2023

The Effect of Public Budgeting Decisions and Tuition Costs on Student Graduation Outcomes in Michigan

Travis Charles Hadden
Walden University

Walden University

College of Health Sciences and Public Policy

This is to certify that the doctoral dissertation by

Travis Hadden

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Shawn Gillen, Committee Chairperson,
Public Policy and Administration Faculty

Dr. Linda Sundstrom, Committee Member,
Public Policy and Administration Faculty

Dr. Olivia Yu, University Reviewer,
Public Policy and Administration Faculty

Chief Academic Officer and Provost
Sue Subocz, Ph.D.

Walden University
2023

Abstract

The Effect of Public Budgeting Decisions and Tuition Costs on Student Graduation Outcomes in Michigan

by

Travis Hadden

MBA, Baker College, 2012

BBA, Baker College, 2009

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Public Policy and Administration

Walden University

February 2023

Abstract

Tuition costs for U.S. public universities have steadily risen in response to decreased state funding in the aftermath of the 2008 Great Recession. Researchers have studied the relationship between public budgeting and higher education but have not established the direct effects of budgeting decisions on student graduation outcomes. The purpose of this quantitative study was to understand why state funding has not kept up with tuition prices and how that affects student graduation rates. The effect of (a) tuition costs and (b) Michigan state funding for public universities on student outcomes was examined. Punctuated equilibrium theory and policy feedback theory, which accounted for periods of stability and instability in financing decisions and radical changes over time, was the theoretical framework. The study featured a retrospective design with secondary data collection. Graduation rates data were collected from IPEDS and state funding and tuition cost data were collected from the Michigan House Fiscal Agency from 2004 to 2021. Two simple linear regressions and one multiple regression were used to analyze the data. Study results indicated that graduation rates increased for every $1 million the state of Michigan spent on public universities and for every $100 a Michigan public university student spent on tuition. The evidence from the study may be useful to state policy makers in allocating the correct amount of public funding for public universities. Appropriate budgeting decisions may bolster student graduation outcomes and subsequent earnings as well as spur statewide economic growth resulting in positive social change.

The Effect of Public Budgeting Decisions and Tuition Costs on Student Graduation Outcomes in Michigan

by

Travis Hadden

MBA, Baker College, 2012

BBA, Baker College, 2009

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Public Policy and Administration

Walden University

February 2023

Dedication

This research effort is dedicated to my family. First, I would like to thank my parents, Charles and Sally Hadden. Second, I would like to thank my aunt, Holly Baldwin. Third, I would like to thank my uncle, Robert Radoye. Find peace in eternal rest.

Thank you.

Acknowledgments

I want to thank the Walden University faculty, library staff, and student success team. I am grateful to my faculty chairperson, Dr. Shawn Gillen, and my second committee member, Dr. Linda-Marie Sundstrom. I want to express gratitude to Dr. La Toya Johnson and Dr. Zin Htway for helping me along the way.

Thank you.

Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction to the Study

In the aftermath of the Great Recession of 2008, lawmakers in all 50 U.S. states decreased state funding for higher education (Weiler & Kiracofe, 2020). Data from 2020 show that funding levels were not yet comparable to those before the recession (Weiler & Kiracofe, 2020). The effect of these funding decisions on state economic health and student outcomes merits investigation. Although several researchers have studied the public budgeting of higher education (Burke & Serban, 1997), they have not yet examined the effects of state funding, student costs, and their effects on graduation rates, according to my review of the literature.

In this quantitative analysis, I examined whether decreases in higher education funding to Michigan public universities and increases in tuition affect student performance. Punctuated equilibrium theory (PET) and policy feedback theory informed the development of the research questions (RQs) and hypotheses and study variables. I sought to understand the short- and long-term effects of decreased state funding of public universities on the state of Michigan and its students.

Specifically, I focused on how budgetary changes affect organizational performance. Positive social change may come from understanding how state funding and tuition costs affect graduation rates at public universities. Increased graduation rates lead to higher incomes, some research shows (Cantor et al., 2018). Graduates of universities also vote and volunteer at higher rates than nongraduates (Cantor et al., 2018). I provide an overview of the study in this chapter. The overview includes background information, the problem and purpose of the study, the RQs and hypotheses,

and overviews of the theoretical framework and nature of the study. I also define key terms and discuss the assumptions, scope and delimitations, limitations, and potential significance of the study.

Background

To understand how the 2008 Great Recession affected higher education in the United States looking at state funding cuts and tuition increases will demonstrate how higher education has changed in the last 20 years. In the United States, higher education has been defunded and commoditized as a matter of policy (Carlson, 2020). State funding has decreased, and tuition has increased turning American higher education into a product. Weiler and Kiracofe (2020) found that all U.S. states reduced state funding for higher education after the 2008 Great Recession. The authors asserted in 2020 that state funding increases were needed to provide public kindergarten to Grade 12 and higher education with the required resources to return to comparable funding levels to those before the Great Recession. Flink (2017) suggested using PET to examine how policy changes public budgeting for public universities. As a theory, PET affirms that policy is slow to change but can rapidly shift (Flink, 2017). Changes in state budgets were incremental, but a phenomenon like a recession can have an immediate effect.

Researchers have extensively explored the public budgeting of higher education. However, research that is specifically focused on Michigan universities and state funding is lacking, according to my review of the literature. I cannot find studies on the combined effect of state funding and student costs on graduation rates. I found no measurement of public financing of secondary education in Michigan and student-borne costs in the

literature. Leaders in all 50 state budgets had to cut spending after the 2008 Great Recession (Weiler & Kiracofe, 2020), including Michigan Governor Jennifer Granholm, who cut funding from Michigan's public universities in 2009 (Olson, 2009). The 2004 to 2021 data collection time frame in this study included the Great Recession and its aftermath, which allowed for analysis of its effects. The recession lasted 18 months officially ending in 2009, however the effects were felt through 2013 (Danziger, 2013). By examining Michigan's state funding of public universities and the subsequent effect on students, I sought to provide insight on how state funding and tuition costs influence graduation rates.

Problem Statement

Michigan's public funding for public universities has decreased over several years due to low enrollments and increased retirement costs, and the short- and long-term effects on the state of Michigan is unknown (Geier, 2018, 2020; Weiler & Kiracofe, 2020). In this study, I investigated the effects of reduced funding of public universities on student performance. Carlson (2020) pointed out that the defunding of higher education has coincided with its commoditization. Higher education in the United States has become a product, with its students seen as customers.

As Weiler and Kiracofe (2020) noted, state legislators decreased public funding of higher education after the 2008 Great Recession. In 2009, Governor Jennifer Granholm reduced the 2009–2010 higher education budget in Michigan by 3.2%, for instance (Olson, 2009). According to Geier (2018), almost 10 years later, Michigan's public universities had lower enrollment rates while still bearing the burden of high retirement

costs for university employees, creating disparities between the economic supply from state funding and the economic demand that might be sought through tuition raises. A search in Thoreau, a multi-database search tool of Walden University Library, provided several articles that address this public budgeting issue. However, research that specifically focused on Michigan universities and state funding was lacking.

Purpose of the Study

The purpose of this quantitative study was to examine why Michigan state funding of public universities has not kept pace with skyrocketing tuition costs and how that affects graduation rates (see Miller et al., 2019). Limited information exists on how state funding and the student cost of attending public universities in Michigan affect graduation rates, according to my review of the literature. This study addressed the 2008 Great Recession as a state funding data point to understand the effects of cutting funding for Michigan public universities. The change in state funding and the cost of tuition were the independent variables. The difference in graduation rates was the dependent variable.

Research Questions and Hypotheses

The overarching RQ was, Were Michigan public universities' graduation rates affected by state funding and tuition costs? The supplemental RQs and hypotheses were as follows:

RQ1: Does state funding affect graduation rates at Michigan public universities?

$H_0$1: State funding does not affect graduation rates at Michigan public universities.

H_a1: State funding does affect graduation rates at Michigan public universities.

RQ2: Does tuition cost affect graduation rates at Michigan public universities?

$H_0$2: Tuition cost does not affect graduation rates at Michigan public universities.

H_a2: Tuition cost does affect graduation rates at Michigan public universities.

RQ3: Do state funding and tuition cost affect graduation rates at Michigan public universities?

$H_0$3: State funding and tuition cost do not affect graduation rates at Michigan public universities.

H_a3: State funding and tuition cost do affect graduation rates at Michigan public universities.

Theoretical Framework

The theories that grounded this research included Baumgartner and Jones's (1993) PET and Flink's (2018) policy feedback. Baumgartner and Jones developed PET in the early 1990s to account for the policy process (Baumgartner et al., 2014). Baumgartner et al. explored PET through the lens of how significant policy changes shift away from existing policy and what that meant for institutional outcomes. PET allows for large-scale public policy and budgeting changes when the public becomes aware of existing problems. The policy process traditionally comprises conditions of stability and instability, and PET accounts for both.

According to Flink (2017), PET demonstrates how policy is typically slow to change but can rapidly change during a crisis. PET was well suited for this research because it explicitly addresses public budgeting decisions throughout the policy process. Through the lens of PET, I was able to explain how the 2008 Great Recession created

rapid policy change for higher education funding in Michigan's state budget. U.S. institutions compounded the effects of budget punctuations because special interests tend to control policy direction (Baumgartner et al., 2014).

Baumgartner et al. (2014) found an intersection between political institutions and administrative decision-making that motivates budgetary change. Special interests play a prominent role in whether a policy agenda is stifled and remains in stasis. Government spending in the United States has increased dramatically since World War II. National budgets have also observed several punctuations after World War II. Schattschneider suggested that political systems favor the status quo instead of significant shifts in policy making (Schattschneider, 1960, as cited in Baumgartner et al., 2014). However, Baumgartner and Jones (1993) contended that policy making combines both moments of sustaining the status quo and moments of legislating significant transitions. This view is similar to budget incrementalism and budget punctuations. The theoretical framework consists of PET and policy feedback theory to understand how budget punctuations affect Michigan public universities outcomes.

Nature of the Study

To address the RQs in this quantitative study, I performed two linear regressions and a multiple regression analysis (see Van Der Merwe & Zidek, 1980). The two linear regressions assessed how state funding and tuition cost affected graduation rates. The multiple regression analysis allowed for an objective determination of whether a percentage change in state funding and student costs affected graduation rates over time. I

obtained secondary data from the House Fiscal Agency in Michigan. I required data on state funding, graduation rates, and tuition costs for 2004 through 2021.

Definitions

Graduation rates: Degrees conferred.

Institutional friction: A state that occurs when an organization's institutional policy process turns inputs into outputs, creating friction and causing small changes and eventually leading to more extensive punctuation (Flink, 2018).

Multiple regression analysis: The method used to establish a linear regression relationship between multiple independent variables in a data set (Leard Statistics, n.d).

Organizational performance: Graduation rates at Michigan public universities.

Policy feedback: A public administration theory that measures organizational performance (Flink, 2018).

Public budgeting: U.S. government funding at the federal, state, and local level and how that funding is determined via the law, the policy process, and bureaucracy (Willoughby, 2014).

Punctuated equilibrium theory (*PET*): A theory that addresses public budgeting decisions throughout the policy process (Flink, 2017).

Student cost: Tuition cost and fees.

Assumptions

The assumptions in this study reference the constraints necessary to conduct my research. I made the assumptions without relying on similar assumptions in peer-reviewed articles or other source materials. To my knowledge, secondary data concerning

state funding, student cost, and graduation rates were readily available and easy to access because of the public nature of these higher education institutions. Collecting secondary data was essential to meet the time frame of my study, which was limited. In this study, I assumed that graduation rates represent organizational performance. I did not assume that I could generalize the results of this study elsewhere. Another assumption was that the validity and reliability of the data were not affected by population size even when Michigan public universities of different sizes were used.

This study included both primary and secondary data. However, for this study, only data from public secondary sources were available. I sought multiple sources for that data, but not all data had multiple sources. Where multiple sources were available, I was able to determine which data best represented the variables. I located public data from the Michigan House Fiscal Agency and the Integrated Postsecondary Education Data System (IPEDS). IPEDS reported graduation rates as percentages. The Michigan House Fiscal Agency reported state funding and tuition cost. In this instance, I assumed that state funding and tuition data from the Michigan House Fiscal Agency and graduation rates data from IPEDS showcased the most representative data values.

When data were missing, I tried other methods of communication to retrieve it. Other data were only accessible through Michigan's senior fiscal analyst. The data estimates came from one state, the state of Michigan. The data collected came only from Michigan's 15 largest public universities. There were several small community colleges and private universities whose data were not collected for this study. Some data analysis used in this dissertation relied on models.

I made assumptions when deciding what data to use to calculate inputs and outputs for this study. The methodological assumption for a simple linear regression is that there needs to be one independent variable and one dependent variable with a linear relationship (IBM Corp, 2020). The methodological assumption for a multiple linear regression is that there needs to be one continuous dependent variable with two or more independent variables showing a linear relationship (IBM Corp, 2020). My first two RQs required a simple linear regression, while my third RQ required a multiple linear regression. The data collected for this study was designed to provide statistical information on the relationships between state funding and tuition costs at Michigan public universities and their effects on graduation rates. For the analysis, I used only publicly available, published data. These assumptions were made to improve the timeliness of the study and improve accessibility to the data. The assumptions also contributed to the research effort being able to move forward.

Scope and Delimitations

In this study, I used secondary data from Michigan's public universities to assess the effect, if any, of state budget cuts on student outcomes. This study included 15 public universities in Michigan to test the independent variables against the dependent variable. The independent (predictor) variables were tuition and state funding and the dependent variable, graduation rates. The data collected were restricted to 20 years, from 2004 to 2021, to include the 2008 Great Recession. The sample was restricted to public universities in the state of Michigan. Private universities and for-profit universities were excluded from the sample. I did not analyze any other state's university systems, even

though all states cut their higher education budgets during the Great Recession (Weiler & Kiracofe, 2020).

Limitations

The primary limitations for internal validity were data selection, methodology, and a change in variables. According to Baumgartner et al. (2014), PET has limitations, including linear predictions. Linear predictions fail because they cannot handle periods of punctuation without periods of equilibrium. Another limitation occurs when a researcher tries to move backward from periods of significant punctuation with periods of stasis. Access to secondary data was also a concern. A potential concern of secondary data is that data access may include a partner-site agreement and need an external ethics review. Speaking with Walden's external institutional review board (IRB) was necessary to complete the study. However, I used public government data, which did not have a partner-site agreement, making it easier to get through Walden University's formal IRB process.

A major limitation of this study is that it is not generalizable. It applies only to the state of Michigan. There were no primary data for this study, whereas there were multiple sources of secondary data that address my RQs and most of my variables. Discerning which data were most effective and provided the most accurate results may have unintentionally posed a limitation. This could have affected the time required to complete the study. There was also a need to address a year of missing data during data collection. IPEDS did not have graduation rates data for the year 2021. In 2020 Covid was a limitation for data collection and affected enrollment and graduation rates.

Significance

In conducting this study, I wanted to address the gap in understanding the explicit connection between Michigan's state funding and tuition costs of public universities and their effect on graduation rates. The research results present public administrators with evidence that they may be able to use to allocate the correct amount of public funding for Michigan's public universities. Increases in graduation rates create social and economic change by increasing income potentials. According to Cantor et al. (2018), students with bachelor's degrees earn more money over time than those with a high school diploma. Graduates also vote, volunteer, and contribute economically to their respective states.

Significance for Existing Theory

Baumgartner and Jones (1993) and Baumgartner et al. (2014) found that significant policy change and significant budget change rarely occur. The researchers discovered that most policy changes and budget changes were incremental and in favor of the status quo. Sometimes, a large economic punctuation occurs, showing an above normal positive leptokurtic distribution. A leptokurtic distribution differs from a normal distribution, in that leptokurtic distributions have a kurtosis value above three (Desmarais, 2019). Leptokurtic policy changes are irregular distributions (Desmarais, 2019). I sought to contribute to the PET literature by expanding Flink's (2018) budgetary and performance change variables. Flink researched standardized test scores in Texas to determine performance change. In this study, I used Michigan public university graduation rates to understand student outcomes. A quantitative analysis of budget inputs and performance outputs may improve comprehension of policy-making effects on

student outcomes. It may also clarify the real-world effect of policy makers' changes to state budgets. My review of the literature indicated that varying budgets in general do not affect organizational performance, but no studies include the specific variables used in this study (Flink, 2018). This retroactive study was necessary to expand the PET literature and research on education financial policy.

Significance for Practice

This study provides an understanding of how policy makers make fiscal policy changes that affect state funding of Michigan public universities and how those changes affect student outcomes. If changes to state budgets increase tuition costs and lower graduation rates, policy makers may need to reevaluate their funding decisions. Evidence that policy makers did not harm performance outcomes is important reference information for future state budgeting decisions during an economic crisis.

Significance for Social Change

This study addressed the knowledge gap of the effects of budgetary change on educational performance change in Michigan public universities and student outcomes. By understanding how policy decisions, institutional friction, and budget changes affect performance, policy makers may be able to have a positive effect on student educational success. College graduates contribute to society by voting and volunteering as well as providing more advanced input into the economy (Cantor, 2018). Policy makers may be able to contribute to beneficial social outcomes by making funding decisions that result in higher graduation rates.

Summary

State funding of public universities has decreased in all U.S. states in the aftermath of the 2008 Great Recession (Weiler & Kiracofe, 2020). Michigan Governor Jennifer Granholm cut funding from her state's public universities in 2009 (Olson, 2009). Michigan's public funding for public universities has decreased over several years due to low enrollments and increased retirement costs (Geier, 2018). It is not known how reduced state funding for Michigan's public postsecondary education affects student outcomes (Geier, 2018). In this study, I addressed this gap in knowledge through quantitative analysis, specifically analyzing how state budgetary changes affect organizational performance through a PET lens. In Chapter 2, I review relevant literature on the study topic to provide justification for this research.

Chapter 2: Literature Review

In conducting this quantitative study, I aimed to understand some of the influences on student performance outcomes. I focused on economic punctuations to Michigan's state-funded universities from the lens of PET (Baumgartner & Jones, 1993). The research centered on how state budgetary changes, made in the aftermath of the 2008 Great Recession, affected Michigan public university student performance as measured by graduation rates.

Public funding of Michigan public universities has not kept up with skyrocketing student costs, and the lack of adequate public funding has had an adverse effect on graduation rates, as shown by measuring the inputs, or budgetary items, against their outputs, or student performance (Flink, 2018; Miller et al., 2019). The literature has limited information on the use of PET with public budgeting especially in the context of regression analysis as a tool for examining organizational performance (Flink, 2018). I collected data before and after the 2008 Great Recession. The percentage change in state funding and tuition cost were the independent variables, and the percentage change in graduation rates was the dependent variable.

Higher education in the United States has been defunded and commoditized as state policy. Higher education is considered commoditized because it relies on profit motive and international finance (Patnaik, 2018). State funding of U.S. public universities has decreased over several years, and the short- and long-term effects on states, including Michigan, is unknown. After the 2008 Great Recession, public administrators defunded public universities in all states (Weiler & Kiracofe, 2020). In Michigan, university

expenses like retirement pensions and administrative costs have increased the need for funding, and this has led to higher changes to student costs (Carlson, 2020; Geier, 2018).

I begin this chapter by explaining the literature search strategy, including the databases and search terms that I used to find relevant research. Baumgartner et al.'s (2014) PET was the main theory that I used for the study's theoretical framework. I explore PET in its academic application and focus on whether public budgeting affects organizational performance. In the literature review that follows, I explain the selected research variables in the context of PET and how Michigan's funding of public universities affects student performance.

Literature Search Strategy

My review of the literature revealed that more research was needed on the effects of public budgeting on organizational performance. I examined peer-reviewed journals, which revealed a lack of consensus in the literature on whether budget punctuations affect organizational performance (Flink, 2018). Continued searches provided information on the effect of punctuated economic equilibrium on public budgeting, higher education, student costs, and graduation rates. The literature review includes journal articles and books that relate to PET and public budgeting.

I searched the literature for the years 2017-2021 to maintain a focus on recent and emergent literature. To probe the origins of PET, I reviewed literature from the early 1990s and 2000s. I collected resources from several databases, including Thoreau, EBSCO Discovery Service. I accessed literature via Walden University's online resources and Google Scholar.

For keyword searches, I used individual and group terms to understand the effects of state funding of public universities and tuition costs on graduation rates. Search terms included the following: *funding or budget or spending of finance*, *budgetary change and punctuated equilibrium theory*, *organizational performance*, *Michigan*, *higher education or college or university or postsecondary or postsecondary*, *enrollment*, *recruitment*, *graduation rates*, *student cost*, *tuition cost*, *Michigan state funding gaps in the literature*, *performance change*, *budgetary change*, and *Michigan state funding of higher education.*

The original searches for my research included seminal works, including Baumgartner and Jones (1993) original work on PET. Jordan (2003) explained how punctuated equilibrium was a new theory in public administration. Jordan pointed out how large budget punctuations eventually lead back to budget equilibrium. More recently, from Flink (2018) discussed how punctuated equilibrium can be used to measure budgeting decisions, policy feedback, and organizational performance. Flink used SAT scores to measure the organizational performance of high schools and how budgetary punctuations affected those scores.

I used the keywords *Michigan* and *higher education funding* to examine how budget cuts could affect Michigan student outcomes in public universities. This yielded 302 results. After removing duplicates, I had 204 peer-reviewed studies on the subject. To narrow the results, I used search combinations including *PET and higher education*, *PET and budgetary change*, *PET and performance change*, *Michigan and student cost*, and *graduation rates and higher education in Michigan*. My inclusion criteria included that works be peer reviewed, published between 2017 and 2021, and written in English. I

eliminated duplicate results. The search results included literature on the following topics (number of articles in parentheses):

- Michigan and higher education funding (204)
- PET (84)
- PET and higher education (49)
- PET, budgetary change and performance change (seven)
- PET and public budgeting (11)
- Michigan, higher education, and student cost (96)
- graduation rates, higher education, and Michigan (55)
- public budgeting and higher education (181)

After reviewing the literature, I narrowed my sources down to 44 articles and books. Before reviewing the literature review, I discuss the theoretical foundation. I used seminal books like the academic work of Baumgartner and Jones (1993) and peer-reviewed journal articles on PET to establish the theoretical framework for the study.

Theoretical Foundation

The search for an academic tool to analyze public budgeting led me to PET. Baumgartner and Jones (1993) developed PET to better understand U.S. policy making and public budgeting. PET posits that incrementalism in political processes is the norm, with rare cases of "punctuation," or crises, that create comprehensive policy and budgeting shifts away from the status quo. PET uses policy and political processes to define issues and set agendas. Schattschneider found that policy makers were not open to new ideas in agenda-setting (Schattschneider, 1960, as cited in Baumgartner & Jones,

1993). A conflict is needed to impart substantial shifts in policy making (Baumgartner et al., 2014). PET was refined through Flink's (2017, 2018) work. I examined PET origins, refinement, theoretical hypothesis, and current application.

Baumgartner et al.'s (2014) updated conclusions, written 2 decades after the original publication, have not changed much from the 1990s. Most policy changes and budget changes occur incrementally, with large punctuations occurring only rarely. Policy making is primarily static, but political institutions force policy issues into public view, rendering significant policy change possible. Special interest groups in political institutions may control policy decisions through "policy monopolies" (2014, p. 61). PET studies have found that some budget punctuations do not affect organizational performance (Flink, 2018). PET is mainly considered a measurement of public policy making. I expanded the application of PET to public budgeting, specifically in the state funding of higher education, with graduation rates as an identifier of student outcomes. The theoretical framework was devised from seminal works as well as current PET literature. In this section, I will discuss the origins of PET and how the theory has changed over the years. I will also describe differences in application of the hypothesis.

Origins of the Punctuated Equilibrium Theory

Baumgartner and Jones's (1993) original work used punctuated equilibrium to examine several different policy-making situations. Baumgartner and Jones found that drastic change in government spending is more common than the literature would suggest. Baumgartner and Jones asked several essential questions in their seminal work, including if political institutions only served the elite and their economic interests or if

institutions provided room for political competition. PET measures periods of stability as well as periods of punctuation or change. The economic elite prosper during periods of stability but tend to lose out when large punctuations occur due to rapid political change.

Baumgartner and Jones (1993) explained how the agenda-setting model exposes policy monopolies. When political groups can no longer come to a consensus, the agenda-setting model is needed. This model has no political equilibrium but, instead, generates new ideas that will cause policy monopolies to implode. Agenda-setting creates competition among old and new policy institutions, paving the way for new policy proposals. The emergence of new policy is why policy institutions must be prepared to handle long periods of policy stasis and large, violent policy punctuations.

Although Schattschneider criticized the pluralist approach for its bias toward upper-class interests, he understood that political conflict was necessary for a healthy democracy (Schattschneider, 1960, as cited in Baumgartner & Jones, 1993). In the pluralist approach, the effects of policy discussions can be broken down into two categories: the disinterested and the interested (Baumgartner & Jones, 1993). Most people are disinterested in most policy positions. Therefore, the interested groups tend to be more successful at producing policy outcomes (Baumgartner & Jones, 1993). Interested groups create winners and losers. Once disinterested people realize they have become policy losers, they mobilize (Baumgartner & Jones, 1993). Once they mobilize, they expand the political conflict. Once the political battle is large enough to affect an institution, long-term policy change can occur.

Baumgartner and Jones (1993) explored the pluralist's idea that political mobilization will lead to countermobilization through their research but found that countermobilization is rare. Often policy makers will come up with a new policy they believe will make positive change and find no opposition. Politicos will create new institutions to implement the new policy and never receive any pushback, suggesting the theories of pluralists like Truman and Madison were wrong (Baumgartner & Jones, 1993). The new institutions, after promoting the new policy, revert to incrementalism. Through agenda-setting, the institutions were influenced by policy entrepreneurs, creating an opportunity for punctuation (Baumgartner & Jones, 1993).

Once the institutional change has occurred, all policy entrepreneurs want to create a policy monopoly (Baumgartner & Jones, 1993). Constant conflict and change in institutions were viewed as unhealthy and unproductive, so experts in these institutions create policy monopolies. Experts in policy monopolies have to convince other stakeholders that outsiders do not understand the complex technical arguments that they alone can provide for the institution to achieve equilibrium. Baumgartner and Jones (1993) provide similar real-world examples such as medical doctors who understand complex life and death issues and military officers who have an exclusive understanding of national defense. According to Baumgartner and Jones, policy monopolies have two characteristics: "First, a definable institutional structure is responsible for policy making, and that structure limits access to the policy process. Second, a powerful supporting idea is associated with the institution" (1993, p. 7). Some policy scholars argue that policy

monopolies were conservative. Baumgartner and Jones (1993) found that policy monopolies were created and destroyed, the opposite of conservatism.

When Baumgartner and Jones (1993) look at agenda-setting and equilibrium, they conclude that policy making is made up of two things: incrementalism and negative feedback. Incrementalism creates countermobilization by political outgroups who were not in power. Countermobilization is a natural way for political outgroups to protect themselves. Mobilizations have to deal with negative feedback. Institutional incrementalism maintains equilibrium, while negative feedback has a negligible effect on the institution. Both incrementalism and countermobilization suggest that these influences on policymaking were adaptive.

Baumgartner and Jones (1993) shift gears in their seminal work to focus on searching for equilibrium. The authors explain that political science is the investigation into how political preferences were born and how those preferences change real-world outcomes. Baumgartner and Jones believe all policy making reaches equilibrium. When policy making shifts institutions away from equilibrium, eventually, healthy institutions will shift back to equilibrium indefinitely. Researchers used "social choice theory and group theory and pluralism" (Baumgartner & Jones, 1993, p. 13). Baumgartner and Jones showed how these three theories led researchers to believe that politics does not always reach equilibrium, making it unpredictable. Although policy making remains somewhat stable, disequilibrium is a distinguishing feature of politics.

The researchers found that the more that political actors were involved in policy change by investing more resources into negative feedback, the less change they can

make (Baumgartner & Jones, 1993). As policy makers invest more political capital in negative feedback, some systems move away from equilibrium. However, these systems always move back to the status quo. The status quo is where positive feedback comes into play. Sometimes political action creates positive feedback. Positive feedback takes small inputs and produces large amounts of systemic change, sometimes creating exponential growth in organizations (Baumgartner & Jones, 1993). When political movements experience positive feedback, development and escalation become permanent. Positive feedback creates popular political systems, which induce rapid change. Positive feedback differs from negative feedback in that it produces non-incremental change in both politics and policy making with later periods of stability (Baumgartner & Jones, 1993).

Partial equilibrium is possible through the apathy of elite individuals (Baumgartner & Jones, 1993). However, self-interested elites can promote stability. According to Baumgartner and Jones (1993), for the most part, Americans were not concerned with public policy, which allows self-interested politicians to make considerable headway in policy making. Policy makers often share the same goals, which would enable policy change. Shared goals mean that the votes civilians make have little effect on policy making. This relationship between self-interested policy makers reinforces policy monopolies and agenda setting (Baumgartner & Jones, 1993).

In conclusion, Baumgartner and Jones (1993) found that U.S. politics is dominated by conflict and that conflict is vital for democracy. According to Baumgartner and Jones, the most important political question is “how much government?” (1993, p. 21). Today’s political right and left wings contest the role of government, disagreeing

about what government should and should not do. The role of special interests and their effect on policy is another important consideration. When politics becomes divisive and each party isolates, policy monopolies become complex and almost impossible to create. As policy monopolies become less likely, there is greater realization of public power. The same groups will not always benefit under the policy process. Depending on issues of the day, different agendas and who is in control of government decide who the policy winners and losers were (Baumgartner & Jones, 1993).

Updates to Punctuated Equilibrium Theory

Baumgartner and Jones' seminal work continues to evolve through new reviews of PET's strengths and weaknesses, new applications outside of the United States, and a new understanding of data infrastructure and subsystems (Baumgartner et al., 2018). A disadvantage of PET is that political systems cannot analyze every issue public administrators face. PET can look at multiple topics at the subsystem level. When political systems encounter significant transformations, PET shows positive feedback. However, negative feedback is the cornerstone of PET, meaning a political institution is showing stability and incrementalism (Baumgartner et al., 2018).

Hypotheses in Punctuated Equilibrium Theory

According to Baumgartner et al., "Punctuated equilibrium in policy studies applies to a particular situation—when political conflict is expanded beyond the confines of expert-dominated policy subsystems to other policymaking venues" (2014, p. 82-84). Baumgartner et al. (2014) explain the general punctuation hypothesis as driving

information into the policy making arena by examining the policy problem's effects, then fixing them.

The general punctuation hypothesis essentially takes policy inputs and turns them into policy outputs (Baumgartner et al., 2014). There were costs for turning inputs into policy outputs for both political actors and institutions. For political actors, the costs were cognitive; they locate problems and devise solutions. Institutional costs come from maintaining stasis. Baumgartner et al. (2014) provided an example of how information inputs in the U.S. Congress lead to more punctuated outputs causing leptokurtic distributions. Agenda-setting distributions should be less leptokurtic than output punctuations.

For inputs to turn into outputs, policy makers need institutional friction (Baumgartner et al., 2014). Institutional friction persuades policy makers to abandon the status quo. However, for some social movements, punctuation theory, after accounting for friction, observes that the movement is progressing too slowly to create punctuated change. Under the punctuation hypothesis, information processing selects how information is collected and disseminated in an organizational context to develop public policy (Baumgartner et al., 2014). Controlling the information flow from the outside world to the policy institutions is important to ensure there is no overwhelming or underwhelming response to information flow.

This next section focuses on how Baumgartner et al.'s (2014) punctuation hypothesis has morphed into Flink's (2018) PET research hypothesis. Flink's work advanced the PET literature by creating a hypothesis that analyzed how friction in policy

affects organizational outcomes. Flink wanted to understand how policy-making decisions affect policy and organizational performance. Flink looked at the distributions of performance change and compared them to that of budgetary change.

According to Flink (2018), the analysis of budget change effects on institutional performance change required a multivariate regression analysis. Flink's research had seven different hypotheses. The first looked at institutional friction and leptokurtic distributions. The second hypothesis tested how budgetary change related to performance change. In hypotheses three through seven, budgetary change related to performance change through three different budgetary change sizes: small, medium, and large. Flink's study, like Baumgartner et al.'s (2014) punctuation hypothesis, analyzed inputs and outputs. Flink (2018) changed the input to budgetary change and the output to organizational performance.

Literature Related to Key Variables and/or Concepts

The literature highlights the importance of budgetary changes and performance changes when used with Baumgartner and Jones's (1993) PET. State funding of higher education and its effects on organizational performance, in this case, graduation rates, were not found in the PET literature. However, Flink's and Li's (2017) research did examine punctuated equilibrium, education, and institutional performance outcomes. The works included in this section do not include all works encompassing the research topic. The selected articles support the purpose of my research endeavor.

Budgetary Changes, Performance Changes, and Punctuated Equilibrium Theory

This section will explore how budgetary and performance changes apply to Baumgartner and Jones's (1993) PET. In government, budgets change all the time, mostly in small incremental ways, but sometimes budgets have punctuated changes; PET measures both (Flink, 2018). Flink asserted that public administrators must focus on sustaining organizational performance regardless of budgetary changes. If administrators have fewer resources, they have to do more with less. Jordan (2003) suggested most budgetary changes were incremental or in a state of equilibrium, while significant changes or punctuations create environmental instability. To research how punctuated budgetary changes affect organizational performance, I looked at organizational history, institutional friction, policy feedback, and endogenous organizational change (Flink, 2018). Flink (2018) found little information on policy changes affecting organizational outcomes in the literature.

When discussing PET, the distribution of budget changes must be compared to the distribution of performance changes for analysis. Flink (2018) explained that this methodology is the best way to understand how budgets affect organizational performance. Through Jordan's research (2003), PET determined individuals and incremental budgetary change have limited ability to deploy information in a way to affect organizational performance. Public administrators cannot process all budgetary problems without prioritizing specific parts of the policy agenda. The distributions of budget changes were the inputs in a multivariate analysis, while the distributions of performance changes were the output. My study will focus on the economic causes of

budget punctuations and performance outcomes, not only incremental budgetary changes (Flink, 2018).

This next section includes research on budgetary change, performance change, and PET to measure institutional friction, environmental friction, and performance gaps. In punctuated studies, budgets were outputs (Flink, 2018). However, Flink later explained that while punctuated studies consider budgets to be outputs in the budgetary literature, budgets also work as inputs in the analysis of governments and other organizations. Flink's (2017) study showed that the fiscal process could address organizational issues. Flink's study indicated policy feedback and endogenous organizational change influence fiscal change. Resource fluctuations have changed how institutions function, but organizational performance is expected even when budget fluctuations occur (Flink, 2017, 2018).

Flink (2017) showed that institutional friction influences budgetary fluctuations. Flink (2018) provided evidence that government institutions maintain their performance and productivity when there were disruptions in financial resources. Institutional friction measures the bureaucratic policy process. There was little to no information on institutional friction and policy consequences affecting institutional subsystems and policy outcomes until the introduction of PET. There is a connection between financial means and organizational output and how budgetary policy processes affect citizens (Flink, 2017, 2018). According to evidence within the budgetary control hypothesis, Flink (2018) suggested that changes in financial resources affect performance. The

budgetary control hypothesis provided evidence that states use budgets to gain political control.

Both of Flink's punctuated equilibrium studies used public education as the background for data collection. In 2017, Flink researched Texas school districts to examine their budgetary and performance data. In the 2017 study, budgetary measurement was Flink's dependent variable. Texas school districts were used in Flink's 2018 study, but with organizational performance as the dependent variable. Flink (2018) measured the percent of students who achieved 1110 scores or higher on the SAT or the ACT equivalent as the performance output. The data were collected from 1,200 school districts between the years 1993 and 2010.

Flink (2018) concluded organizational performance is a significant management concern. Using the results of cognitive testing in Texas school districts, Flink found organizational performance was affected less by institutional friction and more by budgetary changes. However, financial resources fluctuate more than organizational performance, giving organizations hope to stabilize performance outcomes when budgetary fluctuations occur. Flink's 2017 study indicates Texas school districts with low standardized test scores and high teacher turnover led to decreased budgets for educational instruction, with institutional friction causing policy change. Flink (2017) concluded the budgetary process helps decision-makers address bureaucratic matters through understanding the policy process.

Flink (2018) pointed out the public administration literature has a number of studies showing school variables affect performance levels. There is a gap in the

literature when it comes to examining school variables and their effects on performance changes. Flink's (2018) study introduced research on positive and negative punctuations on budgetary changes. Future works must consider that the effect of budgetary changes on performance changes may not show up for over a year, so having a long period of data collection is essential.

In recent research, PET is used to explore all distributions of incremental budgetary change and specific punctuations in budgetary change distributions that occur within a particular time frame (Flink & Robinson, 2020). PET is used to look at the effects of federal, state, and local budgetary changes. According to Li (2017), state funding dropped 23% per student after the Great Recession. This decrease in state funding per full-time student indicated a significant budget punctuation. The time frame in which the punctuation occurred was between 2007 and 2012.

The Great Recession led to higher accountability standards for public higher education (Li, 2017). Taxpayers want to know where their dollars were going and how they were used. This accountability results in difficult decisions for public college administrators when budgetary change occurs, as the taxpayer may expect to see similar organizational outcomes regardless of budgetary changes. Flink and Robinson (2020) contended that large budget punctuations lead to more frequent punctuations over time, meaning administrators should be prepared to maintain performance during dramatic changes in funding.

The Texas school district example explored two types of budget punctuations, negative and positive (Flink, 2018). The inclusion of both negative and positive

punctuation added to the available methodological uses of PET in the literature (Flink & Robinson, 2020). A general rule is that negative punctuation follows positive punctuation. For example, a budget increase will likely occur within 1 to 2 years after a budget decrease. Negative and positive budget punctuations occur in pairs. However, when a budget decreases, or is negative, and increases, or turns positive, it never recovers the entire amount of the decrease (Flink & Robinson, 2020).

Policy incrementalism in connection to the study of budgets has its critics (Flink & Robinson, 2020). Budgets were a result of compromise. During a compromise, two parties come together, and sort out their differences, which means budget punctuations were rare, and incrementalism becomes the norm, leaving those looking for more extraordinary policy and budget change at risk of destroying hard-fought coalitions. Li (2017) pointed out that previous allocations determine incremental budgets. That means politicians have to assess whether limited resources allow for new budgeting strategies because it is easier to rely on the status quo of old budget allocations.

Other than Medicare, higher education budgets experience the highest budget punctuations (Li, 2017). When state budgets have excess funding, higher education obtains a disproportionately high level of funding. The opposite happens when states have fewer appropriations, leading to more significant budget cuts. A distributional analysis methodology was used to test these budget punctuation hypotheses (Flink & Robinson, 2020). A distributional analysis measures I-Kurtosis and L-Kurtosis. This methodology underpins the budget analysis of U.S. states both in practice and in the literature. Institutional friction and organizational professionalism affect budgetary

change. An example of endogenous organizational change is personnel change. An example of policy feedback is organizational performance.

Flink and Robinson (2020) found that positive budget punctuations indicate budget increases and positive punctuations, while negative punctuations indicate significant budget decreases. Li's (2017) research looked at higher education budget cuts and found the higher education sector operates with tight budget constraints. The health of the state budget affects the allocation to higher education. When the state budget is unwell, the negative budget punctuation affects allocations to higher education.

According to Zhang et al. (2017), revolutionary periods in organizations cause punctuated performance change in the literature. However, the recent literature does not demonstrate how this applies to budgeting for organizations. Flink (2019) argued that employers and policy makers judge their managers using organizational performance, contradicting Zhang. The citizenry evaluates politicians by organizational performance. Policy feedback shows organizational performance punctuations contribute to changing budgets. Bad policy feedback or performance gaps were a good determiner of how an organization performs exclusive of considerations of institutional friction, organizational history, and endogenous organizational change.

Recent Applications of Punctuated Equilibrium Theory

The last section examined the cross-sections between budgetary change, performance change and incrementalism, as well as institutional friction and endogenous organizational change, in the context of education. This section covers the different applications of PET with a wider scope. The PET literature includes a discussion of

applications outside of the United States and in different academic disciplines like paleobiology and deep learning. While these studies have nothing to do with state funding and the student cost of higher education, these studies show that similar principles apply to various topics. Baumgartner et al. (2017) wanted to expand the use of PET by introducing variables and concepts not found in the PET literature. However, the use of PET as the theoretical foundation tied this study to these new applications outside of higher education by focusing on budget inputs and performance outputs. The main difference between this study and those of organizations outside of the U.S. is the different styles of government. The U.S. is a democratic nation. Other nations may be authoritarian regimes with little institutional friction (Baumgartner et al., 2017). Institutional friction is the main contributor to macro and subsystem change in democracies (Baumgartner et al., 2014).

Baumgartner et al. (2017) indicated that it is important to push PET applications beyond democratic governments to see how they function in authoritarian regimes. Baumgartner et al. applied the theory to governments in Brazil, Turkey, Malta, and Russia. Baumgartner et al. (2017) found authoritarian regimes were centralized to a higher degree than democracies. Centralized authoritarian regimes do not experience institutional friction. Sebok and Berki (2017) found Hungarian budget punctuations were not a result of the political environment, business cycle, or fiscal cycle, but instead reflect the policy decisions towards total outlays or large one-time debt payments. Sebok and Berki indicated that they used Baumgartner and Jones's (1993) work to analyze incremental budgetary change in combination with punctuated equilibrium to understand

large-scale budget changes. The authors thought that combining hypotheses would generate the best outcomes for their study.

Sebok and Berki (2017) broke down their variables into policy domains. For example, the authors chose categories like macroeconomics and government operations. Sebok and Berki applied these variables to a post-transition Hungary, from an authoritarian model to a democratic one. Sebok and Berki concluded that incrementalism was the norm; however, specific policy areas would demonstrate significant budget punctuations. Baumgartner et al. (2017) concluded that authoritarian regimes had even more pronounced punctuations than western democracies because of how authoritarian policy makers interpret policy change. Baumgartner wanted to continue to look at authoritarian regimes and how their economic, political, and social climates affect budgeting.

PET is used across a large number of academic disciplines. Public budgeting studies used the theory most frequently. While social sciences made up most PET literature, hard science and evolutionary theory made original use of punctuated equilibrium.

Shockley (2020) addressed how policy entrepreneurs use their political and lobbying abilities to attain a particular budgetary outcome. Shockley's research applied Baumgartner and Jones's (1993) study on PET and policy entrepreneurship to paleobiology. Paleobiology can be considered one of the earliest manifestations of PET. Shockley found that paleobiology has had significant punctuations brought on by the

nature of evolution, whereas the policy arena has not. Shockley believed that more policy entrepreneurship could change that.

Cho and Jung (2018) demonstrated how the institutional model of PET applied to the South Korean Sewol Ferry Disaster. The Korean researchers used PET to understand the connection between punctuated events like the Sewol Ferry Disaster and public budgets. The researchers used Google Trends as a tool to see how much public attention the ferry disaster received. Cho and Jung (2018) concluded more punctuations occurred after the Sewol Ferry Disaster because it collapsed the policy monopoly. Once the policy monopoly collapsed, the punctuations caused positive policy feedback. Cho and Jung (2018) and Shockley (2020) agree that intervention is needed for punctuations to occur but suggest different interventions create social change. Cho and Jung (2018) suggested public pressure, while Shockley (2020) urged policy entrepreneurship and lobbying efforts. While the Sewol Ferry Disaster and paleobiology seem to have nothing to do with each other, both studies suggested interventions were needed to understand punctuations in the policy process.

According to Rychert and Wilkins (2018), New Zealand's parliament used PET to understand the effects of a policy change regarding the prohibition of psychoactive substances. Rychert and Wilkins (2018) assessed how policy entrepreneurs, politicians, and legal advisors make changes to the regulatory environment. Kuhlmann and van der Heijden (2018) also used PET to analyze policy change. Specifically, the researchers analyzed Baumgartner and Jones's (1993) empirical work to create a meta-analysis of policy change in different geographic regions. Rychert and Wilkins (2018) looked at how

PET differed in use between the United States' federalist system and New Zealand's parliamentary system. Due to New Zealand's openness and citizen participation, PET was deemed appropriate for analyzing changes to drug policy. Kuhlmann and van der Heijden (2018) used the PRISMA reporting system to synthesize literature reviews on the policy process. PRISMA stands for "Preferred Reporting Items for Systematic Reviews and Meta-Analysis" (2018, p. 330). Kuhlmann and Heijden found that most PET studies have been conducted in English-speaking countries, indicating a need to expand PET studies outside of Western democracies. The researchers also suggested that most PET studies were quantitative, accounting for 48% of all studies completed, while 42% were qualitative, meaning there is a split between PET methodologies.

There were two industries that most would be surprised to learn were associated with PET: the tobacco industry and deep learning in computer science. According to Vannoni (2019), tobacco industry researchers use PET to observe policy punctuations due to negative feedback. Tobacco policy advances studies of PET because policy shifts tend to vary from long incremental changes to short, drastic punctuations with substantial change. Hegelich (2017) concurred that deep learning and PET work together. Deep learning helps researchers understand PET through inputs and outputs. Hegelich pointed out that political systems function as inputs, and budget changes function as outputs. Both authors ground their work in Baumgartner and Jones's (1993) PET. Vannoni (2019) concluded that taxation and smoking regulations shift based on major punctuations. Hegelich (2017) found that most political scientists do not have the tools to analyze the

policy as profoundly as deep learning can. Deep learning cannot improve PET itself, but it can compute variables to better predictions.

Unlike the quantitative examinations I have researched, Sharp's (2019) research used a mixed-methods methodology to examine how U.S. presidents and war affect defense spending. The researcher suggested that for a military budget to have punctuation, war policy must shift, or there must be a presidential transition. Both of these changes facilitate policy shifts by making great changes to the subsystem. Subsystem change is a core piece of PET. Sharp's research looks at four defense spending punctuations that occurred after 1950: "Truman's Korean War buildup, Eisenhower's post-Korean War drawdown, Kennedy's peacetime civil defense buildup, and Bush I's post-Gulf War, post-Cold War drawdown" (Sharp, 2019, p. 367). Sharp's research analyzed percentage change, spending, and positive kurtosis. Sharp found defense spending cyclical, not driven by percentage change. I am using percentage change in my research to decide whether or not budget inputs change performance outputs. Sharp did not find percentage change applicable in his study. Therefore, my research could add to the existing literature.

Yu and Xue's (2019) investigation used a case study to understand the relationship between the evolution of the regime complex and global governance using PET. Guragain and Lim's (2019) exploration of Nepalese budget patterns through time series analysis showed budget appropriation comprises incrementalism and budget punctuations, in alignment with the literature. Yu and Xue's (2019) work consisted of an experiment that applies evolutionary dynamics to regime change. Their research added to

the literature by recognizing that the nature of regime change over time had not been appropriately explored. According to Yu and Xue, a regime complex is "classically defined as an array of partially overlapping and nonhierarchical institutions governing a particular issue area" (2019, p. 646). Using DNA, the researchers explored how evolution affects the regime complex. Global governance regulation can affect the regime complex. Yu and Xue concluded that DNA does contribute to regime complex and global governance change, just like wars and economic catastrophes.

Guragain and Lim (2019) conducted an empirical experiment on Nepalese budget appropriations to test hypotheses surrounding incremental change and punctuated equilibrium to advance the PET literature. The Nepalese parliamentary system controls the budgetary process. Members of the legislature cannot propose tax or budget appropriations; only the finance minister is allowed. Guragain and Lim use Baumgartner and Jones's (1993) research to ground their research theoretically. Guragain and Lim looked at data from 1990 to 2017, finding that political instability is a dominant factor in budget appropriations because of a shared power struggle. Guragain and Lim concluded that Nepal has a fragile government and a developing economy, which indicated a pattern of budgetary appropriations with punctuations. Budget deficits lead to punctuations in the Nepalese budgetary process.

Desmarais (2019) investigated PET and incrementalism in policy change. Desmarais found that the most common way to test PET, incrementalism, and policy change was by comparing means through regression analysis. Lundgren et al. (2018) analyzed international organizations (IO) using statistical analysis to see if novel data on

IOs would show punctuated equilibria. Lundgren et al.'s research showed that five IOs studied between 1980 and 2015 had policy change punctuations. Desmarais (2019) concluded that public policy outputs were static with dramatic punctuations, while policy inputs have heavy tail distributions. Desmarais found that measuring inputs can be complicated, and future theoretical work will be needed if measuring inputs is not possible. Lundgren et al. (2018) came to a similar conclusion, finding that examining IOs can be complicated when looking at policy change and PET. Social pressures on IOs cause institutional friction, often causing punctuations in response time. Lundgren et al. found that more analysis of PET and IOs is needed.

Methodology of Punctuated Equilibrium Theory

This next section has a collection of articles sharing a standard methodology relevant to my RQs and hypotheses. Each article shares a common PET methodology that provides the tools needed to complete this quantitative research study. This article search locates several sources that explain the research design needed during the application phase of this study.

Li (2017) used historical analysis to analyze the effects of significant cuts to higher education funding. Li measured performance and financing in higher education. More broadly, the researcher examined the effects of a series of predictor variables on the dependent variable. My study differs from Li's in that the researcher used a Cox proportional hazards model to measure an unrealized event. I used two simple linear regressions and one multiple regression to measure how state funding and tuition cost affect graduation rates.

Flink (2017) used a PET methodology to examine Texas school districts. Flink uses a secondary data collection method. Flink's study used publicly available secondary data on budgets, performance, and policy making. Flink's (2017) dependent variable was the percentage change in instructional spending. Flink's methodology divides the dependent variable into several categories of change. According to Flink, those categories were, "negative punctuations, medium negative punctuations, incremental changes, medium positive changes, and positive punctuations" (2017, p. 110).

More recently, Flink (2018) used the same data set from Texas school districts but changed the variables. Budgetary change and organizational performance became the independent variables. Instead of looking at instructional spending, Flink examined spending and student performance outcomes to understand whether budgeting influenced standardized test pass rates. Flink measured performance change by percentage. This study had the same variables as those in Flink's model, budget change and performance change. I examined how state budgets and tuition costs might affect student outcomes or degrees conferred. Flink (2018) conducted multivariate regression analysis. I used the same technique to analyze this study's data.

Rationale for Variable Selection

The works contained within this section demonstrate how the variable selection process for my research occurred. Baumgartner and Jones (1993) provide the PET tool for analyzing punctuations in budget inputs and outputs. Flink's (2018) research provides the tools for variable selection. Flink's research showcased how public budgeting is considered input and organizational performance is regarded as an output. Flink's study

established a new way of analyzing public budgeting and its effects on organizational performance through a quantitative analysis grounded in PET. Flink's investigation found that budgetary change is prominent, while organizational performance remained relatively the same; however, performance change is less than budgetary change. This finding indicated that funding sources were less reliable than performance outputs and point to financing as having less friction. In this instance, negative budget punctuations have less effect on organizational performance.

Flink's (2018) work added to the public administration and education literature by including performance changes. My investigation will use different variables not seen before in PET studies but represent budget inputs and performance outputs laid out by Flink's work. I will use state funding of higher education and student cost as budget change and graduation rates as performance change. Flink's research used multiple regression analysis, as will my study. Flink's study used pass rates on standardized tests as the dependent variable for the multivariate inquiry. Flink used budgetary change as the independent variable in the multivariate analysis. In my study, graduation rates will be the dependent variable, while student cost and state funding of higher education will be the independent variables. Flink's (2018) study found that organizations were adept at lessening the effect of budgetary change on organizational performance. My study will follow in the line of Flink's research, which added new data to the PET literature.

Related Studies Featuring the Dependent Variable

The following investigation will show how graduation rates were a good proxy for organizational performance. For the purpose of discussion, degree conferral and

graduation rates will be interchangeable as representative of the concept of organizational output. However, degree conferral is specifically the actual number of degrees handed out, where graduation rates were presented as overall percentages. Harmon and Bragg (2020) researched degree conferral of community college bachelor's degrees in six Great Lakes states, including Michigan. Harmon and Bragg (2020) wanted to understand how job vacancies affected degree conferral in the Great Lakes states. After looking at federal and state databases, the researchers concluded that degrees conferred matched job vacancies. Some of the job openings were in nursing, business, and software development. This research helps observe how equity gaps in bachelor's degree attainment and job openings were closing.

In contrast, Horn and Lee (2017) pursued research that looked at graduation rates at 4-year institutions to determine if statistical inputs affected institutional outputs or graduation rates. The researchers used IPEDS to collect the data. Horn and Lee used a value-added measure to predict graduation rates. Horn and Lee (2017) found that inputs created misclassifications of organizational effectiveness and ineffectiveness. SAT scores and low acceptance rates at universities allowed for misclassifications in the data.

The subsequent two studies investigated graduation success and how service learning can enhance graduation rates in the Midwest. Byrd et al. (2018) found that a dashboard for Wayne State University students that monitored their retention and graduation rates helped improve graduation rates themselves. The graduation rate for Wayne State University students was 26% before the dashboard was created. After the dashboard was implemented, the graduation rate increased to 47% (Byrd et al., 2018).

Due to this increase in graduation rates, the U.S. News and World Report selected Wayne State University to go on its list of top higher education institutions. This improvement in graduation rates showcased the organizational performance of a Michigan university and how that led to further institutional successes. Mungo's (2017) research found that service learning enhanced graduation rates and GPAs for people of color.

Mungo's (2017) study was quantitative, similar to my research. Mungo, using regression analysis, found that service learning classes improved GPA and graduation rates. Students with service learning graduated at a rate of 47.7%, while students without service learning courses only graduated at a rate of 34.4%. Yue's and Hart's (2017) research found that upper-division service learning had a more considerable effect on graduation rates than lower-division service learning. Yue's and Hart's (2017) analysis determined that undergraduate transfers benefited more from service learning than new first-year students, as assessed by graduation rates. These investigations indicate that even when the independent variable is marked as a simple intervention, graduation rates show changes in organizational performance. Student performance is thus the framework for my study, showing that budget and student cost inputs can potentially affect graduation rate outputs.

Modern predictive modeling uses a data input process to analyze performance outcomes (Gunu et al., 2017). Predictive modeling has four steps: "(1) data partitioning, (2) model building, (3) model optimization, and (4) model comparison" (p. 40). Gunu et al. researched how variable inputs affect graduation rates after 6 years of undergraduate education through predictive modeling. Jacob et al. (2017) looked at the Michigan Merit

Curriculum (MMC), a state university preparation course, to analyze student outcomes, as measured by ACT scores. The researchers concluded that only ACT scores in science improved after MMC, by 0.2 points. For students who were unprepared for MMC, MMC decreased college graduation rates. Gunu et al. (2017) also used ACT scores in math, science, English, and writing to predict student graduation outcomes. Gunu et al. concluded that predictive modeling had too many errors or variations in the data and could not prove causation between input variables and graduation outputs after 6 years.

Graduation and pass rates on examinations were the most common ways to measure student outcomes (Yatczak et al., 2021). Yatczak et al.'s study addressed the implications of student success in professional programs. In this investigation, professional programs consisted of "Clinical Laboratory Science, Occupational Therapy and Therapeutic Recreation" (p. 91). Yatczak et al. wanted to understand other ways to measure success, so the researchers used academic achievement, intrapersonal skills, and interpersonal skills to assess thriving in the professional programs. In order to understand different ways of measuring student outcomes, Yatczak et al. (2021) concluded that failing students in professional programs lacked social connections. Professional students need more coping mechanisms to deal with the pressures of continuing education, social interactions, and how faculty can facilitate that work through improved student success. McKim et al.'s (2018) study also looked at signs of student success, focusing on school-based agricultural education (SBAE) enrollment and graduation rates in science, technology, engineering, and math (STEM). The study of SBAE also used enrollment and graduation rates as variables to determine improvements in income for students.

McKim et al. (2018) concluded that SBAE enrollment improved high school graduation rates but negatively affected STEM performance outcomes. As for income, SBAE increased a high school graduate's income by $1,850.67 annually and a postsecondary graduate's income by $457.40 yearly.

These studies help reveal that collecting a variety of data to assess and improve student outcomes is essential. Haupt et al. (2018) focused their research on whether or not study abroad programs improved graduation rate outcomes. Their study analyzed graduation rates for students who participated in study abroad programs and those who did not. The researchers analyzed value-added participation using other metrics than graduation rates, as well. Haupt et al. (2018) conducted a meta-analysis to generalize the data for institutional study abroad programs. Descriptive statistics and significance testing can identify the differences in graduation rates. The researchers did not focus on program type, accommodation, and duration; Haupt et al. (2018) suggest these variables be used for further research. Haupt et al. concluded that study abroad programs should use a national databank based on the GRAD LEAP model. The GRAD LEAP model collects data to move beyond generalization to see how study abroad programs affect student success. This databank should provide institutions with the ability to understand their organization's student outcomes and what influences them.

Related Studies Featuring the Independent Variables

Flink (2018) derives the independent variables in her study from budget changes to see how they affect organizational performance. Flink (2018) used a quantitative method incorporating PET to explain policy punctuations, budget inputs, and

performance outputs. I intend on doing the same in this study. The independent variables representing budget changes in this study were student cost and state funding of Michigan public higher education. These independent variables will be measured over time to see if there is policy punctuation and how that affects institutional performance or graduation rates. The first variable described in the literature will be student cost and its relationship with higher education. Tuition cost is the total amount an undergraduate student has to pay, including tuition and fees, housing and meals, books and supplies, and personal and miscellaneous expenses (The University of Michigan, 2021).

Today, the cost of higher education is an important topic deeply connected to the contemporary student loan debt debate. McClure et al.'s (2017) investigation into college affordability at 4-year universities in the U.S. found that appropriations and subsidies for public universities were down. There was a decline of 30% in appropriations between 2000 and 2015. The second reason tuition costs were higher is that organizational costs continue to go up, which were passed on to students. Campos (2018) argued that student loan debt has exploded because of higher institutional costs and the government subsidized loan market. McClure et al. (2017) argued that the defunding of public universities after the 2008 – 2009 recession has contributed to the increased cost of higher education. Campos contradicts this point, arguing that higher education is not defunded, just state appropriations were down, agreeing with McClure et al. (2017). Funding for higher education remains flat but the funding models did not include the large expansion of new students, meaning higher costs passed on to students to support the organization in accommodating them (McClure et al., 2017). Campos' point is one of

the main reasons I decided to pursue this study on public funding and expenses related to public higher education.

When it comes to the cost of college, many Americans immediately think about student debt. Student debt often has a bad reputation, but it helps millions of Americans obtain an education to make investments in themselves (Glater, 2018). Glater (2018) found that the cost of private nonprofit 4-year education costs around $60,000, and public universities costs were close to that amount. Miller et al. (2019) found that Michigan public universities were now more expensive than ever. Michigan's public funding does not match university costs, creating tuition increases. With tuition increasing around the country, parents and students alike ask if the higher price includes a good return on investment (Glater, 2018). Hu et al.'s (2018) study examined if students who attend community colleges before attending 4-year universities save on tuition and have better outcomes and found that while there was a small amount of savings on college costs, these transfer students had a longer time-to-completion and less chance of completing their degree. The poorer outcomes for students who leave school with student debt were not a good return on investment. Glater (2018) concluded that not going to college was associated with lower incomes and that an investment in education is correlated with longer life expectancies in graduates. Longer life and higher wages for graduates were positive social changes, making the return on investment to match the tuition increase worth it.

This next section will cover the second independent variable of the state funding of Michigan public universities. State budgets change all the time. Policy makers increase

and decrease funding for public universities based on several factors. State funding can vary based on drastic changes in the economic environment, or factors as simple as shifting spending needs from one project to another. For instance, roads and infrastructure improvement might be prioritized over universities so that the budget may reallocate funds away from education to the roads. According to the Michigan House Fiscal Agency (2019), Michigan's state budget operates continuously. There is a specific process the Michigan House and Senate go through to pass a budget, including revenue estimation and appropriations. To understand how policy change affects public budgeting, Epp and Baumgartner (2017) found that the more complex the policy topic is, the more likely significant budget changes will occur. To understand this phenomenon, the researchers compared extreme changes in budgets to the whole distribution of budget changes.

According to Geier (2018), Michigan public universities have issues with funding because of lower enrollments and the high cost of retirement for university staff. Retirement costs, lower state funding, and administrative costs lead to higher tuition costs. One way to look at allocating funds for higher education is through performance funding (Li, 2020). Li (2020) used STEM degree completion to understand how performance funding affected student outcomes, using a conceptual framework of the principal-agent theory. The principal-agent theory strays away from PET. However, Li's connections between performance funding and the effect of state funding of higher education on student outcomes is essential. Geier and McCrumb (2017) directly link public funding to enrollment. Michigan public universities saw decreases in enrollment in

the years between 2014 and 2017; in 2014, there were 1.52 million students in Michigan public universities and by 2017, that number had dropped to 1.49 million. The School Aid Fund in Michigan decided in fiscal years 2014–2015 to increase public funding to community colleges and higher education by a combined $497,524,300 because of the enrollment decline. I examined how the increase or decrease in state funding may affect student outcomes.

The Need for Research on the Study Variables

My review of the public budgeting and PET literature does not include research into state funding, tuition cost, and graduation rates. However, budget change and organizational performance have been researched in with the PET framework (Flink, 2018). This study's variables fit within PET methodology associated with the study of budget inputs and performance outputs (Flink, 2018). Because the variables include only data from Michigan's public universities, the results of this analysis cannot be applied nationwide.

Flink (2017) focused only on total levels of performance and turnover within the context of understanding policy change. Flink found that policy feedback and endogenous organizational change affect budgetary changes. New research should focus on how performance changes affect policy changes. Flink (2018) explores PET through institutional and system friction, marking the first time anyone researched friction in performance. Flink (2018) suggested scholars should conduct new research on educational outcomes other than standardized tests, which led to my study focusing on higher education graduation rates.

Rationale for the Current Study

The U.S. student loan debate spurred the creation of this study's RQ. The topic of student loans and the cost of college tuition has become a daily news story often discussed by prominent policy makers. I wanted to understand if policy decisions led to increased tuition and thereby to students taking on more significant amounts of student debt. To understand policy change and how it affected tuition costs, I needed to focus on public budgeting. Eventually, looking into theoretical frameworks for policy and public budgeting, I came across the work of Baumgartner and Jones (1993). Their PET analysis led me to Flink's (2017) research into public budgeting, policy feedback, institutional friction, and performance change. Ultimately, this study does not examine student debt directly. Instead, I focused on state funding of higher education and tuition costs and how those budgetary changes affected graduation rates or performance change.

Baumgartner and Jones's (1993) and Flink's (2018) studies do not include state funding and tuition costs as independent variables, nor do they use graduation rates as the dependent variable. However, their research efforts provide the foundational work for my RQs. This study's variables address Baumgartner and Jones's (1993) concern with implementing PET in other disciplines and expanding the literature. This study's variables address Flink's (2018) worries with adding to the organizational performance change literature.

There is a large amount of research conducted worldwide addressing higher education and how policy change affects outcomes. There were a few select studies that use PET in their analysis. In Brazilian higher education punctuated equilibrium is a

public policy tool used to analyze policy changes (Brasil et al., 2017). The researchers collected data on policy changes to admissions, racial quotas, and public services. While this study does not reflect my study's variables, it does provide a model for using punctuated equilibrium to analyze higher education. Huang et al. (2018) conducted another study using punctuated equilibrium to analyze higher education policy in Taiwan. Taiwanese higher education institutions were facing a sharp decrease in enrollment. Huang et al. found that there was a policy implemented that led to overexpansion in Taiwanese higher education. The researchers wanted to understand if lifting martial law in 1987 was a trigger event for policy change that led to the education reform movement and the expansion of universities.

Miller et al. (2019) found that Michigan's public universities were more expensive than ever. Michigan's universities public funding does not match costs, creating tuition increases. I want to understand if the cuts in funding and increases in tuition change student outcomes. Geier (2018) found that Michigan universities were having issues with budget because of lower enrollments and the cost of retirement for university staff. Weiler and Kiracofe (2020) found that all states had decreased state funding of their public universities after the 2008 Great Recession. Policy decisions by state legislatures allowed this result. I want to know if the 2008 Great Recession was a trigger event for cutting state funding.

Summary and Conclusions

There is wide-ranging literature on uses of PET, including research on budget inputs and outputs, budgetary change and performance change. I narrowed the literature

by searching PET and higher education together and found there is little to no PET research on higher education funding, tuition costs, and student outcomes. In response to Baumgartner et al. (2017) and Flink (2018), who wanted to expand the PET literature, this study will introduce new variables to PET analysis and provide knowledge that can create positive social change by exploring state funding policy decisions and how they affect student outcomes.

The overall PET literature is expansive. PET originated in paleobiology (Shockley, 2020) and has been used in the social sciences in the United States to analyze budgets and policy. However, as the literature expands on the use of PET, more international studies have appeared. Studies have been conducted in Europe and Asia and with authoritarian and democratic governments (Baumgartner et al., 2017). Starting with Baumgartner and Jones's (1993) seminal work, research in PET continues through broad interdisciplinary studies. Baumgartner and Jones's (1993) seminal work provides sourcing for most of the theoretical framework for this study.

PET is a common theoretical framework in public budgeting and public policy and administration. PET's theoretical framework has been used previously as a budget input process with a performance output process. Baumgartner et al. (2014) and Flink (2018) provide the updates for the theoretical framework by changing the variables studied and changing the punctuation hypothesis to focus on budgetary change inputs and performance change outputs.

PET has served as a way to understand budget inputs and performance outputs and what causes budget punctuations. Researching the literature has provided me with

Flink's (2018) study to ground my research and incorporate the independent and dependent variables. Using Flink's variable layout of budget change and performance change, I will add to the literature by incorporating state funding, tuition cost, and graduation rate data. In Chapter 3, I will share the population, sample sizes, and the research design. Chapter 3 will give an in-depth review of how the data were collected.

Chapter 3: Research Method

The purpose of this study was to understand how state funding and tuition cost affect student graduation outcomes among state public universities in the state of Michigan. The extant literature reveals limited use of the variables I used to answer this study's RQs. Flink (2018) used budgetary change and its effect on organizational performance change to understand educational outcomes. This focus was relevant to my study.

Specifically, I wanted to understand how state funding, cut after the 2008 Great Recession (Weiler & Kiracofe, 2020) and lagging behind rising tuition costs (Miller et al. 2019), affects graduation outcomes for Michigan public universities. State funding and student cost were the independent variables. Change in graduation rates, in line with Flink's (2018) performance change outcomes, was the dependent variable.

Research Design and Rationale

This study was retrospective and involved analysis of secondary data. According to Hess (2004), retrospective studies were less desirable than prospective studies. Retrospective studies look older data, while prospective studies look at new data. However, because I compared secondary data with no participants or instruments, I deemed a retrospective design appropriate. I did not use a sample size with human participants nor did I use an instrument like a survey, just raw data looking for past patterns. There is a long history of using secondary data in social science research (Frankfort-Nachmias et al. 2014). Both Emile Durkheim and Karl Marx performed secondary data analyses, Durkheim to examine government statistics concerning suicide

and Marx to develop his theory of class struggle (Frankfort-Nachmias et al., 2014, p.263). Using secondary data enables a researcher to save time and money (Frankfort-Nachmias et al., 2014).

Generally, secondary data analysis provides a methodological benefit because the analysis can be replicable if accurate (Frankfort-Nachmias et al., 2014). In my case, the data was not replicable to other states, however my study's hypotheses and RQ's are replicable in other states. Moreover, my findings cannot be generalized beyond the state of Michigan because my research data were drawn only from the state of Michigan. The lack of a broad application is one of my study's external limitations. However, other researchers may be able to use different state-specific data sets to replicate the methodology. Another reason for using secondary data is that it expands the time frame from which the data can be collected and analyzed (Frankfort-Nachmias et al., 2014). Frankfort-Nachmias et al. (2014) found that secondary data analysis allows better measurement due to additional independent variable analysis.

I used Flink's (2018) quantitative study as a model to understand how budgetary changes affect organizational performance. Flink expanded on PET analyses of negative and positive punctuations by looking at budget inputs and performance outputs. Like Flink, I explored the consequences of performance outcomes. I examined increases and decreases in Michigan state funding and tuition cost for public universities and how that affects graduation rates. Flink (2018) measured performance through 20 years of secondary, statewide, standardized test score changes from over 1,000 schools. PET studies allow for a wide variety of methodologies and data collection strategies, including

secondary data collection. I measured graduation rate changes between 2004 and 2021 for Michigan public universities. Baumgartner and Jones's (1993) study, which originated the punctuation hypothesis, provided the PET theoretical framework for Flink's (2018) study and this study on budget input and output analysis. The data for the present study came from the Michigan House Fiscal Agency and IPEDS and included state funding data for Michigan's public universities, tuition costs and graduation rates.

Methodology

Population

The target population was Michigan's 15 public universities. The target population was a 270 data point sample size calculated with G*Power 3.1.9.7. The sample consisted of 18 years of data collection, including data on state funding, tuition cost, and graduation rates. The official sample size ended up being 255 because IPEDS did not have graduation rate data for 2021.

Sampling and Sampling Procedures

This study was retrospective and involved analysis of secondary data, not primary data. Therefore, there was no random sampling. The secondary data from the Michigan State House Fiscal Agency and IPEDS encompassed 15 Michigan public universities, with multiple data points based on 18 years of data collection for each university. Multiplying the 15 universities by 18 years equaled 270 data points. Each data point on the spreadsheet was equivalent to a sample. Pooled together for analysis, there were 270 data points for each RQ (or a 270 data point sample size). This sample size is much higher than the 55-point minimum required sample size for RQs 1 and 2 and the 68-point

minimum required sample size for RQ3. All three variables were included in publicly available data sets. State funding and tuition cost were available in the Michigan House Fiscal Agency database. Graduation rates was found in the IPEDS data center. Table 1 provides a summary of the data sources used in the study.

Table 1

Data Sources, Locations, and Participants

Variable	Data location	Type of data	Purpose of data	No. of universities	No. of years in data set	Actual sample size
State funding	Michigan House Fiscal Agency	Public secondary Data	Showcase state appropriations for each school.	15	18	270
Tuition cost	Michigan House Fiscal Agency	Public secondary Data	Illustrate how much each school costs per student.	15	18	270
Graduation rate	IPEDS	Public secondary data	Demonstrate student outcomes.	15	18	270

Note. IPEDS = Integrated Postsecondary Education Data System.

I based the minimum sample size on the a priori power analysis for a simple linear regression for RQs 1 and 2 and a multiple linear regression for RQ3. I used a medium effect size of 0.15, a .05% margin of error, and an 80% power level. The effect size was based on the averages of three studies in the literature review that featured regression analyses. Flink (2017) used a small effect size, Li (2016) used a medium effect

size, and Flink (2018) used a large effect size. Based on my variables and RQs, I averaged the effect sizes of those three studies to obtain a medium effect size of 0.15. According to Cohen (1988), a small effect size is 0.02, a medium effect size is 0.15, and a large effect size is 0.35. Medium effect sizes were most often used for calculating a priori minimum sample sizes. Effect sizes determine the strength between variable relationships. RQs 1 and 2 required simple linear regression analyses with one predictor variable and medium effect size to calculate a minimum sample size of 55 data points. For RQ3, I used multiple linear regression analysis with two predictor variables to calculate a minimum sample size of 68. Once the full data sets were retrieved, I conducted a post hoc sensitivity power analysis to update the effect sizes.

Simple Linear Regression

I performed a simple linear regression to answer RQs 1 and 2. The RQs and hypotheses were as follows:

RQ1: Does state funding affect graduation rates at Michigan public universities?

$H_0$1: State funding does not affect graduation rates at Michigan public universities.

H_a1: State funding does affect graduation rates at Michigan public universities.

RQ2: Does tuition cost affect graduation rates at Michigan public universities?

$H_0$2: Tuition cost does not affect graduation rates at Michigan public universities.

H_a2: Tuition cost does affect graduation rates at Michigan public universities.

The dependent variable was graduation rates at Michigan public universities (scale). The independent variable was state funding (scale). Alpha was set at 0.05, and

power at 0.80. The effect size (F2) was 0.15 (medium). One predictor variable was involved. The calculated minimum sample size, per G*Power 3.1.9.7, was 55.

Multiple Linear Regression

I performed a multiple linear regression to answer RQ3. The RQ and corresponding hypotheses were as follows:

RQ3: Do state funding and tuition cost affect graduation rates at Michigan public universities?

$H_0$3: State funding and tuition cost do not affect graduation rates at Michigan public universities.

H_a3: State funding and tuition cost do affect graduation rates at Michigan public universities.

The independent variables were state funding and tuition cost (scale). The dependent variable was graduation rates at Michigan public universities (scale). The test statistic was a linear multiple regression (fixed model, R2 deviation from zero). The alpha was set at 0.05 and power at 0.80. The effect size (F2) was 0.15 (medium). There were two predictors. The calculated minimum sample size, per G*Power 3.1.9.7, was 68.

Procedures for Recruitment, Participation, and Data Collection

To collect the archival data for this study, I contacted the Michigan House Fiscal Agency by email. I requested help locating Michigan data on the state funding of public universities, the tuition rates, and graduation rates or degrees conferred. The Michigan House Fiscal Agency stores data on Michigan tuition rates and state appropriations and is

publicly accessible. IPEDS stores nationwide graduation rates for public universities and is publicly accessible.

I needed IRB approval before collecting the data, considering each method I used to access the secondary data. I used historical data, so I provided the IRB with reliability, internal, and external validity information. The Michigan House Fiscal Agency and its data specialists were reputable because they were used to pass statewide budgets. The Michigan House Fiscal Agency reports and IPEDS were archives that have been used in research studies before.

Conducting retroactive studies with secondary data is considered an unobtrusive measure (Frankfort-Nachmias et al., 2014). I will not have to handle data collection myself. Not handling the data is a safe way for me to avoid contamination (Frankfort-Nachmias et al., 2014). According to Frankfort-Nachmias et al. (2014), it is acceptable to use public records, including legislative documents, to collect my budget data. I will not use human research participants, a manipulated independent variable, or a survey instrument to conduct this research study. Conducting a retrospective study using secondary data should limit the time required for data collection and IRB approval. I used the data to perform two simple linear regressions for RQs 1 and 2. I used the data to perform one multiple linear regression for RQ3.

Data Analysis Plan

The overarching RQ was, Were Michigan public universities' graduation rates affected by state funding and tuition costs? The overarching RQ is deconstructed into three RQs and null hypotheses. The predictor variable for RQ1 one is state funding. The

predictor variable for RQ2 is tuition costs. RQ3 uses both predictor variables, and all three RQs use the same dependent variable of graduation rates. These RQs and hypotheses look at how budget change affects performance change or organizational outcomes. To quantitatively test the null hypotheses and answer the RQs, two simple linear regression analyses were needed, and one multiple linear regression analysis. Simple linear regression analysis was used for RQs 1 and 2, with one predictor variable. The multiple linear regression analysis was used for RQ3, with two predictor variables. Analysis and statistical tests were conducted with IBM Statistical Program for Social Science Software (SPSS). According to IMB Corp (2020), simple linear regressions have six assumptions, and multiple linear regressions have eight assumptions:

Simple Linear Regression Assumptions

1. Two continuous variables have to be measured.
2. There is a linear relationship between the two variables.
3. There cannot be any outliers.
4. The Durbin-Watson statistic will be assessed.
5. Homoscedasticity will be demonstrated.
6. A normal distribution of errors is ensured.

IBM Corp, 2020.

Multiple Linear Regression Assumptions

1. The dependent variable should be continuous.
2. There needs to be two or more independent variables.
3. The Durbin-Watson statistic is tested.

4. Scatterplots were used to see the linear relationship between independent and dependent variables.
5. Homoscedasticity is demonstrated.
6. No Multicollinearity is found.
7. No outliers were included.
8. Errors were normally distributed.

IBM Corp, 2020.

It is typical for real-world data not to meet some of these assumptions (IBM Corp., 2020). To check the assumptions, I used SPSS to see if the analysis encounters any violation of these assumptions; if positive, I could "transform data" and disregard "outliers" (IBM Corp., 2020). It is also common to change the statistical test if some assumptions were not met (IBM Corp., 2020).

I used SPSS to test my null hypotheses using linear and multiple regression analyses. I looked at the R square, the F-ratio, the *t* value, and the *p* value or significance. If the *p* value is less than .05, I will reject the null hypothesis. If the *p* value is more than .05, I will accept the null hypothesis. With a significance of .05, the confidence interval is 95% (IBM Corp., 2020). This study will show the two simple linear regressions and one multiple regression using scatterplot charts.

Threats to Validity

External Validity

This study cannot be generalized to other states using the same data set. I am using data that is specific to Michigan and Michigan public universities. However, the

same methodology could be applied to other states using state-specific public data matching this study's variables. My findings applies to the state of Michigan, Michigan's public universities, and the state's postsecondary students.

Internal Validity

The Michigan House Fiscal Agency collected the state funding data. Senior analysts for the Michigan House Fiscal Agency collected, reviewed, and stored these data. The state funding data were stored in Microsoft Excel. The tuition data and state appropriations were stored with the Michigan House Fiscal Agency. The graduation rate data were stored on IPEDS.

Ethical Procedures

To conduct this study, I obtained approval from Walden University's IRB, after explaining my data collection method. No human participants were required for this study, eliminating several ethical concerns. The data that is collected is in the public domain, so there is no need to worry about confidentiality. I followed all of Walden University's data collection protocols as per IRB guidelines. I stored the data on my personal computer and to a USB file.

Summary

The purpose of this study is to use PET to understand whether state funding and tuition costs affect student outcomes, based on data from 15 Michigan public universities. I have proposed a quantitative study to address budget inputs and performance outputs to understand how PET works with public budgeting and higher education. I accessed secondary data and conducted linear and multiple linear regression analyses to address

my RQs and null hypotheses. The independent variables were state funding and tuition costs. The dependent variable is graduation rates. To perform these analyses, I used IBM SPSS (27). This chapter has summarized the methodology needed to complete this study, including data collection, internal and external validity, and the ethical procedures required. In Chapter 4, I discussed the results of my two linear regressions and one multiple regression testing my RQs and hypotheses. Chapter 4 also provided scatterplots, a Pearson correlation table, and a multiple regression summary table.

Chapter 4: Results

I sought to determine whether state funding and tuition cost affect graduation outcomes or rates for Michigan's 15 most prominent public universities. According to Weiler and Kiracofe (2020), leaders in every U.S. state cut state funding for public universities after the 2008 Great Recession. Tuition costs have skyrocketed since then, but state funding for Michigan public universities has not kept pace (Miller et al., 2019). The independent variables in this study were state funding and tuition cost. The dependent variable was graduation rates.

I answered three RQs in this study. The overarching RQ was, Were Michigan public universities' graduation rates affected by state funding and tuition cost? State funding and tuition cost were each assessed independently for their effect on graduation rates. Then, I assessed the combined effects of funding and tuition for their effect on graduation rates.

In this chapter, I discuss the data collection for this study, the statistical tests that were undertaken, and the results that were derived from the statistical analyses. I will explain the time frame of data collection and the methods by which the data were compiled and stored. I will also present the statistical results for each of the three RQs and discuss whether they validate either the null or alternative hypotheses.

Data Collection

The Walden University IRB approved my proposal materials on April 26, 2022 (approval no. 04-26-22-0471644), which allowed me to undertake data collection. All analysis is based on publicly available secondary data. As a retroactive secondary data

analysis study, I did not have participants or require an instrument. My IRB status expires when I graduate from Walden University with my degree.

I started data collection on April 30, 2022. I collected state funding and tuition cost data for Michigan's 15 most prominent public universities from the Michigan House Fiscal Agency. I collected graduation rates for the same 15 Michigan public universities from IPEDS. Data were collected for the years 2004–2021. I input the data into a spreadsheet in Microsoft Excel. Data collection took 1 month and ended on May 30, 2022. Initially, the total sample size was 270 data points. I reduced the sample size to 255 data points after I ascertained that IPEDS did not offer graduation rate data for 2021. The sample only represents Michigan's 15 most prominent public universities. The study findings were not generalizable to all public universities and their undergraduate students. Scholars could, however, replicate this study's methodology in other states throughout the United States using similar data sets for other state universities and analyzing the same variables, and they could draw different conclusions.

Results

Each of the three RQs for this study has a set of descriptive statistics based on state funding, tuition cost, and graduation rates data for Michigan's public universities. The SPSS output descriptive statistics show the mean, standard deviation, and sample size. The mean measures central tendency, which represents all the data values divided by the number of data values (Laerd Statistics, n.d.). Standard deviation refers to how spread out the sample data values were through variance (Laerd Statistics, n.d.). To analyze the descriptive statistics for the sample using the mean and standard deviation,

the variable must be continuous and not have any significant outliers (Laerd Statistics, n.d.). Each variable had a 255 data point sample size. To control for residual errors, I broke down state funding by dollar amounts per $1 million. To control for residual errors, I broke down tuition cost by dollar amounts per $100. Table 2 shows the Pearson correlation and descriptive statistics for each of the three variables: state funding, tuition cost, and graduation rates.

Table 2

*Correlation of Graduation Rates, State Funding, and Tuition Cost (*N = 255)

Variable	1	2	3	*M*	*SD*
1. Graduation rates	–			52.60	15.60
2. State funding_$1M	.66*	–		92.90	91.20
3. Tuition cost_$100	.54*	.34*	–	105.02	28.70

* $p < .001$.

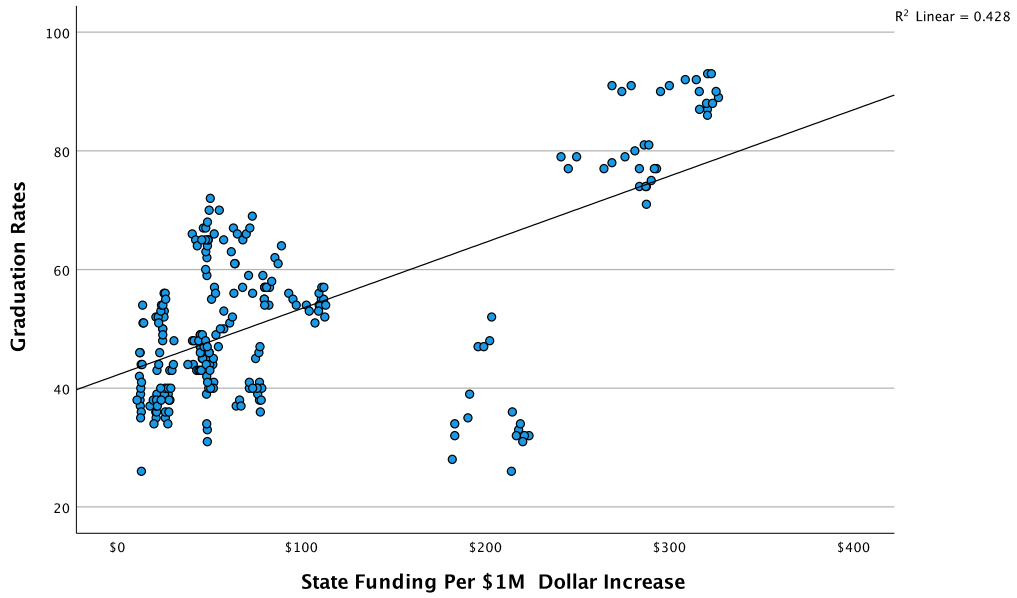
Statistical Assumptions

To answer whether state funding has an effect on graduation rates at Michigan public universities, I performed a simple linear regression, observing seven assumptions. In this instance, the independent and dependent variables were scaled or continuous. The R^2 value was 43%, above 10%, showing the statistical significance of linear regression. A histogram revealed no significant outliers. Using the Durbin-Watson statistic of 1.792, I determined that observation was independent for this linear regression because this statistic was less than 2. These data show homoscedasticity based on the variance being 43%. There were no residual errors because the data were cleaned up by dividing state

funding by $1 million increments. Figure 1 shows the linear relationship and the R-squared value for the $1 million increments in state funding against graduation rates.

Figure 1

Association Between State Funding and Graduation Rates



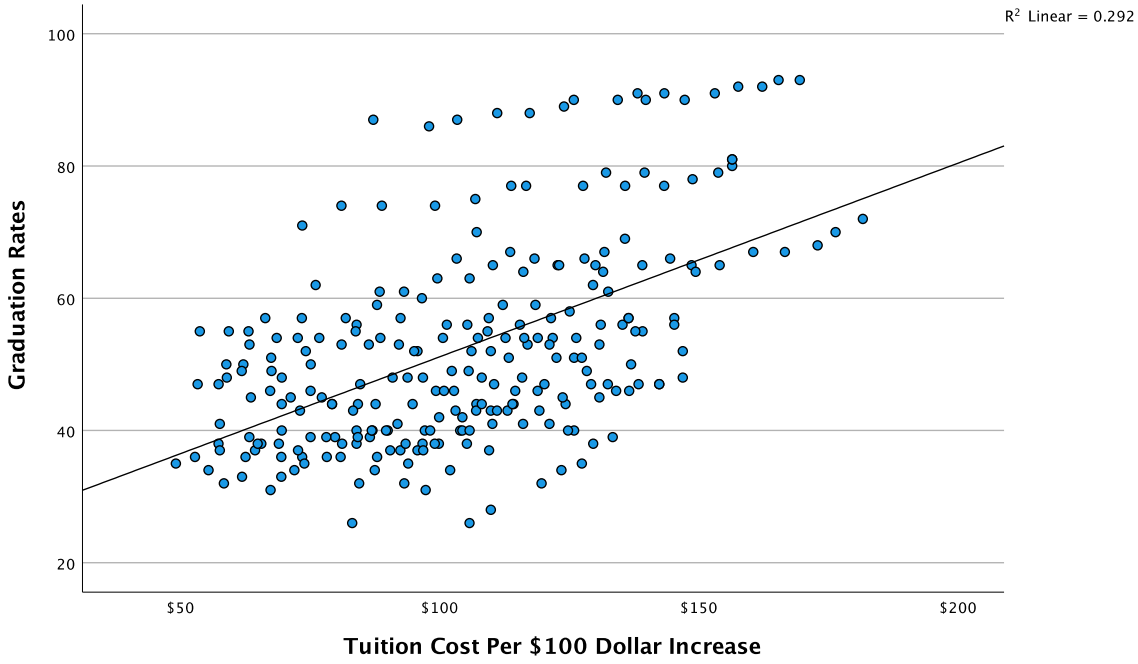
Note. This figure demonstrated 43% variance indicating a linear regression.

I also performed a simple linear regression to answer whether tuition cost affects graduation rates at Michigan public universities. Again, this simple linear regression analysis met the seven assumptions listed by Laerd Statistics (n.d.). For this RQ, both the independent variable and the dependent variable were continuous. The R^2 was 29%, again above 10%, showing statistical significance. There were no significant outliers for RQ2. The Durbin-Watson number was 1.912, less than 2, which meant there was independence of observation. These data show homoscedasticity because the variance was 29%. There were no residual errors because the data were cleaned up by dividing

tuition costs by $100 increments. Figure 2 is a scatterplot that shows linear regression results indicating that graduation rates increase with every $100 in tuition.

Figure 2

Association Between Tuition Cost and Graduation Rates



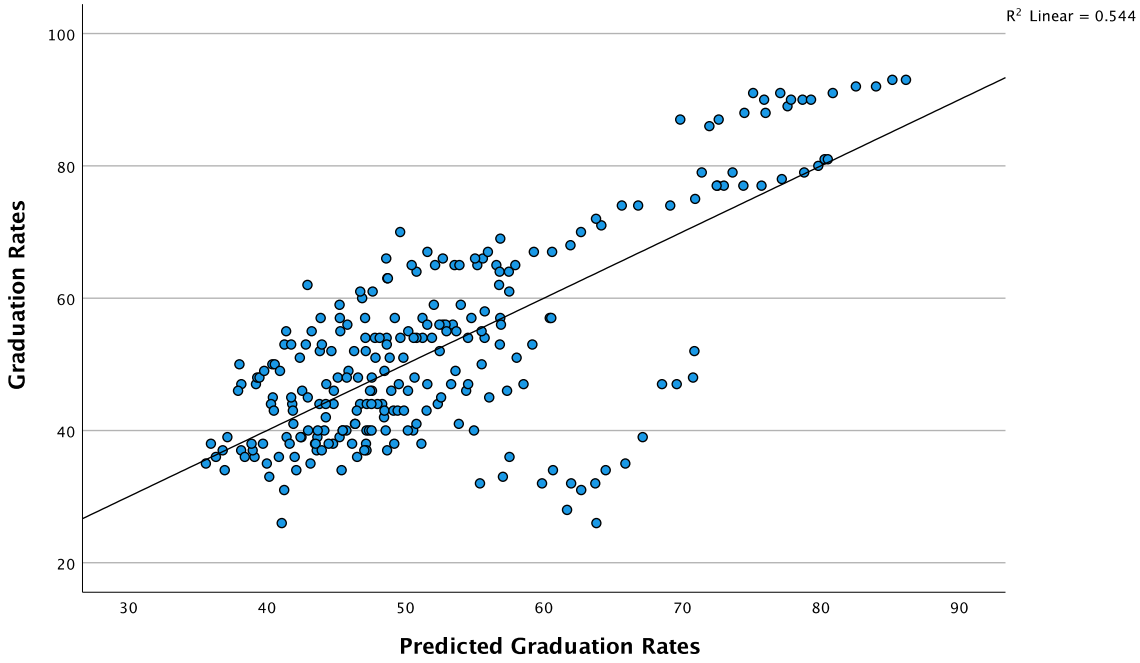
Note. This figure demonstrated 29% variance indicating a linear regression.

I used multiple regression analysis to determine whether state funding and tuition cost affect graduation rates at Michigan public universities. This RQ includes the same assumptions as the simple linear regression with the addition of two or more independent variables that were continuous and have no multicollinearity. For RQ3, the dependent variable of graduation rates remained continuous, and both the independent variables, state funding and tuition cost, were continuous. There was an independence of observation, with the Durbin-Watson statistic being 1.800, less than 2. These data show homoscedasticity because the variance was 54.4%, which is statistically significant.

Again, there were no residual errors because I cleaned up data by dividing the independent variables by $1 million increments for state funding and $100 increments for tuition costs. This multiple regression shows no multicollinearity because each independent variable had a VIF of 1.128. Because the VIF number was less than 10, there was no multicollinearity. Figure 3 is a scatterplot showing the linear relationship between predicted and actual graduation rates.

Figure 3

Association Between Predicted Graduation Rates and Actual Graduation Rates



Note. This figure demonstrated 54.4% variance indicating a multiple linear regression.

Statistical Analysis

To investigate whether state funding affects graduation rates at Michigan public universities, a simple linear regression was conducted. The predictor variable was state funding, and the dependent variable was graduation rates. The predictor variable was

found to be statistically significant [B = .112, 95% CI (.096, .128), $p < .001$], indicating that for approximately every $1 million spent on state funding, graduation rates increased by approximately 11.2%. Thus, for every $1 million in state funding per year, more than 5,800 students will graduate each year from Michigan's 15 top public universities. The number of graduates is based on the total number of undergraduates enrolled in 2021 in the public universities in the sample. The enrollment number is divided by freshman, sophomore, junior, and senior years, then multiplied by the percent increase of graduation rates or the B value [208,336/4*.112]. The model explained approximately 43% of the variability [$R^2 = .428$], and 57% of the variability is attributed to other factors not included in the model. Therefore, the null hypothesis was rejected, and the alternative hypothesis, state funding does affect graduation rates at Michigan public universities, was retained.

To investigate whether tuition cost affects graduation rates at Michigan public universities, a simple linear regression was conducted. The predictor variable was tuition cost, and the dependent variable was graduation rates. The predictor variable was found to be statistically significant [B = .293, 95% CI (.237, .349), $p < .001$], indicating that for approximately every $100 spent on tuition cost, graduation rates increased by approximately 29%. Thus, for every $100 in tuition cost per year, more than 15,200 students will graduate each year from Michigan public universities. The number of graduates is based on the total number of undergraduates enrolled in Michigan's 15 public universities in 2021. The enrollment number is divided by freshman, sophomore, junior, and senior years, then multiplied by the percent increase of graduation rates or the

B value [208,336/4* .293]. The model explained approximately 29% of the variability [R^2 = .292], and 71% of the variability is attributed to other factors not included in the model. Therefore, the null hypothesis was rejected, and the alternative hypothesis, tuition cost does affect graduation rates at Michigan public universities, was retained.

To investigate whether state funding and tuition cost affect graduation rates at Michigan public universities, a multiple linear regression was conducted. The predictor variables were state funding and tuition cost, and the dependent variable was graduation rates. The results of the multiple regression analysis revealed a statistically significant association between state funding, tuition cost, and graduation rates.

Controlling for tuition cost, the regression coefficient [B = .091, 95% CI (.076, .106*), p* < .001] associated with state funding suggests that for approximately every $1 million spent on state funding, graduation rates increased by approximately 9.1%, or more than 4,700 students. The number of graduates is based on the total number of undergraduates enrolled [n = 208,336] in Michigan's 15 public universities in 2021. The enrollment number is divided by freshman, sophomore, junior, and senior years, then multiplied by the percent increase in graduation rates or the B value [208,336/4* .091]. The confidence interval associated with the regression analysis does not contain 0, which means the null hypothesis can be rejected. A similar result was found for tuition cost.

Controlling for state funding, the regression coefficient [B = .196, 95% CI (.148, .244*), p* <.001] associated with tuition cost suggests that for approximately every additional $100 spent on tuition cost, graduation rates increase by 19.6%, or more than 10,200 students. The number of graduates is based on the total number of undergraduates

enrolled in Michigan's 15 top public universities in 2021. The enrollment number is divided by freshman, sophomore, junior, and senior years, then multiplied by the percent increase in graduation rates or the B value [208,336/4* .196]. The confidence interval associated with the regression analysis does not contain 0, which means the null hypothesis can be rejected.

The overall model explained approximately 54% of the variability, $R^2 = .544$. Less than half (46%) of the variability is attributed to other factors not included in the model (see Table 3). Therefore, the null hypothesis is rejected, and the alternative hypothesis that state funding and tuition cost do affect graduation rates at Michigan universities is accepted.

Table 3

*Results of Multiple Linear Regression on Graduation Rates (*N = *255)*

Predictor variable	B	β	*t*	*p*
State funding	.091	.53	11.80	< .001
Tuition cost	.196	.36	8.00	< .001

Note. $R^2 = .544$; Adj. $R^2 = .541$; $F(1, 252) = < .001$; $p = < .001$.

Summary

The RQs and hypotheses were based on understanding how state funding and tuition costs for Michigan public universities affected student outcomes or graduation rates. This line of questioning came from Flink's 2018 work, "Ordering Chaos: The Performance Consequences of Budgetary Changes." Flink (2018) researched how the

budgetary change affected the performance of Texas school districts by analyzing students' SAT scores. My RQs and hypotheses examine budget inputs (state funding and tuition cost) and performance outcomes (graduation rates). The independent variables of state funding and tuition cost showed statistical significance in affecting graduation rates. Therefore, I rejected the null hypotheses for the three RQs and retained the alternative hypotheses. For every $1 million rise in state funding per year, graduation rates increased by approximately 11.2%. For every $100 rise in tuition cost, graduation rates increased by approximately 29%. When controlling for tuition cost for every $1 million spent on state funding, graduation rates increased by approximately 9.1%. When controlling for state funding for every $100 spent on tuition cost, graduation rates increased by approximately 19.6%.

I examined higher education budget cuts after the 2008 Great Recession. Most states had budget cuts for their public universities, including the state of Michigan. Governor Grandholm cut the higher education budget 3.2% in 2009 (Olson, 2009). However, after analyzing the data from 2004 to 2021, I found there has been an incremental increase in state funding for education for the last 18 years, amidst some yearly budget cuts. Increased tuition rates were consistent with the literature, and it is surprising to find that every $100 spent on tuition cost increases graduation rates to an extent that is greater than state funding. Chapter 5 will add to the interpretation of results and follow up with recommendations for future research.

Chapter 5: Discussion, Conclusions, and Recommendations

In this quantitative study, I sought to understand why Michigan state funding of public universities has not kept pace with skyrocketing tuition costs and how that has affected graduation rates (see Miller et al., 2019). In reviewing the literature, I found a lack of research on the variables of state funding and tuition costs, and their effects on Michigan public university graduation rates. Through the lens of PET (Baumgartner & Jones, 1993), I examined the 2008 Great Recession as a punctuation when the state of Michigan cut state funding to higher education. The changes in state funding and tuition costs were the independent variables, and the change in graduation rates was the dependent variable.

I collected state funding and tuition cost data from the Michigan House Fiscal Agency and graduation rates data from IPEDS. These data were accessible to the public. This study was retrospective and involved analysis of secondary data from 2004 to 2021. To answer the RQs, I performed two simple linear regression analyses and one multiple regression analysis (see Van Der Merwe & Zidek, 1980). The multiple regression combined the independent variables of state funding and tuition cost and addressed percentage change in graduation rates over time.

I found that state funding and tuition cost both positively affect Michigan public university graduation rates. For every $1 million spent in state funding of Michigan public universities, graduation rates increased. For every $100 in tuition paid by students, graduation rates increased. Controlling for tuition cost for every $1 million spent on state funding, I found that graduation rates increased. Controlling for state funding for every

$100 in tuition cost paid by students, I found that graduation rates increased. For every $1 million spent by the state of Michigan graduation outcomes improved. For every $100 spent by Michigan students' graduation outcomes improved. All three RQs had their null hypotheses rejected and their alternative hypotheses retained.

Interpretation of the Findings

Baumgartner et al. (2017) called for the application of PET studies to several disciplines, including education. Flink (2018) gathered 20 years of data on Texas public school students' SAT scores to determine whether budget cuts affected student performance. Flink (2018) highlighted a lack of research on the application of PET to budgetary change while analyzing performance change outcomes. Flink's (2018) recommendations were to expand the application of PET by conducting studies on other educational performance outcomes. I found no previous studies on the effect of budget cuts on performance at Michigan's public universities. I also found no studies on how state funding and tuition costs together affect the graduation rates at Michigan's public universities. The overarching RQ of whether graduation rates were affected by state funding and tuition was broken down into three supplemental RQs. Upon statistical analysis, each of the three RQs had their null hypotheses rejected and the alternative hypotheses retained.

RQ1: Does state funding affect graduation rates at Michigan public universities?

H_a1: State funding does affect graduation rates at Michigan public universities.

This study found the predictor variable of state funding to be statistically significant when a simple linear regression was performed with graduation rates as the

dependent variable. This study demonstrates that student outcomes increased despite state funding cuts after the 2008 Great Recession. This study's findings indicate a result consistent with the literature that found that Michigan public universities maintain performance despite budget cuts. In Chapter 2, Flink and Robinson (2020) suggests that in general, institutions maintain performance even when policy decisions lead to budget cuts.

RQ2: Does tuition cost affect graduation rates at Michigan public universities?

H_a2: Tuition cost does affect graduation rates at Michigan public universities.

This study found the predictor variable of tuition cost statistically significant when a simple linear regression was performed with graduation rates as the dependent variable. This study demonstrates that student outcomes increased despite tuition increases between 2004 and 2021. This finding is consistent with the literature, which shows that Michigan public universities maintain performance despite tuition increases. According to Baumgartner et al. (2014), status quo and equilibrium were normal for institutions. Michigan's public universities maintained stability of performance in terms of an average annual increase in graduation rates, regardless of state funding. Stability, incrementalism, and equilibrium were consistent with public policy mechanisms, and institutional punctuations were rare (Baumgartner et al., 2018; Shockley, 2020).

RQ3: Do state funding and tuition cost affect graduation rates at Michigan public universities?

H_a3: State funding and tuition cost do affect graduation rates at Michigan public universities.

For RQ3, I combined both predictor variables, state funding, and tuition cost, to run a multiple linear regression with the dependent variable of graduation rates to find that both predictors were statistically significant. The findings show that Michigan's public universities maintained performance while dealing with budgetary changes from state funding cuts and tuition cost increases. This finding is consistent with the literature in Chapter 2. According to Flink (2018), public budgets change with policy, whereas performance outcomes have limited institutional friction, meaning status quo performance and incrementalism were the norms.

Limitations of the Study

The primary internal limitations of this study were data selection, methodology, and a change in variables. Baumgartner et al. (2014) point out that PET has limitations when dealing with linear predictions. Linear predictions cannot handle periods of punctuation and equilibrium. A secondary limitation is that there is no access to primary data to address my RQs; only secondary public data were available. Secondary data were subject to an external review by the IRB; however, this study was able to pass IRB inspection without a problem. This study has multiple secondary data sources, so narrowing down the suitable sources is key to successful data collection. Ultimately, there were missing data for my dependent variable of graduation rates for 2021 that affected my analysis.

The third limitation of this study is that it's not generalizable. It applies only to the state of Michigan and its 15 top public universities. According to Flink (2018), the most significant limitation was that no Texas public school district wants its SAT scores

to decrease. Every administrator wants SAT pass rates to increase in their districts. This limitation applies to my study concerning Michigan's public universities' graduation rates. Michigan state and university administrators do not want graduation rates for their schools to go down because it affects who they can attract to their universities and their regional and national reputations. The fourth limitation is Covid's impact on data collection for 2020. Covid likely influenced enrollment and graduation rates in 2020.

Recommendations

This study's strength comes from the significance of the findings of the effects of the independent variables on graduation rates. The linear regressions show statistical significance between state funding, tuition cost, and graduation rates. Both state funding and tuition costs affect graduation rate outcomes at Michigan public universities.

The first recommendation is to conduct this study in several different states to see if graduation outcomes were widely affected by state funding and tuition cost. An excellent place to start would be other Midwestern states and universities. Baumgartner et al. (2017) wanted to expand PET to several different disciplines and to varying governments worldwide, including authoritarian regimes. It would be interesting to study university outcomes as it relates to budgetary inputs in authoritarian countries. Including control variables in the assessment of graduation outcomes would be beneficial to see if the outcomes were manipulated in any way.

The second recommendation would be to expand the study by adding more independent variables, another outcome variable, and a control variable to create a multivariate analysis. The addition of control variables is a recommendation from Flink's

(2018) “Ordering Chaos” study. Flink found the regression model could use control variables to see how they affected performance change. For this study, adding control variables could improve the interpretation of graduation rate findings. Future studies should focus on Covid’s effect on enrollment during 2020 as a control variable and how that affected state funding, tuition cost, and graduation rates. Other variables for future studies are GDP, statewide job markets, administrative costs, and state-sponsored scholarships. For example, state-sponsored scholarships would affect student’s tuition costs.

The third recommendation is to expand the time duration of the study. Flink (2018) found that budgetary change takes time to affect performance outcomes. Flink (2018) suggests time lags will improve the analysis. This study was only able to acquire 18 years of data. Analyzing 40 years of state funding, tuition cost, and graduation rates data may provide more information on state funding cuts and tuition cost increases and whether a lagged effect is present in performance change (graduation rates).

Implications

This study has the potential for positive social change at the individual level, state level, and institutional level. Graduation rates go up for every $1 million the state of Michigan spends on public universities. Graduation rates go up for every $100 in tuition spent by Michigan public university students. Students typically want to graduate from Michigan public universities at the individual level. For every $100 a student spends on tuition, graduation rates go up, or outcomes improve. When students spend more on tuition, they are invested in their education and tend to graduate at an increased rate. At

the state level, for every $1 million the state of Michigan contributes to public universities, graduation rates increase. When the state of Michigan invests in higher education, outcomes improve.

This study looked at undergraduate students at Michigan's public universities. According to Cantor et al. (2018), students who earn bachelor's degrees have higher incomes and volunteer more than non-college graduates. Graduates with 4-year degrees, on average, earn $21,000 more than those with high school degrees (Cantor et al., 2018). Four-year degrees were an individual-level determiner of positive social change and a state-level determiner of positive social change.

The positive social change at the institutional level can be identified through the PET, which suggested that Michigan public universities maintained equilibrium and performance outcomes when state funding was cut and tuition costs increased (Flink, 2018). An examination of the effects of state funding, tuition cost and their interaction on graduation rates had not been done before. State funding and tuition cost were treated as budget inputs, and graduation rates were treated as performance outputs moving the methodology forward. This study consequently made an initial, small contribution towards understanding how budgetary inputs affect performance outcomes at Michigan public universities. The methodological implications of this study suggest that findings were consistent with the predictions of Baumgartner and Jones's (1993) PET model.

Conclusion

After the Great Recession in 2008, state funding for public universities declined, including for Michigan public universities (Weiler & Kiracofe, 2020). Michigan state

funding did not keep up with tuition increases, as fiscal policies increasingly aim to defund and commoditize higher education (Carlson, 2020; Miller et al., 2019). It was important for this study to find out how state funding cuts and tuition cost increases affected Michigan public university performance outcomes. The independent variables for this study were Michigan's state funding and tuition costs for postsecondary education. The dependent variable for this study is graduation rates. PET is the theoretical framework on which this study is grounded. The main takeaway from this study is that for every $1 million spent by the state of Michigan on public universities and for every $100 students spend on tuition, graduation rates increase. The simple linear regressions for RQs 1 and 2 demonstrated statistical significance between the independent and dependent variables. The multiple regression for RQ3 shows statistical significance between the independent and dependent variables. For this research to continue moving forward, a new research effort is needed. This new research effort can include new variables and a longer data collection timeline.

References

Baumgartner, F. R., & Jones, B. D. (1993). *Agendas and instability in American politics*. The University of Chicago Press.

Baumgartner, F. R., Jones, B. D., & Mortensen, P. B. (2014). Punctuated equilibrium theory: Explaining stability and change in public policymaking. In P. A. Sabatier & S. M. Weible (Eds.) *Theories of the policy process* (3rd ed., pp. 59-93). Westview Press.

Baumgartner, F. R., Jones, B. D., & Mortensen, P. B. (2018). Punctuated equilibrium theory: Explaining stability and change in public policymaking. In P. A. Sabatier & S. M. Weible (Eds.), *Theories of the policy process* (4th ed., pp. 55-102). Routledge.

Baumgartner, F. R., Carammia, M., Epp, D. A., Noble, B., Rey, B., & Yildirim, T. M. (2017). Budgetary change in authoritarian and democratic regimes. *Journal of European Public Policy*, *24*(6), 792–808. https://doi.org/10.1080/13501763.2017.1296482

Brasil, F. G., de Mattos e Silva, I. H., & Zambello, A. V. (2017). The effects of policy change on Brazil's public higher education system. *Latin American Policy*, *8*(2), 313-331. https://doi.org/10.1111/lamp.12129

Burke, J. C., & Serban, A. M. (1997). Performance funding and budgeting for public higher education: Current status and future prospects.

Byrd, M. A., Woodward, L. S., Song Yan, & Simon, N. (2018). Analytical collaboration for student graduation success: Relevance of analytics to student success in higher

education. *Mid-Western Educational Researcher*, *30*(4), 227–250. https://www.mwera.org/MWER/volumes/v30/issue4/V30n4-Byrd-FEATURE-ARTICLE.pdf

Campos, P. (2018). The economics of American higher education in the new gilded age. *Utah Law Review*, *2018*(4), Article 3. https://dc.law.utah.edu/cgi/viewcontent.cgi?article=1174&context=ulr

Cantor, M., Mustafa, M., Rivers, A., Castillo, P., & Salas, L. (2018). Research report critique: A primer on the college student journey. *Journal of College Access*, *4*(1), Article 8. https://scholarworks.wmich.edu/jca/vol4/iss1/8

Carlson, S. M. (2020). The U.S. student loan debt crisis: State crime or state-produced harm? *Journal of White Collar and Corporate Crime, 1*(2), 140-152. https://doi.org/10.1177/2631309X209215

Cho, K. W., & Jung, K. (2019). Illuminating the Sewol ferry disaster using the institutional model of punctuated equilibrium theory. *The Social Science Journal*, *56*(2), 288–303. https://doi.org/10.1016/j.soscij.2018.12.010

Cohen, J. E. (1988). *Statistical power analysis for the behavioral sciences*. Lawrence Erlbaum Associates.

Danziger, S. (2013). Evaluating the effects of the great recession. *The Annals of the American Academy of Political and Social Science*, *650*(1), 6-24.

Desmarais, B. A. (2019). Punctuated equilibrium or incrementalism in policymaking: What we can and cannot learn from the distribution of policy changes. *Research & Politics, 6*(3). https://doi.org/10.1177/2053168019871

Epp, D. A., & Baumgartner, F. R. (2017). Complexity, capacity, and budget punctuations. *Policy Studies Journal*, *45*(2), 247-264. https://doi.org/10.1111/psj.12148

Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, *41*, 1149-1160. https://doi.org/10.3758/BRM.41.4.1149

Flink, C. M. (2017). Rethinking punctuated equilibrium theory: A public administration approach to budgetary changes. *Policy Studies Journal*, *45*(1), 101–120. https://doi.org/10.1111/psj.12114

Flink, C. M. (2018). Ordering chaos: The performance consequences of budgetary changes. *American Review of Public Administration*, *48*(4), 291–300. https://doi.org/10.1177/0275074016687072

Flink, C. M. (2019). Predicting budgetary change: The effect of performance gaps. *Journal of Public Administration Research & Theory*, *29*(2), 227–237. https://doi.org/10.1093/jopart/muy032

Flink, C. M., & Robinson, S. E. (2020). Corrective policy reactions: Positive and negative budgetary punctuations. *Journal of Public Policy*, *40*(1), 96–115. https://doi.org/10.1017/S0143814X18000259

Frankfort-Nachmias, C., Nachmias, D., & DeWaard, J. (2014). *Research methods in the social sciences.* Worth Publishers.

Geier, B.A. (2018). Michigan. *Journal of Education Finance*, *43*(3), 266 -268.

Geier, B.A. (2020). Michigan. *Journal of Education Finance 45*(3), 318 –320.

Geier, B.A., & McCrumb, D. (2017). Michigan. *Journal of Education Finance*, 42(3), 284–286.

Glater, J. D. (2018). The narrative and rhetoric of student debt. *Utah Law Review*, *2018*(4), 885–895.

Gunu, E. A., Lee, C., Gyasi, W. K., & Roe, R. M. (2017). Modern predictive models for modeling the college graduation rates. 2017 IEEE 15th International Conference on Software Engineering Research, Management and Applications (SERA), Software Engineering Research, Management and Applications (SERA), 2017 IEEE 15th International Conference On, 39–45. https://doi.org/10.1109/SERA.2017.7965705

Guragain, H. P., & Lim, S. (2019). Nepalese budgetary dynamics: Following incrementalism or punctuated equilibrium? *Public Organization Review*, *19*(4), 493–518. https://doi.org/10.1007/s11115-018-0418-6

Harmon, T., Bragg, D. D., University of Washington, C. C. R. I. (CCRI), & Center on Education and Skills at New America (CESNA). (2020). Prospects for scaling community college baccalaureates in six Great Lakes states. Data Note 9. New baccalaureate series. In community college research initiatives.

Haupt, J., Ogden, A. C., & Rubin, D. (2018). Toward a common research model: Leveraging education abroad participation to enhance college graduation rates. *Journal of Studies in International Education*, *22*(2), 91–107. https://doi.org/10.1177/1028315318762519

Hegelich, S. (2017). Deep learning and punctuated equilibrium theory. *COGNITIVE*

SYSTEMS RESEARCH, 45, 59–69. https://doi.org/10.1016/j.cogsys.2017.02.006

Hess, D. R. (2004). Retrospective studies and chart reviews. *Respiratory Care*. *49*(10), 1171-4.

Horn, A. S., & Lee, G. (2019). Evaluating the accuracy of productivity indicators in performance funding models. *Educational Policy*, *33*(5), 702–733.

House Fiscal Agency. (2019) A legislator's guide to Michigan's budget process. https://www.house.mi.gov/hfa/PDF/Alpha/approps_process_report.pdf

Hu, X., Ortagus, J. C., & Kramer, D. A. (2018). The community college pathway: An analysis of the costs associated with enrolling initially at a community college before transferring to a 4-year institution. *Higher Education Policy*, *31*(3), 359–380. https://doi.org/10.1057/s41307-017-0063-7

Huang, Y. L., Change, D. F., & Wen Liu, C. W. (2018). Higher education in Taiwan: An analysis of trends using the theory of punctuated equilibrium. *Journal of Literature and Art Studies*, *8*(1), 169-180.

IBM Corp. Released 2020. IBM SPSS statistics for windows, version 27.0. Armonk, NY: IBM Corp.

Jacob, B., Dynarski, S., Frank, K., & Schneider, B. (2017). Are expectations alone enough? Estimating the effect of a mandatory college-prep curriculum in Michigan. *Educational Evaluation* and *Policy Analysis*, *39*(2), 333–360.

Jordan, M. M. (2003). Punctuations and agendas: A new look at local government budget expenditures. *Journal of Policy Analysis and Management*, *22*(3), 345-360.

Kuhlmann, J., & van der Heijden, J. (2018). What is known about punctuated equilibrium

theory? And what does that tell us about the construction, validation, and replication of knowledge in the policy sciences? *Review of Policy Research*, *35*(2), 326–347. https://doi.org/10.1111/ropr.12283

Laerd Statistics (n.d.). Liner regression analysis using SPSS statistics. https://statistics.laerd.com/spss-tutorials/linear-regression-using-spss-statistics.php

Laerd Statistics (n.d.). Multiple linear regression using SPSS statistics. https://statistics.laerd.com/spss-tutorials/multiple-regression-using-spss-statistics.php

Li, A. (2017). Dramatic declines in higher education appropriations: State conditions for budget punctuations. *Research in Higher Education*, *58*(4), 395–429. https://doi.org/10.1007/s11162-016-9432-0

Li, A. Y. (2020). Performance funding policy effects on STEM degree attainment. *Educational Policy*, *34*(2), 312–349.

Lundgren, M., Squatrito, T., & Tallberg, J. (2018). Stability and change in international policy-making: A punctuated equilibrium approach. *Review of International Organizations, 13*(4), 547–572.

McClure, K. R., Ryder, A. J., & Mauk, A. J. (2017). It all adds up: Examining and enhancing campus climate for affordability at a four-year university. *Journal of Student Financial Aid*, *47*(2), 23–46.

McKim, A. J., Velez, J. J., & Sorensen, T. J. (2018). A national analysis of school-based agricultural education involvement, graduation, STEM achievement, and income.

Journal of Agricultural Education, *59*(1), 70–85. https://doi.org/10.5032/jae.2018.01070

Miller, K., Granville, P., & Mishory, J. (2019). Michigan's college affordability in a regional context. https://eric.ed.gov/?id=ED607538

Mungo, M. H. (2017). Closing the gap: Can service learning enhance retention, graduation, and GPAs of students of color? *Michigan Journal of Community Service Learning, 23*(2), 42–52.

Olson, G. S. (2009). State funding for k-12 school districts and higher education. Senate Fiscal Agency Memorandum.

Patnaik, P. (2018). The commoditization of education. In *The University Unthought* (pp. 211-221). Routledge India.

Rychert, M., & Wilkins, C. (2018). Understanding the development of a regulated market approach to new psychoactive substances (NPS) in New Zealand using punctuated equilibrium theory. *Addiction, 113*(11), 2132–2139. https://doi.org/10.1111/add.14260

Sebõk, M., & Berki, T. (2017). Incrementalism and punctuated equilibrium in Hungarian budgeting (1991-2013). *Journal of Public Budgeting, Accounting & Financial Management, 29*(2), 151–180.

Sharp, T. (2019). Wars, presidents, and punctuated equilibriums in US defense spending. *Policy Sciences*, *52*(3), 367–396. https://doi.org/10.1007/s11077-019-09349-z

Shockley, G. (2020). Punctuated equilibrium theory and the missing agency of the policy entrepreneur. *Journal of Policy & Complex Systems*, *6*(1), 27–49.

https://doi.org/10.18278/jpcs.6.1.3

The Regents of the University of Michigan. Undergraduate admissions: Costs. https://admissions.umich.edu/costs-aid/costs

Van Der Merwe, A. & Zidek, j.V. (1980). Multivariate regression analysis and canonical variates. *Canadian Journal of Statistics 8*(1), 27-38 doi: 10.2307/3314667

Vannoni, M. (2019). A Comparative test of the punctuated equilibrium theory: Policy punctuations in tobacco control. *Journal of Comparative Policy Analysis*, *21*(4), 350–365. https://doi.org/10.1080/13876988.2018.1492675

Weiler, S.C. & Kiracofe, C. (2020). Expanding and contracting support for public education: Commentary on the 2019 state of the states. *Journal of Education Finance. 45*(3), 253-255.

Willoughby, K. G. (2014). *Public budgeting in context: Structure, law, reform and results*. John Wiley & Sons.

Yatczak, J., Mortier, T., & Silander, H. (2021). A study exploring student thriving in professional programs: Expanding our understanding of student success. *Journal of Higher Education Theory & Practice*, *21*(1), 91–104. https://doi.org/10.33423/jhetp.v21i1.4040

Yu, H., & Xue, L. (2019). Shaping the evolution of regime complex: The case of multifactor punctuated equilibrium in governing human genetic data. *Global Governance, 25*(4), 645–669. https://doi.org/10.1163/19426720-02504005

Yue, H., & Hart, S. M. (2017). Service learning and graduation: Evidence from event history analysis. *Michigan Journal of Community Service Learning*, *23*(2), 24–41.

Zhang, Y., Liang, Q., & Fan, P. (2017). Strategic core change, faultlines and team flux: Insight from punctuated equilibrium model. *Journal of Organizational Change Management*, *30*(1), 54–75.