allocated toward each functional category during the ten-year time spans between cohorts, along with increases or decreases in the graduation rates of each institution during this same time frame. The researcher used descriptive statistics in SPSS to identify the median ACT Composite 75th percentile scores and frequencies (cumulative percent) of each score to split the four-year institutions used in this study into two tiers. Although most institutions provided both ACT and SAT 75th percentile scores in subject areas to IPEDS, SAT Total scores are not available in IPEDS. Thus, the researcher chose to use only ACT Composite scores to delineate between high and low institutional selectivity. 322 four-year institutions provided complete ACT data.

Table 3:

Four-year institutions selectivity tiers

Institution Type	ACT 75th Percentile	Selectivity Level	# of institutions
Four-year, public	> 24 Composite	1	166
Four-year, public	≤ 24 Composite	2	156

Analysis

To address Research Question 1, the researcher analyzed descriptive statistics of changes in resource allocation by functional category and executed an Independent Samples t-test. FTE expenditure data in instruction, academic support, student services, and institutional support at four-year institutions were collected and averaged using Microsoft Excel for years 2002-2006 and 2012-2016. The researcher then calculated the percent change in each functional category. Separately, FTE expenditure data in instruction, academic support, student services, and

institutional support at two-year institutions were collected and averaged using Microsoft Excel for years 2006-2008 and 2016-2018. The researcher also calculated the percent change in each functional category for two-year institutions. Descriptive statistics were used in SPSS to assess the extent of change in resource allocation models over a ten-year period for both two and four-year public institutions. The researcher used Independent Samples t-tests to analyze the four-year data sets after they were stratified by selectivity tiers.

To address Research Question 2, the researcher used stepwise multiple regression to analyze the relationship between changes in resource allocation and increases or decreases in graduation rates. The following dependent variables and independent variables were used in three separate regression models to address Research Question 2:

Table 4:

Research question 2 dependent variables and codes

Regression Model(s)	Dependent Variables	Variable Code
1	Change in 100% normal time graduation rate from 2006 to 2016 (four-year institutions)	GRCHANGE4
2	Change in 150% normal time graduation rate from 2008 to 2018 (four-year institutions)	GRCHANGE6
3	Change in 150% normal time graduation rate from 2008 to 2018 (two-year institutions)	GRCHANGE3

Table 5:

Research question 2 independent variables and codes

Regression Model(s)	Independent Variables	Variable Code
1, 2	Change in average annual FTE expenditure for instruction from the 2002 to 2012 cohorts (four-year institutions)	INSTRUCT
1, 2	Change in average annual FTE expenditure for academic support from the 2002 to 2012 cohorts (four-year institutions)	ACADSUPP
1, 2	Change in average annual FTE expenditure for student services from the 2002 to 2012 cohorts (four-year institutions)	STUDSERV
1, 2	Change in average annual FTE expenditure for institutional support from the 2002 to 2012 cohorts (four-year institutions)	INSTSUPP
3	Change in average annual FTE expenditure for instruction from the 2006 to 2016 cohorts (two-year institutions)	INSTRUCT
3	Change in average annual FTE expenditure for academic support from the 2006 to 2016 cohorts (two-year institutions)	ACADSUPP

3	Change in average annual FTE expenditure for student services from the 2006 to 2016 cohorts (two-year institutions)	STUDSERV
3	Change in average annual FTE expenditure for institutional support from the 2006 to 2016 cohorts (two-year institutions)	INSTSUPP

To address Research Question 3, the researcher used stepwise multiple regression to analyze the relationship between changes in resource allocation and increases or decreases in graduation rates at more-selective and less-selective four-year institutions. To analyze the extent to which incoming student cohort standardized test scores influences this relationship, the extra step of filtering by selection variables in SPSS was added. Four separate regression models were run to examine institutions with above and below median incoming student test scores (ACT Composite) with both dependent variables. The following dependent variables, independent variables, and selection variables were used to address Research Question 3:

Table 6:

Research question 3 dependent variables and codes

Regression Model(s)	Dependent Variables	Variable Code
1, 2,	Change in 100% normal time graduation rate from 2006 to 2016 (four-year institutions)	GRCHANGE4
3, 4	Change in 150% normal time graduation rate from 2008 to 2018 (four-year institutions)	GRCHANGE6

Table 7:

Research question 3 independent variables and codes

Regression Model(s)	Independent Variables	Variable Code
1, 2, 3, 4,	Change in average annual FTE expenditure for instruction from the 2002 to 2012 cohorts (four-year institutions)	INSTRUCT
1, 2, 3, 4,	Change in average annual FTE expenditure for academic support from the 2002 to 2012 cohorts (four-year institutions)	ACADSUPP
1, 2, 3, 4,	Change in average annual FTE expenditure for student services from the 2002 to 2012 cohorts (four-year institutions)	STUDSERV
1, 2, 3, 4,	Change in average annual FTE expenditure for institutional support from the 2002 to 2012 cohorts (four-year institutions)	INSTSUPP

Table 8:

Research question 3 selection variables

Regression Model(s)	Selection Variables
1, 3	ACT 75 th Percentile > 24 Composite
2, 4	ACT 75 th Percentile ≤ 24 Composite

In each regression model used to address Research Questions 2 and 3, the researcher examined the variance inflation factor and tolerance levels to assess multicollinearity. Residual statistics, histograms, and scatterplots were examined in all regression models to check for normality and linearity. R Square, R Square Change, and sig. were all examined to assess the relationship between independent and dependent variables.

Summary

This quantitative, non-experimental study sought to investigate whether changes in resource allocation over a ten-year period at two and four-year public institutions have a relationship with increases or decreases in graduation rates during that time-period. This study also examined the extent to which incoming student standardized test scores may influence this relationship at four-year institutions. All data for this study was collected from the Integrated Postsecondary Education Data System (IPEDS). Descriptive statistics, Independent Samples t-test, and multiple stepwise regression models were executed to examine this relationship.

CHAPTER 4: FINDINGS

Introduction

The primary focus of this study was to investigate whether a significant longitudinal relationship exists between changes in institutional categorical expenditure and subsequent changes in graduation rates at two-year and four-year colleges and universities. The majority of prior studies have found that a significant relationship exists between resource allocation and student performance, most commonly measured in student graduation rates (Abouzeida, 2014; Ehrenberg & Webber, 2010; Gansemer-Topf & Schuh, 2003; Marsh, 2014; Promades, 2012; Ryan, 2004; Siniard, 2018; White, 2018). However, the nature of this relationship appears to depend on a variety of student and institutional characteristics (Ehrenberg & Webber, 2010). Prior studies have not always been in agreement regarding which expenditure categories share significant relationships with increased or decreased student performance. Expenditures towards instruction and academic support have, by a wide margin, been the two most consistently identified significant predictor variables for an institutions' graduation rates. Chapter 4 presents the results of this study.

Purpose of the Study

The purpose of this quantitative, non-experimental study was to address a gap in knowledge in the relationship between resource allocation and student performance; change over time. This study may significantly contribute to the existing literature on this relationship by providing a new point of view for institutions and stakeholders to make data-driven decisions to best fit their student and institutional needs. This study sought to examine the longitudinal relationship between changes in categorical institutional expenditures and subsequent increases or decreases in graduation rates at two and four-year colleges and universities. This study also

examined the extent to which the standardized test scores of incoming students influenced this relationship at four-year colleges and universities.

Research Questions

This study addressed the following research questions to assess the relationship between changes in resource allocation and subsequent changes in student performance:

- 1) How have two and four-year colleges and universities adjusted their resource allocation (functional category expenditure per FTE headcount) within the most recent ten-year span of graduating cohorts?
- 2) What is the relationship between adjustments in resource allocation at two and four-year institutions (functional category expenditure per FTE headcount) and increases or decreases in graduation rates during these time periods?
- 3) To what extent, if any, do incoming student cohorts' standardized test scores impact the relationship between adjustments in resource allocation (functional category expenditure per FTE headcount) and increases or decreases in graduation rates at four-year institutions during this time period?

Research Question 1 Findings

- 1) How have two and four-year colleges and universities adjusted their resource allocation (functional category expenditure per FTE headcount) within the most recent ten-year span of graduating cohorts?

To address Research Question 1, the researcher used descriptive statistics and Independent Samples t-tests. Changes in categorical expenditures (per FTE student) over the most recent available ten-year cohort were analyzed separately at two-year institutions and four-year

institutions. Only institutions with complete data sets were included in the analysis. 724 two-year institutions provided complete data sets, while 368 four-year institutions provided complete data sets. The researcher also stratified four-year institutions into two selectivity tiers for further analysis, based on the institution's average ACT composite 75th percentile scores. 322 four-year institutions provided ACT composite data.

Table 9:

Two-year institutions expenditure adjustments (N=724)

Expenditure Category	2006 Cohort FTE expenditure (average)	2016 Cohort FTE expenditure (average)	Change in FTE expenditure (average)	Percent Change (average)	Inflation Adjusted Percent Change*
Instruction	\$4213.58	\$6003.21	\$1789.63	42.48%	24.47%
Academic Support	\$796.21	\$1222.63	\$426.42	53.57%	35.56%
Student Services	\$1004.03	\$1574.91	\$570.88	56.86%	38.86%
Institutional Support	\$1426.57	\$2256.29	\$829.72	58.16%	40.16%

*Consumer Price Index cumulative inflation rate for years 2006-2016 is 18%

Table 10:

Four-year institutions expenditure adjustments (N=368)

Expenditure Category	2002 Cohort FTE expenditure (average)	2012 Cohort FTE expenditure (average)	Change in FTE expenditure (average)	Percent Change (average)	Inflation Adjusted Percent Change*
Instruction	\$6002.64	\$8886.34	\$2883.70	48.04%	21.04%
Academic Support	\$1458.23	\$2296.74	\$838.51	57.50%	30.50%
Student Services	\$1069.25	\$1755.22	\$685.97	64.15%	37.15%
Institutional Support	\$1644.22	\$2439.98	\$795.76	48.40%	21.40%

* Consumer Price Index cumulative inflation rate for years 2002-2012 is 27%

Two-year and four-year institutions collectively increased FTE expenditure in every measured category, even after adjusting for inflation. Resource allocation towards student services saw the greatest increase at four-year institutions, while increases in institutional support spending slightly outpaced student services spending at two-year colleges. Instruction saw the smallest gains in resource allocation at both two-year and four-year institutions. For four-year institutions that also provided complete standardized test score data, an independent samples t-test was run to compare changes in resource allocation according to the following tiers of incoming student test scores. 322 four-year institutions provided complete standardized test score data required for inclusion in the independent samples t-test.

Table 11:

Four-year selectivity tier overview

Institution Type	ACT 75th Percentile	Selectivity Level	# of institutions
Four-year, public	> 24 Composite	1	166
Four-year, public	≤ 24 Composite	2	156

A one-tailed, independent samples t-test noted a statistically significant difference (.033) in the percent change in institutional support at more and less selective four-year institutions. The independent samples t-test did not yield significant results in expenditure changes for instruction, (.239) academic support, (.453) or student services (.195), indicating that more and less-selective institutions have generally maintained similar allocation patterns in these categories.

Table 12:

Four-year expenditures t-test

Expenditure Category	Selectivity Tier	N	Percent Change unadjusted (2002-2012 cohorts)	Sig.
Instruction	1	166	50.46%	.239
	2	156	52.43%	
Academic Support	1	166	64.63%	.453
	2	156	64.04%	
Student Services	1	166	70.13%	.195
	2	156	74.63%	
Institutional Support	1	166	58.84%	.033
	2	156	50.28%	

Research Question 2 Findings

- 1) What is the relationship between adjustments in resource allocation at two-year and four-year institutions (functional category expenditure per FTE headcount) and increases or decreases in graduation rates during these time periods?

Three separate regression models were run to address Research Question 2. The first two regression models assessed four-year and six-year graduation rates, respectively, at four-year institutions. The third regression model assessed three-year graduation rates at two-year institutions.

Regression Model 1 (four-year graduation rate at four-year institutions)

The independent variables in the first regression model were changes in FTE instructional expenditure between the 2002 and 2012 cohorts at four-year institutions (INSTRUCT), changes in FTE academic support expenditure between the 2002 and 2012 cohorts at four-year institutions (ACADSUPP), changes in FTE student services expenditure between the 2002 and 2012 cohorts at four-year institutions (STUDSERV), and changes in FTE institutional support expenditure between the 2002 and 2012 cohorts at four-year institutions (INSTSUPP). The dependent variable was: changes in the four-year graduation rate between the 2002 and 2012 cohorts.

Table 13:

Four-year graduation rates, independent variables descriptive statistics

Independent Variables			
Abbreviation	Mean	STD	N
INSTRUCT	2883.71	1574.44	368
ACADSUPP	838.51	644.32	368

STUDSERV	685.97	423.76	368
INSTSUPP	795.76	631.20	368

Table 14:

Four-year graduation rates, dependent variables descriptive statistics

Dependent Variable			
Abbreviation	Mean	STD	N
GRCHANGE4	5.58	5.84	368

Table 15:

Four-year graduation rates, model summary

Model	R	R Square	R Square		Sig. F
			Change	F Change	Change
1 INSTRUCT	.358	.129	.129	53.975	.000
2 INSTRUCT, ACADSUPP	.380	.144	.016	6.734	.010

Regression model 1 measured the relationship between changes in categorical expenditures and changes in the four-year graduation rates at four-year institutions between the 2002 and 2012 first-year student cohorts. Two independent variables, adjustments in instructional expenditures and adjustments in academic support expenditures, were found to have significant positive relationships with increased four-year graduation rates over the ten-year time period. Adjustments in instructional expenditures (.000) was the first independent variable to enter the model, accounting for 12.9% of the variance in four-year graduation rates. Adjustments

in academic support (.010) accounted for an additional 1.6% of the variance in the dependent variable. Adjustments in allocation towards student services and institutional support were not found to be statistically significant predictors of increased or decreased graduation rates.

Collinearity statistics did not indicate multicollinearity between the predictive independent variables. Analysis of residuals and residual scatterplots indicates that the model did not violate normality or linearity.

Table 16:

Significant predictor variables, regression model 1

Model	Beta	t	Sig.	Tolerance	VIF
1	.264	4.355	.000	.638	1.567
INSTRUCT					
2	.157	2.595	.010	.638	1.567
ACADSUPP					

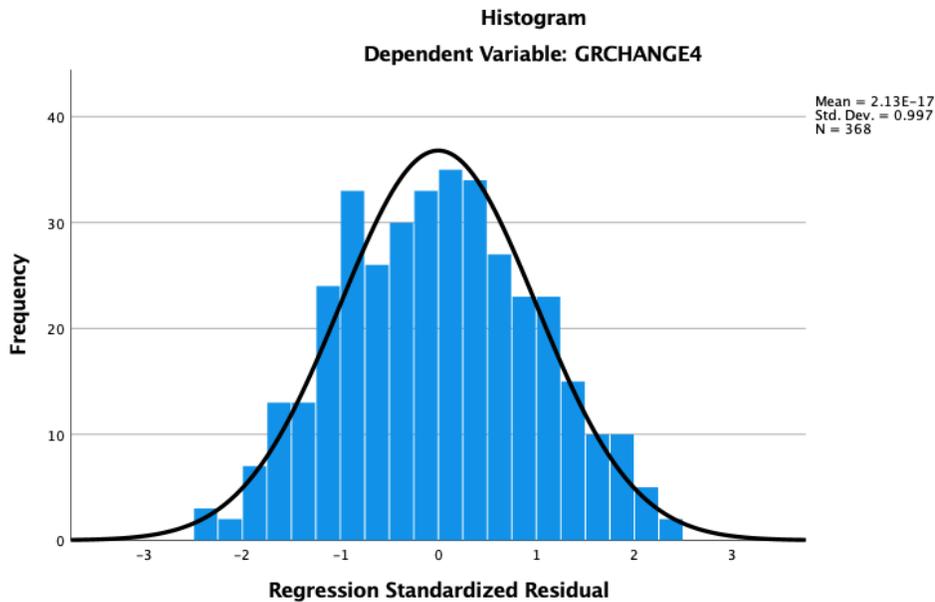


Figure 7: Residuals, four-year graduation rates

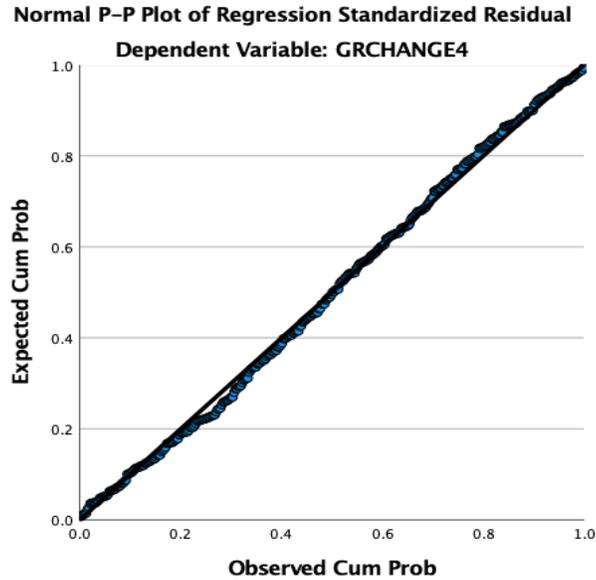


Figure 8: Probability plot, four-year graduation rates

Regression Model 2 (six-year graduation rate at four-year institutions)

The independent variables in the second regression model were changes in FTE instructional expenditure between the 2002 and 2012 cohorts at four-year institutions (INSTRUCT), changes in FTE academic support expenditure between the 2002 and 2012 cohorts at four-year institutions (ACADSUPP), changes in FTE student services expenditure between the 2002 and 2012 cohorts at four-year institutions (STUDSERV), and changes in FTE institutional support expenditure between the 2002 and 2012 cohorts at four-year institutions (INSTSUPP). The dependent variable was changes in the six-year graduation rate between the 2002 and 2012 cohorts.

Table 17:

Six-year graduation rates, independent variables descriptive statistics

Independent Variables			
Abbreviation	Mean	STD	N
INSTRUCT	2883.71	1574.44	368

ACADSUPP	838.51	644.32	368
STUDSERV	685.97	423.76	368
INSTSUPP	795.76	631.20	368

Table 18:

Six-year graduation rates, dependent variables descriptive statistics

Dependent Variable			
Abbreviation	Mean	STD	N
GRCHANGE6	5.61	5.86	368

Table 19:

Six-year graduation rates, model summary

Model	R	R Square	R Square		Sig. F
			Change	F Change	Change
1 ACADSUPP	.157	.025	.025	9.261	.003

Regression model 2 measured the relationship between changes in categorical expenditures and changes in the six-year graduation rates at four-year institutions between the 2002 and 2012 first-year student cohorts. One independent variable, adjustments in academic support expenditures, was found to have a significant positive relationship (.03) with increased six-year graduation rates over the ten-year time period. This model accounted for 2.5% of the variance in the dependent variable. Adjustments in allocation towards instruction, student services, and institutional support were not found to be statistically significant predictors of

increased or decreased graduation rates. Analysis of residuals and residual scatterplots indicates that the model did not violate normality or linearity.

Table 20:

Significant predictor variables, regression model 2

Model	Beta	T	Sig.	Tolerance	VIF
1	.157	3.043	.003	1.000	1.000
ACADSUPP					

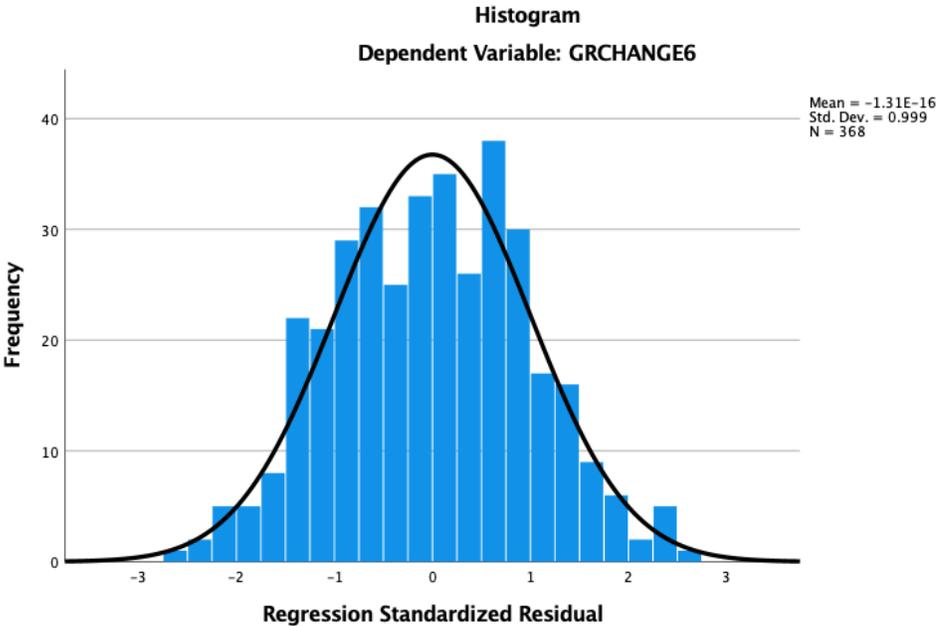


Figure 9: Residuals, six-year graduation rates

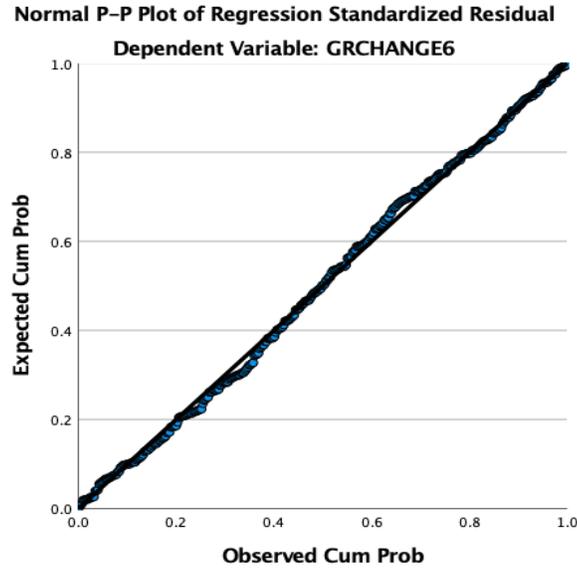


Figure 10: Probability plot, six-year graduation rates

Regression Model 3 (three-year graduation rate at two-year institutions)

The independent variables in the third regression model were changes in FTE instructional expenditure between the 2006 and 2016 cohorts at two-year institutions (INSTRUCT), changes in FTE academic support expenditure between the 2006 and 2016 cohorts at two-year institutions (ACADSUPP), changes in FTE student services expenditure between the 2006 and 2016 cohorts at two-year institutions (STUDSERV), and changes in FTE institutional support expenditure between the 2006 and 2016 cohorts at two-year institutions (INSTSUPP). The dependent variable was changes in the three-year graduation rate between the 2006 and 2016 cohorts.

Table 21:

Three-year graduation rates, independent variables descriptive statistics

Independent Variables			
Abbreviation	Mean	STD	N

INSTRUCT	792.13	695.021	724
ACADSUPP	570.90	446.648	724
STUDSERV	426.97	437.497	724
INSTSUPP	1790.30	1233.333	724

Table 22:

Three-year graduation rates, dependent variables descriptive statistics

Dependent Variable			
Abbreviation	Mean	STD	N
GRCHANGE3	5.67	7.671	724

Table 23:

Three-year graduation rates, model summary

Model	R	R Square	R Square		Sig. F
			Change	F Change	Change
1 ACADSUPP	.143	.021	.021	15.119	.000

Regression model 3 measured the relationship between changes in categorical expenditures and changes in the three-year graduation rates at two-year institutions between the 2006 and 2016 first-year student cohorts. One independent variable, adjustments in academic support expenditures, was found to have a significant negative relationship (.000) with increased three-year graduation rates over the ten-year time-period. This model accounted for 2.1% of the variance in the dependent variable. Adjustments in allocation towards instruction, student services, and institutional support were not found to be statistically significant predictors of

increased or decreased graduation rates. Analysis of residuals and residual scatterplots indicates that the model did not violate normality or linearity.

Table 24:

Significant predictor variables, regression model 3

Model	Beta	t	Sig.	Tolerance	VIF
1	-.143	-3.888	.000	1.000	1.000
ACADSUPP					

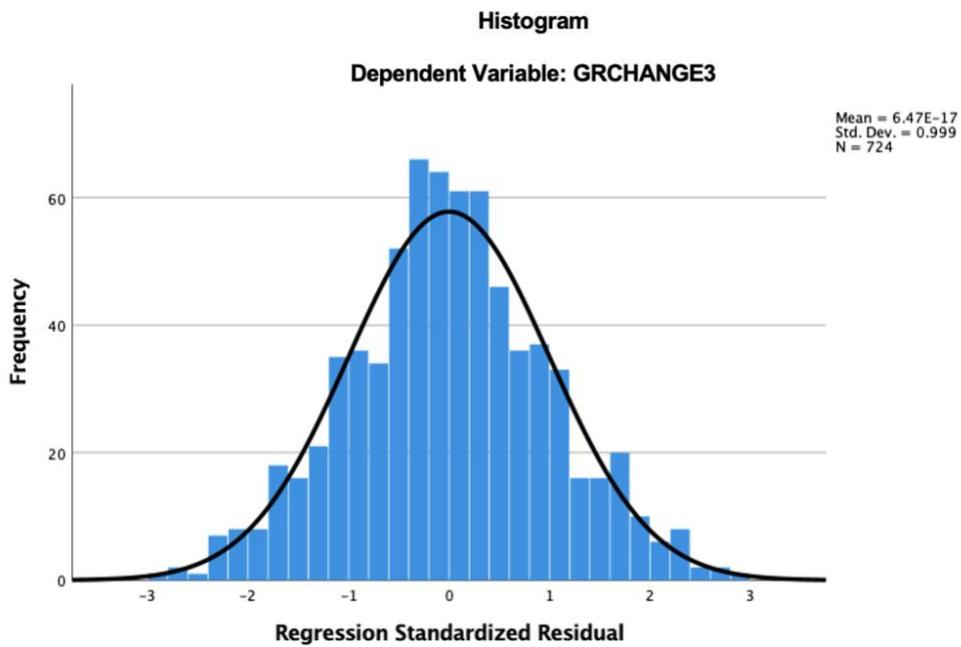


Figure 11: Residuals, three-year graduation rates

**Normal P-P Plot of Regression
Standardized Residual
Dependent Variable: GRCHANGE3**

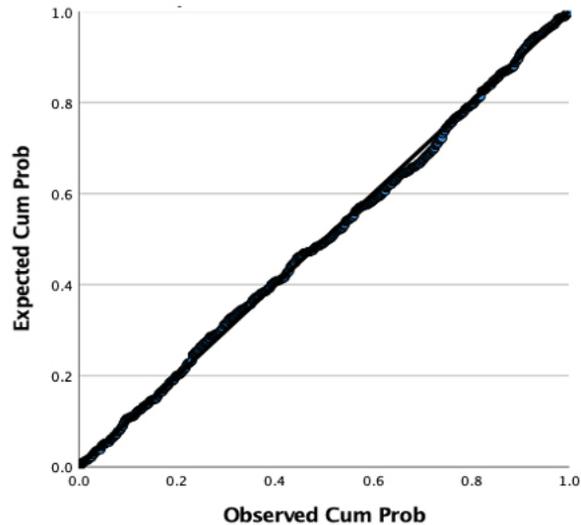


Figure 12: Probability plot, three-year graduation rates

Research Question 3 Findings

3) To what extent, if any, do incoming student cohorts' standardized test scores impact the relationship between adjustments in resource allocation (functional category expenditure per FTE headcount) and increases or decreases in graduation rates at four-year institutions during this time period?

To determine if incoming student standardized test scores impact the relationship between adjustments in resource allocation and changes in four-year and six-year graduation rates at four-year colleges and universities, the researcher executed four stepwise multiple regression analyses with selection variables of two tiers to assess the influence of incoming average student scores. The dependent variables in these analyses were changes in: four-year graduation rates (GRCHANGE4), and six-year graduation rates (GRCHANGE6). The

independent variables in these analyses were: changes in instructional expenditures between the 2002 and 2012 cohorts (INSTRUCT), changes in academic support expenditures between the 2002 and 2012 cohorts (ACADSUPP), changes in student services expenditures between the 2002 and 2012 cohorts (STUDSERV), and changes in institutional support expenditures between the 2002 and 2012 cohorts (INSTSUPP). The researcher split the four-year institutions into two selectivity tiers, according to their average ACT composite 75th percentile scores. Of the 368 four-year institutions with complete data sets that were analyzed for research questions 1 and 2, 322 institutions provided incoming student standardized test score information. Only data from these 322 institutions were used in stepwise regression analyses to address research question 3.

Table 25:

Research question 3 selectivity tiers

Institution Type	ACT 75th Percentile	Selectivity Level	# of institutions
Four-year, public	> 24 Composite	1	166
Four-year, public	≤ 24 Composite	2	156

The first two regression analyses examined institutions' changes in four-year graduation rates from the 2002 to 2012 cohorts, with regression model #1 selecting only institutions with ACT composite 75th percentile scores greater than 24, and regression model #2 selecting only institutions with ACT composite 75th percentile scores less than or equal to 24. The third and fourth regression analyses examined institutions' changes in six-year graduation rates from the 2002 to 2012 cohorts, with regression model 3 selecting only institutions with ACT composite 75th percentile scores greater than 24, and regression model 4 selecting only institutions with ACT composite 75th percentile scores less than or equal to 24.

Regression Model 1 (four-year graduation rate at tier 1 selectivity level institutions)

The independent variables in the first regression model were: changes in instructional expenditures between the 2002 and 2012 cohorts (INSTRUCT), changes in academic support expenditures between the 2002 and 2012 cohorts (ACADSUPP), changes in student services expenditures between the 2002 and 2012 cohorts (STUDSERV), and changes in institutional support expenditures between the 2002 and 2012 cohorts (INSTSUPP). The dependent variable was changes in the four-year graduation rates from the 2002 to 2012 cohorts at tier 1 selectivity institutions (GRCHANGE4).

Table 26:

Research question 3 regression model 1 independent variables

Independent Variables			
Abbreviation	Mean	STD	N
INSTRUCT	3290.60	1776.184	166
ACADSUPP	1017.99	735.334	166
STUDSERV	694.72	393.165	166
INSTSUPP	831.06	659.937	166

Table 27:

Research question 3 regression model 1 dependent variables

Dependent Variable			
Abbreviation	Mean	STD	N
GRCHANGE4	7.39	5.624	166

Table 28:

Research question 3 regression model 1, model summary

Model	R	R Square	R Square		Sig. F
			Change	F Change	Change
1	.341	.116	.116	21.590	.000
ACADSUPP					
2	.378	.143	.026	5.004	.027
ACADSUPP, STUDSERV					

Table 29:

Research question 3 regression model 1, significant predictor variables

Model	Beta	t	Sig.	Tolerance	VIF
1	.341	4.647	.000	.978	1.023
ACADSUPP					
2	-.164	-2.237	.027	.978	1.023
STUDSERV					

One independent variable, adjustments in academic support expenditures, was found to have a significant positive relationship (.000) with increased four-year graduation rates over the ten-year time period. Adjustments in resource allocation towards academic support accounted for 11.6% of the variance in the dependent variable. Another independent variable, adjustments in student services expenditures, was found to have a significant negative relationship (.027) with the dependent variable. Adjustments in resource allocation towards student services accounted for another 2.6% of the variance in the dependent variable. Adjustments in allocation towards instruction and institutional support were not found to be statistically significant predictors of

increased or decreased four-year graduation rates at tier 1 selectivity institutions. Collinearity statistics did not indicate multicollinearity between the predictive independent variables.

Analysis of residuals and residual scatterplots indicates that the model did not violate normality or linearity.

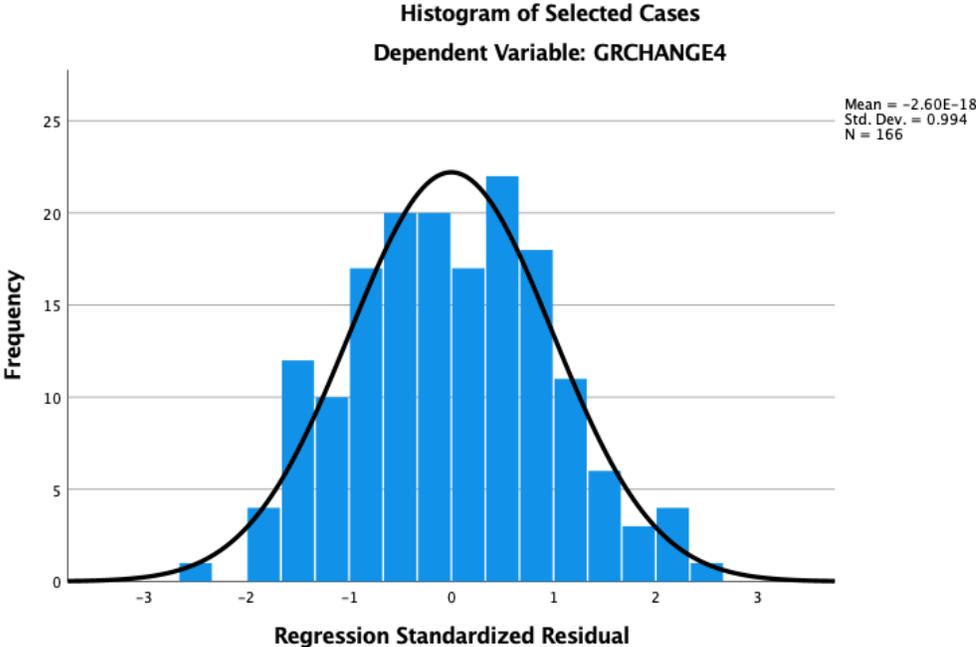


Figure 13: Residuals, four-year graduation rate tier 1

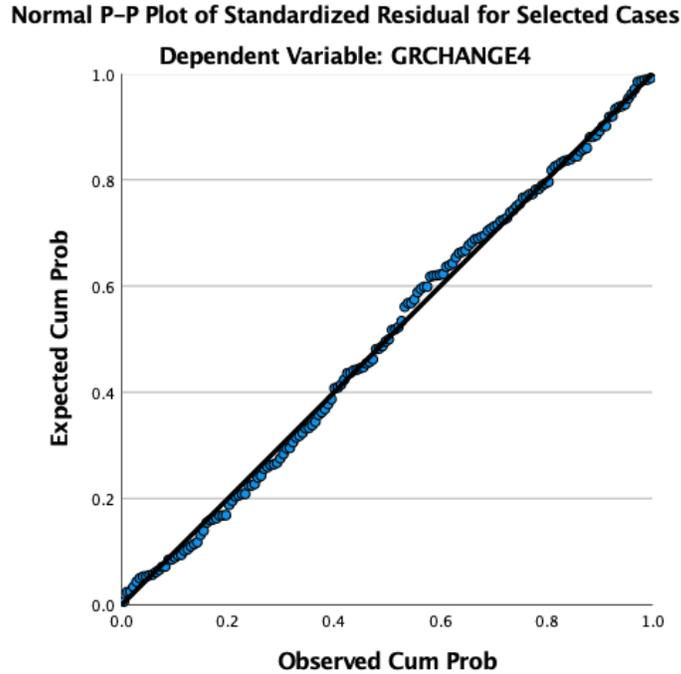


Figure 14: Probability plot, four-year graduation rate tier 1

Regression Model 2 (four-year graduation rate at tier 2 selectivity level institutions)

The independent variables in the second regression model were: changes in instructional expenditures between the 2002 and 2012 cohorts (INSTRUCT), changes in academic support expenditures between the 2002 and 2012 cohorts (ACADSUPP), changes in student services expenditures between the 2002 and 2012 cohorts (STUDSERV), and changes in institutional support expenditures between the 2002 and 2012 cohorts (INSTSUPP). The dependent variable was changes in the four-year graduation rates from the 2002 to 2012 cohorts at tier 2 selectivity institutions (GRCHANGE4).

Table 30:

Research question 3 regression model 2 independent variables

Independent Variables			
Abbreviation	Mean	STD	N

INSTRUCT	2536.92	1167.253	156
ACADSUPP	672.32	461.570	156
STUDSERV	713.44	457.727	156
INSTSUPP	683.06	551.276	156

Table 31:

Research question 3 regression model 2 dependent variables

Dependent Variable			
Abbreviation	Mean	STD	N
GRCHANGE4	3.71	5.018	156

Table 32:

Research question 3 regression model 2, model summary

Model	R	R Square	R Square Change	F Change	Sig. F Change
1	.161	.026	.026	4.095	.045
INSTRUCT					

Table 33:

Research question 3 regression model 2, significant predictor variables

Model	Beta	T	Sig.	Tolerance	VIF
1	.161	2.024	.045	1.000	1.000
INSTRUCT					

One independent variable, adjustments in instructional expenditures, was found to have a significant positive relationship (.045) with increased four-year graduation rates over the ten-year time period. Adjustments in resource allocation towards instruction accounted for 2.6% of the variance in the dependent variable. Adjustments in allocation towards academic support, student services, and institutional support were not found to be statistically significant predictors of increased or decreased four-year graduation rates at tier 2 selectivity institutions. Analysis of residuals and residual scatterplots indicates that the model did not violate normality or linearity.

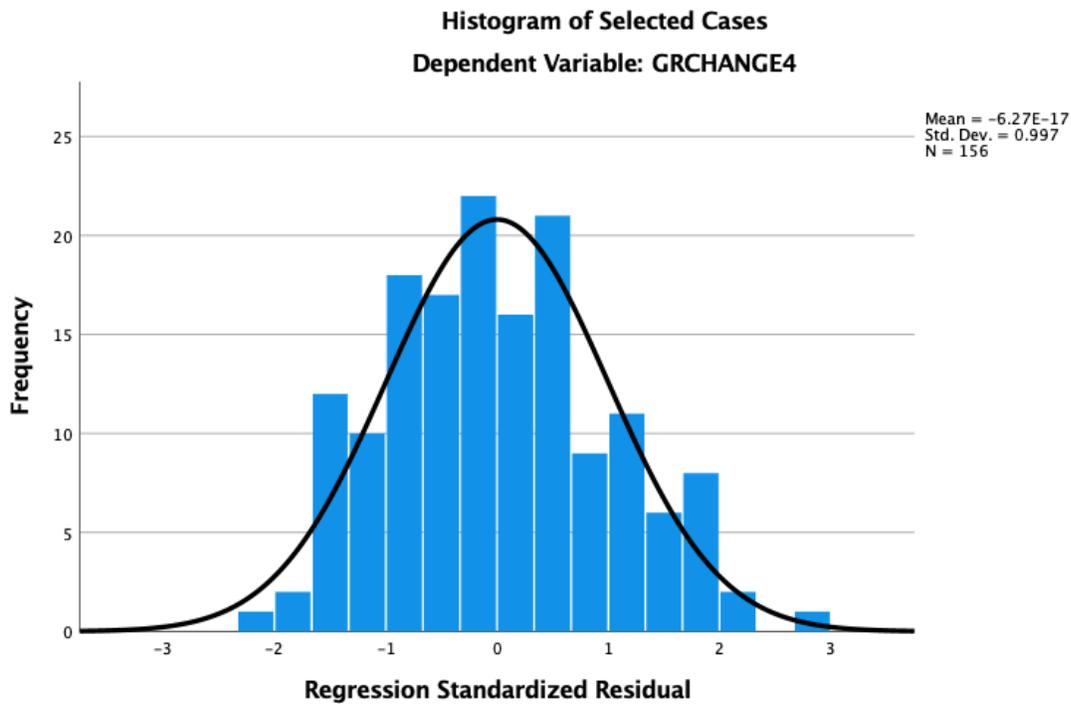


Figure 15: Residuals, four-year graduation rate tier 2

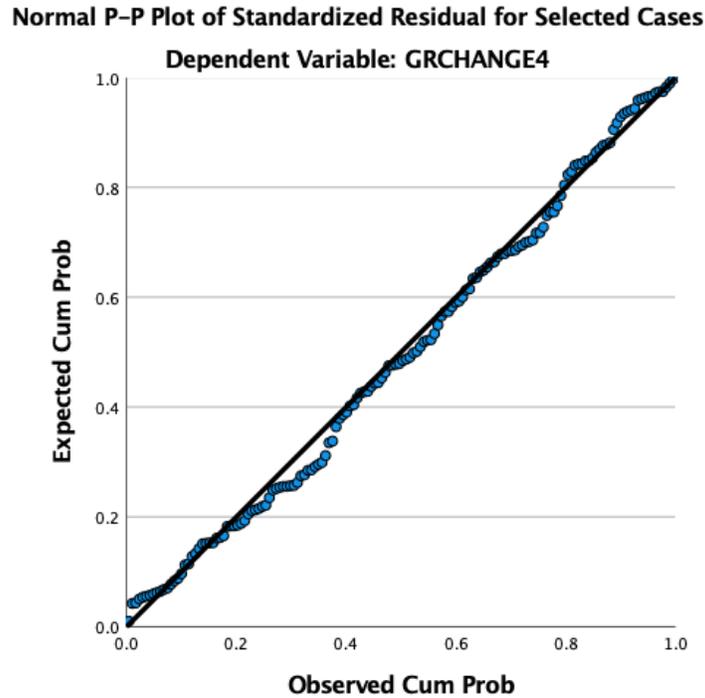


Figure 16: Probability plot, four-year graduation rate tier 2

Regression Model 3 (six-year graduation rate at tier 1 selectivity level institutions)

The independent variables in the third regression model were: changes in instructional expenditures between the 2002 and 2012 cohorts (INSTRUCT), changes in academic support expenditures between the 2002 and 2012 cohorts (ACADSUPP), changes in student services expenditures between the 2002 and 2012 cohorts (STUDSERV), and changes in institutional support expenditures between the 2002 and 2012 cohorts (INSTSUPP). The dependent variable was changes in the six-year graduation rates from the 2002 to 2012 cohorts at tier 1 selectivity institutions (GRCHANGE6).

Table 34:

Research question 3 regression model 3 independent variables

Independent Variables			
Abbreviation	Mean	STD	N

INSTRUCT	3290.60	1776.184	166
ACADSUPP	1017.99	735.334	166
STUDSERV	694.72	393.165	166
INSTSUPP	831.06	659.937	166

Table 35:

Research question 3 regression model 3 dependent variables

Dependent Variable			
Abbreviation	Mean	STD	N
GRCHANGE6	5.36	5.429	166

Table 36:

Research question 3 regression model 3, model summary

Model	R	R Square	R Square Change	F Change	Sig. F Change
1	.158	.025	.025	4.180	.043
ACADSUPP					

Table 37:

Research question 3 regression model 3, significant predictor variables

Model	Beta	t	Sig.	Tolerance	VIF
1	.158	2.045	.043	1.000	1.000
ACAD SUPP					

One independent variable, adjustments in academic support expenditures, was found to have a significant positive relationship (.043) with increased six-year graduation rates over the ten-year time period. Adjustments in resource allocation towards academic support accounted for 2.5% of the variance in the dependent variable. Adjustments in allocation towards instruction, student services, and institutional support were not found to be statistically significant predictors of increased or decreased six-year graduation rates at tier 1 selectivity institutions. Analysis of residuals and residual scatterplots indicates that the model did not violate normality or linearity.

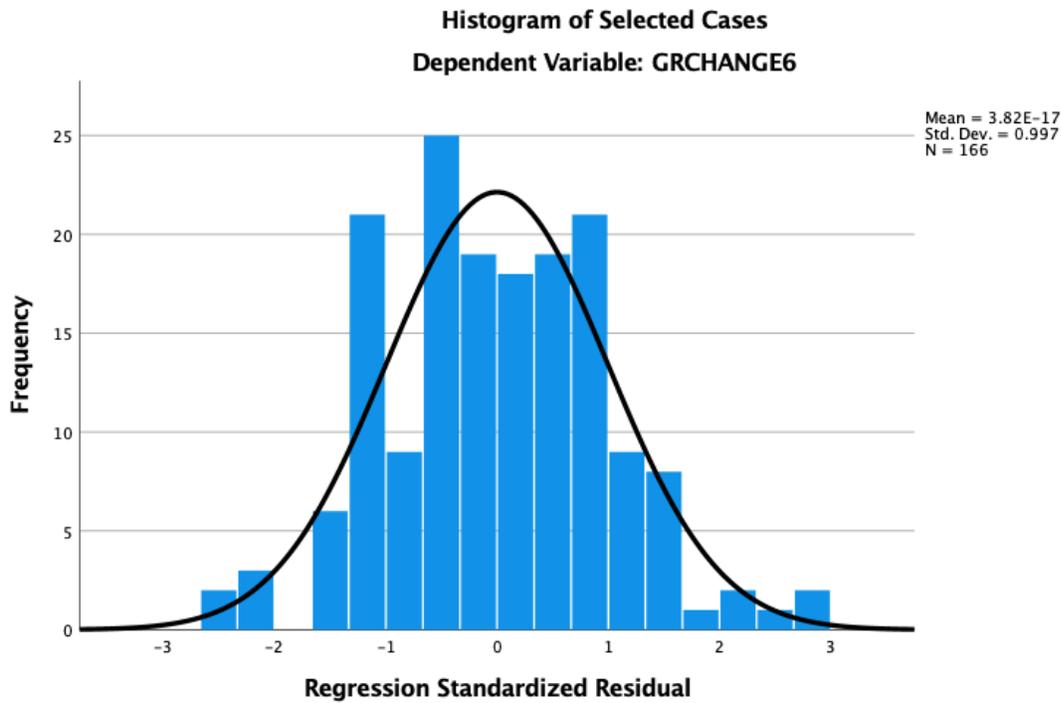


Figure 17: Residuals, six-year graduation rate tier 1

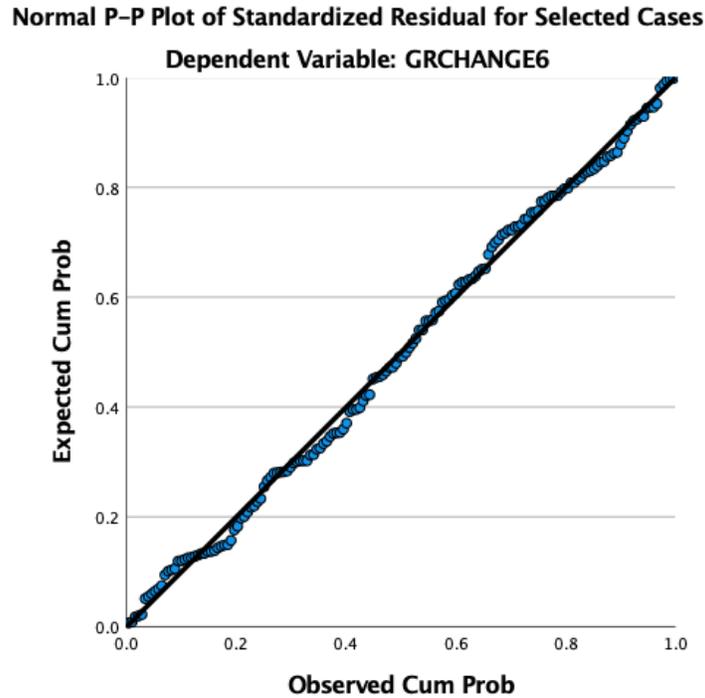


Figure 18: Probability plot, six-year graduation rate tier 1

Regression Model 4 (six-year graduation rate at tier 2 selectivity level institutions)

The independent variables in the fourth regression model were: changes in instructional expenditures between the 2002 and 2012 cohorts (INSTRUCT), changes in academic support expenditures between the 2002 and 2012 cohorts (ACADSUPP), changes in student services expenditures between the 2002 and 2012 cohorts (STUDSERV), and changes in institutional support expenditures between the 2002 and 2012 cohorts (INSTSUPP). The dependent variable was changes in the six-year graduation rates from the 2002 to 2012 cohorts at tier 2 selectivity institutions (GRCHANGE6).

Table 38:

Research question 3 regression model 4 independent variables

Independent Variables			
Abbreviation	Mean	STD	N

INSTRUCT	2536.92	1167.253	156
ACADSUPP	672.32	461.570	156
STUDSERV	713.44	457.727	156
INSTSUPP	683.06	551.276	156

Table 39:

Research question 3 regression model 4 dependent variables

Dependent Variable			
Abbreviation	Mean	STD	N
GRCHANGE6	5.91	6.024	156

Table 40:

Research question 3 regression model 4, model summary

Model	R	R Square	R Square Change	F Change	Sig. F Change
1	.205	.042	.042	6.781	.010
ACADSUPP					

Table 41:

Research question 3 regression model 4, significant predictor variables

Model	Beta	T	Sig.	Tolerance	VIF
1	.205	2.604	.010	1.000	1.000
ACADSUPP					

One independent variable, adjustments in academic support expenditures, was found to have a significant positive relationship (.010) with increased six-year graduation rates over the ten-year time period. Adjustments in resource allocation towards academic support accounted for 4.2% of the variance in the dependent variable. Adjustments in resource allocation towards instruction, student services, and institutional support were not found to be statistically significant predictors of increased or decreased six-year graduation rates at tier 2 selectivity institutions. Analysis of residuals and residual scatterplots indicates that the model did not violate normality or linearity.

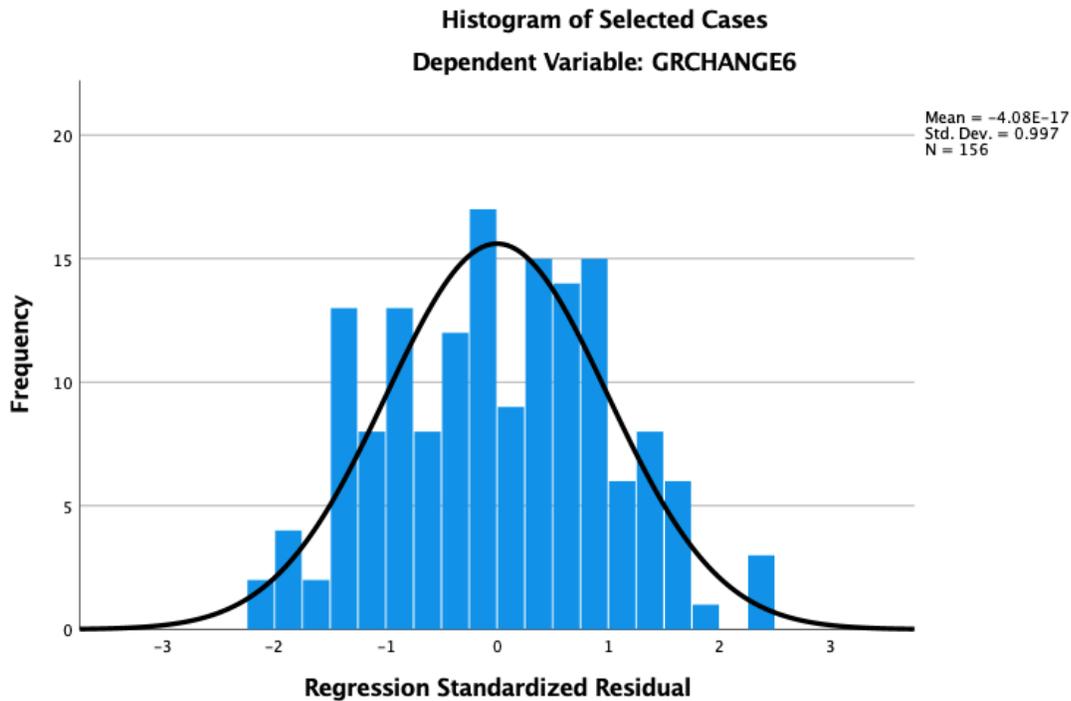


Figure 19: Residuals, six-year graduation rate tier 2

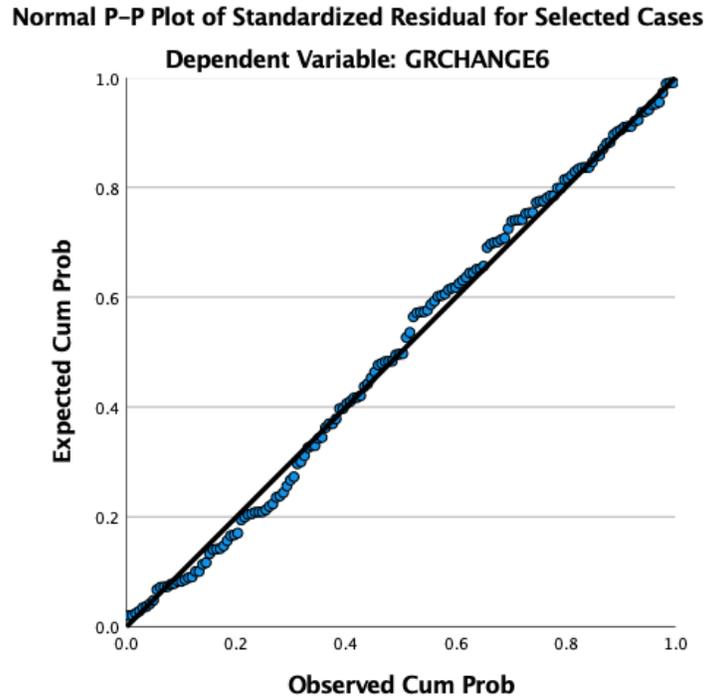


Figure 20: Probability plot, six-year graduation rate tier 2

Summary

This study examined changes in resource allocation at two-year and four-year institutions over a ten-year period. Additionally, this study analyzed the longitudinal relationship between changes in two-year and four-year institutions' categorical expenditures and concurrent changes in institutions' graduation rates within that time frame. Stepwise multiple regression analyses were executed to examine the correlation between changes in resource allocation and changes in graduation rates. Four-year institutions were further stratified by two tiers of average ACT composite 75th percentile scores for additional analysis. The results of this study collectively indicated that a longitudinal relationship does exist between adjustments in resource allocation and changes in graduation rates. At four-year institutions, instruction and academic support expenditures were identified as having a predictive relationship with four-year graduation rates. Academic support expenditures at four-year institutions were also found to have a predictive

relationship with six-year graduation rates. At two-year institutions, academic support expenditures were identified as having a predictive relationship with three-year graduation rates.

Academic support and student services expenditures were found to have predictive relationships with four-year graduation rates at tier 1 selectivity institutions ($ACT > 24$). Among tier 2 selectivity institutions ($ACT \leq 24$), instructional expenditures were found to have a predictive relationship with four-year graduation rates. Academic support expenditures were found to have predictive relationships with six-year graduation rates at both tier 1 and tier 2 selectivity institutions.

CHAPTER 5: DISCUSSION

Introduction

Gansemer-Topf and Schuh (2003) suggested that resource allocation decisions may have tangible impacts on student graduation rates. A series of prior studies have investigated this relationship in the past decade and a half, with most studies identifying a significant relationship between resource allocation and student performance (Abouzeida, 2014; Ehrenberg & Webber, 2010; Gansemer-Topf & Schuh, 2003; Marsh, 2014; Peerenboom, 2012; Promades, 2012; Ryan, 2004; Siniard, 2018; White, 2018). At the institutional level in public postsecondary education, insight into this relationship may prove to be valuable to administrators seeking to facilitate improved student success. Prior research into the relationship between resource allocation and student performance has been conducted within a singular academic year, allowing institutional leaders to compare their current allocation patterns with those of schools with high levels of aggregate student achievement. Since a primary purpose of examining this relationship is to inform future decision making, analyses over a longer period-of-time can provide a valuable new layer to the existing body of research, allowing institutional leaders to see developments in this relationship at other institutions as they make resource allocation decisions for the future of their institution. The purpose of this quantitative, non-experimental study was to address this gap in knowledge in the relationship between resource allocation and student performance; change over time.

This study sought to examine the longitudinal relationship between changes in categorical institutional expenditures and subsequent increases or decreases in graduation rates at two and four-year colleges and universities. This study also examined the extent to which the

standardized test scores of incoming students influenced this relationship at four-year colleges and universities.

Chapter five provides a discussion and walkthrough of conclusions and implications, key recommendations, and suggestions for future research related to the following research questions:

- 1) How have two and four-year colleges and universities adjusted their resource allocation (functional category expenditure per FTE headcount) within the most recent ten-year span of graduating cohorts?
- 2) What is the relationship between adjustments in resource allocation at two and four-year institutions (functional category expenditure per FTE headcount) and increases or decreases in graduation rates during these time periods?
- 3) To what extent, if any, do incoming student cohorts' standardized test scores impact the relationship between adjustments in resource allocation (functional category expenditure per FTE headcount) and increases or decreases in graduation rates at four-year institutions during this time period?'

Summary

The results of this study indicate that significant, positive relationships exist between adjustments in resource allocation towards instruction and academic support and improved four-year and six-year graduation rates at four-year institutions. In particular, improved four-year graduation rates at four-year colleges and universities share an especially strong relationship with increased expenditure towards instruction and academic support over the most recent ten-year span of graduating cohorts. The results of this study indicate that institutional selectivity further influences the relationship between resource allocation and graduation rates. At two-year

colleges, additional expenditures towards academic support were found to have a significant but modest negative relationship with improved three-year graduation rates.

Conclusions and Implications

Research Question 1

Prior research has indicated a trend of decreased spending on instruction and increased administrative spending throughout the 20th century and into the 21st century (Alacbay & Barden, 2017; Leslie & Rhoades, 1995). Desrochers and Hurlburt (2014) found that during the midst of the Great Recession, four-year institutions scaled back institutional support spending as a percent of their overall budget, while two-year institutions made cuts more consistently across the board.

The results of research question 1 assessing changes in resource allocation at both two and four-year institutions are generally consistent with the findings of Desrochers & Hurlburt (2014). Notably, expenditures towards instruction at both two-year institutions (42.48%) and four-year institutions (48.04%) have grown more slowly than expenditures for academic support, student services, and institutional support. Generally, researchers define administrative costs as the combination of institutional support, academic support, and student services (Leslie & Rhoades, 1995). Thus, in a ten-year span, the gap between FTE expenditure for instruction vs. administration has shrunk from 30.50% to 26.97% at four-year institutions and from 23.43% to 15.84% at two-year institutions. The slowed pace of growth in institutional support spending at four-year institutions (48.40%) is also consistent with the findings of Desrochers and Hurlburt, (2014) though this figure still slightly surpasses growth in instructional spending at four-year institutions. However, the slowed pace of institutional support spending has been more prominent at less-selective institutions during the most recent ten-year span of graduating cohorts. Of the 322 four-year institutions that also provided average ACT composite test scores

for incoming students, tier 1 selectivity institutions increased institutional support spending by 8.56% more ($p=.033$) than tier 2 selectivity institutions.

Research Questions 2 and 3

Prior research has primarily identified instructional expenditures, followed by both academic support and student services expenditures as significant predictors of improved student performance (Abouzeida, 2014; Ehrenberg & Webber, 2010; Marsh, 2014; Ryan, 2004; Siniard, 2018). Abouzeida (2014) and Promades (2012) also identified a negative relationship between institutional support expenditures and graduation rates. The results of regression models assessing research questions 2 and 3 indicate a consistent, significant relationship between adjustments in resource allocation and changes in graduation rates. Collectively, the predictor variables found to be significant in this study were generally consistent with the results of prior cross-sectional studies, with a few key differences and nuances. Changes in resource allocation towards academic support and instruction consistently shared significant relationships with increases in graduation rates over the ten-year time frame. While national graduation rates collectively rose by five to six points on average over ten years, an encouraging sign, the functional expense areas that best predicted increases in graduation rates did not coincide with national resource allocation trends. In other words, even though inflation-adjusted spending increased on average in every functional category included in this study, some of the expense areas that saw the largest collective increases over ten years, student services expenditures at both two and four-year institutions and institutional support expenditures at two-year institutions, did not correlate with improved student performance even though graduation rates improved nationally during this time. Rather, institutions that allocated additional funds towards both instruction and academic support shared a significant relationship with improved overall four-

year graduation rates, while institutions that allocated additional resources towards academic support also shared a significant relationship with improved six-year graduation rates.

The differences in results at tier 1 and tier 2 selectivity institutions addressing research question 3 support the previous findings of Ehrenberg and Webber (2010) that institutional selectivity influences the relationship between resource allocation and student performance. Outside of the most consistent predictor variables, academic support and instruction, the only other independent variable found to be significant in any regression models was a negative relationship between student services expenditures and four-year graduation rates at tier 1 selectivity institutions. This supports the previous finding of Ehrenberg and Webber (2010) that student services expenditures are more critical for less selective four-year institutions.

At tier 1 selectivity four-year institutions specifically, increased expenditures towards academic support shared a significant relationship with improved four-year graduation rates. Stratifying the results by selectivity tiers also revealed that increases in instructional expenditures shared a significant relationship with improved four-year graduation rates at tier 2 selectivity institutions. This result suggests that while maintaining an institutional focus on the academic core, instruction, is important at all institutions, this need is particularly acute at less-selective four-year institutions. Holistically, the influence of these two primary independent variables, instruction and academic support, is present in both four-year and six-year graduation rates. However, adjustments in resource allocation share a much stronger relationship with four-year graduation rates as opposed to six-year graduation rates. Further allocation towards instruction and academic support accounted for 14.4% of the total variance in improved four-year graduation rates at four-year institutions, while the strongest predictor variable for improved overall six-year graduation rates, academic support, accounted for a more modest 2.5% of the

variance in the dependent variable. These findings suggest that while resource allocation plays a consistently significant role at the institutional level in whether or not students graduate, resource allocation may play a much larger role in how quickly undergraduate students make progress towards their degrees.

The findings regarding resource allocation and its relationship with graduation rates at two-year institutions varied from those at four-year institutions. The results of the third regression model assessing research question 2 found that academic support expenditures shared a negative relationship with graduation rates, accounting for 2.1% of the variance in three-year graduation rates. National studies of the relationship between resource allocation and graduation rates at two-year institutions are extremely limited, thus this does provide a new layer of information regarding the relationship between resource allocation and student performance. The finding that additional funding allocated towards academic support shares a negative relationship (.000) with graduation rates is notable, though its interpretation should come with additional context. As Cook and Pullaro (2010) noted, 25% of community college students enroll mid-year and thus are not included in traditional cohort graduation rate tracking. However, even if the relatively high number of mid-year enrollees and transfer students at community colleges creates a lower baseline for graduation rates, the nature of this study tracked marginal increases or decreases over ten years, thus significant findings should be carefully considered even if they do account for a modest amount of the total variance in the dependent variable (2.1%). Affordability is a major factor in community college education, but as Cochrane (2015) noted, the financial savings of community college versus the average four-year institution is considerably less than it often appears, once total financial aid is taken into account. Prior research has identified the negative influence of financial stress on student drop-out rates (Joo et al., 2008) and grade point

average (Britt et al., 2016). The findings of research question 2 may have implications not just for categorical resource allocation at the institutional level, but for public funding at the community college level overall, as increases in tuition and student fees to offset funding cuts may be keenly felt by students at two-year colleges in particular.

Key Recommendations and Discussion

- 1) Institutional leaders should make a concerted effort to preserve and prioritize funding for both instruction and academic support. This effort would represent a significant change in the trajectory of resource allocation in higher education, as the gap between instructional spending and overall administrative spending has shrunk considerably in recent decades. This may become increasingly difficult as competition for undergraduate students becomes fierce in 2025 when demographic changes resulting from the great recession begin impacting colleges and universities. Prior studies have shown that institutions demonstrate a willingness to adapt their resource allocation models based on their revenue sources. As funding cuts plateau and stabilize, I recommend that institutions prioritize and invest in activities and resources highly connected to student learning in their academic programs. This study is not intended to identify or recommend expenditure patterns that may enhance student recruitment or retention. Although recruitment and retention are also meaningful and worthwhile goals for colleges and universities, the same independent variables may or may not be significant predictors of institutional success in those areas.
- 2) Both two-year and four-year institutions should prioritize tracking the progress and degree completion of student cohorts at an individual student level. The results of this study indicate that institutions may improve student graduation rates and time to

graduation through investment in instruction and academic support rather than prioritizing more large-scale administrative endeavors or other expenditures not as closely tied to student learning and students' academic programs. However, there is currently not a national database capable of making consistent large-scale comparisons of student success at an individual student level. Student-level cohort tracking would also provide valuable insight into assessing completion rates beyond a 150% normal timeframe. There is currently not a uniform reporting process to track student cohorts beyond six years at four-year institutions, or three years at two-year colleges. As higher education expands to more non-traditional students, this also needs to be improved and prioritized. Tracking student cohorts at the individual level may be even more critical for two-year colleges. Juskiewicz (2017) found that the completion rates of community college students were about 15% higher when one includes students who transfer and complete their education at another institution. The elevated level of student transfers from America's community colleges in addition to the 25% of students that begin their education mid-year at two-year colleges makes tracking student and institutional progress without student-level data more difficult and complex in comparison to four-year institutions (Cook & Pullaro, 2010). However, with 42% of the nation's undergraduates beginning their education in community college, traditional metrics of student and institutional success such as completion rates cannot merely be written off due to data complexities (Cochrane, 2015). Graduation rates, and their relationship with resource allocation, are just as important at two-year colleges, but the context of data limitations should be carefully considered in the meantime. Though it would be a large undertaking

to initiate, student-level cohort tracking at all publicly funded colleges and universities would provide a clearer picture of student and institutional success moving forward.

- 3) Resource allocation should be considered by institutions more heavily as a means to influence time to graduation, rather than drastically increasing the overall number of students that ultimately graduate within 150% of normal time, based on the results of this study. Adjustments in resource allocation consistently accounted for four to five times more explained variance in improved four-year graduation rates as opposed to six-year graduation rates. Even marginal improvements should be noted and acknowledged positively, as it is no small feat for many schools to improve graduation rates by a mere one to two percent. At 14.4% in explained variance in four-year graduation rates in this study, broad resource allocation assessments are worthy of consideration in efforts to improve an institution's graduation rates, yet this explained variance is still modest enough that resource allocation is almost certainly not the only significant institutional factor that could be identified.
- 4) In addition to tracking institutional and student success metrics, assessment of student learning should continue to be prioritized, particularly as institutions face pressure to display evidence of improved performance and efficiency. The purpose of this study was to assess the potential presence of and significance of a relationship between changes in resource allocation and subsequent changes in graduation rates. However, instructors and institutional leaders have a further and ongoing responsibility to assess and provide evidence of student learning, individually and in aggregate, to substantiate the notion that earning postsecondary credentials does indeed help students obtain the skills that we assume and hope that students are gaining. Improved aggregate student performance

metrics alongside stagnant or diminished evidence of student learning would be a step back for postsecondary education in the United States, even if the performance metrics were well-received by stakeholders.

Recommendations for Future Research

As overall enrollment in postsecondary education approaches an estimated 15% drop around 2025, I recommend that future researchers analyze how institutions adjust resource allocation models as they seek to attract and retain students amid increased competition in the next few years. These studies may be even more insightful if future researchers analyze the results by institutional selectivity, institutional size, geographic region, as well as by state systems, as the anticipated enrollment declines are not expected to impact institutions equally. Additionally, in the absence of a national database or reporting system with student-level performance and graduation data, it is recommended that individual colleges and universities take the initiative and continue to pilot student-level data tracking models and present their findings in a public and accessible format. Furthermore, I recommend that institutional researchers execute inaugural studies with these student-level cohort data that can contribute to the growing body of literature on student performance while also spurring momentum in the push for better national student achievement metrics.

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