Building a Model to Test the Relationship Between Higher Education Spending and Student Debt

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In Higher Education

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Abstract

The rising cost of tuition and fees is no doubt a major contributor to rising student debt but it is certainly not the only factor. The amount of debt with which students may graduate can largely be a function of the type of institution they attend (Monks, 2014). There is a dearth of research that focuses on the institutional factors that relate to student debt consumption (Craig & Raisanen, 2014; Macy & Terry, 2007).

Prior studies have shown that the amount of expenditures and the area in which an institution spends their money can impact salient student outcomes. This quantitative dissertation sought to examine institutional expenditures within higher education and their possible relationship to student debt through a fixed-effects analysis that used data across a six-year period. This study examined public comprehensive master’s level institutions as defined by the Carnegie Classification system. This institutional type has been overlooked within higher education research (Henderson, 2007). In short, this dissertation sought to investigate the relationship between spending within the public comprehensive master’s level institution and average annual federal student loan use.

This study found that there was a modest negative relationship between spending on research and academic support and student loan consumption. Spending on operation of maintenance and plant was positively related to student loan consumption. This dissertation further found that the number of students receiving the Pell grant, the percent of students that identify as Hispanic, and the number of full-time equivalent (FTE) students were statistically significant regarding their student loan use. The percent of students receiving the Pell grant within an institution related to higher levels of student debt. The percent of students that identify as Hispanic and the number of FTEs were related to lower average levels of student debt. This study has implications for policymakers and administrators pursuing factors that reduce student loan usage and gives insight into the impacts of institutional spending. These findings also have implications for future research that explores not only institutional spending and student outcomes but also how spending may impact institutional mission and the composition of a student body.
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General Abstract

There is no doubt that the cost of enrolling in a college or university has increased dramatically during the past few decades. There is significant research on the impacts of student loan use and what groups of students may be more or less prone to use student loans and possible associated outcomes (i.e. racial/ethnic background, job placement, homeownership and likelihood of default to name a few). What is far less explored are the ways in which an institution as a whole may impact student loan use. For example, we know very little about whether or not similar students attending similar schools would consume the same amount of student loans. If they do not this could be for a number of reasons. Unfortunately, there is a very limited set of studies that explore this phenomenon.

This study explores one part of this puzzle by examining the spending patterns of public comprehensive master’s level institutions (i.e. Radford University, Eastern Kentucky University, Cal State Northridge) and their relationship to student loan use during a six-year period. Because these institutions tend to be less prominent than large research universities (Virginia Tech) they are often overlooked within higher education research.

Prior research has found that the relationship between institutional spending and student outcome factors such as time to graduation, leadership development, and even the student body’s perception of their university are related. This study was undertaken in a very similar manner except the student outcome was the average annual amount of student loans consumed within the institutional population. There were relationships between spending categories (i.e. research, academic support and operation of maintenance and plant) and student loan use and not between other areas of spending (i.e. instruction, auxiliary, institutional support and student services). The findings from this study are important because even though we understand student loan use and the amount of debt students graduate with is a major concern we know little about the multitude of factors that may have an impact. This study is also important because it is easily replicable and draws data from easily available public databases. As student debt continues to be a concern and college administrators struggle to make up for lost revenues we should have measures and
models that allow researchers and policymakers to readily explore how changes to a university’s spending patterns and even institutional classification may be effecting students.
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Chapter One
Introduction and Research Questions

One of the most significant challenges facing higher education is how students finance their education in the face of substantial increases in the cost to attend a college or university and earn a degree. Often, this financing decision involves using student loans. By the end of the fourth quarter of 2017 the total outstanding student loan debt balance was $1.38 trillion, up from $260 billion at the beginning of 2004. For comparison consumer credit card debt grew from $695 billion to only $834 billion during the same time period (The Center for Microeconomic Data, 2017).

The original intent of the federal loan program was to provide low-interest loans to low-income students. At its creation the loan program was roughly one-third the volume of federal grant programs (Dynarki & Scott-Clayton, 2013). Currently, student loan programs are used by students of all socioeconomic backgrounds and as such have grown to be a much larger portion of federal aid programs. Today, both subsidized and unsubsidized debt, at the federal level represent about 70% of the major federal grant and loan programs expenditures (Serna, 2016). The growth of student loans can be somewhat misleading if one only considers the total amount at all institutional classification levels of higher education. These classifications cover nonprofit and for-profit education and two- and four-year institutions both public and private. The goal of this study was to explore the relationship of expenditures across public four-year higher education institutions that are considered “public regional”, and average federal student loan debt. Therefore, I asked if expenditure patterns are evident at these institutional types with regard to spending arrangements and how this spending correlates with average federal student loan debt levels. As a result, I examined the relationship between student debt consumption and institutional expenditures across time at public four-year master’s level institutions. The research for this dissertation was guided by these questions:

1. Do instructional expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?
2. Do research expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?
3. Do student service expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?

4. Do academic support expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?

5. Do auxiliary expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?

6. Do institutional support expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?

7. Do operations and maintenance of plant expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?

It is important to note that the public four-year master’s level institutions go by a number of different labels but for uniformity in this study they will go by master’s public universities (MPUs). This was further explored in Chapter Two. It was necessary to briefly discuss the overall landscape of higher education and student loans in general to better situate this study and its focus on public four-year higher education.

**Background and Context**

While stories of six figure-level student debt have tended to dominate the student loan narrative, those with more than $100,000 in student debt represent only a small proportion of outstanding debt. Dynarnki and Scott-Clayton (2013) note, “Only 0.1 percent of college entrants, and 0.3 percent of bachelor’s degree recipients, accumulate more than $100,000 in undergraduate student debt” (p. 10). As of 2015, the average balance was roughly $26,000; with the number of active borrowers reaching a high of 12 million in 2010 which has actually receded to about 9 million in 2014 (Haughwout, Lee, Scally & Van der Klaauw, 2015). Further, the percentage of students borrowing has remained relatively stable. Between 2000 and 2009, the percentage of students employing student debt stayed around 65% (Dynarksi & Scott-Clayton, 2013, p. 10). Policymakers and researchers have tended to focus on areas of higher education
that have exhibited the most blatant negative outcomes associated with the use of federal loans at their institutions such as for-profit vocational schools with very low job placement rates. However, this focus often has a negative consequence because the institutions that are targeted, for-profits in this case, often serve underrepresented student populations. As a result, these foci and resulting policies can limit the landscape of attainable institutions available for underrepresented student populations. While these policies intend to protect taxpayer dollars and unwitting student consumers, they also have limited focus on their impact for high need student populations (Serna, 2014). These policies have normalized the notion of aggressive policies towards certain institutions that serve lower income students. However, there is little research that considers the impact on the underserved student populations these institutions, including MPUs, enroll (Serna, 2014).

Significant attention has been given to borrowing in the for-profit sector because of high levels of loan delinquency and poor labor market outcomes. This has led to several accountability measures that resulted in decreases in loan defaults and better protections for low income borrowers (Cellini, 2012; Looney & Yannelis, 2015; Serna, 2014). These accountability measures increased the focus on for-profit higher education and student loan consumption with limited focus on other areas of higher education, namely four-year public higher education. This lack of attention, in terms of policy development and research, may be due to the smaller amounts of student loan debt from students enrolled in public four-year higher education. While the debt burden carried by those who attend public four-year higher education is generally smaller than for-profit and private nonprofit education, it still represents a large portion of the borrowing population. In fact, in 2013-2014 public four-year higher education represented the largest borrowing sector of higher education at 37% (Baum, Ma, Pender & Welch, 2016). In short, while the debt burdens of individual students tend to be lower in public four-year education, the overall amount represents the largest student-borrowing group (Baum, Ma, Pender & Welch, 2016).

Nonetheless, lower debt accumulation by students in public four-year higher education does not mean that these students are immune from the negative consequences associated with student debt consumption. In fact, a recent report by the White House highlighted those students with less than $10,000 in student loan debt account for 66% of defaulted student loans (White House, 2016). Recognizing that larger total student debt levels are not necessary to impart
negative consequences is central to this study and the research questions posited here. Additionally, this study acknowledges that institutional mission and scope also play a significant role in the student loan narrative. To date, only limited research exploring student debt consumption at MPUs exists. This is particularly troubling considering the prominence of student loans in higher education financing and policy.

Turning to institutional financial behaviors, previous research shows that the manner in which institutions spend their money impacts a multitude of student outcomes (Gansemer-Topf & Schuh, 2006; Pike, Kuh, McCormick, Ethington & Smart, 2011; Smart & Toutkoushian, 2001; Titus, 2006; Webber, 2012; Webber & Ehrenberg, 2010). Hence, I propose in this study that there exists a relationship between institutional expenditures and student debt consumption measured by average annual federal student debt usage while enrolled at the institutions examined in this study. This is not unreasonable considering that all areas of institutional expenditures have increased between 1987 and 2016; excluding expenditures on operations and maintenance of plant (Hinrichs, 2016). This has closely tracked with increases in student borrowing. To be clear, the purpose of this study was not to explain why expenditures have been increasing but sought instead to understand the relationship they may share with average federal student debt levels. Further highlighting the importance of this study was the sentiment that college and university officials are spending more and more in an effort to outdo one another to attract the most students (Ehrenberg, 2001). It is further reasonable to theorize that this “arms race” may have undesirable and unintended consequences (Dill, 2003; Frank, 2004; Winston, 2000).

Hence, I posited that students are bearing at least some of this increased spending in the form of additional pressure to borrow more to cover increases in tuition and fees as these institutions try to compete against one another. Often this can come in the form of student fees that are instituted to make up for reductions in state funding (Archibald & Feldman, 2008; Fethke, 2006; Jaquette & Curs, 2015; Koshal & Koshal, 2000; Serna, 2015; Toutkoushian, 2003; Zumeta, 2001). These fees are instituted as “user fees” that cover some form of service given to the student. These fees have proven to be a very volatile and contentious policy issue within higher education (Alexander, 2000; Winston, 2003). These fees may also be used to help finance capital projects aimed at building what Jacob, McCall, and Stange (2013) call “country-club” campuses for example. To that end, it is reasonable that these fees contribute to institutional
spending and play a role in student debt accumulation. In addition to fees, there has been a well-
documented and researched relationship between reductions to state appropriations for higher
education and an increase in tuition charged to students (Barr & Turner, 2013; Delaney, 2014;
Fethke, 2011; Mitchell & Leachman, 2015; Monks, 2014; Serna, 2015; Serna & Harris, 2014).

Another important aspect of this study is that it sought to examine an often-overlooked
institutional type in higher education research. Thus, it only considered public four-year master’s
level institutions (MPU) based on the Carnegie Classification of Higher Education institutions
definition. While this limited the scope of exploration of this study it also allowed for an
examination of a specific institutional type. Studying one group of similarly situated institutions
controls for several possible confounding variables by allowing examination of a more
homogenous group within higher education. For example, limiting the group to a defined
Carnegie classification meant that these institutions will likely have had similar expenditures
categories and shared institutional mission foci. The goal of this study was to add to the student
debt canon of knowledge by exploring which role(s) expenditures play at a specific institutional
type in terms of average federal student debt. Specifically, this study, after controlling for a
number of salient variables, sought to explore the relationship institutional spending may share
with average student debt consumption at MPUs within the U.S.

Study Foundations

Initial interest in this topic and subsequent formation of this study was drawn from an
article in Research in Higher Education by Pike, Smart, Kuh and Hayek (2006). The study
examined the relationship between institutional expenditures and student engagement outcomes
while controlling for a number of student body and institutional characteristics. Their findings
suggested that there was a modest relationship between how institutions spend their money and
student development. They suggested that the relationship between expenditures and student
outcomes is a function of both students’ background and institutional spending behaviors. They
noted overall the relationship between institutional spending and student outcomes is very
complex.

Pike et al. (2006) go on to suggest that, “Much more research is needed to determine
where and how financial investments shape institutional and individual behavior resulting in
improved levels of student engagement and other indicators of student success and educational
effectiveness” (p. 869). Hence, it was this notion that served as the impetus for further exploration of institutional spending and possible impacts on relevant student outcomes, including federal student debt consumptions that was the focus of this dissertation. While this body of literature is relatively new it has expanded to include several topics related to expenditures and student outcomes. However, exploration of institutional expenditures and student financial outcomes remains limited within the research literature. This study sought to fill this gap in the literature by exploring the relationship between institutional expenditures and average federal student debt levels measured at the institutional level.

**Problem Statement and Warrant**

Research related to student debt has been primarily focused at the individual level and has typically examined how the use of student debt impacts outcomes such as choice of major or graduation and retention rates. The focus has been on the characteristics of student borrowers and the impact of borrowing in terms of educational outcomes (Baum & Saunders, 1998; Choi, 2014; Choy, Geis, & Carroll, 1997; Cuccaro-Alamin & Choy, 1998; Flint, 1998; Hochstein & Butler, 1983; Kim, 2007; Looney & Yannelis, 2015; Paulsen & St. John 2002; Simpson, Smith, Taylor & Chadd, 2012; Soria, Weiner & Lu, 2014; St. John, 1994; Xue & Chao, 2015). This research has largely focused on the student, or in the aggregate as student group; meaning that studies analyzed groups of students based on factors such as race or socioeconomic background. The role institutions play has been very limited in this strand of research. As a result the role that the institution plays in student debt consumption has largely been left unexplored (Craig & Raisanen, 2014; Macy & Terry, 2007).

Though the overall amount of student debt consumed every year has long been acknowledged as a significant policy issue, little research has been done to examine the factors contributing to the amount of student debt used by students and factors contributing to variation in student debt usage, at the institutional level. Often, the assumption was that the rising price of tuition was solely to blame for the expanding amount of debt with regard to the role of the institution (Monks, 2014). While the increasing price of tuition can be a large contributor to the problem it is certainly not the only piece of the puzzle (Chen & Wiederspan, 2014; Haliassos & Christou, 2006; Monks, 2014; Simpson et al., 2012). Further research is needed to identify other factors that may contribute to the student debt levels. Based on this significant limitation in the
research literature, this study focused on the finances, and specifically expenditures, of the institution and the possible relationships they may have share with student debt consumption.

There is a growing body of literature that focuses on institutional spending and its impact on student outcomes. However, student debt has yet to be explored as a relevant outcome. Consequently, this study sought to add the body of student debt literature by exploring what relationship may be present between student debt and institutional spending.

**Purpose of the Study**

The purpose of this study was to employ a conceptual framework coupled with observable, quantitatively measurable variables to examine the relationship between student debt consumption and institutional characteristics, specifically institutional expenditures at MPUs. Using data from the Integrated Postsecondary Education Data System (IPEDS), a framework was developed to explore this relationship across a six-year time period. Further this study sought to build on prior studies that explored institutional factors that contribute to student borrowing levels and the impacts of institutional spending on student outcomes.

The conceptual framework and theoretical underpinnings for this study are fully established in Chapter Two with the variable operationalization, rationales, data sources, and methods detailed in Chapter Three. This study was unique in that it takes two distinct areas of higher education research: student debt and institutional spending and merged them, thus allowing for an examination of the relationship between student debt consumption and institutional expenditures over time at MPUs. Therefore, and as noted earlier, this study answered the following seven, related research questions using an econometric approach suitable to multi-year and multi-institutional analyses:

1. Do instructional expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?
2. Do research expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?
3. Do student service expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?
4. Do academic support expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?
5. Do auxiliary expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?
6. Do institutional support expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?
7. Do operations and maintenance of plant expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?

These research questions were drawn from previous analyses of institutional expenditures and their relationship to student outcomes such as graduation rates or measures of student leadership development (Pike et al., 2011; Titus, 2006; Webber, 2012; Webber & Ehrenberg, 2010). Because the basis of this research is rooted in an econometric analysis it is important to understand the basis of econometrics. Econometrics is a method of analysis that allows a researcher to combine economic theory with other areas of study such as sociology, political science, or public/higher education finance (Wooldridge, 2015).

**Scope of the Study**

The scope of this study was to examine the relationship between institutional expenditures and student debt consumption at a specific institutional type. Specifically, all MPUs ($n = 272$), were selected for this study. This study collected data from IPEDS for the academic years 2009-10 through 2014-15 since these were the most, recent, reliable and uniform years of data available through the IPEDS data system for a total number of observations ($N$) equal to 1,632. Because years prior to this time period saw differing types of reporting on expenditures based on different types of accounting standards it made sense to begin the analysis in 2009. Multiple years of data were used to explore the nature of the relationship across time thus exploring the relationship between changes in institutional spending and student debt during a short time period, but long panel data structure in terms of the number of institutions. Once the
data were collected a review of the quality and completeness of each data point led to a number of listwise deletions, this was further highlighted in Chapter Three.

Multiple variables were collected for this exploration. Student population data were collected for each institution including demographic information and financial aid data based upon those shown to be significant in the research literature. Institutional data were collected for tuition and fees, total revenues and state appropriations. Finally, data were collected pertaining to institutional finance including key expenditure categories noted in the research questions. While the scope of this study was limited by the specific nature of the institutional population (MPUs), its efficacy was enhanced by examining an entire institutional type that represents roughly 10% of the higher education population.

**Significance of the Study**

There has been substantial attention paid to growing student debt burdens. In fact, some have posited that we have created a “student debt bubble” (Grant & Anglin, 2013). While this study did not theorize on the reality of a student debt bubble, it nonetheless acknowledged that student debt can be a very real challenge for students, during and after college, as well higher education and society in general. This study aimed to understand one of the many nuances that contribute to student debt levels.

With a focus on an entire educational institutional grouping, this study focused on providing a comprehensive view of relevant institutional factors contributing to student debt levels at MPUs that may, in fact, be applicable to other institutional types. Further, this study laid the groundwork for future analysis on other institutional categories within higher education regarding factors contributing to student debt accumulation. The significant diversity among different institutional types in terms of both mission and financial resources made an aggregate study on the larger public or private nonprofit sector of higher education institutional types difficult. However, this study presented a reliable and straightforward repeatable method for exploring other institutional types separately based upon the framework, variables, and methods employed.

This study is significant for several stakeholders. For example, institutional leaders can gain insight into the role that expenditures play for an important student outcome (student debt). With this information, institutional leaders can better assess how the distribution of institutional spending may affect students. These findings can also provide valuable insight into how
spending over time may impact institutional mission in terms of salient student outcomes such as graduating students with limited financial burden.

At the central administration level, key decision makers in institutional finance may benefit from this study, specifically, administrators who determine how to spend institutional funds on campus improvements. It is possible that rapid increases in this area may be financially too burdensome for the institution and as a result the students that they enroll. Finance department leaders may use these findings to assess spending and how new and old student fees are implemented. For example, institutional finance leaders or the voting student body make decisions to implement student fees to support various initiatives or new student services. These new fees lead to spending in various areas. This study helped to better inform leaders about how new student fees may have impacted student debt accumulation and allow financial leaders to better assess the impact of student fees and charges.

These findings can have additional significance for state level policymakers. Often, state-level policymakers are concerned over the rising cost of higher education and the resulting debt burden assumed by student populations (Elliot & Lewis, 2015). Thus, many states have enacted some form of performance-based funding models for their systems of higher education (Rutherford & Rabovsky, 2014; Tandberg & Hillman, 2014). These findings can offer guidance and inform current models that address student debt or institutional spending. These findings might also inform the extent to which expenditure data is useful as a performance-based metric. State level policymakers could also use these findings to guide implementation for future performance-based funding models that seek to address institutional spending patterns.

This study holds implications for future research related to institutional expenditures and student indebtedness since it sets student indebtedness as the variable of interest using a set of conceptual models applicable to higher education more generally, and finance specifically. This combination of conceptual frameworks for exploring this topic can easily be applied to other institutional types within higher education. A future study might explore the relationship between institutional spending and student debt accumulation at the community college level. Another study might choose to use another proxy for student debt accumulation. Finally, these findings may help institutions explore the efficacy of expenditure patterns when exploring their relationship to student outcomes generally.

**Delimitations**
Similar to other research endeavors, this study has a number of delimitations. The first was related to the data collected from the IPEDS data source. Specifically, the only reliable measure of student debt consumption at the institutional level was average annual federal student debt. This data point was not necessarily reflective of total loan usage as it only included federal student loans. Students may have drawn on private student loans or gained access to some form of student loans offered by their state’s higher education governing body. While all institutions in this study were required to submit data to IPEDS this does not guarantee that each institution reported each data point correctly and may have slightly different reporting methodology for each expenditure category. Next, the nature of the statistical methods applied within this study have also prevented the inclusion of a variable to act as a proxy for cost of living which may certainly have an impact on student debt consumption. Additionally, it is clear that even though there are a federal reporting requirement all institutions do not report full data. This has limited the scope of information available to fulfill specific variables within this study’s model.

Organization and Synopsis of the Study

The first chapter introduced the topic, added historical context, presented the research questions, explained the significance of the study and offered a summary of the findings and their implications for policy, practice and research. The second chapter highlights the relevant areas of literature to this study while also outlining the significance of the institutional type explored. A review of the MPU institutional population was of significant importance for this study. MPUs are an institutional type that remains underexplored in most research strands and almost not existent within student debt research. The institution type (as defined by the Carnegie Classification system) has multiple implications for how each type focuses their expenditures. For example, a research university will clearly have significant research expenditures and an MPU may have little or no expenditures in this area with a large portion of their spending going towards instruction. An understanding of the focus of a typical MPU was critical to better situate this study within the extant literature related to student debt and institutional spending.

Chapter Two also presents the framework guiding the analysis combined with the theoretical underpinnings for this study. Student debt research was explored to better examine the historical context and impacts of student debt consumption. Research that investigated institutional factors that contribute to student debt were offered to better outline the incorporation of certain variables into this dissertation but to also show the limited range of studies that explore
this area of the student debt narrative. This chapter then goes on to review literature related to the rising costs of attaining a college degree and economic theories as to why the cost related to create college graduates has risen so rapidly.

Finally, a review of the literature that explored institutional spending and how it may impact salient student outcomes such as college graduation rates was offered. The review of this literature brought together research on MPUs, student debt, higher education finance, economics, and student outcomes. This analysis helped not only shape a simple framework for analysis but also helped to show that it was plausible to combine econometric theory and higher education research to how institutional spending can impact student debt use.

Chapter Three provides a description of the data and variables and operationalized the conceptual framework for this study. The data was collected from the academic years 2009-2010 to 2014-2015. The basis for the framework acknowledged that the nature of higher education and its highly educated workforce have been largely responsible for the rapid increase in the cost to “produce” a college degree. Because of reductions from state support for higher education combined with rapid increases related to personnel costs many institutions have had to rely on increases to tuition and fees to offset the lost revenue from their states (Zumeta, 2001). In turn, this has shifted the burden to students and families to finance their education. This dissertation posited that, as a result of these rapid increases in certain institutional expenditure categories could be related to increases in average student debt. As such this chapter sought to outline how it will answer: Do instructional, research, student services, academic support, auxiliary institutional support or operations and maintenance of plant expenditures impact average federal student debt as measured at the institutional level, at public-four-year, regional colleges and universities, holding all else equal?

This chapter then outlines the rationale for each variable selected for its inclusion within this study. Subsequently, an overview of how and why panel data were used and the two types of econometric estimating methods that could be used are presented. This chapter then goes on to highlight the statistical methods used to ensure that the correct estimating technique was enacted. Chapter Three closes by highlighting why a fixed-effects estimating technique was chosen and the specifics of what a fixed-effects model required to use this study’s panel data to effectively answer the aforementioned research questions.
Chapter Four presents the descriptive statistics and the findings of the fixed-effects analysis. The descriptive statistics helped to highlight the composition of the data and address any anomalies or presence of an outlier variable. The correlation matrix helped to show that there was in fact a strong connection between a number of expenditure variables. This chapter drew from the conceptual model to display the results of the econometric estimation. The expenditure variables were addressed first followed by the control variables that are outlined in Chapter Three. There was a modest and somewhat small relationship between a few of the expenditure categories and average student debt. The remaining four expenditure categories held no statistically significant relationship with student debt. The control variables showed that there are relationships between student debt and student demographics and financial background.

Moreover, this chapter found that spending on research and academic support were related to lower levels of average student debt. Spending on operation of maintenance and plant was related to increases in average student use. These findings offered numerous implications for research, policy and practice. These findings highlight that how leaders at MPUs choose to spend their institutional dollars can have an impact on student debt consumption. The second part of this chapter reviewed the control variables. These variables were selected based on prior research that explored which institutional factors impact how much debt students use at their institutions. The percent of students receiving the Pell grant was a significant predictor along with the percent of students that identify as Hispanic. These findings confirm that not only the financial composite of a student body matters in determining debt use but also the demographic makeup of the student body. For example, this study found that Hispanic student populations tend to be more debt averse, but it could also be that a specific religious identity could impact loan use as some religions take a negative view of the concept of interest charged on loans.

Chapter Five provides a summary of the study, the implications for policy, practice and research and a general conclusion. I acknowledged that it is critical to examine factors that impact how much students use in debt as they enroll in and matriculate through the post-secondary system within the U.S. This study has shown that from a statistical standpoint, as an institution attempts to, intentionally or unintentionally, shift away from their core mission, there are direct impacts to their student population. Previous research that explored how institutional spending impacts student outcomes did not examine financial aid outcomes, such as student debt. This research helped to further the canon of knowledge that investigates the impact of
institutional spending on their student populations and outcomes. The first four expenditure categories showed no relationship with student debt. The nonfindings showed that MPUs may in fact be able find avenues to increase efficiencies and not necessarily pass the full burden onto students to cover increases in the cost to run an MPU.

This dissertation has shown that increases to spending on research and academic support are related to modest student debt decreases. This finding was surprising in that it was somewhat counterintuitive to the assumptions of the theoretical framework imposed by this study and the implications of prior theory. The theory and prior research posited by this dissertation would imply that spending on operation of maintenance and plant could be related to decreases in student debt. Multiple theories were offered to better explain these relationships. A compelling argument was made that the relationship between MPU spending and student debt could be partially explained by administrators at MPUs spending to increase their profile and academic prestige. This in turn, could mean that MPUs are attracting less financially needy students. Practitioners should begin to review how this spending may be impacting the composition of their student body. It is possible that other students have been drawn there because of a change in the institutional profile or mission are displacing students who would typically enroll at their local MPU.

In addition to higher education expenditures research, this study sought to add to the research on institutional factors that may help explain student debt consumption. The number of full-time equivalent students showed a negative relationship to student debt. Future research should focus on how the impact of the size of an institution may affect debt consumption. In terms of financial aid variables, only the percent of students receiving the Pell grant was a statistically significant indicator. This is not surprising and agreed with prior research. Finally, the percent of students that identify as Hispanic was also a statistically significant control for student debt research narrative. Researchers should further research this phenomenon. It is possible that Hispanic students come from debt adverse backgrounds. What is not clear is if this debt aversion is preventing a certain portion of the Hispanic student population from enrolling in secondary education because they cannot fully finance their education without student loans.

In closing, this study sought to examine if and to what extent institutional spending within MPUs impact student debt use. Students are asked to carry large debt loads as they complete their college degrees with the real risk of incurring negative outcomes associated with
student debt. As policymakers look to enact measures to contain or reduce the debt burdens of students, it is critically important to know what role the institutions play. Both the literature on institutional expenditures and institutional factors that contribute to student debt use are limited. Even further limited is research on MPUs as an institutional type. A large portion of the higher education population attends MPUs and is from an underrepresented background. Typically, these students and this institutional type are overlooked within higher education research even though these students are very likely to feel the negative impact of accumulating too much student debt. This study sought to add to this body of literature to further help future researchers and policymakers understand more pieces of the student debt puzzle. This dissertation sought to fill in these gaps and bring to light an institutional type within higher education that is often overlooked.

Conclusion

Chapter One highlighted the foundation, purpose, warrant, scope, and significance of this study. It provided a background on the current state of the student debt crisis within U.S. higher education. It laid the foundation for the literature that has reviewed student debt but also addressed the gaps in this literature. It began to make the case that it is plausible to combine an examination of institutional expenditures and a student debt outcome as a viable study. As a result, this led to the creation and labeling of the research questions to be presented within this study. Finally, this study offered a summary of this dissertation and an overview of the findings and implications for future policy, practice, and research.
Chapter Two
Literature Review

This chapter presents and analyzes research relevant to the study’s problem, identified as the interrogation of student debt outcomes in relation to institutional expenditures, specific to the public master’s level institution within the broader landscape of higher education. As such, it also lays the groundwork for the construction of a conceptual framework that served as the basis for answering the following research questions:

1. Do instructional expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?
2. Do research expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?
3. Do student service expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?
4. Do academic support expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?
5. Do auxiliary expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?
6. Do institutional support expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?
7. Do operations and maintenance of plant expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?

The study’s conceptual framework relied upon two different streams of research and draws from the relevant literature regarding student debt, educational outcomes, and their relationship with
higher education expenditure and finance behaviors. Even within this vast cross-section of literature, few studies have explored which factors influence average federal student debt at the institutional level. Fewer, yet, have specifically focused on an institutional type within higher education. As such, this chapter weaves together research from three distinct topic areas: (a) public master’s level institutions, (b) student debt, and (c) institutional expenditures/finance. First, I presented a review of the history and composition of the MPUs. Next, I examined student debt from the individual perspective to provide foundational context for this study and then proceeded to examine student debt from the institutional perspective. The final part of this review explored the relationship between higher education expenditures and relevant student outcomes, also providing a framework for analysis. Ultimately, based on this review of the literature, the study advanced a theoretical position indicating that institutional characteristics, institutional expenditures, and student body composition/characteristics each play a role in contributing to the level of average federal student debt when measured at the institutional level.

Overview

Student debt has proven to be a complex issue with a changing narrative as higher education funding models have changed over time. Regardless, the purpose of federal aid, in any form, has been to promote access to higher education, dating as far back as 1944 with the creation of Servicemen’s Readjustment Act (Serna, 2016). Subsequent iterations of financial aid programs have offered a mix of grants and student loans. More recently, student loans have become a dominant portion of student aid packages. In 2008-2009, unsubsidized student loans became the largest form of federal aid (Serna, 2016). Overall, the rise in student loan consumption can be mostly attributed to the rising cost of tuition (Monks, 2014). At the same time, this rationale only explains part of the rising student debt narrative in that institutional expenditures may also play a role in tuition pricing and as a result, in how much student debt is consumed (Monks, 2014).

The purpose of this study was to build a statistical model to investigate a portion of the complex loan narrative by exploring what relationship there may be between average annual federal student debt and institutional expenditures at selected, MPUs. Based on the extensive literature reviewed for this inquiry, I theorized that multiple factors impact the process that determines the level of federal student loan debt a student must acquire to enroll in higher education. The primary factor is the student’s ability to pay for the higher education experience,
including lifestyle expenses, with or without student loans. The second component involves the environment in which the student learns and lives. For example, the environment can include the cost of living required to reside and learn wherever the institution may be located. These two components, taken together, form a relationship that influences the substance and quality of the student’s college career and ultimately how much debt students assume to attend their university. However, the institution also plays a significant role in the student’s decision-making process in terms of price-setting, subsequently affecting the amount of federal aid a student will require to finance her education (Burdman, 2005). In summary, students and his or her ability to finance his or her education combined with the collegiate environment and university factors all work together to determine student debt consumption to some extent.

This notion was formalized by Astin and Antonio (2012), who introduced the Input-Environment-Output model (I-E-O) as a conceptual framework for empirically exploring factors that contribute to student outcomes of various kinds. While the I-E-O model was developed for evaluation of cognitive student development as its primary outcome, it has been, and can be applied to other student outcomes. Simply explained, the Inputs represent items relating to the student’s background, such as parental income, race, ethnicity, academic major, etc. The Environmental factors range from institutional control and financial aid variables to measures of faculty characteristics. Similar to its capacity to address numerous student outcomes or Outputs, the simplicity of this framework allows for application to a diverse range of research questions. As such, the I-E-O framework has been applied to studies that examined topics spanning student retention to the development of leadership abilities. Overall, the I-E-O model is a framework that allows a researcher to explore a range of student outcomes at the institutional level by operationalizing institutional, environmental, and student body variables. Therefore, with the explicit purpose of this study aimed at examining the relationship between institutional expenditures and student debt, the I-E-O framework made for an ideal fit as a component of the study’s conceptual foundation.

A cursory review of data collected by the National Center for Education Statistics, data housed within the Integrated Postsecondary Education Data System (IPEDS), helps to illustrate the purpose of this study and its exploration of the student loan narrative pertaining to student debt (federal) and institutional expenditures. Specifically, IPEDS allows the researcher to review multiple types of data for colleges and universities. For this study, a quick examination of higher
education institutions showed that, with each year, there has been a wide variation in the average annual federal student debt used by students at MPUs. Of course, the variation of average annual federal student loan usage could be attributed to several factors, including the average net tuition after federal and state grants (Monks, 2014) and student debt levels as affected by the cost of living associated with a particular university culture/environment (Craig & Raisanen, 2014). Characteristics of the student population also help to explain the level of student loan usage. For example, the percentage of students using loans and the percentage of Hispanic student population have been shown to share a negative relationship with student loan consumption (Macy & Terry, 2007); meaning that the racial make-up of a university can effect the overall loan usage of an institution’s student body. These areas of data help to explain a portion of the variation in student loan consumption at different institutions, but there are certainly other unexplored areas that may help explain why students at similar institutions have large differences in student debt load.

The ultimate goal of this study was grounded in the examination of institutional factors and expenditure categories that have played and continue to play a role in the level of average institutional, federal student loan debt at master’s level, regional public four-year colleges and universities (MPUs) (as defined by the Carnegie Classification System1). In effect, the conceptualization of the relationships under study here explored if institutional environment, institutional spending practices, and student population characteristics play a role in determining how much federal student debt is being consumed. Furthermore, the chapter helped validate the use of a modified version of the I-E-O model (Astin & Antonio, 2012) and its effective application to the contexts of the problem studied.

In subsequent sections of this literature review, I addressed studies that have explored student debt outcomes, taking into account student characteristics and institutional environmental factors. Specifically, the section that immediately follows covers the background of the institutional type examined in this study, the MPU. The next section focused on research related to student debt, followed by a section that addressed the research on institutional expenditures and the final section proposed a functional form for this study’s conceptual framework. This study’s conceptual framework was guided by Astin and Antonio’s (2012) Inputs-Environment-

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1 See http://carnegieclassifications.iu.edu/definitions.php for a complete listing of university definitions.
Outputs (I-E-O) model and Baumol and Bowen’s (1965) Cost Disease Theory (CDT). The I-E-O model was used as a framework for operationalizing this study’s variables. A major tenant of the CDT is that labor costs are a driving factor that determines the rise of the cost of inputs and subsequent rise in the good or service delivered, relative to other industries. As such, the CDT is the lens by which this study examined and justified the use of expenditures as a variable of interest and impact. Both of these ideas will be more fully developed in subsequent sections of this chapter.

**The Master’s Level Institution**

**Background and Carnegie Classification**

This study examined a specific institutional type: the master’s level public university. Universities designated within this category of higher education institutions are often known by a number of different names, including (a) comprehensive regional universities, (b) state comprehensive universities, and (c) master’s colleges and universities. Any confusion caused by this variation in names is due, in part, to the changing of the Carnegie Classification system’s categorical retooling and relabeling practices implemented across time (McCormick & Zhao, 2005). Currently, and for the purposes of this study, this analysis refers to these institutions as master’s level public institutions, abbreviated as MPUs.

While the Carnegie Classification system has contributed, at times, to a nebulous definition of MPUs, such confusion is rooted in a deeper context that crosses historical, socio-cultural, educational, and economic lines. For example, when thinking of higher education in general, initial images can range from prestigious private universities, to large flagship institutions with prominent football teams and cutting edge research endeavors, to even the local community college (Geiger & Heller, 2011). MPUs tend to be somewhere in the spaces between the aforementioned institutional types. As Henderson (2007) noted, “State Comprehensive Universities [MPUs] have often been called the middle child of higher education” (p. 9). Furthermore, although the land-grant institution has often been described as the “people’s” university, it could be argued that this title is more rightly assigned to MPUs. This is because land-grants, for the most part, have taken the identity of highly selective international research institutions. On the other hand, many MPUs saw their beginnings as “Normal Universities” with the mission to educate teachers to serve local communities. Normal universities were established to educate a region’s students to become educators that would in turn educate the region’s future
students at the primary and secondary level (Henderson, 2007). While many MPUs have grown out of the teachers’ college identity, they still tend to serve the regions in which they reside and offer admission to a wide range of students with a continued emphasis on teaching and access (Henderson, 2007).

This kind of in-between, less defined, or less esteemed status has often left MPUs as an understudied institutional group, despite the fact that they enroll a significant number of students each year. In 2014, MPU’s enrolled more than 2.1 million students, or roughly 10% of the higher education population (Carnegie Classification of Institutions of Higher Education, 2015). Nonetheless, because MPUs tend to have a lower profile nationally, they have garnered significantly less attention in higher education research. Hence, the goal of this study was to fill part of the research gap by examining MPUs and the relationship between their spending patterns and average annual federal student loan debt.

MPU Student Access and Enrollment

In terms of student enrollment, MPUs range in size from the low thousands to much larger enrollments of more than 30,000 students. By definition, the highest level of education is at the master’s level; in some cases, including a handful of doctoral degrees offered and/or conferred. MPUs also tend to prioritize access in their student enrollment practices as compared to larger or more prestigious colleges and universities. This may be due in part to their regional focus. Simply put, MPUs serve students from a smaller regional area surrounding their physical campus location. Their regional focus means that they serve students based more on geography and mission as an access point to higher education. For example, in a study of mission statements, Morphew and Hartley (2006) found that MPUs listed access as their highest priority, while research institutions held research and innovation as their top priority. Historically, this focus on access has also resulted in MPUs experiencing lower graduation and retention rates. “They (MPUs) have provided educational opportunities for students from all racial, ethnic and social-class groups” (Henderson, 2007, p. 7).

While the mission of MPUs is steeped in serving their communities it is clear that there has been pressure to deviate from this in part to pursue more prestige and resources. Often times, this has taken the form of increases to research endeavors (Henderson, 2009; Titus, Vamosiu and Mclure, 2017). In isolation, increases to research endeavors and spending should have a net positive effect on their institutions. However, these changes may come at the expense of the root
mission of MPUs. Research intensive institutions tend to be very expensive to operate and it is plausible to assume that if and when MPUs pursue larger research agendas they may have to sacrifice other areas of spending that could have been better used to support their mission of access and student support (Henderson, 2009).

Access policies have allowed MPUs to serve a diverse range of students—including students of color and students representing various ethnic backgrounds—many of whom may view their local MPU as their only path to a college degree. However, these students often have limited family resources, thus needing student loans to enable them to enroll in college (Jackson & Reynolds, 2013). To that end, it is important to understand the relationship that student loans have on student outcomes.

In fact, student debt tends to have a dual-sided effect on underrepresented student populations. Student loans afford the opportunity for students to enroll in higher education programs that they otherwise might not have been able to afford (McKinney & Burridge, 2015). While student loans may help students afford college there are mixed results as to their overall efficacy. Some studies have found that student loans help to increase persistence among underrepresented students (Chen & DesJardins, 2010; Gladiuex & Perna, 2005) while other studies have shown a negative relationship between student loans and persistence for underrepresented students (Kim, 2007; Paulson & St John, 2002). The positive effects of student loans may be compromised by the fact that these students tend to accumulate larger debt loads than their majority counterparts (Jackson & Reynolds, 2013). Additionally, with respect to their white/majority counterparts, there is a greater likelihood that minority students will not complete their degree programs (Jackson & Reynolds, 2013). In short, based on the literature, it is essential to understand that while the consumption of student loans can have a positive impact on the underrepresented student populations that are prominent in MPUs, it can also increase the likelihood of negative outcomes. Such negative outcomes include indebtedness without completion and higher levels of debt than necessary to complete students’ degree programs. In fact, current trends show that it is not students with large debt loads that experience negative financial consequences such as defaulting on loans and subpar credit. Rather, the majority of student loan defaults come from those who carry small amounts of debt, but who failed to complete their degrees (Hillman, 2014).

Funding Issues
Traditionally, a major source of funding for MPUs has come from state appropriations. However, like many other public institutions, MPUs have increasingly had to rely on tuition revenue because funding from the states has decreased (Henderson, 2007; Ness & Tandberg, 2011; Serna & Harris, 2014; Tandberg, 2010). While tuition has generally been lower at MPUs than at other types of four-year higher education institutions, MPUs have not been exempt from the crisis of rapidly rising tuition rates matched against lower levels of financial support from the states in which they are located (Henderson, 2007). Also, like most other higher education institutions, MPUs have had to transfer their increased operational costs to students in the form of higher charges for tuition and fees (Zumeta, Breneman & Callan, 2012; Serna, 2013, 2015).

In contrast, large, public research universities tend to have several major revenue streams ranging from state appropriations, research grants, alumni giving, tuition, and—in some cases—revenue from hospitals and athletics (Serna, 2013; Toutkoushian, 2003). Prestigious private universities may have the same revenue streams as large, public research universities—along with large endowments—but not the state appropriations. Community colleges tend to have fewer resources, but they also tend to spend and charge significantly less to educate students (Geiger & Heller, 2011). MPUs, on the other hand, face the challenges of producing undergraduates with the same credentials as public research and prestigious private universities with vastly fewer resources at their disposal, all while serving a typically more diverse and resource intensive student population (Henderson, 2009; Pitts, White, & Harrison, 1999).

The Need for More Research: Student Debt and MPUs

Reviewing the existing literature on MPUs is significant to the conceptualization of this study, by undergirding the importance of isolating a particular type of higher education institution to investigate its unique dynamics related to federal student loan debt outcomes. To reiterate, MPUs serve a large proportion students in higher education, attributable to their focus on access policies that result in the enrollment of increasingly diverse student populations. Traditionally, MPUs have had lower rates of retention and graduation, implicating that their less exclusive access policies may be related to these lower rates. However, research has also shown that open access universities—insitutions that accept 80% of applicants—account for major gains in college completions (Doyle, 2010). Simply put, MPUs have been and will continue to be a significant factor for college completion nationwide. Ultimately, these students use varying amounts of student loans to help finance their education, amounts marked by the increasing cost
of education at MPUs. As MPUs continue to adapt to these challenges, the need for more research in this area, including the impact on students currently attending MPUs, is warranted (Kastinas & Kinkead, 2011).

To conclude this section, while MPUs serve large and diverse student populations, they have largely been omitted from the higher education research canon (Henderson, 2009). Again, part of this practice of omission may be due to their ill-defined place in the higher education landscape, as opposed to being considered unworthy of research attention. In effect, the researcher has sought to highlight the fact that students at MPUs are affected by current national trends in the area of student debt. Therefore, it is important to research the corners of higher education not often explored and examine the impacts that these larger forces can have on student populations who receive little attention and who may be at the most risk (Terenzini, Springer, Yaeger, Pascarella, & Nora, 1996). Through its investigation of average student debt levels at MPUs, this study can help to fill the research gap—not only in the area of student debt literature, but also with regard to the gap in research on MPUs in general.

**Student Debt**

**Types of Student Debt Research**

As part of the review process, I encountered many theoretical lenses through which student debt has been explored, with a significant portion of the literature devoted to the individual student. One research strand explored student background (i.e., race, income, and college preparation) and its relationship to student debt (Greene, 1989; Herr & Burt, 2005; Jackson & Reynolds, 2013; Knapp & Seaks, 1992; Podgursky et al., 2002; Steiner & Teszler, 2003; Wilms, Moore & Bolus, 1987). This type of research used student debt as the dependent or outcome variable. A second type of research or theoretical lens explored student debt and its impact on the student (Baum & Saunders, 1998; Choy, Geis, & Carroll, 1997; Brown & Caldwell, 2013; Elliot, Grinstein-Weiss, & Nam, 2013; Woluchem & George, 2014). It operationalized student debt as an independent variable and examined its impact on student outcomes. Another strand of research explored student debt at the macro level. This research tended to focus on exploring institutional factors and student characteristics that contributed to the number of students who fail to repay their student loans and contributed to loan default rates (Choy & Li, 2006; Christman, 2000; Harrast, 2004; Herr & Burt, 2005; Steiner & Teszler, 2005; Volkwein, Szelest, Cabrera, Napierski-Prancl & 1998; Volkwein & Szelest, 1995).
The final area of literature covered, and the one most pertinent to this study, explored which institutional factors might explain student debt accumulation rather than default. Since this study’s research questions asked what relationship, if any, there is between institutional expenditures and average annual federal student debt at MPUs, this study’s main area of focus—in terms of the most relevant research—was aimed at analyses that have explored the significance of institutional factors and their roles in explaining student debt accumulation.

The following sections, “Individual Student Debt” and “Institutional Characteristics of Student Debt,” briefly explored studies that (a) examined student debt on an individual level and (b) other research that explored the role of institutional characteristics and their relationship to student debt. The review of student debt literature on the individual level briefly covered a range of studies that added context to this study, also serving to better highlight how student debt has been researched in the past. The final section on institutional characteristics highlighted studies that directly contributed to the conceptual framework for this study.

**Individual Student Debt**

The federal loan program for colleges and universities was part of Title IV of the Higher Education Act of 1965. Among other forms of grant aid, Title IV established a federal loan program that enabled private lenders to make education loans to students that they guaranteed under the full faith and credit of the federal government (Zumeta, 2001). The 1972 reauthorization of the act added Educational Opportunity Grants (needs-based financial aid grants) and subsidized student loans under the Guaranteed Student Loan Program (GSLP), later known as the Stafford Loan program (Fuller, 2014). Over time, federal loan programs have become a major source of financing for students to fund their education, with unsubsidized loans making up the largest portion of aid since 2008 (Serna, 2016). As the primary vehicle for financing higher education, this proliferation of student loans has led to a line of inquiry that seeks to more fully understand and examine the impact of student loans on financial, educational, and quality of life outcomes for students—both those who have graduated and those who have not graduated.

In general, the research discussed here has explored the impact of student loan usage on student outcomes relevant to vocational, financial, and educational issues. More recent studies on student debt and vocational outcomes show that student debt has an impact on student vocational outcomes (Field, 2009; Rothstein & Rouse, 2011) while older studies tended to find little
evidence that student loans have impacted choice of major or vocational choice (Baum & Saunders, 1998; Choy, Geis, & Carroll, 1997; Flint, 1998; St. John, 1994; Schapiro, O’Malley, & Litten, 1991). This difference may be associated with the increased presence of student loans in higher education funding during the last 20 years. Research into the effects of student loans on financial outcomes tended to be more complicated as the findings across such studies have varied over time.

Initially, student debt was correlated with higher levels of educational attainment and, as a result, higher paying jobs (Baum & Schwartz, 2006; Elliot & Lewis, 2015). More recently, however, research has shown that higher levels of student debt shared a negative relationship with post-college financial outcomes such as homeownership and retirement savings (Brown & Caldwell, 2013; Elliot, Grinstein-Weiss, & Nam, 2013; Woluchem & George, 2014).

Additionally, some studies have indicated that the impact of student loans on educational outcomes (i.e., persistence, enrollment, and completion) is not uniformly distributed among student groups based on certain demographic features. For example, use of student loans by Black students and low-income students was associated with a greater likelihood of non-completion (Kim, 2007; Paulsen & St. John, 2002). With respect to demographics, a number of researchers have specifically explored the relationship between student background and student debt (i.e., race, ethnicity, and family income). These studies have found that Black students and low-income students are disproportionately and negatively impacted by student loans as a form of financial aid, demonstrated by their vulnerability to loan default and their need for higher loan amounts (Greene, 1989; Herr & Burt, 2005; Jackson & Reynolds, 2013; Knapp & Seaks, 1992; Podgursky et al., 2002; Steiner & Teszler, 2003; Wilms, Moore & Botus, 1987).

This section’s review of the research on the impact of student loans on student outcomes, during and after college, provided context for the implications of this study. The overarching, salient finding from the group of studies cited here is that student loans can and do have disproportionately negative impacts on some students. At the same time, the narrative on student loans is changing. For instance, in prior decades, student loans tended to be regarded as worthy investments that would yield multiple, positive outcomes during a lifetime. More recent research, however, has challenged this notion (Brown & Caldwell, 2013; Cooper & Wang, 2014). This has resulted in demand for more nuanced research to more fully understand the efficacy of student loans as a financing option for higher education, especially within contemporary socio-cultural,
economic, and political contexts. In turn, I suggested that the findings generated from this study will add to the student loan research narrative through a deliberate focus on the institutional perspective (MPUs) tied to the implications of rising student debt reviewed in this section, while also illuminating how regional public colleges and universities studied have chosen to expend their resources.

**Institutional Characteristics and Student Debt**

Numerous studies have examined the effectiveness of financial aid policies in higher education, and how they impact student populations (Dynarski, 2000; Dynarski & Scott-Clayton, 2006; Dynarski & Scott-Clayton, 2013; Toutkoushian & Shafiq, 2010; Turner, 2012). Study topics have ranged from state tax policy to the ways in which different socioeconomic groups benefit or suffer under specific financial aid policies. Dynarski (2013) noted that the complexity of aid programs can serve as a barrier to access. For example, “first generation” students were likely to miscalculate the actual cost of attending a school and, as a result, they were more likely to not enroll. Turner (2012) showed that the individual financial benefits of education tax credits were “substantially offset” (p. 472) when institutions reduced their institutional grants. This scenario can occur when the education credits appear as a resource that counts against future aid eligibility. In such a case, by accruing a financial benefit, students might be rendered ineligible for more substantial amounts of institutional aid. In turn, these students consume student loans to make up for the reduced value of their institutional aid (Turner, 2012).

There are few, if any, studies that examine the overall efficacy of student loan programs. This may be due, in part, to the nationalized nature of the federal loan programs. The vastness of student loan programs can inhibit an effective overall evaluation of student loan programs. Moreover, there are few studies that specifically examined if and what institutional factors might play a role in student debt. Still, what limited research exists can be categorized into two groups: (a) studies that explore the specific institutional characteristics that can be attributed to student debt and (b) studies that explore institutional characteristics that help to explain cohort default rates. The term, cohort default rates (CDR), refers to the percentage of students from a university that fail to make payment on their student loans, and they are more prevalent in the research literature. CDRs are of specific interest to university authorities, state officials, and federal officials because they directly serve as a measure of the efficacy of student loan programs (Gross, Cekic, Hossler, & Hillman, 2009). In most cases, student debt is not considered a
concern if the CDR is below an acceptable level and most not-for-profit institutions never approach this level. As a result, very few studies have begun to examine the institutional factors leading to differing levels of student debt as measured at the institutional level.

Keeping in mind the limited amount of research available on the efficacy of student loan programs, the next section places emphasis upon the first line of studies that have been aimed at understanding the institutional level factors associated with student debt. On this point, it should be noted that while CDRs have been/are considered an important area of student debt literature, however they are not directly relevant to this study’s conceptual framework. As such, while I did not further explore CDRs within this section, they are considered part of the groundwork for discussing the implications of the study findings in broader context.

**Institutional Determinants of Student Debt**

There is limited research aimed at exploring the institutional determinants of student debt. This section outlined relevant studies and highlights those findings that serve as the conceptual foundation for the analysis. Macy and Terry (2007) used a sample from 200 colleges and universities to explore the institutional factors that were thought to be drivers of average student debt. They found that the primary determinants were: (a) percentage of college students with debt, (b) tuition and fee rates, (c) size of the institution, (d) value of the institution’s endowment, (e) percentage of classes with 50 or more students, (f) the alumni giving rate, and (g) percentage of Hispanic students (Macy & Terry, 2007). These findings are useful in that they can directly contribute to the conceptual framework and statistical approach for this study.

In a similar vein—using data from IPEDS, the College Board 2011 Annual Survey of Colleges, and the College Scorecard—Craig and Raisanen (2014) examined institutional factors that could be identified as contributors to student debt levels of college graduates. They found that the institution’s location played a significant role in determining the average debt of graduates and noted, “At universities in more urban areas, students borrow larger amounts for their education. Students attending university in rural locations borrow the least” (Craig & Raisanen, 2014, p. 671). Additionally, after controlling for the cost of attendance, they found that schools with high average entrance exam scores (SAT and ACT) correlated to lower average debt for graduates. They posited that this was directly related to the notion that higher entrance exam scores are highly correlated to higher family incomes. There was also a nonlinear relationship between income of families and average student debt, with students from middle-
income families being the most burdened by student debt. The percentage of students living on-campus versus off-campus, or with parents, was also significantly related to higher levels of average student debt after graduation (Craig & Raisanen, 2014). The aforementioned studies provided a meaningful foundation from which the researcher could illuminate factors contributing to the conceptualization of relationships among variables pertaining to this analysis in terms of its analytic approach.

Another study, conducted by Monks (2014), looked at the impact of institutional and state aid policies on variability in student debt. Not surprisingly, he found that the cost of attendance was a significant factor in determining student debt. Of specific interest to this study, Monks (2014) found that increases in institutional expenditures per student correlated to an increase in average student borrowing. Monks (2014) noted, “At public universities, the cost of attendance is not related to total average student debt, conditional on other variables. This result implies that a focus on sticker price in determining debt levels, at least among graduates of public universities, may be misplaced” (p. 136). Monk’s (2014) study had a wide focus on a large sample from all four-year nonprofit higher education. However, the findings and avenues for future research can be used to support this study’s examination of MPUs. Based on this study, institutional expenditures may be more significantly related to student debt, and the cost of attendance might not necessarily be assumed to hold primary significance. The fact that this study’s focus is on MPUs this tangible finding added value to the formation of this study’s conceptual framework and choice of variables presented in Chapter Three. In particular, Monk’s (2014) study offered empirical evidence regarding the value of examining a specific sector of public higher education, including the role institutional expenditures might play in contributing to average student debt, which I nuance here by functional category.

**Institutional Expenditures**

Among the topics discussed about higher education, one that appears to garner a significant amount of attention is the large financial investment required of the student and/or student’s family to participate in higher education. This discussion begs the question, “Why is college tuition so high?” A review of the research on this topic is significant to the purpose of this study based on the idea that average student debt can be related to institutional expenditures; thus, drawing a direct connection between the cost to produce a degree and the price a student pays to obtain the degree. Bowen (1980) advanced this notion through his “Revenue Theory of
Costs” or RTC, to explain why costs were rising so rapidly within higher education. He posited that institutions of higher education would spend as much money as they could raise from whatever source possible. In other words, the only thing preventing raising tuition costs were the ability to generate revenues. More specifically, Bowen (1980) stated,

> On the whole, unit cost is determined neither by rigid technological requirements of delivering educational services nor by some abstract standard of need. It is determined rather by the revenue available for education that can be raised per student unit. Technology and need affect unit costs only as they influence those who control revenues and enrollments. (p. 18)

Essentially, Bowen (1980) believed that an institution’s main goal was to advance its excellence, prestige, and quality—with revenue being the only constraint on increasing costs; which the research literature on MPUs suggests is not their primary aim. Therefore, it was an institution’s will to remove any impediment to increasing revenue regardless of decreasing marginal returns on each additional dollar spent (Bowen, 1980).

Conversely, Archibald and Feldman (2008, 2011) criticized the RTC for being too simplistic and not accounting for a number of other factors that drive expenditures in higher education. They further argued that many other service delivery sectors involving highly educated individuals have experienced similar increases in the costs related to service delivery. For example, Archibald and Feldman (2008, 2011) found that dentistry, physician services, and legal services all exhibited similar trends with respect to the costs of delivering their services. They attributed this trend to the need for highly educated personnel credentialed to deliver these professional services as opposed to higher education institutions blindly spending every dollar acquired. In fact, Archibald and Feldman’s (2008, 2011) major argument, as determined from their study, asserted that institutions have been rather responsible stewards of public resources. Additionally, the professional service sectors studied were not benefiting from the gains in production efficiency experienced by other industries, businesses, or organizations in terms of technology advancements and cost reduction strategies. Specifically, Archibald and Feldman (2008, 2011) found that industries focused on the production of goods were better able to incorporate technologies and introduce new efficiencies that helped to reduce the cost of production across time.

Archibald and Feldman (2008, 2011) provided an even more compelling argument for
increasing costs (at rates above inflation for other goods and services) in their presentation of evidence supporting the “Cost Disease Theory” (CDT). This theory, developed by Baumol and Bowen (1965), posited that it was productivity and the introduction of technologies that could explain differing costs based on sector. Baumol and Bowen (1965) explained,

In the rising productivity sector, output per man-hour increases more rapidly than the money wage rate and labor costs per unit must therefore decline. However, in the sector where productivity is stable, there is no offsetting improvement in output per man-hour, and so every increase in money wages is translated automatically into an equivalent increase in unit labor costs. (pp. 499-500)

In other words, sectors with stagnant levels of productivity (higher education for example) cannot leverage wages to lower the labor cost per unit but instead increases in wages simply raise labor costs.

Baumol (1967) took this theory and applied its economic principles directly to higher education, given that demand for higher education tended to be income and price inelastic. Overall, families were willing to continue paying a larger amount to finance an education because the value of a college degree was a condition for employment in many lucrative fields. This meant that demand for an education would keep increasing even with stagnant levels of productivity, or degree production, in higher education. Baumol (1967) posited that productivity in other areas of the economy would outstrip higher education, eventually leading to rapidly increasing costs in higher education. He also pointed out that this would have a serious impact on low-income students and their ability to pay for their education. It is also fair to say that the rising price of tuition has not decreased the supply of students applying to and enrolling in higher education; though the socioeconomic breakdown of students along the demand curve clearly shows those with higher incomes demanding far more enrollment spaces across higher education (DesJardins & Bell, 2006; Serna & Birnbaum, 2014)

Nonetheless, when speaking in aggregate, research indicates that demand for higher education will remain high as it becomes increasingly required for vocational attainment in most lucrative fields. “And the relatively constant productivity of college teaching leads our model to predict that rising educational costs are no temporary phenomenon” (Baumol, 1967, p. 421). In other words, the nature of higher education’s cost structure and required inputs has tended to stay relatively the same. Specifically, the cost structure is made up primarily of salaries (expenses)
paid to faculty and staff, which has increased without any offsetting of costs through increases to efficiency. This premise is central to this study as a large portion of recorded expenditures can be related to salaries and related expenses depending on budgeting approach. If this is true, the relationship between increasing institutional expenditures and student debt should be explored.

While both theories offered compelling cases for the rising costs in higher education, the RTC (Bowen, 1980) only applies to one industry (higher education), while the CDT (Baumol & Bowen, 1965) has utility across industries. With regard to the latter theory, Archibald and Feldman (2008) asserted, “Cost per student in higher education follows a time path very similar to the time path of other personal service industries that rely on highly educated labor. This is entirely consistent with the cost disease explanation of the rise in cost in higher education” (p. 289). With empirical evidence, the work of Archibald and Feldman (2008, 2011) continues to make a convincing argument that the CDT has the greater explanatory power of higher education costs and their implications for student debt issues and hence is used as the primary theoretical lens for interpreting the results of the final analysis.

In summary, Archibald and Feldman (2008, 2011) reasoned three points to make the case for rising costs in higher education. First, technological processes and advances are not evenly distributed across industries. As a result, some industries—higher education among them—do not benefit from similar cost efficiencies experienced in other production markets. Second, increases in technology have created the need for a more educated and, hence, more expensive workforce in higher education. The supply of such highly educated workers has not kept pace with demand and, consequently, the wages paid to this sector of the workforce (college administration and faculty) remain high. Finally, increases in technology do not necessarily reduce costs. Archibald and Feldman (2008, 2011) argued that technology in higher education has benefited the buyer (i.e., the student) by offering a better and more up to date product (i.e., education). However, technology advancement has also increased the cost of higher education because new processes and innovations are constantly changing; requiring added institutional expenditures to meet the needs of the student and the demands of the contemporary labor market (Archibald & Feldman, 2008, 2011).

While it is true that most universities are in search of excellence, prestige, and quality, not all institutions exert their efforts to the same extent or with the same level of resources. Specific to this study, MPUs that typically have fewer financial resources and serve a wider
range of student abilities are examined here. However, these universities are still beholden to the potential effects described by the CDT. Their expenditures on highly educated labor contribute to a large portion of increasing costs in higher education. Based on these key points, this study explores the ways in which institutional expenditures, across institutional operations, contribute to the debt burden accumulated by students that attend these institutions by combining CDT’s tenets with Astin and Antonio’s I-E-O framework for examining institutional factors related to student outcomes.

**Institutional Expenditures and Accountability**

Increasing calls for accountability in higher education have placed heightened scrutiny on how universities spend their money and to what degree they can show positive student outcomes for such expenditures. It is not uncommon to see news articles from magazines such as *Forbe’s* (Newlon, 2014) that highlighted the large sums of money institutions pay to physically improve their campuses and attract students. While these stories offered insight into the university expenditure narrative, they offered little to explain how institutional expenditures may impact student outcomes. To reiterate, the number of studies that have specifically explored institutional expenditures and relevant student outcomes is quite limited. The expenditure narrative remains further complicated by the plethora of student outcomes that can be examined as the outcome of interest. Thus, while the literature on student outcomes is vast, the goal of this section was to review relevant studies that incorporate a focus on institutional expenditures and their related variables of interest; further, to explore their findings and to highlight further the use of expenditure data in student outcome research with special attention to institutional level variables and outcomes. However, before that can be accomplished it is necessary to give a brief introduction to the history and nature of the expenditure data highlighted in this section.

The Department of Education was established in 1867 with the mission to collect data on the “condition and progress” of education throughout the United States (Fuller, 2011). While the U.S. has collected educational data since 1870, it was not until the creation of the National Center for Education Statistics that institutional level data on higher education become more readily available and uniform in its collection (Fuller, 2011). The first iteration of large-scale data collection happened from 1966 until 1987 through the Higher Education General Information Survey (HEGIS). This survey was replaced by the Integrated Postsecondary Education Data System (IPEDS) with a gradual phase in process starting in 1985 (Fuller, 2011).
IPEDS became the primary source of institutional level higher education related data collection. This has led to a proliferation of studies that examine a wide range of topics using IPEDS data as a rich source of information. The next sections highlighted studies that examine the relationship between institutional expenditures and student outcomes and finally offer a framework for analysis. The first section highlighted older studies that examine this relationship with a wide range of expenditure data. The second section explored studies that utilize IPEDS data and as such are more recent and offered examples for building a framework for analysis.

**Institutional Expenditures and Student Outcomes Research**

One of the first examples of research that examined educational outcomes and educational expenditures is the seminal study titled “Equality of Educational Opportunity” (Coleman et al., 1966). While this landmark study only examined the relationship between expenditures and student outcomes at the K-12 level, it offered an initial framework and justification for examining expenditures and student outcomes. The report found that students’ backgrounds were strongly associated with achievement rather than schools’ expenditures per student. Another study—conducted by Rock, Centra, and Linn (1970)—explored a sample of small colleges in an effort to determine what factors were shared among them that distinguished which were most and least successful in terms of student achievement. Along with other factors included in the study, they incorporated general administration and general expense items. They collected their data on expenditures from the Office of Education (now known as the U.S. Department of Education). Although they did not find a relationship between expenditures and student academic achievement, they did find a relationship across the areas of student income, percentage of faculty with a doctorate, and student achievement (Rock, Centra & Linn, 1970).

Wachtel (1976) found that differences in expenditures (both secondary and post-secondary) impacted students’ post-graduation earnings while controlling for a number of differing factors such as father’s education in years, years of work experience, college attendance, graduate school attendance, and entrance test scores. Similar to Rock, Centra and Linn (1970), Watchel (1976) used expenditure data furnished from the Department of Education.

In “What Matters in College: Four Critical Years Revisited,” Astin (1993) presented findings from a study in which he explored the impact college has on student development. He used a wide range of variables to explore quantitatively the impact of college on students and only briefly explored institutional expenditures. The data for expenditures, similar to the
previous studies was drawn from the Office of Education. Nonetheless, Astin (1993) posited that expenses devoted to student services had a positive effect on student perceptions and attitudes when relating them to student development. On the other hand, instructional expenditures had a more modest and indirect effect on these same variables. These early studies acknowledged that institutional expenditures played a role in student outcomes even though Wachtel (1976) and Astin (1993) did not include expenditures as a focal point of their analyses. In contrast, the next discussion isolated a set of studies that more directly explored the impact of institutional expenditures on student outcomes.

Harrison (1995) investigated the impact of expenditures on college and university development efforts and their relation to fund-raising. He found that alumni costs per student, along with college relations costs per student, were significant factors in predicting the number of active donors per 100 alumni of record. The empirical data from this study were derived from reports furnished to the researcher from two nonprofit organizations: The Council for Aid to Education and The Council for Advancement and Support of Education. Of significant importance in this section is the derivation of expenditure data for each study. Rock, Centra and Linn (1970), Wachtel (1976) and Astin (1993) used expenditure data from the Office of Education, specifically HEGIS. Finally, Harrison’s (1995) study collected expenditure data from two nonprofit organization that collected institutional data. The diversity in expenditure data source was directly related to the lack of uniform collection methods and uniformity of government agencies that collected this type of information. As previously mentioned it was not until the introduction and multiple subsequent updates to the IPEDS system that more reliable and uniform data on expenditures could be used in similar studies. The following section explores studies that employed data from IPEDS as the primary source of expenditure information.

**IPEDS categories and classifications in expenditures research.**

The following studied all operationalize expenditure data, from IPEDS, as a major variable of interest in their studies. It was important to clearly outline the meaning of the data collected. More specifically, what makes the data meaningful to these studies. The data for expenditures can be expressed in two classifications: natural and functional. Natural expenditure data are expressed in terms of what the type of cost is incurred by the institution. When expressed naturally these categories are: salaries and wages, benefits, depreciation, interest
expense, operation expense and other expenses. Functional classification expenditure data are grouped by the purpose of the expense. Institutions report these expenses to IPEDS by the functional categories as: instruction, research, public service, academic support, student services, institutional support, operation and maintenance of plant, net grant aid to students, auxiliary expenses, hospital services, independent operations and other functional expenses (The Integrated Postsecondary Education Data System, n.d.). It is important to note each functional category includes natural expenses such as salaries. For example, the instructional expenditure category includes expenses allocated for the teaching and instruction of the student body but is made up of natural expenses such as salaries for professors. The overall expenditure amounts for each institution in any given year is the same for both classifications, they are simply grouped differently for reporting and accounting.

Functional classifications are of specific interest to researchers because they allow for analysis by examining the impact of how money is spent to support the mission of each institution in terms of student outcomes. As such it is important to note that all the following studies used the functional classification of expenditure. All of the following studies examined, what if any, relationship exists between the way institutions spend their money and various student outcomes. The first set of studies explored student outcomes in terms of cognitive development (Pike, Kuh, McCormick, Ethington & Smart, 2011; Pike, Smart, Kuh, & Hayek, 2006; Ryan, 2005; Smart, Ethington, Riggs & Thompson, 2002; Smart & Toutkoushian, 2001). The second grouping of studies examined the impact of institutional spending on student graduation and/or persistence and retention (Gansemer-Topf & Schuh, 2006; Ryan, 2004; Titus, 2006; Webber, 2012, Webber & Ehrenberg, 2010). The following sections will explore these two groupings of studies that will ultimately help guide this study’s framing of the research questions and implications.

**Expenditure data and cognitive student development.**

Of specific interest to higher education stakeholders is the growth and development of students as they enroll and engage in the higher education experience. The following studies have operationalized some form of cognitive student development as the outcome variable and incorporated functional expense categories as interaction variables in their statistical analysis. Smart and Toutkoushian (2001) combined individual student responses to a survey that measured student growth and institutional level data on expenditures. Their goal was to gauge what impact,
if any, institutional expenditures/type of institutional expenditures contributed to student growth. Smart and Toutkoushian’s (2001) findings suggested, “Higher per-student expenditures are positively related to student gains in interpersonal skills and learning/knowledge acquisition” (p. 48). Interestingly, however, they found that students enrolled at institutions reporting higher expenditures per student—expenditures earmarked for academic support—demonstrated lower gains in knowledge and communication skills. Such inconsistent, sometimes contradictory, findings appear to mirror the complex narrative associated with institutional expenditures and student outcomes. One might surmise that additional spending in any student-related area would directly or indirectly contribute to positive gains in any area of student outcomes. Yet, throughout the expenditure and student outcome literature, this has not always been shown to be the case. In fact, under certain circumstances, studies have shown that there has been a negative relationship with certain expenditure categories and student outcomes.

For example, Smart et al., (2002) examined the impact of total expenditures devoted to instruction, academic support, and student services on the development of students’ leadership abilities during a four-year period. Their findings suggested that there is a moderately indirect effect between expenditures and changes in students’ perceptions of their leadership abilities. Specifically, they found that the proportion of expenses allotted to student services had a positive relationship to student leadership development. On the other hand, the proportion of expenditures allotted to instruction had a negative effect on student leadership development. Upon initial analysis, these findings highlighted the often vexing findings associated with this strand of research; in this case, it seemed counterintuitive that a higher percentage spent on instruction should lead to a negative effect on student leadership development. In response to this particular finding, Smart et al. (2002) posited that students in institutions with a higher percentage of expenditures on student services viewed their campuses as highly valuing student development and leadership. They explained that the reverse was true for institutions that spent more on instructional services. Meaning that these schools spent less on student development and more on typical instruction leading these student bodies to feel like their development was less valued than their classroom education. These findings underscored the importance of reviewing and analyzing the significant impacts of expenditure categories as they can be linked to key student outcome areas and how changes or increases in such categories can be understood in terms of the CDT.
Ryan (2005) found a significantly negative relationship between institutional support expenditures and student engagement using IPEDS and data from the National Survey of Student Engagement for the years 2000-2002. Ryan (2005) noted “This result suggests that institutional decisions regarding the allocation of financial resources, various regulatory requirements, and established norms of institutional administration - all of which can contribute to higher administrative spending - may contribute to lower levels of student engagement” (p. 245). Ryan (2005) is suggesting here that the burdens and norms of administrative spending can have negative outcomes for students. It could be posited that the increasing burden of spending on administration can influence the debt burden of students.

Clearly, study findings within the area of higher education expenditures and outcomes are diverse. As a result, Pike et al. (2006) posited that the contradictory results pertaining to this area of research could be mitigated by students’ level of engagement in purposeful activities; a notion further supported by the Astin & Antonio’s (2012) Inputs-Environment-Output (I-E-O) model, referenced earlier in the chapter. After controlling for a variety of student and institutional characteristics, Pike et al. (2006) found that there was a significant relationship between academic and institutional expenditures and four of their five benchmarks to indicate first-year students’ levels of engagement. Specifically, this study found that spending tended to have a more discernable impact on first year student engagement than at other years of student enrollment. Highlighting the importance of researching institutional patterns of spending and its relationship to student engagement, Pike et al. (2006) suggested, “Much more research is needed to determine where and how financial investments shape institutional and individual behavior resulting in improved levels of student engagement and other indicators of student success and educational effectiveness” (p. 869).

Among the various studies presented thus far, there has been a shared call for more research. The recognition of this need for more information directly contributed to the importance of this study’s specified focus on average student debt because it is crucial to know which financial investments may help or hurt student outcomes. As discussed earlier, the I-E-O model provided much guidance in this respect due to its utility for exploring student outcomes by designating inputs and environmental factors. Specifically, the environmental factors in this study included key expenditure data along with other institutional and student body

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2 For more information on this survey see: http://nsse.indiana.edu/
characteristics. Thus, the I-E-O model/process allowed for an examination of factors suspected to influence average, institutional level federal student debt to lesser or greater degrees.

Pike et al. (2011) further explored relationships involving total institutional expenditures, student engagement, and self-reported learning outcomes. Their study used institutional expenditure data and results from the 2004 National Survey of Student Engagement, a survey instrument through which researchers seek to understand environmental or institutional factors related to student engagement. Their findings varied in terms of significance and impact on student engagement. In fact, they found only a singular, significant relationship between the cognitive development of first-year students and total expenditures, all other student levels (sophomore, junior, and senior) did not show any relationship between cognitive development and expenditures. Pike et al. (2011) surmised that this was because institutions typically focus spending on student development in first-year student programs, as opposed to continuing this kind of spending during the remaining college years.

**Expenditure data and graduation rates, retention and persistence.**

Many higher education policymakers and stakeholders are interested in the “bottom-line” of higher education. They want to know how well institutions are doing in terms of retaining their students and ultimately graduating them and producing students with college credentials. The following studies sought to add to the canon of knowledge regarding student retention, persistence and graduation rates by exploring the role of institutional spending and its impact on those outcomes.

Gansemer-Topf and Schuh (2006) explored the relationship between retention and graduation rates and institutional expenditures. They included institutional selectivity (degree of difficulty to be admitted) as another mitigating factor in their research. In general, their study found that there was a significant relationship between expenditures and retention and graduation rates. However, they also found that differences in the effects of expenditures could be mitigated by the level of institutional selectivity. For example, there was no relationship between percentage of expenditures on institutional support and persistence and graduation rates among lower selectivity institutions while institutional support expenditures did have a significant impact in higher selectivity institutions (Gansemer-Topf & Schuh, 2006). Hence, I suggested that these findings accentuate the value of analyzing a more homogenous group of institutions when performing an analysis of expenditures and student outcomes. A homogenous group study, such
as one focused on MPUs, allowed for a more direct analysis of institutional factors that may contribute to average federal student debt by removing other confounding factors such as institutional selectivity. Another example of persistence research comes from Titus (2006), who used a multi-level analysis to examine the relationship between expenditures and student persistence at four-year colleges and universities. His study took into account student-level predictors and other institutional level factors. Of particular significance, Titus (2006) found that the percentage of expenditures on administration was negatively related to student persistence. This finding was interesting because it offers an indictment of institutional spending on central administration. Spending on administration should help to increase institutional outcomes but Titus (2006) found the opposite.

Ryan (2004) examined the six-year, cohort graduation rates at 363 four-year Baccalaureate I and II institutions. Using functional expenditure categories from 363 colleges and universities, he found a positive and significant relationship between instructional and academic support and the six-year, cohort graduation rate. Webber and Ehrenberg (2010) explained that, during the past two decades, median spending on instruction—per full-time equivalent student (FTE)—had grown more slowly than other spending categories such as academic support, student services, and research. Their research used panel data to explore whether these non-instructional expenditure categories had an impact on graduation rates and first-year retention numbers. They found that student service expenditures did have an influence on graduation and persistence rates. Further, they found that the marginal effects of increasing student services expenditures (measured at the $100 per student rate) were higher at institutions with lower selectivity and a higher portion of students receiving Pell grants. These findings suggest that there is continuing value in examining expenditure patterns and environmental factors, especially as these patterns and factors can be applied in the I-E-O model. As such, new and significant findings can better help institutions decide how to direct funds to enhance student outcomes.

Webber (2012) used detailed data, focused on the individual student level, from the state of Ohio to examine the impact of institutional expenditures on the probability of graduating from college. He found the impact of expenditure categories was different depending on the background of the student. For example, the predictive ability of student services expenditures was greater for students with low SAT/ACT scores. The predictive ability of instructional
expenditures was higher for students with high SAT/ACT scores and those in scientific fields. The findings from this study highlighted the utility of the I-E-O model. Webber (2012) found that environmental factors (institutional expenditures) impacted students (probability of graduating) differently depending on the inputs of the students’ SAT/ACT scores.

The prior two sections highlighted the research literature devoted to examining the relationship between institutional expenditures and student outcomes. The findings from the cited studies were decidedly mixed. This is due, in part, to the wide variation in the outcomes studied, samples used, and the student populations examined. Most importantly, the information presented in this section reinforced the view that it is empirically sound to explore the relationships between student outcomes and institutional spending. Each study clearly used some form of the I-E-O model, although most of the studies did not directly cite said model. Correlating to I-E-O, these studies quantified their independent variables as some form of an Input and Environmental factor and operationalized the dependent variable as the Student Outcome. The student outcomes examined within this body of literature encompassed both cognitive student outcomes and accountability outcomes such as graduation rates and measures of student persistence but not student debt.

Finally, the studies, theories, and findings illuminated here served to set the foundation for this study’s conceptual framework. In other words, the examination of the literature relevant to institutional expenditures and student outcomes provided an overall framework from which to structure a more defined or primary line of inquiry aimed at exploring the relationship between institutional expenditures and average federal student debt specific to MPUs through the lens of the Cost Disease Theory. Ultimately, this review of the literature made the case that average federal student debt can be understood as a function of student body characteristics and institutional expenditure patterns using the Astin and Antonio (2012) I-E-O model implicit in the many studies cited above.

Framework for Analysis

Based on the literature addressing rising costs in higher education, in conjunction with studies on institutional and student factors that drive student outcomes, this study combined the cost disease theory (Baumol & Bowen, 1965) and the I-E-O model (Astin & Antonio, 2012) to provide a framework for analysis. First, the researcher posed the major concern of this study as student debt levels, an issue that studies have shown to be related to the costs of providing higher
education. Second, the research literature reinforced the fact that college inputs (selectivity, “ability metrics,” etc.) and environmental factors (expenditures to teaching, student support, etc.) are related to student outcomes (student learning, leadership, development, graduation, etc.). Therefore, I posited that average institutional student debt levels fall into a similar “outcome” category. Taken together, CDT and I-E-O served to conceptualize the design and implementation of this study relative to the contexts and line of inquiry described. In general, the I-E-O model served as a framework to operationalize the variables while the CDT served as a method to interrogate the findings of this study. The CDT offered the theoretical connection between the inputs (institutional expenditures) and the increasing costs/inputs (tuition and by extension student debt) for higher education to remain viable.

Exploring literature on student debt, at the individual level, helped to illuminate why a study on this topic is relevant to the growing research literature; not only to show the potential negative impacts of student debt, but to also show that student debt carries a number of challenges not limited to students with large post-graduation amounts of debt. Specifically, the researcher explored studies of institutional factors associated with student debt levels for two reasons. First, I intended to show that a similar, existing framework could contribute to the framing of this study’s topic focused on student debt; further, that it is possible, using empirical analysis, to explore which institutional factors may contribute to average federal student debt. Second, since I uncovered very little research explicitly targeting this particular topic, the gap in information reinforced the potential importance of this study. Thus, with little known about which institutional factors contribute to student debt levels, this chapter’s analysis helped to uncover a largely unexplored area.

In turn, I presented the available literature related to institutional expenditures and their impact on student outcomes to better highlight how these topics served to set the foundation for a sound conceptual framework. More specifically, the researcher conceived the review of institutional expenditures and student outcomes to underscore the research questions explored in this study. Following is a review of the research questions:

1. Do instructional expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?
2. Do research expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?

3. Do student service expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?

4. Do academic support expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?

5. Do auxiliary expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?

6. Do institutional support expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?

7. Do operations and maintenance of plant expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?

Further, I drew expenditure category data directly from IPEDS data, demonstrating the utility of including these variables based on the relevant literature. At the same time, the literature review revealed that the institutional factors contributing to student debt levels continue to be under-researched. In fact, the work of Macy and Terry (2007) and Craig and Raisanen (2014) were the only studies that explored institutional factors in relation to student debt. However, these studies used broad samples that included different institutional types and controls (e.g., public versus private). Additionally, the institutional factors used were mostly demographic and related to tuition and fees. While neither of these studies analyzed student debt levels as an outcome in relationship to expenditures, they offered tangible models that combined institutional characteristics and student debt levels into a cohesive and integrated framework for analysis.

Overall, drawing from these distinct—yet clearly related—areas of research facilitated the development of a conceptual framework for this study, including the creation of a functional
form equation serving to underpin the study’s design and analysis process. On this basis, the researcher was able to formally express the relationship between institutional expenditures and average annual federal student debt at MPUs over time. Within this framework, I make the following assumptions about the relationships among variables related to average student debt at the institutional level:

\[
\text{Average Annual Federal Student Debt (AFSD)} = f(X_{it}, Y_{it}, Z_{it})
\]

In this equation, average annual federal student debt is understood to be a function of \(X\), which is equal to annual institutional expenditure categories (e.g., instructional, academic support, student services, institutional support, auxiliary expenditures and maintenance of plant) at institution \(i\) over time \(t\). Next, \(Y\) is equal to institutional characteristics (e.g., total revenue and cost for housing) at institution \(i\) over time \(t\). \(Z\) is equal to student characteristics (e.g., percentage of students using federal loans, percentage of students on Pell grants, percentage of African American students, percentage of Hispanic students), again at institution \(i\) over time \(t\). This functional form equation will serve as the basis for the econometric model, specified in Chapter Three.

Based on the purpose of the study and the research questions that guide it, this conceptual framework tracked directly to the I-E-O model in the following ways: the Inputs were variables associated with the student body composition and institutional factors, the Environment were a set of variables associated with the functional institutional expenditures and the Output will be average annual federal student debt. Thus, the researcher determined that the I-E-O model was entirely appropriate. The conceptual framework also tracked to the CDT by assuming that expenditures are related to certain, expense functions such as large and rapidly increasing salaries for employees that must be offset by other revenue sources (tuition and fees). Finally, the researcher’s conception of this framework directly informed the choice of variables included in the estimating equation.

**Conclusion**

The multifaceted nature of this study meant that multiple areas of research needed to be explored in order to establish a theoretically sound conceptual framework that would provide the basis for examining whether or not a relationship exists between average federal student debt and institutional expenditures. Because the unit of analysis for this study was designated as the

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3 This functional form was adapted directly from Webber and Ehrenberg, (2010, p. 948).
master’s level public university (MPU), I provided a brief history and background context for this institutional type. This information was important to establishing an understanding of the position of MPUs in the higher education landscape, including a brief interrogation as to why MPUs and their students have been understudied topics in the research literature.

This chapter reviewed the literature related, directly and indirectly, to student debt and institutional expenditures. This chapter offered insight into the complex narrative of institutional spending and student outcomes. This analysis led to the formation and presentation of a framework for analyzing the relationship between average annual federal student debt and institutional expenditures. A more detailed discussion of the equation is the focus of Chapter Three Methodology, which specifically defined each variable, data source and measure, and presented the econometric model used in this study.
Chapter Three
Data and Methods

This chapter outlined the data collection and econometric methods employed in this dissertation. The chapter described the data being analyzed and sources of the data, the collection methods and the years of data that are represented. The methodological approach that was examined and rationales provided for its use and implementation. Ultimately, this chapter outlined the variables and methods used to answer the seven research questions:

1. Do instructional expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?
2. Do research expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?
3. Do student service expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?
4. Do academic support expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?
5. Do auxiliary expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?
6. Do institutional support expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?
7. Do operations and maintenance of plant expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?

The conceptual framework for this study combined Baumol & Bowen’s “Cost Disease Theory” (1965) (CDT) and Astin and Antonio’s I-E-O model (2012) to provide a framework for
analysis. Chapter Two offered an in depth analysis of CDT. A main tenet of CDT is that sectors that use highly educated labor experience more rapid gains in the cost of offering their services than other industries that require a less educated workforce. Additionally, the CDT posited that sectors such as higher education do not always benefit directly from gains in technological advancement. That is to say, though technology may introduce new ways to increase worker productivity and efficiency these are not as readily applicable to service sector industries as they are to production industries. Hence, while technology may introduce a more effective or dynamic way to offer said service it does not always result in lower costs. Specifically, technology has provided a more dynamic and a versatile way of providing higher education but has not necessarily made the process less costly in its delivery (Archibald & Feldman, 2008, 2011).

Similar to the medical and dental professions, higher education tends to employ a highly educated workforce. As many other service industries, higher education spends a majority of its funds on salaries and benefits for employees be they faculty, administration, or general staff positions. With this in mind it is not unreasonable to assume that major expenditure categories increase across time and have a direct impact on rising tuition which are revenues required to keep a university financially viable and may be related to student loan debt accumulation.

By extension these increases could certainly be passed onto students in the form of student loans as universities charge higher rates of tuition and in return create the necessity to use student loans to cover the increased tuition and fee payments (Monks, 2014). Increasing personnel expenditures and other expenses required to run a university can be passed on to students in the form of higher tuition and fees, which in turn may result in increased consumption of student loans. These ideas are central to this study’s analysis since it sought to understand, after controlling for a number of relevant variables, how and what role may institutional expenditures play in determining average student debt. Astin and Antonio’s I-E-O (2012) model offers a simple conceptual framework to weave these variables together to explore the relationship between institutional expenditures and average annual federal student debt while controlling for other relevant factors. Specifically, this study posited that the Inputs of student demographics and the Environment composed of institutional spending and may have an impact on the amount of student loans that are consumed at MPUs.

The relationship between institutional expenditures and average annual federal student debt was analyzed using STATA 14IC statistical software package. This chapter further outlines
the reasoning for the model specification that was chosen and briefly explains why other model specifications were not suited to the task. Additionally, all variables chosen are clearly defined and outlined. The methodology, variable definition and selection outlined here allows for future researchers interested in institutional expenditures and student debt to replicate the findings of this dissertation and use this framework for further, parallel explorations.

The first part of this chapter defined the organization of the data set used in this dissertation. The rationale for each variable incorporated in the model was offered and the purpose it served as part of the theoretical framework. The second part of this chapter outlined the econometric approach employed and an overview of the model specification based on this approach. As such, this study employed a model best suited for analysis of panel data used in this dissertation. Because panel data can be analyzed through multiple methods this chapter further defines and outlines these methods and ultimately make the case for the how the data were analyzed.

The model specification and variables incorporated each follow the literature and conceptual framework outlined in Chapter Two and for which implications are offered in later chapters. There has been ample research on student debt and how it impacts individuals. However, there has been very little research on the institutional factors that play a role in student debt accumulation. The model in this chapter incorporated variables that have relationships to student debt accumulation and adds, as the primary variables of interest, additional institutional expenditure variables. An important difference between this study and previous studies on institutional factors that influence student debt is the inclusion of time series panel data. That is to say, data analysis over a defined time period rather than simply a cross-section. This addition allows for an exploration of the impact of changing spending patterns of universities across time while controlling for other, well-known driver of institutional student debt levels.

Data

The data for this study were drawn from the U.S. Department of Education’s Integrated Post-Secondary Education Data System (IPEDS) for the academic years 2009-2010 to 2014-2015. These variables are listed in Table 1. Table 1 provides the name of the variable, the source, and a brief explanation of its measure. These years were selected for two reasons. First, 2014-2015 is the most recent year that all data below were available. Second, there were changes
in the collection of expenditure data that required all public institutions to report in the same manner starting in the year 2009-2010. To start, it is important to note how MPU’s were

Table 1

Variable Definitions

<table>
<thead>
<tr>
<th>Variable</th>
<th>Source</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Annual Federal Student Debt</td>
<td>IPEDS (2009-10 to 2014-15)</td>
<td>Any monies that must be repaid to the lending institution for which the student is the designated borrower. Includes all Title IV subsidized and unsubsidized loans.</td>
</tr>
<tr>
<td>Average Annual Federal Student Debt</td>
<td>Same as Above</td>
<td>The sum of all operating expenses associated with the colleges, schools, departments, and other instructional divisions of the institution and for departmental research and public service that are not separately budgeted. This would include compensation for academic instruction, occupational and vocational instruction, community education, preparatory and adult basic education, and remedial and tutorial instruction conducted by the teaching faculty for the institution's students.</td>
</tr>
<tr>
<td>Institutional Support Expenditures</td>
<td>Same as Above</td>
<td>The sum of all operating expenses associated with the day-to-day operational support of the institution. Includes expenses for general administrative services, central executive-level activities concerned with management and long-range planning, legal and fiscal operations, space management, employee personnel and records,</td>
</tr>
</tbody>
</table>

4 For more information on this change see https://nces.ed.gov/ipeds/deltacostproject/download/DCP_History_Documentation.pdf
For more information on these variables see: https://surveys.nces.ed.gov/ipeds/Downloads/Forms/IPEDSGlossary.pdf
<table>
<thead>
<tr>
<th>Variable</th>
<th>Source</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Expenditures</td>
<td>Same as Above</td>
<td>The total expenses are the sum of all operating expenses associated with activities specifically organized to produce research outcomes and commissioned by an agency either external to the institution or separately budgeted by an organizational unit within the institution. The category includes institutes and research centers and individual and project research.</td>
</tr>
<tr>
<td>Student Service Expenditures</td>
<td>Same as Above</td>
<td>The sum of all operating expenses associated with admissions, registrar activities, and activities whose primary purpose is to contribute to students' emotional and physical well-being and to their intellectual, cultural, and social development outside the context of the formal instructional program.</td>
</tr>
<tr>
<td>Academic Support Expenditures</td>
<td>Same as Above</td>
<td>Total expenses are the sum of all operating expenses associated with activities and services that support the institution's primary missions of instruction, research, and public service.</td>
</tr>
<tr>
<td>Auxiliary Expenditures</td>
<td>Same as Above</td>
<td>The sum of all operating expenses associated with essentially self-supporting operations of the institution that exist to furnish a service to students, faculty, or staff, and that charge a fee that is directly related to, although not necessarily equal to, the cost of the service.</td>
</tr>
<tr>
<td>Operation of Maintenance and Plant Expenditures</td>
<td>Same as Above</td>
<td>The sum of expenses for operations established to provide service and maintenance related to campus grounds and facilities used for educational and general purposes.</td>
</tr>
<tr>
<td>Variable</td>
<td>Source</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-----------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Total Revenue</td>
<td>Same as Above</td>
<td>Total revenues for the essential education activities of the institution. Core revenues for public institutions include tuition and fees; government appropriations; government grants and contracts; private gifts, grants, and contracts; investment income; other operating and nonoperating sources; and other revenues and additions.</td>
</tr>
<tr>
<td>State Appropriations</td>
<td>Same as Above</td>
<td>Revenues received by an institution through acts of a legislative body, except grants and contracts. These funds are for meeting current operating expenses and not for specific projects or programs.</td>
</tr>
<tr>
<td>Tuition and Fees</td>
<td>Same as Above</td>
<td>The published in-state tuition and fees charged to students, based on full-time enrollment.</td>
</tr>
<tr>
<td>Average Amount of Grants</td>
<td>Same as Above</td>
<td>Any grant aid includes Federal, State and local government grants and institutional grants.</td>
</tr>
<tr>
<td>Full-Time Equivalent Students</td>
<td>Same as Above</td>
<td>The number of full time equivalent students each year, measured by credit hours.</td>
</tr>
<tr>
<td>Percent on Student Loans</td>
<td>Same as Above</td>
<td>Percent of the student body using student loans.</td>
</tr>
<tr>
<td>Percent on Pell Grant</td>
<td>Same as Above</td>
<td>Percent of the student body receiving the Pell grant.</td>
</tr>
<tr>
<td>Percent of Hispanic Students</td>
<td>Same as Above</td>
<td>Percent of the student body that identify as Hispanic.</td>
</tr>
<tr>
<td>Percent of Black Students</td>
<td>Same as Above</td>
<td>Percent of the student body that identify as Black.</td>
</tr>
</tbody>
</table>

selected in terms of the IPEDS data set. The IPEDS data center allows for the selection a pre-determined group of institutions to compare along both time and variables of interest. For this study MPU’s were selected by defining the group as all Master’s level institutions (defined as
small, medium and large in terms of student body size and offering at least 50 master’s degrees and less than 20 doctoral degrees) and categorized as public (Carnegie Classification of Institutions of Higher Education, 2015). This yielded a total population set of 272 institutions during a six-year period.\footnote{For more information on Carnegie Classification definitions see \url{http://carnegieclassifications.iu.edu/definitions.php}}

The variables of interest, Average Annual Federal Student Debt (AAFSD) and MPU expenditures, presented a number of complicating factors that ultimately led to the selection of IPEDS as the principal database. The first challenge was finding a reliable data source that offers debt and expenditure information on all MPUs. The National Center for Education Statistics (NCES) facilitates national surveys that track student financial aid outcomes and variables. However, NCES uses a sampling technique to acquire a nationally representative sample. Substantively, this meant that the NCES surveys do not offer data that can be applied to all MPUs as only a portion of these institutions are included in each survey and examining the entire MPU population is a driving tenet of this study. In other words, this study relies on a panel data approach that requires observations for each institution and year combination.

Another challenge was obtaining a complete data set for all MPUs during the time period noted previously where reporting requirements were more carefully refined. Various nonprofits collect data on student debt and expenditures at an institutional level. Unfortunately, these data sets proved to be unreliable and incomplete. Universities do not have to provide data to nonprofits, but based on federal financial aid regulations, must report them to the federal government. While most did provide the nonprofits with information, a substantive minority did not. This meant that these data sets did not offer complete information on student level debt. All MPUs receive Title IV funding and as a result are required to submit data to NCES under the IPEDS collection system. This meant that IPEDS data offered the only reliable and complete data set for student debt for all MPUs over a defined period of time. A strength of this analysis was also the homogeneity of the group being studied. MPUs, by definition, have similar missions, degree offerings, sources of revenues, and areas of expenditures. Substantively, this meant that it was possible to accrue reliable and accurate data from this source.

It is important to note that this study includes 12 variables that include dollar amounts used to examine student debt across time. This required an inflation of the dollar amounts so they
can be reported as constant values or in real dollar terms. Specifically, this study inflated any variable that includes dollar amounts to 2015 values using the Consumer Price Index. Doing so allows for interpretation of the parameter estimates, in real dollar terms, when explored in terms of the relationship among expenditure categories, control variables, and the dependent variable—AAFSD.

Additionally, all non-binary and non-percentage variables were included as natural log transformations. This transformation helps to address any skewness that is often exhibited in financial data represented as monetary values. Furthermore, the natural log transformation makes the interpretation of the parameter estimates more clear as they are expressed as percentage changes (Titus, Vamosiu & McClure, 2016; Wooldridge, 2017).

**Conceptual Model**

This study uses Astin and Antonio (2012) I-E-O model and Baumol & Bowen’s CDT (1965) to help conceptualize the model within this study. Figure 1 shows the relationship between the variables that are listed as an Input, Environment or Outcome. In this case the control variables are considered to be part of the Input in the model and the Expenditure variables are considered to be part of the Environment while the Outcome is listed as average annual federal student debt. This model acknowledges that the Inputs and Environmental variables not only interact with the Outcome variable but also with each other. This conceptual model becomes a modified version of the I-E-O model because of the inclusion of the CDT. The CDT acts as a barrier to enhancements in technology and efficiency that might typically help to reduce personnel costs within higher education. If the CDT holds true for this study, it is reasonable to assume that the aggressive growth of the expenditure categories may impact average student debt. This is because of the assumption that costs (expenditures) are rising so rapidly that state support has not kept pace and as a result this has meant dramatic increases to tuition and fees that further leads to larger student debt loads to make up the difference. This will be discussed a bit further in this chapter, but it is important to note that all the referenced expenditure categories have risen with the only exception being operation of maintenance and plant (OMP). It was fair to posit, from prior discussed research and theory that a decrease in OMP may lead to less student debt levels because there should be areas of savings that can be distributed throughout the institutions.
**Figure 1.** This is conceptual model created within this dissertation and was based on both Astin and Antonio’s (2012) I-E-O model and Baumol and Bowen’s (1965) CDT.

**Dependent Variable**

The dependent variable is the annual average amount of federal student loans awarded to undergraduate students. These data were collected from the U.S. Department of Education’s Integrated Post-Secondary Education Data System (IPEDS) for each year from 2009-2010 to 2014-15. As previously stated, all monetary data were inflated to real 2015 dollars and were converted by a natural log transformation. These data included any monies that must be repaid to the lending institution when the student was the designated borrower. The largest component of these data come from subsidized and unsubsidized student loans offered under Title IV. It is important to note that this does not include PLUS loans or any other loans made directly to parents and private loans. While the amount of these other loans outstanding can be substantial, it is difficult to attach a parental student loan to a specific student let alone the institution they attended. This variable is an annual number, meaning that it is the average amount of loans taken in that year by a student body at a given MPU. This variable, based on the available evidence, is in fact the most comprehensive, reliable and complete measure of student debt for students attending MPUs.
A descriptive analysis of this variable illuminated an interesting finding. Figure 2 shows the AAFSD used at all MPUs from 2009-10 to 2014-15.

Figure 2. Average Federal Student Debt Carnegie Classification: Masters.

These data were retrieved from the IPEDS Data Center from 2009-10 to 2014-15. It is important to note that these numbers are listed in inflated 2015 dollars. When reviewing the average federal loan amounts without converting them to real dollars they remain relatively unchanged from year to year. This trend is somewhat surprising considering the student loan narrative revolved around rising student debt. To ensure that MPU are not experiencing some anomaly that has not affected other areas of public four-year higher education it was prudent to examine the two other major types of public four-year higher education (as defined by the Carnegie Classification system). The same trend appears in both categories with almost no change in AAFSD in nominal dollars but when converted to real 2015 dollars there is a decline during the examined time period.

This is somewhat surprising descriptive trend may be explained by a couple factors. First, it is plausible to assume that the economic recovery from the Great Recession reduced or limited the need for students to consume as much student debt. A second factor, and possibly most significant, is the annual federal loan limits imposed on student lending. For first-year dependent students the limit is $5,500, second-year students $6,500 and $7,500 for third-year students and beyond. For first-year independent students or students whose parents were declined Parent
PLUS loans the limit is $9,500, second year students $10,500 and $12,500 for third year students and beyond. In short, dependent students are those under 24 years of age who were not foster children, orphans, or active duty military. This represents a significant portion of the entire undergraduate student population. Dependent students are allowed access to additional loan amounts if their parent(s) are declined access to Parent PLUS loans based on poor credit ratings.  

The fact that federal student loans are limited and not increased on a regular basis means that there is limited room for vast annual increases in average borrowing regardless of the need or economic circumstances of the time. Further, it is plausible to infer that, the ending of the Great Recession saw large numbers of independent students (higher borrowing power) leave or never enroll in an MPU because of the increase in economic prosperity. Additionally, it is further plausible to infer that more parents were approved for the separate federal Parent PLUS loans (due to increases in personal credit ratings) thus leaving more MPU students with limited federal student borrowing power. This information is pertinent to review because this descriptive information highlights a somewhat surprising trend. In real 2015 dollars, average annual federal student loans have been decreasing. However, this should not affect the rigor of this study as the methods and research questions do not point to a directional relationship between variables.

**Expenditure Variables**

This study draws institutional expenditures data from IPEDS that includes the following expenditure categories: instructional, research, student service, academic support, auxiliary, institutional support and operation and maintenance of plant. As previously stated all monetary data were deflated to real 2015 dollars and were converted by a natural log transformation. In total, IPEDS offers data on 12 separate functional expenditure categories. It is important to note that while this study only included seven of the 12 expenditures categories the vast majority of expenditures are captured within these seven areas. In the most recent fiscal year 2015, these expenditure categories accounted for an average of 88%. The smallest percentage was reported as 66% of total expenditures and the largest was reported at 99% (IPEDS, n.d.). Discussion on why certain expenditure categories were excluded is discussed in later parts of this section. As discussed in Chapter Two these categories were defined by their functional category. For example, each functional category was defined in terms of their intended purpose such as

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Instructional expenditures relating directly to student instruction. Instruction was considered a functional category as these expenses are for instructors’ and faculties’ salaries whose primary purpose is teaching. This meant that each functional category represented spending devoted to those areas of the institution and each category had significant portions of their expenditures devoted to employee compensation. This made it possible to examine the extent to which a functional category may or may not have a significant impact on a student outcome. More specifically, for this study it is possible to examine the extent to which each functional category may or may not be related to changes in student debt consumption at MPUs.

Instruction expenditures are the total of all operating expenses associated with the instructional divisions of the university. This includes the colleges, schools, departments and all other instructional divisions and the associated costs of personnel compensation. This category represented the largest amount of spending directly associated with in-class instruction. The instruction category excludes expenses for personnel whose primary function was academic administration such as an academic dean for example. The academic support category includes expenses that support the primary mission of the university. These areas include instruction, research and public service. For example, the computer and networking expenses related to various academic programs. These expenses can also support the function and purpose of the institution library. Other expenses in the academic support category include information technology expenses related to instruction, and other academic administrative expenses such as the compensation to academic deans. Expenses for course and curriculum administration support and any programs that support research endeavors would be included in this category. The academic support category is thought to support each academic program through expenditures on libraries or research support whereas a category such as institutional expenditures is thought to support the entire university on a large scale.

Student service expenditures include the total spending for admissions, registrar activities, financial aid office operations, and any activities whose primary purpose is to promote and contribute to the wellbeing of students outside of the classroom setting. Specific examples include intramural athletics, student organizations, cultural events, and student newspapers. Student health services and intercollegiate activities may be included when they are not operated

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7 For complete definitions for all IPEDS categories see:

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as a self-supporting auxiliary unit within the institution. Auxiliary expenditures are for self-supporting units of the institution. Examples of these are college unions, student housing, food services, college stores and student health services. It is important to note that these functional areas may charge additional fees to students for each use of the service or they charge a semester fee for the use of the service or facility. Institutional support includes expenditures related to the day-to-day operational support of the university. This includes general administrative services, central executive-level activities, long-term planning functions, legal and fiscal operations, public relations, development (fundraising) operations and employee and personnel records management. Finally, operation of maintenance and plants is included as it represents a diverse area of spending within MPUs. This category included spending on items required to provide service to the campus for educational and general purposes. Examples would include utilities and insurance.

Instruction, academic support, research, student service, auxiliary, institutional support and operation of maintenance and plants represented 7 of the 12 expenditure categories collected through IPEDS. Public service, scholarship and fellowship, hospital services, independent operations and other expenses and deductions (all other expenditures not accounted for under other functional categories) represented the remaining functional expense categories not examined as part of this study. The defined characteristics of MPUs exclude hospital services as areas of interest for this study. Under the Carnegie Classification system MPUs do not have any levels of spending in this area. Public service, independent operations and other expense deductions are not major areas of spending for MPUs and none of the studies in Chapter Two included these as part of their exploration. Scholarships and fellowships expenditures are distributed throughout undergraduate and graduate students. This focus of this study was undergraduate students. It would be difficult to state the relative impact of the scholarship and fellowships for undergraduate students as this category did not offer any differentiation between graduate and undergraduate expenditures. Additionally, this study included further control variables for the amount of grants offered to students. As such this category was not included in this study. Instruction, academic support, student service, auxiliary and institutional support were incorporated because multiple studies have shown that these functional categories do have an impact on several, relevant and related student outcomes (Titus, 2006; Gansemer-Topf & Schuh, 2006; Smart et al., 2002; Pike et al., 2011; Webber, 2012). Operation and maintenance of plant
was not included in these studies but this study differs from others in that the student outcome dependent variable is a financial measure and not a cognitive outcome that may be affected by spending in this area.

Operation and maintenance of plant differs somewhat from the other categories in that technology has played a large role in the reduction of the expenses in this area. Scroggins, Fielding and Thompson (2012) noted that expenditures in this category had dropped significantly between 2007 and 2008. While a portion of this can be attributed to reductions in institutional budgets, a significant portion of the reduced spending also has to do with the introduction of green energy and more efficient ways to provide utility services for campus. Additionally, this area has seen a large increase in the presence of out-sourcing of these services to reduce spending this area (Scroggins, Fielding & Thompson, 2012) which could indicate that costs are not necessarily diminished but simply shifted off the institution’s budget. This area of spending seems to deviate from Baumol & Bowen’s CDT (1965) in that it has been decreasing within higher education. Therefore, it is prudent to explore what role decreased spending, even if only in one category, may play in student debt consumption.

Control Variables

This study focused on institutions as the unit of analysis, more specifically MPUs. To that end, it was prudent to control for a number of variables with respect to institutional characteristics and study body composition that may impact AAFSD. Control variables for tuition and fee charges, total revenues, and number of full-time equivalent students (FTE) were included as control variables for institutional characteristics. Percent of Hispanic students, percent of Black students, average grant amount, percent on Pell and percent using student loans were included to control for factors associated with the student body makeup of each MPU.

Tuition and fees were included to control for the amount that students have to pay for their education. Research has shown that the amount of tuition and fees charged is significantly related to student debt accumulation (Macy & Terry, 2007). Total revenues were included as a control for the resources that an MPU may be able use to mitigate rising costs and offset any possible reductions to the funding they receive from their state government. Prior research has shown that the size of an institution’s endowment has a negative relationship with student debt levels (Macy & Terry, 2007). Essentially, this means that the larger (measured at a per student basis) an institution’s total revenue translates into support which may help offset student debt
consumption in some fashion either directly or indirectly. Additionally, the total amount of state appropriations was considered as a separate revenue variable. It is clear that state appropriations have a relationship with tuition and fees, so it was further reasonable to examine a relationship with state appropriations and student debt levels (Barr & Turner, 2013; Delaney, 2014; Fethke, 2011; Mitchell & Leachman, 2015; Monks, 2014; Serna, 2015; Serna & Harris, 2014).

In addition to institutional characteristics, it was prudent to control for factors associated with the composition of the student body within each MPU. First, factors associated with financial aid were considered. The percent of students on the Pell grant was incorporated as a control. Since the Pell grant is a need-based federal grant, this variable acts as a proxy for the level of financial need within a student body. Prior research has shown that the amount of grant aid and the percent of students receiving some form of financial aid share a significant relationship with student loan consumption (Monks, 2014). IPEDS offers the average total amount of any grant received by a student as a category. This was particularly attractive because it covers not just the more common Pell Grant but also other grant aid that may be state or institution specific. In other words, total grant aid is included as a control. The second financial aid variable considered was the percent of students using student loans. Examining institutional factors, Monks (2014) and Macy and Terry (2007) both concluded that the percentage of students using student loans was a determining factor in predicting student debt consumption.

A review of the relevant literature in Chapter Two shows that student loan consumption is not distributed across racial groups uniformly. Specifically, research has shown that the racial make-up of student body can play a role as an institutional determinant of student debt. As such, it is prudent to add these student body characteristics to the model. Macy and Terry (2007) found that the percent of Hispanic students, with respect to the overall racial make-up of the student body, has a negative relationship with student debt levels. Similarly, Hahn and Price (2008) found that Hispanic students had a strong aversion to student borrowing and almost two-thirds of the Hispanic students agreed that student loans were only to be used as a last resort for funding their education. While not yet explored empirically, this study posited that the percent of Black students may also be a significant determinant of average federal student debt. For example, Price (2004) found that 25% of Black college graduates had what was considered an excessive student debt load compared to 20% for White students. Further, Jackson and Reynolds (2013) found that Black students acquired larger levels of student debt than did their White counterparts.
These findings help to make the case that controlling for the percentage of Black students within an institution is a valuable control variable when examining the determinants of average institutional debt.

Finally, scale effects were controlled for by taking into account the number of full-time equivalent undergraduate students. This factor was especially important to consider because a number of variables examined in this study are directly related to the relative size of the institution. For example, the amount that an institution spends on student services is somewhat meaningless without considering how many students such expenditures support. Additionally, as noted in Chapter Two, there is a large variation in student body size within the MPU population. Therefore, it is prudent to ensure each measure considers the relative impact of each variable by controlling for possible scale effects introduced by the total FTEs of each institution.

Consistent with Astin and Antonio’s (2012) I-E-O framework this study included variables for the Inputs that included student body characteristics that are both financial and demographic. The Environmental variables included the spending of the MPUs. All these factors are posited to affect the Outcome of interest, AAFSD. Guided by Baumol & Bowen’s “Cost Disease Theory” (1965) this study included expenditure categories that include employee compensation to explore what role functional expenditure categories may play in determining the average student debt consumed at an institution. Moreover, the CDT theory provided a theoretical lens through which, the findings of this dissertation can be examined. In other words, a central assumption that guided the analysis is that the rising costs of labor across all expenditure categories in higher education are affecting student debt consumption.

**Excluded Institutions**

Once the data were collected and aggregated it was clear that there were several institutions with missing or incomplete data. The nature of this study required a balanced panel, meaning that there could not be missing data points. As a result, it was decided that institutions with missing data would be deleted. It is not always clear as to why certain data points were not submitted by the institutions. Typically, this happens when an institution is new; it recently changed Carnegie Classification or is considered a satellite campus of a larger university or system. In a number of cases institutions were removed because they were too different than what this study intended to explore. For example, a number of institutions were actually the online educational platform of their university system and others were part of U.S. territories.
Finally, in a few cases it is plausible to assume the institution simply did not report the data. The listwise deletion process showed that 24 institutions would be removed from the original data set yielding a new N of 249. These institutions are represented in Table 2. This process did not significantly change the state or geographic representation within the data set. The decision to further explore the relationship between state appropriations as a separate variable led to the exclusion of institutions from the state of Colorado. This yielded a new N of 244 institutions.

Table 2

Institutions Excluded

<table>
<thead>
<tr>
<th>Institutions</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arizona State University-Polytechnic</td>
<td>AZ</td>
</tr>
<tr>
<td>Arizona State University-West</td>
<td>AZ</td>
</tr>
<tr>
<td>Colorado State University-Global Campus</td>
<td>CO-Online</td>
</tr>
<tr>
<td>Governors State University</td>
<td>IL</td>
</tr>
<tr>
<td>Lincoln University</td>
<td>PA</td>
</tr>
<tr>
<td>Pennsylvania State University-Penn State Great Valley</td>
<td>PA</td>
</tr>
<tr>
<td>Pennsylvania State University-Penn State Harrisburg</td>
<td>PA</td>
</tr>
<tr>
<td>Pennsylvania State University-World Campus</td>
<td>PA-Online</td>
</tr>
<tr>
<td>Rutgers University-Camden</td>
<td>NJ</td>
</tr>
<tr>
<td>Southern Polytechnic State University</td>
<td>GA</td>
</tr>
<tr>
<td>SUNY Empire State College</td>
<td>NY</td>
</tr>
<tr>
<td>Texas A &amp; M University-Central Texas</td>
<td>TX</td>
</tr>
<tr>
<td>Texas A &amp; M University-Texarkana</td>
<td>TX</td>
</tr>
<tr>
<td>Thomas Edison State University</td>
<td>NJ</td>
</tr>
<tr>
<td>University of Guam</td>
<td>Guam</td>
</tr>
<tr>
<td>University of Houston-Clear Lake</td>
<td>TX</td>
</tr>
<tr>
<td>University of Houston-Victoria</td>
<td>TX</td>
</tr>
<tr>
<td>University of North Georgia</td>
<td>GA</td>
</tr>
<tr>
<td>University of North Texas at Dallas</td>
<td>TX</td>
</tr>
<tr>
<td>University of Puerto Rico-Mayaguez</td>
<td>Puerto Rico</td>
</tr>
<tr>
<td>University of South Florida-Sarasota-Manatee</td>
<td>FL</td>
</tr>
<tr>
<td>University of the Virgin Islands</td>
<td>Virgin Islands</td>
</tr>
<tr>
<td>Institutions</td>
<td>Location</td>
</tr>
<tr>
<td>-------------------------------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>University of Washington-Bothell Campus</td>
<td>WA</td>
</tr>
<tr>
<td>University of Washington-Tacoma Campus</td>
<td>WA</td>
</tr>
<tr>
<td>Adams State University</td>
<td>CO</td>
</tr>
<tr>
<td>Colorado State University- Pueblo</td>
<td>CO</td>
</tr>
<tr>
<td>Metropolitan State University of Denver</td>
<td>CO</td>
</tr>
<tr>
<td>University of Colorado- Colorado Springs</td>
<td>CO</td>
</tr>
<tr>
<td>Western State Colorado University</td>
<td>CO</td>
</tr>
</tbody>
</table>

*Note: There were 24 institutions excluded for the initial model and 29 when state appropriations were considered which resulted in the removal of all Colorado based institutions.*

**Methodology**

The choice of methodology for this study was guided by prior literature, the data structure, and the research questions. There are certainly several econometric models that could be considered for this study. However, reviews of relevant higher education literature significantly narrowed the selection in terms of methodology. Craig and Raisanen (2014) and Macy and Terry’s (2007) studies on determinants of student debt helped to guide the variable selection for this study but both only examined this phenomenon using cross-sectional data or simply put data that only covered one time-period. Since the unit of analysis is at the institutional level, and the goal is to examine these relationships across time, panel data methods offered the most fruitful alternatives for this study. To that end, the decision needed to be made regarding the length of time data would be collected to examine these intuitions and the role they play in average student debt.

Hence, in this study, cross-sectional data would have meant taking only one year of IPEDS data for analysis. That is, all MPUs would have been compared against each other over that year when exploring the relationship between institutional expenditures and student debt. A major drawback of cross-sectional data and analysis is that it does not control for unit heterogeneity and as such one runs the risk of encountering omitted variable bias (Zhang, 2010). Since, IPEDS offers rich data across long time periods, it seemed inappropriate to use cross-sectional data that incorporated only enough variables to significantly draw a relationship between student debt and institutional expenditures. Additionally, this study examined all MPUs and as such there is more value in examining changes within each MPU as opposed to comparing
changes between MPUs. Taking all this into consideration made the use of panel data the more attractive option.

Panel data is characterized by multiple measurements across time for multiple units or in this case MPUs. Panel data collects information on two dimensions, the observations for an entity and observations across a specified time-period. A major advantage of panel data is that it controls for individual heterogeneity (Wooldridge, 2015; Zhang, 2010). There are several observed and unobserved factors that can impact the findings. For example, one can observe the amount of expenditures on student services but we cannot observe the culture of the student service office. A culture that promotes engaging with students and espousing financial literacy may certainly play a role in student debt consumption but is very difficult to observe and quantify. Panel data allows the estimation to difference out these “unobserved effects” and as a result better control for factors that may not have been included in the model thus ultimately controlling for individual heterogeneity. More specifically, the use of panel data helps to control for a type of omitted variable bias that is related to the unobservable but idiosyncratic character of each institution (Baltagi, 2005). Panel data uses multiple observations across time and can compare within units and as a result offers the ability to remove unobserved constant variables over time. Substantively this meant that while MPUs are a homogenous group there are certainly still multiple observed and unobserved differences between MPUs, which makes the use of panel data ideally suited to the analysis. These differences, without being controlled for, would certainly impact the findings of this study.

Panel data sets are ideal for answering policy-making questions because their findings can be used to make the case for causality whereas cross-sectional data cannot make a case for causality (Zhang, 2010). This study sought to address whether institutional expenditures impact student debt levels. A goal is to investigate the relationship in terms of close-to-causal terms. Using cross-sectional data would only help explain the degree to which differences in institutional expenditures between institutions impacted levels of student debt in the single year under study. Using panel data allowed for an examination of the between and within institution (MPU) variation and as a result tests the relationship between changes in institutional expenditures and student debt levels over time. More specifically, examining whether changes in institutional expenditures impact student debt consumption (Ransom, 2013). This would be particularly of interest to higher education policy makers as they consider accountability metrics
to assess better institutional outcomes and student outcomes, in this case specifically student debt.

The use of panel data in higher education research is a relatively new phenomenon (Zhang, 2010). Significant attention has been paid to the factors that affect state appropriations/support for public higher education through the use of panel data (Cheslock & Gianneschi, 2008; Dar & Lee, 2014; Delaney & Doyle, 2014; Doyle, 2012; Hillman, Tandberg, & Gross, 2014; Jaquette & Curs, 2015; McLendon, Hearn, & Mokher, 2009; Ness & Tandberg, 2013; Serna & Harris, 2014; Tandberg, 2013; Toutkoushian & Hillman, 2012; Volkwein & Tandberg, 2008; Zang, 2007). These studies have explored a diverse range of topics surrounding state issues with higher education (funding, regulation, and nonresident enrollment) but all use the same methodological approach; the fixed effects method (FE). Fixed effects methods are certainly not the only method that may be used to analyze panel data but it is certainly the most prevalent method within higher education research that uses panel data. The following sections outline the different methodological approaches and offer a rationale based on appropriate statistical assumptions for use of the general FE estimator.

**Rationale**

There were a number of econometric models that were available to explore the phenomenon in this study. The literature was clear on the most effective techniques to analyze panel data; either a Fixed Effects (FE) or Random Effects (RE) technique. Both have advantages and disadvantages and tend to be best suited based on the composition of data (Kennedy, 2008; Wooldridge, 2015). The choice between FE and RE in panel data analysis can be selected by a statistical analysis of the data but also by the structure of the data and the goal of the research (Kennedy, 2008). As noted earlier the FE method is most common in higher education and is employed when the aim of your research is to better inform policy decisions (Zhang, 2010). Another consideration is the scope of the data. If the data exhausts the population under study the FE method is most appropriate. This is because one is able to explore the cross-sections of annual data that is the goal of the analysis and any “interference” is confined to these cross-sections (Kennedy, 2008). This study does exhaust the population, meaning all MPUs are represented in the data set. If, however, the data is drawn from a larger population at random, which means the goal is to make inferences about the larger population then RE is most
appropriate (Kennedy, 2008). In short, the FE method analyzes difference within cross-sectional units of panel data versus the between unit analysis performed by the RE effects method.

Another concern when choosing between the FE and RE estimator is the relationship between the explanatory variables and the composite error term.

A key assumption of the RE estimator is that the composite error term is uncorrelated with the explanatory variables. Essentially, the RE model assumes all “unobserved” effects can be placed in the error term and are in essence random in nature. The assumption regarding the randomness of the “unobserved” effects may not be true. If not, the error changes across time with a constant value provided by the constant “unobserved” effect the composite error term becomes serially correlated across time periods with explanatory variables leading to the parameter estimate coefficients provided by the RE model to be significantly biased (Kennedy, 2008; Wooldridge, 2015). This however is mitigated to some extent by using a FE estimator, since the “unobserved” effects are differenced out. This results in the explanatory variables not being correlated with the error term thus leading to more efficient parameter estimates. Moreover, the estimation of cluster-robust standard errors means that errors are clustered by unit, providing more confidence in the inferences drawn since this helps to lessen concerns of serial correlation over time (Kennedy, 2008; Wooldridge, 2015). All of these assumptions lead to the selection of a FE estimator.

A review of the literature and statistical methods has shown that FE is the preferred method for analysis within this study. As such the following sections will focus more heavily on FE. However, a brief overview of the RE method and its assumptions are be offered as well.

**Estimation**

This study examined the impact of institutional expenditures on average annual federal student debt at all MPUs. Ideally, FE regressions were conducted to estimate the parameter coefficients. The typical FE effect model allows for the estimation of unit effects, which in this case are related to the idiosyncratic and unobservable institutional characteristics. However, this model does not incorporate time effects. The time effects can be incorporated by the use of a two-way FE model that that takes into account both the unit and time effects. Both the individual FE model and two-way FE model presented in the following sections with a brief overview of the RE model as well as specification tests used to determine the appropriate choice of model (FE versus RE).
The General Fixed-Effects Model

The individual FE and RE model that is used to estimate the parameter coefficients for the unit effects is operationalized as (Cameron & Trivedi, 2009, Wooldridge, 2015, p. 466):

\[ y_{it} = \alpha_i + x'_{it}\beta + u_{it} \]  \hspace{1cm} (3.1)

Note that the basic equation is the same for FE and RE; it is the assumptions about the data that direct the use of either method. In this equation \( y \) would represent the average, institutional-level, student debt at institution \( i \) (MPU) in time-period \( t \). The regressors are represented by \( x' \). They are included, in this case, as a vector which includes institutional expenditures and institutional control variables at institution \( i \) in time \( t \), and where \( \alpha \) represents unobserved institution specific effects that do not change over time, and \( u \) represents the idiosyncratic error at institution \( i \) in time \( t \). Notice that \( \alpha \) only has an \( i \) subscript as it represents all the unobserved time invariant/unchanging factors that impact \( y \) over time based on institution-specific characteristics. Often \( \alpha_i \) is referred to as the “unobserved effect” (Wooldridge, 2015) or fixed effects. Finally, \( \beta \) is a vector of parameter coefficients for each variable (Cameron & Trivedi, 2009).

While the FE and RE models share the same linear form, there are major differences in the assumptions and relationships between the variables based on each model’s underlying tenets. FE allows for an arbitrary correlation between \( \alpha_i \) and \( x_{it} \) while RE does not allow for a correlation between \( \alpha_i \) and the independent variables (Kennedy, 2008; Wooldridge, 2015). In other words, the FE model assumes that unobserved but unchanging institutional characteristics are related to the error term and should be included as controls. Therefore, it is assumed that in FE models the regressors may be correlated with individual-level effects. This factor alone makes FE a more attractive option for statistical analysis in this study since this is often assumed in financial and econometric studies of higher education. However, RE models allow for increased efficiency in its models but imposes additional orthogonality conditions that must also be met. In RE models, the assumption is made that (Wooldridge, 2015, p. 474):

\[ Cov(x_{itj}, \alpha_i) = 0, t = 1,2, ..., T; j = 1,2, ..., k. \]  \hspace{1cm} (3.2)

It is impractical to assume that there would be no correlation between the unobserved effects and the independent variables in this study because so many of the unobserved MPU fixed effects are likely correlated with many of the chosen independent variables. However, it was possible to test this assumption statistically to determine which estimator would result in estimates that are
consistent and efficient. A test of overidentifying restrictions (OIR) was performed to determine the most appropriate model. This test utilized the orthogonality assumption that under a FE estimator the regressors are correlated with the idiosyncratic error while the RE estimator imposes additional orthogonality conditions that the regressors are uncorrelated with the group-specific error (Antonakis, 2012). If a rejection of the null hypothesis, meaning that equation 3.2 is not satisfied, the FE estimator is considered the preferred method\(^8\) (Indiana University, 2015). The results of the test of overidentifying restrictions via the STATA 14 IC xtoverid function returned a p-value of 0.000. Substantively this means that we rejected the null hypothesis that the additional orthogonality assumptions of the random effects model are not met and a fixed effects model is statistically the most efficient model.

Prior theory, data structure and statistical analysis confirm that FE is the preferred method to estimate the model presented. To control for the assumption that there is a relationship between regressors and individual level effects and to create a consistent estimation of the regression parameters that may take place, the fixed-effects or unobserved effects are eliminated through a mean-differencing process (Cameron & Trivedi, 2009; Wooldridge, 2015).

Consider the equation (Wooldridge, 2015, p. 466):

\[ y_{it} = \alpha_i + x_{it}\beta_1 + u_{it}, \quad t=1, 2, \ldots, T \]

(3.3)

the average for each \(i\), in this equation, over time is denoted as:

\[ \bar{y}_i = \alpha_i + \bar{x}_i\beta_1 + \bar{u}_i \]

(3.4)

Where \( \bar{y}_i = \sum_{t=1}^{T} y_{it} \), and so on. Subtracting the second equation (3.4) from the first (3.3) results in the within model or mean-difference estimator (Wooldridge, 2015, p. 467):

\[ y_{it} - \bar{y}_i = \beta_1(x_{it} - \bar{x}_i) + u_{it} - u_i, \quad t=1, 2, \ldots, T \]

(3.5)

Notice that \( \alpha_i \) is fixed in both equations and as a result is no longer a parameter in the estimating equation. A more simplified version of this equation can be expressed as (Wooldridge, 2015, p. 467):

\[ \bar{y}_{it} = \beta_1 \bar{x}_{it} + \bar{u}_{it} \]

(3.6)

Where \( \bar{y}_{it} = y_{it} - \bar{y}_i \), is the time-demeaned data on \(y\) and the same for \( \bar{x}_{it} \) and \( \bar{u}_{it} \) (Wooldridge, 2015). Again, notice that the \( \alpha_i \) or unobserved heterogeneity has been removed from the equation. This is known as the “within transformation” (Wooldridge, 2015). This process helped

\(^8\) For more specifics on the OIR see Arrellano (1993) and Wooldridge (2002, pp. 290-291).
to control for both the idiosyncratic errors and the time invariant characteristics that may also be unobservable. It also helped to control for omitted variable bias in the model by removing the unobserved time-invariant variables (Cameron & Trivedi, 2009; Wooldridge, 2015). Ultimately, this allowed for more consistent estimates of $\beta$ through the removal of $\alpha$. A major drawback of the general FE model is that any time invariant variables included in the model will be dropped from because of the mean differencing process (Wooldridge, 2015). For example, this means that considering something such as proximity to a city would not be a viable variable for this study. All the variables in this study vary over time and as such are a good fit for the FE model. Still, it is important to note that this equation is only controlling for unit effects (MPUs). Since this study is interested in both time and unit effects an extended FE model is presented below.

### Two-Way Fixed Effects Model

This study was not only interested in the effects of the institutional expenditures and their impact on average federal student debt at MPUs but also considering the impact of time. The effect of time can be accounted for by employing a two-way effects model. In this case, two-way refers to both unit and time effects in the model. Consider the equation (Cameron & Trivedi, 2009, p. 238):

$$ y_{it} = \alpha_i + \gamma_t + x'_{it}\beta + u_{it} $$  \hspace{1cm} (3.7)

This model is a standard expression for the two-way fixed effects model. All the variables represent the same variables listed in equation (3.1) with the addition of $\gamma_t$ representing a vector of variables for time effects. The two-way fixed effects model introduces both time and unit effects. Additionally, the time component helps to deal with many threats to internal validity that might be introduced by secular time trends in the data. Substantively, this means that it is possible to control for secular trends that may be affecting all institutions over time. Cameron and Trivedi (2009) note that for shorter panels (as is the case for this study) it is common to treat the time effects ($\gamma_t$) as fixed effects, this then allows for the above equation to be reduced to the simple FE model equation (3.1) if the regressors in the equation include a set of time dummies (with one dropped to avoid the dummy-variable trap) (p. 238). Additionally, an important assumption of the two-way FE model is that of a balanced panel (complete data set). It is reasonable to assume that the data drawn from IPEDS created a balanced panel because of the federally required submission of MPU data and since the analysis relies on each institution.
having observations for each and every year on each and every variable and a listwise deletion was performed to ensure a balanced panel.

The two way fixed-effects model is a powerful tool for analysis. As cited earlier, fixed-effects is often used within higher education policy research (Zhang, 2010). In general, this is because the two way fixed-effects methods use a number of variables and controls that allow for a close to casual analysis. First, the $\alpha_i$ represents the institutional specific effects that do not change over time or change slowly. The fixed-effects model controls for these by differencing them out of the equation which substantively means that the model controls for unobserved effects within each MPU. While MPUs share a number of similarities they certainly also have a number of slowly changing, or unchanging, effects that should be controlled for such as location, size classification or state location to name a few. Second, the $\gamma_t$ represents the time-effects within the model. Substantively this means that the model controls for secular-trends that occur over time that may be impacting the MPU institutional population. For example, some of these trends may be associated with a nationwide economic recovery from the Great Recession or a change at the federal level to student loan borrowing regulations. Together these controls allow for a close to casual analysis of the relationships ($\beta$-coefficients) between the variables of interest and control variables and the dependent variable, in this case student debt.

**Conclusion**

This chapter outlined the data source and time range under study. This chapter presented a methodological framework that is designed to answer the research questions presented in Chapter One. The choice of variables is guided first by the limited but insightful research on the determinants of student debt. The remaining choice of variables is informed by the more robust area of literature pertaining to institutional expenditures and student outcomes. The use of panel data in higher education research was briefly outlined. The methodological approach, based on research, structure of the data and statistical analysis dictated the FE approach. As such this approach garnered much of the attention within this chapter. The resulting model that was outlined gave insight into the role that institutional expenditures play in student debt accumulation at MPUs and is explored fully in the subsequent chapters.
Chapter Four

Results and Findings

The following chapter presents the descriptive statistics and results of the statistical analyses outlined in Chapter Three. The first section discusses the summary statistics and a brief discussion on the overall composition of the data. The second section of this chapter presents the results of the fixed effects econometric analysis. These findings are reported as subsections based on the grouping of each variable in the model; either a variable of interest (expenditures) or as a control variable. The results and findings are listed in this chapter and their implications will be discussed in Chapter Five.

Descriptive Statistics

The summary statistics for this study are listed below. These measures include the mean, standard deviation, and minimum and maximum values. These data help to highlight the structure and spread of the variables presented within this study. Average annual federal student debt (AAFSD) was $7,072 with a standard deviation of $1,003. The small variation within this variable is to be expected as federal loan limits restrict the amount students can borrow. Instructional expenditures represented the largest area of expenditures by far. This is consistent with other areas of higher education and is at the core mission of MPUs. Expenditure levels were largely a function of the sizes of each institution with enrollment ranging from 1,125 to 31,399.

Research expenditures showed a skewness and as a result an abnormal distribution. A review of this data showed some institutions are spending zero dollars and outlier institutions spent amounts up to two hundred million. The research expenditure data were left unchanged as anomalies in this spending category could offer insight into MPUs that are attempting to spend outside of their core mission and create a higher profile and more revenue with increased spending on research endeavors. However, because there were a number of data points within the research variable it is important to note that they were transformed from a zero value to .0001 so they could then be transformed by a natural log conversion. The variables that represent the percent of Hispanic and Black students showed possible anomalies within the data. This would be expected because the MPU institutional populations included several of minority serving institutions that have a very high percentage of students that identify as non-White such as historically Black colleges and universities and Hispanic serving institutions.
Table 3 showed the variability and range of the data. In addition, it provided further insight into the descriptive statistics that represent this data set. Descriptions for each variable are available in Chapter Three within Table 1. The following sections will discuss the selection for the findings within the variables of interest and the findings within the control variables.

Table 3

Descriptive Statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Annual Federal Student Debt (per student) $</td>
<td>7,072</td>
<td>1,003</td>
<td>2,182</td>
<td>12,325</td>
</tr>
<tr>
<td>Instruction Expenditures $</td>
<td>60,159,912</td>
<td>38,735,125</td>
<td>7,702,267</td>
<td>231,536,368</td>
</tr>
<tr>
<td>Institutional Support Expenditures $</td>
<td>18,264,014</td>
<td>12,461,583</td>
<td>1,696,651</td>
<td>79,326,975</td>
</tr>
<tr>
<td>Research Expenditures $</td>
<td>3,568,026</td>
<td>9,176,623</td>
<td>0</td>
<td>215,276,308</td>
</tr>
<tr>
<td>Student Service Expenditures $</td>
<td>14,499,562</td>
<td>11,083,347</td>
<td>1,786,675</td>
<td>86,113,065</td>
</tr>
<tr>
<td>Academic Support Expenditures $</td>
<td>14,614,500</td>
<td>10,366,158</td>
<td>99,837</td>
<td>85,069,025</td>
</tr>
<tr>
<td>Auxiliary Expenditures $</td>
<td>20,014,213</td>
<td>17,770,298</td>
<td>214,355</td>
<td>158,715,438</td>
</tr>
<tr>
<td>Operation of Maintenance and Plant Expenditures $</td>
<td>12,956,824</td>
<td>8,290,360</td>
<td>1,215,018</td>
<td>50,662,158</td>
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<tr>
<td>Total Revenue $</td>
<td>156,820,284</td>
<td>93,543,145</td>
<td>22,452,028</td>
<td>549,404,834</td>
</tr>
<tr>
<td>State Appropriations $</td>
<td>40,354,668</td>
<td>26,246,518</td>
<td>4,559,301</td>
<td>169,728,776</td>
</tr>
<tr>
<td>Tuition and Fees $</td>
<td>7,124</td>
<td>1,893</td>
<td>3,001</td>
<td>15,024</td>
</tr>
<tr>
<td>Average Amount of Grants $</td>
<td>6,498</td>
<td>1,763</td>
<td>1,880</td>
<td>17,239</td>
</tr>
<tr>
<td>Full-Time Equivalent Students</td>
<td>7,846</td>
<td>4,965</td>
<td>1,125</td>
<td>31,339</td>
</tr>
<tr>
<td>Percent on Student Loans</td>
<td>58.21%</td>
<td>18.01%</td>
<td>4.00%</td>
<td>100.00%</td>
</tr>
<tr>
<td>Percent on Pell Grant</td>
<td>44.07%</td>
<td>16.01%</td>
<td>11.00%</td>
<td>90.00%</td>
</tr>
<tr>
<td>Percent of Hispanic Students</td>
<td>9.64%</td>
<td>13.26%</td>
<td>0.14%</td>
<td>94.57%</td>
</tr>
<tr>
<td>Percent of Black Students</td>
<td>16.97%</td>
<td>24.34%</td>
<td>0.30%</td>
<td>97.52%</td>
</tr>
</tbody>
</table>
A further exploration of the independent variables was examined by creating a correlation table between independent variables. This is listed below in Table 4. There is a strong positive correlation between several of the expenditure variables. This is not surprising based on the nature of higher education. Each institution has limited funds to spend and an increase or decrease in one expenditure area should be, at least moderately correlated to changes in other areas of spending. Total revenue holds strong correlations to areas of spending that are typically funded through state appropriations and collection of tuition. These areas include instruction, academic support, student services, institutional support, and operation of maintenance and plant (OMP). There is a much more moderate correlation between total revenues and research and auxiliary expenditures. This could be due in part to the limited role research spending typically plays with the MPU institution population and auxiliaries typically draw funding from other sources such as user fees.

It is not surprising that the number of full-time equivalent students showed a strong correlation between almost all financial variables. It is typical for an institution to base some portion of their spending based on the amount of their enrollment. For example, the amount a MPU spends on instruction should be related to the total number of actual students they are educating. There was a similar but moderate correlation between state appropriations and academic support, student services, institutional support, auxiliary and OMP. This would make sense because state appropriations are typically only spent within areas that relate to expenses directly earmarked for the cost of educating students. Research is typically not considered a core function of MPUs and spending in this area is not typically funded through state appropriations, so it would make sense that all the other areas of expenditures had a modest correlation to state appropriations but not with research expenditures.

In terms of student demographics and financial aid variables there are a number of areas of interest. The percent of Hispanic students has a moderate negative correlation with the percent on loans. The percent of Black students has strong positive correlation to the percent on Pell.

This section has offered a brief review of the descriptive statistics for this study and an overview of correlation and strength between the independent variables. The following section will examine the results of the fixed-effects analysis.
Table 4

*Correlations of Statistics of the Independent Variables*

<table>
<thead>
<tr>
<th></th>
<th>Instruction</th>
<th>Research</th>
<th>Academic Support</th>
<th>Student Services</th>
<th>Institutional Support</th>
<th>Auxiliary</th>
<th>OMP</th>
<th>Total Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instruction</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research</td>
<td>0.1890</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic Support</td>
<td>0.8371</td>
<td>0.1340</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student Services</td>
<td>0.7951</td>
<td>0.0565</td>
<td>0.7791</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Institutional Support</td>
<td>0.8069</td>
<td>0.2111</td>
<td>0.7060</td>
<td>0.6810</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auxiliary</td>
<td>0.4314</td>
<td>0.0423</td>
<td>0.3943</td>
<td>0.1501</td>
<td>0.2015</td>
<td>1.0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OMP</td>
<td>0.8789</td>
<td>0.2393</td>
<td>0.7351</td>
<td>0.6803</td>
<td>0.7771</td>
<td>0.3903</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>Total Revenue</td>
<td>0.9521</td>
<td>0.2899</td>
<td>0.8723</td>
<td>0.7770</td>
<td>0.8030</td>
<td>0.5290</td>
<td>0.8545</td>
<td>1.0000</td>
</tr>
<tr>
<td>State Appropriations</td>
<td>0.4666</td>
<td>0.0494</td>
<td>0.4608</td>
<td>0.3603</td>
<td>0.3722</td>
<td>0.3428</td>
<td>0.4080</td>
<td>0.5042</td>
</tr>
<tr>
<td>Full-Time Equivalent</td>
<td>0.9056</td>
<td>0.0893</td>
<td>0.8575</td>
<td>0.8127</td>
<td>0.7507</td>
<td>0.4077</td>
<td>0.7609</td>
<td>0.9087</td>
</tr>
<tr>
<td>Tuition and Fees</td>
<td>0.1519</td>
<td>-0.0055</td>
<td>0.0982</td>
<td>0.1614</td>
<td>0.0866</td>
<td>0.2963</td>
<td>0.1833</td>
<td>0.1440</td>
</tr>
<tr>
<td>Percent on Loans</td>
<td>-0.3499</td>
<td>-0.1696</td>
<td>-0.2831</td>
<td>-0.2512</td>
<td>-0.3245</td>
<td>0.1087</td>
<td>-0.3078</td>
<td>-0.3170</td>
</tr>
<tr>
<td>Percent on Pell</td>
<td>-0.1744</td>
<td>0.0087</td>
<td>-0.1262</td>
<td>-0.1182</td>
<td>0.0002</td>
<td>-0.4097</td>
<td>-0.1454</td>
<td>-0.1839</td>
</tr>
<tr>
<td>Total Grant</td>
<td>0.1317</td>
<td>0.0481</td>
<td>0.1109</td>
<td>0.1659</td>
<td>0.1147</td>
<td>0.0681</td>
<td>0.1509</td>
<td>0.1511</td>
</tr>
<tr>
<td>Percent Hispanic</td>
<td>0.2066</td>
<td>0.0673</td>
<td>0.2058</td>
<td>0.2084</td>
<td>0.2218</td>
<td>-0.2141</td>
<td>0.1853</td>
<td>0.1741</td>
</tr>
<tr>
<td>Percent Black</td>
<td>-0.2181</td>
<td>0.0591</td>
<td>-0.1615</td>
<td>-0.1840</td>
<td>-0.0158</td>
<td>-0.1180</td>
<td>-0.1191</td>
<td>-0.1615</td>
</tr>
<tr>
<td></td>
<td>State Appropriations</td>
<td>FTE</td>
<td>Tuition and Fees</td>
<td>Percent on Loans</td>
<td>Percent on Pell</td>
<td>Total Grant</td>
<td>Percent Hispanic</td>
<td>Percent Black</td>
</tr>
<tr>
<td>------------------------------</td>
<td>----------------------</td>
<td>-----</td>
<td>------------------</td>
<td>------------------</td>
<td>----------------</td>
<td>-------------</td>
<td>------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>State</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full-Time Equivalent</td>
<td>0.4513</td>
<td>1.0000</td>
<td>0.0099</td>
<td>0.0323</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tuition and Fees</td>
<td>-0.1110</td>
<td>-0.3422</td>
<td>0.3140</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent on Loans</td>
<td>-0.0281</td>
<td>-0.1674</td>
<td>-0.3577</td>
<td>0.0836</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent on Pell</td>
<td>0.1563</td>
<td>0.0882</td>
<td>0.1528</td>
<td>-0.0204</td>
<td>0.2569</td>
<td>1.0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Grant</td>
<td>0.1764</td>
<td>0.1766</td>
<td>-0.1977</td>
<td>-0.4927</td>
<td>0.2482</td>
<td>0.1933</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>Percent Hispanic</td>
<td>-0.0871</td>
<td>-0.2313</td>
<td>-0.1659</td>
<td>0.3121</td>
<td>0.6851</td>
<td>0.2409</td>
<td>-0.1949</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

**Results and Discussion**

The results presented in this section illuminate the principal findings of this study. The primary focus of this dissertation was to explore what impact or relationship there may be between AAFSD consumption and institutional spending at MPUs. These results offer meaningful insight into the ever-expanding canon of work on student debt with a specific nod to an often-overlooked institutional type. A review of the coefficients, standard errors and statistical significance showed a number of interesting results for both the Input variables (control) and the Environmental variables (institutional expenditures).

There were two issues that arose throughout the data collection and analysis. First, it became clear that any available cost-of-living variable was unreliable. Data drawn from IPEDS yielded information that was incomplete for all data points that could be used as a proxy for cost-of-living. The most reliable data was available through a data point that assigned a number for
level of urbanization or population density. However, the nature of a fixed effects study follows a process that demeans the data and as a result drops any slowly changing or time invariant variables (Wooldridge, 2015). This would render any data that assign a fixed digit to a location type negligible in the analysis. As a result, the model does not include a data point that controls for location.

Another concern was the Total Revenue variable. In IPEDS, this consists of the sum totals reported by each MPU regarding the amount of revenue they have taken in each year. Total revenue was a large variable that may have obscured or confounded another valuable control variable such as collected tuition and fees, government appropriations, grants and contracts, private gifts and interest income. State appropriations constitute a considerable amount of total revenue and are also one of the most researched revenue variables within higher education (Barr & Turner, 2013; Delaney, 2014; Fethke, 2011; Mitchell & Leachman, 2015; Monks, 2014; Serna, 2015; Serna & Harris, 2014). This issue was addressed by running a second model that used total state appropriations received each year as a variable in addition to the total revenues variable. The reductions to state appropriations are often cited as a leading cause for the increase in the price of tuition, and as a result, possibly larger debt loads assumed by students.

With this in mind, it is necessary to note that the state of Colorado has a unique process that obscures the total state appropriations in their data collection process. This meant that MPUs from the state of Colorado would have to be omitted from the second model. The MPUs from Colorado report their state appropriations as dollars from tuition and as a result there is no single variable that can be derived to represent revenues received from state appropriations. This resulted in five institutions being removed from the dataset for the second model. These institutions are listed here and in Table 2 in Chapter Three:

- Adams State University
- Colorado State University- Pueblo
- Metropolitan State University of Denver
- University of Colorado- Colorado Springs
- Western State Colorado University
The results were decidedly mixed throughout the analysis. This was not surprising as the review of literature on expenditures to outcome studies have shown a multitude of findings. These results are presented in Table 5 and 6.

Table 5

Estimation Results Using Fixed-Effects

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Robust Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instruction Expenditures (ln)</td>
<td>.026</td>
<td>.045</td>
</tr>
<tr>
<td>Institutional Support Expenditures (ln)</td>
<td>.009</td>
<td>.019</td>
</tr>
<tr>
<td>Research Expenditures (ln)</td>
<td>-.002**</td>
<td>.001</td>
</tr>
<tr>
<td>Student Service Expenditures (ln)</td>
<td>-.040</td>
<td>.035</td>
</tr>
<tr>
<td>Academic Support Expenditures (ln)</td>
<td>-.034**</td>
<td>.014</td>
</tr>
<tr>
<td>Auxiliary Expenditures (ln)</td>
<td>.015</td>
<td>.015</td>
</tr>
<tr>
<td>Operation of Maintenance and Plant Expenditures (ln)</td>
<td>.029*</td>
<td>.017</td>
</tr>
<tr>
<td>Total Revenue (ln)</td>
<td>.037</td>
<td>.034</td>
</tr>
<tr>
<td>Tuition and Fees (ln)</td>
<td>-.041</td>
<td>.055</td>
</tr>
<tr>
<td>Average Amount of Grants (ln)</td>
<td>.087</td>
<td>.059</td>
</tr>
<tr>
<td>Full-Time Equivalent Students</td>
<td>-.142**</td>
<td>.069</td>
</tr>
<tr>
<td>Percent on Student Loans</td>
<td>.000</td>
<td>.001</td>
</tr>
<tr>
<td>Percent on Pell Grant</td>
<td>.007***</td>
<td>.002</td>
</tr>
<tr>
<td>Percent of Hispanic Students</td>
<td>-.654***</td>
<td>.197</td>
</tr>
<tr>
<td>Percent of Black Students</td>
<td>-.173</td>
<td>.361</td>
</tr>
</tbody>
</table>

Adjusted R-Squared=.10997 N=249

(ln)= natural log

***denotes statistical significance at the .01 level

**denotes statistical significance at the .05 level

*denotes statistical significance at the .10 level
Table 6

*Estimation Results Utilizing Fixed-Effects with State Appropriations*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Robust Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instruction Expenditures (ln)</td>
<td>.026</td>
<td>.045</td>
</tr>
<tr>
<td>Institutional Support Expenditures (ln)</td>
<td>.009</td>
<td>.019</td>
</tr>
<tr>
<td>Research Expenditures (ln)</td>
<td>-.002**</td>
<td>.001</td>
</tr>
<tr>
<td>Student Service Expenditures (ln)</td>
<td>-.040</td>
<td>.035</td>
</tr>
<tr>
<td>Academic Support Expenditures (ln)</td>
<td>-.034**</td>
<td>.014</td>
</tr>
<tr>
<td>Auxiliary Expenditures (ln)</td>
<td>.015</td>
<td>.015</td>
</tr>
<tr>
<td>Operation of Maintenance and Plant Expenditures (ln)</td>
<td>.029*</td>
<td>.017</td>
</tr>
<tr>
<td>Total Revenue (ln)</td>
<td>.037</td>
<td>.034</td>
</tr>
<tr>
<td>State Appropriations (ln)</td>
<td>-.005</td>
<td>.026</td>
</tr>
<tr>
<td>Tuition and Fees (ln)</td>
<td>-.043</td>
<td>.056</td>
</tr>
<tr>
<td>Average Amount of Grants (ln)</td>
<td>.087</td>
<td>.059</td>
</tr>
<tr>
<td>Full-Time Equivalent Students</td>
<td>-.142**</td>
<td>.069</td>
</tr>
<tr>
<td>Percent on Student Loans</td>
<td>.000</td>
<td>.001</td>
</tr>
<tr>
<td>Percent on Pell Grant</td>
<td>.007***</td>
<td>.002</td>
</tr>
<tr>
<td>Percent of Hispanic Students</td>
<td>-.653***</td>
<td>.196</td>
</tr>
<tr>
<td>Percent of Black Students</td>
<td>-.177</td>
<td>.361</td>
</tr>
<tr>
<td>Adjusted R-Squared= .10941</td>
<td>N=244</td>
<td></td>
</tr>
</tbody>
</table>

(ln)= natural log

***denotes statistical significance at the .01 level

**denotes statistical significance at the .05 level

*denotes statistical significance at the .10 level

The second model’s addition of state appropriations did not yield any substantively significant differences from the first model. This meant that total revenues were an appropriate control variable for an MPU’s ability to support students and that this aggregate variable captured the impacts of state appropriations on student federal loan consumption. However, a discussion of the state appropriations variable and the second model are still explored in the following sections.
Expenditure Variables

The results presented in Table 5 and 6 show the complex role that institutional expenditures may play in student outcomes. These findings also represent the impetus for this study. As outlined in previous chapters, the main goal of this study was to determine what impact institutional spending at MPUs may have on AAFSD usage. The results from Table 5 and 6 show many interesting results. The variable for Instruction expenditures was not statistically significant. Webber and Ehrenberg (2010) noted that during the past two decades the median spending on instruction, per FTE grew more slowly than other areas of institutional spending. Theoretically, increases in instructional spending would represent an expenditure category that includes the high salaries of professors and instructional staff. Additional spending in this area would represent a significant factor in increases to tuition to offset these expenses.

If this area of spending was statistically significant it would agree with the CDT. However, this nonsignificant finding warrants further discussion. Instructional spending is an area of higher education that typically cannot offset expenditures with increases to technological efficiencies. Instead, institutions have often increased their adjunct teaching staff and increased class sizes in lieu of adding the costlier full-time tenure track staff (Archibald & Feldman, 2011; Ehrenberg & Zhang, 2005). Because of this, it is plausible to assume that the slower growth of instructional spending at MPUs would not be related to average federal student debt levels. It is possible that instructional spending is an area that higher education has managed to leverage some forms of efficiency by possibly increasing class size and how they deliver instruction through cheaper adjunct faculty labor. It is likely that reductions to costlier full-time tenure positions have been replaced with cheaper part-time adjunct faculty. In turn, this may have helped to keep Instructional spending low enough that it has not affected student levels of debt.

Institutional support expenditures were not found to be statistically significant. This is somewhat surprising considering that this category represents the “central administrative” expenses of MPUs. Theoretically, the more institutions spend on central administration, the more the overall costs, and as a result the total price of tuition should be positively related to these increases. Titus (2006) found that the percent spent on administration was negatively related to student persistence. He posited that the spending on administration held an opportunity cost for other functions that could better support student persistence. While the outcome of AAFSD is substantially and substantively different than student persistence, it is important to note here that
spending on central administrative expenses in this study does not appear to have the similar negative influence on AAFSD. It is reasonable to assume that the relationship between institutional spending and overall student outcome metrics is more complex than suggesting administrative costs as a main culprit for the financial challenges facing higher education (Leslie & Rhoades, 1995).

Student service expenditures did not have a statistically significant impact on student debt. It could be posited that spending on student service programs allows students to make healthier decisions; both in terms of physical health and financial health. For example, student service spending could include financial aid personnel and services to increase financial awareness. However, there is a limited amount of research on the impacts of financial literacy education and its impacts on college students. Surprisingly, what is available has shown that financial literacy programs have a limited and short-term impact (Fernandes, Lynch & Netemeyer, 2014). If financial literacy programs do not have a significant impact, it is sensible to assume that spending on student services would not help to lower average federal student debt. Areas of student service spending include mental health, career and financial aid counseling in addition to social and cultural development and in some cases admissions and health services. These are all areas that employ highly educated labor, so it would seem implausible that financial literacy interventions would counteract the costs of increased costs associated with student service employment (Archibald & Feldman, 2008, 2011).

Somewhat surprisingly, spending on auxiliary functions did not have a statistically significant relationship to AAFSD during this time period. It has often been posited that increases in institutional spending to attract more students have taken the form of “user fees” to pay for these campus improvements or enhancements (Jacob, McCall, and Stange, 2013). It is plausible that the effects of “user fees” are more prominent at other institutional types (i.e. prestigious private universities or flagship public institutions) and are not as large within the MPU institutional population. The answer to four of the seven research questions posited by this study, Do instruction, institutional, auxiliary and student support expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal, is that there is no statistically significant relationship.

Turning to the other three questions, there were three expenditure categories that shared a statistically significant relationship with AAFSD: research, academic support, and operation of
maintenance and plant (OMP). The research expenditure variable’s coefficient was of small negative statistical significance. A one percent increase in spending on research suggests a less than one percent decrease in AAFSD within the MPU population. Expenditures on academic support were also statistically significant with a negative relationship. However, the coefficient for this category was more substantial. A one percent increase in spending on academic support expenditures indicates a 3.4% decrease in AAFSD. The negative relationship between these two variables and average federal student debt imply that the CDT may not be adequate to explain the relationship between expenditures and student debt.

The CDT posits that sectors or industries that cannot leverage productivity and technological advances adequately to reduce costs, with respect to the inflating costs of inputs, will suffer from more rapid increases to labor costs than other sectors or industries. Both research and academic support expenditure categories would certainly represent areas that employ highly skilled labor. They would also represent areas of spending for MPUs that would typically fall outside of their core mission of educating the local student populations. It is plausible that these findings represent more than just fiscal matters but a shift away from the typical core mission of an MPU that is in some way affected their student populations and the need to borrow. A significant portion of research expenditures is supported by grant monies. This makes it plausible to conjecture that some amount of the grant money generated is either directly or indirectly helping to reduce costs for students and as a result less student debt.

Interestingly, spending on OMP was statistically significant (at the .10 level) and had a positive relationship. A one percent increase in spending on OMP was related to a 2.9% increase in AAFSD. This finding was contrary to what had been posited based on previous theory and institutional spending patterns presented in Chapter Two. It is somewhat troubling that spending within this area was related to increases in AAFSD. OMP was an area of spending that has been decreasing during the past two decades and was also an area that could possibly leverage increases to efficiencies and technological advances. It is difficult to speculate why this area of spending holds a positive relationship to the dependent variable. It is clear that any savings, as a result of reduced spending, are not being transformed into a student benefit by way of lower tuition or student debt levels. This will be dealt with directly in Chapter Five.

Control Variables
The input variables in this model served as controls. Each variable was selected because prior literature had indicated some relationship between it and institutional student debt levels. As reviewed in Chapter Two, the studies on institutional factors that impact student debt levels are limited. However, the control variables represent a robust community of variables. These variables include items related to tuition and fees, institutional revenue variables, study body size and demographics, and numerous financial aid variables that control both for financial need and average financial aid packages.

Tuition and fees.  

It has been assumed that tuition and fees are to blame for the rising debt burden of college students, however, this notion may be misplaced (Monks, 2014). In fact, prior research has shown that there are several factors that can influence student debt loads such as housing criteria, location, class size, educational capital, alumni giving rates and the total value of the institution's endowment (Craig & Raisanen, 2014; Macy & Terry, 2007; Monks, 2014). To that end, it is not surprising that this study did not find a statistically significant relationship between the average tuition and fees at MPUs, and AAFSD. It is important to note that the MPU population is generally considered to have lower levels of tuition (Henderson, 2007) than other four-year institutions. This finding seems to mirror Monk’s (2014) finding that:

At public universities, the cost of attendance is not related to total average student debt, conditional on other variables. This result implies that a focus on sticker price in determining debt levels, at least among graduates of public universities, may be misplaced (p. 136).

This non-finding points to the complicated nature between tuition and fees and student debt. It is further plausible to assume that the limitations placed on annual federal student debt are a contributing factor. For example, for many students increases to tuition and fees may already exceed their federal loan borrowing limits so increases to tuition and fees could not be offset by federal student loans.

Total revenue and state appropriations.  

These variables were of specific interest because of the financial relationship between an institution’s ability to generate revenue and how much students are charged for tuition. It has frequently been posited that a reduction in revenues (specifically state appropriations) directly created the need to raise tuitions levels to make up for the lost funding. Macy and Terry (2007)
found that the amount of an institution’s endowment and alumni giving rate directly impacted student debt. While these revenue sources make up only a portion of total revenue, it illuminated the important role that an institution’s total revenue played in student debt consumption. While neither total revenues nor state appropriations were statistically significant it is important to discuss the possible relationship for both variables.

Total revenues showed a non-significant relationship with average student debt. This would seem to be contradictory to prior research. However, it is important to note that total revenue also includes revenue generated from the collection of tuition and fees from students. Prior research has shown that tuition and fees have not only been increasing at public institutions but have also increased as total percentage of total revenue. It is plausible to assume, within MPUs, that total revenue could be a proxy for the burden that students must contribute to total revenue in the form of tuition and fees instead of a proxy for the amount of revenue resources an MPU has to offset costs and keep tuition from rising. Further study may illuminate why there is a non-significant relationship between total revenue and AAFSD within this area of higher education.

State appropriations (as shown in the Table 6) shows a non-significant finding with a negative relationship to AAFSD. The negative coefficient, though not statistically different from zero, could support the research narrative that reductions to state appropriations have had a significant, and often negative, impact on public higher education (Heller, 2011; Koshal & Koshal, 2000; Serna, 2015). In this case, it could be presumed that reductions to state appropriations are causing MPUs to make up for this lost revenue by raising additional revenue from other sources such as increased tuition and fees. Simply put, any decreases in state appropriations over time could be related to increases in average student debt usage.

**Average amount of grants.**

The average amount of grants did not have a statistically significant relationship to AAFSD. Based on the research literature and theoretical frame employed here, it would seem plausible that the Average Amount of Grants offered to students at an institution should be related to the average amount of debt consumed. The larger the amount of grants, the more loan eligibility should be displaced. Prior research has shown a relationship between grant aid and student loans (Macy & Terry, 2007; Monks, 2014). However, Macy and Terry (2007) only considered the percentage of students receiving the Pell grant and did not include a variable
expressed as an average dollar amount. Monks (2014) included a grant variable that only included the natural log of the average amount of state aid and did not include a dollar amount for the Pell grant. Craig and Raisanen (2014) did use a total aid variable (all financial aid that did not include loans). They stratified the average amount of aid between five income categories that were categorized from lowest income levels to highest levels. The statistical significance of their findings differed depending on the income levels of the students. Indeed, in a recent report, Serna (2016) noted that examining the true effects of grants compared to loans, in terms of student access and debt consumption, have been mixed.

The variable within this dissertation was the average amount per year and did not use any income level stratification. Because the average grant variable was not statistically significant it is difficult to speculate on the impact of average grant amounts on student debt. However, based on prior research, it is necessary to note that the relationship between grant amounts and student debt is nuanced. It is reasonable to assume that this relationship is not only about the total average amount but also about factors that include family income and possibly the total cost of attendance of the institution(s).

**Percent on Pell.**

The percentage of students receiving any amount of Pell grant had a positive and statistically significant relationship to AAFSD. This is not surprising because the amount of students that receive Pell grants is generally accepted as a proxy for the student body’s financial need and indeed, may be a better proxy for student need as compared to grants (Macy & Terry, 2007). It is important to note that the average amount of grants variable only accounts for the average among students who receive federal Title IV aid, and not the average for all enrolled students, while the percentage of students using Pell grant accounts for the entire student population. Once more, it could be that institutions that award larger grant packages do so to a small percentage of their student populations, while the total percent on Pell is a much more holistic view of a student body’s financial need.

**Percent on student loans.**

Somewhat surprisingly, the percent of students using federal student loans did not have a statistically significant relationship to average federal student debt. Prior studies (Monks, 2014; Macy & Terry, 2007) found that the percentage of students using federal loans had a significant relationship with student debt consumption. It is difficult to speculate why this study did not
yield a similar finding. One clear difference between this study and the aforementioned studies is the population being examined. This study only examined MPUs while the prior two studies investigated a broad range of four-year institutions with large variations in institutional resources and a more dynamic model for financial aid recipients. Moreover, another possible explanation is that percentages in this case, might mask the true effects of student loan consumption since loans are viewed differently from grants when students choose to go to or continue college. Specifically, an institution is mandated to offer and give full grant eligibility while students choose how much, if any, student loans to use. Additionally, any student (assuming they are not in default on prior federal student loans) qualifies for student loans regardless of financial need. In contrast, the percent on Pell is a gauge for financial need of a student population as a student must be below a certain income threshold to qualify for the Pell grant. In this case it is plausible that the percent of students using loans is not a good proxy for financial need and in turn overall loan consumption.

**Percent of Hispanic students enrolled.**

The percentage of students that identify as Hispanic was a strong statistical indicator of student debt consumption. There was a strong negative relationship between the percent of Hispanic students enrolled and the debt consumption. This is not surprising considering that previous studies have shown that Hispanic student populations tend to be debt averse and less likely to use loans than their counterparts (Hahn & Price, 2008; Hillman, 2015; Macy & Terry, 2007; Serna, 2016).

**Percent of Black students enrolled.**

Somewhat surprisingly, there was not a significant relationship between the Percentage of Black Students enrolled and average federal student debt use. Prior research has shown that Black students have been disproportionately negatively affected by student loan outcomes such as loan default, failing to complete the degree, and larger sums of borrowing than their peers (Greene, 1989; Herr & Burt, 2005; Jackson & Reynolds, 2013; Knapp & Seaks, 1992; Podgursky et al., 2002; Steiner & Teszler, 2003; Wilms, Moore & Bolus, 1987). From this research it is reasonable to speculate that there may be a positive relationship between the percent of Black students and student loan consumption. Jackson and Reynolds (2013) found that Black students were more likely to accumulate greater debt loads than their white counterparts. They also noted that this effect was much smaller when controlling for parental education and socioeconomic
status. To that end, it may be that a more effective analysis of Black students should examine this group stratified by income levels and parental education as it is still completely conceivable that the lower income Black students with parents with limited education are being disproportionately affected with larger debt loads.

**Full time equivalent students.**

The number of full-time equivalent (FTE) students was found to have a negative and statistically significant relationship to AAFSD. There was significant variation in the number of FTE students within this study. The smallest MPU had slightly more than 1,000 FTE students with the largest enrolling just over 30,000 and a standard deviation of just less than 5,000 FTEs. Macy and Terry (2007) noted that the number of courses offered with greater than 50 students enrolled had a significant and negative relationship with student debt burden. This suggests that there may be positive financial impacts on students if they enroll in larger institutions. However, it is equally likely that the relationship between full-time equivalent student enrollment and average federal student debt is a function of the number of students using aid at larger MPUs. For example, the number of students using aid acts as the denominator when calculating average student debt. It is likely that there are larger numbers of students using federal aid at larger MPUs, thus reducing their student debt consumption.

**Conclusion**

This chapter reviewed the findings of the fixed-effects econometric analysis. The findings show that there is a modest relationship between expenditure categories and average annual federal student debt. The body of literature surrounding student outcomes and institutional expenditures has shown that in limited ways there is a connection between outcomes and spending. This was also true for this study.

The results of this study offered insight into the connection between student debt and institutional spending. The conceptual framework for this study implied that if there was a relationship between institutional expenditures and student debt it would be positive. The framework combined that Cost Disease Theory (CDT) with the Input-Environment-Output (I-E-O) model. The basic premise was that rapidly increases costs to operate a MPU were as a result of the CDT. These rises in labor costs were outstripping most other areas of production as service sectors, such as higher education, are not able to leverage increases to productivity and must maintain a highly educated and well compensated workforce. Theoretically, this would be
reflected in expenditure categories as a majority of expenditure categories consist of labor costs. These increases may be causing the rapid rise in the cost of obtaining a college degree and as a result increases to student debt use. Meaning that over time increases in spending should, if at all, be related to increases in AAFSD. The variables were operationalized within the I-E-O framework with expenditure categories, student demographics, and institutional factors making up the Inputs and Environment and Average Federal Student Debt making up the student Outcome variable.

The statistically significant findings showed the opposite of what was proposed through the framework of this study. Instruction, Institutional, Student Service and Auxiliary expenditures were not statistically significant. This was somewhat surprising as these areas constitute a majority of MPU spending. Research, academic support and operation of maintenance and plant all had statistically significant findings. Surprisingly, both research and academic support had a negative relationship to average annual federal student debt. Substantively this means that the more MPUs spend in these categories, the lower the debt levels of their students. This finding indicated that it may be as important to explore what spending in certain categories symbolizes in terms of commitment to their given mission. It is plausible that spending in these categories represents an attempt at creating new revenue streams and possibly attempting to shift from a regional comprehensive university to one with a research agenda. OMP had a positive relationship to student debt. This indicates that policy makers and researchers should recognize that reductions to spending in certain areas of higher education do not directly impact students. It should be further explored how policy can incentivize institutions to use reductions in spending in certain areas to impact students and their financial burden more directly.

Other institutional and student body characteristics also proved to be an important determinant of student debt. The overall financial profile, as determined by the percent receiving Pell grant, was a significant indicator. The higher the percentage of the student body that identifies as Hispanic indicated an aversion to borrowing and lower levels of student debt. The greater the enrollment of the institution indicated lower levels of student debt. While the remaining control variables were not statistically significant there was important information to be interpreted.
Both total revenue and state appropriations were non-significant. State appropriations were added as a variable and a second model was run. In both models state appropriations were non-significant and there were no substantive change to any other variables. Surprisingly, total revenues had no significant statistical relationship to AAFSD. It was posited that this is because tuition and fee revenue most likely make up the majority of this variable and as a result total revenues may have been a better proxy for how much of the revenue burden students bear by paying increasing dollar amounts for tuition and fees than a variable to express the resources an institution has to support their students. State appropriations were non-significant. In theory, if a state increases the amount of funding they allot to higher education, there should be a decrease in annual average federal student debt, within MPUs this was not found to be the case.

The variables that represented tuition and financial aid yielded a complex set of findings. The amount of Tuition and Fees paid by students was non-significant. This was a surprising finding, considering tuition and fees are often cited as the main culprit for ballooning student debt. It is possible that the relationship between tuition and fees and student debt, at MPUs, is more nuanced than the variables utilized in this analysis. The total amount of grants was also a non-significant variable. Again, this is somewhat surprising. In theory, an increased amount of grants a student body receives should help decrease their need to accept student loans. The total grant variable may have been more useful if it could represent differing incomes levels. For example, the total grant amount may be statistically significant for students in the most needy income bracket and non-significant for students in the less needy income brackets.

The percentage of students using Pell grants was statistically significant and represented a positive relationship. A higher percentage of students receiving the Pell grant was related to higher average annual federal loan usage. The percent of students using federal loans was nonsignificant. It is reasonable to assume that financial aid variables are nuanced, and future policy decisions and research should take into consideration income factors that examine students by income level and also cost of living variables. The percent of students that identify as Black was non-significant. It may be that this is a non-significant variable within the MPU institutional population but significant within other areas of higher education such as community colleges. Future policy research and decisions should take into consideration the differences that exist between institutional types and their impacts on student outcomes with respect to the makeup of their student populations.
Much like prior institutional expenditures and student outcome research this dissertation has a complex set of findings. It is fair to say that the relationship between institutional expenditures and student debt is a modest one at best. Even so, it is clear there is valuable information to be gained for policy makers and researchers. For example, spending in an area such as research results in lower debt burdens for students that attend MPUs. The implications of these findings for policy, practice, and research are drawn out more fully in the next chapter.
Chapter Five
Summary, Implications and Conclusions

This chapter offers an overview of this study’s framework and analysis and the implication of its findings for both researchers and higher education stakeholders. It explores areas for future research, the specific relevance of findings for MPUs, and draws summative conclusions.

The interest and foundation for this study was drawn from Pike, Smart, Kuh and Hayek’s (2006) study. Their study explored the relationship between institutional expenditures and student engagement outcomes. Their findings suggested that there was a marginal relationship between institutional spending and student engagement outcomes. The authors of this foundational study illuminated the significant yet complex relationship between institutional spending and student outcomes. They suggested that further research was needed to understand how, and to what extent, institutional spending can impact student outcomes.

There is a growing body of research that explores the relationship between institutional spending and student outcomes. While this body of research stretches back almost 50 years (Coleman et al., 1966; Rock, Centra, & Linn 1970; Watchel, 1976), the majority of compelling research has taken place since the creation and consolidation of institutional data within IPEDS (Gansemer-Topf & Schuh, 2006; Pike et al., 2011; Pike et al., 2006; Ryan, 2005; Smart et al., 2002; Smart & Toutkoushian’s, 2001; Titus, 2006). These studies used data drawn from functional expenditures categories, such as instructional and student services. The expenditure data was regressed against two types of student outcomes: cognitive and retention/graduation rates. Cognitive outcome variables were operationalized as items such as increases to leadership ability, student development, and student engagement (Pike et al., 2011; Pike et al., 2006; Ryan, 2005; Smart et al., 2002; Smart & Toutkoushian’s, 2001). The academic variables consisted of graduation rates, retention information and persistence (Gansemer-Topf & Schuh, 2006; Ryan, 2004; Titus, 2006; Webber, 2012; Webber & Ehrenberg, 2010). A review of this expansive literature showed that there were no studies that explored institutional expenditures and salient student outcomes related to student debt. This was surprising considering the massive increases to tuition and fees and, by extension, the average amount of student debt carried by students enrolled in American higher education institutions. Unrestrained spending by institutions of higher education, and the manner by which higher education decision makers spend institutional
funds, is often cited as the main contributor to current student debt levels (Campos, 2015; Greene, Kisida & Mills, 2010).

Baumol and Bowen (1965) offered the Cost Disease Theory (CDT) to explain why costs in sectors that require highly educated labor have outstripped other areas of production. Their economic theory stated that because these sectors cannot leverage increases to productivity through the addition of capital, that the cost to consume labor in these sectors would result in cost increases rising faster than inflation. They specifically posited that higher education would be just such a sector because of the highly educated labor it takes to produce college graduates and operate a university. Archibald and Feldman (2008, 2011) helped to further develop the CDT as a well-established economic theory. They theorized that higher education, as a sector, is not effectively able to leverage technological advancements to increase efficiency and reduce costs. Because the global workforce has an increasing demand for a more educated employee, these employees are more expensive to educate. As stated in the preceding paragraphs, with regard to capital investments, it is important to note that technology does not necessarily reduce costs for higher education institutions. In fact, the complexity and pace at which new technology emerges has made it increasingly expensive for higher education institutions to leverage and invest in new technology.

Archibald and Feldman’s (2008, 2011) work that reviewed the CDT and higher education concluded that these institutions, while subject to the pitfalls of the CDT, are in fact still good stewards of their resources. Even though college and university officials were found to be good stewards of their resources it is still unclear how rapidly increasing costs associated with the CDT and higher education are impacting students on an individual level. Specifically, are students at MPUs part of a context that results in an outcome related to increases in student debt consumption as institutional spending increases? To help answer this, Astin and Antonio (2012) created a theoretical model that has been utilized in numerous research nodes pertaining to student outcomes. The model operationalizes variables as Input variables, Environmental variables and Outcome variables (I-E-O). And while this model can be adapted in many variations, it has not yet been related to student debt. In fact, there is very little research that situates student debt as the student outcome variable of interest and explores which institutional and environmental factors contribute to student loan usage and consumption.
This dissertation sought to take the foundations of the aforementioned student outcome studies based in I-E-O models, while including the formalization of student debt levels as a relevant outcome measure, and economic theories, as well as methods, to better illuminate what relationship may be present between institutional spending and student debt at a specific institutional type. I combined Baumol and Bowen’s CDT with Astin and Antonio’s I-E-O model to create a conceptual framework for this study. Master’s level public institutions (MPU) were chosen because of their mission, the role they play in the higher education landscape, and the limited research that explicitly focus on MPUs. Typically, these institutions enroll students from their local geographic area and tend to offer admission to a wide range of students. Because of the limited research on what may contribute to student debt consumption at said institutions, and also the limited foci relative to MPUs, this study sought to answer the following research questions:

1. Do instructional expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?

2. Do research expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?

3. Do student service expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?

4. Do academic support expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?

5. Do auxiliary expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?

6. Do institutional support expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?
7. Do operations and maintenance of plant expenditures impact average federal student debt as measured at the institutional level at public-four-year, regional colleges and universities, holding all else equal?

Data were drawn from a six-year period and included 249 institutions (all classified as MPUs) throughout the U.S. with more than 1,400 observations. A Fixed-Effects estimation was performed using variables based on an analysis of relevant prior literature. The ultimate goal of this study was to explore what relationship may exist between institutional expenditures and average annual student debt for students that attended a MPU.

**Findings and Implications**

The prior chapter reviewed the findings of the fixed-effects econometric analysis with an overview of the results. The goal of Chapter Five is to expand on these findings and provide further insight into their implications for future policy, practice and research. Focus will be placed upon the implications for the MPU institutional population throughout this chapter.

**Environmental Variables: Institutional Expenditures**

This section explores the findings related to the seven interrelated research questions of this study. While this study did not speculate as to the nature of the relationship between institutional expenditures and student debt, the theories and conceptual model imply that there could be a positive relationship between expenditure categories and student debt. Simply put, higher institutional spending in any one functional area creates a need for more revenue to cover these expenses. Often, this is covered in the form of increases to tuition and fees. In turn, students may need to use greater amounts of student loans to cover these increases.

The findings of this study showed that there may be a relationship between certain expenditure categories and average annual federal student debt, albeit only in a few categories, with a somewhat modest relationship. The findings presented within this study appear to run counter to the aforementioned logic. In fact, two of the three statistically significant findings—research and academic support—have the opposite relationship than would be expected if the CDT and the proposed relationship between student debt and increases in expenditure categories held true based on the conceptual framework employed here. In total, of the seven expenditure variables, three showed a statistically significant relationship between MPU expenditures and student debt.
Instruction, institutional, student services and auxiliary expenditures.

Prior studies that examine institutional expenditures and student outcomes show mixed results. These studies examined student outcomes in terms of cognitive development or graduation and persistence metrics. While these studies laid the groundwork for this analysis, their outcomes variables and metrics were substantially different than this study’s student outcome—average annual federal student debt (hereafter referred to as student debt). It is fair to say that the studies that examined graduation, retention and persistence rates are more closely aligned with this dissertation. These studies used a student outcome that had a universal metric. For example, one can examine the impact of spending in certain areas and the relationship to six-year graduation rates over a large institutional population. Studies that used cognitive outcomes such as leadership development, are more difficult to quantify because there is no universal definition for leadership development. To that end, a majority of the focus of this chapter will be placed on prior research and avenues for future policy, practice, and research that utilizes generally accepted student outcomes (i.e. student debt, graduation rates, persistence, post-graduation earnings).

Instructional expenditures were not related to student debt. Webber and Ehrenberg (2010) highlighted that the median spending on instruction has grown significantly slower than other expenditure categories during the last two decades. This may be due in part to increases in efficiencies in this area, such as increases to adjunct faculty and decreases to more expensive full-time tenured faculty. It is also likely that increases to class sizes have played a role. This would allow an increase in efficiency by educating more students without increases to instructional faculty. In other words, the marginal costs of adding one more student a classroom could be rather low. This may have helped to keep instructional expenditures lower and, as a result, not directly affected tuition levels and, indirectly, student loan use or consumption. Within the framework of this study, this finding would imply that CDT theory is not affecting instructional expenditures as previously theorized. In fact, this may show that, in certain areas, MPUs are able to leverage efficiencies and technological advances to help offset the extreme labor costs associated with higher education instruction.

It is also clear that the percentage of adjunct faculty to full-time tenure track faculty has consistently shifted towards a much larger portion of adjunct faculty. However, future policy should focus on the holistic impact of spending on instruction. This dissertation used a student
debt variable with limited explanatory power. The student debt variable only covers debt on a yearly basis, and on average at each institution. One could easily argue that students are incurring more debt if there is a connection between instructional expenditures and a negative impact on time to graduation. If an MPU sought savings through reductions to instructional spending that led to an increase in time to degree completion, it could be argued that the students are bearing part of that burden. For example, a student that takes, on average, 6.5 years to graduate as opposed to 5.5 years to graduate may accrue more total, but not necessarily average annual, debt. In fact, Ryan (2004) found that there was a positive and significant relationship between instructional spending and six-year graduation rates. To that end, it would be beneficial for future policymakers and institutional leaders to examine the relationship between instructional spending and time to graduation and possible relationships with total student debt accumulation.

It is somewhat surprising that spending on institutional support did not have any significant relationship with student debt usage. It is evident that many believe a major culprit in the growing costs of higher education is the increase in the number of administrators. This nonfinding is important for policymakers in that it adds to the research that indicates central administrative spending is not directly a significant contributor to the student debt narrative from a statistical perspective. However, it is important to note that this only applies to the MPU population. It would be prudent to explore if this is also true for other areas of higher education. It is conceivable that MPUs have lower compensation for those that fill their central administration ranks than other areas, such as doctoral granting research institutions.

Student service expenditures include counseling for financial aid, mental health, career guidance, and other forms of social and cultural development. While this dissertation did not find a direct relationship between student service expenditures and student debt, there are significant applications for policy and practice to consider. It has been shown that higher student service expenditures at institutions with lower selectivity and higher financial need populations are related to better graduation and persistence rates (Weber 2012; Webber & Ehrenberg, 2010). It is reasonable to believe that students from higher need populations (both financial and academic backgrounds) are able to gain the valuable counseling and support from greater student service support and programming.
Policymakers and practitioners should examine and consider that there is most likely differing levels of impact on student outcomes depending not only upon expenditures in a functional area but also the background of the students. Lower income students may benefit significantly from increases to student service programming. Without research that explores how student service programming and intervention methods are impacting student outcomes it is difficult to say how student service expenditures could be best used to support positive student outcomes such as lowering average student debt. It is possible that student service expenditures can be spent in a more efficient manner that supports high need students without adding additional costly administrators. An assessment of student service spending and programming such as online financial awareness or the size of a financial aid staff at an MPU should be examined.

Expenditures on auxiliary services did not have a significant relationship to student debt. Food services, bookstores, residential services (dormitories), parking services, student health services, student unions, recreational programs, and intercollegiate athletics (including debt service on buildings primarily used for intercollegiate athletics) are included in auxiliary spending. These areas all rely on some form of variable student payment for the service (varying meal plans, bookstore costs, etc.) or a fixed user fee such as a per semester student health service charge. It is difficult to speculate why there is no significant relationship between auxiliary spending and student debt.

Similar to spending on administrative staff, spending on lavish dorms and intercollegiate athletics is often attributed to increasing tuition costs and increasing debt levels. This was not found to be the case in terms of this dissertation’s findings. It is important to note that both tuition and fees were collected as a single variable. The national data that represents tuition and fees can be unreliable because depending on reporting status and definitions institutions report tuition and fees in a varying manner. For example, one state may use a definition for fees that has a meaning closer to a cost for tuition and instruction. Another might use the fee terms to represent how much a student must pay above and beyond tuition for items like a health center fee. Higher education policymakers, researchers and practitioners would benefit from a well-defined reporting process and definition for what constitute “user fees.” Currently, the meaning of fees versus tuition is different depending on the reporting institution. This makes the data unreliable, and as a result, near impossible to study the effect of “user fees,” specifically, on
various salient student outcomes. Without such data it is very difficult to tell what evidence there is within the narrative that says lavish university expenditures on student dorms, intercollegiate athletics, and the like, are responsible for the increases in student debt use.

This finding when viewed through this dissertation’s conceptual framework suggests that auxiliary spending may be able to avoid some of the pitfalls associated with the CDT. Auxiliary spending represents areas that could be outsourced to vendors and private contractors. This would allow a more efficient process and provider to cater to students at MPUs. Often, these providers follow market-pricing trends and the student body’s demand for a service helps determine the price. The conceptual model of this dissertation would then indicate that auxiliary spending may able to leverage greater efficiencies and technology and may not have a direct impact on student debt. Future researchers and practitioners should explore the manner and effectiveness of auxiliary service outsourcing at MPUs. This information would give valuable insight into processes that may be able to support more efficient spending in other functional areas. For example, the MPU population may benefit from outsourcing various student services. Services such as resume building and support may easily be offered through an online provider. This could help reduce career services costs and allow the entire student population to determine which type of service they would like to opt into and reduce the labor cost to the university.

This section reviewed the non-significant findings for the outlined research questions within this dissertation. While not statistically significant these findings also help to inform the ways in which an institution’s spending can impact student debt, at least at MPUs. The following section will explore the expenditure variables that did return statistically significant relationships to student debt.

**Research, academic support and operation of maintenance and plant.**

The notion that research expenditures are negatively related to student debt at MPUs is a surprising finding. For policy, practice and research there are several things to consider. First, the size of the coefficient is small. This makes it difficult to extrapolate the substantive meaning of the finding. For example, a one percent change in research expenditures would equate to a decrease in average student debt by $14.14 per year. Second, when one considers this study found that the average annual student debt was $7,072 per year it becomes difficult to make a connection with policy and practice considerations. This finding might suggest that institutional policies that aim to increase research expenditures may actually result in increased and
diversified revenue streams that help offset loan consumption by a small amount. It is interesting to note that research expenditures are an area that would typically fall outside of the core mission of an MPU. As reviewed in Chapter Two, MPUs typically focus on instruction of their regional student population and do not offer many doctoral level degrees. Additionally, spending in areas outside of an institution’s core mission could carry significant extra costs but could also generate overhead revenue.

Research expenditures not only include grant funded or sponsored research funding, but also separately budgeted departmental research endeavors. In either scenario, it is likely that an MPU would be adding extra cost without being able to use a scale effect to keep the cost of research manageable. Simply put, research would typically be performed by a faculty member that is well compensated and would not be able to simply increase their research output to increase efficiency. If a school wants to increase efficiency on instructional costs, it can simply increase class sizes, yet this is obviously not the case with research. This idea is in accordance with the CDT. What is not clear is if these new research expenditures are creating additional revenue that is currently more than offsetting increases to research expenditures. This is important to consider because if these are new expenditures MPUs may be experiencing short terms gains that would be wiped out across time as they increase spending on research and increasingly expensive research faculty, staff and physical operations.9

Another important factor to consider is how MPUs classify their expenditures. Research expenditures can be endeavors that are internally budgeted departmental items. In this case, it is not research that is funded by some form of external grant but simply an internal expenditure that is classified as research. It is plausible that MPUs could be reclassifying expenditures as research from other areas, such as instructional expenditures. In either case, additional spending or reclassification of spending is an outcome that would seem to counter the instructional mission of MPUs. Policymakers and practitioners should explore and consider why MPU leaders may be taking steps to reclassify expenditures and what impact this may have on student outcomes.

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9 It is important to note that microeconomic theory dictates there will be an inflection point where the marginal costs would outweigh the marginal benefits. Each functional expenditure category will have a point where adding more inputs (students, research, staff, etc.) will have greater costs than the financial resources they create will have a point where adding more inputs (students, research, staff, etc.) will have greater costs than the financial resources they create.
Researchers should examine more closely if additional spending on research is a function of new dollars being spent and if so are MPUs able to actually create additional financial resources with these expenditures. Without this knowledge it is not possible to determine if spending on research is a net positive for many MPUs. It is conceivable that increases to research expenditures are creating new revenue streams that help maintain lower tuition levels or are creating new funding opportunities for students to offset tuition costs. The student debt variable in this study only applies to undergraduate students so such a claim is difficult to make. It is unlikely that research funding is significant enough to offset large amounts of undergraduate student debt, but from the results presented here, might make a small impact. It may be that research expenditures are encouraging a shift in the mission of MPUs.

As reviewed in Chapter Two, it was typically the mission of MPUs is to serve a more general and regional student population. Often times, students would complete public service or educational type degrees. In turn, this meant that faculty members focused more on a teaching mission than that of a research agenda that is more common at a research-intensive state flagship university (Henderson, 2009). Titus, Vamosiu and Mclure (2017) noted that many MPUs are slowly shifting focus from teaching to an increased focus on research endeavors. It is not completely clear why this is happening. It has been posited that this could be a result of MPUs looking to gain a more prestigious status, which typically comes with greater research portfolios and research revenue. There is also a possibility that mimetic isomorphism is taking place. As some MPUs increase their research endeavors other MPUs may be following this trend. It has been shown that within organizational culture institutions will shift as other institutions make changes because it is assumed that these changes are beneficial and institutional imitation occurs (Morgan, 2006). It could also be that MPUs are feeling pressure to increase and diversify their revenue streams as state budgets and other financial resources become scarcer (Titus, Vamosiu and Mclure, 2017).

It is plausible that certain MPUs are attempting to raise their profile academically and increase their research spending. This could be in an attempt to attract additional high-income nonresident students that pay higher tuition rates and increase their research revenue. It is also reasonable to believe that an increase to their profile could be attracting more resident students with higher family incomes. If we consider that certain MPUs may be experiencing an increase to their profile via increases to research, it is equally likely that they may also be changing the
profile of their applicant pool. It is no secret that higher education applies admissions selectivity as a value to perceived quality and prestige of an institution. It is also true that there is a significant connection between academic background, ability and familial income (Davis-Kean, 2005). By extension, it is reasonable to posit that, as certain MPUs increase their research expenditures and academic quality, they are able to increase their admission selectivity and move further away from their traditional student body. Quite simply, they could be attracting and admitting higher achieving and higher income students and admitting less financially or academically needy students. As a consequence, they would be changing the composition of their student body. The student body could, on average, have less financial need, which translates to less demand for student loans. This would certainly have significant implications for policy and practice.

Additionally, this study found that there is also a negative relationship between academic support expenditures and student debt. This finding implies that a one percent increase in academic support expenditures is related to a 2.9% decrease in student debt. When expressed as a dollar amount, this equates to a $240 decrease in average student debt. This is a relatively large amount in terms of overall student debt. Academic support is classified as any expenditure that supports the instruction, research or public service functions of the institution. This includes expenditures for support and management direction to the instruction, research, and public service programs including academic administration that encompass college deans and associated support staff. Academic support also includes spending on faculty awards and development. It is reasonable to assume that spending in these areas could represent an attempt to increase the quality, revenue, and academic profile of the institution. Spending within this area could attract and retain highly rated faculty.

Similar to the findings for research expenditures, this finding could represent an attempt to increase quality and academic profile that has the unintended consequence of attracting a less financially needy student population. It is no secret that as state funding for higher education has decreased the need to raise other revenue sources has increased. A major source for this new revenue would be in the form of increasing the number of students without proportionally increasing the costs and inputs to educate them. One could speculate that an MPU’s attempt to spend in these two areas is an attempt to increase the profile and quality of the institution. Additional spending on academic support may arise as the student body increases as a result of
attempting to raise more tuition revenue. As faculties are asked to take on more roles and instruct and support more students it would be critical to spend more to retain them and ensure that they remain a valued faculty member.

These changes could be affecting their neediest student populations. Further examination should explore if increases to research and academic support spending are related to changes to both the selectivity of their institutions and the income profile of their student bodies. If practitioners at MPUs are committed to their teaching and service missions (as explored in Chapter Two), they would benefit from exploring how shifts away from each of these core values towards an insensitive research agenda might result in possible reductions to their lower income student populations. It is certainly possible that MPUs that are spending more in research and academic support are simply adding more high-income students that consume smaller amounts of student loans and not reducing their low-income student populations. As the student body increases in size the percent of low-income students may not rise proportionately. This could be for a number of reasons. First, an MPU may already be in an area without a large low-income student population. Second, these perceived increases to quality may not be something that is as apparent to lower income student populations.

Often times, students from these backgrounds are concerned with simply attending an institution to finish a degree. This is due in part to their financial circumstance. They may have multiple burdens that higher income families and students typically do not have to manage. In turn, these high-income families can take more time to investigate the measures of quality surrounding each institution and select from a broad range of schools. Without further exploration it is impossible to know if financially needy students are being displaced at MPUs or they are not proportionally represented by increases in an MPU’s student population. This should be a concern for practitioners that want to represent and advocate for high need underrepresented student populations. It is critical to understand what the consequences are of shifts within the MPU institutional student population as they shift their spending patterns and attempt to raise their academic profile. The local MPU may be the only option for many financially needy and underrepresented students. More research needs to be done to explore whether or not there is a student migration happening within the MPU institutional population. Specifically, more research needs to explore if there are displaced students that are a result of MPUs attempting to increase their profile through changes in spending patterns.
It was speculated within this dissertation’s framework that operation of maintenance and plant (OMP) could be an area that shows a negative relationship with student debt. Very broadly, it was found that expenses on OMP have been decreasing during the last two decades (Hinrichs, 2016). This is not necessarily true for MPUs and specifically may not be true since the Great Recession. It is true that spending in this area can largely been outsourced to cheaper labor and the cost of operating the utilities within newer more efficient buildings should reduce overall costs of powering facilities. However, a significant portion of OMP has been deferred across time as revenue becomes scarcer and institutional leaders spend in other areas deemed more critical. State support for higher education has a significant impact on OMP as well. A state may choose to fund capital improvements for an MPU or the MPU itself may raise funds by issuing debt (Serna, 2013b). It is probable that latter is true. It is important to review the specific components of OMP spending to better explore the positive relationship with student debt. OMP includes all expenditures to provide service and maintenance for the campus grounds and facilities. This includes administration, custodial service, building and utility repairs, utility costs, property insurance, property rentals and debt service.

As MPUs seek to improve their campuses they are facing limited resources and a credit market that has begun to scrutinize the financial circumstances and leadership of MPUs. This may result in lower credit ratings which in turn would increase the annual debt service paid by each MPU to make these campus improvements (Serna, 2013b). This dissertation found that a one percent increase in spending on OMP was related to a 2.9% increase in student debt or an increase of $204. The implications of this result are somewhat concerning. It is possible that increasing spending within this area is being allocated to areas such as administration, property rentals and debt service. MPUs may be spending in this area to increase the quality and attractiveness of their campus to increase their profile and compete for students. This could indicate that MPUs are spending on campus improvements that cannot be supported by current revenues, and in turn, students may be bearing part of this burden through increases to tuition and fees, hence, resulting in higher debt levels.

Researchers would benefit from exploring what drives increases to spending on OMP within the MPU institutional population. It is possible that MPUs are engaging in unnecessary spending to increase their campus profile. However, it is equally believable that this spending is a result of necessity. Institutions often put off campus improvements and maintenance as long as
possible as they tend to be costly and for a time period can be deferred. It may be that MPUs are increasingly forced to spend on critical campus improvements and do not have the multitude of revenue sources to pay for these improvements that may be available to other institution types. Unfunded state mandates may also play a role. If state level policy makers are instituting policies that direct campus leaders to spend on OMP to comply with various statutes and laws it is possible that these costs are being passed onto the student body. If this is the case, then this could indicate that states should seek to better support MPU campus infrastructure through capital appropriations (Delaney & Doyle, 2014; Ness & Tandberg, 2013; Tandberg & Ness, 2011). Otherwise, their student populations will continue to bear the burden of supporting improvements to campuses with outdated buildings and infrastructure.

The findings of this section have shown that the relationship between institutional spending and student outcomes is complex. Like many of the prior studies that examined institutional spending and student outcomes, this study found marginal connections between variables, but statistically significant, nonetheless. While some of these findings were surprising, they highlighted how shifts in institutional mission and policies may be present in spending patterns. The following section will examine the control variables within this dissertation.

**Input Variables: Institutional and Student Body Characteristics**

The findings presented in Chapter Four presented valuable insights with regard to the student debt narrative. This study sought to examine the relationship between average annual federal student debt and how institutional funds are spent. Critical to this examination were the control variables. These variables covered institutional factors such as total revenue, state appropriations, the number of full-time equivalent students and the amount charged annually in tuition and fees. The remaining controls covered student body variables of the percent of the student body receiving the Pell grant, the percent receiving student loans, the average amount of grants received, the percent of students that identify as Hispanic and the percent that identify as Black. The following sections will examine these findings and their implications for MPUs and their student populations.

**Institutional variables.**

Prior research has shown that the size of an institution’s endowment and alumni giving rate were important factors in determining the debt load of students (Macy & Terry, 2007). Typically, MPUs do not have large endowments and have relied on revenue from state
appropriations and tuition and fees. To that end, it was prudent to include major revenue sources in this study when examining student debt. It was somewhat surprising that neither of the revenue variables shared a statistically significant relationship with student debt. When considering the impact of total revenue on student outcomes, future researchers should consider the percent that is generated from tuition and fees. For example, this dissertation used total revenues as an aggregate dollar amount. A variable like this has limited explanatory power. An MPU could lose revenue from their state but raise tuition equally. Without considering a percentage change, a total revenue variable, overtime, would appear to be largely unchanged.

Policymakers could examine the applicability of including the percent of tuition and fees making up total revenues as a benchmark for future performance-based budgeting models. An institution that is heavily reliant on tuition and fees may not be as effective as a similarly situated institution that relies less heavily on tuition and fees as a source of revenue.

The IPEDS data collection process uses a varying number of methods to collect data that represents an average variable in a dollar amount. For average annual federal student debt the variable is calculated by taking the total outstanding loans used by an entire MPU student body and divided by the total number of students using student loans. This is important to recognize because the negative relationship could easily be attributed to an increase in students (FTEs) that simply draws down the average. This would be a likely explanation as this finding would simply be a function of the scale effects controlled for by this dissertation.

The findings highlighted within this dissertation suggest one theory. As an MPU increases its FTE or student body size, they are accumulating additional students from less needy backgrounds, and as result, these new students are using less in student debt. Finally, it could also be that MPUs are benefitting from an economy of scale. Meaning that as MPUs increase in student body size they are generating more revenue (through tuition and fees) with a similar amount of costs. In turn, this could mean that they are able to limit tuition increases, and as a result, students at MPUs with a growing number of FTEs take on lower debt amounts.

Without further analysis it is impossible to say how changes to the number of FTEs within the MPU institutional population are impacting student debt use. It is critical that policymakers better understand how changes to student body size impact numerous salient student outcomes. This information could enhance policy making as state authorities manage expanding and shrinking higher education populations.
In a similar vein, researchers could benefit from understanding more about how the size of student body affects student outcomes. Titus, Vamosiu and McClure (2017) found that most public master’s institutions (MPUs) are cost efficient in terms of their degree production with regard to institutional spending per FTE. These findings suggest that larger MPUs tend to be more cost efficient. Nonetheless, it remains unclear what relationship enrollment may have on average federal student debt. However, it is conceivable to assume that the size of an institution has an impact on their ability to be more cost efficient which results in lower and slower tuition increases and as a result less student debt. However, this finding should be viewed with considerable skepticism. There is no empirical evidence that clearly shows that the benefits of attending a more cost-efficient institution are passed onto a student in terms of lower debt loads. Moreover, larger MPUs have a larger national profile and are likely able to attract students with healthier and wealthier financial backgrounds. To that end, it is critical that future researchers explore how the size of an MPU may be impacting areas other than cost efficiency as there is rich information to be gained and there may be significant negative and positive impacts to students at these institutions.

It is clear that tuition and fees plays a complicated role in the student debt narrative. This study did not find a statistical connection between the listed price of tuition and fees and student debt. This dissertation placed the institution as the unit of analysis and a resulting limitation was that a singular variable (tuition and fees) was used as a proxy for what students are required to cover for higher education costs in the form of direct payment, student loans, or some form of grant or scholarship. Part of the justification for the use of this singular variable was Monk’s (2014) finding that the cost of attendance (COA) did not share a relationship with student debt at public universities. The COA is a number that represents what it would cost a typical student to attend a specific university for an academic year. This includes the cost for housing (dependent on whether or not the student pays for their housing or they live with their parents), tuition and fees, travel, books and supplies and a category for a few other limited expenses. The COA is not representative of what all students pay but simply of the estimated amount of resources it takes to pay for one academic year of education. Monk’s (2014) study and this dissertation both used a variable (COA and tuition and fees respectively) that represents what a student might pay contingent on student and family income. Some students may qualify for large grants while others only a limited amount and yet others none at all. It is entirely possible that not controlling
for these factors have obscured the significant role tuition and fees play in the student debt

Similarly, factors such as familial and student income and in some cases familial
background should be controlled for in future research that explores student debt. For example,
tuition and fees only represent what the governing board of the university has set. This is not
necessarily a great indicator for what a student actually pays. Families and students within
different income brackets will pay different amounts for tuition and fees. Typically, this would
happen because an MPU will award grants based on financial need. In fact, Craig and Raisanen
(2014) found that there was a nonlinear relationship with student income and average student
debt. Students from the lowest and highest income brackets were likely to be in less debt than
their peers from a middle-income category. It is likely that there are income categories for
students at MPUs that would share a statistically significant relationship with tuition and fees and
student debt and others that do not. For example, high need or low-income students’
characteristics may not share a relationship with tuition and fees and student debt because MPUs
provide sufficient grants to offset any connection. Conversely, higher income students may have
enough financial resources to avoid using student loans to pay for their tuition and fees. There
could also be a relationship for these students but at a much smaller level. This means they may
be less sensitive to increases in tuition and fees and require less debt to cover the increases.
Future researchers should consider studies that include the net price paid by a student based on
income brackets. It is clear that the relationship between tuition and fees and student debt is too
complex to not use stratified variables based on net price and family and student income. This
information would further allow practitioners to better determine how to distribute aid based on
financial need and the associated outcome with average student debt. For example, shifting an
amount of grant aid away from high income students to middle income students may result in
greater reductions to student debt for middle income students than their higher income would
peers experience.

There are a number of institutional variables that can impact student debt. Total revenues
and state appropriations were not statistically significant factors in student debt consumption.
However, they are important factors when considering a multitude of issues within higher
education financing. Total revenues should be further explored by examining which revenue
components are most prominent, such as tuition and fees. The number of FTEs plays a
significant role in determining student debt. Without further exploration it is difficult to conjecture the reason that FTEs are a significant variable in the student debt narrative. It is not clear if student body size results in an economy of scale impact or other factors such as larger student bodies tend to attract additional lower need students because of a greater national profile. Surprisingly, tuition and fees do not play a significant role in predicting average levels of federal student debt. It is possible that MPUs are sufficiently offering enough grant aid help to cover costs for students that would otherwise use student loans. The following section will examine the variables that were operationalized to control for the characteristics of student bodies at MPUs.

**Student body variables.**

The average amounts of grants received by students were not directly related to student debt, which was somewhat surprising. It would seem intuitive that increases to amounts of grants awarded to students should help decrease the need for student loans. Typically, when students are awarded grant aid these funds are directly sent to the institution and would be applied to any tuition or fees owed. Policymakers and researchers should explore the relationship between state level grants and increases to tuition. Increases to tuition and fees may be related to an increase to grants awarded to students. This would remove the need for students receiving grants at MPUs to consume student loans. State level policymakers and researchers should review these policies and how they may impact students within different income brackets. It is possible that students who receive partial grants have to use larger amounts of student loans than those of their peers in lower and higher income brackets. The use of stratified data, by income level, would be helpful to examine the impact of grants on student debt.

In terms of financial neediness, this study used the percent of the student population receiving Pell grant as a variable to measure student populations within an MPU. While the impact of this variable was relatively small, it was significant. This finding is important in that it further solidifies the importance and value of using institutional Pell grant information to inform future policy and research. The percent of students using student loans was not a significant factor in determining student debt. As mentioned in the prior chapter, it is reasonable, within the MPU population, that the percent of students using loans was not a good proxy for the financial need of the student population.

The foundation of this study has been situated within the conceptual notions of affordability and accountability. Research has shown that student debt use and impacts are not
evenly distributed through student populations. Indeed, students from disadvantaged or underrepresented backgrounds often experience greater and much more negative outcomes than that of the majority population. To that end, it was prudent to explore how underrepresented students fair in terms of debt accumulation while they attend MPUs. The scope of this study and the available data limited this exploration to students that identify as Hispanic or Black as a percentage of the total student population. It was not particularly surprising that the percent of Hispanic students was a strong statistical indicator of debt levels at MPUs. Larger percentages of Hispanic students were related to lower levels of student debt. This finding makes sense, in that, Hispanic student populations tend to be somewhat debt averse (Macy & Terry, 2007). Hispanic family structure tends to favor strong ties and structure. This can discourage Hispanic students from searching for and attending post-secondary education further from home; in fact, there may be a large percentage that live with their parents. This may also have the effect of reducing housing costs for Hispanic students, thus reducing their need for student loans. Future policy and research should consider how this affects Hispanic student populations. It is possible that their debt aversion is actually discouraging some students from even attempting to enroll in college (Elliot & Friedline, 2013). In essence, some Hispanic students could benefit from lower debt levels but others could suffer because student loans are critical to their ability to afford and attend an MPU. There was no connection between the percent of Black students and student debt at MPUs. Unlike Hispanic students, Black student populations tended to be more likely to incur more debt than their White population counterparts. This finding only applies to MPUs and as such the relationship between the percent of Black students and student debt should be explored throughout other areas of higher education and perhaps more nuanced even at MPUs.

This study has shown that tuition and fees and grant aid may only help a small portion of what drives student loan consumption at MPUs. The percent of students using student loans was not significant and most likely was not a good proxy for student demand for loans. The percent of students awarded any amount of Pell grant was significant and proved to be a good indicator of financial neediness. The greater the percent of Hispanic students was strongly related to lower student levels; the percent of Black students was not. The findings and discussion presented in Chapters Four and Five help to make the case for multiple areas of future research. This will be discussed in the following section.
Avenues for Future Research

This section identifies areas for future research based on the relevant literature and findings of this study. First, the research based on institutional spending that impacts student outcomes and institutional factors that are related to student debt is very limited. The research on institutional spending and student outcomes has tended to focus on student development variables and graduation rates while largely omitting financial or economic considerations. This study is one of the first such research studies that explored how institutional spending may impact debt accumulation. Future research should focus on differing institutional types. It is very likely that the findings of this study are unique in that they only focused on MPUs. It is very unlikely that community colleges would spend on areas specifically devoted to research or that state appropriations play a significant role in private liberal arts colleges.

Future research could also benefit from examining student debt using an expanded or more nuanced variable metric. This study used a debt variable that represented the average annual federal student debt used by undergraduate students at MPUs. This variable was useful for exploring MPUs because they tend to have lower costs, and as a result, a limited need for student loans above the available federal loan limits. This may not be the case for other institutional types such as large land grant flagship institutions or prestigious private universities. Their tuition costs may exceed federal loan limits and undergraduate students may need to leverage private or institutional loans. A study that examines total average student loan usage may prove fruitful for these types of institutions.

Additional research could focus on graduate students in lieu of undergraduate student populations. There is an absence of research devoted to the factors that contribute to the debt loads carried by graduate students during and after degree completion. There are few key differences between undergraduate and graduate students in terms of how institutional spending and student debt may interact. First, the federal loan limits for graduate students are much higher than those for undergraduates. This would make any federal data on graduate student lending a more holistic variable to explore. Secondly, the funding mechanisms for graduate education tend to include funding from more diverse sources. For example, fellowships and assistantships (administrative, research, and teaching) can be major sources of funding for graduate education. It is plausible that spending in certain areas may relate to increases or decreases to funding for graduate education, which could in turn influence how much debt a graduate student population
assumes. As a graduate degree becomes more important for workforce outcomes, it is imperative for higher education researchers to begin examining the multitude of factors that impact their debt loads including institutional spending.

Finally, there would be value in reexamining this study or a similar study through the theoretical lens of Bowen’s (1980) Revenue Theory of Costs. It was clear the expenditure categories within this study were varied in terms of the outcomes associated with spending patterns of the six-year period that was examined. The statistically significant findings within this study imply that MPUs may be engaging in spending patterns designed to increase their academic profile and prestige. As such, future research should explore the relationship between institutional spending and student debt with a more critical lens such as the Revenue Theory of Costs.

**Conclusion**

This study answered seven research questions that related to relationships between institutional spending on instruction, student services, institutional support (central administration), auxiliary services, research, academic support, operation of maintenance and plant (OMP) and average annual federal student debt through an econometric analysis. Previous researchers have explored the relationship between student outcomes and functional expenditure categories in a similar manner to this dissertation (Gansemer-Topf & Schuh, 2006; Pike et al., 2011; Pike et al., 2006; Ryan, 2005; Smart et al., 2002; Smart & Toutkoushian’s, 2001; Titus, 2006). This dissertation, however, has filled a gap in the literature related to research pertaining to student debt and how higher education spending may affect student outcomes.

The first four expenditure categories showed no relationship with student debt. This was not particularly surprising, based on prior research. Moreover, that only a few categories related to this dissertation’s student outcome and only held a modest relationship. Similar research has tended to find a limited and modest connection between spending and student outcomes. This dissertation has shown that spending increases on research and academic support are related to modest student debt decreases. This finding was surprising in that it was in direct opposition to the assumptions of the theoretical framework imposed by this study and the implications of prior theory. Conversely this study found that increases to spending on OMP were related to increases in student debt at MPUs.
Multiple theories were offered to better explain these relationships. A compelling argument was made that the relationship between MPU spending and student debt could be partially explained by administrators at MPUs spending to increase their profile and academic prestige. This in turn, could mean that MPUs are attracting less financially need students.

In addition to investigating higher education expenditures, this study sought to add to the research literature on institutional factors that may help explain student debt consumption. The number of full-time equivalent students showed a negative relationship to student debt. In terms of financial aid variables, only the percent of students receiving the Pell grant was a statistically significant indicator. This aligns with prior research on the topic. Finally, the percent of students that identify as Hispanic was also a statistically significant control for student debt consumption.

In closing, this study sought to examine if and to what extent institutional spending within MPUs impact student debt use. Students are increasingly asked to carry large debt loads as they complete their college degrees with increasingly significant negative consequences. As policymakers look to enact measures to contain or reduce the debt burdens of students, it is critically important to know what role the institutions play. Both literature on institutional expenditures and institutional factors that contribute to student debt use are limited. This study sought to add to this body of literature to further help future researchers and policymakers understand more pieces of the student debt puzzle and how higher education spending may be related to student outcomes. This dissertation also sought to fill in these gaps and bring to light an institutional type that is often overlooked within higher education research.
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