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The Impact of Resource Allocation on Graduation Rates

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**The Impact of Resource Allocation on Graduation Rates at
Moderately and Less Selective Private Institutions**

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Abstract

Higher Education is currently facing challenges from a variety of forces; a stagnant economy, shifting student demographics, increased accountability and need for the demonstration of value. Colleges and universities are being forced to function more efficiently and at the same time improve student outcomes. One major outcome that has come under increased scrutiny is student graduation rate. With revenue at many institutions expected to remain flat or in some cases decline over the next several years institutions must find a way to strategically allocate their funds so as to positively impacts student outcomes, in this instance graduation rate. While studies have examined the relationship between institutional expenditures and graduation rates this study looks at a specific type of institution that has not yet been a focus; moderately and less selective private, four year institutions.

Using the theoretical framework of Berger and Milem (2001), this study analyzed student completion research through the lens of organizational theory. Their work identified two overarching categories, the "structural demographic features" of the institution including size selectivity, and student body composition and "organizational behavior dimensions" which include institutional expenditures. The following research questions were examined; Did the recession of 2008 influence institutional expenditures? Do 6-year graduation rates differ by level of selectivity? Do institutional resource allocations in terms average expenditure per FTE differ by level of selectivity? Is there a relationship between institutional expenditures and completion as measured by 6-year graduation rates? What influence, if any, do institutional characteristics and institutional expenses have of 6-year graduation rates?

The sample for this study was 363 institutions with an average acceptance rate of 70% or greater from 2006-2011. Using the IPEDS dataset institutional expenditures designated for

institutional support, instruction, academic support, and student service were extracted for the 2006-2011 reporting years. In addition, institutional characteristics including the total institutional size, percentage of students who were white, and acceptance rate were extracted for the same years.

There were two main analyses conducted in this study. The first was an ANOVA to determine which if any institutional expenditures increased over time. After adjusting for inflation only the student service expenditure category increased significantly over the selected time period. There was also variation among these institutions by selectivity with respect to graduation rates and institutional expenditures. Institutions with an acceptance rate between 70 and 79% had a higher graduation rate and spent more on instruction, student services and institutional support than those institutions with an acceptance rate of 90% or greater. Using a Linear Mixed Model it was determined that institutional characteristics had the largest impact on graduation rates and expenditures instruction had a small but significant and positive impact on graduation rates. Possible implications for theory and practice were discussed, as were limitations. Future research was suggested to expand the understanding of institutional expenditures, the limitations of the current graduation rate, calculation, and the expansion of this analysis to include public institutions.

Dedication

To Allyson, for all of your love, support, and encouragement

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CHAPTER I: Introduction

Statement of Problem

Several emerging issues including the stagnation or decline in financial resources, reduced funding from public sources and the increasing demand for accountability, are forcing higher education to re-examine its purposes, practices, and outcomes. As higher education is looking to become more efficient and use its resources strategically, how can it do so and ensure that the educational environment conducive to student outcomes is not adversely affected? How does the institution's resource allocation contribute to a positive learning environment? What institutional expenditures are likely to influence student educational outcomes?

Various stakeholders ranging from government agencies to prospective students and parents are asking institutions to demonstrate the value of a college education. Higher education institutions are now held more accountable for student learning and institutional spending that improves the learning environment for students. Alexander (2000) noted that accountability movement is the result of two trends: the massification of higher education and the increased financial burden on college students and parents. Massification refers to increase in the number of students outside the traditional 18-22 year old, pursuing higher education through a variety of avenues (Alexander, 2000). In fact, the percentage of student enrolled in higher education that fit the traditional age group represents only 60% of the undergraduate student population in 2011 (National Center for Educational Statistics, 2012).

Since the 1980s college tuition has outpaced inflation by roughly two to three percentage points each year (Ehrenberg, 2000). More recent data indicates that tuition and fees from 2003-2004 to 2010-2011 increased by an average of 2.6% for private institutions and 4.8% for public institutions. This ongoing trend of college pricing has shifted the funding burden to students

exacerbated by the financial crisis of 2008, which has left many institutions with reduced

endowments and a heavier reliance on tuition revenue, making students and their families bear

the rising cost of higher education.

The National Association of Student Financial Aid Administrators (2012) highlights that

in 2010 and 2011 state and local support for higher education declined per full time equivalent

student by 7 and 3.7 percent respectively. Conversely, during this same time period tuition and

fees at both public and private 4-year institutions increased 4.1% and 3.1% respectively (NCES,

2013). As state support has fallen, colleges and universities have focused increased attention on

cost containment efforts and the expense structure, leading to staff reductions, pooling of

information technology services with other colleges, and centralizing purchasing to name a few

(Chobator, 2010).

As Pascarella and Terenzini (1998) argued more than a decade ago, colleges are now

forced to address cost effectiveness while having cost containment in mind. Not all expenses are

created equal; there are some that may impact the student learning more than others; what and

how much institutional expenses are necessary to deliver a quality academic experience for

students? Which expense categories are more linked to positive student academic outcomes?

Research on college expenditures and the impact they have on the learning environment

has increased in quantity and scope over the past several years. A review of the existing

literature demonstrates inconclusive evidence on which institutional expenditures have the most

significant, positive impact on the learning environment, which warrants further investigation on

the impact institutional resource allocation on student success. There are two major reasons for

the lack of agreement: the proxy or outcomes measures used to define a quality learning

environment and the institutions used in the samples of many studies. Outcome measures for

quality have ranged from institutional accreditation scores, student engagement and student development (Belfield & Thomas, 2000; Ryan, 2006; Toutkoushin & Smart, 2001).

The sampling in many of these studies is also problematic, failing to account for institutional size, control, or proportion of expenditures allocated to undergraduate versus graduate education (Gansemer-Topf & Shuh 2003; Hamrick, Schuh, & Shelley 2004). However, research that has used graduation rates as the outcome measure for four year colleges has revealed relatively consistent findings. Although the level of selectivity of the institution and financial background of the student body does appear to impact results, instructional and academic support expenditures have been shown to have a positive impact on graduation rates (Ryan, 2004; Gansemer-Topf & Shuh, 2003; Hamrick et al., 2005).

It should be noted that the magnitude of the impact expenditures have on graduation rates may vary depending on institutional selectivity. Gansemer-Topf and Shuh (2006) found that selectivity and institutional expenditures explained over 60% of the variance in graduation rates. When disaggregating low and high selective institutions, results indicated that expenditures accounted for 30% of the variance in graduation rates for low selective institutions and 49% for high selective institutions, indicating the extent to which expenditures contribute to graduation rates differs by institutional selectivity. In their study, academic support and instructional expenditures only had a significant impact on graduation rates for high selective institutions whereas no significant impact of academic support and instructional expenditure were found on less selective institutions.

Student service expenditures appear to impact graduation rates when the institution is serving a particular student population. Webber and Ehrenberg (2010) explored whether institutional expenditures other than those aimed at instruction impacted persistence and

graduation rates. Using econometric modeling techniques with data from 2002-2003 to 2005-2006, the researchers conducted a simulation to examine if a reallocation of resources would influence graduation rates. Results indicate that student service expenditures impact graduation rates. These expenditures are more important at institutions where the incoming test scores are lower and those that have a higher percentage of Pell Grants per student, suggesting that student service expenditures play a more significant role in student outcomes among less selective institutions and those with a large percentage of Pell recipients.

As mentioned before, there appears to be a relationship between expenditures and graduation rates but the type of expenditure is dependent on institutional characteristics, particularly admissions selectivity. Building on prior research, this proposed study is to address gaps in the literature in two ways: First, while institutional selectivity has been used as a variable in some studies, little research has focused solely on institutions that are moderately and less selective. Second, all of these studies pre date the financial recession of 2008 providing an opportunity to examine the role of institutional expenditures in graduation rates in the current and much different financial climate. The timing of the previously mentioned studies is the key variable. None of the research has accounted for institutional expenditure changes after the recession offering an opportunity to see if the prior research is still valid or if the financial downturn will yield different and more informative results.

Theoretical Framework

Berger and Milem (2000) examined current research on student persistence and completion through an organizational perspective. Their research determined that research in this area could be segmented into two components, the structural demographics of the institution, and the organization behavior dimensions. The first component involves the study of

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institutional characteristics such as institutional selectivity, student size and composition. The

second component draws from organizational theory where one defines organization behavior as

the actions of organizational agents (faculty, administrators, and staff) at a college or university

(Berger, 2001).

Hanson and Stampen (1996) argued that the way in which colleges and universities spend

their resources demonstrates the priorities of the institution. If college completion is an

important priority for an institution one may be able to determine if their actions (spending) are

consistent with this priority and whether the overall mix of expenditures is appropriate. Using

the theoretical framework of organizational behavior and in particular their resource allocation

policies, this study will examine if there is a relationship between institutional expenditures on

instruction, academic support, student services and graduation rates at moderately and less

selective institutions.

Significance of the Study

Graduation rates are becoming increasingly important due to the fact that it assesses

student persistence and other value such as the attainment of a degree (Burke, 1998). The

converse is also true. The lack of graduation through attrition has several negative consequences

for students as well as institutions. Students leaving college experience negative consequences

related to self-esteem and financial opportunities while institutions lose tuition revenue and in

some cases reputation (Tinto, 1987). Spurred by decades of research emphasizing that a college

education is required for the majority of jobs in the current knowledge economy, in 2009

President Obama announced a lofty goal to increase the percentage of college graduates

significantly by the year 2020. While the United States has been losing its competitive standing

in the global market, other countries have been increasing the percentage of college educated

individuals. In particular, European and Asian countries have been increasing the proportion of individuals with a college degree with the United States ranking 15th among G-20 countries in the 25-34 age group (Wendler, Bridgeman, Cline, Millet, Rock, Bell &McAllister, 2010).

Three quarters of the fastest growing occupations require more than a high school diploma. College graduation rates have been at the forefront of many policy discussions regarding the value of higher education. Many groups ranging from government official, accreditation bodies and prospective parents and students are looking at these rates as a measure of institutional quality. Although scrutiny over graduation rates is nothing new, there has been increased pressure on higher education institutions to disclose their graduation rates in a more transparent manner to all stakeholders. Currently, there has also been preliminary discussion regarding linking financial aid to an institution's graduation rate (Kelly, 2013). In what way can colleges allocate their increasingly limited resources in a manner that promotes college completion as measures through graduation rates (Alexander, 2000)? With increased focus on accountability and graduation rates coupled with limited financial resources, colleges are examining their practices and policies to determine what they can or should do to improve graduation rates.

While it appears that there is a relationship between institutional expenditures and college completion, little research has been conducted, focusing on institutions that do not have the ability to be selective and in turn shape their class. Many institutions that are heavily tuition-dependent wrestle with achieving a desired headcount by accepting a high percentage of applicants. This results in admitting students who have a wide range of incoming characteristics, some of which are not conducive to educational outcomes such as degree completion. The recent economic downturn has put these types of institutions on fragile financial footing. For the

past several years the financial position of many families has worsened making private higher education less affordable. The elite and highly selective institution does not experience this same level of price sensitivity and even if a portion of their applicant pool cannot afford the price tag they have more than enough potential students to fill their class.

Purpose of the Study and Research Questions

The purpose of this study is to determine which institutional expenditures contribute to graduation rates. The ultimate goal is to provide institutional administrators with information they can use during their budgeting process to efficiently allocate resources to improve graduation rates. This study will be a significant addition to the current research in several ways. First, this study will examine institutional expenditures reflecting changes that have occurred after recession of 2008. Given the current economic climate this type of trend analysis is important to note if there are any shifts in institutional priorities.

Second, instead of the most selective institutions, the study will look at institutional expenditures and graduation rates among moderately and less selective institutions that are more vulnerable financially in the current economic climate and have largely been ignored in the current research.

Finally, it is my hope that the findings of this study will help stimulate informed conversations when institutions are beginning their budgeting process. While it will not provide detailed recommendations on line item expenditure it can serve as a platform if indeed graduation rates are a priority.

Focusing on moderately and less selective institutions in the United States and the institutional expenditures of multi-year data, this study will use a linear mixed model analysis. In this study, moderately and less selective private institutions are defined as those considered

competitive, less competitive, or non-competitive using Baron's College Selectivity Ranking. This research intends to answer the following research questions:

1. Did the recession of 2008 influence institutional expenditures?

2. Do 6-year graduation rates differ by level of selectivity?

3. Do institutional resource allocations in terms average expenditure per FTE differ by level of selectivity?

4. Is there a relationship between institutional expenditures and completion as measured by 6-year graduation rates?

5. What influence, if any, do institutional characteristics and institutional expenses have of 6-year graduation rates?

CHAPTER II: Theory and Literature Review

Structure of Literature Review

This literature review examined several articles in depth to ascertain the role that educational expenditures play in student outcomes. This type of analysis has been common in K-12 research for decades but is relatively a new focus in higher education research. Given this fact the first two studies reviewed are meta-analyses of cost function studies in K-12 education. The reason for their inclusion is twofold. First, they highlight the complexity of trying to link educational expenditures directly to student outcomes. Second, these two studies were references frequently in the higher education research on cost functions and they helped to inform and provide context for additional studies.

The focus then shifts to higher education with several studies that all examine the cost function but with varying outcome measures. This is an important point. There appear to be no studies examining the relationship between expenses and actual learning outcomes; rather studies use different proxies for student learning. Several of these different measures were included in this review.

The first study included represents the more traditional type of higher education expenditure research, analysis from the perspective of economies of scale. The second study examines the relationship between institutional expenditures and accreditation rating. These institutional perspectives then transition to more outcome driven research. Two studies are included that examine the relationship between institutional expenditures and persistence and graduation rates. The outcome measure then turns to a popular research construct in higher education, student engagement. The final four articles examine whether institutional expenditures impact student engagement using the National Survey of Student Engagement.

K-12 Research as Context

Hanushek (1997) produced a summary of cost function research in higher education. This was the latest iteration in a long line of studies he conducted in this area. Cost function research operates under the assumption that different types of expenses on education will yield different educational outcomes. Many studies have adopted this model and this study was a meta-analysis to determine whether there were consistent and reliable findings to indicate that there is indeed a link between expenses and educational outcomes.

This study concentrated on published results available through 1994. All studies selected were published in peer review journals, had some measure of socioeconomic background, at least one resource measure, and a statistically reliable outcome measure for student performance. These criteria yielded 90 individual publications that comprised the sample for this study. In all, 377 individual production function estimates, relationship between some resource and some outcome measure of student achievement, were obtained.

The data analysis involved the systematic summarization of these results from the studies. Results from previous individual studies yielded conflicting findings with respect to the relationship between expenditures and student achievement. Therefore, this study looked for systematic effects that hold across the board range of studies.

In his preliminary analysis Hanushek examined the variables used in previous literature and trends in education to identify key resource categories in education. Many were informed by the educational climate at the time and included teacher/pupil ratio, teacher experience, salary, and education, and administrative and facility expenditures.

Using the tally method Hanushek found that with respect to classroom resources only 9% of the studies using teacher's education and 15% using teacher to pupil ratio found a positive and

significant impact on student performance. In terms of per pupil expenditures only 27% of the coefficients showed a positive significant effect on student performance.

One interesting finding was that resources seem to have a different impact depending on the unit of analysis in the study. Resources had an increasing positive and significant impact on student achievement as the unit of analysis went from individual school, to district, to state.

Hanushek found no evidence of a relationship between the inputs and student achievement. Only a very low percentage of the study showed a statistically positive relationship with student achievement demonstrating that neither teacher characteristics nor per pupil expenditure positively impact student outcomes. This was particularly profound in studies that used individual schools as the unity of analysis.

His general conclusion was that there is no strong or consistent relationship between school resources and student performance. Simply increasing funding will not improve the educational outcomes of students. However, the data also demonstrate the need to acknowledge the differences in schools, teachers, and students. Evidence did suggest that differences exist among teachers and schools although not from a from a resource allocation perspective.

While finding no evidence that links resources to student achievement this study provides useful context and guidance for further study. First, when looking to analyze resources the unit of analysis is important. The increasing impact of resources from individual school, to district, to state shows that the data can yield significantly different results depending on what level the researcher chooses to examine. Second, resources are not what impacts student achievement but rather how the resources are used. The resource categories are based on financial statements and do not allow for the study of what the resources are actually used for in the classroom environment. Third, there is a variation in the operational definition of student achievement.

While this study was effective in synthesizing disparate studies it did highlight the need for a more consistent outcome measure.

Hanushek's work is highlighted in a good deal of educational research and his assertion that there is no link between expenses and outcomes has been both supported and contradicted. Hedges, Laine, & Greenwald (1996) replicated one of Hanushek's earlier studies due to their concern of his method of analysis. The researchers questioned the analytic method used in the initial study by Hanushek commonly referred to as vote counting. The major criticism is that vote counting is useful for summarizing data but is not appropriate for inference.

To build on the previous study the researchers incorporated two methods used in meta-analysis, combined significance tests and combined estimation methods. This type of data analysis allowed the researchers to determine if the data is consistent with the null hypothesis in all studies used in the analysis. The methods used provided a common statistical value for disparate studies.

The selection of production function studies included the following criteria and were similar to the work done by Hanushek; data are in peer review journal or book, data originates in the US, outcome measure is some form of student achievement, school level data is used, presence of control for socioeconomic background.

The final sample consisted of 60 distinct studies. Resource variables were related to teacher/pupil ratio, teacher, experience, teacher ability, teacher education, teacher salary, per pupil expenditures, and school size. The outcome variable was again student achievement, in whatever form the individual studies conceptualized. Prior to discussing results a brief description of the statistical methods in this study is warranted.

Combination significance testing and effect magnitude estimation were used to analyze the

production function coefficients from the selected studies. Combination significance testing allows for the combining of statistical significance from varying studies to explore one unifying hypothesis. Two hypotheses were tested in this study, a positive case where the null is accepted and there is no relationship and a negative case where the null is rejected because a relationship is identified.

Effect magnitude testing attempts to estimate the strength of the relationship between inputs and outputs. Given the studies used different measures for input and outcomes a standardized regression coefficient was calculated.

Results for the combined significance testing indicate that there was a positive significant relationship between every resource category and student achievement. Results from the combined significance tests indicate that effect sizes for all variables were positive and in most cases robust.

The results of this study contradict the previous work of Hanushek and showed that there is a positive relationship between resource inputs and student outcomes. In particular, using the more robust statistical techniques yielded a significant positive relationship between resource inputs including per pupil cost and student achievement.

These two studies are indicative of much of the research related to expenditures and academic achievement. In this case, the studies were identical except for the statistical analysis and they yielded very different results. The other issue is that these types of meta-analysis introduce a number of confounding variables given they are the product of multiple, disparate studies. More direct research is needed to truly understand the relationship.

It is apparent from the previous studies that cost function analysis has been a common practice in K-12 research for a significant amount of time. The same type of analysis is

somewhat limited in the higher education environment. While the data for such analysis has

been available for some time only a handful of studies have explored it in a comprehensive

manner. When looking to higher education, the first analyses involving expenses were

conducted mainly to determine whether efficiencies were able to be gained from an economy of

scales.

Higher Education Cost Containment

Toutkoushian (1999) has found that many institutions have begun calculating their

expenditures per students and use this measure to compare their level of efficiency to other

institutions. However, this type of analysis has issues in that it does not account for differing

institutional missions, and geographic location. Not accounting for these characteristics can yield

erroneous results and lead to poor policy choices for institutions.

Toutkoushian argues that cost functions are useful information to the administration in that

they can help examine relationships between enrollments and per student expenditures with the

goal of improving efficiencies. For example, an institution may look at the cost per student and

determine that enrollment expansion is needed to improve the institution's economy of scales.

The data for this study included data from the IPEDS Finance, Fall Enrollment, Salaries, and

Institutional Characteristics surveys for the 1994-95 academic year. The sample consisted of

four year institutions without a medical school or hospital, enroll both undergraduate and

graduate students, and have no missing data for the variables used in the model. Accounting for

these characteristics, the final sample was 828 institutions, with 453 and 375 private and public

institutions respectively.

Multiple regression analysis was used to estimate cost functions with total expenditures and

expenditures per student serving as the independent variable. Model 1 suggested a U shaped

average cost curve for research, with the negative slope indicating that economies of scale are present when research is incorporated with undergraduate and graduate instruction.

Model 3 indicated that institutions can see a reduction of cost per student by approximately $170 if they increase the student faculty ratio by one. Results also demonstrate cost per student would decline if there was decreased utilization of full professors and increased use of adjuncts. Public institutions were found to have significantly lower total and per student expenditures than private institutions.

Overall results indicate that there are numerous factors that influence institutional expenditures and that there are indeed ways in which to significantly reduce institutional costs. However, the focus of this study was to determine which ways an institution can reduce cost and the quality of the learning environment is thus ignored. While cost containment is a worthy goal for an institution this study indicates that several of the ways in which costs could be lowered may have a negative impact on the learning environment.

Therefore research is needed to examine what cost containment and resource allocation polices ensure institutional efficiency without hindering the overarching goal of educating students. Cost function analysis has started to transition from efficiency to effectiveness. Studies in higher education are now beginning to examine the impact of institutional expenditures on the learning process rather than strictly from a cost containment perspective. Given that funds are likely to remain tight, the focus is shifting to proper resource allocation for the benefit of the student learning experience. The next several studies examine research that use a variety of outcome measures for student learning, some being at most somewhat direct and others far more indirect.

Institutional Accreditation Rating as an Outcome Measure

Belfield and Thomas (2000) assess the link between institutional expenditures and the performance of higher education institutions in the United Kingdom. The data was collected for 190 institutions including financial data as well institutional performance data from the 1996 Chief Inspector's Annual Report. In the United Kingdom, colleges and universities undergo a periodic assessment similar to the US accreditation process. They are rated in seven key areas; responsiveness, governance and management, quality assurance, recruitment and guidance, staffing, equipment, and accommodation. Colleges are assessed in each of these areas on a five-point scale with 1 being the strongest rating and 5 being the weakest.

Three expense categories were used, total institutional expense, expense per student, and item level expense. The researchers hypothesized that total expenditure and expenditure per student would relate negatively to overall assessment grades and item level expense would relate negatively with individual assessment items.

Results from the regression model indicated a statistically significant effect on the assessment grade based on the total institutional expenditures. There appears to be an economy of scales. Larger institutions can offer more programming, allow faculty to specialize in a particular area, and have more wherewithal to meet student expectations. The physical environment is also impacted. Institutions with larger overall expenditures tend to have larger campuses, facilities, and libraries. All of these factors could contribute to higher assessment scores given the focus of the particular categories.

While total institutional expenditures were significant the researchers found that their hypothesis regarding item level expenses did not find support. Direct teaching expenses did not have a statistically significant impact on the assessment score. Therefore transferring money from other areas to teaching has no impact on assessment grades. Finally, per student

expenditure did demonstrate a positive relationship with the governance and management.

Many in the field have referenced this study. Those that argue there is no relationship between expenditures and student achievement highlights it while those that believe there is a relationship refutes it. One important point to remember is that this study did not use a direct measure of student achievement rather it used the institutional assessment as the unit of analysis. Therefore the finding that overall expenditures had a positive impact on the assessment grade should be the focal point rather than whether the item level expense of teaching had an impact. Again, a global assessment measure was used as the outcome variable. Other studies use measures that are more closely related to student learning outcomes, among them persistence and graduation rates.

While graduation and persistence rates are more targeted measures that the institutional assessment score used by Belfield and Thomas (2000), they still do not directly measure the student learning experience rather, whether they completed some educational experience irrespective of quality. In recent years several studies have examined the impact of institutional expenditures on student engagement and frequently results from the National Survey of Student Engagement. Student engagement has been widely accepted as an appropriate proxy measure for student learning.

Institutional Expenditures and Student Engagement

The concept of student engagement is not in any way a new one. The foundation for National Survey of Student Engagement is built on and can be considered a more recent iteration of a number of educational theories proposed by a variety of researchers. The basic concept of student engagement is rather intuitive. It holds that the more students spend time on the study and application of a subject, in conjunction with faculty feedback the better their learning (Kuh,

2009).

This simple but powerful idea can be traced back to the 1970s. If one looks at the questions on the NSSE they will see a great similarity between it and the College Student Experience Questionnaire (CSEQ) developed by Robert Pace thirty years ago. Pace's work looked to identify and measure what he called quality of effort which hypothesized that when students invest more time and effort in educational tasks they show increased gains and improved educational outcomes (Pascarella & Terenzini 1991). These activities range from the time spent studying, frequency with which the student interacted with peers and faculty, to the way in which they applied what they learned (Pace, 1984).

The research from Pace on educational activities mirrored the work of Alexander Astin who developed his theory of student involvement. In this theory, Astin argued that the more the student ingrained themselves into the educational environment, whether it is joining clubs and activities, developing a relationship with a faculty member, or joining a study group of peers, the better the outcomes (Astin 1999). This theory of involvement has several components.

First, the involvement identified by Astin involves the physical and psychological investment in educational activities. Second, the involvement varies in intensity from activity to activity. Third, there are both qualitative and quantitative aspects of involvement. You can measure the time a student spends on a particular assignment as well as the quality of that assignment. Fourth, the amount of student learning is proportional to the quality and quantity of student involvement. Finally, the effectiveness of educational policy is dependent on increasing the level of student involvement (Astin 1999).

Astin's work is significant in that it not only links student engagement, or in his terms student involvement, to improved educational outcomes but also identifies the fact that these

gains are measurable. That level of measurement is essential to the validity of the NSSE. In

addition, the student involvement theory shifted the focus from treating student development as

the outcome measure to measuring the processes that promote quality student development. The

important aspect of student engagement is that institutional policies can increase level of

engagement thus making the NSSE a valuable tool for measuring and then manipulation

institutional policies and practices (Pike & Kuh, 2005).

Ryan (2006) examined the relationship between educational expenditures and student

engagement. The sample for this study was 142 colleges and universities. Elements from The

National Survey of Student Engagement (NSSE), a well-respected survey of best practices in

higher education, were used as the measure for student engagement.

Ryan extracted institutional and student characteristics from the Integrated Postsecondary

Educational Data System (IPEDS). These characteristics included incoming SAT data, gender

breakdown, age, percentage of part time students, institutional size, institutional control, and

percentage of non-science majors, which served as control variables. In addition to these control

variables the IPEDS dataset also provided the expense data broken out into several categories;

instruction, academic support, student services, and institutional support. All of these amounts

were combined with full time equivalent enrollment (FTE) to calculate an average expense by

category per FTE.

The results of an OLS multiple regression model explained roughly 35.7% of the variation in

student engagement. The variables of focus in the study, institutional expenses, did not yield

statistically significant results although the relationship between instruction and engagement was

positive. Interestingly, the expenses related to institutional support had a significant negative

relationship on engagement. This study demonstrates that there appears to be some relationship

between expenses and engagement but it is far more complex than initially thought. It is possible that the expense categories, while grouping together similar expenses, are masking some underlying variable.

The lack of significance may lie in the usage of selected items from the NSSE rather than the overall benchmark scores. Further analysis using the benchmark scores may in fact yield significant findings due to the fact that they incorporate a broader sample of individual survey items from the NSSE.

Toutkoushin and Smart (2001) attempted to determine whether institutional expenditures contributed to self-reported student growth, which could be considered a limitation in that it was not tied to data to reflect actual growth. However, with that limitation in mind, they found that institutional characteristics such as the level and targets of institutional expenditures can affect student self-report gains.

The sample data for this study was collected from a 1986 initial and 1990 follow up survey by the Cooperative Institutional Research Program (CIRP). The sample consisted of 2,269 students from 315 institutions. The dependent variables were selected items from the CIRP survey used to measure student's perceived gains in a variety of skills including leadership, learning/knowledge, tolerance awareness, preparation for graduate school, communication skills, and job related skills. The institutional variables for institutions were level of spending per student and the percentages of expenditures devoted to instruction, academic or institutional support.

A multiple regression was conducted to assess how the student and institutional characteristics impacted student gains. Results indicate that after controlling for student background higher per student expenditures are positively related to student gains in

interpersonal skills and learning/knowledge acquisition. In terms allocation the students enrolled at institutions with a higher percentage devoted to academic support reported lower gains in learning/knowledge acquisition. However a higher proportion of expenditures on institutional had a positive effect of gains in learning/knowledge. The inverse relationship between level of academic support and gains in learning/knowledge seems counterintuitive. Further research is needed to examine what comprises that particular expense category and see if those underlying elements are impacting the relationship. Finally, instructional expenses had no significant impact on self-reported gains, which is again surprising.

Pike, Smart, Kuh & Hayek (2006) acknowledged the contradictory results from many study looking at the relationship between institutional expenditures and student achievement. Given the mixed results of prior studies they believed that there may be an underlying factor that was contributing to the complexity in linking expenditures to student achievement. Rather than focus on student achievement as the outcome variable they used student engagement as an indirect measure of student learning which is becoming more prevalent in higher education research.

The sample consisted of 154 private and 144 public institutions. In this study six types of expenditure categories were used; instruction, research, public service, academic support, student services, and institutional support. The outcome measures were the National Survey of Student Engagement benchmark scores.

The institution was the unit of analysis in this study and NSSE benchmark scores were regressed on institutional expenditures and expense variables. The NSSE collects data for both freshman and senior level student and the analysis examined these two populations separately. Results indicated that for freshman at public institutions academic support and institutional support were positively related to Level of Academic Challenge. Academic and institutional

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supports were also positively related to Active and Collaborative Learning. For seniors at public institutions academic and institutional supports were again positively related to Level of Academic Challenge and expenses on instruction and research were positively related to Enriching Educational Experiences.

Results of freshman from private institutions only student service expenses were significantly related to the benchmark scores. For seniors at private institutions, instruction, public service, and student service were positively related to the Active and Collaborative Learning Benchmark. The instruction expense showed to have a positive relationship with Student Faculty Interaction and Enriching Educational Experience for seniors at public institutions and both freshman and seniors at private institutions. Limited relationships were found for the expense categories related to research, public service, and student services.

Overall, these results add to the complexity of understanding the impact of institutional expenditures on the learning environment. Institutional control, the student's year in college, and the type of engagement all impact the relationship between expenditures and engagement. One important finding in this study is the impact of instructional and institutional expenditures on student engagement.

Pike, Kuh, McCormick, & Ethington (2011) looked to address some of the inconsistent findings in the cost function research. They argued for several factors they believe are contributing to the disparate results from varying studies. First, they argue that links between expenditures and outcomes are most likely minimized given only a small amount of variation in outcomes is attributed to differences across institutions. Second, the different results from studies may lie in the fact that they use different definition for both expenditures and outcomes. Third, they propose that expenditures have an indirect relationship on learning outcomes.

Finally, many studies do not account for student differences as they move through the college process and that differences exist between the outcome measure for freshman, sophomore, juniors and seniors.

These four factors served as the foundation for the guiding questions of this research. First, do student-learning outcomes vary significantly across institutions? Second, after controlling for student and institutional characteristics, are learning outcomes related to combined expenditures? Third, after controlling for student and institutional characteristics are expenditures directly related to measures of student engagement? Finally, do expenditure relationships differ by student class level?

The data for this study included student responses for the spring 2004 National Survey of Student Engagement (NSSE) administration yielding 34,823 first year students and 34,606 senior level students. Student engagement was measured using response data from this survey as represented in NSSE's five benchmarks; Level of Academic Challenge, Student-Faculty Interaction, Supportive Campus Environment, Enriching Educational Experiences, and Active and Collaborative Learning.

Additional student level variables from the NSSE were used for control; gender, ethnicity, transfer status, enrollment status, first generation student, residence, and major. Institution level variables were also used for controls and obtained from the Integrated Postsecondary Educational Data System and the College Board. These variables included institutional size, level of graduate enrollment, selectivity, part time enrollment levels, graduate coexistence, residential population, percent of students majoring in arts and sciences, and percent of students entering as transfer student.

The independent variable for this study was institutional expense data obtained from the

2003-2004 IPEDS finance survey. Combined expenditures in instruction, academic support, student services, and institutional support were used and divided by FTE enrollment to produce expenditure measures for this study.

Given that the students were nested within institutions, hierarchical linear modeling was used. A series of models were specified and tested. Results indicated that there was statistically significant differences in learning outcomes between institutions although small compared to the differences within each institution.   The combined expenditures were positively and significantly related to two of the five NSSE benchmarks, academic challenge and student faculty interaction for both freshman and senior level students.

Persistence and Graduation Rates as Outcome Measures

Ryan (2004) examined the impact of institutional expenditures on 6 year graduation rates. The sample for this study included 363 baccalaureate institutions based on Carnegie classification. Institutional expenditures for instruction, academic support, student services, institutional support and 6 year graduation rates for the fall 1995 freshman cohort were collected from the IPEDS data set for each institution. Each expense categories was combined with the institutional full time equivalency enrollment (FTE). The result was an average expenditure per FTE for each of the separate categories. There were several hypotheses posed by the researcher. First, they believe a positive significant relationship exists between expenses on instruction, academic support, student support, and graduation rates. Second, institutional support expenses will have a negative effect on graduation rates.

An ordinary least squares regression was used to test these hypotheses. In addition to the previously mentioned variables, academic preparation, gender, ethnicity, age, institutional size, residential nature of campus, institutional affiliation, and institutional control were used as

control variables.

Results indicate that there is a significant positive relationship between instructional and academic support expenses and graduation rates. In fact instructional expenditures had the highest beta coefficient in the model (b=.281). Expenditures on student services and institutional support did not have a statistically significant effect on student graduation rates.

The finding regarding instructional expenditures and graduation rate is one that suggests further research. While somewhat intuitive it would be beneficial to look at the detailed expenses to see what actually comprises the total category and see if there are some expenses which are more impactful than others. For example, is faculty salary the primary driver or is it the instructional technology employed by the institution? Additional research has produced similar findings as it relates to institutional expenditures and persistence and graduation rates.

Using Tinto's academic departure theory Gansemer-Topf and Schuh (2003) looked to determine whether expenditures on academic support and instruction have an effect on student retention and graduation rates. Tinto argued that the more academically and socially integrated student were to the campus environment the more likely they were to persist and ultimately graduate and believed that the academic component was the more important of the two. Many institutions have developed programs that allow students to become more involved on campus, many with an academic and social component intertwined including learning communities, service learning, and specialized residential communities. While research has been conducted and found that these activities do indeed improve retention and graduation rates the funding aspect has been largely ignored.

The sample for this study included 216 private and public Research and Doctoral Universities. Data was collected from the Integrated Postsecondary Educational Data System

(IPEDS), and the US News and World Report "America's Best Colleges" issue. Data from IPEDS was collected for the 1999 academic year and retention and graduation rates were obtained from the 2001 US News data source.

Multiple regression analysis indicated that instructional and academic support predict and have a significant and positive relationship to first year retention rates indicating the more institutions spent per student in these areas, the higher the first year retention. Results also showed that instructional and academic support expenditures predict and were positively and significantly correlated to graduation rates indicating that institutions allocating more resources to these areas had higher graduation rates.

In a follow up study Gansemer Topf & Shuh (2006) examined the impact of institutional selectivity and expenditures on graduation rates. The sample consisted on 466 private institutions. Expenditure and graduation data was obtained from IPEDS while selectivity was based on Barron's selectivity measure.

Multiple regression analysis indicated that selectivity and institutional expenditures explained over 60% of the variance in graduation rates. When segmenting low and high selective institutions results indicated that expenditures explain 30% of the variance in graduation rates for low selective institutions (those defined as less competitive) and 49% for high selective institutions (those defined as most competitive).

When looking at the expenditures separately the results indicated that for low selectivity institutions expenditures on instruction and institutional grants had a positive impact on graduation rates while expenditures on student services had a negative impact. For high selectivity institutions expenditures on instruction and academic support had a positive impact on graduation rates.

Webber & Ehrenberg (2010) explored whether institutional expenditures other than those aimed at instruction impacted persistence and graduation rates. The sample for this study consisted of 1161 four-year colleges and universities. These institutions were then segmented by Carnegie classification as well as student characteristics. The stratification based on student characteristics is important given that research has demonstrated institutional expenditures have different outcomes depending on the composition of the student body.

Using econometric modeling techniques involving the estimation of equations using a panel of data for four years 2002-2003 to 2005-2006, Webber & Ehrenberg conducted a simulation to see if a reallocation of resources would impact graduation rates. Results indicate that student service expenditures impact graduation indicating that increasing student service expenditures by $500 dollars per student would increase the graduation rate by 0.7 percentage points. In particular these expenditures are more important at institutions where the incoming test scores are lower and those that have a higher percentage of Pell Grants per student. The simulation pointed to the fact that a reallocation of funds from instruction to student service would increase graduation rates at these institutions. These findings are extremely important to less selective institutions and those with a large percentage of Pell recipients.

Hamrick, Schuh, and Shelley (2004) examined the impact of institutional characteristics and resource allocation on graduation rates. The sample consisted of 444 public institutions. Using IPEDS data institutional characteristics, expenditures, and graduation rates were extracted.

Full model regression, bivariate regression, and hierarchical modeling were used to analyze the data. Results highlighted the importance institutional characteristics play in graduation rates. In particular the lower the percentage of applicants admitted, the higher the graduation rate. From an expenditure perspective instructional, library, and academic support expenditures

impacted graduation rates explaining between 21% and 34% of the variance. These findings

emphasize the importance of instructional related expenditures.

Conclusion and Future Research

The convergence of financial constraints and an increased focus on student outcomes has

forced colleges and universities to re-evaluate how it allocates resources. Higher education

needs to determine how to effectively leverage limited resources to ensure that they are meeting

their mission of providing a quality educational environment for students. With limited

resources administrators must determine the most effective resource allocation to ensure that

while controlling for costs and aiming to deliver value to students they are not negatively

impacting the learning environment. There does appear to be a relationship between institutional

expenditures and student learning to some degree although the current research falls short of

providing a comprehensive conceptual model. Several areas need to be considered for future

research as this is a complex issue.

There are studies that find a link between instructional expenditures and graduation rates

where others highlight the impact of academic and institutional support expenses. One major

reason for this is how researchers define student learning. This is a common issue in higher

education as there has yet to be developed a widely accepted operational definition of student

learning and an exact way in which to measure it.   Without one agreed upon measure and

method studies took an institutional assessment view while others focused on student

completion. More recent studies have used student engagement as a proxy for student learning.

However, one common thread is present in all studies reviewed, institutional and student

characteristics must be accounted for in any analysis of expenses and student learning.

Future studies also need to refine their sampling. The studies reviewed demonstrated that the

link between expenditures and educational outcomes varies depending on size and control of institution as well as whether or not they offer graduate degrees. To limit these issues future studies may want to examine like institutions. For example, private institutions have significantly different funding sources that may impact their allocations and should be examine separately. Given that these studies cannot differentiate undergraduate and graduate expenses, baccalaureate and master's granting institutions should also be examine separately.

In addition to the outcome measure and sampling the expense variables used in the studies, while consistent based on IPEDS data, may be masking underlying institutional activities. Perhaps the traditional, global view of expenses is not sufficient. For example, the positive effects of instructional expenses on student learning may be the result of student faculty ratios and the ability for an institution to offer a wider range of course offerings.

The student service expenses may reflect an institution's commitment to diverse co-curricular offerings that increase student engagement. Additional research needs to deconstruct the traditional higher expense categories and determine what they represent at an operational level. This may prove to be difficult in that the IPEDS finance survey is the only common data set accepted in the current research environment. However, a consortium that is willing to provide more detailed data from the institutional budget, similar to the current Delaware Cost Study, may allow for more robust findings. For example, rather than just looking at the relationship between overall student service expenses and engagement researchers would be able to see if there is a relationship between the number of clubs and activities, the type of co-curricular programming and the composition of social experiences offered. Again, rather than just focusing on the resource, we could examine the utilization of those resources.

There are other data sources that may serve to complement the IPEDS data set and provide

future researchers with more detailed expense data. Colleges and universities are required to submit audited financials each year. These 990 forms are available to the public and provide similar information to the IPEDS in some respect but more detail in others, especially from the perspective of administrative costs and fundraising endeavors.

The research in this area is evolving and there are many opportunities for future research to address the aforementioned issues. In particular, the link between institutional expenditures and student engagement has significant potential to provide institutions important information when allocating resources in the context of finite dollars while ensuring student learning is still supported as needed.

CHAPTER III: Data and Methods

The purpose of this study was to determine which institutional expenditures contribute positively to institutional graduation rates. More specifically, this study examined the relationship between institutional expenditures (instruction, academic support, student service, institutional support) and completion as measured by 6-year graduation rates among moderately and less selective private institutions, defined as those admitting 70% or more of their applicants. This cutoff is consistent with the selectivity categories found in Barron's rankings although their term of classification is less competitive. In addition, institutional expenditures and graduation rates were analyzed based on the level of institutional selectivity.

This chapter begins with the presentation of the theoretical framework that guided this study. The sample used for this study and the methods of data collection are discussed. Next, the study's research questions are presented followed by a detailed account of all independent and dependent variables used in the study providing both description of each variable and the way they were collected as well as he data sources that were used. Finally, a description of the research design that was used to address the proposed research questions is described. Specifically, the rationale for using a Linear Mixed Model as data analysis strategy is provided.

Theoretical Foundations

Research conducted by Berger and Milem (2000) analyzed student completion research through the lens of organizational theory. Their work identified two overarching categories, the "structural demographic features" of the institution including size selectivity, and student body composition and "organizational behavior dimensions" when assessing current literature on persistence and completion. Berger (2001) defines behaviors as the actions of organizational agents (faculty, administrators, and staff) at a college or university. One major "behavior" of

these agents is the determination of where to allocate its resources. This is a different way of looking at the relationship between college priorities and graduation rates, given that many times studies on college persistence and completion focus on the student characteristics and their behaviors. To address this issue, researchers have argued that looking at issues such as attrition from an organization perspective as opposed to solely a student perspective could provide a better understanding of how the college's structure and decisions impact student persistence and college completion (Berger & Milem, 2000).

The impact of administrative behavior through these decisions has been shown to influence student outcomes and when viewed through this lens allows institutions to develop more direct policies to influence student persistence and not just dwell on theory (Tinto, 1993). Resource allocation is an important decision that institutions make on an annual basis. This is where this study links its research inquiry to the theoretical framework. Hanson and Stampen (1996) argued that the way in which colleges and universities spend their resources demonstrates the priorities of the institution.

In this study the institutional resources referred to expense patterns in the areas of instruction, student service, academic support and institutional support. The underlying assumption is that if college completion is an important priority for an institution, one may be able to determine if their actions, measured in this study as their institutional expenditure decisions, are consistent with this priority.

Using organizational behavior and in particular their resource allocation policies as a theoretical framework, this study examined if there is a relationship, if any, between institutional expenditures on instruction, academic support, student services and 6-year graduation rates at moderately and less selective institutions.

Research Questions

The following research questions were explored in this study:

1. Did the recession of 2008 influence institutional expenditures?

2. Do 6-year graduation rates differ by level of selectivity?

3. Do institutional resource allocations in terms of average expenditure per FTE differ by level of selectivity?

4. Is there a relationship between institutional expenditures and completion as measured by 6-year graduation rates?

5. What influence, if any, do institutional characteristics and institutional expenses have on 6-year graduation rates?

Data Sources

Data for this study was obtained exclusively from the Integrated Postsecondary Educational Data System (IPEDS). IPEDS is a collection of mandatory surveys required of all institutions that receive federal financial aid and offer the most robust data set for this type of research given the required submission for each institution.

The data for this study reflects the 2006, 2007, 2008, 2009, 2010, 2011 reporting years to evaluate any changes that occurred in institutional expenditure policies after the recession of 2008. Years prior to 2008 served as a baseline measure and those after 2008 were included to see if there were any significant changes in expenditure patterns. Given that the recession impacted different areas at different times all available years after 2008 were included in this study. In addition the 2006 data collection cycle was the starting point for this analysis given changes that were made to the IPEDS data collection. The expense categories were revised in this collection year and for the first time added athletic expenditures to the student service

category and out of the institutional support category where they had been previously reported. By using data from 2006 through 2011, the most current year available at the time of this study, all expense categories were reported consistently.

The IPEDS Data Center was used for all data extraction. This online portal allows for the selection of institutions through segmentation of several categories including but not limited to control; private or public, geographic location, size, acceptance rate and Carnegie Classification. Using the threshold of an acceptance rate above 70 percent for all private institutions an initial data extraction yielded 374 institutions. Those that failed to report a graduation rate for more than three of the six reporting years were removed as were Rabbinical Schools and Seminaries. The final sample for this study was 363 private, nonprofit, four year institutions, with an average acceptance rate of 70% or greater for the previously mentioned reporting years, that are similar in terms of Carnegie classifications in the United States including Doctoral Research Universities, Master's Colleges and Universities, and Baccalaureate Colleges.

For profit institutions were not included in this study given the nature of their business model. While instructional expenses at for-profit institutions could be compared to nonprofit, although the majority of the expense would be adjunct driven, the fact that they do not offer student activities and a traditional campus makes a comparison in other expense categories such as student service and academic support problematic.

The rationale behind selecting only private 4-year institutions and excluding public 4-year institutions relates to the funding sources of these institutions. Public institutions receive the overwhelming majority of their funding from the state while private institutions rely on tuition and fees from students, fundraising, and grants. Tuition and fees are by far the largest funding source for private institutions (NCES, 2014). Therefore, the current demographic

climate of a plateauing traditional college age population, stagnant endowments that are still recovering from the recession of 2008, and lower household income, impacts them to a greater degree (Moody's, 2013). The high level of tuition dependency for private colleges makes resource allocation and re-allocation a challenge given that revenue can fluctuate significantly from year to year.

The utilization of Carnegie classification is an attempt to include institutions with graduate programs of similar size given undergraduate and graduate expenses cannot be identified separately. The IPEDS Data Center allowed for the identification of institutions that meet these requirements. Table 1 describes the actual criteria entered into the IPEDS Data Center.

Table 1

IPEDS Data Center Selection Criteria

Category	Selection Criteria
Geographical region	United States
Sector	Private not-for-profit, 4-year or above, primarily baccalaureate and above
Carnegie Classification 2010: Basic	Doctoral/Research Universities
	Master's Colleges and Universities ;
	Baccalaureate Colleges--Arts & Sciences

Variables

The dependent variable for this study is the institutional six-year graduation rate that was obtained from the IPEDS graduation rate survey. The graduation rate survey is required from

every institution during the winter collection cycle each year. Detailed criteria are provided by IPEDS to each institution to establish their initial cohort, identify acceptable exclusions, and properly calculate a 4, 5, and 6-year graduation rate.

In short, the graduation rate is a calculation of the percentage of students that were part of the first time, full time freshman cohort in a given year who completed their bachelor's degree within a six-year time frame. It must be noted that there are limitations to using 6-year graduation rates. The data only reflects first time freshman, not including the transfer and part time student population. In fact, a recent report from the American Council on Education found that approximately 61% of the students at four-year colleges are excluded based on the current definition. While not perfect it is still the most precise measure of completion available.

Institutional characteristics and institutional expenditure data served as the independent variables and were obtained from the IPEDS Institutional Characteristics, Enrollment, and Finance Survey. Institutional characteristics, the percentage of students who were white, selectivity, and institutional size were included to address the structural demographic category of the theoretical framework. Several expense categories were included such as the amount spent on instruction, student service, institutional support and academic support to address the organizational behavior dimension category of the theoretical framework. All of these variables were extracted from the IPEDS Data Center and are presumed to be consistent with the required reporting definitions. Unlike audited financial statements the IPEDS data breaks down expenses by a more granular level making it more useful in this type of analysis. The categories in the audited financials provide a line item for library and instruction. However, student services, academic support, and institutional support are not segmented.

Instruction is a functional expense category that includes expenditures for all schools, departments and other instructional division of the institution's credit and non-credit activities, public service, and research that were not separately budgeted for.

Academic support is an expense category that includes expenses for support services that are part of the institution's mission of instruction, research, or public service and were not directly charged to these primary programs. Expenses related to libraries, museums, galleries, audiovisual services, academic development, academic computing, curriculum development and academic administration are included in this category

Student service is a functional expense category that includes expenses for admissions, student life, athletics and registrar activities. It is mainly comprised of administration that deals directly with students and includes areas that impact the student's academic and social development outside of the classroom setting.

Institutional support is a functional expense category that includes the cost of day-to-day activities. Administrative roles and activities that are not directly involved with students are included such as the institutional accounting office, institutional research, and fundraising

The full time equivalent enrollment for each institution was obtained from the IPEDS Institutional Characteristics survey. The Institutional Characteristics survey is required from each institution and includes enrollment and descriptive components. Full time equivalent enrollment (FTE) is the total full time enrollment for an institution plus one third of the part time enrollment. All expense categories will be divided by the institutional FTE to normalize the data and account for differences in institutional size. This is common practice in higher education research to address any imbalances in the proportion of full time and part time students.

The percent of undergraduate students who were white was obtained from the IPEDS

Enrollment survey that is required during the spring collection cycle. The percentage of students

admitted was taken from the Institutional Characteristics survey that is required during the spring

collection cycle. It is important to note that the percentage of white students were taken from the

entire students population while acceptance rate is solely based on the first time, full time

freshman class entering that specific year. These are limitations present in the IPEDS data

collection process.

Methods

In order to address the proposed research questions five types of analysis were conducted.

First, descriptive statistics were used to examine the average expenditure per FTE over time to

identify overall trends. Second, an ANOVA was run to determine if expenditures and

institutional 6-year graduation rates increased or decreased significantly over the selected time

period and whether graduation rates and expenditures differed by level of selectivity (low,

medium, and high).

Third, institutions in the sample were organized into three categories by average six-year

acceptance rate. Institutions with an acceptance rate of 70-79% were categorized as low,

institutions with an acceptance rate of 80-89% were medium, and institutions with an acceptance

rate of 90% or higher were high. An analysis of variance was conducted to see if there were

differences in graduation rates and total expenditure amounts in each category.

Fourth, a correlation analysis was conducted to see if there was any relationship between

the independent variables and graduation rates. This analysis also allowed the assessment of

multicolinearity.

Finally, a linear mixed model (LMM) was used to determine what institutional expenditures impact graduation rates. While a traditional multiple regression would have appeared to suffice initially, the nature of the data set lends itself to a multi-level model. LMM allows for the organizational change to be to be analyzed over time. In this study the organization is each of the colleges or universities included in the sample. Second, the use of LMM allows for the study of change over time and accounts for certain characteristics of longitudinal data such as multiple observations and homogeneity that occur over time when there are repeated measures for the same person or institution (Raudenbush & Bryk, 2002).

In this study the unit of analysis is the institution with six years of graduation rate and expenditure data. By using a hierarchical design, the relationships of variables, year over year expenditures, in the data sets and their dependency will be addressed. Finally, LMM allows for the characterization of individual patterns of behavior for individual cases, in this case the allocations of resources for each institution (West, 2009).

The reason for choosing LMM was that the nature of the data could result in misleading interpretations based on the inter-relation of the variables from year to year rather than actual statistical relationships. Linear mixed models are appropriate when examining clustered or dependent data and in this case when data is collected for institutions over time. Using LMM allows the researcher to improve estimation of effects within individual data points, limiting the impact of nested data (Heck, Thomas, & Tabata, 2010; Raudenbaush & Bryk, 2002).

The following equations were used to assess the impact of institutional characteristics and expenditures on 6-year graduation rates.

$$Y_{ij} = B_{0j} + B_{ij}(time) + e_{ij}$$

$$B_{oj} = B_{00} + B_{01}(FTE) + B_{02}(percwhite) + B_{03}(admit) + B_{04}(instruc) + B_{05}(studserv) + B_{06}(academsupp) + B_{07}(instsupp)$$

$$B_{ij} = B_{10}(FTE) + B_{11}(percwhite) + B_{12}(admit) + B_{13}(instruc) + B_{14}(studserv) + B_{15}(academsupp) + B_{16}(instsupp)$$

The first equation expresses the trajectory of the institutional graduation rate over the time period in the study. The second equation between institution characteristics has been added to the model to account for differences in the intercepts. Finally, the third equation models the growth differences between institutions to look for variation in the intercept (Singer & Willet, 2003; Hecht, Thomas & Tabata, 2010).

Limitations

Several limitations of this study should be acknowledged. Several pertain to the data being used for the analysis and one deals with the sample of institutions selected.

The data for this analysis relies on information extracted from the Integrated Postsecondary Education Data System. There are limitations to using data from the IPEDS surveys. Although there are clear definitions for each data element the data is still self-report and allows for some variation in interpretation from those individuals responsible for the submission. Institutions may allocate expenses in a slightly different manner depending on their operations although as a whole, the data set has been used extensively despite these discrepancies.

A second limitation with respect to IPEDS data was that it is not possible to distinguish between expenditures related to undergraduate and graduate studies. A third limitation is the graduation rate metric. There has been criticism of the fact that it only measures completion for first time full time freshman and does not account for transfer students. While this is a limitation there is currently no alternative.

The timeframe for this study could also be considered a limitation. The six years used in this study were intended to measure any impact that the financial downturn of 2008 may have

had on college and university spending patterns. It is conceivable that the impact from the recession of 2008 will have an impact in future years and that the three years after the recession were not long enough to account for any institutional allocation changes attributed to the recession. In addition, the time period chosen was only six years and may not have been ample time to demonstrate real changes in graduation rates.

The sample of moderately and less selective institutions is a limitation in this study. It does not include any selective private institutions nor does it assess expenditures at public and for-profit institutions.

Finally, the data for expenditures did not account for different costs of living across the country. Faculty salaries and the cost to do business vary from state to state and even region to region.

CHAPTER IV: Results

This chapter is divided into four main sections with each section related to one of the research questions. The first section presents the results of descriptive statistics for all institutions; graduation rate, instructional expense per FTE, institutional support expense per FTE, student service per FTE, and academic support per FTE are examined. The results of one-way ANOVA are then presented for each variable to identify significant differences over time.

The second section of the chapter examines the sample by level of selectivity to determine if there were any significant differences in graduation rates and expenses. This analysis includes all six years of data and categorizes the sample population by their admissions rates.

The third section looks at the relationship between institutional characteristics, institutional expenditures, and graduation rates and provides the interpretation of a correlation analysis.

The final section describes the results of Linear Mixed Model (LLM) that was employed to determine what impact specific institutional characteristics and expenditures have on graduation rates.

Results of Descriptive Analysis

Research Question 1: Did the recession of 2008 influence institutional expenditures?
To address this research question descriptive statistics were computed for all variables.

The mean six-year graduation rate from 2006 to 2011 was 55.38% for selected institutions.

Table 2

Mean 6-Year Graduation Rates (N = 363)

Year	Minimum	Maximum	M	SD
2006	12	90	55.69	13.605
2007	5	92	54.92	15.099
2008	1	100	55.54	15.430
2009	9	100	55.38	14.245
2010	9	100	55.09	14.780
2011	17	95	55.63	13.878

The mean six-year graduation rate has remained consistent over the selected time period. It is important to note that there are outliers, noting minimum and maximum rates, which approach both the high and low end of the spectrum. This demonstrates substantial variation due to a rather large standard deviation in terms of graduation rates. When compared to all private institutions across the states from the IPEDS data collection tool, the moderately less selective institutions in this study lag by approximately 8-10% in terms of six-year graduation rate (see Table 3).

Table 3

Comparison of Sample versus all Private College Graduation Rates for 2006 to 2011

	2006	2007	2008	2009	2010	2011
All Private 4-Year	64.5	64.5	64.6	65.1	65.4	65.1
Sample	55.7	54.9	55.5	55.4	55.1	55.6
Difference	-8.8	-9.6	-9.1	-9.7	-10.3	-9.5

The average expenditure on instruction increased annually from 2006 to 2011. The overall increase was 14.7% from 2006 to 2011

Table 4

Summary of Expenditures (in $ per FTE) for Instruction (N = 363) for 2006 to 2011

	Minimum	Maximum	*M*	*SD*
2006	$,480.86	$26,095.77	$7,708.39	$2,983.03
2007	$1,696.57	$27,207.80	$7,993.56	$3,023.66
2008	$2,028.75	$27,586.80	$8,283.55	$3,073.23

2009	$1,913.81	$29,041.27	$8,415.44	$3,368.71
2010	$1,456.83	$27,165.95	$8,543.14	$3,273.46
2011	$2,179.53	$28,130.79	$8,842.48	$3,343.02

The average expenditures for six years were as follows; 2006 ($M = 7708$, $SD = 2983$), 2007 ($M = 7993$, $SD = 3023$), 2008 ($M = 8283$, $SD = 3073$), 2009 ($M = 8415$, $SD = 3368$), 2010 ($M = 8543$, $SD = 3273$), 2011 ($M = 8842$, $SD = 3343$). Similarly to graduation rates, there is also a significant variation in the amount spent on instruction as indicated by the standard deviation.

The average expenditure on academic support increased annually from 2006 to2011. The overall increase was $255.58 or 13.1% from 2006 to 2011.

Table 5

Summary of Expenditures (in $ per FTE) on Academic Support (N = 363) for 2006 to 2011

	Minimum	Maximum	*M*	*SD*
2006	$66.78	$9,018.66	$1,944.70	$1,207.86
2007	$160.19	$11,158.19	$2,049.90	$1,283.08
2008	$178.12	$11,865.99	$2,098.94	$1,319.37
2009	$133.56	$11,991.85	$2,112.50	$1,381.43
2010	$121.83	$11,566.11	$2,144.28	$1,397.96
2011	$155.26	$10,592.01	$2,200.28	$1,356.98

The average expenditures for all years were as follows; 2006 ($M = 1944.70$, $SD = 1207.86$), 2007 ($M = 2049.90$, $SD = 1283.08$), 2008 ($M = 2098.94$, $SD = 1319.38$), 2009 ($M = 2112.50$, $SD = 1381.43$), 2010 ($M = 2144.28$, $SD = 1397.96$), 2011 ($M = 2200.28$, $SD = 1356.98$).   While the percentage change for academic support was above 10%, it is worth noting that the actual dollar difference over six years is $255.58. This is somewhat counterintuitive in that less selective institutions are admitting students who are not at the highest level of academic performance and therefore they might need more academic support to succeed.

The average expenditure on student services increased annually from 2006 to2011. The overall increase was $745.86 or 23.1% from 2006 to 2011.

Table 6

Summary of Expenditures (in $ per FTE) on Student Service (N = 363) for 2006 to 2011

Year

	Minimum	Maximum	*M*	*SD*
2006	$38.19	$13,554.52	$3,227.55	$1,410.65
2007	$37.26	$10,738.48	$3,416.06	$1,473.61
2008	$31.90	$14,622.08	$3,569.47	$1,574.94
2009	$100.13	$18,750.91	$3,671.85	$1,813.02
2010	$101.34	$20,474.04	$3,770.27	$1,804.82
2011	$230.62	$15,118.39	$3,973.41	$1,757.86

The average expenditures for all years were as follows; 2006 (M = 3227.55, SD = 1410.65), 2007 (M = 3416.06, SD = 1473.61), 2008 (M = 3569.47, SD = 1574.94), 2009 (M = 3761.85, SD = 1813.02), 2010 (M = 3770.27, SD = 1804.82), 2011 (M = 3973.41, SD = 1757.86). The overall increase in student service expenses on a percentage basis is significant. This expense category is rather complex including operations from various areas of the campus such as admission, athletics, student activities thereby making the determination of what drove the increase difficult to ascertain.

The average expenditure on institutional support increased annually from 2006 to 2011. The overall increase was $385.96 or 8.2% from 2006 to 2011.

Table 7

Summary of Expenditures (in $ per FTE) on Institutional Support (N = 363) for 2006 to 2011

Year

	Minimum	Maximum	Mean	Std. Deviation
2006	$36.55	$38,077.20	$4,695.09	$3,192.15
2007	$385.57	$34,474.26	$4,851.52	$2,934.76
2008	$667.45	$28,438.94	$4,898.95	$2,708.07
2009	$838.28	$29,728.92	$4,826.90	$2,796.06
2010	$739.47	$29,974.09	$4,849.88	$2,763.06
2011	$1,079.99	$43,353.21	$5,081.05	$3,251.36

The average expenditures for all six years were as follows; 2006 ($M = 4695$, $SD = 3192.15$), 2007 ($M = 4851.52$, $SD = 2934.76$), 2008 ($M = 4898.95$, $SD = 2708.07$), 2009 ($M = 4826.90$, $SD = 2796.06$), 2010 ($M = 4849.88$, $SD = 2763.06$), 2011 ($M = 5081.05$, $SD = 3251.36$). The average expense on institutional support is second only to that of instruction. This expense category would reflect increases in the number of administrators outside of admissions, student services, and athletics such as finance office, human resources and compliance and is consistent with the current trend of growing administrations in higher education (Bean, 2005).

While graduation rates have remained consistent over the selected time period, all expenditure categories have increased to varying degrees. Not surprisingly, the average amount spent on instruction is the highest among all expense categories by a significant amount. Given the mission of these institutions one would hope to see the largest amount of investment in this area. Overall the average amount spent on academic support is by far the lowest of all reported categories.

Results from ANOVA

A one-way ANOVA was conducted to compare the influence of time on the average graduation rate. As seen in Table 8, there was no significant changes in graduation rates by time [$F_{(5, 2150)} = .164$, $p = .976$]. Figure 1 below shows a relatively consistent six year graduation rate from 2006 to 2011.

Figure 1

Mean Graduation Rates (N = 363) from 2006 to 2011
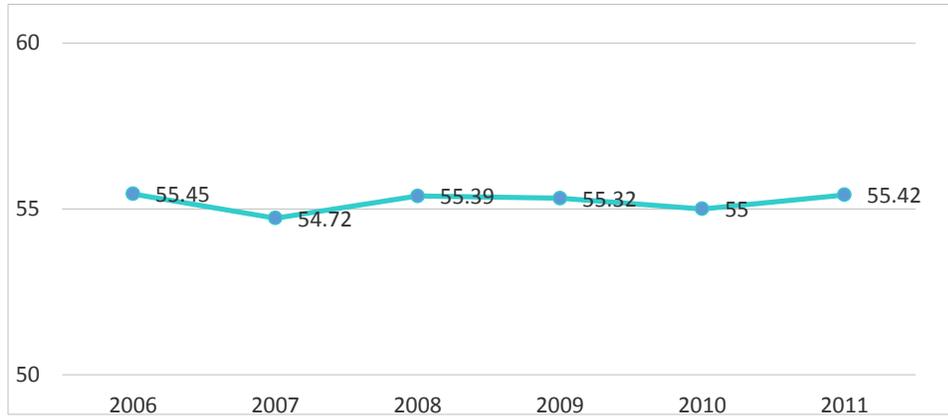
Table 8

Analysis of Variance for Graduation Rates by Year 2006-2011

	F	df	Mean Square	Sig.
Between Groups	.164	5	34.519	.976
Within Groups		2150	210.837	
Total		2155		

A one-way ANOVA was conducted to compare the effect of time on the instructional expenditures per FTE. Instructional expenditures were adjusted using CPI with 2006 as the base year. Figure 2 provided below shows an increase in instructional expense per FTE of roughly

$200 from 2006 to 2011. Table 9 indicates that while there was an increase it was not

statistically significant.

Figure 2

Mean Expenditures (in $ per FTE) on Instruction (N = 363) for 2006 to 2011
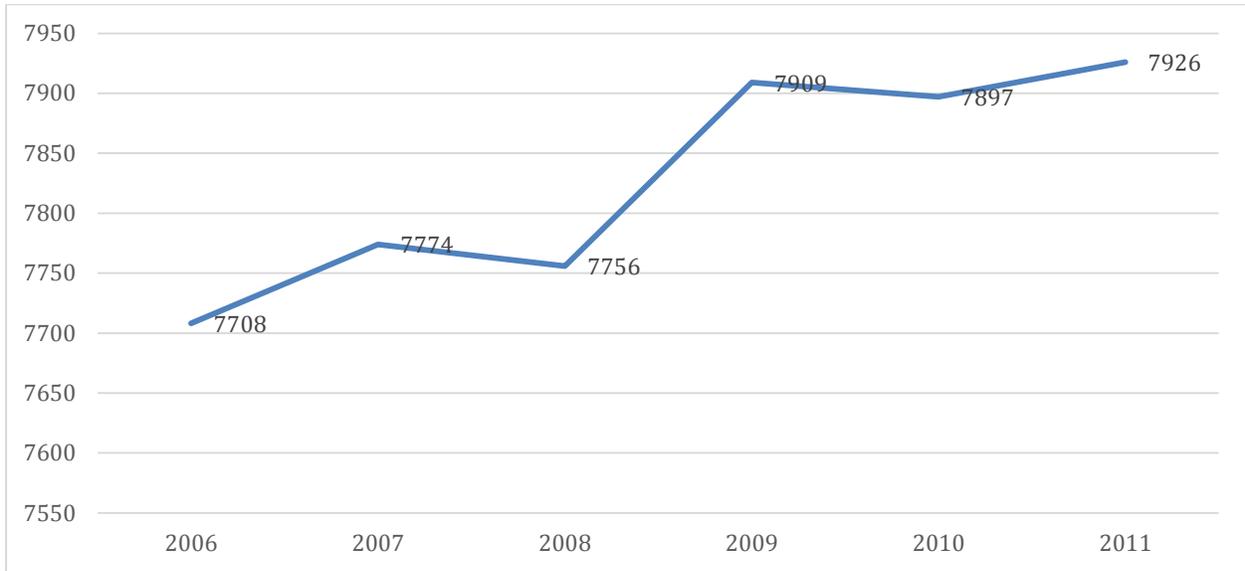
Table 9

Analysis of Variance for Instruction by Year 2006-2011

		F	df	Mean Square	Sig.
instruction	Between Groups	.350	5	3150614	.882
	Within Groups		2172	8997667	
	Total		2177		

There was a no significant effect of time on instructional expenditures per FTE [F

$(5,2172) = 3.50$, p=.882]. While nominal dollars show an increase, after adjustments for

inflation there was no significant difference.

A one-way ANOVA was conducted to compare the effect of time on the academic

support expenditures per FTE. Academic support expenditures were adjusted using CPI with

2006 as the base year.   Figure 3 shows relatively static spending on academic support per FTE

and Table 10 confirms that there was no statistically significant change over time.

Figure 3
Mean Expenditures (in $ per FTE) on Academic Support (N = 363) for 2006 to 2011
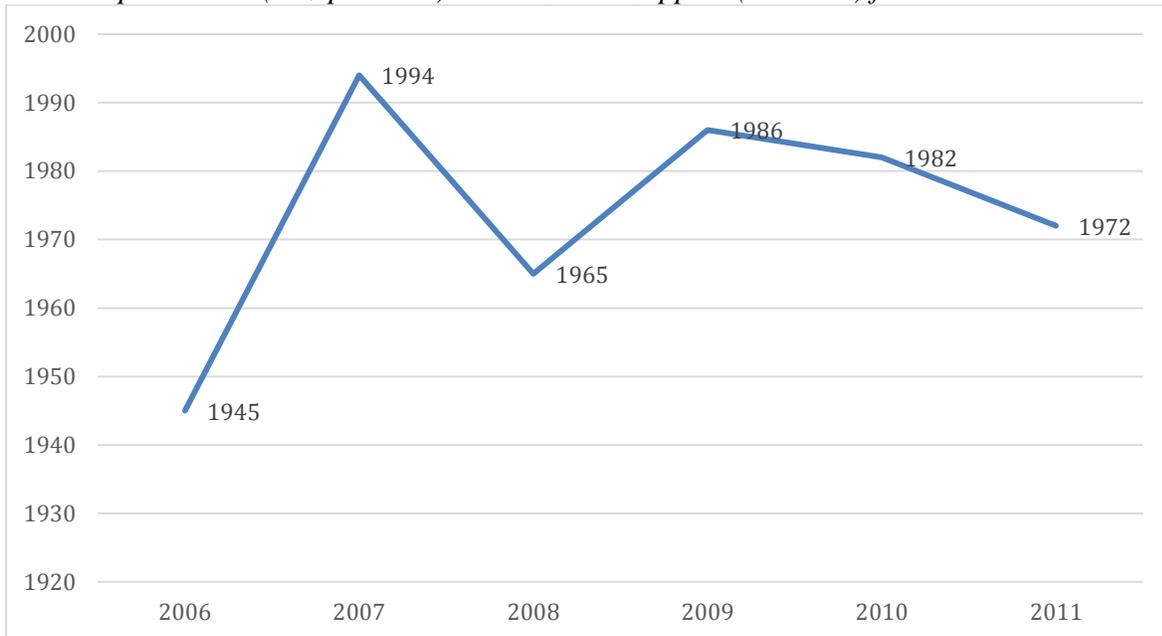
Table 10

Analysis of Variance for Academic Support by Year 2006-2011

		F	df	Mean Square	Sig.
academic support	Between Groups	.07	5	109905	.997
	Within Groups		2172	1562880	
	Total		2177		

There was not a significant effect of time on academic support expenditures per FTE at the p<.05 level [F (5, 2172) = .070, p=.997]. Therefore, while there was a slight increase over time, it was not significantly higher from the baseline year of 2006.

A one way ANOVA was conducted to compare the effect of time on the student service expenditures per FTE. Student service expenditures were adjusted using CPI with 2006 as the base year.

Figure 4

Mean Expenditures (in $ per FTE) on Student Service (N = 363) for 2006 to 2011
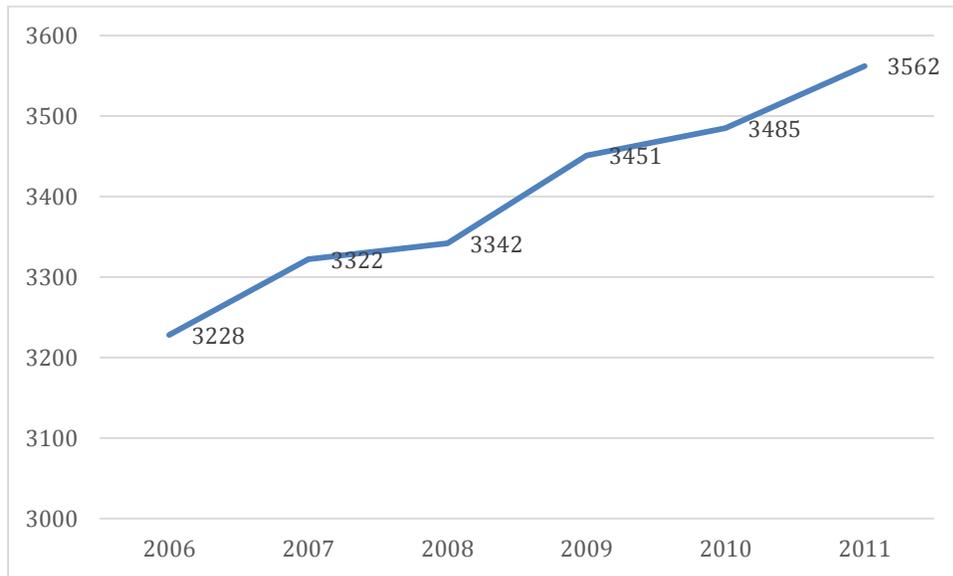
Table 11

Analysis of Variance for Student Service by Year 2006-2011

		F	df	Mean Square	Sig.
student service	Between Groups	2.27	5	5453033	.043
	Within Groups		2172	2398034	
	Total		2177		

There was a significant effect of time on student service expenditures per FTE [F (5,

2172) = 2.27, p < .05]. Post hoc comparisons using the Tukey HSD test indicated the mean

expenditures for the initial year 2006 ($M = 3228$, $SD = 1411$) was significantly lower than the

year 2011 ($M = 3562$, $SD = 1576$).

A one-way ANOVA was conducted to compare the effect of time on the institutional

support per FTE. Institutional support expenditures were adjusted using CPI with 2006 as the

base year.

Figure 5

Mean Expenditures (in $ per FTE) on Institutional Support (N = 363) for 2006 to 2011
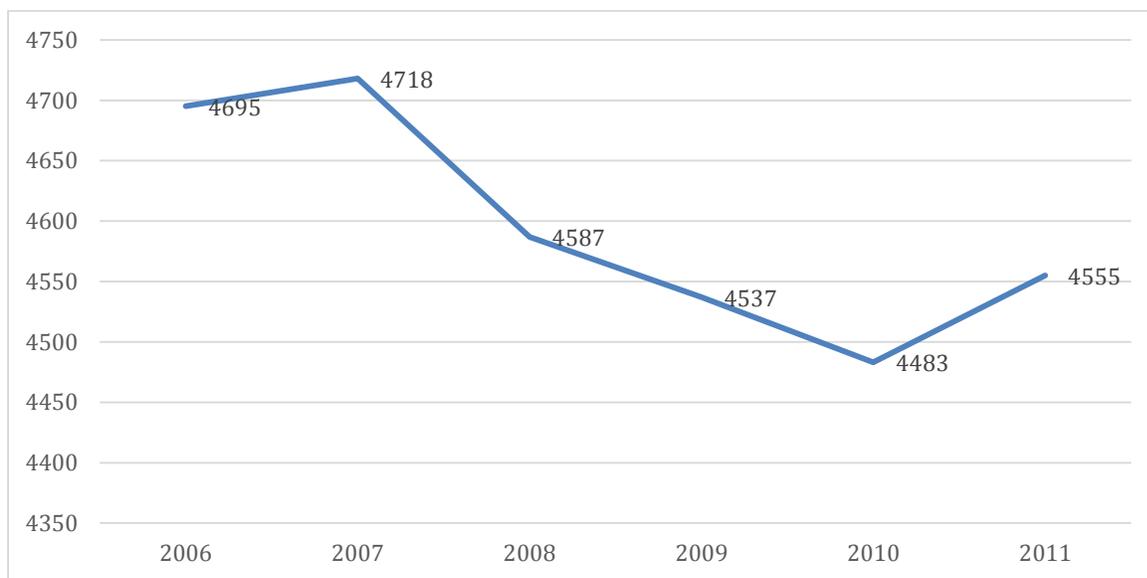
Table 12

*Analysis of Variance for Institutional Support by Year 2006-2011*

		F	df	Mean Square	Sig.
institutional support	Between Groups	.40	5	3108868	.849
	Within Groups		2172	7781489	
	Total		2177		

There was a no significant effect of time on institutional support expenditures per FTE at the p<.05 level [F (5, 2172) = .40, p = .849]. The average amount spent per FTE is second highest behind instructional expenditures. The growth in administrative positions at colleges and universities has been well documented and has raised concern that the increase is both unwarranted and is taking away from the educational mission of colleges and universities (Arum & Roska, 2011).

While all expenditure categories increased over time, the rate of change varied. After accounting for inflation rate, the only expense category that outpaced inflation and represents a substantial increase in real dollars is the area of student service.

It is worth noting that the fiscal downturn of 2008 does not seem to have any direct influence on institutional expenditures. All expense categories increased over the selected time period. However, only the student service expense category showed significant increases from a

statistical and inflationary point of view. The trend analysis shows a shifting of institutional

expense priorities with an ever-increasing emphasis on student service.

Moderately and less selective private institutions, defined as those who had an average

graduation rates of 70% or greater from 2006-2011, were categorized as high (6-year average

acceptance rate between 90 and 100%), medium (6-year average acceptance rate between 80 and

89%), and low (6 year average acceptance rate of 70-79%). Table 13 shows the mean graduation

rate and average expenditure by category by level of selectivity. Institutions that have the highest

acceptance rate lag in both graduation rates and the dollar amount of expenditures in each

category. Low and medium level institutions have more comparable graduation rates and

spending amounts.

Results of Descriptive Analysis by Institutional Selectivity

Research Question 2: Do 6-year graduation rates and levels of resource allocation differ

by level of selectivity? Descriptive analysis of institutional selectivity showed differences in both

graduation rates and expenditures. An ANOVA was then used to determine if the differences

were statistically significant. Results from this analysis are presented and described in

subsequent tables.

Table 13

Average Graduation Rates and Institutional Expenditures by Level of Selectivity

	N	*M*	*SD*
graduation rate			
low	1416	56.05	13.86
medium	666	54.6	15.41
high	96	50.55	16.38
instruction per FTE			
low	1416	8330.80	2841.02
medium	666	8410.27	3849.27
high	96	7029.83	2970.63
academic support per FTE			
low	1416	2088.22	1245.07
medium	666	2104.31	1468.61
high	96	2057.04	1468.99
student service per FTE			
low	1416	3731.95	1716.68
medium	666	3463.55	1502.80
high	96	2708.46	1565.60
institutional support per FTE			
low	1416	4810.27	2558.06
medium	666	5116.33	3677.36
high	96	3979.28	2377.08

Results from ANOVA by Selectivity

A one-way ANOVA was conducted to determine whether there was a significant

difference in average graduation rate by level of selectivity.

Table 14

Analysis of Variance for Graduation Rates by Selectivity

	F	df	Mean Square	Sig.
Between Groups	7.635	2	1596.839	.000
Within Groups		2153	209.140	
Total		2155		

There was a significant effect of selectivity on graduation rate [F (2, 2153) = 7.63, p < .05]. Post hoc comparisons using the Tukey HSD test indicated the mean graduation rate for institutions ranked high was significantly lower (M=50.55, SD = 16.38) than those in the rank of low (M = 56.05, SD = 13.86). Those that are more selective even within the moderately less selective institutional sample tend to have a higher graduation rate.

A one-way ANOVA was conducted to compare institutional expenditures by selectivity.

Table 15

Analysis of Variance for Expenditures by Selectivity

		F	Df	Mean Square	Sig.
Instruction	Between Groups	8.081	2	82155066	.000
	Within Groups		2175	10166698	
	Total		2177		
academic support	Between Groups	.068	2	119190	.935
	Within Groups		2175	1762203	
	Total		2177		
student service	Between Groups	20.869	2	56655220	.000
	Within Groups		2175	2714799	
	Total		2177		
institutional support	Between Groups	7.039	2	60805473	.001
	Within Groups		2175	8638563	
	Total		2177		

There was a significant effect of selectivity for instructional expense [$F_{(2, 2175)}$ = 8.08 , $p < .05$], student service [$F_{(2, 2175)}$ = 20.87 , $p < .05$], and institutional support [$F_{(2, 2175)}$ = 7.04 , $p < . 05$].

Post hoc comparisons using the Tukey HSD test indicated the average instructional expenditures for the institutions ranked high (M = 7029, SD = 2970.) was significantly lower than institutions ranked medium (M = 8410, SD = 3849), and low (M = 8330, SD = 2841).

Average student service expenditures for the institutions ranked low (M = 3732, SD = 1717) was significantly higher than institutions ranked medium (M = 2104, SD = 1469), and high (M = 2057, SD = 1469). Average institutional support expenditures for the institutions ranked high (M = 3979, SD = 2377) was significantly lower than institutions ranked medium (M = 5116, SD = 3677), and low (M = 4810, SD = 2588).

In sum, the more selective of institutions within the sample tend to spend more on instruction, student service, and institutional support than those that are the least selective.

Results from Correlation Analysis

Research Question 3: Is there a relationship between institutional expenditures and college completion as measured by 6-year graduation rates? In order to address this research question a correlation analysis was conducted to examine if there was a relationship between all institutional expenditures variables and graduation rates. The correlation matrix highlights that several variables had a significant correlation to graduation rates.

The results of the correlation analysis indicate that in terms of graduation rate six of the seven independent variables had a significant correlation at the p < .05 level, (percentage of students who were white r(2154) = .26, FTE r(2154) = .18, percent of students admitted r(2154) = .05, instructional expense per FTE r(2154) = .41, academic support expense per FTE r(2154) = .21, student service expense per FTE r(2154) = .11. Although significant, only the instructional expenses per FTE indicated an even moderately strong correlation to graduation rate. The correlation analysis also indicates that there does not appear to be any issues related to colinearity with no coefficients above .70.

Table 16

Correlation Matrix Examining Variables Related to Graduation Rates

	instruction	academic support	student service	institutional support	graduation rate	percent white	FTE
instruction							
academic support	$.492^{**}$						
student service	$.420^{**}$	$.318^{**}$					
institutional support	$.328^{**}$	$.274^{**}$	$.317^{**}$				
graduation rate	$.411^{**}$	$.205^{**}$	$.110^{**}$	.008			
percent white	$.053^{*}$	-.035	$.070^{**}$	-.042	$.258^{**}$		
FTE	$.094^{**}$	$.135^{**}$	$-.169^{**}$	$-.195^{**}$	$.180^{**}$	$-.121^{**}$	
percent admitted	.032	.042	-.016	-.011	$.051^{*}$	.042	$-.092^{**}$

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Results from Linear Mixed Model

Research Question 4: What influence do institutional characteristics and institutional expenses have on 6-year graduation rates?A linear mixed model (LMM) was chosen to examine the influence of institutional expenditures on graduation rates. Using LMM provides flexibility when dealing with datasets that may contain missing data. In the sample used for this study missing data was found in both graduation and acceptance rates. Imputation was considered but it was less than 2% of the entire data set. More importantly LMM reduces the error variance using data that is highly interrelated (Shek & Ma, 2011). As previously stated the correlation analysis indicates that there does not appear to be any issues related to colinearity with no coefficients above .70.

Therefore, given the nature of the dataset, Linear Mixed Modeling was thought to be an appropriate statistical technique. Model A, an unconditional means model was run, which includes only the outcome variable with no predictors (see Table 18). The purpose of this model was to determine the intraclass correlation coefficient (ICC). The ICC was calculated by dividing the sum of the within institution variance by the sum of the within institution variance plus the residual.

The calculation yielded a result of 78.8% surpassing the recommended threshold of 67% and confirming the need to use LMM (Hox, 1995). The higher ICC indicates that the units are more homogenous and thus the analysis would benefit from using multilevel analysis. If the ICC were below the threshold there would be no real advantage to using LMM (Heck, Thomas, & Tabata, 2010).

Table 17

Model A Unconditional Model

Parameter	Estimate	Std. Error	Wald Z	Sig.
Residual	45.48	1.52	29.93	.000
Intercept [subject = unitid]	168.17	13.07	12.86	.000

A second model, Model B, was performed to determine what impact time had on the institutional graduation rates. The purpose was to see if there was change in graduation rates over the time period selected for the study. Shown in Table 19, results indicated that while time

had a positive impact it was not significant impact. The intercept of 55.23 served as the baseline year rate and while the estimate demonstrated a 1% increase it was not significant. This result is not surprising given the relative stability of graduation rates and that the selected time period is a relatively short time frame to expect any significant changes.

Table 18

Model B Unconditional Model

Parameter	Estimate	Standard Error	df	T	Sig.
Intercept	55.23	0.74	360.32	75.1	.000
Time	0.01	0.1	345.41	0.12	0.91

The final model, Model C, includes all of the between-institution predictor variables. The purpose of this model was to incorporate the institutional characteristics and expenditure data into the model to determine which, if any, influenced graduation rates.

The analysis yields several statistically significant predictors including the percentage of students who were white ($p < .001$), full time equivalent enrollment ($p < .001$), and acceptance rate ($p < .05$). In terms of expenses, instructional expenses ($p < .001$) were statistically significant.

From an institutional characteristics perspective, the percentage of white students demonstrated a positive significant impact on retention. A 1% increase in the percentage of white students translates to approximately an 8% increase in graduation rate. The number of students enrolled and percentage of students accepted were also positive and significant

indicating that a one-student increase in FTE and 1% increase in acceptance rate would yield an increase .1%, and 4% respectively in graduation rate.

One institutional expense category was significant in this model. The average amount spent on instruction had a significant, positive impact on graduation rates. This result is consistent with other research that instructional expenses play an important role in improving graduation rates (Gansemer, Topf & Shuh, 2006; Ryan, 2004). The model estimates that for every $1 increase on instruction per FTE one could expect a .1% increase in graduation rate.

The amount spent on academic support and student service did not have a statistically significant impact in this model. This result was consistent with other research (Ryan, 2006; Webber & Ehrenberg, 2010) but surprising given the institutions in this study. The institutions that are less selective tend to admit students that are less prepared academically and one would surmise these students would benefit from the academic and student support offered at colleges. While they may indeed benefit in other ways it does not appear impact graduation rates. This raises concern when, as previously presented, the student service expenditures was the only category that showed a significant increase after accounting for inflation and it takes money away from investments in instruction.

Table 19

Model C Conditional Model

Parameter	Estimate	Std. Error	df	t	Sig.	
Intercept	36.657278	2.617680	1241.406	14.004	.000	***
Percent white	.081436	.025240	1170.695	3.227	.001	***
FTE	.000569	.000175	1234.226	3.261	.001	***
Percent admitted	.040407	.013477	1900.101	2.998	.003	***
Instruction	.001286	.000179	1148.349	7.202	.000	***
Academic support	.000378	.000385	1384.435	.982	.326	
Student service	-.000528	.000281	1648.987	-1.878	.061	
Institutional support	-.000156	.000153	1633.422	-1.023	.306	

*. Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).

From an institutional characteristics perspective, it appears that a higher percentage of white students and larger enrollment tends to lead to higher six-year graduation rates. The percentage of white students being significant is not surprising but does raise several issues. First, from a moral standpoint an institution will not actively pursue a higher percentage of white students given the discriminatory nature of this type of policy. Second, with the projected growth in the Hispanic and other minority population, the percentage of white students is likely to decline based on demographic change resulting in a possible decline in graduation rates if other steps are not taken (Fry, 2011).

The size of the institution is also an area that would be difficult to control given the plateauing of the traditional age population with many colleges trying to simply maintain their enrollment levels. The fact that a higher acceptance rate leads to a higher graduation rate was surprising and counterintuitive. This finding suggests that being more selective for these institutions would actually have a negative impact on their graduation rates and requires further

investigation. Therefore, while significant and important, the institutional characteristics are not easily controlled or manipulated by the institution.

In summary, the results indicate that less selective institutions have had a stable graduation rate from 2006 through 2011 although it lags behind all private institutions. Institutional expenditures increased in all categories but only student service grew significantly and outpaced inflation. Several variables in this study had a positive relationship with graduation rates although only the amount spent on instruction was moderately strong. In terms of predicting graduation rates several institutional characteristics, a higher percentage of white students, a higher acceptance rate, and larger enrollment all had a significant positive impact. On the expense side instructional expenditures had a significant positive impact while institutional support expenditures had a significant negative impact on graduation rates.

Chapter V: Discussion and Implications

Discussion of Results

Drawing upon Berger and Milem's (2000) organizational theory as a theoretical framework, this study sought to examine the influence of institutional structural demographics (institutional size, selectivity, and student composition) and organizational behavior (institutional expenditures) on six-year graduation rates at moderately and less selective private college and universities for an extended period of time from 2006 to 2011. Although several studies have explored this relationship, this study differs in that the sample was comprised exclusively of 363 institutions that are categorized as moderately and less selective institutions with respect to admissions criteria with all having an average six year acceptance rate between 70 and 100 percent. This study also looked at overall graduation rates and expenditure trends as well as institutional characteristics that might influence graduation rates. The expenditure trends were analyzed to identify any significant changes that could be attributed to the financial downturn of 2008.

Several statistical techniques were used to address the research questions posed in this study. First, an ANOVA was conducted to determine if there were significant differences in average graduation rates over time for the entire sample. Second, an ANOVA was conducted to determine if there were any significant changes in expenditures by category over time. Third, institutions were categorized by the level of selectivity and an ANOVA was conducted to examine if there were significant differences in expenditures and graduation rates by selectivity. Fourth, a correlation analysis was conducted to assess if there were any issues with multicollinearity and to examine the relationship between institutional characteristics,

expenditures, and graduation rates. Finally, a linear mixed model (LLM) was built to determine the extent to which institutional expenditure categories affected graduation rates.

This study revealed that several institutional characteristics and one expense category-- instruction --had a significant impact on graduation rates. Findings indicated that there was no significant change in the graduation rates over the time period accounted for in this study. Not surprisingly, the average graduation rates for the sample were lower than those of all private institutions.

The findings of this study were unable to identify any decline in institutional expenditures that could have been attributed to the financial downturn of 2008. In fact, trend analysis indicated that institutional expenditures in all categories increased over time. While overall increases in expenditures occurred in real dollars, after adjusting for inflation significant differences over time were found only in the student service category.

Interestingly, the average student service expenditure per FTE was the only category that had significant increases after adjusting for inflation. The study suggests that there appears to be a long-term shift in spending based on forces outside of the economic climate, mainly increased pressure to provide students with amenities and services at the expense of other investments.

Significant differences were found in both graduation rates and expenditures when institutions were analyzed by level of selectivity. Institutions with an acceptance rate between 70 and 79% had a higher graduation rate and spent more on instruction, student services and institutional support than those institutions with an acceptance rate of 90% or greater. The significantly lower dollar amount spent in each category is consistent with previous research

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suggesting that institutions admitting students at a rate above 90% might be unable to make

meaningful changes in resource allocation even if it would yield a higher graduation rate given

their overall financial situation (Bain, 2006).

The correlation analysis indicated that seven independent variables had a significant

correlation with graduation rates: the percentage of white students, the total full time equivalent

enrollment, the percentage of students admitted, instructional expense per FTE, academic

support expense per FTE, and student service expense per FTE. While all significant, instruction

was the only variable that had a moderately strong correlation. These findings are consistent with

previous research (Cabrera, Burkum, & La Nasa, 2005; Titus, 2004; Gansemer-Topf & Schuh,

2003; Ryan, 2004)

Results of linear mixed model indicated that all institutional characteristics and one

expense category, instruction, had a significant impact on graduation rates. The study affirms

the impact of race/ethnicity on graduation rates that has been demonstrated in the past research

(Alon & Tienda 2005; Cabrera et al, 2005). The percentage of students, who were white, was

significantly and positively correlated to graduation rates and demonstrated a significant positive

impact as well. Findings from this study indicate that institutional selectivity had a significant

positive impact on graduation rates. This result, on the surface, might seem counterintuitive but

has been reflected in the literature although not on a consistent level. The impact of selectivity

appears to be dependent on whether the researcher controlled for student characteristics such as

student preparedness and socio-economic status among others (Reason, 2009; Russell & Atwell,

2014). In sum, overall research on selectivity and graduation rates has produced inconsistent

findings with some studies finding no relationship (Adelman, 1999) and others finding a positive

(Small & Winship, 2007) or negative (Sander & Taylor, 2012) relationship.

Results indicate that institutional size, measured by the institutional FTE, had a significant, positive impact on graduation rates highlighting that larger enrollments lead to higher graduation rates. These findings have also been supported by previous literature attributing the increase in enrollment to economies of scale (Titus, 2004).

The average amount spent on instruction had a significant, positive effect on six-year graduation rates. These findings are consistent with previous research (Gansemer-Topf & Schuh, 2003; Ryan, 2004; Hamrick et al, 2004) although the samples were not moderately and less selective private institutions in these studies.

Implications for Theory

Research has suggested that higher education institutions can benefit from the organizational perspective. This perspective offers a unique lens for analysis identifying both structural demographic and behavioral components of student persistence and completion (Berger & Milem, 2000). Results from this study reinforce this idea and demonstrate the value of this theoretical perspective.

Demonstrating the effect of both institutional structure and behavior on graduation rates, the present study provides evidence affirming the usefulness of the organizational perspective when studying college graduation rates. With respect to the structural demographic component, findings indicated that all institutional characteristics including the percentage of students who were white, institutional selectivity, and institutional size all had a significant impact on graduation rates.

The behavioral component of the organizational perspective was also supported in this study. In the present study, the premise was that institutional resource allocation is a way in which colleges overtly express their institutional priorities. The LMM analysis indicated that there were two expense categories that significantly impacted graduation rate performance: the average amount spent on instruction and the average amount spent on institutional support. The findings suggest that institutional expenditures do impact graduation rates and that the organizational perspective could serve as an appropriate lens through which to assess institutional priorities and their relation to specific outcomes such as graduation rates.

Viewing colleges and universities as organizations and assessing institutional priorities through structure and resource allocation are important for several reasons. First, the expenditure data provides an unfiltered view of what the institution values and provides a way in which to quantify institutional behavior. It is unlikely that any institution would publicly state in this current economic climate that student completion is not a priority.

Second, this study suggests that institutional assessment and realignment of current resource allocations could potentially result in increases in graduation rates. This minimizes the politics that surround many decisions on college campuses and provides data-driven evidence to support institutional decision-making and impartial information to share with internal stakeholders.

Finally, colleges can gain a better understanding of how their institutional, student demographic, and financial characteristics impact institutional performance and which can be readily modified and which cannot. Reason (2009) argues that the demographic component is more fixed than the behavioral component and that institutions should focus on their behaviors

rather than the institutional characteristics for shorter term improvements given that they have more immediate control in this area.

Overall, this study underscores the importance of both institutional characteristics and certain institutional expenses on graduation rates. The results are by and large consistent with previous research in this area but deviates in one area relating to academic support. Ryan (2004),using OLS, found a significant positive relationship between instructional and academic support expenses and graduation rates. In fact, instructional expenditures had the highest coefficient in the model (b = .281) whereas expenditures on student services and institutional support did not have a statistically significant effect on student graduation rates. These results are similar to the results of the present study with the exception of academic support expense with no significant impact on graduation rates.

Academic support and instruction were positively related to graduation rates (Gansemer-Topf & Schuh, 2003). In a follow up study, Gansemer-Topf and Schuh (2006) incorporated institutional selectivity into the analysis, finding differences in the impact of various expenses depending on selectivity. The differences in overall expenditures in terms of total allocations were consistent with the present study and suggest that more selective institutions may have more financial flexibility.

Hamrick, Schuh, and Shelley (2004) found that from an expenditure perspective instructional, library, and academic support expenditures impacted graduation rates, accounting for between 21% and 34% of the variance. These findings point to the importance of instructional related expenditures. The present study affirms that the impact of instructional expenditures which has been a consistent finding regardless of the sample of institutions. However, contrary to previous studies, academic support was not found to positively contribute

to graduation rates in the present study.

Implications for Policy and Practice

Several conclusions and suggestions for institutional policy can be drawn from the results of this study. First, this study underscores the importance of graduation rates that has been used regularly as a measure of value and quality of higher education institutions (American Council on Education, 2010). Federal policies, such as the White House scorecard has made graduation rate a key metric for prospective students, parents, legislators, and policymakers (Field, 2012).

Not only have graduation rates been used as an important indicator for institutional quality but also access to this measure has increased exponentially for those outside of higher education. Previously, colleges would offer their graduation rates when asked or the prospective student would need to search through one of the many guidebooks such as The Princeton Review or U.S. News and World Report. Colleges are now required to exhibit an increased level of transparency including graduation rates on the college website and is required by the Higher Education Act. (United States Department of Higher education, 2006). Also, the IPEDS dataset, which was only accessible to those who worked in higher education, has been redesigned to be more user friendly to prospective students, parents and others outside of higher education. This increased transparency has resulted in colleges being forced to explain why their graduation rate may not be at an expected or acceptable level from the perspective of external agencies, students, and parents (Chronicle of Higher Education, 2012).

This study highlights the fact that the graduation rates for moderately and less selective institutions have not increased from 2006 to 2011. These institutions are lagging behind the

private sector as a whole by 8-10% posing potential problems for them when trying to justify their value to prospective students and external constituents.

Given a stagnant and in some regions in the US a declining traditional age student population, the level of competition for students will likely increase. If graduation rates do not increase, these moderately and less selective institutions will be at a competitive disadvantage when attempting to demonstrate quality, in this instance measured by graduation rate, in an effort to enroll students. With the short time period of this study one would not expect any drastic changes in graduation rates. However, given the importance of graduation rates as a measure of higher education quality, institutions need to focus their efforts to improve this rate for the future and the results of this study indicate that moderately and less selective institutions should take into consideration reallocating resources.

Among the institutional demographic characteristics that contributed to graduation rates, results from this study found that a higher percentage of white students led to higher graduation rates. While it is inconceivable that institutions would implement discriminatory admissions policies to improve their graduation rates by increasing the percentage of white students, this information is useful and important as institutions respond to a changing demographic landscape in higher education. Shifting demographics will impact graduation rates negatively if disparity in completion among racial/ethnic minorities continues. In particular, the growth in the Hispanic college student population provides both challenges and opportunities for colleges and universities. A report from Pew Research in 2011 indicates that from 2009 to 2010 Hispanic enrollment in higher education grew by 349,000, or 24%, outpacing all other racial and ethnic groups. However, while more Hispanic students are attending college, they continually lag

behind other groups in terms of completion. The demographic shift will result in many

institutions enrolling students with an ever-declining white student population. Thus, it is

important for them to address completion issues with the Hispanic population and other

racial/ethnic groups and develop strategies to improve student outcomes.

Results from this study should shed light on institutions and researchers to reassess how

they define *selectivity.* The relationship between institutional selectivity and graduation rates has

not been established in the research literature, producing conflicting findings (Russell & Atwell,

2014). One possible reason for this inconsistency may be the fact that selectivity is being

defined and studied mainly in the context of high school grade point average and SAT scores.

Rather than focusing solely on GPA and SAT scores, many admissions offices are taking

a more holistic approach with quantitative metrics being complimented by student essays,

recommendations, extracurricular activities, and personal interviews. The admissions officer has

a great deal of information at their disposal and can look at the candidate and see if they are a

good match for the institution even if their scores tend to be lower. Research has shown that

institutional fit is a key component to college completion (Bean, 2006). It is worth considering

whether institutions are identifying more candidates who have the characteristics to succeed and

coordinating their recruitment activities to bring in these types of students which would in turn

lead to a higher acceptance rate.

This study revealed that the financial crisis of 2008 did not appear to alter spending in

any real way. However, it is worth noting that expenditure trends indicate a shifting of spending

priorities. While all the categories increased annually, only student service did so at a

statistically significant level and when accounting for inflation. Findings from this study indicate

that despite significant growth and outpacing inflation student service expenditures had no significant impact on graduation rates.

Previous research has shown that student service expenditures can positively influence graduation rates (Webber & Ehrenberg, 2010). However, this study looked at only moderately and less selective private institutions and the results may seem counterintuitive. If the student population at moderately and less selective institutions are less academically prepared than those at highly and more selective institutions, it would make sense that they would need more support to graduate.

These findings underscore the complexity of the student service expense classification. A significant portion of student service expenditures may in fact be dedicated towards social activities and amenities athletics, and admissions but not support students need to succeed academically (Chronicle of Higher Education, 2014). The significant increases in student service expenditures needs to be examined closely considering the fact that unlike instructional expenses, this category is far more inclusive in terms of federal reporting requirements. Given that student service expenditures do not appear to impact graduation rates the question as to why these resources have been consistently increased remain yet to answer.

Many would be led to believe that the primary driver for this expense is student affairs but that assumption might be inaccurate. Student service also includes expenses related to admissions, the registrar, and athletics. Given the aforementioned stagnation of traditional college age students, institutions like those in this study, which many times lack the "prestige factor" need to be more aggressive when recruiting new students. This means larger staff,

increased marketing, more events and an overall increase in the dollars spent to recruit a new student cohort.

With the pressure to recruit and achieve a certain level of prestige, admissions and athletics have been focal points for many institutions. Investments in recruitment, student activities, and athletics may aid recruitment but have not been empirically verified to positively influence completion rates. Increasingly competitive admissions cycles have resulted in what many have deemed an arms race in higher education. Given that more dollars are being spent on recruitment and student activities, many institutions have created entire departments dedicated to marketing an institution to prospective students (Chronicle of Higher Education, 2014). These institutional investments could be driving the increase in student service expenses identified in this study.

An analysis by the American Institute for Research in 2014 indicated that from 2001-2011 increases in student service outpaced all other categories at most colleges. The higher education workforce also benefited from the increases in student services, accounting for much of the 28% increase in additional wages. These increases occurred while wages and salaries in other expense categories stagnated or decline. During the same time period student service expenses increased 20-30%. Taken together this offers yet another possible explanation for the significant increase in student service expenses over the time period in this study.

Arum and Roksa (2010) argue that institutions have increasingly focused on students as consumers and neglected the learning environment in favor of improving student amenities and services outside of the classroom. Many institutions are relying on increased student amenities and activities as a way to attract prospective students and that this increase is a sign of increasing

competition among institutions. From a consumer prospective, the increased expenditures on amenities and activities are driven by the demand of prospective students and their parents. With moderately and less selective institutions the increased offerings are a way in which the institution attempts to differentiate itself from other schools. Many of these types of expenses are, by definition, reported in the student expense category. Student service expenses are a broad category and need to be analyzed at a more granular level, allowing institutions to determine what components of the expenditures are driving the increases in the student service category and whether they are leading to the intended outcome.

Findings of this study indicated the amount of expenditures on instruction showed a modest increase. The primary driver in this expense category is faculty salaries and therefore dependent on the number of faculty and their compensation. Based on data from the Chronicle of Higher Education (2012) it can be surmised that the growth in this category was attributed mainly to faculty salary increases and not additional resource allocation to new instructional and academic endeavors.

The composition of the faculty may also help to explain the modest increase in expenditure over time. A common theme in higher education is the increased reliance on adjunct faculty. This may also be a factor in the modest increase. The growth in adjunct faculty is notable accounting for roughly 40.2% and 53% of the faculty at private research and private comprehensive colleges and universities (NCES, 2009). This study did not include the percentage of adjunct faculty as a variable but could warrant further investigation.

Research has pointed to the positive relationship between full time faculty and student engagement. This relationship has been attributed to a higher level of expertise in the classroom,

and full time faculty being more accessible to students through office hours and unofficial meetings on campus (Schuetz, 2002; Umbach & Wawrzynski, 2005;). While adjuncts are less expensive for institutions, their availability and potential for developing meaningful relationships with students is limited. When there is a need to reduce costs through the use of adjuncts, moderately and less selective institutions should carefully weigh the impact of this decision. In the context of this study's findings, while yielding short-term financial gains, the long-term prospect of student completion should be considered. Increasing adjunct reliance would cost less for the institution but negate the positive impact full time faculty have been shown to have on student persistence and completion.

Although institutional support expenditures grew over time no statistically significant change was found. Increases in administration over the last decade in higher education have been well documented (American Institute for Research, 2014). Reasons for these increases include growing demand for compliance, legal work, and management in an increasingly complex higher education environment. While the purpose of this study was not to evaluate the need for institutional expenditures, the findings do indicate that this expense category may provide an opportunity for reallocation. The results of LLM indicated institutional support expenditures had a significant negative impact on graduation rates. Therefore, institutions might need to consider reallocating current resources from the institutional expenditure category to instruction in order to improve the overall institutional graduation rate.

The disparity between institutions with varying levels of selectivity was an important finding in this study. With the number of traditional age college students plateauing for the next decade, the lower graduation rate puts less selective institutions at a significant disadvantage

when trying to demonstrate institutional quality to prospective students, parents, and other external constituents. The dollar amount spent in the area of instruction, student service, and institutional support varied by selectivity with the more selective of the sample spending more than the least selective in several categories. Those institutions with the highest acceptance rate are facing significant challenges in that they need tuition revenue to allocate more to instruction. However, with the lower graduation rates they are less likely to attract the students they need to provide the revenue.

Recommendations for Future Research

The six-year graduation rate from IPEDS is currently the only metric for assessing college completion. As stated previously, the exclusion of transfer student who make up a significant percentage of the college population are not included, providing an incomplete picture when studying college completion. It would be beneficial to find a way to capture incoming transfer cohorts in much the same way as freshman and track their progress towards completion.

The LMM conducted in this study indicated that the percentage of students that were white significantly and positively impact graduation rates. With the growth in the Hispanic college population, this percentage will most likely decline. Future research needs to be conducted to determine what factors influence Hispanic student college completion as well as other non-White groups.

An examination of institutional policies, student characteristics, and resources in the context of racial/ethnic composition and selectivity (moderately and less selective institutions)

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could provide insight and inform actions that would help reduce the gap between the enrollment and completion rates in Hispanic students as well as other non-White student populations.

The significant increase in student service expenditures appears to be a trend that deserves further examination. First, the impetus for this trend should be identified to determine if it is attributable to the "prestige" movement or perhaps the popularity of the concept of student engagement and its proposed impact on student retention and completion. The complexity of the student service category could also benefit from additional research. As mentioned previously, several expenses such as admissions, student activities, and athletics are all included in this category. Using other data sets, additional research could be conducted to deconstruct this category and identify what area(s) contributes to the significant increases.

The findings from this study applied only to private institutions. The same methodology could be applied to 4-year public institutions. In addition, the sample could be expanded to include all private institutions regardless of selectivity to examine the overall impact of expenditures on graduation rates. The time frame of this study could be expanded to analyze graduation rates over a longer period of time to examine any significant changes in graduation rates and expenditures. This also calls into question whether a six-year time frame is long enough to allow for identifiable institutional change. This rate of change and financial flexibility of institutions could warrant future research and could look to incorporate and analysis of institutional revenue which was not part of this study.

Further research may also benefit from the addition of a cost of living adjustment to the expenditure data to account for any geographic differences and further refine the model. As previously stated, this study focused on expenditures by specific categories per FTE. Future

research could examine the total institutional expense structure to see if overall percentages by all categories yield significant findings.

The viability of institutions that are at the high end of the selectivity spectrum could be examined. This study demonstrated that the institutions that were the most selective out of the sample tended to spend more in real dollars in all expenditure categories. Future research should be conducted to examine the financial sustainability of the least selective institutions. The Bain Capital (2006) report suggested that institutions with a high level of tuition dependency, limited endowment, high acceptance rate, and stagnant enrollment might not be financially viable in the future. Examination of these factors and financial limitations may indicate these institutions have no real means of improving graduation performance from an allocation perspective due to a current and future lack of overall revenue. Further research, qualitative in nature, could identify these institutions and examine ways in which they are addressing these fiscal constraints.

Conclusion

This study demonstrated that moderately and less selective institutions face a variety of challenges and opportunities. Graduation rate will continue to be an important metric and institutional value will be tied to it. The sample of institutions used in this study had a lower graduation rate than their peers putting them at a significant disadvantage in the market.

The linear mixed model provided several insights. A higher percentage of students who were white and overall institutional size were both shown to positively impact graduation rates. However, institutions should not rely on these factors if they are looking for improved graduation rates. The growing Hispanic population in particular will result in a more diverse student body. Institutions need to find ways in which they can improve the completion rates for

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these students or face a declining graduation rate. In terms of overall enrollment, the overall plateauing of the traditional age population indicates institutional enrollment will most likely remain stagnant or in some ways decline.

While institutional characteristics are slow to change, institutions have more immediate control over their financial resource allocation. The amount spent on instruction had a positive and significant effect on graduation rates. Apparently, this provides a potential opportunity for institutional resource allocation by taking dollars devoted to institutional support and other categories and applying them to instruction.

The student service expense has grown significantly and institutions need to better understand the drivers. The growth does not appear to be related to solely to student affairs but may be partially attributed to admissions and athletics. Further conversation on campus is warranted, as this is another category that could provide additional financial flexibility and reallocation opportunities to instruction.

The current economic climate, shifting demographics, and increased demand for accountability is forcing higher education to become more intentional with its resource allocation policies. This study has demonstrated that real improvements in graduation rates can be realized through increased understanding and funding of certain expense categories.

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