A TEST OF RESOURCE DEPENDENCY THEORY USING HIGHER EDUCATION INSTITUTION BEHAVIORAL CHANGES AFTER STATE BASED MERIT AID ADOPTION

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by

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The undersigned, appointed by the dean of the Graduate School, have examined the dissertation entitled

A TEST OF RESOURCE DEPENDENCY THEORY USING HIGHER EDUCATION INSTITUTION BEHAVIORAL CHANGES AFTER STATE BASED MERIT AID ADOPTION

presented by Jason Evans,

a candidate for the degree of doctor of philosophy,

and hereby certify that, in their opinion, it is worthy of acceptance.

Professor Brad Curs

Professor Casandra Harper Morris

Professor Kathy Felts

Professor Raj Darolia

DEDICATION

I dedicate this dissertation to family. First, I thank my parents for providing me the opportunities to pursue academic rigor. Second, I thank my wife, Erica, who supported me and let me talk "at her" as I figured things out. Third, to my daughter, Meredith, who only knew I was at work at night and on weekends, I cannot wait to spend more time with you!

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ABSTRACT

The purpose of this study was to analyze whether four-year, public institutions altered their behaviors as their revenue streams changed. I utilized state based merit aid adoption to examine whether institutions altered their functional expenditures and faculty employment behaviors as institutions became more resource dependent on students. The dependent variables concerning functional expenditures analyzed were instruction, research, student services, public services, academic support, institutional support, and scholarships. The dependent variables concerning faculty employment analyzed were part-time faculty, full-time non-tenure-track faculty, and full-time tenure-track faculty. A difference-in-difference estimation strategy estimated institutional responses to a merit aid program being adopted in their state. The findings indicated that after merit aid adoption in their state, institutions altered their behaviors in ways that indicated they became more resource dependent on students. Specifically, the models indicated that, on average, institutions in states that adopted a merit aid program spent more money on instruction, institutional support, and scholarships and employed more part-time faculty than institutions in states that did not adopt any merit aid program. The findings of this study suggest that if states direct funds to students that institutions will respond as though the students provide the funding and not the state.

CHAPTER 1 - INTRODUCTION

In the United States, federal and state governments have long supported higher education in various forms. Money flows either to institutions or to students depending on the terms of the policy enacted. In 1862, the United States government passed the *Morrill Act* providing federal funding to the states to start their own land grant institutions (Rudolph, 1990). A little over a hundred years later, Congress passed The Higher Education Act of 1965 creating, what is now called, the Pell Grant program providing federal monetary assistance to students who meet low-income criteria (Curs, Singell, & Waddell, 2007), and also, creating what is now known as the Stafford Loan Program (The Association of Centers for the Study of Congress, n.d.). While the federal government traditionally focused on supporting low-income students, states implemented a mix of support that has historically focused on supporting institutions directly (Quigley & Rubinfeld, 1993). This state support subsidy did not target any specific student. This made it so that institutions could lower the amount they charge all students in tuition. All students at state supported schools, regardless of their income, were charged the same rate in tuition. Then they might have additional financial support, such as scholarships, grants, and loans that could discount the cost of attendance even further.

In 1993, the governor of Georgia, Zel Miller, passed the Helping Outstanding Pupils Educationally (HOPE) merit aid scholarship program to increase higher education access for academically high achieving high school graduates (Zhang & Ness, 2010). HOPE provided free tuition to any high school graduate from a Georgia high school who graduates with at least a 3.0 GPA. The caveat with the scholarship was that students needed to attend a college in Georgia (Dynarski, 2004). The goal of this program was to keep high ability students in Georgia

believing that the students would remain in state after graduating which would slow down the out migration of college educated people from Georgia to other states (Zhang & Ness, 2010).

After Georgia adopted HOPE in 1993, by 2006, 13 additional states adopted a merit aid program (Zhang & Ness, 2010). While these programs each had their own nuances, the goal remained the same: keep the best and brightest in state for college and hopefully after. Indeed, these programs vary in requirements and generosity depending on the state (Sjoquist & Winters, 2015; Zhang & Ness, 2010). For example, Louisiana, Mississippi, and West Virginia require a minimum high school GPA in addition to a minimum ACT score to get a scholarship, but Louisiana's program differs in that students can earn more scholarship money as they hit different tiers in their ACT scores. Even though the students in those states have to meet nearly the same minimum requirements to get some sort of merit scholarship, the amount awarded varies among those programs. Louisiana offers full tuition just for meeting the minimum requirement of the program plus additional funds as ACT score increases, while Mississippi provides up to $2500 per academic year (Zhang & Ness, 2010). Alaska and Missouri awards their merit aid scholarships based on the strength of students relative to their peers. Alaska provides and award for the top 10% of each high school graduating class, while Missouri provides its merit aid scholarship to the top 3% of Missouri ACT or SAT test takers.

This shift in state funding of higher education (i.e. state appropriating higher education money to students and not solely institutions) altered the higher education funding landscape. Before merit aid programs, there were no large scale, state-based appropriations that went to funding individual students. Researchers wanted to know if merit aid programs met the goals that justified their passing. Indeed, most of the research performed on the effect of merit aid program adoption examined changes in student behavior. As the main goal of a merit aid

program was to increase the number of high achieving high school graduates attending an in-state institution and subsequently finding employment within that state, researchers have focused on whether merit aid programs have achieved their desired effects (e.g. Dynarksi, 2004, 2008; Zhang & Ness, 2010). Fewer studies have focused on institutional behavior, and those studies focused on tuition and fee setting (Curs & Dar, 2010; 2010b; Long, 2004). The research for this study is in the vain of understanding changes in institutional behavior after merit aid adoption.

Purpose of the Study

The purpose of this study is to analyze whether institutions alter their behavior as their revenue streams change. The purpose of this study is not to study the effects of merit aid program adoption. Rather, merit aid program adoption was utilized to understand what happened when states suddenly appropriated funds to students to attend institutions instead of those funds going to institutions directly. Indeed, merit aid program adoption served as such a sudden departure to traditional higher education funding that it acted as an exogenous shock to the system. When a state adopted a merit aid program, that policy adoption altered the revenues directly coming to institutions from its various revenue sources. Prior research showed that institutions do respond to merit aid adoption, but that research has tended to focus on how institutions adjust their pricing post program adoption (Curs & Dar, 2010; 2010b; Long, 2004). I narrowed my purpose from understanding whether institutions alter all their behaviors to two more specific behaviors, expenditures on various functional areas and faculty employment.

Theoretical Framework

To understand why institutions would alter their behaviors after a change in revenue source, I utilized resource dependency theory. Resource dependency theory helps explain the interactions between organizations and their environments (Powell & Rey, 2015), while focusing

specifically on the ways in which an organization uses its environment to survive (Pfeffer & Salancik, 1978). This theory explains how organizations, while having internal leaders, also have external controllers (Pfeffer & Salancik, 1978). External constituents can lead an organization by controlling the resources an organization needs. The internal leaders will then alter behaviors to appease the external constituents to ensure organizational survival. As this study focuses on two institutional behaviors, institutional expenditures and faculty employment, two additional theories were needed to understand changes in behaviors. Bowen's (1980) revenue theory of cost helps explain changes in expenditures, and internal labor market (ILM) theory helps explain changes in faculty employment.

Resource Dependency and Bowen's Revenue Theory of Costs

Higher education institutions are multi-product firms that produce multiple outputs from multiple inputs (Bowen, 1980). As institutions become more resource dependent on certain inputs, they will alter their output producing behavior to more closely match the goals of the input provider. Institutions mainly produce teaching, research, and public services, and an institution's expenditures help support some combination of creating those outputs. Institutions' multiple inputs include revenue from student tuition, government appropriations, grants and contracts, gifts, and private investments and endowments. Resource dependency theory would predict that as an institution becomes more resource dependent on one source of revenue over another, it would change its priorities in producing teaching, research, and public service to match more closely the goals of the revenue source (Fowles, 2014; Leslie et al., 2011; Pfeffer & Salancik, 1978; Slaughter & Leslie, 1997).

Resource Dependency and Internal Labor Markets

While resource dependency theory predicts that institutions will do something to match the desires of the resource providers, ILM theory helps explain what institutions might do in terms of faculty employment after a state adopts a merit aid program. ILMs are governed by administrative policies as opposed to external economic forces (Doeringer & Piore, 1971). ILM theory discusses two employee types, core and peripheral. Core employees tend to cost more and are hired on a more permanent basis than peripheral employees. Internal labor market theory predicts that merit aid adoption should affect the ILMs of institutions for two reasons. The first, the shift from resource dependency on state appropriations to resource dependency on student tuition dollars could create instability and hiring core faculty, especially tenure-track faculty could be risky for institutions. As a result, institutions might want to hire more peripheral faculty in order to have more flexibility in planning.

Research Questions

To assist with understanding whether institutions alter their expenditure and faculty employment behaviors in light of merit aid program adoption, I created research questions to answer.

Research Question 1

The first research question I propose in this study is: *How do institutions alter their expenditures after the state in which they reside adopts a merit aid program?* To answer this question, I examined changes in the expenditures for the following functional areas: instruction, research, student services, public services, academic support, institutional support, and scholarships.

Research shows that institutions appear to alter their expenditure behaviors in these areas to appease their constituents (Jacob et al., 2018; Leslie et al., 2011; Slaughter & Leslie, 1997). Institutions have spent more on instruction relative to other places on which they could spend money, such as student services as the proportion of high-achieving students increases (Jacob et al.). After Minnesota adopted performance based funding, the University of Minnesota altered its expenditure behaviors to appease the state by meeting the state's goals (Hearn et al., 2006). As such, a sudden shift in funding ought to lead to a shift in expenditures. Bowen's revenue theory of cost then predicts that those shifts will benefit the resource providers.

Research Question 2

The second research question is: *How do institutions alter their contingent faculty composition after the state in which they reside adopts a merit aid program?* In examining contingent faculty employment, I refer to an institution's choices in hiring faculty across the categories of full-time non-tenure-track*1* faculty and part-time*2* faculty. As merit aid adoption changes resource dependencies, institutions might not want to continue employing core faculty at the same rate until they understand what changes their respective institutions will undergo. If that were the case, ILM theory would predict that there should be an increase in peripheral faculty employment.

1 Full-time non-tenure-track faculty refers to faculty who have a full-time, contractual relationship with an institution, and are not paid simply per course taught.

2 Part-time faculty includes those who are hired on a course-by-course basis. They are also called adjuncts.

Research Design

This study utilized the quasi-experimental design of difference-in-difference identification to find a reliable estimation of the effect merit aid adoption on faculty employment and institutional expenditure categories. Difference-in-difference identification approximates a natural experiment in which one individual or group receives a treatment and another homogenous group does not (Angrist & Pischke, 2009). By subtracting the within group difference over time from the between group difference, one can find a reliable estimate from the impact of a policy adoption (Conley & Taber, 2011). By using a carefully selected control group, this quasi-experimental design controlled for the many things that could create bias in correlational, quantitative designs (Angrist & Pischke, 2009). In this study, states that adopted merit aid were the treated group, and states that have not adopted a merit aid program acted as a control group. I also performed an estimation using states that will eventually adopt a merit aid program as a control group as they are likely more homogenous to the treated states.

In this study, I employed data from the Delta Cost Project and National Center for Education Statistics' (NCES) Integrated Postsecondary Education Data System (IPEDS) to create measures of faculty employment and institutional expenditures to serve as dependent variables for this study. To answer the first research question, I created seven dependent variables. Each variable relates to the functional expense areas of: instruction, research, student services, public services, academic support, institutional support, and scholarships. For each of these areas, I calculate each expenditures per full-time equivalent student (FTE) in an academic year. To answer the second research question for this study, I created two dependent variables measuring contingent faculty composition. For the first measure of contingent faculty, I calculated the number part-time faculty FTE at an institution in an academic year. For the

second measure of contingent faculty, I calculated the number of full-time non-tenure-track faculty per FTE.

Significance of the Study

Merit aid revenue and state appropriations both began at the same place, the state government, and end at the same place, an institution. The difference between the two was that state appropriations flow directly from the state to an institution while merit aid scholarships flow from the state through students to an institution. That indirect flow through students suddenly makes institutions resource dependent on students at a greater rate than they were before merit aid adoption. However, it could be that institutions only view themselves as resource dependent on the state, and they do not care about the indirect flow through students, as the money does not begin with them. In that case, we ought to see no result in the difference-in-difference estimation and can conclude that a dollar from the state is just a dollar from the state and student choice does not matter. This study could help support an understanding of whether or not institutions will alter their behaviors when states indirectly fund institutions through students instead of directly fund them through appropriations.

While not an explicit goal of the study, the results of this study have implications for understanding the effect of merit aid adoption on institutional behaviors and resource dependence in higher education. While previous studies have shown the impacts of merit aid on students (Dynarski, 2004) and graduates (Harrington et al., 2016; Ness, 2010) and a few on the institutional behavior of tuition and fee setting (Curs & Dar, 2010; Long, 2004), this study examined whether institutions alter their internal labor markets and expenditure behaviors after merit aid adoption in their state. These results could help state legislatures understand the program effects as they plan to adopt one in a state that does not have one, make alterations to

the program in states that do have one, or even drop the program altogether. Additionally, institutions may become more aware of how they might react should their state adopt or alter a merit aid program.

Previous studies employing resource dependency theory have found that institutions alter their behaviors as they become more resource dependent on students. Indeed, as an institution becomes more reliant on tuition and less reliant on other sources of funding, those institutions spend more on education and education related expenses (Fowles, 2014) and instruction (Leslie et al., 2011). Indeed, they even help ensure that students complete their degree programs and graduate (Titus, 2006).

I argue that when a state adopts a merit aid program, institutions in that state act as though they have become more resource dependent on students. This study adds to the literature on institutional behavior change when institutions become more resource dependent on students. When that happens, institutions ought to adjust their behaviors to match the desires of their students.

Definitions

Part-Time or Adjunct Faculty. Faculty who were hired on a course by course basis and have no long term contracts or commitments from the institution(s) where they were employed. The terms adjunct and part-time should be considered identical.

Full-time non-tenure-track faculty. In this dissertation, this refers to faculty who had a full-time work arrangement with an institution. They were not simply paid on a per course basis.

Functional expenditure category. An IPEDS determined group of expenditures to serve one of the main functions at an institution. These included: instruction, research, student services, public services, academic support, institutional support, and scholarships.

Institutions. In this dissertation, institutions were be 4-year, public colleges or universities. If other institution types were discussed, I explain that in text.

Merit Aid Scholarship Program. Sometimes just shortened to merit aid or merit aid program, this was a type of scholarship program that is ran by a state, not an institution, and the primary qualification was a demonstration of being high ability in some way.

Summary

This chapter serves as the introduction to this study. First, it presents a discussion concerning the history of some of the state-based funding sources for U.S. higher education and the shift to merit aid programs starting in the early 1990s. Then, this chapter provided the purpose of this study, which was to analyze whether institutions alter their behavior as their revenue streams change. More specifically, this study analyzed the institutional behaviors of changes in expenditures and faculty employment. I then provided the theoretical justification for why institutions ought to alter their behaviors, by combining resource dependency theory with Bowen's revenue theory of costs and combining resource dependency theory with ILM theory. I then provided an overview of the difference-in-difference research design. Lastly I discussed the significance of this study for the study of higher education.

In Chapter 2, I provide an in depth discussion concerning the literature on merit aid programs, institutional expenditures, faculty employment. I also include discussions on resource dependency theory, Bowen's revenue theory of costs, and ILM theory and their applications to higher education research. I also discuss my research questions in more detail and provide testable hypotheses for each question. In Chapter 3, I discuss the quasi-experimental methods used to analyze changes in institutional behavior and faculty employment after a shift in resource dependencies. In Chapter 4, I discuss the results of the analyses and the various robustness

checks performed to understand the results better. Lastly, in Chapter 5, I discuss how the results answer the hypotheses and research questions. I also discuss if I met the purpose of the study and what the results mean in the context of the higher education literature more broadly.

CHAPTER 2 – LITERATURE REVIEW

In this study, I examined the effect of merit aid program adoption on institutional expenditures and contingent faculty employment, as these served as excellent test cases to understand whether and how institutions alter behaviors after shifts in revenue source. In addition, I discuss why we should expect any effect of the treatment on institutional expenditures and contingent faculty employment, and specific research questions and hypotheses about the effect of merit aid program adoption on institutional expenditures and contingent faculty employment. This research adds to the body of knowledge on merit aid programs through a more thorough discussion of how merit aid adoption affects institutional behaviors. The purpose of this study was to analyze whether institutions alter their behavior as their revenue streams change. To understand one facet of this potential change, I measured changes in two institutional behaviors, institutional expenditures and contingent faculty employment, after the state in which an institution is located adopts merit aid program.

Throughout this literature review, I discuss: the impetus and features of the various merit aid programs and program types throughout the United States; an examination of the literature on institutional expenditures with a focus on factors related to institutions altering their expenditure behaviors; an examination of the literature on contingent faculty employment with a focus on factors related to institutions altering their contingent faculty employment; and the theoretical justification as to why merit-aid adoption would be expected to alter institutional behaviors on faculty employment and expenditures. Lastly, I end the literature review with a discussion of specific research questions and testable hypotheses that are grounded in the literature.

Merit Aid Programs

The funding of higher education as long been an interest of the U.S. government. As early as 1816, U.S. governmental institutions saw higher education as a priority as evidenced by the case *Trustees of Dartmouth College v. Woodward*, (1819) when the state of New Hampshire attempted to take over Dartmouth College turning it into a state ran institution. In 1862, the federal government passed the first *Morrill Act* providing federal funding to the states to invest in their own land grant institutions; in turn making a state governed college a norm for every state while states continued some financial support for those institutions (Rudolph, 1990). Post World War II, the *Serviceman's Readjustment Act*, which contained the *G.I. Bill of Rights*, was passed in 1944. Part of the act provided money for college for returning soldiers. The Higher Education Act of 1965 created what would eventually become the Pell Grant program that supplements a student's cost of higher education with federal monetary assistance to students who meet low-income criteria (Curs, Singell, & Waddell, 2007). In addition, the act created the Stafford Loan Program that guaranteed repayment on loans should a student default (The Association of Centers for the Study of Congress, n.d.). At the state level, states supported higher education attainment largely by doing what they could to keep tuition low and supplement needy students with additional grants (Heller, 2002).

In 1990, Indiana created the Indiana Twenty-first Century Scholars Program. This scholarship program only for low-income students had a slight merit component, requiring high school students to graduate with at least a 2.0 grade point average (GPA) (St. John, et al., 2003). The scholarship from the Twenty-first Century Scholars Program covered the entire cost of tuition. Arkansas, in 1991, created the Arkansas Academic Challenge Scholarship (Hawley & Rork, 2013), which also targeted low-income students and required a 2.5 high school GPA.

Unlike, Indiana's scholarship, the Arkansas Academic Challenge Scholarship, did not cover the full cost of tuition. Though relative to the earnings of states near Arkansas, the low-income requirement was not as strict (Dynarski, 2008).

Georgia's Helping Outstanding Pupils Educationally (HOPE) scholarship served as a blueprint for designing a true large scale state-based merit-aid program (Doyle, 2010; Zhang & Ness, 2010). In 1993, Georgia legalized the lottery and with the proceeds from ticket sales created the HOPE scholarship. HOPE's low entrance point (3.0 high school GPA) and generous award (full tuition) allowed for many students to be able to attend colleges in Georgia at low cost (Dynarski, 2008; Zhang & Ness, 2010). Unlike Indiana and Arkansas, Georgia did not target only low-income students, but rather all students who could demonstrate their merit based on high school GPA (Dynarski, 2008). At its inception, nearly 60% of Georgia high school graduates qualified for the scholarship (Dynarski, 2008, p. 578), while about 30% of Georgia high school graduates were estimated to use their merit aid (p. 604).

Soon after Georgia adopted the HOPE program, other states in the Southeastern portion of the U.S. began adopting merit-aid programs (Doyle, 2010). While Doyle specifically mentions that he found a lack of evidence that merit-aid adoption was caused by a traditional policy diffusion, nonetheless by 2012, 25 states had adopted some sort of merit aid program (Sjoquist & Winters, 2012). Not all states have the same criteria and award amounts for their merit-aid programs. Some are less generous with their amounts or number of students who qualify. For example, at its beginning in 1997, Missouri's Bright Flight Program only awarded scholarships to the top 3% scorers on the ACT exam for that academic year and only covers $2000 a year of tuition (Sjoquist & Winters, 2012). Program structures vary as well, with some states adopting tier based awards depending on how well students score in both their high school

careers and on standardized tests. Louisana's Tuition Opportunity Program for Students, established in 1998, required a high school GPA of 3.0 and a 20 ACT score to qualify for full tuition coverage. Additionally, as ACT score increases, the scholarship amount increases to help cover other costs associated with attending college (Sjoquist & Winters, 2012). Tennessee's Education Lottery Scholarship, has always used a combination of both merit and need to determine award amounts distancing itself from a merit only trend adopted by other states (Ness & Mistretta, 2009, Topal, 2013).

Table 1 shows the variability of award criteria, amounts, and eligible institutions in merit aid programs. First, all merit aid programs have some sort of pre-college demonstration of academic ability through high school grade point average (GPA) or meeting a threshold score on a standardized test (e.g. ACT or SAT). Financing education at in-state schools is a feature of all programs, though twelve of the programs do allow for funding students at private institutions. Michigan allowed its program to fund students who attend out-of-state institutions. Merit aid programs also vary in strength as the programs can be narrow or broad reaching and/or small or large rewards (Sjoquist & Winters, 2012). A program was only considered strong in the case that it reaches a broad number of students and the reward amount is large. Dynarski (2004) defines a program as "broad" when at least 30% of graduating high schoolers meet the qualifications to receive the merit scholarship (p. 65). A large reward is one that covers most or all of the tuition at a public institution in the awarding state (Sjoquist & Winters, 2012). In Table 1, I also include information as to whether a program is strong or weak. Thus, based on the work of Sjoquist and Winters (2012), I considered the following nine states to have adopted strong merit aid programs based on those criteria: Florida, Georgia, Kentucky, Louisiana, Nevada, New Mexico, South Carolina, Tennessee, and West Virginia.

TABLE 1

Merit Aid Programs, Their Year Established or Significantly Altered, Initial Award Criteria, Initial Award Amount, Eligible Institutions, and Their Strength from Their Adoption Onward

State (Merit Program Name)	Year Established	Award Criteria	Award Amount	Eligible Institutions	Strong/ Weak Program
Alaska (University of Alaska Scholars Award)	1999	top 10% of high school class	$2,750	University of Alaska campuses	Weak
Florida (Bright Futures)	1997	two-tiered awards with both GPA and SAT/ACT requirements: 1. 3.5 GPA & 1270 SAT (28 ACT) 2. 3.0 GPA & 970 SAT (20 ACT)	two-tiered awards with both GPA and SAT/ACT requirements: 1. full tuition at public universities 2. 75% tuition	in-state public and private institutions	Strong
Georgia (Helping Outstanding Pupils Educationally, HOPE)	1993	"B" average (3.0 High School GPA)	full tuition	in-state public and private institutions	Strong
Kentucky (Kentucky Educational Excellence Scholarship, KEES)	1998	students "bank" scholarships for based sliding scale of GPA (2.5–4.0) in each high school grade (9–12) and earn a bonus based on ACT score (15–36)	GPA for each year of high school: 2.5 = $125, 4.0 = $500; ACT bonus: 15 = $36, 28+ = $500	in-state public and private institutions	Strong
Louisiana (Tuition Opportunity Program for Students, TOPS)	1998	three-tiered awards with both GPA and ACT requirements: 1. 3.0 GPA & 27 ACT 2. 3.0 GPA & 23 ACT 3. 3.0 GPA& 20 ACT	three-tiered awards with both GPA and ACT requirements: 1. full tuition + $800 per year 2. full tuition + $400 per year 3. full tuition	in-state public and private institutions	Strong
Massachusetts (John and Abigail Adams Scholarship*)*	2006	top 25% of scores in school district on MCAS state assessment; also, must score advanced" on either mathematics or language arts section and at least "proficient" in the other	full tuition	in-state public institutions	Weak

Table 1 Continued

State (Merit Program Name)	Year Established	Award Criteria	Award Amount	Eligible Institutions	Strong/ Weak Program
Michigan (Merit Award Scholarship)	2000	"acceptable" score on all four components of MEAP test assessment, or "acceptable" score on two tests & 24 ACT	one-time awards: $2,500, in-state institutions (public or private); $1,000, out-of-state public or private institutions (eligible for additional $1,500 if student later transfers to in-state institution)	in-state and out-of state (at a reduced award amount) public and private institutions	Weak
Mississippi (Eminent Scholars Program)	2008	Cancelled Program	-	-	Weak
	1995	3.5 GPA & 29 ACT	tuition and fees up to $2,500 per year	in-state public and private institutions	Weak
Missouri (Bright Flight)	1987	top 3% of all Missouri ACT or SAT test takers	$2,000	in-state public and private institutions	Weak
Nevada (Millennium Scholarship)	1999	3.0 GPA	variable rates ranging from $40–80 per credit hour depending on institution type; maximum annual awards: $2,500 (4-year), $1,250 (2-year)	in-state public institutions	Strong
	2006	3.25 GPA	variable rates ranging from $40–80 per credit hour depending on institution type; maximum annual awards: $2,500 (4-year), $1,250 (2-year)	in-state public institutions	Strong
New Mexico (Lottery Success Scholarship*)*	1996	college GPA 2.5 after first 12 credit hours	full tuition	in-state public institutions	Strong

Table 1 Continued

State (Merit Program Name)	Year Established	Award Criteria	Award Amount	Eligible Institutions	Strong/ Weak Program
South Carolina (Palmetto Fellows, LIFE, and HOPE)	2001	three-tiered awards: 1. 3.5 GPA & 27 ACT & top 6% of HS class 2. 3.0 GPA & 24 ACT & top 30% of HS class 3. 3.0 GPA	three-tiered awards: 1. $6,700 (1st year), then $7,500 in subsequent years 2. $4,700, $300 book allowance 3. $2,850 (one-time)	in-state public and private institutions	Strong
Tennessee (Tennessee Education Lottery Scholarship, TELS)	2003	four-tiered awards: 1. 3.75 GPA & 28 ACT 2. 3.0 GPA or 19 ACT & AGI < $36k 3. 3.0 GPA or 19 ACT 4. 2.75 GPA & 18 ACT & AGI < $36k	four-tiered awards with GPA, ACT, and income requirements: 1. $4,000 2. $4,000 3. $3,000 4. $2,000	in-state public and private institutions	Strong
	2004	four-tiered awards: 1. 3.75 GPA & 28 ACT 2. 3.0 GPA or 21 ACT & AGI < $36k 3. 3.0 GPA or 21 ACT 4. 2.75 GPA & 20 ACT & AGI < $36k	four-tiered awards : 1. $4,300 2. $4,800 3. $3,300 4. $2,150	in-state public and private institutions	Strong
West Virginia (Providing Real Opportunities for Maintaining In-State Student Excellence, PROMISE)	2002	3.0 GPA and 21 ACT	full tuition	in-state public and private institutions	Strong
	2005	3.0 GPA and 21 ACT (20 ACT sub-score on all sections)	full tuition	in-state public and private institutions	Strong

Note. Adapted from Zhang and Ness (2010) and Sjoquist and Winters (2015a)

Empirical Evidence on the Effects of Merit Aid

Due to the nature of merit aid program creation (i.e. state legislatures create these programs), researchers can use quasi-experimental design techniques to estimate the effects that merit aid programs have, as the programs act as an exogenous shock to the relationship between institutions and the students in their respective states rather than a system of codetermined adjustments over time (Lowry, 2001). Indeed, many researchers have taken advantage this and studied merit aid program effects in a variety of ways. I found two main categories of study types. The first category consisted of research examining student behavior changes (e.g. college attendance behaviors, graduation, employment). The second set of research examined how institutions altered their own behavior after merit aid adoption.

Student Behavior. One major research area on merit aid programs has been on how these programs have affected student behavior. Researchers have examined college attendance behaviors of students and changes in college access because of merit aid program adoption. Additionally, researchers have also examined how well students who receive merit aid perform in college and their employment behaviors after college. After Georgia adopted HOPE, car sales increased in Georgia counties with residents above the 75th income percentile that also had a significant number of students attending an in-state institution (Cornwell & Mustard, 2007).

Enrollments. Georgia's HOPE program was found to influence not only whether or not students went to college but also where students went to college (e.g. Cornwell et al., 2006; Dynarski, 2004). Cornwell et al. (2006) found that within four years of Georgia's HOPE implementation, enrollments in Georgia's four-year public institutions rose 9 percent (p. 774). Dynarski (2004) also found that students graduating from a Georgia high school were 7 to 9 percent more likely to attend college than high school graduates from similar Southern US states.

Additionally, HOPE helped increase enrollments for both students who were well-off financially and were financially needy as determined by students' Pell Grant eligibility (Singell et al., 2006). Examining enrollments in Georgia and Arkansas, Dynarski (2008) found that merit aid adoption increased enrollments 1.6 percentage points.

The increased college access for students seems to be unbalanced by student demographic as a result of the nature of merit aid programs though. The merit aid programs in Michigan, New Mexico, and Florida ultimately helped those most likely to go to college anyway (Binder et al., 2002; Heller & Rasmussen, 2001). Indeed, Georgia's HOPE program and the New Mexico Lottery Success Scholarship both helped White students more than traditionally underrepresented racial groups (i.e. Black, Latino, Native American) (Binder et al.; Dynarski, 2004) and male students more than female (Binder et al., 2002). In Alaska, Florida, Kentucky, Michigan, and New Mexico, White high school graduates received a greater proportion of merit aid scholarships relative their proportional representation of racially underrepresented high school graduate peers (Ferrell, 2004).

Choice. After the Georgia HOPE program was implemented, students, on average, chose to attend four-year public institutions in-state at a greater rate, while at the same time enrollments at the two-year public institutions in Georgia did not increase at the same rate (Cornwell et al., 2006; Dynarski, 2004). However, that effect may be only be true for non-elite institutions, as students from states with merit aid programs maintained the same choice behaviors for enrolling in elite institutions after merit aid adoption (Sjoquist & Winters, 2015a). Singell, Waddell, and Curs (2006) found that HOPE had a differential impact on students with high financial need[3].

[3] High financial need was determined by a student's eligibility for the Federal Pell Grant, a grant program for students whose family would be able to contribute little to nothing towards the student's education.

Students who were both financially needy and HOPE recipients also were more likely to attend two-year colleges or less selective four-year colleges. The decline in enrollment at two-year public institutions in Georgia may be related to that state, as research found growth at two-year public institutions in Florida after the implementation of its Bright Futures program (Zhang, Hu, & Sensenig, 2013).

Collegiate Completion. The merit aid programs in Arkansas and Georgia increased the share of the young, working age population with a college degree nearly three percentage points (Dynarski, 2008). Not all studies tout the positive impact of merit aid programs on collegiate completions. Sjoquist and Winters (2012), examining a broad swath of merit aid program, found that merit aid scholarships in general, contradicting Dynarski (2008) and Scott-Clayton (2010), do not increase bachelor degree attainment. Indeed, to ensure that the effect of the merit aid program is not biased by the ability of the program to affect behaviors, Sjoquist and Winters[4] (2012), examining only strong merit aid programs, found no effect on bachelor degree attainment. Jones-White et al. (2014) found that recipients of merit aid were more likely to graduate from the institution of first enrollment while other loan aid is associated with students leaving their institutions of first enrollment.

Dynarski's (2008) research on student success as a result of merit aid adoption demonstrated differential impacts for various demographic groups. While on average, the population Dynarski (2008) examined increased their Bachelor's Degree attainment, her research points to the possibility that some women, instead of choosing no college, go on for the Associate's Degree more often, and men choose to go on for a Bachelor's Degree when they previously may have stopped going to college after receiving an Associate's Degree.

[4] Who classified the strong and weak program dichotomy

Collegiate behavior changes. Additionally, Cornwell, Lee, and Mustard (2005) found that on average HOPE recipients at Georgia's institutions, because of HOPE's college GPA requirements, took fewer full-load semesters compared to their non-HOPE recipient peers. The HOPE recipients also were more likely to withdraw from courses, as they feared they would receive a low grade and hurt their chances to maintain HOPE eligibility. Goetz et al. (2008) examined students who lost their HOPE scholarships. Students who had lost HOPE, but stayed at their institution, took on high credit card debt and a significant amount of credit card debt relative to peers.

STEM Enrollment. As graduating students with a degree in a Science, Technology, Engineering or Mathematics (STEM) field has become a significant goal for the United States, and majors in those fields are critical to state economies (Zhang, 2011). Additionally, students perceive STEM majors as more difficult than other majors such as education (Sjoquist & Winters, 2015b). Students then fearing they might lose their merit aid, due to GPA maintenance requirements to maintain eligibility might then choose non-STEM majors. Indeed, students who earn merit aid are more likely to either not choose a STEM major or switch to a non-STEM major as GPA declines (Delaney, 2007; Sjoquist & Winters, 2015b; Zhang, 2011; Zhang et al., 2006).

Employment. One of the state goals in implementing merit aid programs is to entice potential students from that state to attend in-state colleges and find a job in state (Zhang & Ness, 2010). Of those who do earn their bachelor's degree, Fitzpatrick and Jones (2012) found that those graduates from institutions in states that adopted a merit aid program were slightly more likely to live in-state after college. Additionally, in examining Missouri's Bright Flight program, which is a narrowly targeted program of high standardized test achievers, Harrington et al.

(2016) found that Bright Flight had a positive likelihood for a student to remain living in Missouri eight years after high school graduation. Students earning the Florida Bright Futures scholarship were also more likely to stay in Florida after graduation (Hickman, 2009). Alternatively, in examining the University System of Georgia's graduates' post-collegiate employment, Sjoquist and Winters (2003) found no effect on the employment of individuals after HOPE was implemented relative to the students who graduated before HOPE was implemented.

Institutional Behavior. Much less research has been done on how merit-aid programs have affected institutional behaviors. After the passing of HOPE, Georgia's institutions on average raised the cost of attendance (through fees) nearly enough to capture about 30 additional cents for every dollar in merit-aid students received (Long, 2004). Research suggests that private institutions may have attempted to recoup even more of the merit-aid subsidy in raising the price for room and board (Long, 2004). Institutions in states with more centralized governance structures do increase net price for students (Curs & Dar, 2010b). These institutions could not simply raise tuition due to the centralized governing board, so they instead lowered the amount of institutional aid provided (Curs & Dar, 2010b) or, in the case of Georgia, raised fees (Long, 2004).

While there is little research on how institutions altered their pricing structures in light of merit-aid, there is less research on expenditure behaviors (Curs & Dar, 2010b; Long, 2004). Merit-aid appeared to have replaced some institutional scholarships, as evidenced by a reduction in institutional scholarships expenditures relative to similar colleges (Curs & Dar, 2010b; Long, 2004). Ness & Lips (2011) found that flagship institutions in merit aid states generally use different wording in promoting scholarship financial aid by discussing merit aid scholarships going to the "best and brightest (p. 11)" students in order to increase "access and affordability (p.

12)." It could be argued that enrollment changes are an institutional behavior, however, choosing whether and where to go to college is also a student behavior. As institutions do not have enough control over that student choice, I argue that enrollment should be considered a student, not institutional behavior.

Scholarly Controversies About Merit Aid Programs

While a new scholarship program designed to help more students attend college might not seem like a negative, some scholars do have qualms with these types of programs (Dynarksi, 2004; Doyle, 2010; Heller & Marin, 2004). Their key worry stems from the idea that merit aid programs disproportionately advantage the advantaged (Dynarski, 2004; Farrell, 2004; Heller, 2004). Indeed, Heller (2002) asks the readers of his research to imagine a scholarship program for which the economically disadvantaged in a state overwhelmingly pay, but the state overwhelmingly distributed the scholarship funds to the more economically advantaged. The economically disadvantaged in a state tend to play the lottery at a much greater rate than those who are more economically advantaged (Heller, 2002). The advantaged families tend to have students who perform better in school or on standardized tests (Heller & Rasmussen, 2002). Thus, we end up with a program in which the disadvantaged support advantaged students' college attendance (Binder & Ganderton, 2004; Heller, 2002).

Merit aid adoption additionally alters the racial makeup of student bodies at colleges as colleges admit more advantaged students at the cost of disadvantaged students as many of the disadvantaged are racial minorities (Dynarski, 2004; Heller, 2002). Indeed, Ness and Noland (2007) found the most racially equitable merit aid program for helping disadvantaged students was Tennessee's program that was broad based and took family income into account as part of the awarded amount.

Institutional Expenditures

The focus of the literature on how institutions alter their behaviors due to financial changes frequently hones in on how institutions attempt to replace one revenue stream with another (Cheslock, 2006; Cheslock & Gianneschi, 2008; Ehrenberg, 2002; Vedder, 2004). Articles and entire books are dedicated to understanding why college costs students and taxpayers so much, usually shifting blame to state governments (Chen & St. John, 2011; Fethke, 2011), political ideologies (Archibald & Feldman, 2006; Cheslock, 2006; Leslie et al., 2011) growing administration (Ehrenberg; Martin, 2009; Slaughter & Leslie, 1997; Vedder, 2004), or prestige maximization efforts (Bowen, 1980; Ehrenberg, 2002; Morphew & Baker, 2004; Weisbrod et al., 2008). While that research is important, it is tangential to the topic I will discuss here.

It may be true that public institutions replace perceived losses of state appropriations with higher tuition and fees (Cheslock, 2006; Fethke, 2011; Gillen, 2012; Koshal & Koshal, 2000), but the literature I focus on here stems from the question: when the source of a portion of the total revenue an institution takes in changes, do institutions then spend their money differently? If so, in what ways do institutions spend their money differently? In this section, I will discuss the changes in expenditures broadly and highlight trends associated with the changes. Then, I will discuss the research performed on each expenditure category including research as to what association that expenditure category has on student outcomes if that research exists.

Trends in Expenditures

Getz and Siegfried (1991) and Harter, Wade, and Watkins (2005) argue that institutions vary their expenditures across their several functional areas in an attempt to try to increase their prestige as much as possible. The work done by these researchers demonstrates that institutions

do not adjust their expenditures at the same rate for all their functional categories over time. The main source of data that researchers in this area tend to use comes from the Integrated Postsecondary Education Data System (IPEDS) (Fowles, 2014; Getz & Siegfried, 1991; Harter et al., 2005; Leslie et al., 2011). As such, they often discuss the growth and relative growth in the following IPEDS defined functional categories: instruction; public service; academic support; student services; institutional support; plant operations; unrestricted scholarships; and mandatory transfers. Overall, they found each institutions spent more in each functional category, but each category did not grow more expensive at the same rate as all the others.

Desrochers and Hurlburt (2016) on behalf of the Delta Project on Postsecondary Costs provide a rich, descriptive analysis concerning the changes in institutional expenditures over time. Indeed, for most four-year public institution types (research, master's, bachelor's), CPI adjusted spending increased over four (i.e. instruction, student services, academic support, institutional support) of the seven expenditure areas from 2003-2013. Harter et al. (2005) found that between 1989 and 1998, public service, student services, institutional support, and unrestricted scholarships grew faster than instructional spending. Getz and Siegfried (1991) and Harter et al. attribute increasing expenditures – beyond the rate of inflation – to declining enrollments, increases in faculty salaries, and non-instructional expenditures. Additionally, a drive to increase the faculty to student ratio tended to be a driver in total expenditure costs.

Types of Expenditures

Instructional expenditures. IPEDS defined instructional expenditures as, "a functional expense category that includes expenses of the colleges, schools, departments, and other instructional divisions of the institution and expenses for departmental research and public service that are not separately budgeted" (Delta Data Dictionary, 2015). It should be noted that

within the category of instructional expenditures that IPEDS does not disaggregate all research and instructional support from this category (Leslie et al., 2011). While there are separate categories for research and public service expenditures, the time budgeted into faculty salaries for research and public service is considered an instructional expense. Only when there is additional funding for these items outside the budgeted salary does IPEDS report expenditures in those areas. Therefore, not all items in the instructional expenditures category are purely instruction related.

Fowles (2014) and Leslie et al. (2011) find that changes in instructional expenditures is linked with changes in funding source. Leslie et al.'s findings highlight the relationship between funding source and spending on instruction. Indeed, at the average public institution, for every dollar in additional tuition revenue, institutions put about 46 cents of that towards instruction, while at the average private institution, a dollar increase in tuition was associated with a 47 cent increase in instructional expenditures (Leslie et al., 2011). Compared to all other revenue categories, tuition increases are the most likely driver of increased spending on instruction (Leslie et al., 2011). Fowles (2014) confirms this association in his study showing that as public institutions have become more dependent on tuition revenue than state appropriations over time, they put more of the budget towards education and education related expenses and less towards other expenditure categories.

Research about students choosing not only whether to attend college, but also, what college to attend, highlights this strong link between tuition and instruction. In examining various student cohorts, Long (2004) found that tuition has played much less of a factor for non-low-income students entering college in 1972 than in 1992. However, quality (as measured by instructional expenditures) was a determining factor for those students who were already college

bound. Indeed, every $1000 a college spent towards the instruction category was associated with a 7.5% increase in the likelihood a student would choose a college over other colleges (Long, p. 294).

Research. IPEDS defined research expenditures as "a functional expense category that includes expenses for activities specifically organized to produce research outcomes and commissioned by an agency either external to the institution or separately budgeted by an organizational unit within the institution" (Delta Data Dictionary, 2015). Changes in research practices and research expenditures have a strong association with changes in funding source (Leslie et al, 2011; Slaughter & Leslie, 1997). In describing the many different facets of *academic capitalism*, Slaughter and Leslie discuss that the source of funding has been found to alter the types of research that faculty perform. Indeed, over time, research revenue for higher education became restricted so that those funding research (e.g. federal and state governments) could place pressure on institutions to get the types of research they believed should be done put first and foremost (Slaughter & Leslie, 1997).

Leslie et al. (2011) found similar results in their more updated empirical analysis. For the average public research institution, a one dollar increases in tuition was associated with a 5 cent increase in instruction, and a one dollar increases in state appropriations was associated with an 11 cent increase in instruction (Leslie et al., 2011). Grants and contract and gifts were the two categories most strongly associated with increases in research spending for the average public research institution. Indeed, a one dollar increases in revenue from grants and contracts was associated with a 50 cent increase in research expenditures, and a one dollar increases in gifts was associated with a 55 cent increase on research (Leslie et al., 2011). It tends to be the case that the grants and contracts are restricted funds, so that money must be earmarked for research

and cannot necessarily be directed where the institution could use it more dexterously (Slaughter & Leslie, 1997). Thus, the connection between grants and contracts and research expenditures manifests itself as a large association between grants and contracts revenue and research expenditures.

The even larger association between gifts and research expenditures likely stems from the institutions likely specifically looking for donors to give to research causes that they care about (Cheslock & Gianesschi, 2007). This appears to be the case; Cheslock and Gianneschi (2007) found that institutions with research extensive missions were able to replace losses in state appropriations with gifts at a more significant rate than similar schools that did not have strong of a research component. This could be due to the idea that donors with special research causes in mind would want to use higher education researchers to meet those unique research needs (Cheslock & Gianneschi, 2007).

Student services. IPEDS defined student services expenditures as "a functional expense category that includes expenses for admissions, registrar activities, and activities whose primary purpose is to contribute to students emotional and physical well-being and to their intellectual, cultural, and social development outside the context of the formal instructional program" (Delta Data Dictionary, 2015). At public research institutions, Leslie et al. (2011) found that all categories of revenue (except 'other') had a statistically significant association with student services expenditures. For public research institutions, changes in tuition and gifts were associated with the largest changes in student services expenditures (Leslie et al., 2011). A one dollar change in tuition revenue was associated with an eight cent increase in student services expenditures, and a one dollar change in gifts revenue was associated with a seven cent increase in student services expenditures (Leslie et al., 2011).

Other studies have attempted to understand why student services expenditures increases. These studies and the media tend to play off of the idea that colleges are in a so-called "amenities arms race" (Dur & Glazer, 2007; Jacob et al., 2018; Kadamus, 2016; McCarthy, 2015; Newlon, 2014). The media claims that colleges are competing against each other in building and providing ultra-posh amenities in order to try to win over students and get them enrolled (Kadamus, 2016). While food service was once a cafeteria worker serving canned corn (Scott, 2014), students now are able to order aromatic spiced chicken over forbidden brown rice (McCarthy, 2015).

The academic side of the discussion, while approaching the topic from a social science lens, still focuses on the amenity aspect of student services (Dur & Glazer, 2007; Ehrenberg, 2002; Jacob et al., 2011). Indeed, Dur and Glazer (2007) titled their article "Subsidizing Enjoyable Education," and Jacob et al. being their article's title with "College as Country Club." While, as mentioned in Chapter 1, spending on student services helps students, especially low-income students, graduate, these academics attempt to discover whether institutions have gone beyond helping students and creating this posh lifestyle.

Jacob et al. (2018) argue that student-institution match with drive the amount institutions charge (tuition and fees) for the consumption side of education (as part of student services). They found that high-ability students who strive for academic rigor in their college value colleges that place more emphasis on instructional expenditures, while students who have shown themselves to be lower-ability with high-wealth compared to their high-ability peers value institutions that place more emphasis on student services and creating more consumptive experiences for students. The link between tuition and student services at public institutions (Leslie et al., 2011) follows this idea. Students who have both high-wealth and high-ability will

have an equal preference for instructional expenditures and student services expenditures (Jacob et al., 2018). Those students will gravitate towards private institutions but prefer increases in tuition to go towards academic prestige over amenity prestige. Lower-ability students with high-wealth will prefer the opposite, but would likely not be academically successful enough, on average, to get into a competitive private research institution, and would thus be drawn to a public research institution with prestigious amenities.

Other expenditures. Aside from Leslie et al.'s (2011) article on how revenue variations affect expenditures across various categories at research institutions, the literature lacks a thorough examination of what causes or is associated with changes in public services, academic support, institutional support, and scholarships, which are the final major expenditure categories for institutions. These categories are a significant cost to institutions (Desrochers & Hurlburt, 2016), and, controlling for inflation, the amount of money institutions are putting towards these categories has been increasing over time. Fowles (2014), in his work on resource dependence and expenditures, rolls all those other expenditures into a general expenditure category. Webber and Ehrenberg (2010), in examining expenditures' effect on graduation rates, only add academic support as a variable of interest to instruction, research, and student services, while omitting public services, institutional support, and scholarships.

Public services. IPEDS defined public services expenditures as "a functional expense category that includes expenses for activities established primarily to provide non-instructional services beneficial to individuals and groups external to the institution" (Delta Data Dictionary, 2015). Leslie et al. (2011) found a statistically significant association for all revenue categories with public services expenditures for public research institutions. The associations are also financially significant for tuition, appropriations, and gifts. The associations between tuition and

public services expenditures and appropriations and public services expenditures helps contribute to Fowles's (2014) theory of resource dependence in higher education. For every one dollar increase a public research institution derives from tuition, we should expect 20 cent decrease in expenditures on public services on average and for every one dollar increase a public research institution derives from appropriations, we should expect 10 cent increase in expenditures on public services on average (Leslie et al., 2011). Thus, as institutions become more reliant on the public for money, the more institutions provide support to the public.

Academic support. IPEDS defined academic support as "a functional expense category that includes expenses of activities and services that support the institution's primary missions of instruction, research, and public service" (Delta Data Dictionary, 2015). Not much has been written about expenditures on academic support, and even less has been written on why the amount spent in this area ought to change over time (Desrochers & Hurlburt, 2016; Leslie et al., 2011; Webber & Ehrenberg, 2010). Webber and Ehrenberg findings concerning what kinds of expenditures help students graduate may shine a light on this. They found that when comparing spending on student services vs. spending on academic support, spending on student services helped Low SAT/High Pell bachelor and master's degree seeking students far more than spending on academic support. Spending on academic support was shown to be a positive influence on the graduation rates of High SAT and PhD students.

Leslie et al. (2011) found that increases in revenue from gifts was associated with the biggest, positive increase in academic support. Given that Leslie et al. examined only research institutions, this result makes sense in the context of Cheslock and Gianneschi's (2008) findings on donation behaviors. That is, donors will donate to prestigious institutions or prestigious causes (restricted funds) to raise their own prestige. This also follows in line with the theory of

what is called the Matthew Effect, in which wealthy institutions are able to use their wealth to become even more wealthy at a rate greater than less wealthy institutions (Cheslock & Gianneschi). Additionally, as alumni donors prefer to see their money go to specific areas (Cheslock & Gianesschi, 2008), many of those areas fall under academic support such as libraries and museums.

Institutional support. IPEDS defined Institutional support expenditures as "a functional expense category that includes expenses for the day-to-day operational support of the institution" (Delta Data Dictionary, 2015). The literature on changes in institutional support over time (i.e. administrative activities not budgeted elsewhere), are mostly discussed in the literature as bureaucratic growth in higher education.

One reason institutional support expenditures have increased over time is changes in governmental regulations over higher education institutions has caused bureaucratic growth (Getz & Siegfried, 1991; Vedder, 2004). Title IX compliance requires more and more lawyers (Vedder, 2004). Institutional review boards to gauge ethical practices in research, especially research using animals have grown as compliance rules have gotten stricter (Vedder, 2004). Campus police and safety measures have become costlier as students and government call for more and better campus security (Getz & Siegfried, 1991).

Another theorized reason for growth is that institutions hire administrators to handle changes in revenue (Slaughter & Leslie, 1997). During times of organizational turbulence, for example, sudden, unexpected decreases in state appropriations, institutions will search for alternative revenue sources. As part of that search, institutions will hire individuals for the purpose of being strategic in competing for those resources that other similar institutions are seeking (Slaughter & Leslie, 1997). Additionally, securing these new funding sources tends to

be out of faculty expertise, so asking faculty to secure private gifts as part of their service would not be as efficient as having those faculty conduct research, and the faculty would likely prefer researching over finding donors to fund a new project (Slaugher & Leslie, 1997).

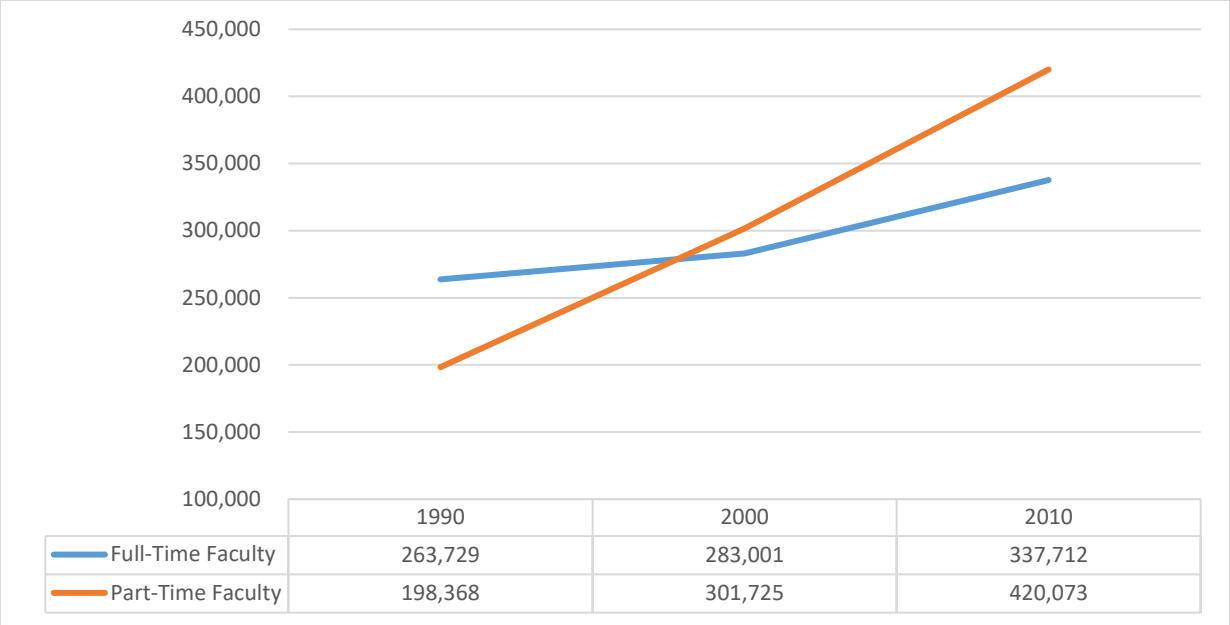
Scholarships. The definition of what counts as a scholarship changed over time. From 1987-1996 IPEDS defined scholarship expenditures as "the gross amount of grant aid provided to students, regardless of grant source" (Delta Data Dictionary, 2015). From 1997-2013, IPEDS defined scholarship expenditures as "the amount is the sum of all operating expenses associated with scholarships and fellowships treated as expenses because the institution incurs an incremental expense in the provision of a good or service" (Delta Data Dictionary, 2015). Generally, scholarship expenditures refer specifically to scholarships and fellowships offered by an institution. Money that flows to a student from a third-party scholarship provider is not included (Leslie et al., 2011). Leslie et al. only find a moderate association between revenue category and scholarships. Tuition was the strongest and most economically significant revenue variable that was associated with changes in scholarships (Leslie et al., 2011). Indeed, a positive one dollar change in tuition revenue was associated with an 11 cent increase in scholarship expenditures at public research institutions (Leslie et al., 2011).

Contingent Faculty Employment

Researchers have examined the rising proportion of contingent faculty for some time (e.g. Gappa, 1984; Gappa & Leslie, 1993; Tuckman, 1978). Contingent faculty exist in one of two groups (Jaeger & Eagan, 2009, 2011; Kezar & Sam, 2010). The first group consists of faculty who are on a part-time or adjunct basis and are hired to teach class by class. The second group consists of faculty who are hired full-time but do not have tenure or tenure-track appointments. The first key discussions concerning the modern iteration of the rising proportion of contingent

faculty began in 1978 through the American Association of University Professors (AAUP) trade publications (Tuckman, 1978; 1981), and scholars began writing books about the subject in the early 1980s (Gappa, 1984; Leslie et al. 1982). Indeed, this change has persisted so long, that the New Faculty Majority, a not-for-profit contingent faculty advocacy group formed in 2009, and in 2012, received official 501c(3) status from U.S. government allowing it to conduct research on behalf of helping contingent faculty.

Desrochers and Kirshtein (2014) in their descriptive analysis of the changes in faculty employment demonstrate that over-time there has been a decrease in full-time faculty and increases in part-time faculty relative to the number of students in higher education. Figure 1 shows the count change of faculty types from 1990 to 2010 for all four-year public institutions. Figure 1 contains a visualization of the count change over the 20 years that Desrochers and Kirshtein (2014) describe. Indeed, the gap between full-time and part-time faculty flipped and grew larger towards the part-time faculty count comparing 1990 and 2010.

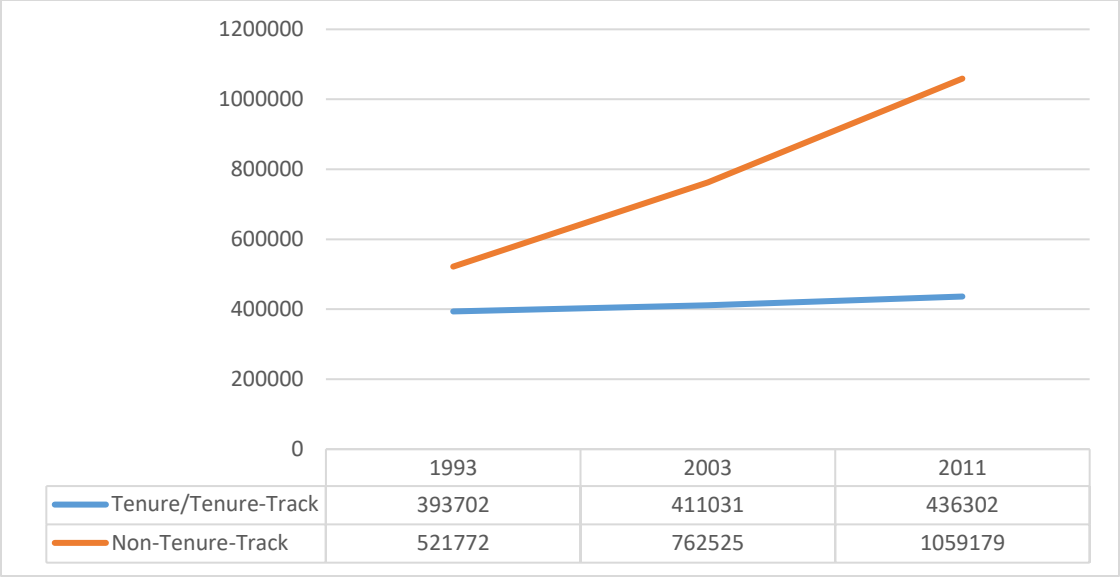


	1990	2000	2010
Full-Time Faculty	263,729	283,001	337,712
Part-Time Faculty	198,368	301,725	420,073

Note. The counts used in this table are drawn from Desrochers and Kirshtein's analysis which uses data from the Delta Cost Project's IPEDS Database. They broke out counts by institution type, but I combined them here to adjust for later discussions.

Figure 1. Changes in Counts of Faculty Type (Full-Time and Part-Time) from 1990 – 2010.

Curtis (2014), on behalf of the AAUP, provides another view into changes in contingent faculty employment through examining changes in the number of tenure-track and non-tenure-track faculty over time. As can be seen in Figure 2, the count of tenure-track faculty has remained fairly stagnant over the course of nearly 20 years compared the changes in the counts of non-tenure-track faculty.



Note. The counts used in this table are drawn from Curtis's (2014) analysis which uses data from the National Center for Education Statistics' Fall Staff Survey. The data were originally broken out into additional faculty types, but I combined them here to match the discussion in this dissertation.

Figure 2. Changes in Counts of Faculty Type (Tenure-Track and Non-Tenure Track) from 1993 – 2011.

In the remainder of this section on faculty employment, I will discuss the empirical evidence concerning what has been shown to affect faculty employment and the empirical evidence concerning the trade-offs in academic quality if core or contingent faculty teach students.

Empirical Evidence on the Determinants of Faculty Employment

Studies focusing on the changing nature of faculty employment tend to focus on one of three areas: the effect of various faculty types on students (e.g. Bettinger & Long, 2010; Ehrenberg & Zhang, 2005; Umbach, 2007), the effect of faculty changes on institutional governance (e.g. Gappa & Leslie, 1993; Kezar & Sam, 2013), and the causes of the changes in faculty employment (e.g. Cheslock & Callie, 2015; Slaughter & Leslie, 1997, Zhang & Liu, 2010). In this section, I will provide background concerning the third focus area, the causes of changes in faculty employment. In addition to simply discussing faculty counts, faculty salaries

are closely entwined with faculty employment (Roemer & Schnitz, 1982) and should also be discussed alongside changes in faculty employment.

While I will demonstrate in the following section, that the literature strongly argues that institutions change their contingent faculty employment in response to internal and external changes, Cheslock and Callie (2015) note that faculty composition and salaries are often slow to change given the nature of higher education institutions. Tenure provides a stabilizing force keeping the size and composition of core faculty at mostly consistent levels from year to year. Additionally, higher education institutions will be reluctant to make sweeping changes as they could affect the educational quality of the institution (Cheslock & Callie, 2015). As a dire financial situation approaches, salaries would likely be frozen as a first step before even furloughs would be considered (Cheslock & Callie, 2015). However, these freezes and furloughs in dire times could move average salaries and faculty composition as administrators might seek to appease core faculty more so than contingent faculty. The changes to faculty composition must be thought of in terms of long-term trend changes and not simply shocks to the system.

Additionally, much of the literature assumes that as institutions open up faculty spots, that there will always be a faculty member to take that position. Kim, Morse, and Zingales (2009) argue that this is not necessarily the case at all institution types. Some faculty, historically, have been able to look for institutions with certain characteristics, such as high research productivity. They argue that this effect of elite, research faculty selecting only elite, research institutions has dwindled over time. Indeed, by the time Merit Aid programs (as discussed in the previous section) came to be, the findings of Kim, Morse, and Zingales (2009) seem to indicate that the institutions, not prospective faculty, ought to be the sole drivers of the changes in the ratios of contingent faculty across institutions.

The literature on the association between expenditures and faculty employment focuses on what internal or external factors have been found to be the potential cause of changes in faculty employment. Additionally, the controversial topic of remedial education has also been shown to be a driver of changes in contingent faculty employment. In the next subsections, I will discuss key internal factors (faculty salaries, institutional characteristics, and the composition of the student body) and external factors (state appropriations and endowment changes) that are known to be associated with or affect faculty employment.

Salaries. The salaries paid to full-time professors have been found to be a driving factor in the employment of contingent faculty (Cheslock & Callie, 2011; Ehrenberg & Zhang, 2004; Liu & Zhang, 2007; Zhang & Liu, 2010). Across the key studies linking full-time faculty compensation and the employment of contingent faculty, the researchers consistently found that as the salaries of full-time faculty increased, new proportion of contingent to full-time faculty increased as well. Zhang and Liu (2010) argue that this phenomenon occurs as senior administrators view hiring and retaining top faculty as an investment in the prestige of an institution and will deploy slack resources towards these full-time faculty given the slack resources are high enough. When slack resources are low, adding more prestigious faculty becomes too costly of an investment, and those same administrators will view it in the best interest of the institution to hire contingent faculty in order to reduce costs during low-budget times.

Institutional Characteristics. Zhang and Liu (2010) found, unsurprisingly that wealthier institutions, (i.e. institutions that are able to draw the highest revenues) employ more core and full-time faculty and fewer contingent faculty. Additionally, these wealthier the institution the more tenure/tenure-track that institution employs. Leslie et al. (2012) argue that

this effect exists due to Bowen effects. That is, wealthier institutions want to get the best faculty possible in order to maximize their prestige. In turn, the best faculty tend to want to be full-time, tenure/tenure-track. Since wealthy institutions can afford the best, they hire the best as part of their prestige maximization efforts.

If an institution exists in a large city or a suburb, all other things being equal, institutions hired more contingent faculty on average (Zhang & Liu, 2010). These institutions are able to employ more contingent faculty as in more densely populated areas, there are more contingent faculty who are able to be hired. Indeed, some contingent faculty are not hired simply by one institution. In cities with many colleges, some faculty may hold adjunct teaching appointments with several colleges (Gappa & Leslie, 1993).

Private institutions, compared to their public counterparts, tend to employ more part-time faculty (Zhang & Liu, 2010). Zhang and Liu suggest that this is due to private institutions pursuing cost savings at a greater rate and being more concerned with economic efficiency than public institutions.

Institutions with strong STEM programs tend to have more full-time faculty and fewer part-time faculty compared to schools with fewer STEM programs in their portfolio (Zhang & Liu, 2010). This is likely due to qualified STEM faculty having more options outside of academia, as their skills are more transferable to fields in the private sector. Zhang and Ehrenberg (2010) examining the relationship between faculty employment and research and development expenditures found similar results. They found that increases in full-time, tenure/tenure-track faculty correlated most strongly with increases in research and development expenditures, while increases in part-time faculty correlate much more weakly with increases in research and development expenditures.

Having a medical school also is associated with increases contingent faculty and full-time instructors and a decrease in tenure/tenure-track faculty (Zhang & Liu, 2010). Medical schools have very low student-to-faculty ratios, so we should see an increase in faculty in general compared to similar institutions without medical schools. The background that qualified instructors have would lead those instructors not to be as concerned with being tenure/tenure-track as faculty in other fields, and these faculty would likely be content with being instructors. Additionally, some of the contingent faculty in the medical school could be about to retire and wanting to impart their knowledge part-time to the next generation of doctors.

Student body composition. The type of students that institutions enroll can, in part, dictate the faculty types that administrators must or want to hire. As an institution enrolls more part-time students, we should expect the number of part-time faculty per full-time equivalent student to increase as well (Zhang & Liu, 2010). Slaughter and Leslie (1997) note that institutions tend to take on the characteristics of their resource providers. Thus, as an institution has a larger share of part-time resource providers (i.e. tuition payers), that institution would then begin to reflect that with more part-time faculty.

Interestingly, very wealthy schools that tend to attract the top students have been found to count on those best students to teach each other (Winston, 1999). Indeed, Harvard, in the early 1990s, was found to employ teaching assistants to teach the majority of large lecture courses in the social sciences by counting on high quality student peers to engage in the teaching and learning process (Clotfelter, 1996).

State appropriations. State appropriations, and often argued, insufficient amounts of state appropriations are often the first to be cited as the cause of increased reliance on contingent faculty at public higher education institutions (Amacher & Meiners, 2004; Gappa & Leslie,

1993; Grubb, 1999; Mortimer et al., 1985; Slaughter & Leslie, 1997). Mortimer et al. (1985) argue that the state budgetary process creates too much uncertainty about future funds for an institution, and the institutions then argue that they need to have a flexible workforce at their disposal to handle that uncertainty.

Gappa and Leslie (1993) observe that a state's budgeting process affects the hiring of part-time faculty, particularly when administrators speculate that a shortfall in state appropriations is on the horizon. Further, they argue that often, administrators claim to plan to hire new, core faculty for an upcoming academic year, and then when state appropriations fall below the original plan, those administrators enter a "mini-crisis" (Gappa & Leslie, 1993) and state they must adjust plans and hire contingent faculty instead in order to protect the finances of their institution. Indeed, this budget-cycle game between institutional responses to state budgeting has nearly become a ritual for many institutions (Gappa & Leslie, 1993).

Endowments. Research has shown that doctoral universities vary the salary structure, faculty count, and ratio of contingent to core faculty as endowment levels change (Carbone & Winston, 2004; Brown et al., 2014; Mortimer et al., 1985; Winston, 2004). Mortimer et al. (1985) found that chief academic officers often claim uncertainty about future giving and the nature of their endowments as a reason to need flexibility in their ability to spend money. This flexibility is often found in hiring contingent faculty.

Brown et al. (2014), studying the effects of market shocks on endowments found that these shocks can cause institutions to adjust their faculty hiring practices. Specifically, negative shocks, (i.e. loss of endowment funds) are strongly related to a reduction in the number of tenure track faculty. Indeed, "a negative endowment shock equivalent to 10 percent of a university's budget leads to a 4.9 percent reduction in the number of tenure-system faculty during the

following year (either through less hiring, greater attrition, or more dismissals)" (Brown et al., 2014, pp. 933-934). Alternatively, they found that when it came to positive shocks in endowment (e.g. sudden, large gifts) had no effect, likely due to the prestige factor that senior administrators receive by growing their institutions' endowments. Additionally, Brown et al. (2014) found no association between the employment of adjunct faculty and endowment shocks.

Remedial education. Another cause of the increase of contingent faculty stems from state policies regarding the remediation of underprepared undergraduate students (Gappa & Leslie, 1993). There are a few key issues stemming from the remediation problem. First, more and more students are being found to need remediation. Second, many core faculty do not have the skill set or, sometimes, desire to perform this type of work. Third, some states have policies against higher education institutions funding the remediation of students. It is argued that if the state already paid for that person to be educated, why should the state pay again? (The Alliance, 2011). As a result, remediation can be a costly endeavor that is difficult to fund, and to find qualified, enthusiastic core faculty to perform this task is exceedingly difficult. Many institutions that do offer remediation will choose high school teachers to moonlight as remedial instructors, thus adding additional contingent faculty to the institutional faculty count (Gappa & Leslie, 1993).

Empirical Evidence on the Effect of Faculty Type

In this dissertation, faculty employment mainly serves as a test case to determine whether institutions alter behaviors when their funding source changes. Though faculty employment is not the focus of the study, the reason faculty employment changes is a concern has yet to be addressed here. The answers to the question of why faculty employment is a concern falls into two main research categories. The first grouping consists of research regarding the professional

lives of contingent faculty, specifically as it relates to their treatment by the institution or institutions for whom they work (Charfauros & Tierney, 1999; Kezar & Sam, 2013). The second grouping consists of research regarding contingent faculties' ability to support students in their learning endeavors (Figlio et al., 2015). As this dissertation focuses on the effect of a scholarship program adoption, I focus on the effects faculty have on student success and how this varies by contingent faculty type.

Part-time/adjuncts. Umbach (2007) found "part-time faculty use active and collaborative techniques less frequently than tenured and tenure-track faculty. They also challenged their students significantly less and spent significantly less time preparing for class than their more permanent peers" (p. 102). In contrast, Bettinger and Long (2010) found that the use of adjuncts within professional disciplines, such as education and engineering, was linked to students continuing to take courses within those fields, conjecturing it could be due to the fact that many adjuncts in those fields are older professionals with occupational experience working in those fields. In a unique study examining freshmen behavior at Northwestern University, Figlio et al. (2015) found that when a student has a course in a subject area, students who had a contingent faculty member were more likely to take the next, more advanced course in the sequence. In addition, compared to the students who had a tenure-track faculty member in the first course, the students who had a part-time/adjunct professor in the first course received a .052 higher GPA for the second course in the sequence.

Full-time/non-tenure-track. Furthermore, Umbach (2007) found full-time, non-tenure-track faculty were more similar to the tenured and tenure-track faculty but still challenged students less than their peers. In addition, Umbach (2007) found increased employment of contingent faculty in general was associated with less non-class interaction between faculty and

students at an institution. Ehrenberg and Zhang (2005) ask whether tenured and tenure-track faculty matter in the outcomes of undergraduate students. In examining the persistence rates of undergraduate students, they discover higher exposure to contingent faculty was associated with lower graduation rates. Further, this effect was greater at public institutions over private institutions. In the same Figlio et al. (2015) study mentioned in the previous paragraph, Figlio et al. (2015) examined full-time/non-tenure-track faculty's effectiveness compared to tenure-track faculty. Indeed, students who took the second course in a sequence, after taking the initial course from a full-time non-tenure-track faculty, received a .062 higher GPA than the students who had a tenure-track faculty member in the first course.

Conceptual Framework

I ground this study in multiple theories to describe the predicted relationship between merit aid adoption and institutional behavior. First, I used resource dependency theory as the guiding framework as changing dependencies act as the impetus for institutions deviating from their average behaviors. While resource dependency theory demonstrates that institutions ought to change behavior, other theories help predict what kind of behavior changes to expect. To predict changes in spending among the various functional expense categories, I call upon Bowen's (1980) revenue theory of cost to predict the relative change in each expense category. To predict changes in faculty employment in light of merit aid adoption, I call upon internal labor market theory to describe the expected institutional changes in the contingent faculty employment.

Resource Dependency

Resource dependency theory serves as the main guiding theoretical framework for this study. Drawing on organizational open-systems theories, resource dependency theory acts as a

lens to help researchers focus on the way in which an organization interacts with its environment (Powell & Rey, 2015). More specifically though, resource dependency theory acts as a way to understand why institutions must vary their behaviors in response to changes in behavior of their resource providers. Pfeffer and Salancik (1978) discuss the three critical factors critical in determining whether an organization is dependent.

> First, there is the importance of the resource, the extent to which the organization requires it for continued operation and survival. The second is the extent to which the interest group has discretion over the resource allocation and use. And, third, the extent to which there are few alternatives, or the extent of control over the resource by the interest group, is an important factor determining the dependence of the organization (pp. 45-46).

Public higher education institutions, by definition of these criteria, are resource dependent on whoever provides money to them. Historically, the resource that mattered most to these institutions is state appropriations (Slaughter & Leslie, 1997). Traditionally, public institutions derive large parts, if not the largest part, of their funding from state and local governments. Secondly, state governments have a great control over the way money for higher education funding is distributed (Slaughter & Leslie, 1997). Thus, when an institution's environment changes, that institution must adapt to those external forces or else that institution will have decreased changes for organizational survival and sustainability (Powell & Rey, 2015).

Slaughter and Leslie (1997) discuss at length the influence of external control of higher education institutions through a resource dependency theory lens. Applying resource dependency theory to higher education, they note, "In particular, resource dependence holds that those who provide resources to organizations such as universities have the capability of exercising great power over those organizations" (Slaughter & Leslie, 1997, p. 68). They also note governments have historically given institutions autonomy, seeming to imply governments could have exercised more power over the institutions given their dependence on those governments. Public

institutions' dependence on funding still permits some indirect control by governments over institutions (Slaughter & Leslie, 1997). This is evidenced by institutions acting ever more entrepreneurially as appropriations from states have consistently declined (Slaughter & Leslie, 1997; Slaughter & Rhoades, 2004).

Fowles (2014) argues that resource dependency theory provides a straightforward way of examining institutional choices as higher education institutions look to their environments to determine how to adapt to serve clientele better. When the clientele is the state, state goals, such as public service, ought to have great importance to an institution as they are the revenue providers. When the clientele is students, what students value, such as instructional expenditures, ought to have great importance to an institution. However, institutions draw resources from multiple stakeholder groups and provide multiple services to those stakeholders (Fowles, 2014). As such, the percentage of total budget that changes over time for various expenditure categories should vary with importance to revenue provider.

Empirical Applications. Institutional leaders' beliefs that their institution is more beholden to one resource provider over another can influence institutional behaviors (Lowry, 2001). In examining institutional characteristics that influence behaviors concerning tuition setting and functional expense categories, Lowry (2001) discovered that institutions with elected (i.e. not appointed) coordinating boards would try to support more spending on students (e.g. instruction and student services) and keep tuition low. On the other hand, institutions with appointed governing boards, who, as he notes, is often more influence by faculty and administrators have less concern with tuition and will support spending in areas other than instruction and student services.

Fowles (2014) found that as institutions become more dependent on tuition dollars for share of total revenue, expenditures on education and related (E&R) expenses increased at public four-year institutions. In examining the relationship between revenues and expenditures at public research institutions, Leslie et al. (2011) found that for every $1 brought in from tuition, institutions would spend about $0.46 of that on instruction and would decrease spending on public services by about $0.20. In studying college completion rates of students, Titus (2006) found that as institutions rely more on student tuition, the students from that institution were more likely to complete their degree programs. This bolsters the concept that as institutions rely upon students more for their resources, they put more effort into helping students succeed.

Studies on performance based funding draw on resource dependency theory to provide insight into whether institutions respond to the desires of resource providers. With performance based funding, institutions understand what is explicitly wanted from them through a funding formula concerning whether institutions meet their goals or not (Nisar, 2014). Tandberg and Hillman (2014) found that performance based funding had little to no effect on the institutional behavior of increasing graduation rates. Sanford and Hunter (2011) estimated different results in examining performance based funding in Tennessee. Institutions did not appear to alter behavior enough to earn the additional funds. They argue that the amount of funding compared to already earmarked state appropriations were not large enough to influence behavior.

Qualitative research has indicated that campus officials speak as though they take performance based funding into account. In interviews with institutional administrators at the University of Minnesota, Hearn et al. (2006) found that institutions do try to prioritize what the state wants when additional money is involved. Martinez and Nilson (2006) found a similar result with administrators from the South Dakota University System. While the funding

associated with performance in South Dakota was 5% of state appropriations, the administration viewed the performance goals as symbolic of the goals of the state officials for South Dakotan higher education.

Bowen's Revenue Theory of Cost

Prestige maximization lies at the heart of Bowen's revenue theory of cost (Bowen, 1980). Bowen theorized institutions will raise as much money as they are able in order to maximize their prestige. Theorizing that institutions will always act in a manner to increase prestige Bowen created the following hypotheses of higher education revenues and expenditures, which he calls laws:

1. The dominant goals of institutions are educational excellence, prestige, and influence.
2. In quest of excellence, prestige, and influence, there is virtually no limit to the amount of money an institution could spend for seemingly fruitful educational ends.
3. Each institution raises all the money it can.
4. Each institution spends all it raises.
5. The cumulative effect of the preceding four laws is toward ever increasing expenditure.

More often than not, the research that draws upon Bowen's theory discusses the phenomenon of rising costs in higher education as this theory provides a thorough lens of understanding institutional price setting and spending behaviors. Martin (2009), calling upon Bowen's (1980) theory, refers to higher education costs as "the black hole that cannot be filled" (p. 12). Bok (2003) compares institutions to compulsive gamblers and exiled royalty claiming there is "never enough money to satisfy their desires" (p. 9). Ehrenberg (2002) argues that administrators want their institutions to be the very best in nearly everything they do and seek out as many resources as possible to make those areas the very best.

Internal Labor Market Theory

Internal labor market (ILM) theory focuses on internal labor markets decided by top down administrators within organizations as opposed to external labor markets and economic pressures. This theory, developed by Doeringer and Piore (1971) argues that an organization's "internal labor market, governed by administrative rules, is to be distinguished from the external labor market of conventional economic theory where pricing, allocating, and training decisions are controlled directly by economic variables. (pp. 1-2). ILMs are governed by administrative policies, while external labor markets are pressured by traditional pricing and resource allocation economics (Rosenblum & Rosenblum, 1990). ILM theory posits administrators in organizations may design employment sub-systems to maximize economic efficiencies (Liu & Zhang, 2007; Rosenblum & Rosenblum).

Simplifying the theory for understanding the higher education faculty context, we find that institutions often hire two sets of employee types: core and peripheral. Core employees often come with high costs (salary and benefits) and are rigid in their employment. Peripheral employees are hired at a lower cost and their employment is flexible (Capelli & Neumark, 2004; Liu & Zhang, 2007; Osterman, 1987). The research considers tenure track faculty who have guaranteed lifetime employment – assuming tenure is reached and there is no reasonable action to terminate – core faculty employees. All other faculty who institutions hire based on contracts of varying lengths are considered peripheral faculty; though some research will refer to peripheral faculty as contingent faculty[5] (Jaeger & Eagan, 2009, 2011; Kezar & Sam, 2010).

[5] Throughout the dissertation, I use the term contingent as the term is more closely aligned with the body of higher education research that this dissertation aims to be part of.

This theory is especially apt for this study, because an essential part of the theory concerns itself with how organizations respond to changing economic conditions in their hiring practices. Tenure-track or tenured faculty are often paid more, have greater benefits, and have stronger job security than other faculty members (Liu & Zhang, 2007). Universities often assign part-time faculty courses that many full-time faculty often prefer not to teach, such as large lecture hall courses, remedial courses, and courses outside the hours of a traditional working day. In addition, they often do not sit on doctoral committees, do not receive a travel budget, or receive support to seek research grants (Liu & Zhang, 2007). Thus, part-time faculty cost universities' less to have on hand and also can be allocated in ways to improve market efficiencies for universities.

Research Questions and Hypotheses

The purpose of this study is to analyze whether institutions alter their behavior as their revenue streams change. To understand one facet of this potential change, I measured changes in two institutional behaviors, institutional expenditures and contingent faculty employment, after the state in which an institution is located adopts merit aid program. I created the following research questions to answer for this study.

Research Question 1. How do institutions alter their expenditures after the state in which they reside adopts a merit aid program?

Research Question 2. How do institutions alter their contingent faculty employment after the state in which they reside adopts a merit aid program?

As demonstrated by the research on resource dependency, as funding source changes we ought to expect institutions to act differently. When states adopt merit aid programs a major change in resource dependence occurs. Using Pfeffer and Salancik's (1978) definition of resource

dependence, public institutions before merit aid were had a mix of funding with much of it coming from tuition and their respective states. After merit aid adoption, students' discretion over where their funds went and the amount of funds at students' discretion changed. Thus, they tuition and state appropriations mix changed as well. This shift to utilizing students as the central source of resource ought to affect institutional behaviors.

Resource Dependency and Bowen's Revenue Theory of Cost

Drawing from Bowen's (1980) laws and research suggesting that institutions alter expenditure behaviors as revenue streams are altered, it follows that when a state adopts a merit-aid program, a fundamental shift in revenue has occurred, and thus a shift in expenditures would likely co-vary or soon follow. The fundamental shift that occurred after merit aid was adopted manifested in two key changes. First, academically inclined[6] students changed their preferences as far as which higher education institutions to attend (Cornwell et al., 2006; Dynarski, 2004, 2008). Given that most merit aid programs require students to attend an in-state, public institution, merit aid earners who might have gone to out-of-state or private institutions will have a stronger preference for in-state schools. Second, while the state provides the merit aid funds, it is the students who direct the funds. If institutions want to capture the funds associated with merit aid earners, then institutions will have to increase spending on areas that students prefer. Institutions may also not change or decrease spending in areas that other resource providers cared about more.

Predictions for Increased Expenditures

The two theories in tandem predict that institutions will spend more in the functional areas that students either care about the most or will help improve student persistence. Of the

[6] Academically inclined meaning merit aid earners.

seven functional expenditure categories, if merit aid adoption did alter institutional resource dependency to be more reliant on students, then spending on instruction, academic support, institutional support, and scholarships should increase. I developed hypotheses for each of these areas to test in this dissertation.

Instruction - Hypothesis 1A. If merit aid adoption changed institutional dependencies, then relative to institutions in states that did not adopt a merit aid program, merit aid adoption will be associated with higher institutional spending on instructional expenditures.

When merit aid is adopted in a state, resource dependency predicts that institutions will spend more on the areas students care about. Instruction is one of the areas that students care about. As Jacob et al. (2018) demonstrated, more academically inclined students expect higher levels of instruction, and institutions tend to meet that expectation. Additionally, faculty salaries and institutional prestige relate very closely to each other (Melguizo & Strober, 2007). Faculty salaries are an instructional expenditure (Delta Data Dictionary, 2015). As Bowen's Revenue of Cost Theory predicts, institutions will justify putting as many resources as possible into capturing the revenue from merit aid, so instructional expenditures ought to increase after merit aid adoption since students care about the instruction at an institution.

Academic Support - Hypothesis 1B. If merit aid adoption changed institutional dependencies, then relative to institutions in states that did not adopt a merit aid program, merit aid adoption will be associated with higher institutional spending on academic support expenditures.

Academic support expenditures helps support higher ability students compared to lower ability students (measured by SAT scores) but has no differential impact on students of different economic backgrounds (Webber & Ehrenberg, 2010). As institutions see more students of

higher ability, theory predicts that academic support expenditures to be higher at institutions in merit aid adopting states. Not only do academic support expenditures have the potential to entice more merit aid earners to attend an institution, these expenditures might help merit aid earners persist longer at an institution allowing the institution to receive more years of revenue from that student.

Institutional Support - Hypothesis 1C. If merit aid adoption changed institutional dependencies, then relative to institutions in states that did not adopt a merit aid program, merit aid adoption will be associated with higher institutional spending on institutional support expenditures.

Managing the changes that come with merit-aid adoption will likely require more full-time administrators and support staff for all institution types (Slaughter & Leslie, 1997). Unlike nimbly employed adjunct faculty, these administrators and support staff, while likely only being hired to manage the initial change, will ultimately stay beyond that. A growing bureaucracy can help bring in more resources from merit aid earners in addition to supporting areas that brings an institution prestige. Resource dependency theory predicts that institutions in merit aid adopting states will have higher institutional support expenditures than institutions in states without a merit aid program.

Scholarships - Hypothesis 1D. If merit aid adoption changed institutional dependencies, then relative to institutions in states that did not adopt a merit aid program, merit aid adoption will be associated with higher institutional spending on scholarships and grants expenditures.

For all public institutions in a merit aid adopting state, there will be an increased in state competition in order to enroll the students who would have went out of state or to a more cost

effective institution. By enrolling students who would not have attended if they had not received a merit aid scholarship, institutions could both enroll more academically inclined students and capture the revenue from the merit aid scholarship. Following Bowen's theory, an institution raises all of the money it is able to and spends money in places that maximizes its prestige. Capturing the tuition revenue of the most academically inclined students thereby raising institutional prestige falls in line with Bowen's theory. Institutions could likely try to entice merit aid earners by offering additional funding to students in order to enroll as many merit aid earners as possible. Therefore, I expect scholarship and grants expenditures to be higher at institutions in states offering a merit aid program.

Predictions for No Change or Decreased Expenditures

Resource dependency theory (Pfeffer & Salancik, 1978) and Bowen's (1980) revenue theory of cost together predict that institutions will not alter their spending or spend less in the functional areas that are not a priority to students, especially the most academically inclined students. Of the seven functional expenditure categories, if merit aid adoption did alter institutional resource dependency to be more reliant on students, then spending on research, student services, and public services should either not change or decrease. I developed hypotheses for each of these areas to test in this dissertation.

Research – Hypothesis 1E. If merit aid adoption changed institutional dependencies, then relative to institutions in states that did not adopt a merit aid program, merit aid adoption will be associated with lower institutional spending on research expenditures.

While research can be part of a faculty member's job, one must keep in mind, that research expenditures includes only research that goes beyond the scope of a faculty member's

main job function. A faculty member who has 40% teaching responsibility, 40% teaching responsibility, and 20% service responsibility would have $0.00 associated with research expenditures, unless that research is above and beyond that 40% research time allotment or additional outside funds are used to support that research. The research done as part of that 40% job responsibility would fall into instructional expenditures. When merit aid is adopted in a state, resource dependency predicts that institutions will spend more on the areas students care about. Research is one of the areas that students do not care about. Therefore institutions will either maintain their current research expenditures or decrease spending on research if they are in a state that adopted a merit aid program.

Student Services – Hypothesis 1F. If merit aid adoption changed institutional dependencies, then relative to institutions in states that did not adopt a merit aid program, merit aid adoption will be associated with lower institutional spending on student services expenditures.

It could be argued that resource dependency theory predicts that institutions might actually increase student affairs expenditures, but here, I argue that resource dependency theory predicts that institutions in merit aid adopting states will ultimately have no change or decrease their student affairs expenditures. The reason that resource dependency theory could predict that student affairs expenditures would increase at institutions after merit aid adoption in their state is an amenities arms race among institutions (Dur & Glazer, 2008; Jabob et al., 2013). Institutions could use build nicer amenities that appeal to potential merit aid earners to compete with each other in order to lure students from other institutions. However, for well-known institutions, their strongest competitors would have been well-known out-of-state institutions. As nearly all merit aid programs require students to stay in-state to receive the scholarship, these institutions

are no longer compete with out-of-state institutions. Therefore, those institutions no longer have as strong of a competition with out-of-state schools. Institutions that do not have a strong reputation will likely compete against the well-known in-state institutions, so there might be some positive effect. Institutions could also build amenities as auxiliary enterprises, and then the amenity would be budgeted as an auxiliary and not student services (Delta Data Dictionary, 2015).

Aside from the amenities discussion, merit aid also alters the student body composition at in-state institutions, so that institutions become more dependent on more academically inclined students. Webber and Ehrenberg (2010) demonstrated that while student services expenditures helps increase persistence for undergraduate students, this effect becomes less strong as students are more adapt for success in college. They found student services expenditures showed no effect in supporting students who had high SAT scores or were from well off families. Given the nature of merit aid programs, those who are likely to get merit aid tend to have high standardized test scores. Additionally, merit aid also tends to go to students from well off families (Dynarski, 2004; Farrell, 2004; Heller, 2004). Institutions will not need to spend as much on student services if there would not be as much of an impact on their new student compositions.

Public Services – Hypothesis 1F. If merit aid adoption changed institutional dependencies then relative to institutions in states that did not adopt a merit aid program, merit aid adoption will be associated with lower institutional spending on public services expenditures.

Resource dependency theory posits that as institutions become less reliant on the will of the state legislature for funds, the less willing institutions will be to perform public service tasks

to seek funds. Additionally, public services does not tend to be an area that generates prestige for an institution relative to other, more well-known areas such as research and graduation rates. Therefore, public services will be lower as a result of merit aid adoption.

Resource Dependency and ILM Theory

While resource dependency drives the main theoretical justification for this study, I examine Research Question Two -- *How do institutions alter their contingent faculty employment after the state in which they reside adopts a merit aid program?* -- through ILM theory as well. I use ILM theory to analyze higher education practices by applying the concept of core employees to tenure-track faculty members and the remaining faculty members as contingent employees.

Since Research Question Two focuses on the effect of merit aid adoption on changes in contingent faculty employment, both resource dependency theory and ILM theory must be used to understand the two-step process in the process from how the merit aid revenue can affect whether core or peripheral faculty are employed. First the states with merit aid programs provide funds to students who meet their program's criteria. Second, students direct the funds to an institution through their enrollment. Resource dependency theory predicts that since institutions are dependent on various revenue supports for resources, when a support changes, institutions will also change their behaviors (Pfeffer & Salancik, 1978). ILM theory predicts that organizations will employ more peripheral employees when they need a lot of flexibility in their employment systems (Cappelli & Neumark, 2004; Osterman, 1987).

Using ILM theory, I can then predict the relationships between revenue sources and faculty employment through the choices institutions might make to cut costs or plan for the future. With employment being the largest expenditure for institutions (Slaughter & Leslie,

1997), administrators would focus on creating an optimal system of faculty employment to help the institution succeed in its goals. After a state adopts a merit aid program, institutions in that state should prepare for more students. However, it may be difficult for institutions to accurately predict yearly changes. Organizations facing greater instability and uncertainty from external pressures will be more strategic in their employment of contingent faculty (Priem et al., 1995).

Predictions for Increased Faculty Employment

Resource dependency theory and ILM theory in tandem predict that institutions will employ more contingent faculty due to greater instability from external pressures (Priem et al., 1995). I considered both part-time faculty and FT NTT faculty as contingent faculty in this dissertation. While relative to part-time faculty FT NTT might not seem to be contingent, both groups compared to full-time tenured, tenure-track faculty are contingently employed. I developed hypotheses for each of these contingent faculty categories to test in this dissertation.

Part-time faculty employment - 2A. If merit aid adoption changed institutional dependencies, then relative to institutions in states that did not adopt a merit aid program, merit aid adoption will be associated with more part-time faculty.

As institutions become more revenue dependent on students, resource dependency theory, in tandem with ILM, predicts that institutions in merit aid adopting states will employ more part-time than institutions in states without merit aid programs. Indeed, Liu and Zhang (2007) found that as institutions became more reliant on tuition and fees, they employed a higher share of part-time faculty. Merit aid adoption is also associated with additional in-state attendances of students who would have otherwise went out-of-state for college (Cornwell et al., 2006; Doyle, 2010). As institutions see sudden influxes of new students, they ought to employ more part-time faculty to handle the turmoil until a

new equilibrium is found. Additionally, the most desired in-state institutions might not increase their capacities immediately after merit aid adoption, which could drive students to less desired institutions. The less desired institutions would be wary of the more desired institutions increasing capacity thus losing enrollments to the institutions students prefer. They would then also want to employ additional part-time faculty to handle the fluctuations in enrollment after merit aid adoption.

FT NTT employment - 2B. If merit aid adoption changed institutional dependencies, then relative to institutions in states that did not adopt a merit aid program, merit aid adoption will be associated with more full-time non-tenure-track faculty.

As institutions become more revenue dependent on students, resource dependency theory, in tandem with ILM, predicts that institutions in merit aid adopting states will employ more FT NTT than institutions in states without merit aid programs. Resource dependency theory predicts a higher employment of FT NTT faculty at institutions in states that adopted merit aid relative to institutions in states that did not adopt merit aid. Resource dependency theory predicts this for the same reasons that it predicted that part-time faculty would increase. However, full-time faculty do come with additional commitments from an institution (Rosenblum & Rosenblum, 1990). So, while resource dependency theory predicts FT NTT employment to be higher at institutions in merit aid adopting states, compared to part-time faculty, the effect should not be as high.

Predictions for No Change in or Decreased Faculty Employment

While the employment of core faculty was not a focus area of this research, I included the employment of full-time tenured, tenure-track (FT TT) faculty to serve as a comparison group for the contingent faculty. While I predicted that I would an increase in contingent faculty per

FTE at institutions in merit aid adopting states, I predicted that I would find no change or a decrease in core faculty per FTE at institutions in merit aid adopting states. I developed this final testable hypothesis for this research study.

FT TT faculty employment - 2C. If merit aid adoption changed institutional dependencies, then relative to institutions in states that did not adopt a merit aid program, merit aid adoption will be associated with no change in or fewer full-time tenured, tenure-track faculty.

As institutions become more revenue dependent on students, resource dependency theory, in tandem with ILM, predicts that institutions in merit aid adopting states will employ fewer or not change their employment of FT TT per FTE student than institutions in states without merit aid programs. In addition to all the perks associated with being a full-time employee, FT TT faculty also had tenure or were working towards tenure which creates an even stronger relationship with an institution (i.e. even less flexibility in employment). As the employment of core employees is associated with stable enviornments (Capelli & Neumark, 2004), theory then predicts in the unstable environment of post-merit aid adoption in a state, that merit aid adoption would be associated with fewer FT TT faculty.

Heterogeneity of Merit Aid Program Strength

Not all merit aid programs were created equally, Sjoquist and Winters (2012) created a classification system of strong vs. weak merit aid to highlight the difference between program types in their analysis. This classification was important for my analyses as well. Merit aid programs that were strong would likely cause a greater change in resource dependence than merit aid programs that are weak. That is, students gain more influence as there are more of them with more money. Table 1 includes a column including Sjoquist and Winters's (2012) strong/weak

classification system for the various merit aid programs that will be included in my subsequent analyses. As such I developed this final hypothesis: Strong merit aid programs will have a greater effect on institutional expenditures and contingent faculty employment than weak merit aid programs.

Just as with the research on performance based funding in light of resource dependence changes (Sanford & Hunter, 2011), I expect the amount of money on the line to have a significant effect on how much institutions are willing to change. In states with a narrowly targeted, small reward merit aid program such as Missouri's Bright Flight, we might not see much of an effect of the program. However, a broadly targeted, high reward program like Georgia HOPE ought to have a much larger effect. More specifically, if the effect of merit aid adoption on contingent faculty employment shows that institutions in merit aid adopting states is lower relative to institutions in non-adopting states, I would expect a strong merit aid program to show that effect to be even lower. Additionally, I expect a similar effect for institutional expenditures. If institutions affected by merit aid alter their spending, I would expect the altered spending to be a greater effect at institutions affected by a strong merit aid program.

Summary

The purpose of this study was to analyze whether institutions alter their behavior as their revenue streams change. To understand one facet of this potential change, I measured changes in two institutional behaviors, institutional expenditures and contingent faculty employment, after the state in which an institution is located adopts merit aid program. The first part of this chapter included relevant literature on merit aid programs including their origins, justifications, expectations, and known effects. I also identified a hole in the literature concerning merit aid as scholars (albeit a few) have largely ignored institutional behaviors after the adoption of merit aid.

The second part of the chapter discussed the literature on the institutional behavior of expenditures. The third part of the chapter discussed the literature on the institutional behavior of faculty employment and the effect that faculty employment has on students. I then discussed the theoretical frameworks that guided this study. First, resource dependency predicted that institutions would alter their behavior. Bowen's revenue theory of cost and ILM theory predicted how the behavior would alter. I concluded the chapter with a series of testable hypotheses. The results from Chapter 4 answer these hypotheses to determine if merit aid adoption affected institutional resource dependency.

CHAPTER 3 - METHODS

In Chapter 2, I argued that 4-year public institutions are resource dependent on various constituents, and the key source of funding traditionally has been the state government of the state where the institution is located, though the strength of that amount can vary from state to state (Cheslock & Gianneschi, 2007; Leslie et al., 2012). As institutions look to their various constituents for funding, those institutions are likely to alter their behavior to serve best the constituents who provide the most resources (Powell & Rey, 2015; Sanford & Hunter, 2011; Salancik & Pfeffer, 1974). When the state adopts a merit aid program, a shift in resource dependence occurred. Before merit aid program adoption states directly appropriated higher education funds directly to institutions. After merit aid adoption, additional state funds for higher education suddenly became directed by the merit aid earners. Thus, merit aid programs cause a shift in resource dependence, as students now direct more of the revenue institutions could receive if the merit aid earners enroll at their institutions.

The purpose of this study is to analyze whether institutions alter their behavior as their revenue streams change. To understand one facet of this potential change, I measured changes in two institutional behaviors, institutional expenditures and contingent faculty employment, after the state in which an institution is located adopts merit aid program.

Research Question 1. How do institutions alter their expenditures after the state in which they reside adopts a merit aid program?

If institutions become more resource dependent on students, then I predicted, based on theory, that institutions ought to alter their spending behaviors in ways that appease students, especially high achievers, over other revenue providers. I predicted, based on theory, that expenditures on items like public service would decrease, while expenditures on instruction

would increase, as students care less about projects performed for the state and care about funding related to instructional expenditures such as student to faculty ratios.

Research Question 2. How do institutions alter their faculty composition after the state in which they reside adopts a merit aid program?

If institutions became more resource dependent on students, then I predicted, based on theory, that institutions ought to alter their employment subsystems in ways that assume that students have become a more key resource provider. Theory and research suggest that as institutions become more reliant on students for revenue, they will begin to employ more contingent faculty due to the flexible nature of their employment.

In this chapter, I discuss the research design of this study to analyze institutional behavior changes in light of resource dependency changes. First, I discuss the process of determining the best available method for the analysis, which was a difference-in-difference identification strategy. Then I provide additional information about the difference-in-difference identification strategy including the statistical assumptions, creation of control groups, and robustness checks. I conclude the chapter with a discussion of the data, sample, and variables used in the analyses.

Research Design

In order to answer these research questions, I used quantitative methods. These methods provided the opportunity to analyze the aggregated behavior of many institutions at once. This allowed broad generalizations to be made about the choices institutions make in light of their state adopting a merit aid program. In contrast, a qualitative study would be able to offer more nuanced information about the information and thought processes about why certain options for allocations were made but would lack in the generalizability and scaling of quantitative methods.

Quantitative methods provided the generalizable information desired to answer the research questions for this study. Ordinary least squares regression could provide an understanding of relationships among variables, but it cannot identify a causal relationship. Experimental design, while giving researchers an understanding of a cause and effect relationship using by comparing subjects that received a treatment vs. subjects that did not, is not an available strategy for post-hoc state policy research. The research strategy for this study needed to be the quasi-experimental design of difference-in-difference identification modeling. In the research design section, I provide the justification for using a difference-in-difference identification strategy for the dissertation's analyses.

Ordinary Least Squares

Many researchers might turn to looking at this problem through ordinary least squares (OLS) regression (Angrist & Pischke, 2009). This method allows the researcher to examine the relationship between variables while controlling for other confounding variables (Wooldridge, 2010). When using basic OLS regression, a researcher's question must be: how are changes in the dependent variable correlated with the independent variable? While the cause and effect relationship can be theorized with the estimations from OLS, OLS cannot prove that relationship (Angrist & Pischke, 2009; Wooldridge, 2010).

Indeed, given the nature of the OLS, studies of state policy often suffer from endogeneity issues arising from two potential sources. Endogeneity occurs when a confounding variable affects both the independent variable and the error term (Wooldridge, 2010). When an ordinary least squares model has endogeneity issues, the coefficient on the independent variable will be biased, and the explanatory ability of the coefficients will not be accurate.

The first source of potential endogeneity is omitted variable bias (Wooldridge, 2010). Omitted variable bias occurs when one does not control for a confounding variable that is associated with an independent variable and the error term in the estimating equation. Unmeasured variables can potentially affect the variance in the independent variable(s) and the variance in the dependent variable. A famous example of this is Krueger and Ashenfelter's (1994) discussion on measuring the effect of schooling on wages without also measuring ability. If student characteristics, like ability is omitted, then all of the variance in wages would be associated with schooling. By examining twins with the same biological characteristics, Krueger and Ashenfelter (1994) controlled for unmeasured variables that can both affect schooling and wages. So, one should include an error term in the estimating equation to control for the noise associated with those unmeasured variables. When an omitted variable correlates with an independent variable, it cannot be fully included in the error term as it is associated with the variance of the independent variable.

The other potential source of endogeneity is the problem of simultaneity (Wooldridge, 2010). Simultaneity issues occur when the independent variable(s) and dependent variable are determined at the same time. For example, in the higher education world, decreases in state appropriations could cause an institution to raise tuition, but at the same time, institutions raising tuition could cause decreases in state appropriations. Therefore, one could not utilize ordinary least squares regression to get an unbiased estimate on the effect of changes in state appropriations on changes in tuition (Koshal & Koshal, 2000). If changes in faculty composition and institutional expenditures determine merit-aid adoption, while merit-aid adoption also determines changes in faculty composition and institutional expenditures, endogeneity due to simultaneity would occur.

Experimental Design

The experimental method would provide the best causal explanation of any effect merit adoption would have on institutions (Shaddish et al., 2002). The experimental method solves the endogeneity problem mentioned previously. Researchers do this through randomly assigning a treatment to part of a group of a homogenous population, with the qualities of homogeneity varying by the examined treatment. Before the treatment, the individuals behave very similarly, then some receive a treatment, and then the treated and untreated groups are examined to see the differences between them. As the only difference between the untreated and treated groups is the randomly distributed treatment itself, the effect of the treatment is the differences between the groups (Shaddish et al., 2002). The untreated group then acts as the counterfactual to the treated group. This provides the best possible information to understanding what would have happened to the treated group if that had not been treated.

The concept of the counterfactual concerns the question: if the treated individual or group were never actually treated, what would have happened instead? Since we cannot know the answer to this, as once a treatment is applied at a specific time, it cannot be unapplied at that same time, we look to other similar individuals or groups who would have likely behaved in the manner as the treated if they were untreated. This similar behaving, yet untreated individual or group, is named the counterfactual (Shaddish et al., 2002). Researchers do their best to identify the most similar counterfactual to the treated, often using random assignment over a sample to determine who gets the treatment and who does not. The researchers will create a homogenous treatment group, and then randomly assign some to a treatment and some to not being treated. This helps ensure that there is no bias through desire to be part of the experiment (Shaddish et al., 2002) or receive the treatment as everyone wants to receive it.

In state policy research though, the experimental method is not practical. This method though would require a group of similar states to be selected, and then one or some of those states to be provided a merit aid program, while other states go without to serve as a control group. In the period for this experiment as well, the states should not alter their higher education policies at all except for merit aid programs for treatment states. Comparing the difference in changes before and after merit aid adoption for the treatment and control groups would then provide the true estimate of merit aid adoption on faculty composition and institutional expenditures (Shaddish et al., 2002). However, in the realm of policy analysis, policies are not randomly assigned, and states cannot be expected to change and innovate (Angrist & Pischke, 2009). Indeed, experimental design would not work to examine the outcomes in this study.

Quasi-Experimental Design

Further, quasi-experimental design, a type of quantitative method, can be used to approximate an experiment using group differences through replicating many of the characteristics of an experiment (Shaddish et al., 2002). In experimental design, through random assignment of a treatment and all other things being equal, researchers can approximate the effect that treatment caused. Correlational designs, such as OLS regression, can only provide an understanding of the strength of a relationship between variables (Wooldridge, 2010). Quasi-experimental design on the other hand provides more than a simultaneous relationship between the independent and dependent variable; it provides an estimation of the linear cause and effect relationship between variables (Wooldridge, 2010).

When researchers lack the ability to assign a random treatment, they can use quasi-experimental designs to approximate a cause and effect relationships between treatments and those treated. Quasi-experimental methods are especially appropriate in the case of a state policy

adoption as the treatment to be examined (Shaddish et al., 2002). The federal government does not assign policies to states at random. Therefore, experimental design cannot be used to analyze the effect of a policy on a state. This study will use the quasi-experimental design of difference-in-difference modeling to approximate the effect of state based merit aid adoption on faculty employment and institutional expenditures.

The simplest method to examine the outcome of merit aid adoption on faculty composition and institutional expenditures would simply be to examine faculty composition and institutional expenditures before a state adopts a merit aid program and after a state adopts a merit aid program. This "one-group pretest-posttest design" (Shaddish et al., 2002, p. 108) acts as a weak research design, as it provides very little insight into the counterfactual. The counterfactual is what would have happened if the treatment never occurred. If one simply looks at how institutions behave in a merit aid adopting state before merit aid adoption and after merit aid adoption, there would be no counterfactual to examine, as there was no instance when there was no treatment. It could be true that merit aid program adoption causes institutions to behave differently. However, with this method, we cannot determine that to be true or false, as many other confounding factors exist that could have influenced changes. A counterfactual would provide evidence of what happens at institutions if their state had not adopted a merit aid program.

Although more complicated than a pretest - posttest design, quasi-experimental designs that use both control groups and pretests helps improve reliability of analytical estimates (Shaddish et al., 2002). In contrast to experimental design in which the treatment is randomly assigned to the treated and all others act as the control group, in quasi-experimental design the control group is chosen based on pretest characteristics similar to the treated group to maximize

the similarities between the groups. An example of this is Dynarski's (2004) study concerning the Georgia HOPE merit aid program. In an analysis concerning the effects of Georgia HOPE, Dynarski (2004) argued other Southern U.S. states would serve as a sufficient control group. By using just U.S. Southern states, as opposed to all U.S. states, Dynarski (2004) could then limit any bias stemming from Georgia being a state in the Southern U.S. Examining the differences between groups before a treatment and differences between groups after a treatment is aptly called a difference-in-difference identification (Angrist & Pischke, 2009). This was the strategy used in this dissertation.

Difference-in-difference Identification Strategy

Given that ordinary least squares regression does not meet the needs to understand institutional behaviors due to potential endogeneity issues biasing estimated program effects and experimental design is not possible with policy research, I utilized the quasi-experimental design strategy of difference-in-difference identification to isolate the effects of the adoption of merit aid on institutional behaviors. Difference-in-difference modeling is especially appropriate when making an inference through examining a state level policy change (Conley & Taber, 2011). Similar to experimental design, difference-in-difference identification requires at least two groups measured consistently over a period with one group receiving a treatment and the other not receiving any treatment (Angrist & Pischke, 2009). Unlike experimental design, one does not need random assignment to estiamte a causal claim from a difference-in-difference estimation, but rather, one must ensure that the treated group would have behaved just as the untreated group in relation to longitudinal changes in the dependent variables (Meyer, 1995). That is, the behavioral changes concerning the dependent variable must trend similarly before treatment.

Difference-in-difference design calculates the mean of within group differences from the pre-treatment to post-treatment periods, and then calculates the mean difference of the between group differences to understand the true, mean program effect (Angrist & Pischke, 2009; Meyer, 1995). Difference-in-difference estimation also controls for the problems of omitted variable bias stemming from national changes that would affect both the treated and control groups as there would be no difference in effect for those groups (Meyer, 1995). That is, states that did not receive a treatment acted as the counterfactual to the states that did, similar to the counterfactual in experimental design.

Difference-In-Difference Assumptions

Two key assumptions exist concerning difference-in-difference modeling that must hold true to calculate unbiased estimates about the effect of the independent variable. First, there must be a comparison group (the counterfactual) that, in the absence of treatment, would behave identically similar to the treated group in respect to choices made about the dependent variable (Bertrand et al., 2004; Meyer, 1995). That is, in the absence of a treatment, the expected between group difference at the end of the period would equal zero (Meyer, 1995). The before treatment portion of this assumption can be examined through comparing the trends in the dependent variables of each group to see if they are parallel to each other (Angrist & Pischke, 2009; Meyer, 1995). Difference-in-difference modeling calculates the average rate of change for each group before and after the time of treatment. Therefore, institutions can have different starting points, but must change similarly up to the point of treatment on the treated groups.

This assumption is referred to as the parallel trends assumption (Angrist & Pischke, 2009). Difference-in-difference modeling requires a time series for both the treated and untreated groups. As such, researchers can graphically depict the average group behavior for

each time measurement. Additionally, a line of best fit for each groups' pre-treatment averages can also be depicted graphically. Researchers can visually examine whether or not the lines of best fit for each group are parallel to each other. If the lines are perfectly parallel, that indicates both groups behave identical in regards to their dependent variable. The less parallel the lines are, the less similar the groups are. Thus, non-parallel pretreatment lines indicate biased estimates.

The second assumption dictates the treatment must be exogenous (Hillman, Tandberg, & Gross, 2014; Meyer, 1995). When a state mandates a policy beyond the control of the higher education institutions, the new policy acts as an exogenous shock to the institutions that may cause reactions from those institutions beyond their plans (Hillman et al., 2014). Merit aid programs act as a shock to higher education institutions according to this definition as they are legislated by state legislatures and not institutions themselves. While it may be true that institutions might lobby for merit aid programs to come to their states, those institutions do not directly adopt merit aid on behalf of their state. Indeed, many actors apart from higher education institutions determine the adoption of statewide merit aid scholarship programs (Gandara et al., 2017; Ness & Mistretta, 2010). As institutions play an indirect role in merit aid adoption, the treatment can then be considered an exogenous shock to the expected behaviors of the institutions in states that adopt merit aid.

Estimating Equations

A basic difference-in-difference identification was estimated through the effect of a state policy change by estimating the following equation:

$$Y_{it} = \beta Adopt_i * After_t + \delta After_t + \gamma Adopt_i + \varepsilon_{it} \qquad (1)$$

where $Adopt_i$ and $After_t$ are both dichotomous variables. $Adopt_i$ takes on the value of one when the institution exists in a state that adopted merit aid, and takes on the value of zero if the state did not adopt merit aid. $After_t$ is a one in the years that merit aid was adopted, and a zero in the years before merit aid was adopted. Thus, $Adopt_i * After_t$ yields an effect (changes in Y_{it}) only when an institution resides in a state that has adopted merit aid and also only for years that merit aid has been adopted. Additionally, this effect is relative to the time period before adoption and to the states that never adopted a merit aid program.

For this study, the estimating equations I followed employ a modified difference-in-difference structure (Angrist & Pischke, 2009; Meyer, 1995). I regressed alternative measures of institutional expenditures and contingent faculty employment (Y_{it}) on an indicator variable which equaled one if a state has implemented a merit-aid program in a particular year($Merit_{it}$), institution-level control variables (X_{it}), state-level control variables (S_{st}), institution-level fixed effects (δ_i), and year fixed effects (δ_t). The difference-in-difference estimating equation took the form:

$$Y_{it} = \beta Merit_{it} + \delta' X_{it} + \gamma' S_{st} + \delta_i + \delta_t + \varepsilon_{it} \qquad (2)$$

The coefficient on the indicator of whether a merit program exists was interpreted as the effect of state implementation on institutional behaviors (Angrist & Pischke, 2009). That is, beta equaled the change in the dependent variable relative to institutions in states that did not adopt a merit aid program. Additionally, using a regression technique provided a statistical p-value, which told us whether that difference was statistically significant (Woodridge, 2010).

The inclusion of year and institutional level fixed effects in the equation controls for all measured and unmeasured variables that do not vary by time nor institution (Taniguchi, 2005). Fixed effects modeling works by transforming all variables from averages to deviations from

averages. If any variable does not change from year to year or within an institution, it will difference itself out of the equation. For example, if we believe having a hospital as part of an institution would affect faculty employment or institutional expenditures, and the institution has a hospital for the entire sampling period, institutional fixed effects would control for that, as there is zero variance from having a hospital. Time fixed effects controls for aggregate level differences that occur overtime to all institutions throughout all years. Changes in the U.S. Gross Domestic Product, inflation of the dollar, and general U.S. population growth are all controlled for by year fixed effects. I continued to cluster my standard errors under this equation in the same manner as my aforementioned estimating equation.

Clustered standard errors. Following Bertrand, Duflo, and Mullainathan's (2004) recommendation, I clustered the standard errors at the institution level in order to account for any serial correlation among years for each institution. Policy changes at the state level usually require clustered standard errors at the state level (Abadie et al., 2017). As not all merit aid programs have the same structure, the treatment is heterogeneous, so the clusters ought to be adjusted to the state level (Abadie et al., 2017). However, within a state the programs are homogenous for all students choosing four-year public institutions. Additionally, I argue that the policy change is at the student level as students now direct funds. If students were randomly assigned an institution within a state, then clustering at the state level would be appropriate (Abadie et al., 2017). However, this is not the case. Students purposefully choose certain colleges over others due to the heterogeneity of institutions. Thus, the standard errors should be clustered at the institutional level.

Serial correlation affects the standard errors, and can cause Type I errors, which are rejecting the null hypothesis with one should have accepted it (i.e. claiming there is a statistically

significant treatment effect difference between the groups when none exists) (Bertrand et al., 2004). Three factors highlight severe problems with difference-in-difference serial correlation. The first, if an estimation employs a long time period (i.e. more than 8 periods), the analysis could overestimate the significance level of the beta coefficient. In this study, I use a long time period of 26 years. Second, the dependent variables used in the study are highly serially correlated. Institutions do not radically fire all faculty and rehire new faculty of different types from year to year. Tenure provides for an especially strong serial correlation from year to year. Also, budgets ought not vary wildly from year to year. As employees are the highest cost to an institution (Baumol, 1993), expenditures would also likely be serially correlated from year to year. Third, the treatment variable changes little over time. As the treatment is dichotomous, the standard errors would likely be biased by serial correlation.

Failure to cluster standard errors in light of these issues would likely lead to a Type I error, and I would reject a finding that there is a post-treatment difference (Bertrand et al., 2004; Brewer, Gates, & Goldman, 2013). Fortunately, given my data, I can take advantage of the statistical software program, STATA, to cluster my standard errors to control for the serial correlation. STATA's clustering method works well when there is both a long time period and many clusters (Angrist & Pischke, 2009). As I had multiple years both pre-treatment and post-treatment, I met the long time period for the method.

Comparison Groups

Difference-in-difference modeling dictates that in order to understand the counterfactual (i.e. institutional behaviors if merit aid was never adopted by the state) there must be some commonality between the treated and untreated groups (Angrist & Pischke, 2009). Specifically, the treated states' behavior changes as they relate to the dependent variables must be identical to

the behavior changes of untreated states before policy adoption to have an estimate that is unbiased. This can be done by calculating a line of best fit for the average institutional behavior concerning the dependent variables and comparing those slopes for the years preceding policy adoption for each group. Following the methodology of Dynarski (2004) and Zhang and Ness (2010) I used all states which implemented large-scale merit aid as treatment groups and construct three alternative comparison groups to serve as potential counterfactuals for the merit aid adopting states. Those three groups were all states, states that meet a visual examination of the parallel trends assumption, and states that adopted a merit aid program.

All states. First, I included institutions in all US states to serve as the comparison group for institutions in states that adopt merit-based aid programs. Utilizing a large sample size to include all the public, four-year institutions in all states could increase the power of the estimation, potentially resulting smaller standard errors than with more limited sample (Bertrand et al., 2004; Brewer et al., 2013). As this model did considered all non-treated institutions as a suitable comparison group, I referred to it as the base model.

Parallel trends. However, states which never adopt a merit aid program may be economically, politically, and socially different from states that do implement such policies. Thus, the whole US may not be an appropriate comparison group, as these differences could demonstrate a violation of the parallel trends assumption creating a group that does not serve as a true counterfactual to the treated group. As a result, I created line graphs (one for each dependent variable and treated state) that allowed me to visually examine each state's institutions' pre-treatment lines of best fit for each dependent variable against the lines of best fit of all institutions in states that did not adopt a merit aid program. If the trends were not approximately parallel, I excluded them from the sample. If the lines were moving forward in

the same direction and did not seem that they would cross in the first 10 years following merit aid adoption in the treated state, I deemed the lines parallel enough for analysis.

Staggered Adopting States. In line with Dynarski's (2004) modeling, I also restricted the sample to only those states that implement merit-based aid and allow the differential timing of adoption to use these states as both treatment and comparison groups. Indeed, a state that might be about to adopt a merit aid program, but has not yet, should make for a strong comparison against states that have adopted a merit aid program. This method would likely produce the best counterfactual for the treatment states, as the conditions for merit aid adoption would likely be following the same changes over time. With this method, one should include years before the first state adopts merit aid, then, move states into the treatment group as they adopt merit aid, until all states join the treated group. As institutions do not control what year states adopt merit aid, merit aid adoption still acts as an exogenous shock. However, the sample size would then become far more limited, and statistical power would decrease.

Heterogeneity Concerns

Merit aid for the first five years. As time progresses through the years of this sample, states could enact additional policies that affect institutional behavior. Indeed, Tennessee had altered its newly adopted merit aid program after just one year in place and West Virginia after just three years (Zhang & Ness, 2010). As the years for this study span from 1987-2013, states that adopt merit aid early have more time to enact new policies that might affect institutional behaviors. To ensure that I capture the shock of merit aid adoption, I included an additional variable in the model that allows for the first five years after merit aid adoption and the years after the first five years to be different from one another. The estimation equation takes this form:

$$Y_{it} = \beta_1 Merit_{it} + \beta_2 Merit\_plus\_5_{it} + \delta' X_{it} + \gamma' S_{st} + \delta_i + \delta_t + \varepsilon_{it} \quad (3)$$

While $Merit_{it}$ goes from 0 to 1 when it is both in a state that adopted merit aid and in a year that merit aid was enacted for that state, $Merit\_plus\_5_{it}$ goes from 0 to 1 when it is both in a state that adopted merit aid and five years after merit aid was enacted for that state.

Merit aid program strength. As mentioned previously, not all merit aid programs are likely to have the same impact. In order to understand whether strong merit aid programs are different from weak programs, and if so, to what magnitude, I added a dichotomous term to the estimation equation. This interaction term allows for both strong and weak merit aid programs to be estimated. This equation takes this form:

$$Y_{it} = \beta_1 Merit_{it} + \beta_2 Merit_{it} * Strong_{it} + \delta' X_{it} + \gamma' S_{st} + \delta_i + \delta_t + \varepsilon_{it} \quad (4)$$

where $Strong_{it}$ = 1 if a state has a strong merit aid program and otherwise = 0. The regression coefficient on $\beta_1 Merit_{it}$ estimates the impact of weak merit aid programs on the dependent variables, while the coefficient on $\beta_2 Merit_{it} * Strong_{it}$ plus the coefficient on $\beta_1 Merit_{it}$ equals the estimated effect of strong merit aid programs on the dependent variables. Over time, states have not adjusted their merit aid programs enough to change between strong and weak. Once a state adopts a strong or weak program, that program remains strong or weak throughout the analysis. When using this equation limiting my sample to the Staggered Adopting States modeling, I included a limitation to only states that adopted any merit aid program and to states that adopted only a strong merit aid program.

Robustness Check

Granger causality. The second robustness check I perform is ensuring that we have what is referred to as Granger Causality (Shaddish et al., 2002). Granger Causality tests ensure that the cause and effect relationship is unidirectional (Shaddish et al., 2002). That is, I need to

ensure that institutional behavior changes do not cause merit aid adoption in a state. It could be the case that after learning that Georgia and Florida adopted merit aid programs, institutions in other states might begin to alter their behaviors to seem more like Georgia's and Florida's pre-merit aid adoption behaviors in order to spur their own state legislatures into adopting a merit aid program. I performed the Granger Causality test by lagging merit aid adoption for four years to see if pre-treatment comparisons predict changes in institutional behavior. The final equation follows.

$$Y_{it} = \beta_1 Merit_{it} + \beta_2 Merit_{it-1} + \beta_3 Merit_{it-2} + \beta_4 Merit_{it-3} + \beta_5 Merit_{it-4} + \delta' X_{it} + \gamma' S_{st} + \delta_i + \delta_t + \varepsilon_{it} \quad (5)$$

Each of the lagged variables was dichotomous and became a 1 for a single year before merit aid adoption. The coefficient on each lagged variable indicates if institutions in states adopting a merit aid program are either changing behavior from a stimulus other that merit aid or are anticipating the merit aid program's effect on students and altering their institutional behaviors before the implementation of the program. The coefficient on $\beta_2 Merit_{it-1}$ shows this for the first year before adoption. The coefficient on $\beta_3 Merit_{it-2}$ shows this for only the second year before adoption. The coefficients on $\beta_4 Merit_{it-3}$ and $\beta_5 Merit_{it-4}$ indicate this for the third and fourth years respectively.

Data, Sample, and Variables

The original population for this study included all institutions that report their data to the federal government. From there, I narrowed the sample to institutions that were within the public sector and were baccalaureate, master's, or research institutions according to the 2005 Carnegie classification (which I call four-year public institutions). I chose to examine only public institutions as private institutions are already largely tuition driven, and I would not

expect their resource dependence to change much. Additionally, I excluded the associate degree granting two-year institutions or community colleges due to their ability to raise money through the additional source of local appropriations (Desrochers & Kirshtein, 2014). While associate degree granting institutions were resource dependent on the state and tuition, just as four-year public institutions are, associate degree granting institutions draw money from local appropriations as well for financial support.

Data

The primary data source for this project came from the Delta Cost Project. The Delta Cost Project (2018) "provides policymakers, higher education administrators, and the general public with analyses and resources to deepen understanding of what colleges do with their money." One of the resources provided is data from the National Center for Education Statistics' (NCES) Integrated Postsecondary Education Data System (IPEDS) for the years 1987-2013. The federal government mandates all public institutions to report their data, and IPEDS holds the data for all the institutions that fit my criteria for analysis. Many of the data had been collected, cleaned, and prepared by The Delta Cost Project (Desrochers et al., 2015) which included detailed institutional level data drawn from the IPEDS surveys.

The Delta Cost Project's data helped solve many of the issues surrounding longitudinal analysis of IPEDS data. Some university systems have reported data in a parent/child relationship in which a system can report pieces of data, while also individual campuses may also report items. The Delta Cost Project data grouped together institutions within the parent/child relationships to provide constituency across the sample years. Additionally, the collection of finance related variables had changed over time with two-different possible accounting standards having taken place at different institution types in addition to other changes

in reporting having taken place (Desrochers et al., 2015). The Delta Cost Project harmonized these finance variables and carefully mapped them over time to provide the most accurate, longitudinal data source for higher education finance research.

Data limitations. A potential, significant data limitation for this study stemmed from inconsistent measurement of variables over time. Desrochers et al. (2015) note that in the years of data collection, public and private institutions used two different accounting standards, some institutions in a system reported some data individually and some with the parent system, and some variables needed to be combined to account for inconsistent measurement. Fortunately, the Delta Cost Project on Postsecondary Costs had carefully tracked those issues and workarounds for many of those issues exist, so that the data were useable for research (Desrochers et al., 2015).

Additionally, Jaquette and Parra (2016) highlight many of the problems with the Delta Cost Project database. Indeed, they found the issues to be so severe, that they recommend that the "Delta Cost Project database should not be used to analyze public institutions." (p. 630). The key limitation they found has to do with the parent-child relationship, and in particular, how institutional expenditures are reported through this structure. Institutions that are part of a university system will report some of their data about their individual campus and some of their data will be reported at the system level. The Delta Cost Project database though has assigned a campus to the system. For example, the University of Illinois – Chicago serves as the system flagship to report all expenditures data for the entire University of Illinois university system. Indeed, this reporting issue has led the Delta Cost Project database to exclude about 8% of public institutions (Jaquette & Parra, 2016, p. 634).

This data limitation makes research comparing public institutional types inappropriate due to systematic errors in values (Jaquette & Parra, 2016). Researchers could not use this database to discuss the changes in behavior of a research institution vs. a master's institution. Also, no additional variables that need to be merged into the database at the institution level would be appropriate. A single institution could be merged onto a collapsed parent-child relationship that is reported as a single institution causing errors and bias in values. I argue that the methods I use alleviate some of the issues brought forth. By only examining public institutions, the measurement differences in accounting standards should not be problematic. Additionally, Delta Cost Project's collapsed variables concerning expenditures alleviated many of the measurement issues concerning expenditures changing standards. While disaggregating institution types might lead to a more thorough analysis, my focus is on four-year institutions generally. The control variables I needed to bring into the database were at the state level as well, which does not violate Jaquette and Parra's (2016) recommendation.

An additional data limitation stemmed from the difference-in-difference design. As state policy research cannot be controlled like experimental research, state policy researchers must identify the best counterfactual among the available data. A near perfect counterfactual may not be available. The difference-in-difference design across multiple periods would require perfectly identical slopes for the treated and untreated groups in order to achieve an unbiased estimate from the regression results. However, states innovate, change, and adapt their policies, and institutions also innovate, change, and adapt due to pressures from internal and external constituents. As such, researchers must identify the best counterfactual group that has the closest possible parallel trends to the treated groups to provide the least biased estimates. On one hand, if the rate of change in the slope of the dependent variable for the untreated group is greater than

the rate of change in the dependent variable for the treated group, then the result of the analysis will be biased upwards. That is, the coefficient will estimate a biased result that is larger and more positive than the estimate would have been if the trends were perfectly parallel. On the other hand, if the rate of change in the slope of the dependent variable for the untreated group is less than the rate of change in the dependent variable for the treated group, then the result of the analysis will be biased downwards. That is, the coefficient will estimate a biased result that is larger and more negative than the estimate would have been if the trends were perfectly parallel.

Dependent Variables

To answer the two research questions for this dissertation, I created to sets of dependent variables for the analysis. The first set of dependent variables were designed to answer the question: *How do institutions alter their expenditures after the state in which they reside adopts a merit aid program?* Simply looking to see if institutions spent more as they received additional funds would not address the purpose of this study though. As such, I analyzed changes in expenditures across various functional categories that also address how institutions prioritize spending after their state adopts a merit aid program. The second set of independent variables were designed to answer the question: *Research Question 2. How do institutions alter their faculty composition after the state in which they reside adopts a merit aid program?* Specifically, I want to analyze changes in their contingent employment. As theory leads me to believe that if institutions rely more on students as a key resource, if institutions in states that adopted merit aid employ more contingent faculty after merit aid adoption, relative to institutions in states without merit aid, then this indicates that institutional dependencies did change after merit aid adoption.

Expenditures. I included various expenditure categories per full-time equivalent (FTE) student at an institution in an academic year as the dependent variables for the analysis to answer research question one. The Delta Cost Project calculated the measure of FTE students by adding the count of full-time students at an institution to a number of adjusted part-time students (Delta Data Dictionary, 2015). That adjustment to the count of part-time students varies based on the level and control of the institution and the level of the student. Institutions should alter their expenditure behaviors to position themselves more strategically to garner resources and increase their prestige. Additionally, institutions ought to prioritize spending in some areas over others as well. Thus, I examined how each expenditure category changes after merit aid adoption. The expenditure categories I examined included: instruction, research, student services, public service, academic support, institutional support, and scholarships. Table 2 shows the various expenditure categories and their definitions.

Table 2.

Institutional Expenditure Measure Sources and Definitions

Dependent Variables	Data Source	Dictionary Definition
Instructional Expenditures	Delta Cost Project	A functional expense category that includes expenses of the colleges, schools, departments, and other instructional divisions of the institution and expenses for departmental research and public service that are not separately budgeted. Includes general academic instruction, occupational and vocational instruction, community education, preparatory and adult basic education, and regular, special, and extension sessions. Excludes expenses for academic administration where the primary function is administration. Information technology expenses related to instructional activities are included if the institution separately budgets and expenses information technology resources. Operations and maintenance and interest amounts attributed to the instruction function have been subtracted from the total instructional expenditure amount at FASB reporting institutions. Operations and maintenance amounts (and interest in the 2009 aligned form) attributed to the instruction function have been subtracted from the total amount at public Aligned form reporting institutions.

Table 2 Continued

Dependent Variables	Data Source	Dictionary Definition
Research Expenditures	Delta Cost Project	A functional expense category that includes expenses for activities specifically organized to produce research outcomes and commissioned by an agency either external to the institution or separately budgeted by an organizational unit within the institution. The category includes institutes and research centers, and individual and project research. This function does not include non-research sponsored programs (e.g., training programs). Also included are information technology expenses related to research activities if the institution separately budgets and expenses information technology resources (otherwise these expenses are included in academic support.) Operations and maintenance and interest amounts attributed to the research function have been subtracted from the total research expenditure amount at FASB reporting institutions. Operations and maintenance amounts (and interest in the 2009 aligned form) attributed to the research function have been subtracted from the total research expenditure amount at public Aligned Form reporting institutions.
Student Services Expenditures	Delta Cost Project	A functional expense category that includes expenses for admissions, registrar activities, and activities whose primary purpose is to contribute to students emotional and physical well-being and to their intellectual, cultural, and social development outside the context of the formal instructional program. Examples include student activities, cultural events, student newspapers, intramural athletics, student organizations, supplemental instruction outside the normal administration, and student records. Intercollegiate athletics and student health services may also be included except when operated as self - supporting auxiliary enterprises. Also may include information technology expenses related to student service activities if the institution separately budgets and expenses information technology resources (otherwise these expenses are included in institutional support.) Operations and maintenance and interest amounts attributed to the student services function have been subtracted from the total student services expenditure amount at FASB reporting institutions. Operations and maintenance (and interest in the 2009 aligned form) amounts attributed to the student services function have been subtracted from the total student services expenditure amount at public Aligned Form reporting institutions.
Public Service Expenditures	Delta Cost Project	A functional expense category that includes expenses for activities established primarily to provide noninstructional services beneficial to individuals and groups external to the institution. Examples are conferences, institutes, general advisory service, reference bureaus, and similar services provided to particular sectors of the community. This function includes expenses for community services, cooperative extension services, and public broadcasting services. Also includes information technology expenses related to the public service activities if the

Table 2 Continued

Dependent Variables	Data Source	Dictionary Definition
		institution separately budgets and expenses information technology resources (otherwise these expenses are included in academic support). Operations and maintenance and interest amounts attributed to the public service function have been subtracted from the total public service expenditure amount at FASB reporting institutions. Operations and maintenance amounts (and interest in the 2009 aligned form) attributed to the public service function have been subtracted from the total public service expenditure amount at public Consolidate Form reporting institutions.
Academic Support Expenditures	Delta Cost Project	A functional expense category that includes expenses of activities and services that support the institution's primary missions of instruction, research, and public service. It includes: the retention, preservation, and display of educational materials (for example, libraries, museums, and galleries); organized activities that provide support services to the academic functions of the institution (such as a demonstration school associated with a college of education or veterinary and dental clinics if their primary purpose is to support the instructional program); media such as audiovisual services; academic administration (including academic deans but not department chairpersons); and formally organized and separately budgeted academic personnel development and course and curriculum development expenses. Also included are information technology expenses related to academic support activities; if an institution does not separately budget and expense information technology resources, the costs associated with the three primary programs will be applied to this function and the remainder to institutional support. Operations and maintenance and interest amounts attributed to the academic support function have been subtracted from the total academic support expenditure amount at FASB reporting institutions. Operations and maintenance amounts (and interest in the 2009 aligned form) attributed to the academic support function have been subtracted from the total academic support expenditure amount at public Aligned Form reporting institutions.
Institutional Support Expenditures	Delta Cost Project	A functional expense category that includes expenses for the day-to-day operational support of the institution. Includes expenses for general administrative services, central executive-level activities concerned with management and long range planning, legal and fiscal operations, space management, employee personnel and records, logistical services such as purchasing and printing, and public relations and development. Also includes information technology expenses related to institutional support activities. Operations and maintenance and interest amounts attributed to the institutional support function have been subtracted from the total institutional support expenditure amount at FASB reporting institutions. Operations and maintenance amounts (and interest in the 2009 aligned form) attributed to the institutional support function have been subtracted from the total institutional support expenditure amount at public Aligned Form reporting institutions.

Table 2 Continued

Dependent Variables	Data Source	Dictionary Definition
Scholarship Expenditures	Delta Cost Project	From 1987-1996 this is the gross amount of grant aid provided to students, regardless of grant source. Starting in 1997 at FASB reporting institutions and 2002 at GASB 34/35 reporting institutions, this amount is the sum of all operating expenses associated with scholarships and fellowships treated as expenses because the institution incurs an incremental expense in the provision of a good or service. Thus, payments, made to students or third parties in support of the total cost of education are expenses if those payments are made for goods and services not provided by the institution. Examples include payments for services to third parties (including students) for off-campus housing or for the cost of board provided by institutional contract meal plans. The amount of expense in this function at the majority of GASB reporting institutions is the total of all institutional scholarships reduced by the amount that is classified as discounts and allowances. Operations and maintenance and interest amounts attributed to the grants function have been subtracted from the total grants expenditure amount at FASB reporting institutions.

Instruction. As mentioned earlier, The Delta Data Dictionary (2015) provides a detailed description of what is included as instruction expenditures, and those details are in Table 3. The category of instructional expenditures is the combined cost of providing instruction to students. These include faculty salaries, and if a faculty member's research is not budgeted separately, it is included here. Institutional employees who are primarily administrative, but hold faculty rank, like an academic dean, will not be budgeted here. Information technology expenditures related to instruction can be budgeted here as well.

Research. Research expenditures includes items associated with producing research for agencies either funded by groups external to the institution or separately budgeted by the institution, such as an internal research grant. In addition to grant funded research projects, the research expenditure category includes institutes and research centers. Information technology

associated with producing research can be budgeted here as well, if the expenditures on that information technology are associated with the research (Delta Data Dictionary, 2015).

Student Services. Student services includes all the staff salaries and items that support students beyond the teaching mission of an institution (Delta Data Dictionary, 2015). Support from admissions, financial aid, registrar's offices would be included here. Additionally, expenditures from student affairs such as student unions (when not billed as an auxiliary), residential living, orientation, student organization support would be examples of student affairs expenditures.

Public Service. Public service expenditures includes the salaries and items associated with providing non-instructional support to the public, such as institutes, information provision, serving as a local broadcast station. When an institution provides extension services, as many land grant institutions do, the salaries and items associated with extension are budgeted here (Delta Data Dictionary, 2015).

Academic Support. Academic support expenditures include items associated with supporting the teaching, research, and public service missions of an institution (Delta Data Dictionary, 2015). These include staffing and supporting purchases and preservation for libraries, museums, and galleries. If a school or college within an institution has some sort or demonstration program where students learn by doing, such as a publically open dental clinic for dental students or a veterinary clinic for veterinary students, the costs associated with those are budgeted here. Administrators not directly associated at a departmental level (e.g. department chair) would have their salaries and salaries of their support staff budgeted here in addition to the other support expenditures they would require.

Institutional Support. Institutional support concerns the budgeted items related to the day-to-day operations of an institution. Items included here would be related to maintaining the institution in many capacities. All things associated with physically maintaining the institution including repairing buildings, landscaping, planning expansion would be budgeted here. Those supporting the campus through understanding its legal and fiscal changes would also be budgeted here. Institutional research support also falls under this category (Delta Data Dictionary, 2015).

Scholarships. Scholarship expenditures very between two time periods. From 1987-2001, any scholarship or fellowship that goes through an institution to a student, even if an external grant or other agency funds the scholarship or fellowship, gets counted in this category (Delta Data Dictionary, 2015). From 2002-2013, scholarships and fellowships must come out of the institution's budget to be included[7].

Faculty. Changes in contingent faculty serve as one of the two dependent variable categories for this study. I measure faculty composition in three ways. First, I will examine a count of all part-time faculty per full-time equivalent students (FTE) at an institution. Second, I used the count of full-time non-tenure-track (FT NTT) faculty per FTE students. Third, I used the count of full-time tenured or tenure-track (FT TT) per FTE students.

Part-time faculty. The first measure, part-time faculty per FTE, provides an idea of whether merit aid adoption increases or decreases the number of part-time faculty per full-time students at institutions in a state that adopts merit aid. If institutions need to make quick, short-term adjustments in their internal labor markets, they will look for part-time faculty to teach

[7] Table 3 discusses in more detail. Public institutions, which are the only types included in this study, report on the GASB standard Table 3 refers to.

courses until more long-term adjustments could be made (Liu & Zhang, 2007). The institutions may also see a boon of new students to be temporary as other, competing institutions determine their capacity in light of funding changes.

FT NTT faculty. The second measure, the count of FT NTT faculty per FTE student, demonstrated whether institutions view the change in money-flow as a source that still may disappear but carries some long-term stability. A full-time job offer tends to demonstrate the desire to have a lasting relationship with a faculty, but that relationship might need to be terminated under certain circumstances, such as low enrollment at a tuition driven institution. Additionally, administrators seeing more money coming in from students may opt for hiring more full-time teachers instead of research faculty, as creating small, impactful classes would be good for students. Indeed, Zhang and Liu (2010) found that institutions often replace part-time faculty with full-time non-tenure-track faculty, keeping the percentage of full-time faculty relatively stable.

FT TT faculty. The third measure, the count of FT TT faculty per FTE student, served as a robustness check for the analyses concerning contingent faculty. In order to answer research question two, I needed information that answers whether institutions were strategically altering their contingent faculty employment. While the previous two measures, changes in part-time and FT NTT faculty, can answer that question, examining changes in the core faculty bolster the answer to research question two. If institutions began employing more contingent faculty after merit aid adoption in their state, and also, core faculty employment decreases or remains stable, then that would even further highlight that institutions became more resource dependent on students after their states adopted a merit aid program.

To calculate measures of FT NTT faculty per FTE and FT TT faculty per FTE at an institution, I merge IPEDS Fall Staff Survey data onto the Delta Cost Project data. While Jaquette and Parra (2016) warn against this, given my analytical approach and that these IPEDS data are not drawn from finance related variables, I carefully combined tenure information onto the Delta Cost Project data. To be careful in this approach, I carefully examined the mapping of data collapsing for institutions onto reporting units, and I followed the same collapsing as I merged the additional data onto the Delta Project's data set.

Independent Variable of Interest – Merit Aid Adoption

A state's adoption of a merit aid program serves as the independent variable for this study. I calculate merit aid adoption through an interaction variable between state and a dichotic variable that equals 0 for years in which that state has not merit aid and 1 for years in which the state has adopted merit aid. This follows the methods used by other researchers performing difference-in-difference modeling on the effects of merit aid adoption (Cornwell & Mustard, 2007; Dynarski, 2004; Sjoquist & Winters, 2015a). Additionally, I will use Sjoquist and Winters's (2012) research for determining year of merit aid adoption. The information they provide along with their research draws together the best discussions concerning the years merit aid program were not just adopted, but also implemented.

Weak/Strong Merit Aid Programs. Sjoquist and Winters (2015a) discussed that not all merit aid programs are equal in effectiveness. I then also used their schema to perform additional analyses for all merit aid programs, strong merit aid programs, and weak merit aid programs to understand any effect differences these program strengths might have. The table I included in Chapter 2 shows the various state merit aid programs and whether they are considered weak or strong. For Sjoquist and Winters (2015a), a program is strong if it applies to

a large proportion of college attending students and pays for most of the college tuition for a student. Therefore, I created alternative estimating equations using all merit aid programs and then only merit aid programs considered "strong." If institutions do not respond to "weak" merit aid programs, but they do respond to "strong," the estimation of the effect of merit aid programs would be averaged out to seem weak. Indeed, any potential effect might not be seen if the weak programs are not excluded from analysis.

Control Variables

Angrist and Pischke (2009) argue that control variables help increase the precision of the estimating equation by reducing the variance of the residuals. By including some of the major factors one expects to be highly correlated with the dependent variables (e.g. part-time students are highly correlated with part-time faculty employment) in the estimating equations, one can then reduce the standard deviation of the independent variable. As the standard deviation around an independent variable decreases, the explanatory power of that variable increases. As this research looks to institutional behaviors in light of a state policy adoption, I included control variables that correlate strongly with state behaviors and institutional behaviors.

Institutional control variables. With any regression technique, one must worry about omitted variable bias (Angrist & Pischke, 2009). To help with this, the quantitative researcher should identify potential variables that could affect the other variables. Since a sudden change in source of funding between students and states serves as the quasi-experiment of this study, I will control for other sources of funding that may have an effect on the dependent variables. Indeed, Leslie et al. (2011) have demonstrated that revenue and expenditures are highly related. Desrochers and Wellman (2011) discuss the most accurate way to track revenue in The Delta Cost Project data on higher education institutions across various categories. In light of their

discussion, I included various revenue source variables to control for higher education revenue categories that are not associated with tuition or state appropriations. Table 3 shows the control variable names, data source, and definitions.

Table 3.

Institutional Control Variables, Sources, and Definitions

Institutional Control Variables	Data Source	Dictionary Definition
Private Gifts, Investment Returns, and Endowment Income	Delta Cost Project	The total amount of revenue coming from affiliated entities, private gifts, grants and contracts, investment returns and endowment earnings. Endowment earnings stopped being reported to IPEDS in 1997 for FASB reporting institutions and 2002 for GASB reporting institutions.
Federal Appropriations, Grants, and Contracts	Delta Cost Project	The total amount of revenue coming from federal appropriations, grants, and contracts. Pell Grants are excluded if they were reported as federal grants.
State and Local Grants and Contracts	Delta Cost Project	The total amount of revenue from state and local grants and contracts.
Auxiliary Enterprises	Delta Cost Project	Revenues generated by or collected from the auxiliary enterprise operations of the institution that exist to furnish a service to students, faculty, or staff, and that charge a fee that is directly related to, although not necessarily equal to, the cost of the service. Auxiliary enterprises are managed as essentially self-supporting activities. Examples are residence halls, food services, student health services, intercollegiate athletics, college unions, college stores, and movie theaters.
Hospitals, independent operations, and other sources	Delta Cost Project	The total amount of revenue from hospitals, independent operations, and other sources.

Private gifts, investment returns, and endowment income. The first institutional control variable I included is revenue from private gifts, investment returns, and endowment income (PIE). PIE is defined as: "The total amount of revenue coming from affiliated entities, private gifts, grants and contracts, investment returns and endowment earnings" (Delta Data Dictionary, 2015). As institutions endowments and fundraising ability can vary greatly (Cheslock and Gianneschi, 2008) among public institutions, it is important to control for bias that could stem from changes across institutions in terms of their PIE revenue.

State and local grants and contracts. The Delta Data Dictionary (2015) defines state and local grants and contracts as the amount of revenue coming to an institution from state and local grants and contracts. Additionally, institutions could have different relationships with their states and the local government around the institution. Institutions could have missions that include performing research for the state and their locality, or they might have additional educational courses that the state or local government or community contracts them to perform. As such, these additional funds would likely not be fixed from year to year nor homogenous across institutions, so it is important to include them to reduce potential bias.

Federal appropriations, grants, and contracts. The Delta Data Dictionary (2015) tautologically defines revenue from federal appropriations, grants, and contracts as "The total amount of revenue coming from federal appropriations, grants, and contracts." As institutions have varying missions, some institutions can attempt to receive additional funding through federal research grants. Institutions may strategically spend more on research or hire more core research faculty in order to secure lucrative federal grants (Slaughter & Rhoades, 2004). Thus, it is important to control for revenues associated with federal appropriations, grants, and contracts to reduce bias associated with research expenditures and faculty employment. Additionally, I chose the version of this variable that excluded federal Pell Grants as Pell Grants were not consistently reported over time. Institutions could have reported Pell Grants within this category when Pell Grants ought to fund a student and not act as an appropriation for an institution.

Auxiliary enterprises. The Delta Data Dictionary (2015) defines revenue from auxiliary enterprises as: "Revenues generated by or collected from the auxiliary enterprise operations of the institution that exist to furnish a service to students, faculty, or staff, and that charge a fee that is directly related to, although not necessarily equal to, the cost of the service" (Delta Data

Dictionary, 2015). Auxiliary enterprises vary from institution to institution. Some institutions with large athletic programs that can support themselves with ticket sales might have athletics as an auxiliary, while other institutions might not if ticket sales cannot support the program. Some institutions offer amenities that act as an auxiliary such as a movie theater on campus, and that movie theater could generate a profit. What might count as a student services expenditure at one institution, might count as an auxiliary expenditure at another if budgeted differently. As such, it is important to control for auxiliary revenue sources to reduce potential bias in the analyses of institutional expenditures.

Hospitals, independent operations, and other sources. This last category serves as the catch all for all other sources of revenue an institution might bring in. There may be other sources of funding that could create additional biases in the analyses. For example, having a hospital throughout the sample is controlled for by the institutional level fixed effect. If the hospital suddenly opens a new wing that has been under construction allowing for new patients and requiring more doctors (who can also be faculty) to take care of them, that shift would not be controlled for by the fixed effects. The revenue from those patients to help pay for the new faculty would be controlled for though within this control variable.

State controls variables. While merit-aid programs should drive additional students to attend college, other factors related to their environment might also drive additional students to attend college or cause changes in the ability of states to finance higher education. These state controls should help alleviate potential, omitted variable bias of other potential factors associated with changes in ability for individuals to pay for college and the ability for states to appropriate additional funds to their higher education institutions. As such, I included a state's unemployment rate and per capita income (Cornwell et al., 2009; Hillman et al., 2014).

Unemployment rate. A state's unemployment rate could affect institutional enrollments, as high levels of unemployment coincide with increases in higher education attendance and vice versa (Arkes, 2010; Perna, 2000). If institutions view the changes in attendance as a result of a temporary change that occurred in just their own state, they might seek part-time faculty at a greater rate than if they believe there is a larger, consistent uptick in institutional enrollments. Additionally, these students might have needs different from the previous year's average student, and institutions might spend money differently to serve those students. The Bureau of Labor Statistics holds data on unemployment rates for each state for all the years in the study, and I drew on their data to include unemployment rate in my analysis.

Per Capita Income. Cornwell, Mustard, and Sridhar (2009) argue that per capita income should be included as a control for their study as a measure of other alternatives. While they saw this control variable needed as it would help control for students' choices in attending college or earning a wage, I used this to control for other well-paying, alternative jobs for faculty. In states with low-incomes, more professionals might try to supplement their own incomes with part-time teaching, or alternatively, high incomes might draw full-time faculty out of the faculty workforce and into other job sectors. The Bureau of Economic Analysis made these data publicly available.

Summary

In this chapter, I discussed the research design of this study to analyze institutional behavior changes in light of resource dependency changes. First, I discussed the process of determining the best available method for the analysis, which was a difference-in-difference identification strategy. Then I provided additional information about the difference-in-difference identification strategy including the statistical assumptions, creation of control groups, and

robustness checks. I concluded the chapter with a discussion of the data, sample, and variables used in the analyses.

CHAPTER 4 – RESULTS

The purpose of this study was to analyze whether institutions alter their behavior as their revenue streams change. To understand one facet of this potential change, I measured changes in two institutional behaviors, institutional expenditures and contingent faculty employment, after the state in which an institution is located adopts merit aid program. I created the following research questions to answer for this study.

Research Question 1. How do institutions alter their expenditures after the state in which they reside adopts a merit aid program?

Research Question 2. How do institutions alter their contingent faculty employment after the state in which they reside adopts a merit aid program?

In this chapter, I present evidence that answers these questions through an inferential analysis that utilized the quasi-experimental design method of difference-in-difference modeling. Difference-in-difference modeling utilizes a quasi-experimental approach to control for omitted variable bias that could affect the coefficient from the regression equations used to determine the impact of merit aid program adoption (Angrist & Pischke, 2009). To further support the evidence of the relationship between merit aid adoption and both faculty employment and institutional expenditures, I also utilized three robustness checks to help support the analytical findings.

This chapter contains the following sections: an overall discussion of the data used for the analysis including descriptive statistics for the control variables; the descriptive statistics and results of the difference-in-difference estimations concerning institutional expenditures; the descriptive statistics and results of the difference-in-difference estimations concerning faculty employment; and lastly, a discussion relating the findings back to the research questions. During

my first analysis, I also discuss at length why I chose alternative specifications. However, I limit that discussion to the first analysis, as the alternative specifications follow the same pattern over all analyses. When I deviate from the pattern for any dependent variable, I discuss it in that section.

Characteristics of the Sample

Institutions in Merit Aid States by Year

The final sample included 477 institutions[8] per academic year from 1987 – 2013[9]. Table 4 shows the number of institutions in a state adopting a merit aid program by academic year. Those in the "In a State with no Merit Aid Program" column are located in states that did not adopt a program. The "In a State with a Merit Aid Program" column shows the growing number of institutions affected by their states adopting merit aid. Starting in academic year, 2009, Michigan cancelled their merit aid program, which is why the count of institutions decreased in that year. Lastly, the column titled "In a State with a Strong Merit Aid Program [10]" column shows the number of institutions affected by a strong merit aid program in an academic year. This number is inclusive of those in the "In a State with a Merit Aid Program" column in Table 4. Indeed, being affected by a strong merit aid program is indicative of being affected by a merit aid program. Between 2006 through 2008, a maximum of 142 institutions (about 30%) resided in states with a merit aid program. From 2003 through 2013, the maximum of 89 institutions (about 19%) resided in states with a strong merit aid program.

[8] As a reminder, the term "institutions" can refer to entire university multi-campus systems.
[9] The academic year is indicated by the latest semester of a year. For example, academic year 2000 is the 1999-2000 academic year.
[10] Strong Merit Aid Programs are only considered strong in the case that they reach a broad number of students and the reward amount is large. Nine of fifteen merit aid adopting states adopted strong merit aid programs based on those criteria.

Table 4

Count of Institutions in States with No Merit Aid Program, In States Adopting a Merit Aid Program, in States Adopting a Strong Merit Aid Program

Academic Year	Total	In a State with no Merit Aid Program	In a State with a Merit Aid Program	In a State with a Strong Merit Aid Program
1987	477	467	10	0
1988	477	467	10	0
1989	477	467	10	0
1990	477	467	10	0
1991	477	457	20	0
1992	477	457	20	0
1993	477	438	39	19
1994	477	438	39	19
1995	477	430	47	19
1996	477	424	53	25
1997	477	414	63	35
1998	477	392	85	57
1999	477	388	89	60
2000	477	373	104	60
2001	477	361	116	72
2002	477	351	126	82
2003	477	344	133	89
2004	477	344	133	89
2005	477	344	133	89
2006	477	335	142	89
2007	477	335	142	89
2008	477	335	142	89
2009	477	350	127	89
2010	477	350	127	89
2011	477	350	127	89
2012	477	350	127	89
2013	477	350	127	89

Revenue Characteristics of the Institutions

While institutions have multiple revenue streams (Bowen, 1980), I am concerned with two key revenue categories: revenue from the state and revenue from students. Resource dependency theory predicts that the more beholden an institution is to a resource provider, the

more that institution will alter its behavior to appease the resource provider (Pfeffer &Salancik, 1978). The most significant form of state revenue for institutions is state appropriations, which are legislated funds that go directly from the state to institutions. Revenue from students comes in many forms including tuition, fees, and governmental grants. Once a state adopts a merit aid program, there is a sudden shift in the composition of revenue from students, and state grants (as part of governmental grants) becomes a much larger if not the largest portion of student revenue. Additional state revenue flows through students to institutions replacing the money students paid from their own dollars. Institutions are beholden to the state to receive these funds, but they are also beholden to the students as the students direct to which institutions the funds go by choosing whether or not to attend a certain college.

Figure 3 and Figure 4 show the change in the average proportion of total revenues that come from state appropriations and students, respectively, over time for institutions that were never affected by a merit aid program, institutions that had been affected by a merit aid program at some time, and institutions that had been affected by a strong merit aid program at some time. In the analyses in the study, the never affected by merit aid group consisted of institutions in states that never adopt a merit aid program plus institutions in states that had not yet adopted a merit aid program. By locking institutions in each category and not letting them shift as states adopt merit aid programs, changes in leaving one group and entering into another grouping could not bias the average behavior of institutions in states that never adopt a merit aid program. This allowed for a visualization of the trends to show whether institutions in states that did not adopt a merit aid program could serve as a satisfactory counterfactual for institutions in states that did

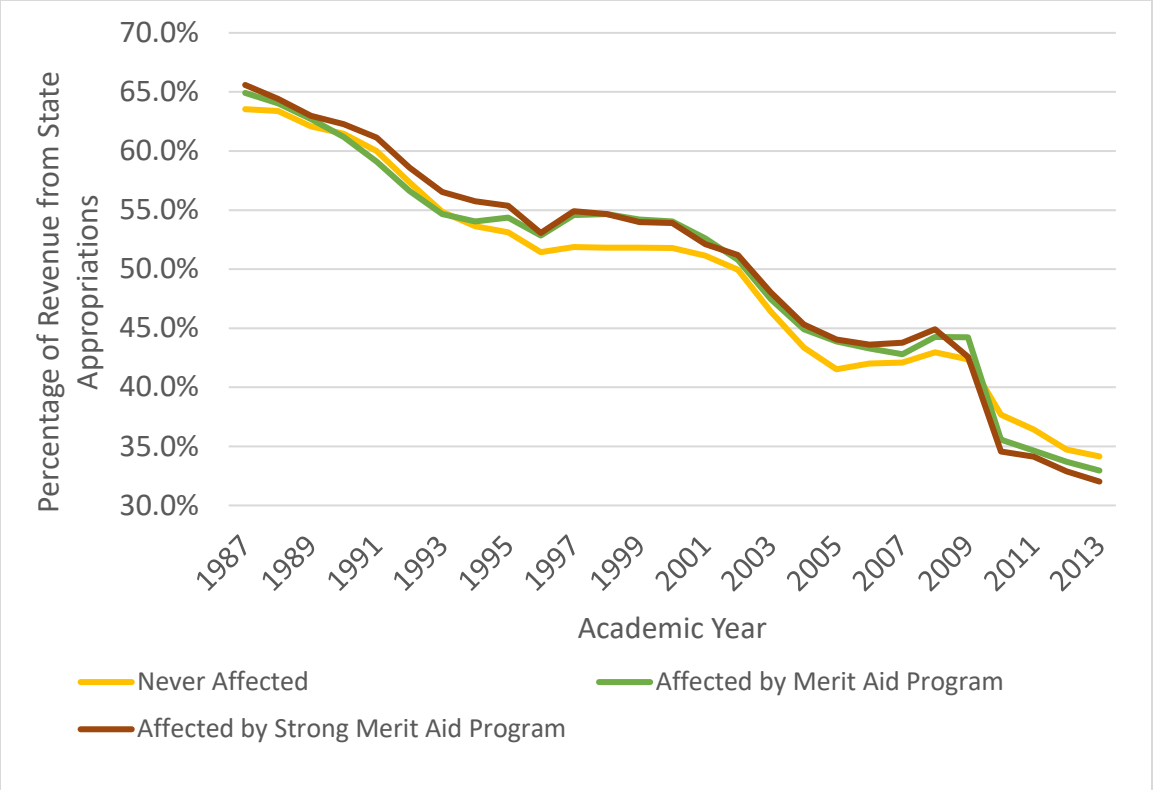


Figure 3. Change in average revenue from state appropriations in merit aid program adopting states, strong merit aid program adopting states, and states that did not adopt a merit aid program.

Figure 3 shows that, on average, all three groups share similar experiences with the portions of their revenue from state appropriations with similar declines over time with small upticks around 1997 and 2008. This evidence lends credence to the idea that financially, the institutions that do not reside in states that adopt merit aid programs can act as a counterfactual to those that do.

Additionally, Figure 4 also shows that all three groups share a similar change in average proportion of revenue from students, including students' tuition and fees, Pell Grants, Federal Supplemental Educational Opportunity Grants, state grants, and local grants. In context of Figure 1, Figure 2 further highlights that in terms of revenue all three groups are similar in their switch to utilizing student money as state appropriations decrease. This further highlights the

fact that states that do not adopt merit aid programs act as a suitable control group when examining the institutional behaviors of states that do adopt merit aid programs.

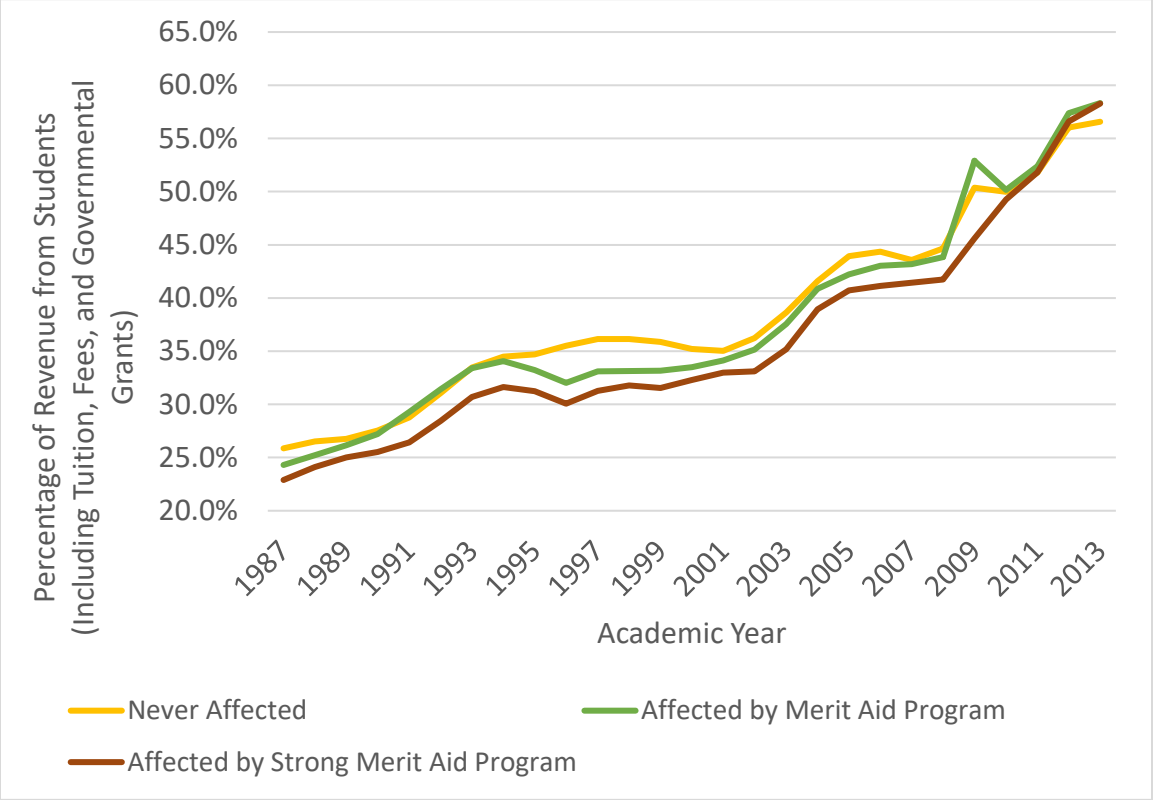


Figure 4. Change in average revenue from students (Including tuition, fees, federal, state, and local grants) in merit aid program adopting states, strong merit aid program adopting states, and states that did not adopt a merit aid program.

Characteristics of the Control Variables Used in the Estimating Equations

As mentioned in Chapter 3, while difference-in-difference estimation does not require control variables. The inclusion of control variables helps with the precision of the analysis. Indeed, I included the control variables, shown in Table 4, in my analysis that relate to state level factors and institutional level revenue that could affect faculty employment and institutional expenditures. Table 4 shows that there were 12,189 measurements over time in each variable. As there were 477 institutions over 27 years, a balanced sample with no missing data would have yielded 12,879 observations. However, there were missing data. Cheema (2014) offers a

suggestion of how to handle these missing data. He suggests that at 5% missing data in a large data set, listwise deletion serves as the best solution. Listwise deletion entails removing the entire observation (i.e. data row) from the analysis if any one piece is missing. The sample had 690 rows with missing data for at least one control variable and were removed from the analysis.

IPEDS data do have some inconsistencies especially in earlier years. This is due to the rules governing the submission of data to the National Center for Education Statistics. Indeed, in some years answering certain questions were optional, so some institutions opted not to answer them. Additionally, definitions changed over time, which cause the data to be inconsistent from the beginning of data collection for this study in 1987 to the end of data collection in 2013. The Delta Project data standardized much of the data making it usable in the analyses here, which is why they collapsed some of the control variables into one group. Throughout my upcoming analyses, the number of observations (i.e. N) will be less than 12,189 due to missing dependent variable measurements and other sample restrictions.

Table 5

Control Variables Used in Analyses

VARIABLES	N	Mean	Std. Dev.
State Per Capita Income	12,189	30,581	9,964
State Unemployment Rate	12,189	5.92	1.86
Private Gifts, Investment Returns, and Endowment Income (in millions)	12,189	14.85	60.35
Federal Appropriations, Grants, and Contracts (in millions)	12,189	33.24	88.51
State and Local Grants and Contracts (in millions)	12,189	15.27	48.81
Auxiliary Enterprises (in millions)	12,189	30.19	52.77
Hospitals, Independent Operations, and Other Sources (in millions)	12,189	78.20	232.68

Changes in Institutional Expenditures

In this section, I discuss the descriptive results and inferential results that answer research question two. First, I discuss the choices made to help interpret the results of the difference-in-difference estimations. Then, I provide an analysis of each dependent variable separately. By organizing this section in this manner, I can more completely discuss each dependent variable in its own context. In each section, I discuss the distribution of the dependent variable, changes in each section's expenditure category, and finally the difference-in-difference estimates of the effect of merit aid program adoption on institutional expenditures.

I followed the common practice in measuring higher education expenditure variables by dividing the total amount spent in each category by the number of full-time equivalent (FTE) students and then taking the natural log of that number (Cheslock & Gianesschi, 2008; Jacob, 2018; Leslie et al., 2011; Ryan, 2004; Webber & Ehrenberg, 2010). This transformation changes the interpretation of the dependent variable so that a one unit change in the independent variable (i.e. merit aid adoption) becomes associated with an percentage difference in the dependent variable between adopters and non-adopters (Institute for Digital Research and Education, 2017).

Additionally, a normally distributed dependent variable is important in difference-in-difference estimation as it decreases the issues of heteroskedasticity. Heteroskedasticity allows for observations with large deviations from the mean to influence the statistical relationship between the dependent variable and the independent variable more than observations near the mean (Statistics Solutions, 2013). This biases the standard errors by giving additional weight to institutions with fewer options to alter their expenditures or faculty employment (Wooldridge, 2010). Indeed, institutions that have no tenure lines or only hire full-time faculty would not vary over time in their faculty composition. Institutions with no research mission would vary little or

not at all relative to institutions that have a moderate research mission. By transforming the dependent variable through taking the natural logarithm of it, I reduced the heteroskedasticity of the dependent variable giving an equal weight to all observations.

In the analysis tables I include in each section, I display the exponentiated coefficients and standard errors. The exponentiated coefficient for a dichotomous variable is the ratio of the expected geometric mean for the included predictor variable over the expected geometric mean for the not included reference variable. Additionally, I employed institutional and year fixed effects in my analysis. Thus, for the regression results, the coefficient is interpreted as an average within institution change compared to the control group.

In the regression tables for each section, there are three analyses. The first analysis dubbed the 'base' model assumed that all institutions in states that did not adopt merit aid programs or were about to adopt merit aid programs should act as a control group to those that did. As Figure 1 and Figure 2 demonstrated, institutions on average had similar changes over time in both revenue from state appropriations and revenue derived from student attendance. Indeed, over time, institutional reliance on state appropriations and student revenue changed at much the same rate for all three groups.

However, difference-in-difference estimation requires that the control group have similar pre-treatment trends in terms of the dependent variable. Thus, while other institutions in states that did not adopt a merit aid program serve as a good control group on average, they might not for each state's institutions. In the second analysis of each dependent variable, I removed institutions in merit aid adopting states where the parallel trends assumption did not pass a visual examination. For example, Floridian institutions had parallel pre-treatment trends for instructional and research expenditures but not for student services expenditures. Consequently,

when analyzing student services expenditures, institutions in Florida were removed from the student services expenditures analysis.

The third analysis followed Dynarski's (2004) modeling suggestion that states about to adopt merit aid programs serve as a good counterfactual to states that have adopted merit aid programs. Through this modeling, institutions in states about to adopt a merit aid program create their own control group. Through this analysis, I was able to test the sensitivity of using all institutions in states that did not adopt merit aid by comparing the coefficients of the regression results. However, this method reduced the sample size quite a bit, and as a result, this method lacked much of the statistical power of the base method. Another possibility exists, in that institutions in states that adopt merit aid late have begun to alter their behaviors before merit aid adoption. Merit aid adoption was not randomly assigned. Indeed, merit aid program adoption largely took place in the Southeast United States.

While merit aid program adoption served as a shock to the system for the institutions in states that adopted early, for institutions in other states that adopted later, they had more foresight into what to expect. Those in late adopting states could have began the process of acting like an institution in a program adopting state before their state's program was adopted to help reduce the shocks that early adopters faced. For each dependent variable, I included an additional analysis to test for Granger Causality (Angrist & Pischke, 2009). Following the methods of Autor (2003), I altered the year of merit aid adoption for each state to exist for exactly one year for four years prior to merit aid adoption. This allowed for me to see if institutions are responding to the adoption of merit aid in the academic years before merit aid was adopted in their state. This information will provide additional information as to how much of an exogenous shock merit aid adoption was to institutions in merit aid adopting states.

Instructional Expenditures

IPEDS defined instructional expenditures as, "a functional expense category that includes expenses of the colleges, schools, departments, and other instructional divisions of the institution and expenses for departmental research and public service that are not separately budgeted" (Delta Data Dictionary, 2015). According to theory and research, instructional expenditures is one of the expenditures that students would prefer institutions to spend more on. If the coefficients for instructional expenditures are statistically significant and positive, the analyses would then suggest that institutions in merit aid adopting states adjusted their behaviors as their resource dependency changed.

Figure 5 shows a comparison of the distribution on instructional expenditures per FTE and logged transformed distribution of instructional expenditures per FTE. Following the conventional method of using the natural log of expenditures per FTE yielded a distribution that is approximately normal. This transformation was important, since the untransformed data were very right skewed leading to issues with heteroscedasticity potentially biasing the standard errors of the regressions.

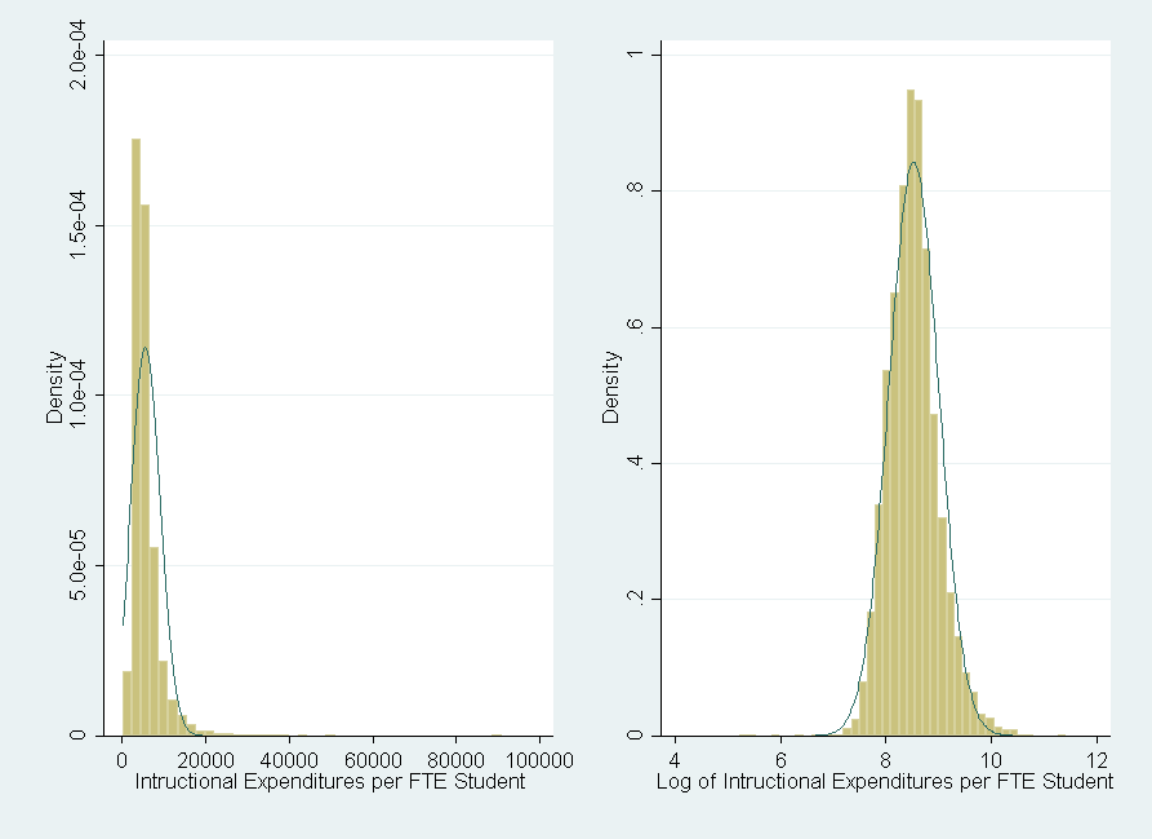


Figure 5. Histograms of Instructional Expenditures and Log of Instructional Expenditures

Figure 6 shows the change in average logged instructional expenditures per FTE student during the analysis period for states that never adopt merit aid, states that adopt a merit aid program, and states that adopt a merit aid program. Overall, the average institution in all three groups spent more on instruction over time at a nearly matched rate. In 2008, the last year in any changes in merit aid programs, a wider gap between merit aid affected institutions and institutions not affected by merit aid begins to occur.

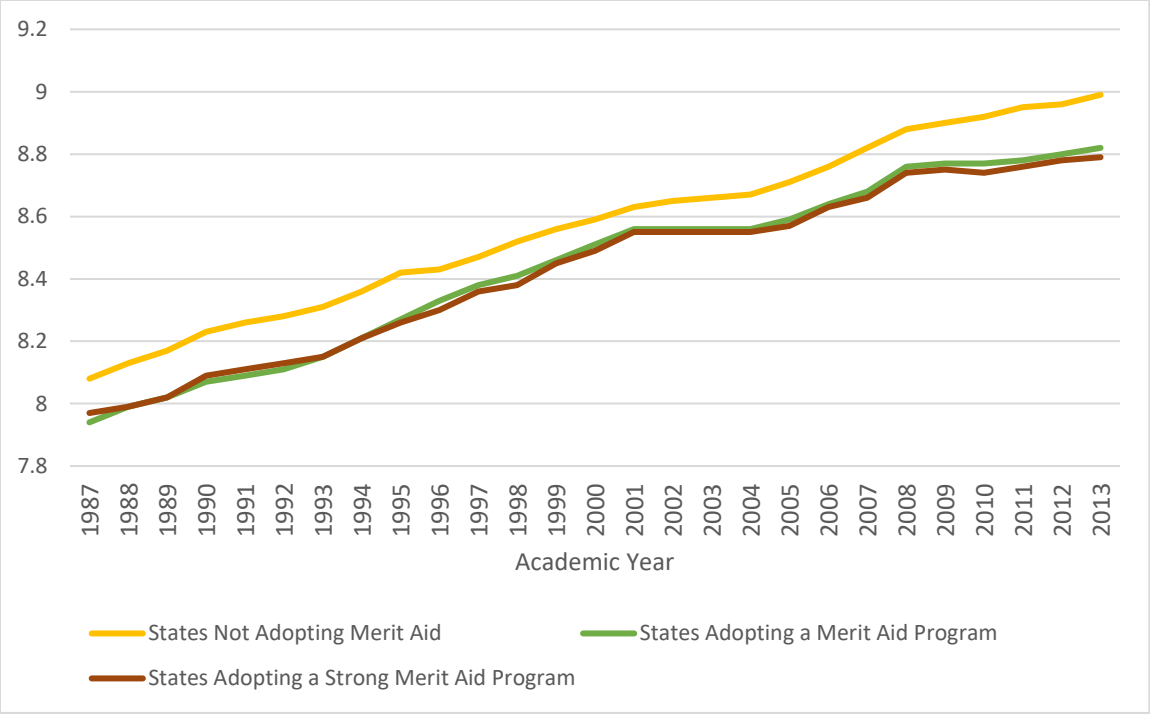


Figure 6. Logged mean of Instructional Expenditures per student FTE by Academic Year for Institutions in Merit Aid Program Adopting States, Strong Merit Aid Program Adopting States, and States that Did Not Adopt Merit Aid

Table 6 contains the results of three separate analyses. The "base" model estimated that when a state adopts a merit aid program, institutions in that state on average spent about 2.6% more on instruction than states that had not adopted merit aid. This model was statistically significant at the 5% level, indicating that there was a 95% chance that the result found was not based on a chance occurrence. The estimation from the base model suggests that institutions do alter their spending on instruction, after the state in which they reside adopts a merit aid program. The base model assumed that all states serve as a suitable control group and did not take into account the pre-treatment trends of institutional spending on instruction.

Table 6

The Effect of Merit Aid Program Adoption on Instructional Expenditures

VARIABLES	(1) Base Instruction	(2) PT Removal Instruction	(3) Staggered Instruction
Merit Aid	1.026**	1.026**	0.991
	(1.011)	(1.012)	(1.012)
Constant	2,897***	3,059***	2,442***
	(1.042)	(1.049)	(1.059)
Observations	12,187	11,158	3,716
R-squared	0.849	0.855	0.856
Number of Institutions	471	431	142
Year FE	YES	YES	YES
Institution FE	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

However, as mentioned previously, examining all states without concern for their pre-treatment behavior violates the parallel trends assumption. Indeed, having visually examined the parallel trends of the institutions in each state in the analysis as they relate to instructional expenditures, I found that Alaska, Georgia, Massachusetts, Mississippi, and Nevada all were not suitable. Figure 5 shows the trends for those aforementioned states. After removing those five states, the regression results yielded an estimate that institutions in states with a merit aid program on average spent 2.6%[11] more spent on instruction compared to peers. Even though five states were removed, each of these states did not have a large number of institutions, so only 40 observations were removed.

[11] This result is not exactly the same as the naïve model. The seemingly identical result stems from a choice in where to round for brevity sake.

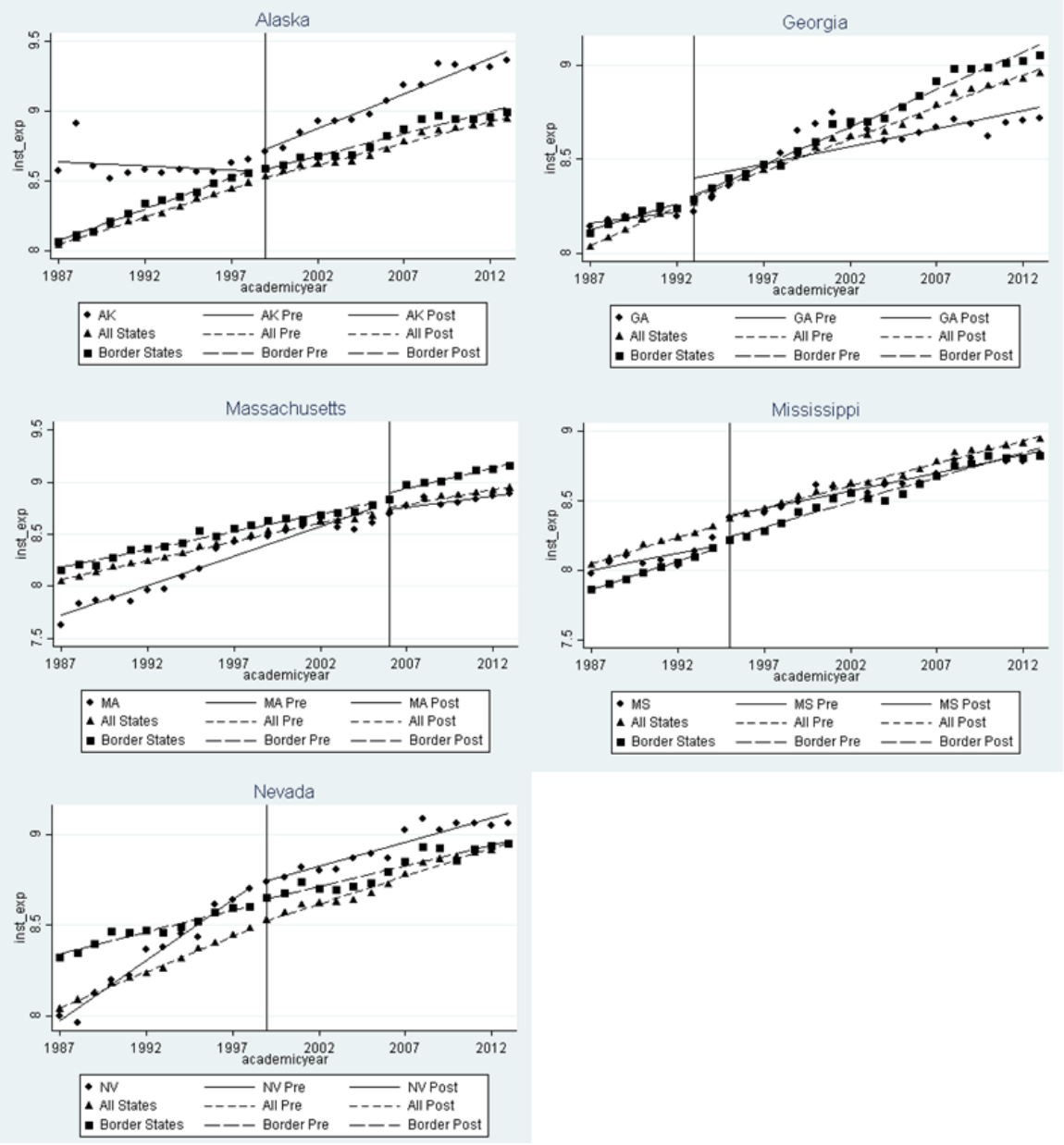


Figure 7. Institutions in States that do not Pass a Visual Examination of the Pre-Treatment Parallel Trends Assumption Concerning Instructional Expenditures

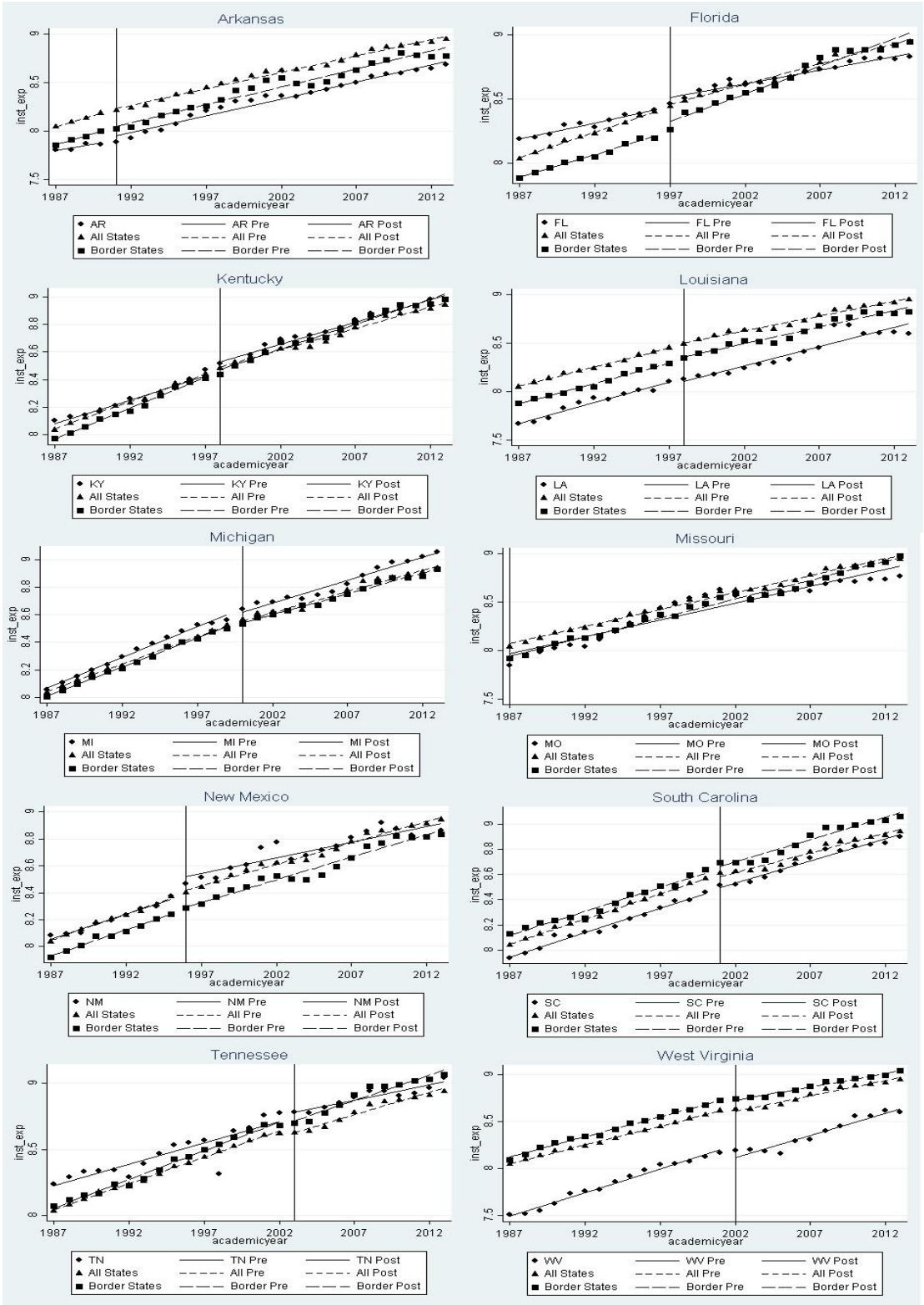


Figure 8. Institutions in States that Pass a Visual Examination of the Pre-Treatment Parallel Trends Assumption Concerning Instructional Expenditures

Having utilized Dynarski's (2004) method of analyzing just the institutions in states that adopted a merit aid program, which I refer to as the staggered model, I found a statistically insignificant result and the coefficient was close to one. This model then suggests that there was no effect of merit aid adoption on instructional expenditures. While the statistically insignificant result might have been the result of a smaller sample size, the coefficient is also relatively close to one, which could also yield a statistically insignificant result.

Table 7 follows the same regression analysis as Table 5 with one exception. In the analysis shown in Table 7, I included an additional variable that allows the effect of merit aid program adoption to differ between the first five years after adoption and all the years after the first five years after adoption. Since merit aid program adoption ought to have acted as an exogenous shock to the average pattern of behavior, allowing for a long timeframe after policy adoption could have introduced additional biases such as other changes in state policies that could have affected instructional expenditures. The additional variable allowed for the ability to analyze the effect of merit aid for only the first five years after the adoption of the program.

The base model estimates that institutions in merit aid program adopting states spent 1.2% more than institutions whose states did not adopt a merit aid program. Having removed states that did not meet the parallel trends assumption that result increased to 1.1%. In the staggered model, in the first five years after adoption, the estimation yielded a slightly negative result. However, these results were not statistically significant. Across all three models though, the coefficients on the variable for merit aid after five years were statistically significant. In the base model, institutions in merit aid adopting states spent 4.2%[12] more on instruction than

[12] Since the estimating equation is a double log model (i.e. the dependent and independent variable are both logged), when dummy variables interact, the coefficients are multiplied not added.

institutions in states without merit aid. After removing the five states that did not pass a visual examination of the parallel trends assumption, the regression results yielded an estimate that institutions in states with a merit aid program on average spent 4.4% more spent on instruction compared to peers. In the staggered model, institutions in states that had adopted merit aid spent 3.6% more on average than institutions that have yet to adopt merit aid. These results indicate several possibilities concerning institutions in merit aid adopting states. They could indicate that institutions might not immediately respond to the adoption of merit aid. They could indicate that merit aid does not serve an exogenous shock to the system. They could also suggest that institutions in merit aid adopting states begin reacting to other stimuli associated with merit aid adoption in a state.

Table 6

The Effect of Merit Aid Program Adoption on Instructional Expenditures for the First Five Years Post Adoption

VARIABLES	(1) Base Instruction	(2) PT Removal Instruction	(3) Staggered Instruction
Merit Aid	1.012	1.011	0.991
	(1.009)	(1.010)	(1.012)
Merit After 5 Years	1.030***	1.033***	1.046***
	(1.010)	(1.013)	(1.012)
Constant	2,848***	3,004***	2,412***
	(1.042)	(1.050)	(1.062)
Observations	12,187	11,158	3,716
R-squared	0.850	0.855	0.858
Number of Institutions	471	431	142
Year FE	YES	YES	YES
Institution FE	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

For Table 8, I added a coefficient to the original model (Table 6) to analyze the effect of strong merit aid programs on institutions. I posited that strong merit aid programs would have a different effect than weak merit aid programs. Including the variable for strong merit aid programs allowed for an estimate of the effect on instructional expenditures separately for weak and strong programs. In the base model, institutions in states with weak merit aid programs were found to spend 3.7% more than institutions with no merit aid program, and 1.8% more in the model where states that violated the parallel trends assumption were removed. However, in that model was statistically insignificant. In the base model, I found that institutions in states with strong programs spent 2% more on instruction than institutions in states without a merit aid program though this was not have a statistically significantly different effect. In the model with the states removed for not passing an examination of the parallel trends assumption, I found institutions in states with a strong merit aid program spent 2.8% more on instruction.

Table 8

The Effect of a Strong Merit Aid Program Adoption on Instructional Expenditures

VARIABLES	(1) Base Instruction	(2) PT Removal Instruction	(3) Staggered All Instruction	(4) Staggered Strong Instruction
Merit Aid	1.037***	1.018	0.999	
	(1.013)	(1.016)	(1.015)	
Merit Aid X Strong	0.984	1.010	0.989	1.043***
	(1.018)	(1.022)	(1.020)	(1.015)
Constant	2,909***	3,055***	2,463***	2,846***
	(1.043)	(1.050)	(1.064)	(1.108)
Observations	12,187	11,158	3,716	2,341
R-squared	0.849	0.855	0.856	0.834
Number of Institutions	471	431	142	89
Year FE	YES	YES	YES	YES
Institution FE	YES	YES	YES	YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

For the next two analyses concerning instructional expenditures, I again followed Dynarski's (2004) solution of creating a control groups out of institutions in states that will have had adopted a policy. I limited the sample to just institutions in states that had adopted either any merit aid program (Table 5 - Staggered All) or a strong merit aid program (Table 5 - Staggered Strong). Having limited my sample to only institutions in states that adopted a merit aid program in general, I found that institutions in states that adopted a weak merit aid program spent, on average, 0.1% less on instruction than institutions in states that were about to adopt a merit aid program. In that same analysis, I found that institutions in states with strong merit aid programs spent 1.1% less on instruction than institutions about to adopt a merit aid program. For this model though, both coefficients were statistically insignificant. When analyzing only the institutions in states that adopted a strong merit aid program, I found that these institutions spent on average 4.3% more on instructional expenditures than institutions in states that will eventually adopt a strong merit aid program. The coefficient was statistically significant at the .01% level.

To test for Granger Causality, I added four dichotomous variables to the model that indicate that merit aid had been adopted in a state before merit aid was actually adopted. Each lagged variable existed only for one year, and there is one lagged variable for each of the four years before merit aid was adopted. If merit aid truly was a shock that institutions did not expect that altered their behaviors, then the coefficients should be statistically insignificant. Statistically significant differences in the years before merit aid adoption would indicate that institutions in states adopting a merit aid program are either changing behavior from a stimulus other that merit aid or are anticipating the merit aid program's effect on students and altering their institutional behaviors before the implementation of the program.

Table 9 shows the results of my test for Granger Causality. In the base model, in the fourth year before merit aid adoption, institutions in states that will have adopted merit aid four years later are statistically significantly different from institutions in non-adopting states. However, in the model with the removal of states with institutions that did not pass a visual examination of the parallel trends assumption that difference no longer existed. This indicated that removing the institutions in states that did not meet the parallel trends assumption served as a good control group for this analysis. In the staggered policy adoption model, in the two years before adoption, the coefficient indicated that institutions that were about to adopt merit aid are statistically significantly different from those not yet adopting. This results indicates that institutions in states about to adopt a merit aid program began to adjust their instructional expenditure behavior before merit aid influenced the students.

Table 9

The Effect of a Merit Aid Program Adoption on Instructional Expenditures Including Lagged Coefficients to Test for Granger Causality

VARIABLES	(1) Base Instruction	(2) PT Removal Instruction	(3) Staggered Instruction
Merit Aid	1.030**	1.027*	0.972*
	(1.013)	(1.015)	(1.017)
Year Lag 1	1.002	1.001	0.957***
	(1.012)	(1.012)	(1.014)
Year Lag 2	0.999	0.996	0.962***
	(1.011)	(1.012)	(1.013)
Year Lag 3	1.007	1.007	0.977**
	(1.011)	(1.012)	(1.012)
Year Lag 4	1.026***	1.012	1.001
	(1.010)	(1.010)	(1.010)
Constant	2,894***	3,057***	2,424***
	(1.042)	(1.050)	(1.062)
Observations	12,187	11,158	3,716
R-squared	0.849	0.855	0.857
Number of Institutions	471	431	142
Year FE	YES	YES	YES
Institution FE	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Research Expenditures

IPEDS defined research expenditures as "a functional expense category that includes expenses for activities specifically organized to produce research outcomes and commissioned by an agency either external to the institution or separately budgeted by an organizational unit within the institution" (Delta Data Dictionary, 2015). According to theory and research, research expenditures is one of the expenditures students typically do not care about. If the coefficients for research expenditures are statistically insignificant or statistically significant and negative,

the analyses would then suggest that institutions in merit aid adopting states adjusted their behaviors as their resource dependency changed.

Figure 9 shows a comparison of the distribution on research expenditures per FTE and logged transformed distribution of research expenditures per FTE. Following the conventional method of using the natural log of expenditures per FTE yielded a more normal distribution than the unlogged model. As with instructional expenditures, and all dependent variables used in this study, a normal distribution helped remove bias in the standard errors of the various regression analyses I performed to understand the relationships among the dependent variables and merit aid adoption.

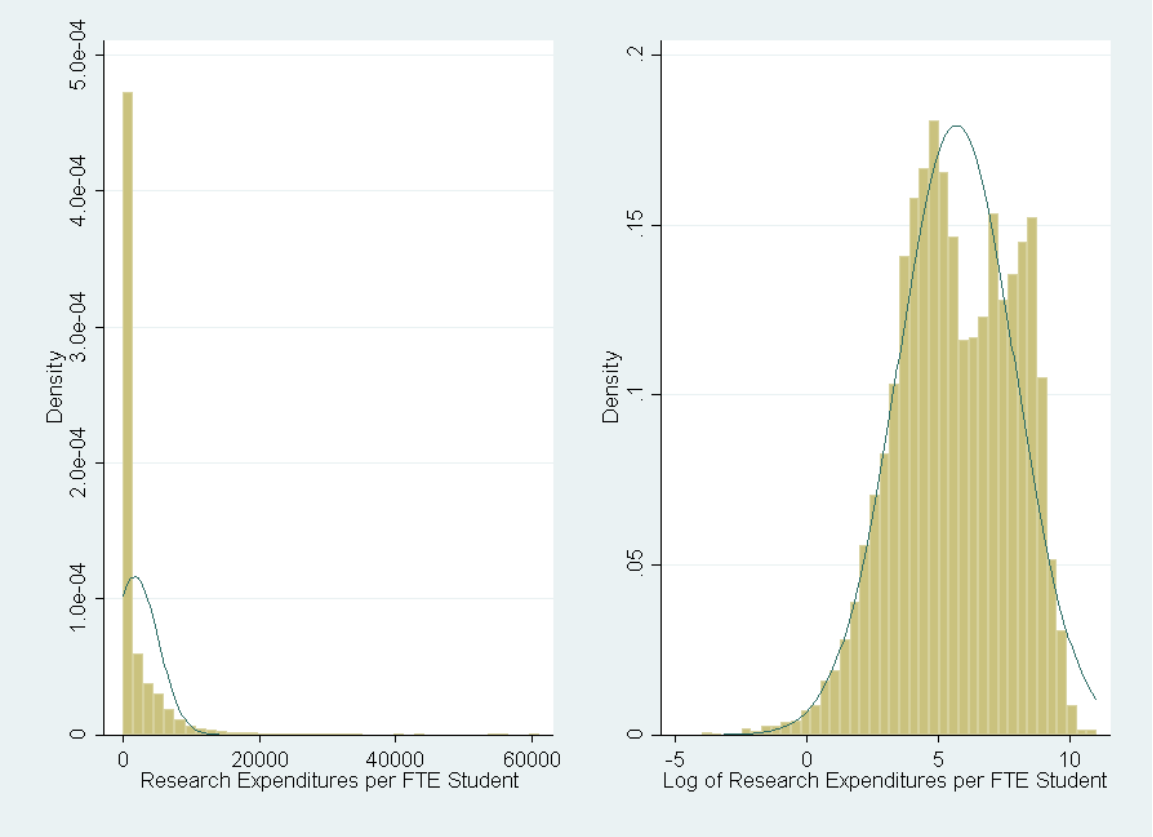


Figure 9. Histograms of Research Expenditures and Log of Research Expenditures

Figure 10 shows the change in average logged research expenditures per FTE student during the analysis period for states that never adopt merit aid, states that adopt a merit aid

program, and states that adopt a merit aid program. In general, all institutions regardless of merit aid adoption moved in a similar upwards trajectory over time. However, the institutions in states that adopted merit aid program experienced more volatility on average than institutions in non-adopting states. The sample sizes are different from one another as well, so it could be that there are states that cause a smoothing effect in the non-adopting group.

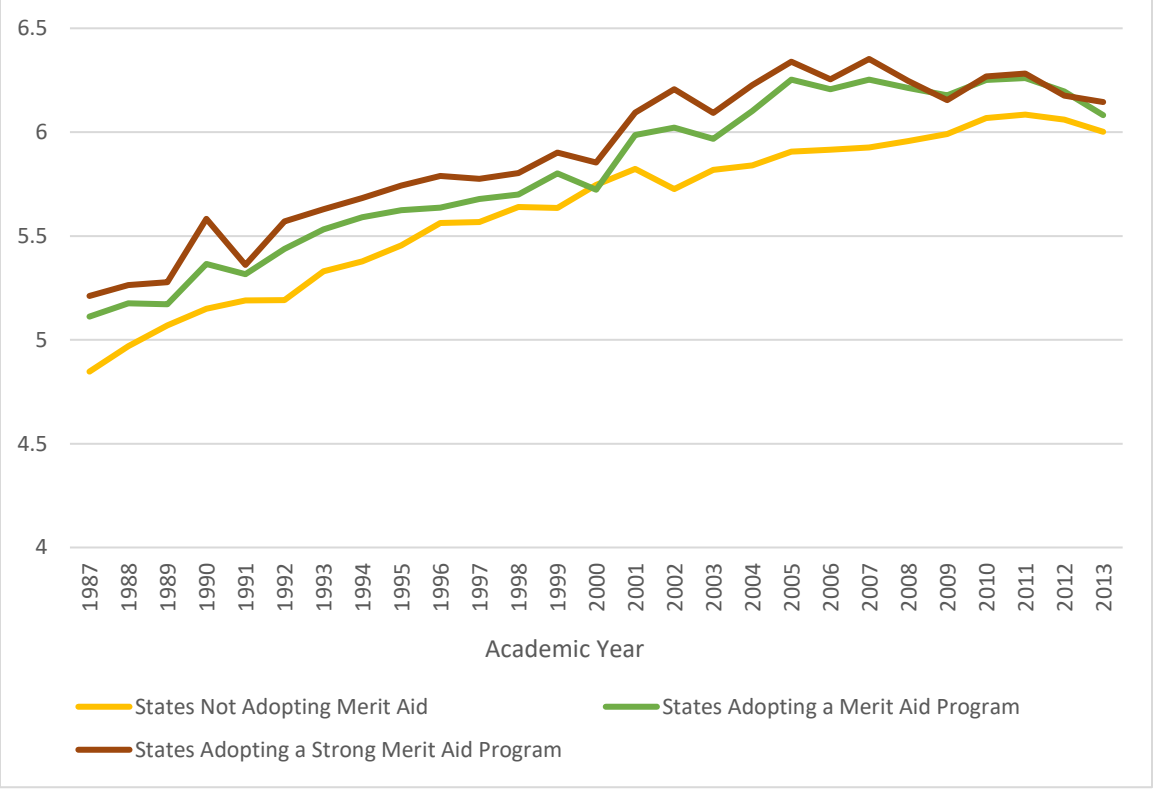


Figure 10. Logged mean of Research Expenditures per student FTE by Academic Year for Institutions in Merit Aid Program Adopting States, Strong Merit Aid Program Adopting States, and States that Did Not Adopt Merit Aid

Table 10 shows the results from the first three sets of analyses concerning research expenditures. In each analysis, I found no statistical difference between institutions in merit aid adopting states and institutions that did not adopt a merit aid program. However, each result was positive indicating that institutions in merit aid adopting states may have increased research expenditures after merit aid adoption. Compared to the analyses on instructional expenditures,

the research expenditures analyses contains about 1100 fewer of observations in the full, Base model. The accounting for research expenditures had changed from the beginning of data collection to the end of data collection, and the Delta Project mapped responses as accurately as possible. However, discrepancies were handled by leaving the data missing. I decided to handle missing data through listwise deletion instead of imputation according to Cheema's (2014) suggestion. In examining the pre-adoption parallel trends for average institutional behavior concerning research expenditures, I found that Alaska, Georgia, Louisiana, Mississippi, and Tennessee did not pass a visual examination to make the claim that institutions in these states would likely have had the same trajectory if the states in which they are located had not adopted a merit aid program. Figure 9 shows the visualizations.

Table 10

The Effect of Merit Aid Program Adoption on Research Expenditures

	(1)	(2)	(3)
	Base	PT Removal	Staggered
VARIABLES	Research	Research	Research
Merit Aid	1.060	1.086	1.121
	(1.069)	(1.096)	(1.090)
Constant	226.2***	212.3***	597.8***
	(1.303)	(1.315)	(1.970)
Observations	10,941	9,828	3,192
R-squared	0.245	0.237	0.296
Number of Institutions	460	412	134
Year FE	YES	YES	YES
Institution FE	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

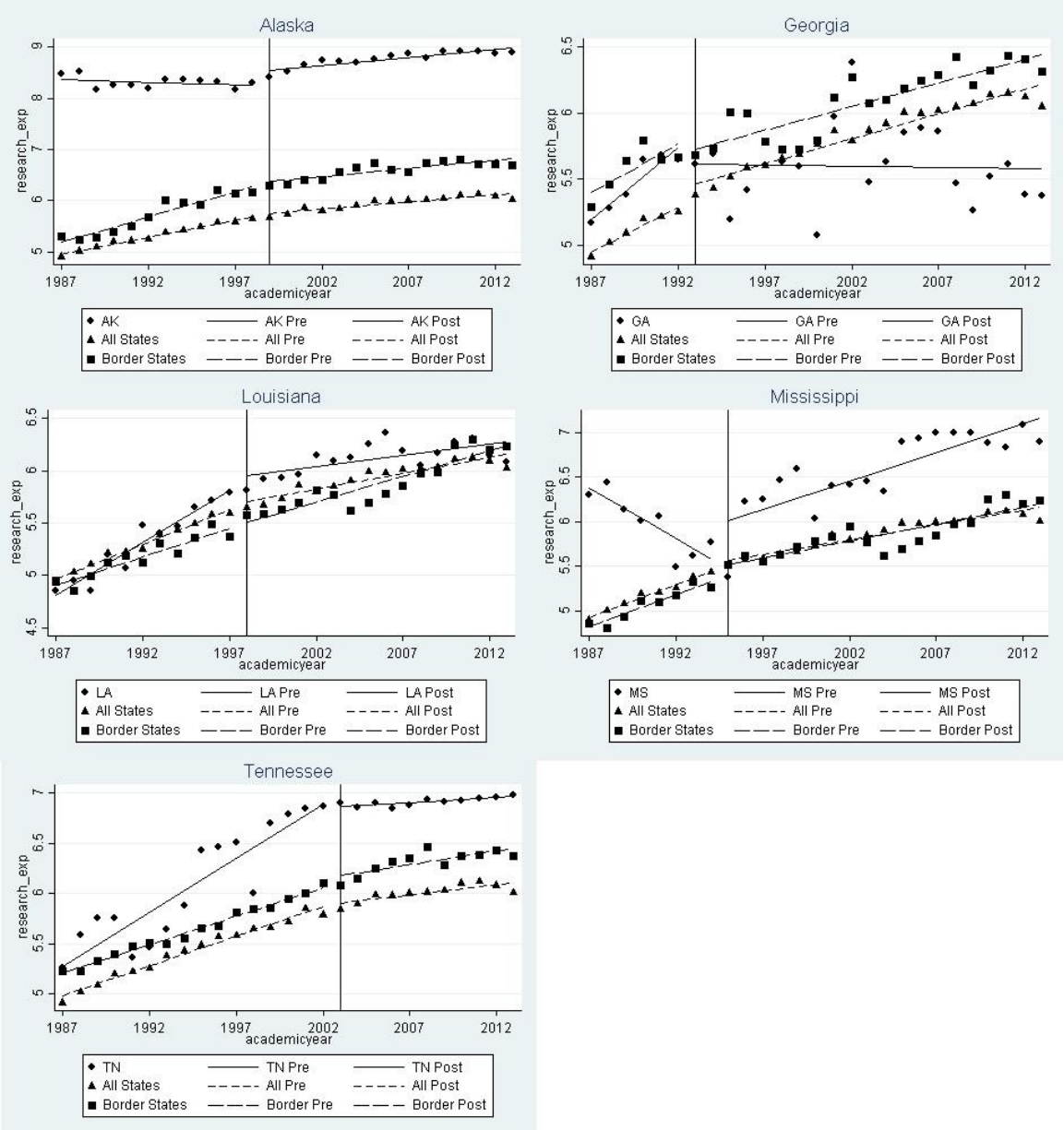


Figure 9. Institutions in States that do not Pass a Visual Examination of the Pre-Treatment Parallel Trends Assumption Concerning Research Expenditures

Table 11 included an additional variable that allows the effect of merit aid program adoption to differ between the first five years after adoption and all the years after the first five years after adoption. Across all three models, I found no statistically significant difference between institutions in merit aid adopting states and institutions that did not adopt a merit aid

program in both the first five years after adoption and in the years after the first five years. All coefficients yielded positive results. In the base model and the staggered model, institutions in sates that adopted merit aid spent more on average in the subsequent years after the first five years. In the model that removed states whose institutions did not pass a visual examination of the parallel trends assumption, in the subsequent years after the first five years post-adoption, institutions began to spend less on research relative to the first five years but still about 7.7% more than institutions in states that did not adopt a merit aid program.

Table 11

The Effect of Merit Aid Program Adoption on Research Expenditures for the First Five Years Post Adoption

VARIABLES	(1) Base Research	(2) PT Removal Research	(3) Staggered Research
Merit Aid	1.057	1.092	1.122
	(1.064)	(1.088)	(1.090)
Merit After 5 Years	1.007	0.987	1.034
	(1.065)	(1.076)	(1.073)
Constant	225.2***	213.8***	595.1***
	(1.305)	(1.320)	(1.972)
Observations	10,941	9,828	3,192
R-squared	0.245	0.237	0.296
Number of Institutions	460	412	134
Year FE	YES	YES	YES
Institution FE	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 12 included an additional coefficient to the original (Table 9) model to analyze the effect of strong merit aid programs on institutions as strong merit aid programs could have had a different effect than weak merit aid programs. Indeed, strong programs were associated with more spending than both institutions with no merit aid program and institutions in states with

weak merit aid programs in the base, parallel trends controlled for, and staggered all models. In the staggered strong model, the coefficient yielded negative results. Across all models though there were no statistically significant differences exist among any of the comparison groups.

Table 12

The Effect of a Strong Merit Aid Program Adoption on Research Expenditures

VARIABLES	(1) Base Research	(2) PT Removal Research	(3) Staggered All Research	(4) Staggered Strong Research
Merit Aid	1.006	1.018	1.076	
	(1.096)	(1.088)	(1.104)	
Merit Aid X Strong	1.078	1.107	1.063	0.926
	(1.134)	(1.162)	(1.141)	(1.136)
Constant	223.8***	208.6***	586.1***	582.1***
	(1.303)	(1.310)	(1.966)	(2.802)
Observations	10,941	9,828	3,192	2,013
R-squared	0.245	0.237	0.296	0.332
Number of Institutions	460	412	134	85
Year FE	YES	YES	YES	YES
Institution FE	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 13 shows the results for the models that test for Granger Causality. As with all the other models concerning research expenditures, there were no statistically significant results. This indicates that institutions in states that adopted merit aid were not statistically different from those institutions in states that did not adopt a merit aid program. Indeed, I found that there was no statistically significant association between merit aid adoption and research expenditures.

Table 13

The Effect of a Merit Aid Program Adoption on Research Expenditures Including Lagged Coefficients to Test for Granger Causality

VARIABLES	(1) Base Research	(2) PT Removal Research	(3) Staggered Research
Merit Aid	1.060	1.066	1.182
	(1.088)	(1.115)	(1.127)
Year Lag 1	1.052	1.021	1.152
	(1.092)	(1.119)	(1.116)
Year Lag 2	1.009	0.972	1.108
	(1.075)	(1.085)	(1.093)
Year Lag 3	0.962	0.900	1.008
	(1.093)	(1.125)	(1.097)
Year Lag 4	0.970	0.911	1.025
	(1.073)	(1.093)	(1.067)
Constant	226.0***	213.3***	604.8***
	(1.303)	(1.313)	(1.974)
Observations	10,941	9,828	3,192
R-squared	0.245	0.237	0.297
Number of Institutions	460	412	134
Year FE	YES	YES	YES
Institution FE	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Student Services Expenditures

IPEDS defined student services expenditures as "a functional expense category that includes expenses for admissions, registrar activities, and activities whose primary purpose is to contribute to students emotional and physical well-being and to their intellectual, cultural, and social development outside the context of the formal instructional program" (Delta Data Dictionary, 2015). According to theory and research, student services expenditures is one of the expenditures institutions will not invest in if they become more resource dependent on students. If the coefficients for student services expenditures are statistically insignificant or statistically

significant and negative, the analyses would then suggest that institutions in merit aid adopting states adjusted their behaviors as their resource dependency changed.

Figure 11 shows a comparison of the distribution on student services expenditures per FTE and logged transformed distribution of student services expenditures per FTE. Following the conventional method of using the natural log of expenditures per FTE yielded an approximately normal distribution. A normal distribution helped remove bias in the standard errors of the regression analyses I utilized to understand the relationships between the student services expenditures and merit aid adoption.

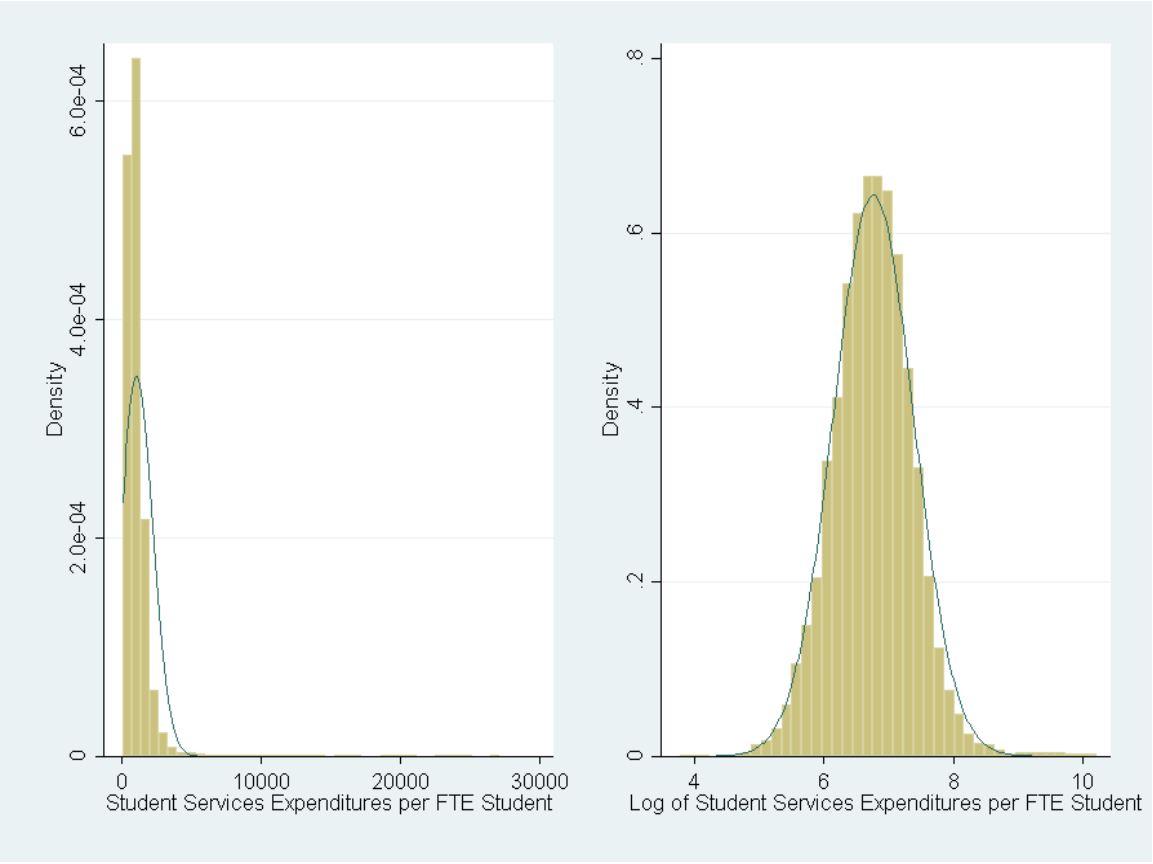


Figure 11. Histograms of Student Services Expenditures and Log of Student Services Expenditures

Figure 12 shows the change in average logged student services expenditures per FTE student during the analysis period for states that never adopt merit aid, states that adopt a merit aid program, and states that adopt a merit aid program. In general, all institutions regardless of merit aid adoption moved in a similar upwards trajectory over time. Unlike research expenditures, student services expenditures have a similar number of institutions with complete data as instructional expenditures.

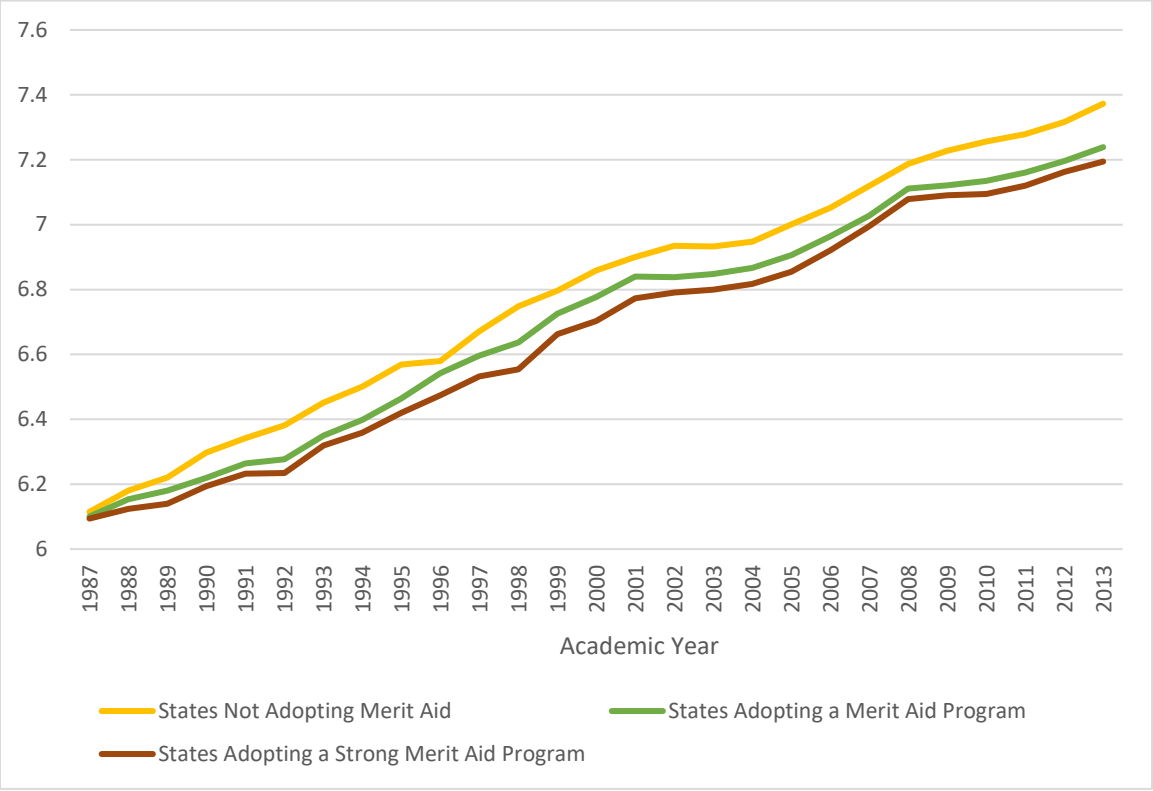


Figure 12. Logged mean of Student Services Expenditures per student FTE by Academic Year for Institutions in Merit Aid Program Adopting States, Strong Merit Aid Program Adopting States, and States that Did Not Adopt Merit Aid

The results shown in Table 14 indicate that institutions in states that adopted a merit aid program on average do not statistically significantly differ in student services expenditures than

institutions in states that did adopt a merit aid program. Indeed, even when removing Florida, Louisiana, and Massachusetts from the analysis, as they did not pass the visual examination of the parallel trends assumption, I found no statistically significant difference. Figure 12 shows these institutions trends. The statistically insignificant results for all models were negative and very close to one.

Table 14

The Effect of Merit Aid Program Adoption on Student Services Expenditures

VARIABLES	(1) Base Student Services	(2) PT Removal Student Services	(3) Staggered Student Services
Merit Aid	0.980	0.990	0.995
	(1.022)	(1.026)	(1.022)
Constant	431.8***	460.8***	309.3***
	(1.070)	(1.077)	(1.115)
Observations	12,187	11,328	3,716
R-squared	0.773	0.780	0.770
Number of Institutions	471	438	142
Year FE	YES	YES	YES
Institution FE	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

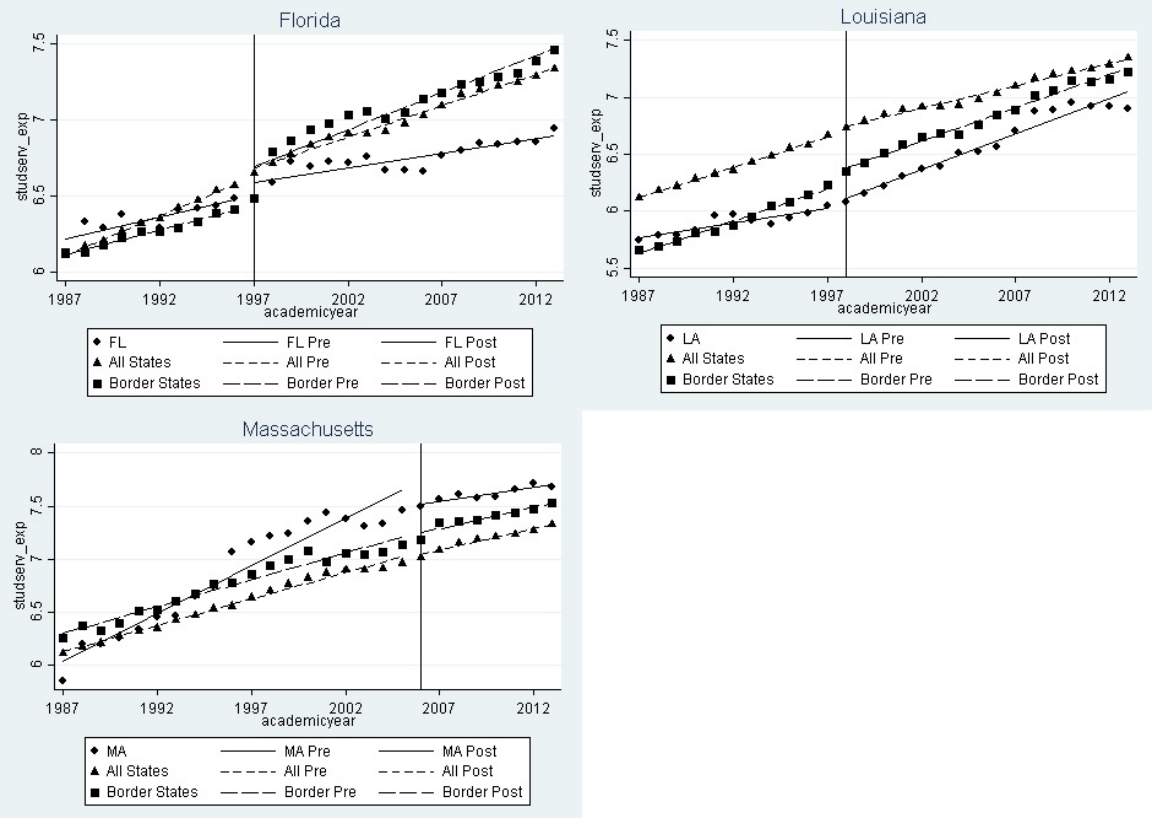


Figure 13. Institutions in States that do not Pass a Visual Examination of the Pre-Treatment Parallel Trends Assumption Concerning Student Services Expenditures

Table 15 shows the results from the analyses in which I allowed the first five years after merit aid adoption to differ from the years after that. In both analyses in which I use institutions in states that had not adopted a merit aid program, I found statistically insignificant, negative differences between institutions in merit aid adopting states and institutions in states that did not adopt merit aid or did not adopt merit aid yet. However, when using institutions in states about to adopt a merit-aid program as the comparison group, I found a statistically significant difference. Indeed after the years after the first five years post adoption, on average, institutions in states that adopted merit aid spent 4.0% more on student services in that time than those in states that had not yet adopted a merit aid program.

Table 15

The Effect of Merit Aid Program Adoption on Student Services Expenditures for the First Five Years Post Adoption

VARIABLES	(1) Base Student Services	(2) PT Removal Student Services	(3) Staggered Student Services
Merit Aid	0.976	0.986	0.995
	(1.019)	(1.023)	(1.022)
Merit After 5 Years	1.011	1.010	1.045**
	(1.020)	(1.022)	(1.021)
Constant	429.1***	458.2***	305.5***
	(1.072)	(1.080)	(1.116)
Observations	12,187	11,328	3,716
R-squared	0.773	0.780	0.770
Number of Institutions	471	438	142
Year FE	YES	YES	YES
Institution FE	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 16 shows the analyses in which I included a variable to allow for the strength of the merit aid programs to differ. In those analyses, I found mixed results. In the base model, I found institutions in states with weak merit aid programs spent 3.9% less on student services compared in institutions in states with no merit aid programs. Institutions in states with strong merit aid programs spent 0.9% less on student services compared in institutions in states with no merit aid programs. In the model in which states without pre-treatment parallel trends were removed, I found statistically significant differences for both weak and strong programs. Indeed, in that analysis, institutions in states that adopted a weak merit aid program spent 6.9% less on student services than institutions in states that did not adopt merit aid. However, institutions in states with a strong merit aid program spent 2.1% more on student services than institutions in states that did not adopt a merit aid program. When using the staggered all model I found institutions

in states with weak merit aid programs spent 5.1% less on student services than those institutions in states that had not yet adopted any merit aid program but would eventually. In that same model, I found institutions in states with strong merit aid programs spent 2.0% more on student services. However, when analyzing institutions in states that had not yet adopted a strong merit aid program, but would eventually, as a comparison group, I found that institutions in states that adopted merit aid spent 5.4% more on student services on average compared to states that would eventually adopt a strong merit aid program.

Table 16

The Effect of a Strong Merit Aid Program Adoption on Student Services Expenditures

VARIABLES	(1) Base Student Services	(2) PT Removal Student Services	(3) Staggered All Student Services	(4) Staggered Strong Student Services
Merit Aid	0.961*	0.931***	0.949**	
	(1.024)	(1.025)	(1.026)	
Merit Aid X Strong	1.031	1.097**	1.075*	1.054*
	(1.038)	(1.043)	(1.042)	(1.027)
Constant	428.6***	457.6***	292.6***	290.5***
	(1.073)	(1.078)	(1.131)	(1.228)
Observations	12,187	11,328	3,716	2,341
R-squared	0.773	0.780	0.771	0.753
Number of Institutions	471	438	142	89
Year FE	YES	YES	YES	YES
Institution FE	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The results in Table 17, in which I included lags to test for Granger Causality, indicate that before merit aid adoption, institutions in states about to adopt merit aid were statistically significantly different from those that did not adopt merit aid. Indeed, every lagged variable's

coefficient was both negative and statistically significant. While it is not likely that student services spending affected a state's legislative body to adopt a merit aid program, the results from this analysis reveal that the influence of spending on student services ought not be summarily dismissed in their decision. More likely though, the results suggest that institutions began institutions began altering their own student services expenditures in light of merit aid adoption. Additionally, the results only reveal that institutions in merit aid adopting states spent less than institutions in non-adopting states. It could be the case that institutions in non-adopting states began spending much more on student services to try to lure students from states that adopted merit aid, since to qualify for a merit aid scholarship one must attend an in-state institution.

Table 17

The Effect of a Merit Aid Program Adoption on Student Services Expenditures Including Lagged Coefficients to Test for Granger Causality

VARIABLES	(1) Base Student Services	(2) PT Removal Student Services	(3) Staggered Student Services
Merit Aid	0.951*	0.959	0.947
	(1.028)	(1.033)	(1.034)
Year Lag 1	0.911***	0.902***	0.905***
	(1.028)	(1.032)	(1.032)
Year Lag 2	0.932***	0.935***	0.927***
	(1.023)	(1.025)	(1.027)
Year Lag 3	0.937***	0.938***	0.943**
	(1.024)	(1.025)	(1.026)
Year Lag 4	0.962*	0.959*	0.957*
	(1.023)	(1.022)	(1.024)
Constant	437.2***	469.9***	304.0***
	(1.072)	(1.079)	(1.118)
Observations	12,187	11,328	3,716
R-squared	0.774	0.780	0.772
Number of Institutions	471	438	142
Year FE	YES	YES	YES
Institution FE	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Public Services Expenditures

IPEDS defined public services expenditures as "a functional expense category that includes expenses for activities established primarily to provide noninstructional services beneficial to individuals and groups external to the institution" (Delta Data Dictionary, 2015). According to theory and research, public services expenditures is one of the expenditures institutions will not spend more in if they become more dependent on students. If the coefficients for public services expenditures are statistically insignificant or statistically significant and negative, the analyses would then suggest that institutions in merit aid adopting states adjusted their behaviors as their resource dependency changed.

Figure 14 shows a comparison of the distribution on public services expenditures per FTE and logged transformed distribution of public services expenditures per FTE. Following the conventional method of using the natural log of expenditures per FTE yielded an approximately normal distribution though with a slight left skew.

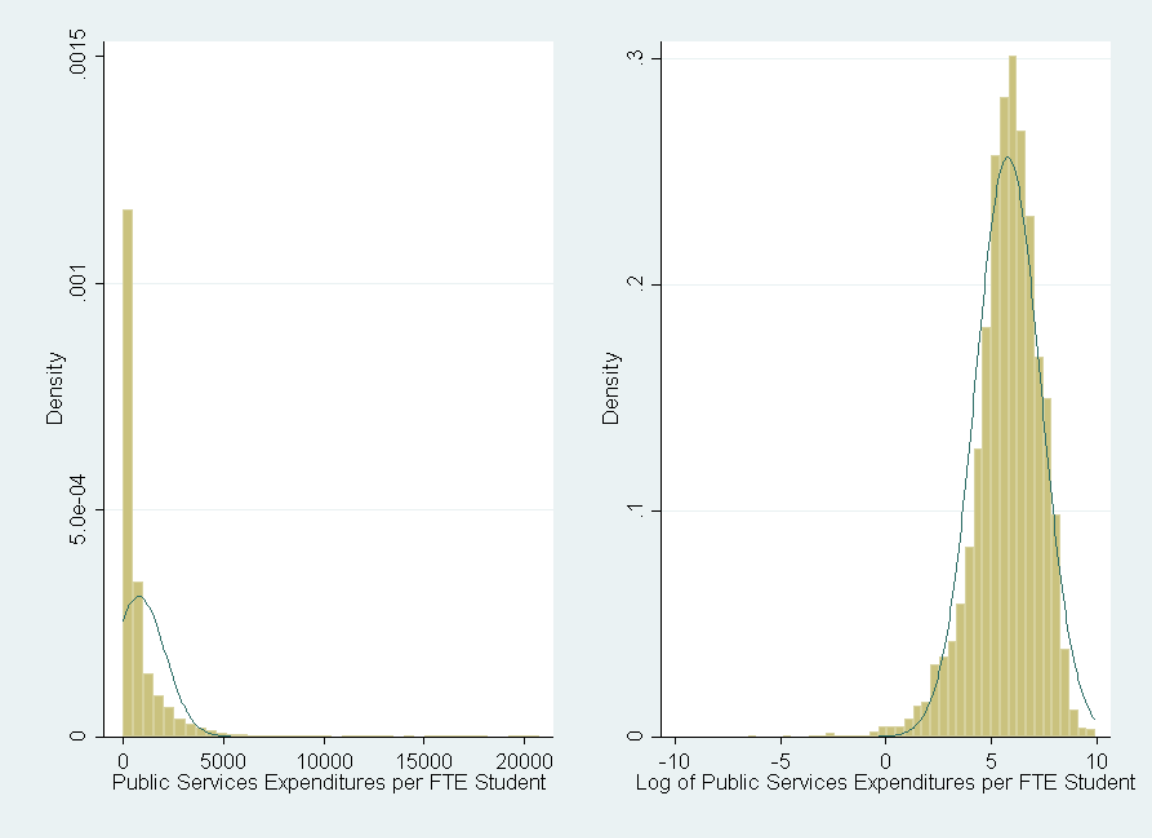


Figure 14. Histograms of Public Services Expenditures and Log of Public Services Expenditures

In general, Figure 15 highlights that public services expenditures overall followed the same upward trend over time. However, the behaviors of the three groups did vary from each other at several points. Between 1992 and 1995, institutions in both weak and strong merit aid program decreased their merit aid expenditures, and then increased them again. Between 1997 and 2001, all institutions increased their public services expenditures; however, the rate change at institutions in states that adopted a merit aid program was higher. Lastly, from 2006 to 2013,

all three institutions types acted differently. The institutions in states not adopting a merit aid program held their public services expenditures fairly even. States with weak merit aid programs saw their institutions spending less every year in public services, and states with strong merit aid programs saw their institutions spending far less each year relative to the other two groups.

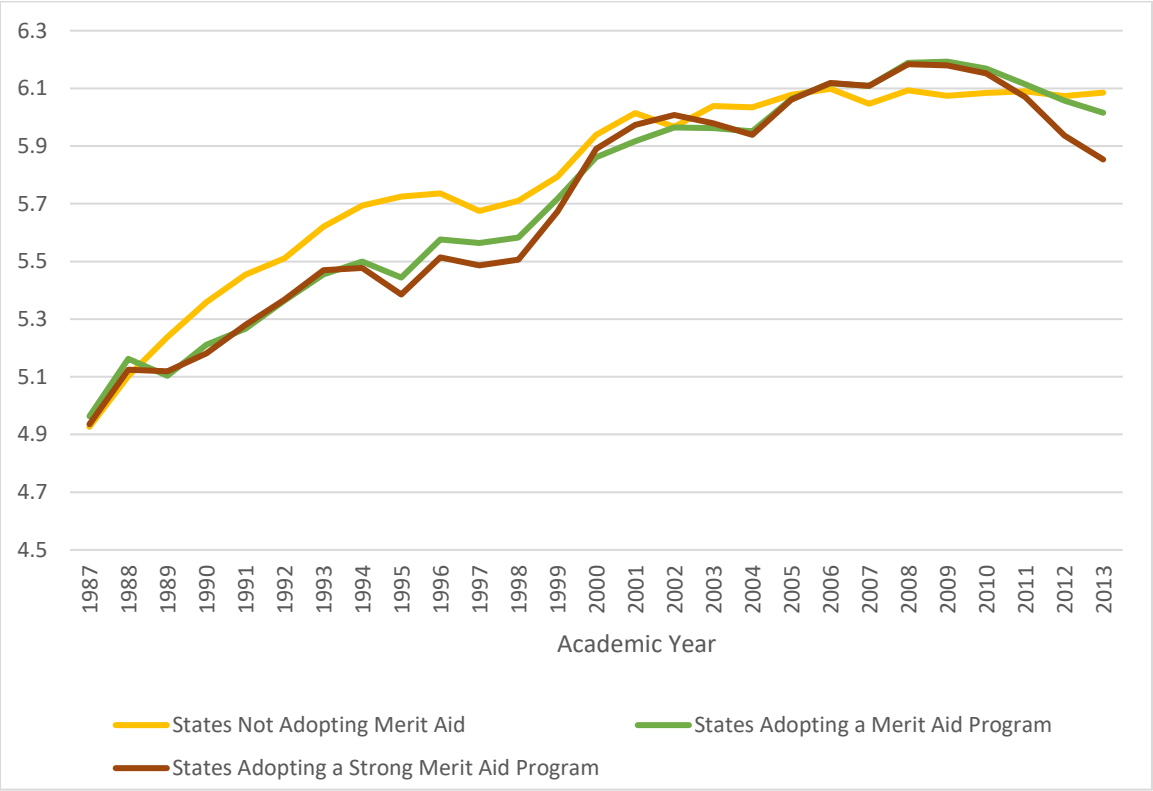


Figure 15. Logged mean of Public Services Expenditures per student FTE by Academic Year for Institutions in Merit Aid Program Adopting States, Strong Merit Aid Program Adopting States, and States that Did Not Adopt Merit Aid

The results in Table 18 show that institutions in states that adopted a merit aid program on average do not statistically significantly differ in public services expenditures than institutions in states that did adopt a merit aid program. Indeed, after removing Louisiana and Nevada from the analysis, as they did not pass the visual examination of the parallel trends assumption, I found no statistically significant difference. Figure 15 shows these institutions' trends before

and after merit aid adoption. However, all of the coefficients on all three models in Table 15 shows negative results.

Table 18

The Effect of Merit Aid Program Adoption on Public Services Expenditures

VARIABLES	(1) Base Public Services	(2) PT Removal Public Services	(3) Staggered Public Services
Merit Aid	0.977	0.977	0.888
	(1.077)	(1.084)	(1.077)
Constant	173.8***	176.3***	169.0***
	(1.309)	(1.319)	(2.220)
Observations	11,522	11,094	3,554
R-squared	0.263	0.268	0.246
Number of Institutions	467	450	140
Year FE	YES	YES	YES
Institution FE	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

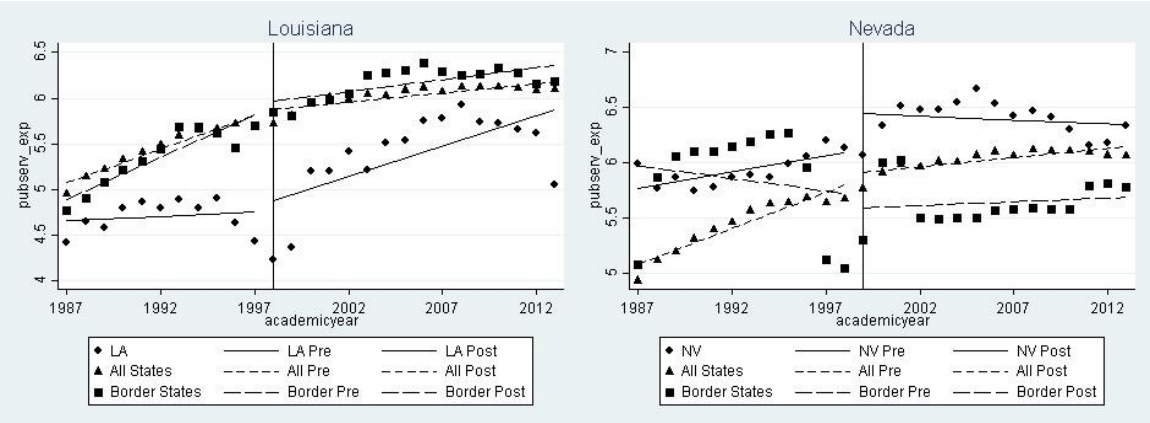


Figure 16. Institutions in States that do not Pass a Visual Examination of the Pre-Treatment Parallel Trends Assumption Concerning Public Services Expenditures

Table 19 includes an additional variable that allows the first five years post adoption and the remaining years in the sample to differ from one another. In all three models, I find statistically insignificant, negative results for the first five years. In the base model, I do find a

statistically significant difference in the time after the first five years post adoption. In that model, these institutions spent 5.0% more on public services, on average, after the first five years of having a merit aid program in their state relative to institutions in states without merit aid in the same time frame. In the model that removed institutions in states that did not pass a visual examination of the parallel trends assumption, I found intuitions in states with strong merit aid programs, in the years after the first five years, spent 2.9% more on public services than institutions in states without merit aid though this result was statistically insignificant. In the staggered model, I found that in the time after the first five years of merit aid adoption institutions in states that have adopted merit aid spent 3.0% less on public services than institutions about to adopt merit aid.

Table 19

The Effect of Merit Aid Program Adoption on Public Services Expenditures for the First Five Years Post Adoption

	(1)	(2)	(3)
	Base	PT Removal	Staggered
VARIABLES	Public Services	Public Services	Public Services
Merit Aid	0.922	0.940	0.889
	(1.072)	(1.077)	(1.077)
Merit After 5 Years	1.139**	1.095	1.091
	(1.066)	(1.068)	(1.088)
Constant	160.9***	167.2***	166.6***
	(1.307)	(1.317)	(2.219)
Observations	11,522	11,094	3,554
R-squared	0.264	0.269	0.247
Number of Institutions	467	450	140
Year FE	YES	YES	YES
Institution FE	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 20 shows that the inclusion of a variable that allowed weak and strong variables to differ from one another did not result in a statistically significant difference in public services expenditures among institutions in states with no merit aid program, a weak merit aid program, or a strong merit aid program. Additionally, there was no difference in public services expenditures when using institutions in states about to adopt any merit aid program or institutions in states about to adopt a strong merit aid program as the comparison group. The statistically insignificant results though indicate that weak merit aid programs are associated with decreased spending on public services expenditures relative to institutions without merit aid programs. The results concerning strong programs were mixed. In the models that use institutions in other states as a comparison group, I found that residing in a state with a strong merit aid program was associated with higher spending on public services though the effect was small and statistically insignificant. The base model was 0.4% less, and in the model that removed institutions in states that did not pass a visual examination of the parallel trends assumption, it was 1.1% less. In the staggered all model, strong merit aid adoption was associated with 0.1% less spending on public services relative to institutions that would eventually adopt any merit aid program. In the staggered strong model, strong merit program adoption was associated with 7% less spending on public services relative to institutions that would eventually adopt a strong merit aid program.

Table 20

The Effect of a Strong Merit Aid Program Adoption on Public Services Expenditures

VARIABLES	(1) Base Public Services	(2) PT Removal Public Services	(3) Staggered All Public Services	(4) Staggered Strong Public Services
Merit Aid	0.923	0.924	0.848	
	(1.130)	(1.130)	(1.117)	
Merit Aid X Strong	1.088	1.094	1.073	0.930
	(1.171)	(1.182)	(1.174)	(1.116)
Constant	170.7***	173.1***	161.1***	122.5***
	(1.303)	(1.312)	(2.203)	(3.563)
Observations	11,522	11,094	3,554	2,242
R-squared	0.263	0.268	0.246	0.229
Number of Institutions	467	450	140	88
Year FE	YES	YES	YES	YES
Institution FE	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 21 contains the results for the models that test for Granger Causality. In the models that use other states as a comparison group, there were no statistically significant results. This indicates that institutions in states that adopted merit aid were not statistically different from those institutions in states that did not adopt a merit aid program. In the model that uses institutions in states that will ultimately adopt a merit aid program, three of the four lagged years are statistically significant. This indicates that institutions about to adopt merit aid could be altering their behaviors before merit aid adoption.

Table 21

The Effect of a Merit Aid Program Adoption on Public Services Expenditures Including Lagged Coefficients to Test for Granger Causality

VARIABLES	(1) Base Public Services	(2) PT Removal Public Services	(3) Staggered Public Services
Merit Aid	0.923	0.942	0.780**
	(1.098)	(1.104)	(1.129)
Year Lag 1	0.884	0.949	0.807*
	(1.104)	(1.103)	(1.132)
Year Lag 2	0.888	0.947	0.833
	(1.096)	(1.095)	(1.120)
Year Lag 3	0.887	0.906	0.843*
	(1.088)	(1.095)	(1.108)
Year Lag 4	0.859	0.881	0.821*
	(1.101)	(1.110)	(1.119)
Constant	178.2***	178.9***	162.3***
	(1.310)	(1.321)	(2.225)
Observations	11,522	11,094	3,554
R-squared	0.264	0.268	0.250
Number of Institutions	467	450	140
Year FE	YES	YES	YES
Institution FE	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Academic Support Expenditures

IPEDS defined academic support as "a functional expense category that includes expenses of activities and services that support the institution's primary missions of instruction, research, and public service" (Delta Data Dictionary, 2015). According to theory and research, academic support expenditures is one of the expenditures that institutions would spend more on as they became more dependent on students. If the coefficients for academic support expenditures are statistically significant and positive, the analyses would then suggest that institutions in merit aid adopting states adjusted their behaviors as their resource dependency changed.

In Figure 17, I show a comparison of the distribution on academic support expenditures per FTE and log transformed distribution of academic support expenditures per FTE. I followed the conventional method of using the natural log of expenditures per FTE, the logged distribution is approximately normal with a very slight left skew.

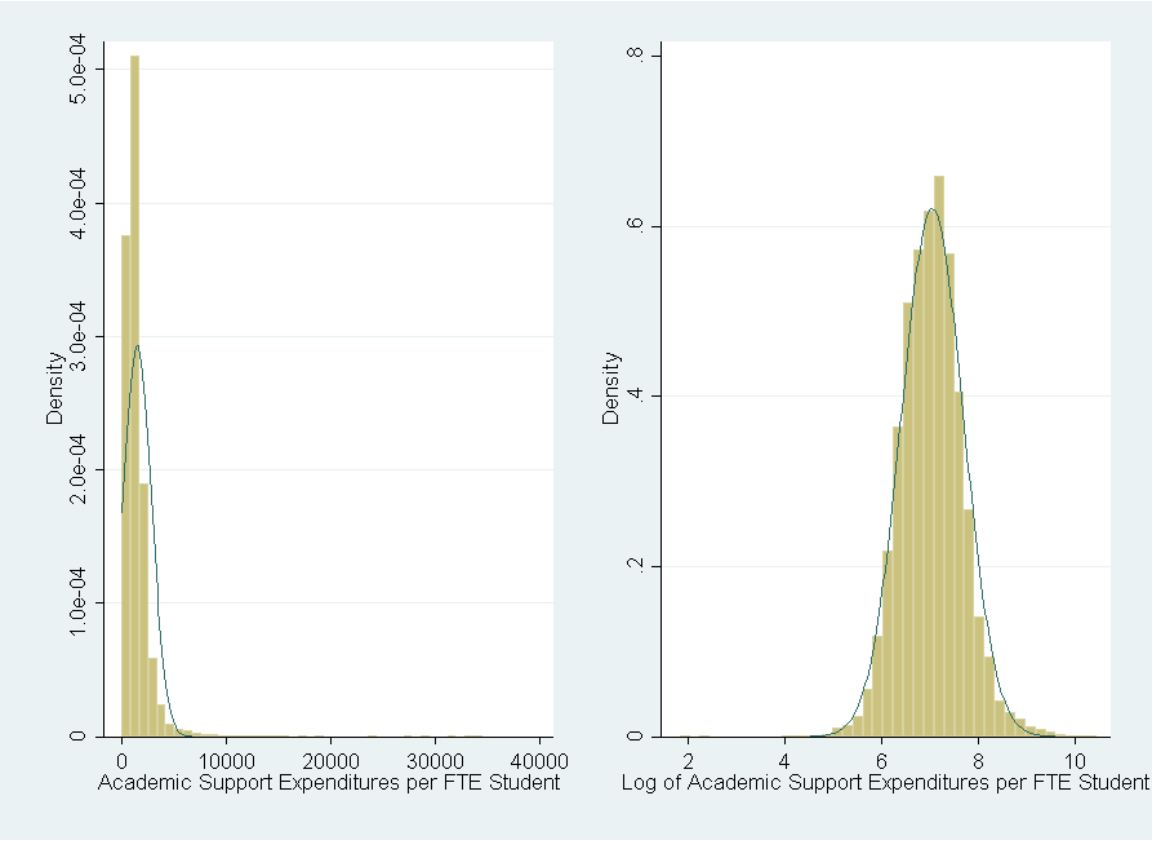


Figure 17. Histograms of Academic Support Expenditures and Log of Academic Support Expenditures

Figure 18 shows the change in average logged academic support expenditures per FTE student during the analysis period for states that never adopt merit aid, states that adopt a merit aid program, and states that adopt a merit aid program. In general, all institutions regardless of merit aid adoption moved in a similar upwards trajectory over time. Moreover, all institutions seem to have nearly the same rate changes, while institutions in states that never adopted merit

aid had spent more per FTE on academic support services than those in states that adopted a merit aid program.

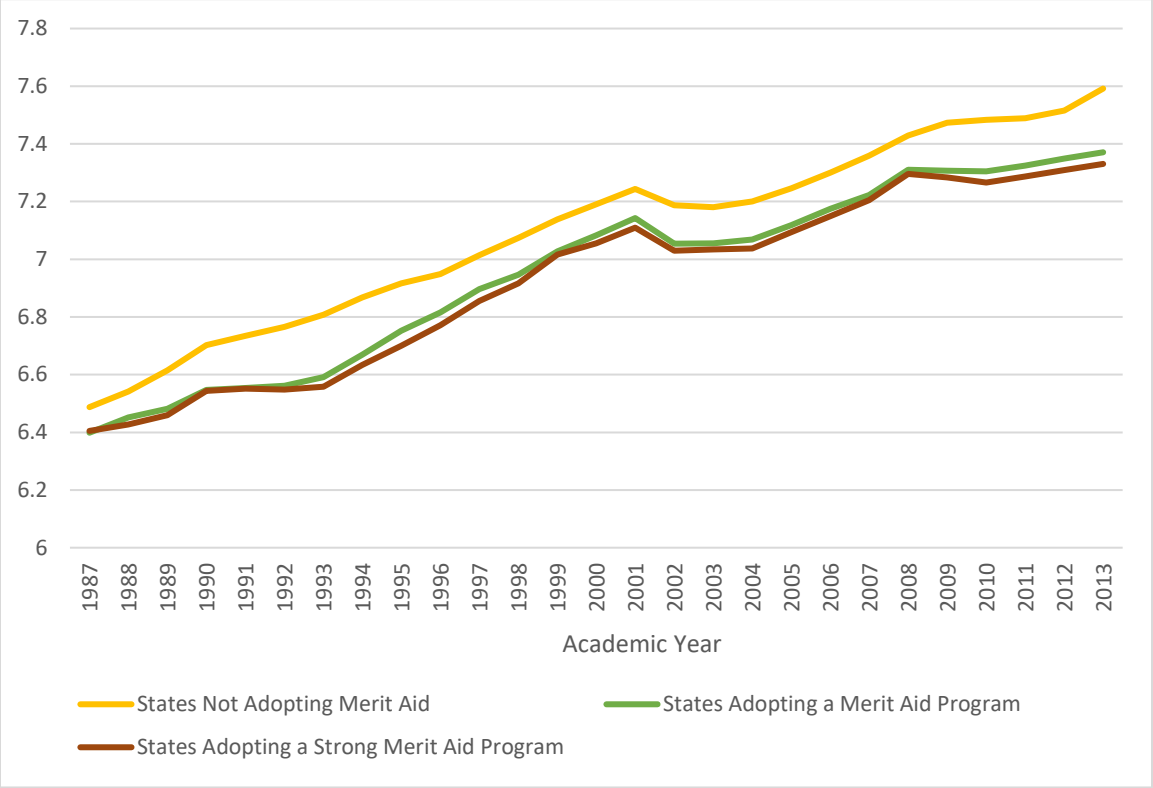


Figure 18. Logged mean of Academic Support Expenditures per student FTE by Academic Year for Institutions in Merit Aid Program Adopting States, Strong Merit Aid Program Adopting States, and States that Did Not Adopt Merit Aid

The results in Table 22 show that institutions in states that adopted a merit aid program on average do not statistically significantly differ in academic support expenditures than institutions in states that did adopt a merit aid program. Removing the states did not pass the visual examination for the parallel trends assumption did not yield statistically significant results either. The states that did not pass the visual examination were, Alaska, Georgia, Massachusetts, and New Mexico. Figure 18 illustrates these institutions' trends before and after merit aid adoption. Using only institutions in states that adopt a merit aid at some point does not yield a statistically difference result between pre-merit aid adoption and post-merit aid adoption. All

models though do indicate that institutions in states that adopt merit aid spend more on academic support than institutions in states that did not or have not yet adopted a merit aid program.

Table 22

The Effect of Merit Aid Program Adoption on Academic Support Expenditures

VARIABLES	(1) Base Academic Support	(2) PT Removal Academic Support	(3) Staggered Academic Support
Merit Aid	1.030	1.035	1.008
	(1.022)	(1.027)	(1.021)
Constant	581.1***	606.5***	436.3***
	(1.069)	(1.074)	(1.134)
Observations	12,187	11,269	3,716
R-squared	0.679	0.680	0.718
Number of Institutions	471	436	142
Year FE	YES	YES	YES
Institution FE	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

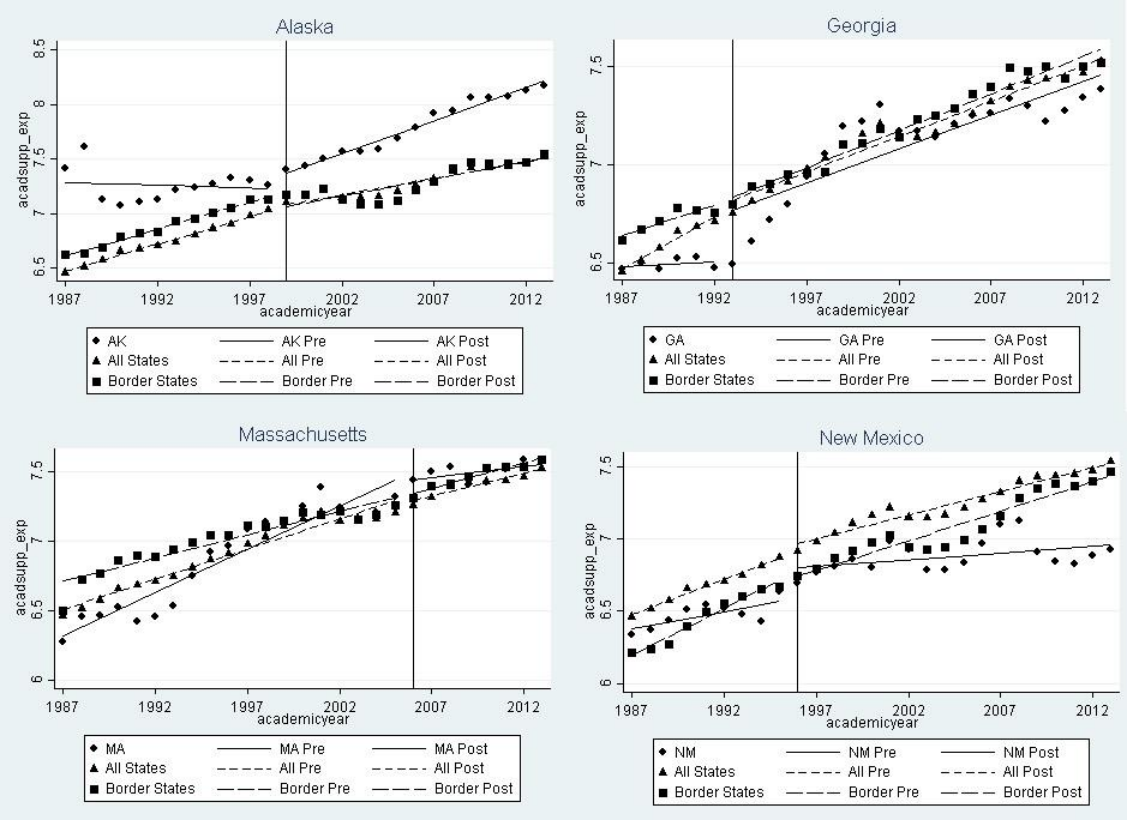


Figure 19. Institutions in States that do not Pass a Visual Examination of the Pre-Treatment Parallel Trends Assumption Concerning Academic Support Expenditures

In the next set of analyses, shown in Table 23, I included an additional variable that allows the first five years post adoption and the remaining years in the sample to differ from one another. Even with this variable included, I found no statistically significant difference in the first five years post adoption in any model. In the time after the first five years post adoption, in the models that use institutions in states that did not adopt a merit aid program as a control group, I also found no statistically significant results. In the model which utilizes institutions in states that adopted merit aid later as a comparison group, I found a statistically significant difference. Indeed, these institutions spent 2.1% more on academic support, on average, after the first five years of having a merit aid program in their state relative to institutions that would eventually a merit aid program.

Table 23

The Effect of Merit Aid Program Adoption on Academic Support Expenditures for the First Five Years Post Adoption

VARIABLES	(1) Base Academic Support	(2) PT Removal Academic Support	(3) Staggered Academic Support
Merit Aid	1.016	1.031	1.008
	(1.018)	(1.021)	(1.021)
Merit After 5 Years	1.031	1.009	1.052**
	(1.022)	(1.024)	(1.023)
Constant	571.0***	603.8***	430.2***
	(1.071)	(1.077)	(1.132)
Observations	12,187	11,269	3,716
R-squared	0.679	0.680	0.719
Number of Institutions	471	436	142
Year FE	YES	YES	YES
Institution FE	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In the next set of analyses regarding academic support expenditures, I included a variable that allows weak merit aid programs and strong merit aid programs to differ. Table 24 shows that the inclusion of this variable did not result in a statistically significant difference in academic support expenditures among institutions in states with no merit aid program, a weak merit aid program, or a strong merit aid program. Additionally, there was no statistically significant difference in academic support expenditures when using institutions in states about to adopt any merit aid program or institutions in states about to adopt a strong merit aid program as the comparison group.

In the models that use other states as a control group, merit aid adoption is associated with higher spending on academic support relative to institutions in states without any merit aid program. In the base model, weak merit aid programs were associated with 3.2% higher

spending relative to institutions in states without merit aid, and n the model that removed institutions in states that did not pass a visual examination of the parallel trends assumption, weak merit aid programs were associated with 3.8% higher spending on academic support relative to institutions in states without merit aid. In the base model, strong merit aid program adoption was associated with a 2.8% higher spending on academic support relative to institutions in states without merit aid, and in the model that removed institutions in states that did not pass a visual examination of the parallel trends assumption, strong merit aid program adoption was associated with a 3.4% higher spending on academic support relative to institutions in states without merit aid.

In the staggered models that use institutions that will adopt a merit aid program as a control group, I found adopting a weak merit aid program was associated with institutions spending 0.1% less on academic support relative to institutions about to adopt a merit aid program, while adopting a strong merit aid program was associated with spending 1.1% more on academic support relative to institutions that had not adopted any merit aid program. In the staggered strong model, the analysis showed that institutions in states with a strong merit aid program has 1.5% higher expenditures on academic support relative to institutions in states that will eventually adopt a merit aid program.

Table 24

The Effect of a Strong Merit Aid Program Adoption on Academic Support Expenditures

VARIABLES	(1) Base Academic Support	(2) PT Removal Academic Support	(3) Staggered All Academic Support	(4) Staggered Strong Academic Support
Merit Aid	1.032	1.038	0.999	
	(1.027)	(1.031)	(1.028)	
Merit Aid X Strong	0.996	0.996	1.013	1.015
	(1.039)	(1.046)	(1.040)	(1.030)
Constant	581.7***	606.7***	431.8***	314.6***
	(1.070)	(1.074)	(1.137)	(1.249)
Observations	12,187	11,269	3,716	2,341
R-squared	0.679	0.680	0.718	0.696
Number of Institutions	471	436	142	89
Year FE	YES	YES	YES	YES
Institution FE	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 25 shows the results of the test for Granger Causality concerning academic support expenditures. In the base model, in the first year before merit aid adoption, institutions in states that are one year away from adopting a merit aid program are statistically significantly different from institutions in non-adopting states in that same year. However, in the model with the removal of states with institutions that did not pass a visual examination of the parallel trends assumption that difference no longer existed. This indicates that removing the institutions in states that did not meet the parallel trends assumption served as a good control group for this analysis. In the staggered policy adoption model, in the first two years before adoption, the coefficient indicated that institutions that were about to adopt merit aid are statistically significantly different from those not yet adopting. These results indicate that institutions in

states about to adopt a merit aid program began to adjust their spending on academic support before merit aid influenced the students.

Table 25

The Effect of a Merit Aid Program Adoption on Academic Support Expenditures Including Lagged Coefficients to Test for Granger Causality

VARIABLES	(1) Base Academic Support	(2) PT Removal Academic Support	(3) Staggered Academic Support
Merit Aid	1.020	1.033	0.980
	(1.027)	(1.031)	(1.030)
Year Lag 1	0.959*	0.981	0.935***
	(1.023)	(1.024)	(1.026)
Year Lag 2	0.974	0.997	0.955*
	(1.023)	(1.026)	(1.025)
Year Lag 3	0.994	1.019	0.982
	(1.021)	(1.023)	(1.022)
Year Lag 4	0.988	0.988	0.977
	(1.018)	(1.020)	(1.019)
Constant	583.4***	607.4***	431.2***
	(1.069)	(1.075)	(1.134)
Observations	12,187	11,269	3,716
R-squared	0.679	0.680	0.719
Number of Institutions	471	436	142
Year FE	YES	YES	YES
Institution FE	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Institutional Support Expenditures

IPEDS defined Institutional support expenditures as "a functional expense category that includes expenses for the day-to-day operational support of the institution" (Delta Data Dictionary, 2015). According to theory and research, institutional support expenditures is one of the expenditures that institutions would spend more on as they change dependencies in order to strategically manage the change. If the coefficients for institutional support expenditures are

statistically significant and positive, the analyses would then suggest that institutions in merit aid adopting states adjusted their behaviors as their resource dependency changed.

Figure 20 shows a comparison of the distribution on instructional expenditures per FTE and logged transformed distribution of institutional support expenditures per FTE. Following the conventional method of using the natural log of expenditures per FTE yielded a distribution that is approximately normal. This transformation was important, since the untransformed data were right skewed leading to issues with heteroscedasticity potentially biasing the standard errors of the regressions.

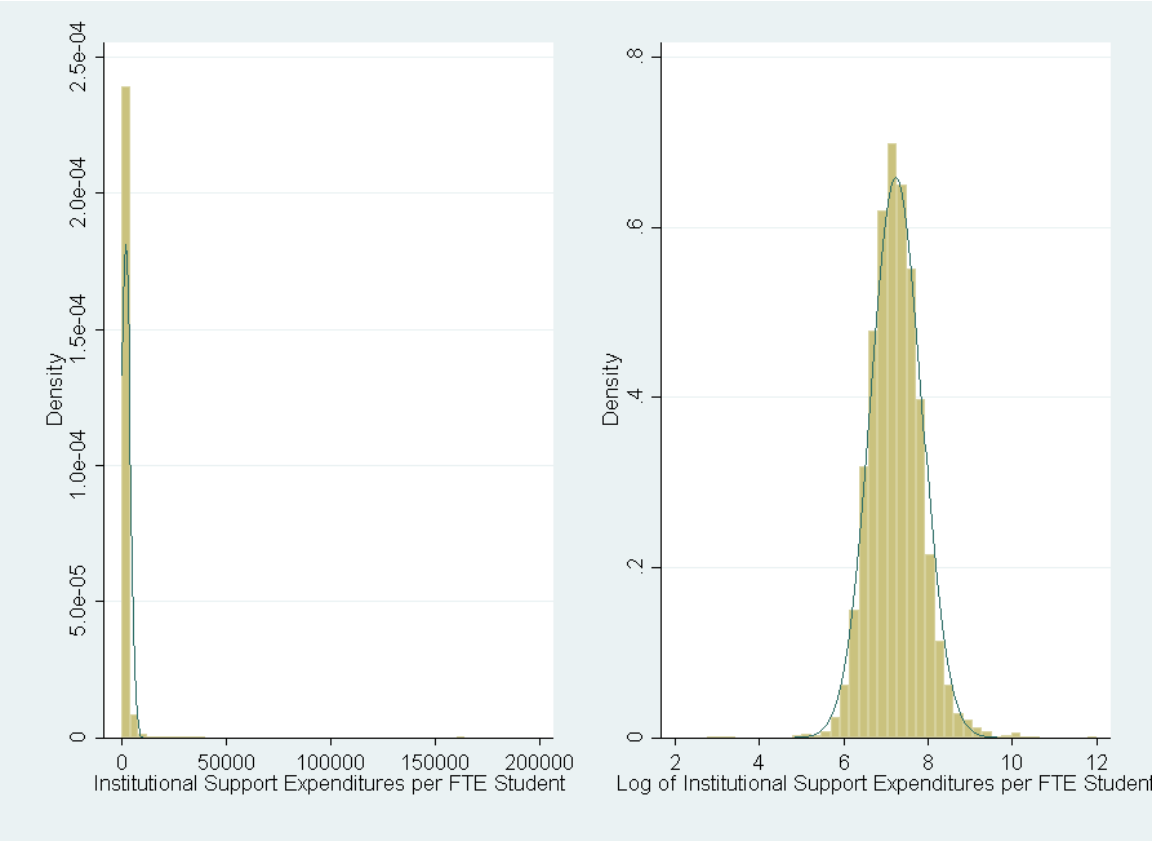


Figure 20. Histograms of Institutional Support Expenditures and Log of Institutional Support Expenditures

Figure 21 shows the change in average logged institutional support expenditures per FTE student during the analysis period for states that never adopt merit aid, states that adopt a merit aid program, and states that adopt a merit aid program. In general, all institutions regardless of merit aid adoption moved in a similar upwards trajectory over time. All institutions seem to have nearly the same rate changes, which indicates that all institutions had the same large scale pressures to alter their behaviors from year to year.

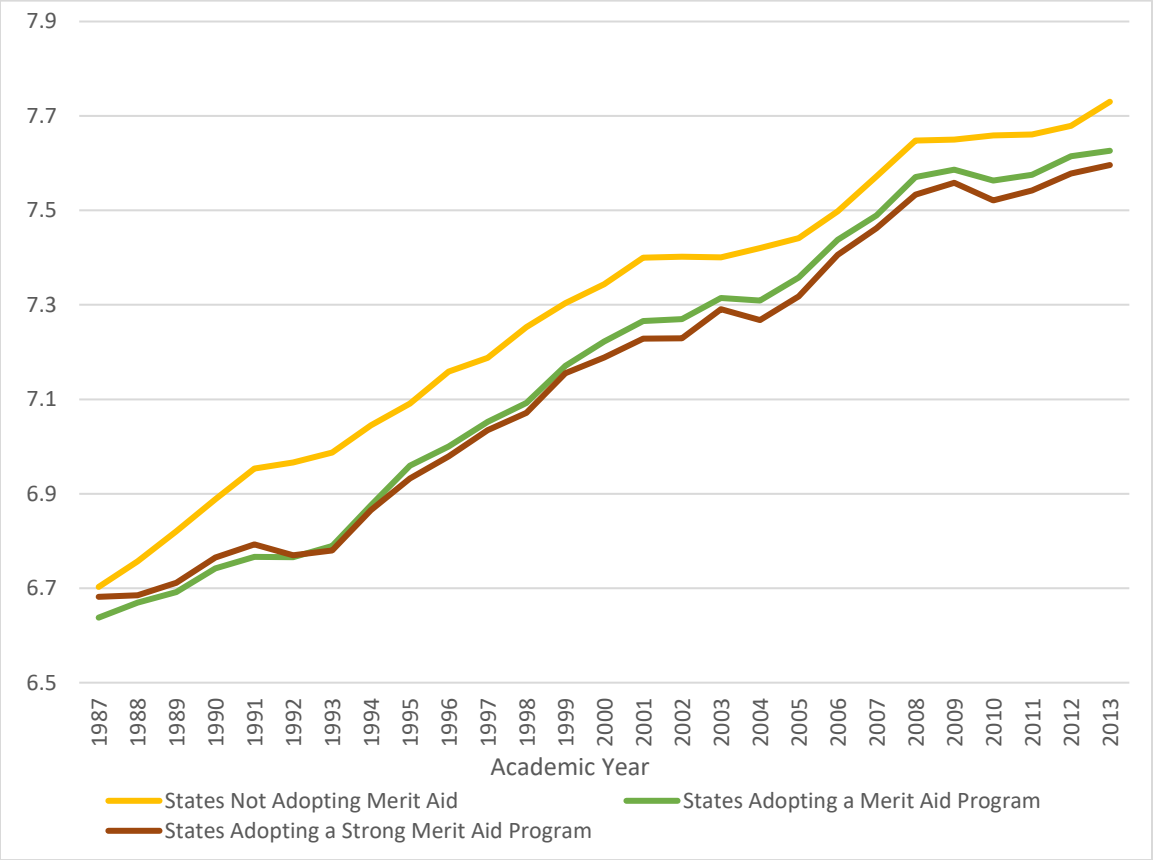


Figure 21. Logged mean of Institutional Support Expenditures per student FTE by Academic Year for Institutions in Merit Aid Program Adopting States, Strong Merit Aid Program Adopting States, and States that Did Not Adopt Merit Aid

In Table 26, I show the initial set of regressions I ran to examine how institutions altered their institutional support expenditures after merit aid was adopted. These yielded statistically significant results when using institutions in states that did not adopt a merit aid program as the control group. Indeed, when treating all institutions in non-adopting states as an appropriate control group, the adoption of a merit aid program was associated with 3.7% higher institutional support expenditures relative to institutions in states that did not adopt merit aid. When removing the states that did not pass a visual examination for parallel trends pre-treatment, the adoption of a merit aid program was associated with a 6.1% more spent on institutional support expenditures relative to the control group. As shown in Figure 21, the states that I removed were: Alaska, Florida, Kentucky, Massachusetts, South Carolina, and Tennessee. In the staggered model, the result was negative and statistically insignificant.

Table 26

The Effect of Merit Aid Program Adoption on Institutional Support Expenditures

VARIABLES	(1) Base Institutional Support	(2) PT Removal Institutional Support	(3) Staggered Institutional Support
Merit Aid	1.037*	1.061**	0.991
	(1.020)	(1.025)	(1.023)
Constant	1,016***	1,053***	840.5***
	(1.077)	(1.085)	(1.124)
Observations	12,185	10,958	3,716
R-squared	0.673	0.674	0.736
Number of Institutions	471	424	142
Year FE	YES	YES	YES
Institution FE	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

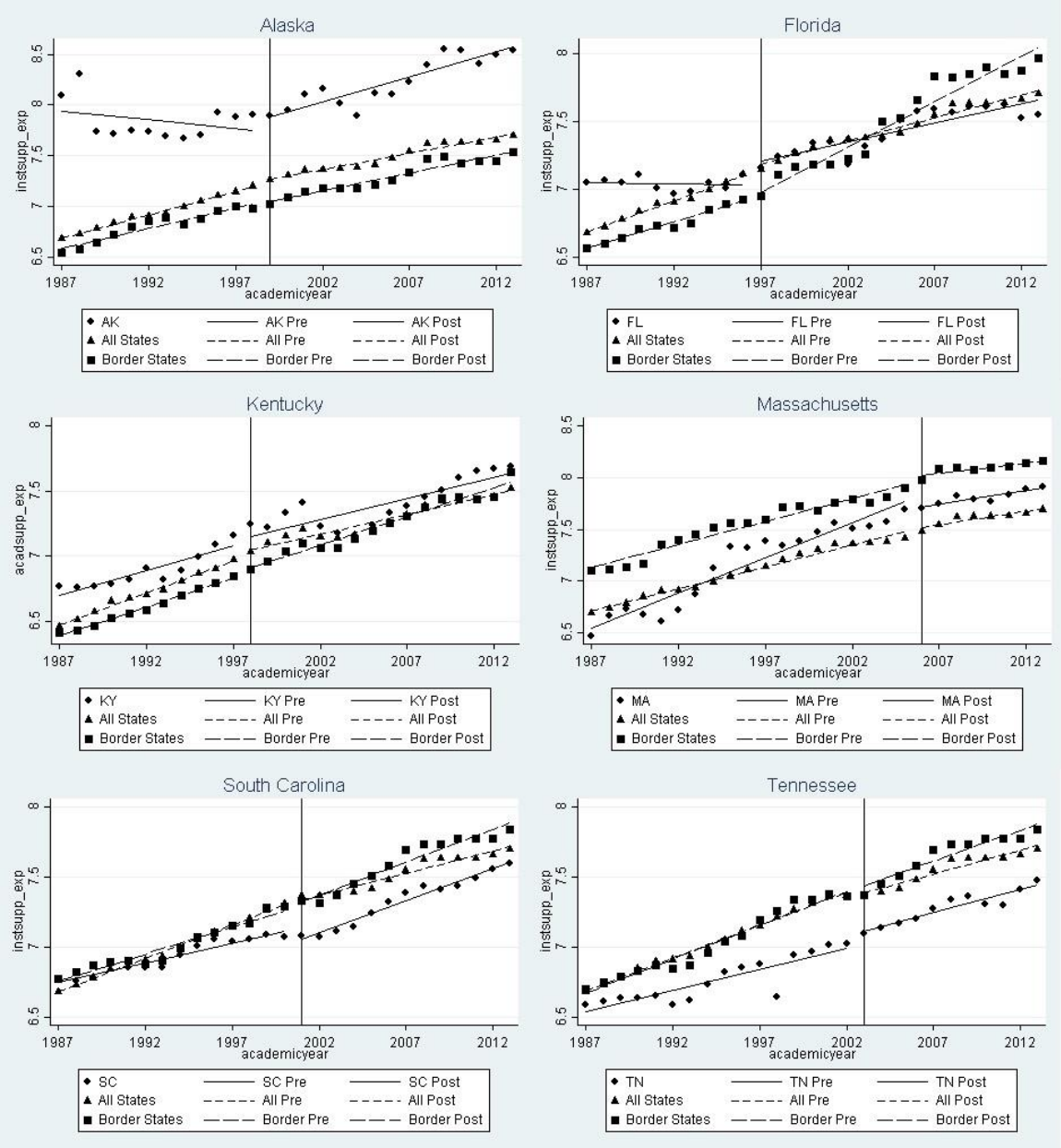


Figure 22. Institutions in States that do not Pass a Visual Examination of the Pre-Treatment Parallel Trends Assumption Concerning Institutional Support Expenditures

The results shown in Table 27 included an additional variable that allows the first five years post adoption and the remaining years in the sample to differ from one another. With this variable included, I found no statistically significant difference in the first five years post adoption in any model. Similar to the results in Table 25, I found statistically insignificant,

positive results for the models that use other states as a control group and a statistically insignificant, negative result for the model that uses institutions that will eventually adopt a merit aid program as a control group.

Table 27

The Effect of Merit Aid Program Adoption on Institutional Support Expenditures for the First Five Years Post Adoption

VARIABLES	(1) Base Institutional Support	(2) PT Removal Institutional Support	(3) Staggered Institutional Support
Merit Aid	1.002	1.020	0.992
	(1.018)	(1.022)	(1.023)
Merit After 5 Years	1.079***	1.089***	1.063***
	(1.020)	(1.024)	(1.021)
Constant	972.2***	1,006***	826.6***
	(1.078)	(1.087)	(1.126)
Observations	12,185	10,958	3,716
R-squared	0.674	0.675	0.738
Number of Institutions	471	424	142
Year FE	YES	YES	YES
Institution FE	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

However, in the time after the first five years post adoption, all models show statistically significant, positive results. After the first five years of having a merit aid program in their state, the base model shows that institutions in merit aid adopting states spent 8.1% more on institutional support than institutions in non-adopting states. Further, when removing the institutions in states that did not pass the visual examination for parallel trends, I found merit aid adoption was associated with 11.1% more spending on institutional support. In the model which uses institutions in states that adopted merit aid later as a comparison group, I found a

statistically significant difference. Indeed, these institutions spent 5.4% more on academic support, on average, after the first five years of having a merit aid program in their state.

The next set of analyses, shown in Table 28, on institutional support expenditures after merit aid adoption, I included a variable that allow for weak and strong merit aid programs to be different from one another. This variable showed that institutions in states with weak merit aid programs on average spent more on institutional support, while institutions with strong merit aid programs in their states spent less on average on institutional support than institutions in states that adopted a weak program relative to institutions not affected by merit aid. In the base model that uses all institutions in all non-adopting states as a control, I found that institutions in states that adopted a weak merit aid program spent 8.8% more on institutional support compared to institutions in states that did not adopt a merit aid program, while institutions in states with a strong merit aid program spent only 1.3% more. In the model that removed the institutions in states that did not pass the visual examination for parallel trends, institutions affected by a weak merit aid program were statistically significantly different from institutions in states that did not adopt, but strong programs were not statistically significantly different. Indeed, institutions in states with weak merit aid programs were associated with spending 7.6% more on institutional support, and institutions in states with strong merit aid programs were associated with spending 5.2% more on institutional support than institutions in states with no merit aid program.

Table 28

The Effect of a Strong Merit Aid Program Adoption on Institutional Support Expenditures

VARIABLES	(1) Base Institutional Support	(2) PT Removal Institutional Support	(3) Staggered All Institutional Support	(4) Staggered Strong Institutional Support
Merit Aid	1.088***	1.076**	1.037	
	(1.031)	(1.034)	(1.033)	
Merit Aid X Strong	0.931*	0.978	0.933*	1.049*
	(1.039)	(1.047)	(1.042)	(1.029)
Constant	1,034***	1,056***	886.1***	774.9***
	(1.078)	(1.086)	(1.127)	(1.209)
Observations	12,185	10,958	3,716	2,341
R-squared	0.673	0.674	0.738	0.743
Number of Institutions	471	424	142	89
Year FE	YES	YES	YES	YES
Institution FE	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In the final two regressions concerning institutional support expenditures (i.e. the models with utilize staggered adoption to allow institutions in merit aid adopting states to serve as their own control group), I found statistically significant results for strong merit aid programs in both the model that utilizes any merit aid adoption and the model that utilized only strong merit aid adoption. In the model that uses any institution in a state that has yet to adopt merit aid as a control group, institutions in states that adopted a weak merit aid program had 3.7% higher expenditures on institutional support expenditures. That same model shows that institutions in states that adopted a strong merit aid program had 3.2% lower expenditures on institutional support expenditures. In the model that examines only institutions in states that adopted a strong merit aid program and uses staggered adoption of strong merit aid programs to create a control

group, I found that adopting a strong merit aid program was associated with institutions spending on average 4.9% more than institutions in states that had not yet adopted a strong merit aid program.

The results in Table 29 included lagged variables to test for Granger Causality. The coefficients indicate that before merit aid adoption, institutions in states about to adopt merit aid were statistically significantly different from those that did not adopt merit aid. Indeed, all but one lagged variable's coefficient was both negative and statistically significant. While it is not likely that institutional support expenditures affected a state's legislative decision to adopt a merit aid program; the results from this analysis reveal that the influence of institutional support expenditures on the legislative process concerning merit aid cannot be statistically eliminated. More likely though, the results suggest that institutions began altering their own institutional support expenditures before the upcoming merit aid adoption.

Table 29

The Effect of a Merit Aid Program Adoption on Institutional Support Expenditures Including Lagged Coefficients to Test for Granger Causality

VARIABLES	(1) Base Institutional Support	(2) PT Removal Institutional Support	(3) Staggered Institutional Support
Merit Aid	1.008	1.030	0.934**
	(1.025)	(1.032)	(1.034)
Year Lag 1	0.933***	0.930**	0.908***
	(1.024)	(1.032)	(1.027)
Year Lag 2	0.929***	0.935***	0.908***
	(1.019)	(1.024)	(1.021)
Year Lag 3	0.934***	0.931**	0.911***
	(1.021)	(1.029)	(1.022)
Year Lag 4	0.962**	0.977	0.950***
	(1.018)	(1.022)	(1.019)
Constant	1,027***	1,071***	826.1***
	(1.079)	(1.087)	(1.129)
Observations	12,185	10,958	3,716
R-squared	0.674	0.674	0.740
Number of Institutions	471	424	142
Year FE	YES	YES	YES
Institution FE	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Scholarships and Grants Expenditures

The definition of what counts as a scholarship changed over time. From 1987-1996 IPEDS defined scholarship expenditures as "the gross amount of grant aid provided to students, regardless of grant source" (Delta Data Dictionary, 2015). From 1997-2013, IPEDS defined scholarship expenditures as "the amount is the sum of all operating expenses associated with scholarships and fellowships treated as expenses because the institution incurs an incremental expense in the provision of a good or service" (Delta Data Dictionary). According to theory, scholarships expenditures is one of the expenditures that institutions would spend more

on as institutions compete for students. If the coefficients for scholarships expenditures are statistically significant and positive, the analyses would then suggest that institutions in merit aid adopting states adjusted their behaviors as their resource dependency changed.

I show a comparison of the distribution of scholarships and grants expenditures per FTE and log transformed distribution of scholarships and grants expenditures per FTE in Figure 23. I followed the conventional method of using the natural log of expenditures per FTE, the logged distribution is approximately normal.

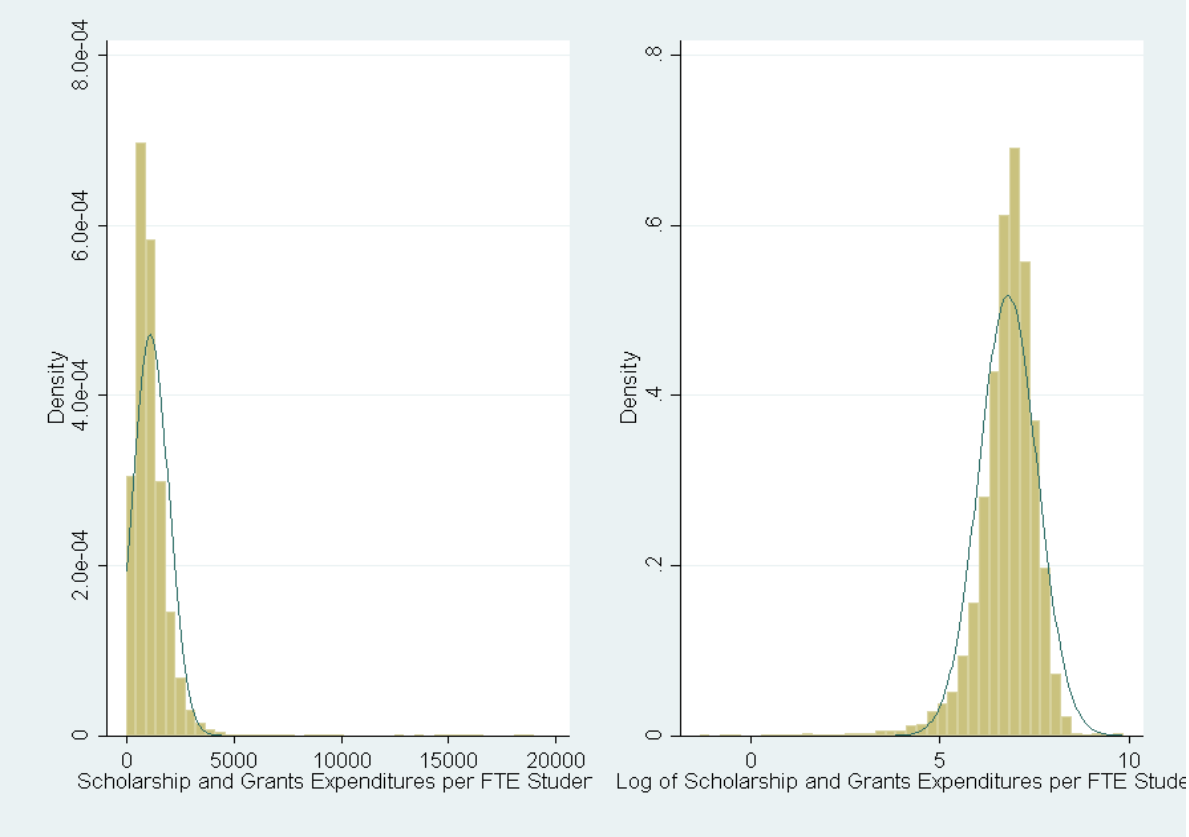


Figure 23. Histograms of Scholarships and Grants Expenditures and Log of Scholarships and Grants Expenditures

Figure 24 shows the average spending on scholarships and grants by an institution over time during the analysis period for states that never adopt merit aid, states that adopt a merit aid

program, and states that adopt a merit aid program. From 1987-2001, all institutions on average had nearly the same rate increase, though with more volatility for institutions in states that adopted any merit aid program. In academic year 2002, there was a sudden drop in expenditures on scholarships and grants for all institutions. The stemmed from changes in IPEDS definitions which applied to all public institutions in the same reporting year (Delta Data Dictionary, 2015). Institutions in states adopting a strong merit aid program had the smallest change; institutions in states with no merit aid had the second smallest change, while institutions in states with a weak merit aid program had the largest change from during the definition change. From 2001-2013, all institutions in each category had approximately the same rate change though from 2012-2013, institutions in states without a merit aid program had a positive rate change while institutions in states with a merit aid and/or strong merit aid program continued a negative rate change.

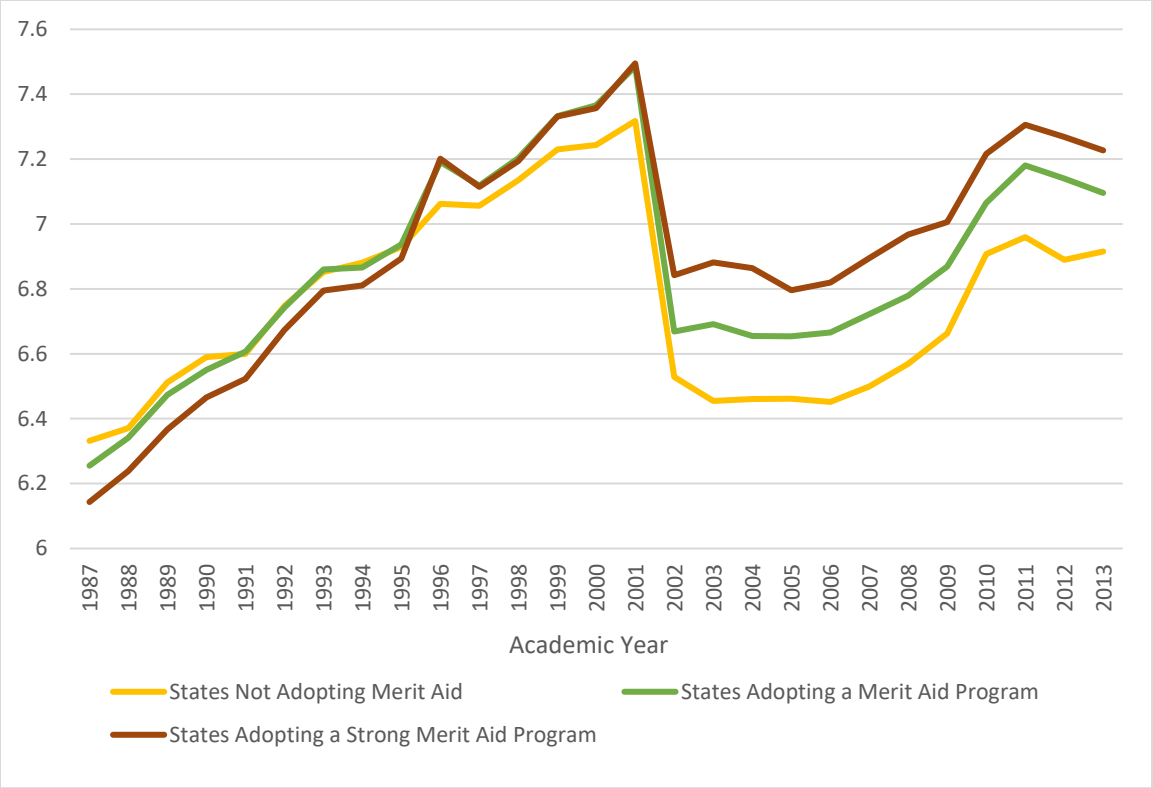


Figure 24. Logged mean of Scholarships and Grants Expenditures per student FTE by Academic Year for Institutions in Merit Aid Program Adopting States, Strong Merit Aid Program Adopting States, and States that Did Not Adopt Merit Aid

The initial set of regressions, shown in Table 30, I ran to examine how institutions altered their scholarships and grants expenditures after merit aid was adopted yielded statistically significant results in all three models. Indeed, when treating all institutions in non-adopting states as an appropriate control group, the adoption of a merit aid program was associated with 22.3% higher scholarships and grants expenditures relative to institutions in states that did not adopt merit aid. When removing the states that did not pass a visual examination for parallel trends pre-treatment, the adoption of a merit aid program was associated with a 23.8% more spent on scholarships and grants expenditures relative to the control group. As shown in Figure 24, the states that I removed were Massachusetts and Tennessee. When using only states that had adopted merit aid as their own control group, I found that institutions in states that had

already adopted merit aid spent, on average, 26.5% more on scholarships and grants than institutions in states that will have had eventually adopted a merit aid program.

Table 30

The Effect of Merit Aid Program Adoption on Scholarships and Grants Expenditures

VARIABLES	(1) Base Scholarships	(2) PT Removal Scholarships	(3) Staggered Scholarships
Merit Aid	1.223***	1.238***	1.265***
	(1.050)	(1.048)	(1.063)
Constant	1,221***	1,078***	1,033***
	(1.226)	(1.241)	(1.379)
Observations	12,138	11,727	3,716
R-squared	0.305	0.302	0.371
Number of Institutions	471	455	142
Year FE	YES	YES	YES
Institution FE	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

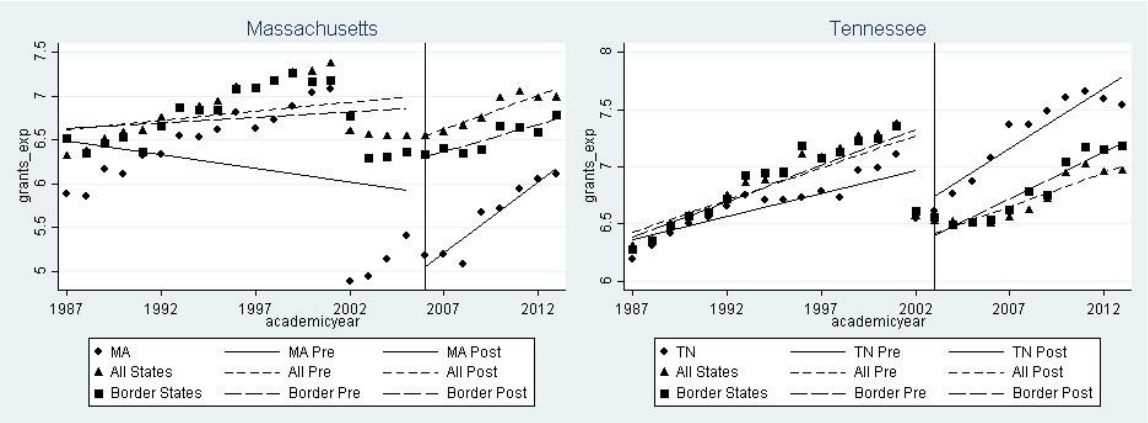


Figure 25. Institutions in States that do not Pass a Visual Examination of the Pre-Treatment Parallel Trends Assumption Concerning Scholarships and Grants Expenditures

In the next set of regressions I used to analyze the institutional behavior of spending on scholarships and grants, I included an additional variable that allows for the first five years after merit aid adoption to differ from the years after the first five years post-adoption. As seen in

Table 31, in all three models, I found statistically significant results for both the first five years post-adoption and statistically significant results for the years after the first five years post adoption. In comparison to institutions in all states that did not adopt merit aid, in the first five years post merit aid adoption, institutions in states that adopted merit aid spent 15.6% more on scholarships and grants and in the subsequent years spent 31.1% more on scholarships and grants. In the model in which the states that did not pass a visual examination of parallel trends, I found that in the first five years post merit aid adoption, institutions in states that adopted merit aid spent 17.2% more on scholarships and grants and in the subsequent years spent 32.1% more on scholarships and grants. When using only states that had adopted merit aid as their own control group, I found that institutions in states that had already adopted merit aid spent, in the first five years on average, 26.7% more on scholarships and grants than institutions in states that will have had eventually adopted a merit aid program. In the subsequent years after the first five years, in this model, I found that institutions that had adopted merit aid spent 67.8% more on scholarships and grants than institutions in states that had not yet adopted merit aid.

Table 31

The Effect of Merit Aid Program Adoption on Scholarships and Grants Expenditures for the First Five Years Post Adoption

VARIABLES	(1) Base Scholarships	(2) PT Removal Scholarships	(3) Staggered Scholarships
Merit Aid	1.156***	1.172***	1.267***
	(1.044)	(1.040)	(1.062)
Merit After 5 Years	1.134***	1.127**	1.324***
	(1.046)	(1.047)	(1.058)
Constant	1,136***	1,004***	956.4***
	(1.230)	(1.246)	(1.355)
Observations	12,138	11,727	3,716
R-squared	0.306	0.304	0.389
Number of Institutions	471	455	142
Year FE	YES	YES	YES
Institution FE	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 32 shows the set of regressions analyzing expenditures on scholarships and grants includes a variable that allows weak and strong merit aid programs to be different. In both models which use states that had not adopted any merit aid programs as a control group, I found a statistically significantly results for only strong merit aid programs. Indeed, when using the base model (i.e. all states that did not adopt a merit aid program), I found that the adoption of a weak merit aid program was associated with a 7.5% less spending on scholarships and grants compared to institutions in states that did not adopt any merit aid program, while the adoption of a strong merit aid program was associated with 40.2% more on scholarships and grants compared to institutions in states that did not adopt any merit aid program. When using the model in which states that did not pass a visual examination of the parallel trends assumption were excluded, I found that the adoption of a weak merit aid program was associated with a

2.2% less spending on scholarships and grants compared to institutions in states that did not adopt any merit aid program, while the adoption of a strong merit aid program was associated with 35.6% more on scholarships and grants compared to institutions in states that did not adopt any merit aid program.

Table 32

The Effect of a Strong Merit Aid Program Adoption on Scholarships and Grants Expenditures

VARIABLES	(1) Base Scholarships	(2) PT Removal Scholarships	(3) Staggered All Scholarships	(4) Staggered Strong Scholarships
Merit Aid	0.925	0.978	0.930	
	(1.068)	(1.062)	(1.072)	
Merit Aid X Strong	1.516***	1.387***	1.599***	1.221***
	(1.084)	(1.080)	(1.085)	(1.058)
Constant	1,100***	1,047***	721.5***	128.9***
	(1.225)	(1.242)	(1.340)	(1.420)
Observations	12,138	11,727	3,716	2,341
R-squared	0.311	0.306	0.399	0.467
Number of Institutions	471	455	142	89
Year FE	YES	YES	YES	YES
Institution FE	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In the models that only use states that adopted a merit aid program at some point as their own control group, I found statistically significant results for only the coefficients for strong programs. In the model that uses states that had not yet adopted any merit aid program, I found that institutions in states that adopted a weak merit aid program spent 7.0% less on scholarships and grants than institutions in states that had not yet adopted a merit aid program. In contrast, the results for strong merit aid program adoption indicate that institutions had 48.7% more in scholarships and grants expenditures than at institutions in states had not yet adopted any merit

aid program. In the last regression concerning scholarships and grants expenditures, I limited the sample to only institutions that at some point adopt a strong merit aid program. I found that institutions in states that adopted a strong merit aid program spent 22.1% more on scholarships and grants than institutions that will have had eventually adopted a strong merit aid program.

Table 33 shows the results for the models that included lagged variables to test for Granger Causality. The coefficients in the base and staggered models indicate that before merit aid adoption, institutions in states about to adopt merit aid were statistically significantly different from those that did not adopt merit aid. In those two models, every lagged variable's coefficient was both negative and statistically significant. However, only one lagged variable in the model that removed institutions in states that did not pass a visual examination of the parallel trends assumption was statistically significant. This indicated that the removal of institutions from Massachusetts and Tennessee helped create a sufficient control group concerning scholarship expenditures.

Table 33

The Effect of a Merit Aid Program Adoption on Grants and Scholarships Expenditures Including Lagged Coefficients to Test for Granger Causality

VARIABLES	(1) Base Scholarships	(2) PT Removal Scholarships	(3) Staggered Scholarships
Merit Aid	1.159**	1.210***	1.149*
	(1.059)	(1.052)	(1.083)
Year Lag 1	0.923*	0.958	0.900*
	(1.049)	(1.038)	(1.063)
Year Lag 2	0.880***	0.943	0.857**
	(1.051)	(1.036)	(1.062)
Year Lag 3	0.861***	0.942*	0.847***
	(1.054)	(1.035)	(1.061)
Year Lag 4	0.875**	0.967	0.862**
	(1.056)	(1.035)	(1.059)
Constant	1,248***	1,095***	1,010***
	(1.227)	(1.244)	(1.368)
Observations	12,138	11,727	3,716
R-squared	0.306	0.302	0.376
Number of Institutions	471	455	142
Year FE	YES	YES	YES
Institution FE	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Changes in Faculty Composition

In this section, I discuss the descriptive results and inferential results that answer research question one. When examining faculty, I am concerned with three measures: changes in the number of part-time faculty per FTE student, changes in the number of full-time non-tenure-track (FT NTT) faculty per FTE student, and changes in the number of full-time tenured, tenure-track (FT TT) faculty per FTE student. Unlike expenditure variables, the data on faculty are much less consistent throughout the sample. IPEDS did not always require faculty counts each

year, but some institutions did opt to report their data in years not required. Additionally, due to data limitations, I used the Delta Project's data to analyze part-time faculty while I had to merge IPEDS data onto the Delta Project's data to analyze FT NTT and FT TT faculty. In each section, I discuss the distribution of the dependent variable, changes in each section's faculty numbers category, and finally the difference-in-difference estimates of the effect of merit aid program adoption on faculty numbers.

Part-Time Faculty

IPEDS does not have a clear definition of who part-time faculty are, and according to the Delta Cost Project (2015), institutions can define who are part-time faculty for themselves. For this study, part-time faculty are those faculty who do not have a strong, lengthy relationship with an institution. As the key piece of internal labor market theory (Doeringer & Piore, 1971) that this study utilized concerns flexibility, I consider part-time faculty as those who would not necessarily expect to have a teaching assignment the next semester. According to theory and research, institutions should employ more part-time faculty as they become more resource dependent on students. If the coefficients for part-time faculty employment are statistically significant and positive, the analyses would then suggest that institutions in merit aid adopting states adjusted their behaviors as their resource dependency changed.

Figure 26 shows the distribution of part-time faculty per FTE student and the log-transformed distribution of part-time faculty per FTE student. The transformation helped bring the distribution closer to normal than the untransformed data. The original data had a large bound at or very near zero, as there are institutions do not hire part-time faculty. As such, while the log-transformed variable is closer to normal than the untransformed, there is still a left skew.

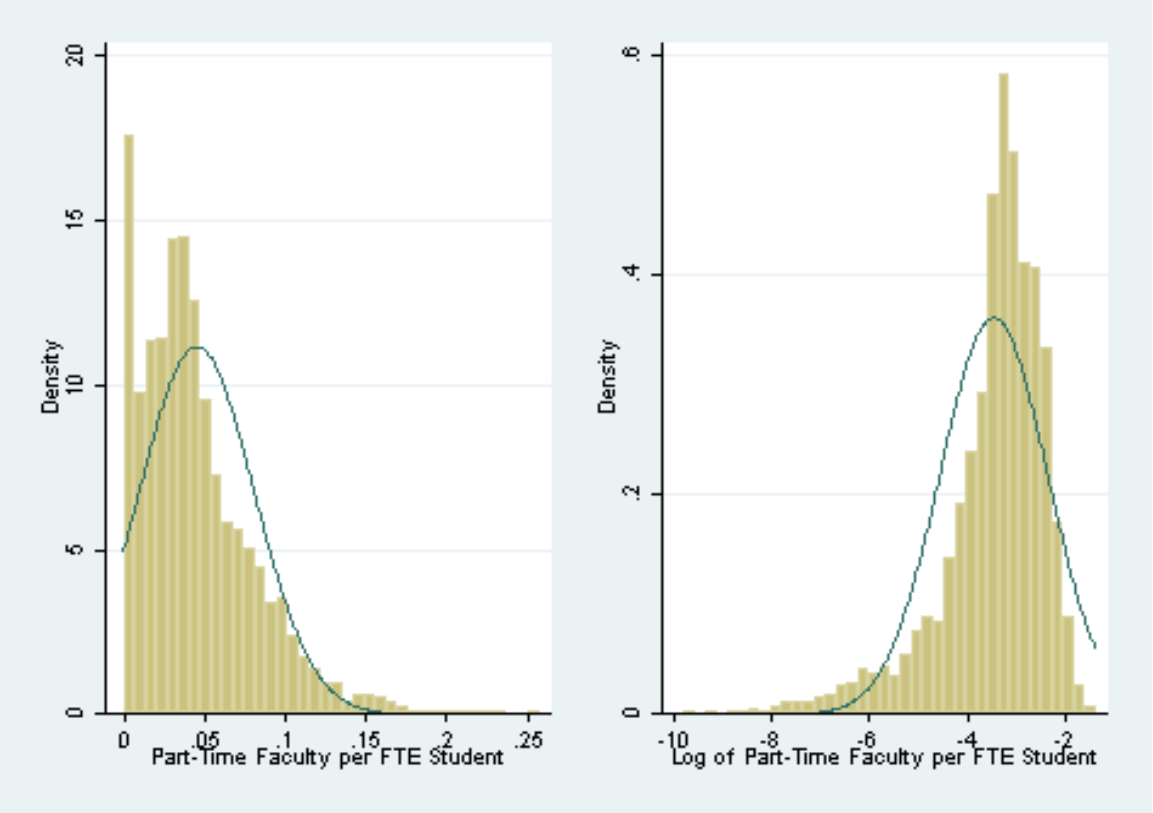


Figure 26. Histograms of Part-Time Faculty per FTE and Log of Part-Time Faculty per FTE

Figure 27 shows the change in average logged part-time faculty per FTE student during the analysis period for states that never adopt merit aid, states that adopt a merit aid program, and states that adopt a merit aid program. Unlike the dependent variables concerning institutional expenditures, gaps exist for some, but not all odd numbered years in the sample. Indeed, from 1987-2001, there are no odd numbered years in the sample, but starting in 2003, IPEPS collected part-time faculty counts annually. This led to a smaller number of observations in the analyses for part-time faculty compared to the analyses on expenditures. Indeed, while the base models for most expenditure variables was more than 12,000, the base models for part-time faculty yields a number of observations at 6,899.

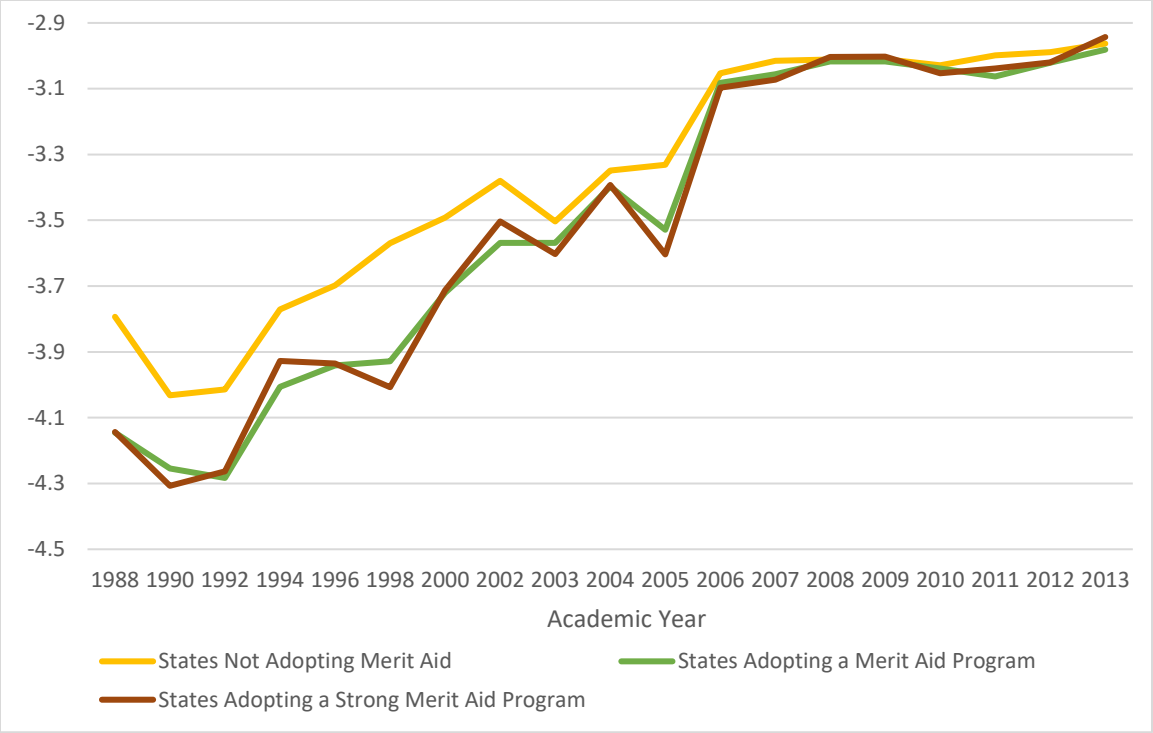


Figure 27. Log of Part-Time Faculty per FTE by Academic Year for Institutions in Merit Aid Program Adopting States, Strong Merit Aid Program Adopting States, and States that Did Not Adopt Merit Aid

In general, all institutions regardless of merit aid adoption moved in a similar upwards trajectory over time. From 1988-2006, there was a gap in the trend lines between institutions affected by any merit aid program and not affected. From 2005 to 2006, the institutions affected by adoption had a sudden rate change, and all institutions regardless a merit aid adoption were nearly identical in regards to the employment of part-time faculty.

Table 34 shows the results of the initial set of regressions that examined how institutions altered their part-time faculty composition after merit aid was adopted. These regressions yielded statistically significant results in the models that used institutions in states that did not adopt merit-aid as a control group. Indeed, when treating all institutions in non-adopting states as an appropriate control group, the adoption of a merit aid program was associated with 25.7% more part-time faculty relative to institutions in states that did not adopt merit aid. After

removing from the sample the states that did not pass a visual examination for parallel trends pre-treatment, the adoption of a merit aid program was associated with 30.6% more employment of part-time faculty relative to the control group. As shown in Figure 28, eight of the fifteen states that adopted a merit aid program were removed from the sample. These states included: Alaska, Arkansas, Florida, Kentucky, Nevada, Tennessee, and West Virginia. When using only states that had adopted merit aid as their own control group, I did not find a statistically significant difference from states that had not yet adopted a merit aid program but eventually would. However, the coefficient was positive and indicated that institutions in states that adopted a merit aid program would employ 6.9% more part-time faculty relative to institutions that were about to adopt a merit aid program.

Table 34

The Effect of Merit Aid Program Adoption on Part-Time Faculty Employment

	(1)	(2)	(3)
	Base	PT Removal	Staggered
VARIABLES	Part Time Faculty	Part Time Faculty	Part Time Faculty
Merit Aid	1.257**	1.306*	1.069
	(1.094)	(1.161)	(1.125)
Constant	0.0325***	0.0397***	0.0110***
	(1.238)	(1.265)	(1.627)
Observations	6,899	5,904	2,062
R-squared	0.224	0.226	0.254
Number of Institutions	469	405	142
Year FE	YES	YES	YES
Institution FE	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

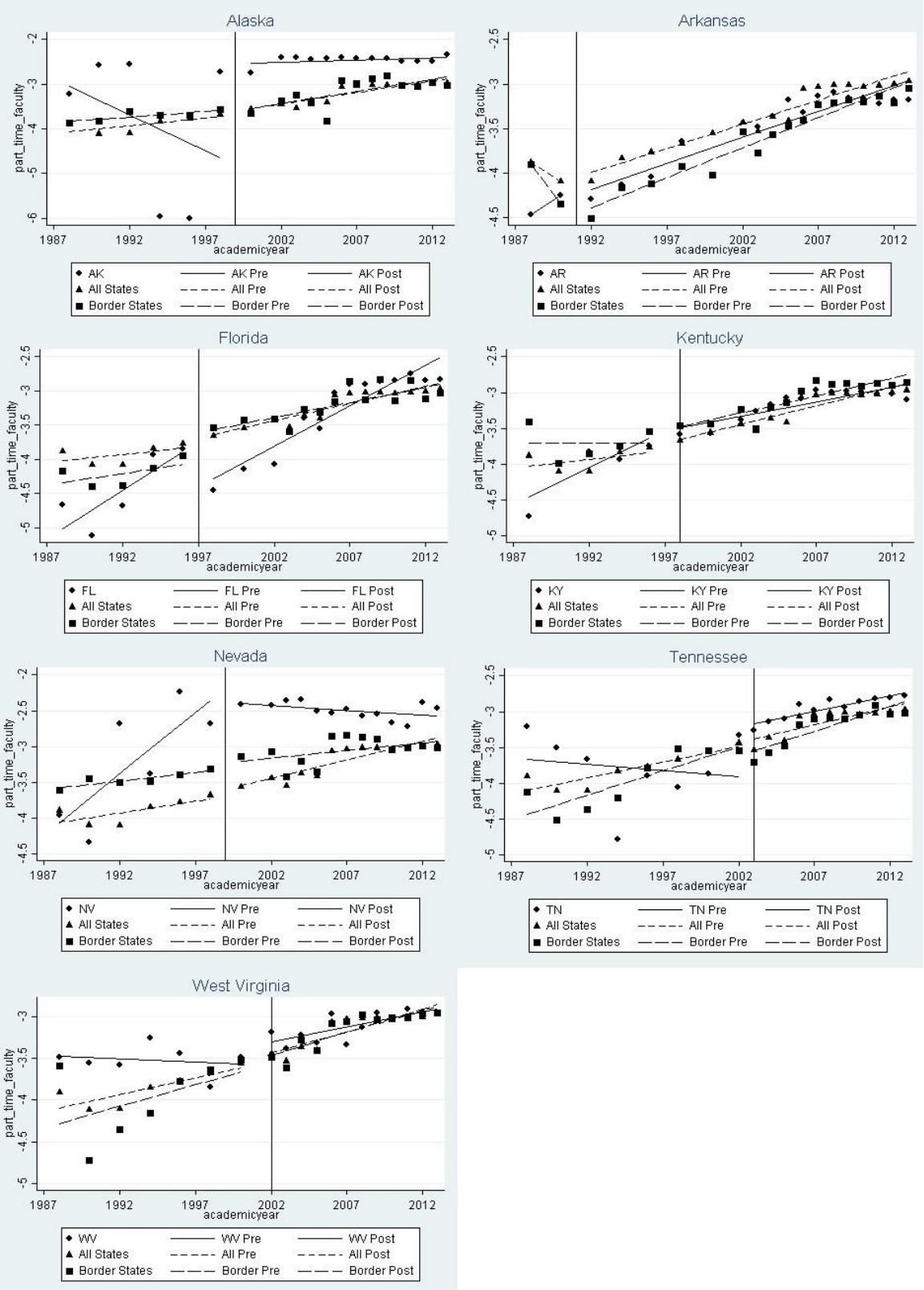


Figure 28. Institutions in States that do not Pass a Visual Examination of the Pre-Treatment Parallel Trends Assumption Concerning Part-Time Faculty

The next set of regressions, shown in Table 35, I used to analyze the employment of part-time faculty included a variable that would allow the first five years after merit aid adoption in a state to differ from the subsequent years. In all three models, I found statistically insignificant, positive results for the first five years post adoption. However, for the subsequent years, all three models show a statistically significant result. In the base model, I found that institutions in a state that adopted a merit aid program, on average, after the first five years of the policy, employed 49.6% more part-time faculty than institutions in states that did not adopt merit aid. When removing the states that did not pass a visual examination for parallel trends, that model indicated 52.2% more part-time faculty for the time after the first five years at institutions in states that adopted merit aid relative to institutions in states that did not. The results for the regression in which I utilized the staggered adoption of the policy to create a control group from institutions about to adopt a merit aid program, show that institutions in states that adopted merit aid employed 31.9% more part-time faculty in the time after the first five years than institutions that at some point will adopt merit aid.

Table 35

The Effect of Merit Aid Program Adoption on Part-Time Faculty Employment

VARIABLES	(1) Base Part Time Faculty	(2) PT Removal Part Time Faculty	(3) Staggered Part Time Faculty
Merit Aid	1.076	1.003	1.064
	(1.093)	(1.185)	(1.124)
Merit After 5 Years	1.390***	1.517***	1.240**
	(1.079)	(1.140)	(1.090)
Constant	0.0269***	0.0345***	0.0109***
	(1.237)	(1.260)	(1.600)
Observations	6,899	5,904	2,062
R-squared	0.231	0.233	0.257
Number of Institutions	469	405	142
Year FE	YES	YES	YES
Institution FE	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 36 shows the next set of regressions to analyze part-time faculty employment included a variable that allows weak and strong merit aid programs to differ from one another. Across all four regressions, I found no statistically significant results. The sample size should be once again noted here as compared to the sample sizes used in the expenditures variables, as the number of observations is nearly half of the analyses on expenditures. In both models that used other institutions in states that did not adopt merit aid, the results were positive for both weak and strong merit aid programs. In the base model, institutions in states with weak merit aid programs employed 12.3% more part-time faculty, and institutions in states with weak merit aid programs employed 33.1% more part-time faculty relative to institutions in states that never adopted a merit aid program. In the model that removed institutions in states that did not pass a visual examination of the parallel trends assumption, institutions in states with weak merit aid programs employed 25.0% more part-time faculty, and institutions in states with weak merit aid

programs employed 32.4% more part-time faculty relative to institutions in states that never adopted a merit aid program. In the staggered all model, I found that weak merit aid programs were associated with 3.8% lower part-time faculty employment, but strong merit aid programs were associated with 13.9% higher part-time faculty employment relative to institutions in states that will eventually adopt some a merit aid program. In the staggered strong model, I found that institutions in states with a strong merit aid program had 0.3% lower employment of part-time faculty relative to institutions in states that will eventually adopt a strong merit aid program.

Table 36

The Effect of a Strong Merit Aid Program Adoption on Part-Time Faculty Employment

VARIABLES	(1) Base Part Time Faculty	(2) PT Removal Part Time Faculty	(3) Staggered All Part Time Faculty	(4) Staggered Strong Part Time Faculty
Merit Aid	1.123	1.250	0.962	
	(1.163)	(1.436)	(1.182)	
Merit Aid X Strong	1.185	1.059	1.184	0.997
	(1.219)	(1.499)	(1.240)	(1.209)
Constant	0.0313***	0.0395***	0.00989***	0.00180***
	(1.253)	(1.276)	(1.697)	(2.125)
Observations	6,899	5,904	2,062	1,299
R-squared	0.225	0.226	0.255	0.303
Number of Institutions	469	405	142	89
Year FE	YES	YES	YES	YES
Institution FE	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 37 displays the results of the final models concerning part-time faculty employment that test for Granger Causality. No lagged coefficient in any of the models

indicated that institutions in states about to adopt merit aid are statistically significantly different from institutions in states that never adopted merit aid programs.

Table 37

The Effect of a Merit Aid Program Adoption on Part-Time Faculty Employment Including Lagged Coefficients to Test for Granger Causality

	(1)	(2)	(3)
	Base	PT Removal	Staggered
VARIABLES	Part Time Faculty	Part Time Faculty	Part Time Faculty
Merit Aid	1.233*	1.246	1.048
	(1.114)	(1.185)	(1.153)
Year Lag 1	1.067	1.005	1.031
	(1.144)	(1.194)	(1.153)
Year Lag 2	1.076	1.167	1.110
	(1.135)	(1.220)	(1.158)
Year Lag 3	0.831	0.756	0.828
	(1.184)	(1.267)	(1.179)
Year Lag 4	0.888	0.800	0.906
	(1.165)	(1.296)	(1.180)
Constant	0.0327***	0.0403***	0.0112***
	(1.238)	(1.265)	(1.628)
Observations	6,899	5,904	2,062
R-squared	0.225	0.228	0.256
Number of Institutions	469	405	142
Year FE	YES	YES	YES
Institution FE	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Full-Time Non-Tenure Track Faculty Employment

IPEDS breaks down full-time faculty into three groups, tenured, tenure-track, and non-tenure-track. For this dependent variable, I analyze the full-time faculty who are reported as non-tenure-track. As with part-time faculty, a key piece of internal labor market theory (Doeringer & Piore, 1971) that this study utilized concerns flexibility. While not as flexible in employment as part-time faculty are, FT NTT are still somewhat flexible,especially compared to

FT TT faculty (discussed next). According to theory, institutions should employ more FT NTT as they become more resource dependent on students. If the coefficients for FT NTT employment are statistically significant and positive, the analyses would then suggest that institutions in merit aid adopting states adjusted their behaviors as their resource dependency changed.

Figure 29 shows a comparison of the distribution of FT NTT faculty per FTE student and log-transformed distribution of FT NTT faculty per FTE student. I followed the conventional method of using the natural log of the variable, and the result was that the logged distribution was approximately normal.

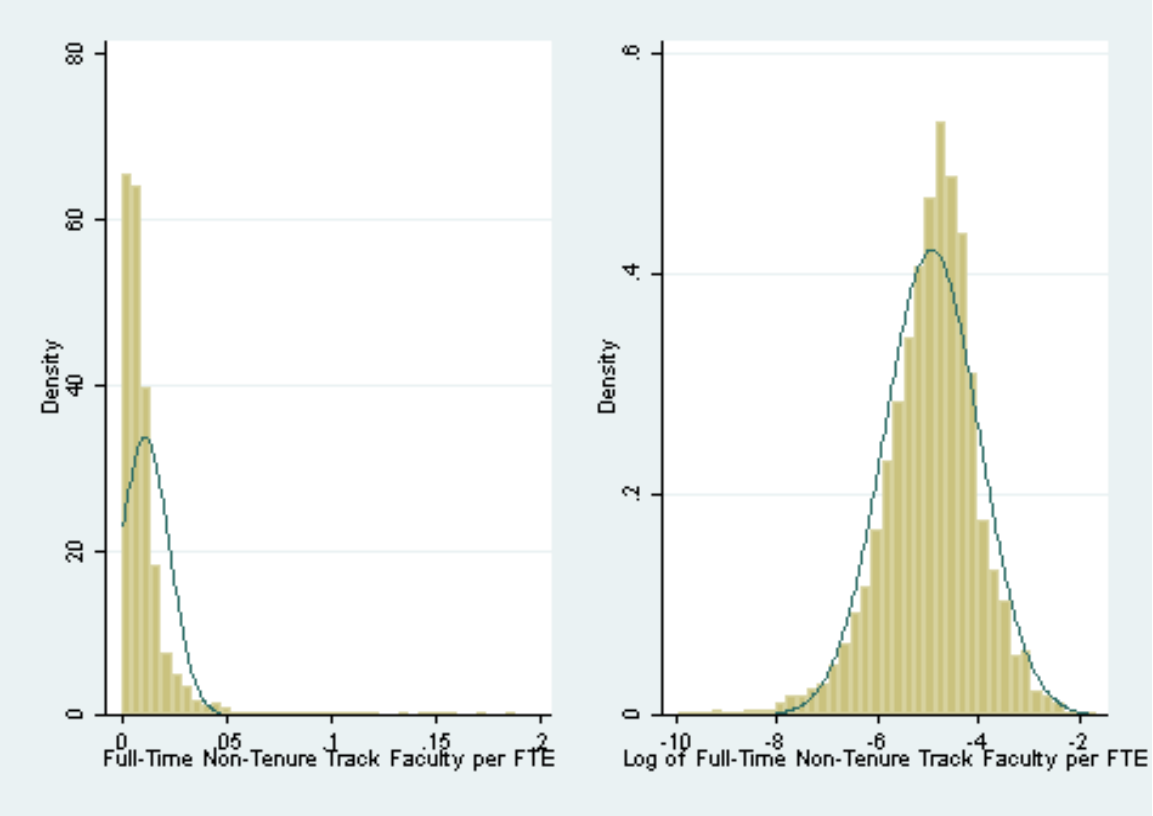


Figure 29. Histogram of Full-Time Non-Tenure Track Faculty per FTE and Log of Full-Time Non-Tenure Track Faculty per FTE

Figure 30 shows the change in average logged FT NTT faculty per FTE student during the analysis period for states that never adopt merit aid, states that adopt a merit aid program, and states that adopt a merit aid program. Overall, all lines fall nearly on top of each other which indicates that anything that happened to one group that might have affected the employment of FT NTT faculty likely affected all institutions evenly. Even if the sudden peaks and valleys between 1992 and 1998 were a result of measurement error or changes in reporting standards that would have happened to all institutions evenly, so results relative to other institutions ought not to be biased. Additionally, this sample started in 1990, which only gives Arkansas one year of pre-treatment data. Also, the years 1996 and 2001 were removed from the sample due to insufficient number of observations.

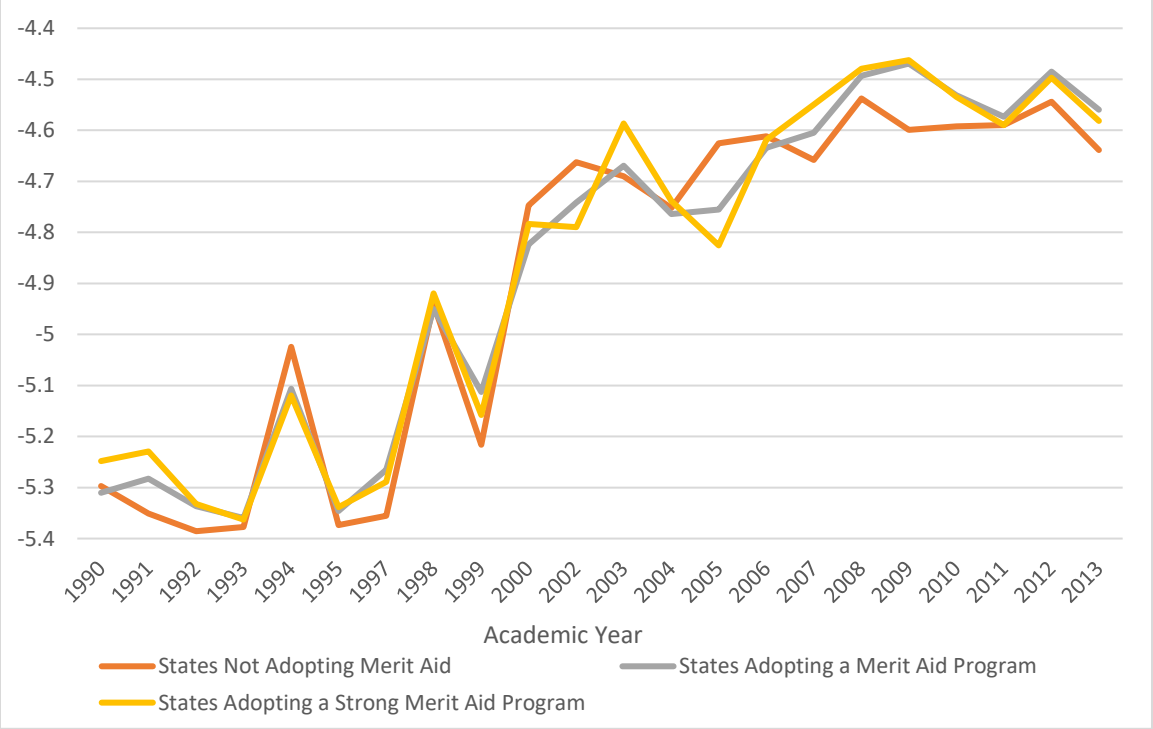


Figure 30. Log of Full-Time Non-Tenure Track Faculty per FTE Student by Academic Year for Institutions in Merit Aid Program Adopting States, Strong Merit Aid Program Adopting States, and States that Did Not Adopt Merit Aid

In Table 38, I show the regression results from my first set of analyses. I found statistically insignificant, negative results for all the regressions. Even with removing the bias from including states with institutions that on average do not pass a visual examination of the parallel trends assumption, illustrated in Figure 31, I did not find a statistically significant difference between institutions affected by merit aid and those that were not. The states that did not pass the visual examination for parallel trends included: Arkansas, Georgia, Missouri, New Mexico, and Tennessee. When I limited the sample to only institutions in states that had adopted a merit aid program to take advantage of the natural control group of those institutions in states that will eventually adopt a merit aid, I still found statistically insignificant, negative results.

Table 38

The Effect of Merit Aid Program Adoption on Full-Time Non-Tenure-Track Faculty Employment

	(1)	(2)	(3)
	Base	PT Removal	Staggered
VARIABLES	FT NTT Faculty	FT NTT Faculty	FT NTT Faculty
Merit Aid	0.947	0.935	0.970
	(1.048)	(1.052)	(1.054)
Constant	0.00600***	0.00587***	0.00834***
	(1.189)	(1.195)	(1.404)
Observations	9,337	8,555	2,836
R-squared	0.363	0.368	0.363
Number of Institutions	466	427	139
Year FE	YES	YES	YES
Institution FE	YES	YES	YES

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

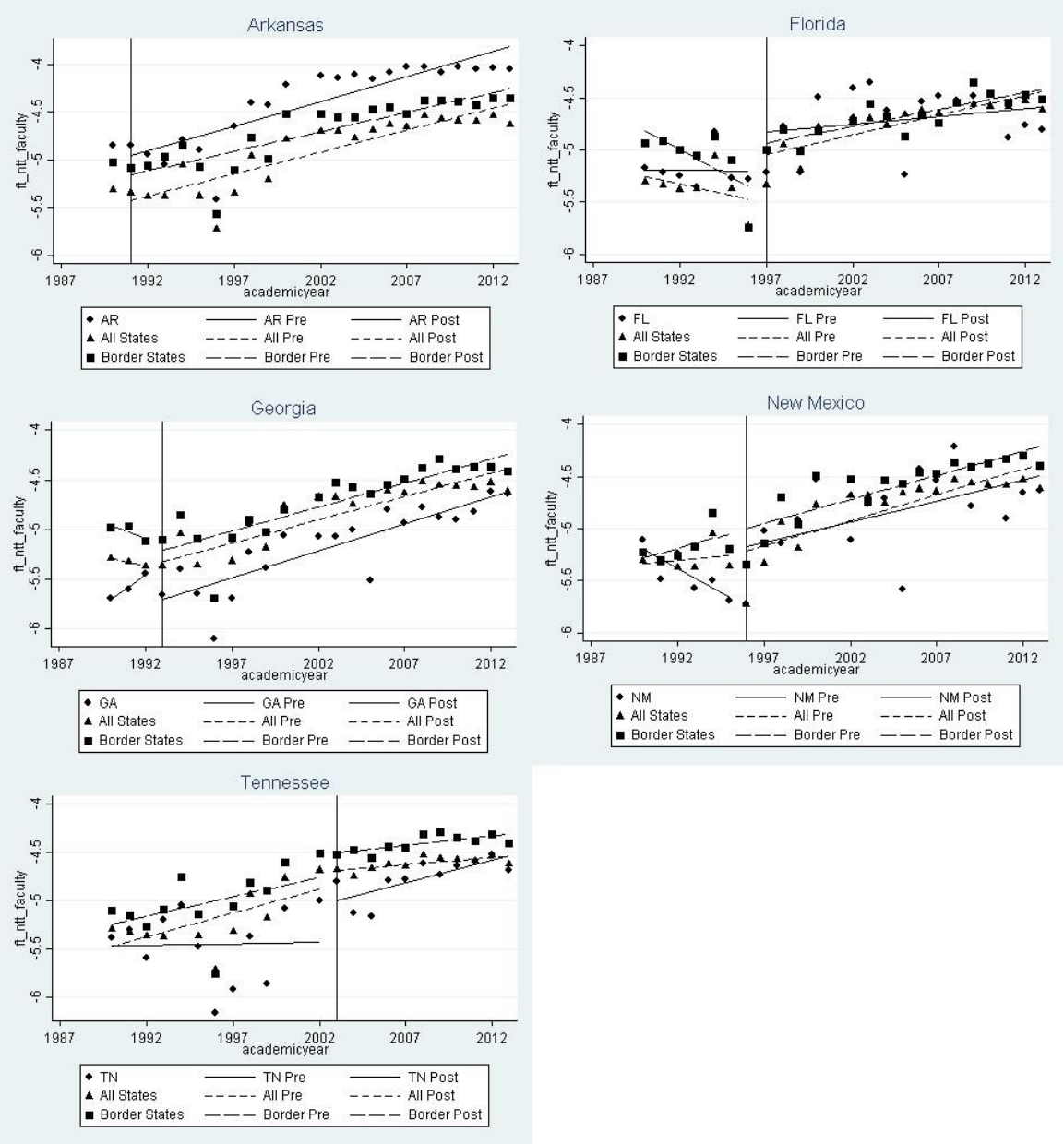


Figure 31. Institutions in States that do not Pass a Visual Examination of the Pre-Treatment Parallel Trends Assumption Concerning Full-Time Non-Tenure-Track Faculty

Table 39 shows the results of another set of regression analyses I performed to examine if institutions alter their employment practices after merit aid was adopted. In this set, I included a variable that allowed the first five years after merit aid adoption to be different from the years following that first five-year period. The results indicate that in the first five years after merit aid

adoption, institutions in merit aid adopting states employ fewer FT NTT faculty relative to institutions in states that did not adopt a merit aid program or had not adopted one yet. In the model that removes the states that did not pass a visual examination of the parallel trends assumption, the result for the first five years was statistically significant.

Table 39

The Effect of Merit Aid Program Adoption on Full-Time Non-Tenure-Track Faculty Employment for the First Five Years Post Adoption

	(1)	(2)	(3)
	Base	PT Removal	Staggered
VARIABLES	FT NTT Faculty	FT NTT Faculty	FT NTT Faculty
Merit Aid	0.931	0.917*	0.970
	(1.047)	(1.051)	(1.054)
Merit After 5 Years	1.039	1.041	1.051
	(1.049)	(1.055)	(1.048)
Constant	0.00584***	0.00574***	0.00824***
	(1.192)	(1.199)	(1.403)
Observations	9,337	8,555	2,836
R-squared	0.363	0.368	0.364
Number of Institutions	466	427	139
Year FE	YES	YES	YES
Institution FE	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

On average, relative to institutions in states without a merit aid program, institutions in states with a merit aid program employed 8.3% fewer FT NTT faculty in the first five years after program adoption. In the years after the first five years post adoption, the base model indicated that institutions in merit aid adopting states employed 3.3% fewer FT NTT faculty, and in the model that removed institutions in states that did not pass a visual examination of the parallel trends assumption the coefficient indicated that institutions in merit aid adopting states employed 4.5% fewer FT NTT faculty. In the staggered model, in the time after the first five years post

adoption, institutions that had adopted merit aid employed on average 1.9% more FT NTT faculty relative to institutions that will adopt merit aid.

Table 40 shows the next set of regression analyses to examine FT NTT employment after merit aid adoption. These models include an additional variable that allows weak and strong merit aid programs to differ. Across all four models, the analysis estimated no statistically significant results. Additionally, all the models indicate that weak merit aid program adoption is associated with the employment of fewer FT NTT faculty at an institution. Additionally, in both models that use institutions in states that never adopt merit aid as a control group, strong merit aid program adoption was associated with 4.0% fewer FT NTT faculty in the base model and 5.2% fewer faculty in the model that removed institutions in states that did not pass a visual examination of the parallel trends assumption. In the staggered all model, institutions in states with strong merit aid programs had on average 2.5% lower FT NTT employment relative to institutions about to adopt a merit aid program. The staggered strong model indicated that on average institutions in states that had adopted merit aid employed 4.5% more FT NTT faculty relative to institutions in states that had not yet adopted their strong merit aid program.

Table 40

The Effect of a Strong Merit Aid Program Adoption on Full-Time Non-Tenure-Track Faculty Employment

VARIABLES	(1) Base FT NTT Faculty	(2) PT Removal FT NTT Faculty	(3) Staggered All FT NTT Faculty	(4) Staggered Strong FT NTT Faculty
Merit Aid	0.922	0.914	0.964	
	(1.062)	(1.064)	(1.070)	
Merit Aid X Strong	1.041	1.037	1.011	1.045
	(1.086)	(1.095)	(1.093)	(1.091)
Constant	0.00590***	0.00576***	0.00823***	0.0140***
	(1.195)	(1.202)	(1.442)	(1.667)
Observations	9,337	8,555	2,836	1,776
R-squared	0.363	0.368	0.363	0.336
Number of Institutions	466	427	139	86
Year FE	YES	YES	YES	YES
Institution FE	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 41 shows the results of the test I implemented to look for Granger Causality. No lagged coefficient in any of the models indicated that institutions in states about to adopt merit aid are statistically significantly different from institutions in states that never adopted merit aid programs.

Table 41

The Effect of a Merit Aid Program Adoption on Full-Time Non-Tenure-Track Faculty Employment Including Lagged Coefficients to Test for Granger Causality

	(1) Base	(2) PT Removal	(3) Staggered
VARIABLES	FT NTT Faculty	FT NTT Faculty	FT NTT Faculty
Merit Aid	0.913	0.919	0.934
	(1.065)	(1.071)	(1.086)
Year Lag 1	0.964	0.903	0.983
	(1.074)	(1.086)	(1.084)
Year Lag 2	0.874	0.862	0.892
	(1.086)	(1.094)	(1.095)
Year Lag 3	0.977	1.002	0.975
	(1.060)	(1.057)	(1.069)
Year Lag 4	0.897	0.902	0.929
	(1.092)	(1.115)	(1.091)
Constant	0.00605***	0.00605***	0.00826***
	(1.190)	(1.197)	(1.406)
Observations	9,337	8,333	2,836
R-squared	0.363	0.372	0.364
Number of Institutions	466	417	139
Year FE	YES	YES	YES
Institution FE	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Full-Time Tenured, Tenure-Track Faculty Employment

IPEDS breaks down full-time faculty into three groups, tenured, tenure-track, and non-tenure-track. For this dependent variable, I sum the full-time faculty who are reported as tenured and tenure-track for use in the analyses. In contrast to part-time faculty and FT NTT, FT TT faculty are extremely inflexible in their employment. According to theory, institutions should employ fewer FT TT or have no change in their employment as the institutions become more resource dependent on students. If the coefficients for FT TT faculty are statistically insignificant or statistically significant and negative, the analyses would then suggest that

institutions in merit aid adopting states adjusted their behaviors as their resource dependency changed.

Figure 32 shows a comparison of the distribution of FT TT faculty per FTE student and log-transformed distribution of FT TT faculty per FTE student. I followed the conventional method of using the natural log of the variable, and the result was that the logged distribution was approximately normal though very left skewed. This is likely due to some institutions in the sample having zero FT TT faculty at institutions that might not have a tenure system.

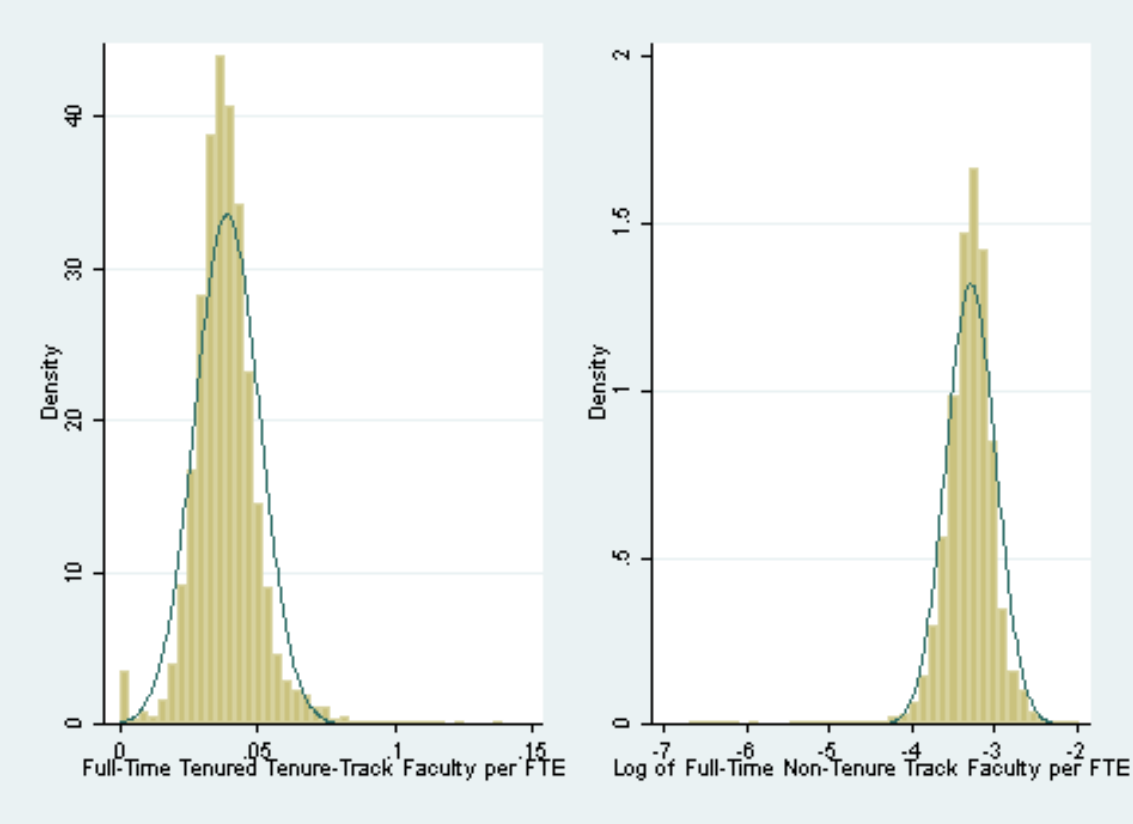


Figure 32. Histogram of Full-Time Tenured, Tenure-Track Faculty per FTE and Log of Full-Time Tenured, Tenure-Track Faculty per FTE

Figure 33 shows the change in average logged FT TT faculty per FTE student during the analysis period for states that never adopt merit aid, states that adopt a merit aid program, and

states that adopt a merit aid program. Overall, all lines fall nearly on top of each other which indicates that anything that happened to one group that might have affected the employment of FT TT faculty likely affected all institutions evenly. Additionally, this sample started in 1990, which only gives Arkansas one year of pre-treatment data. Also, the years 1996 and 2001 were excluded from this sample due to many missing observations that were not applied evenly to all institutions.

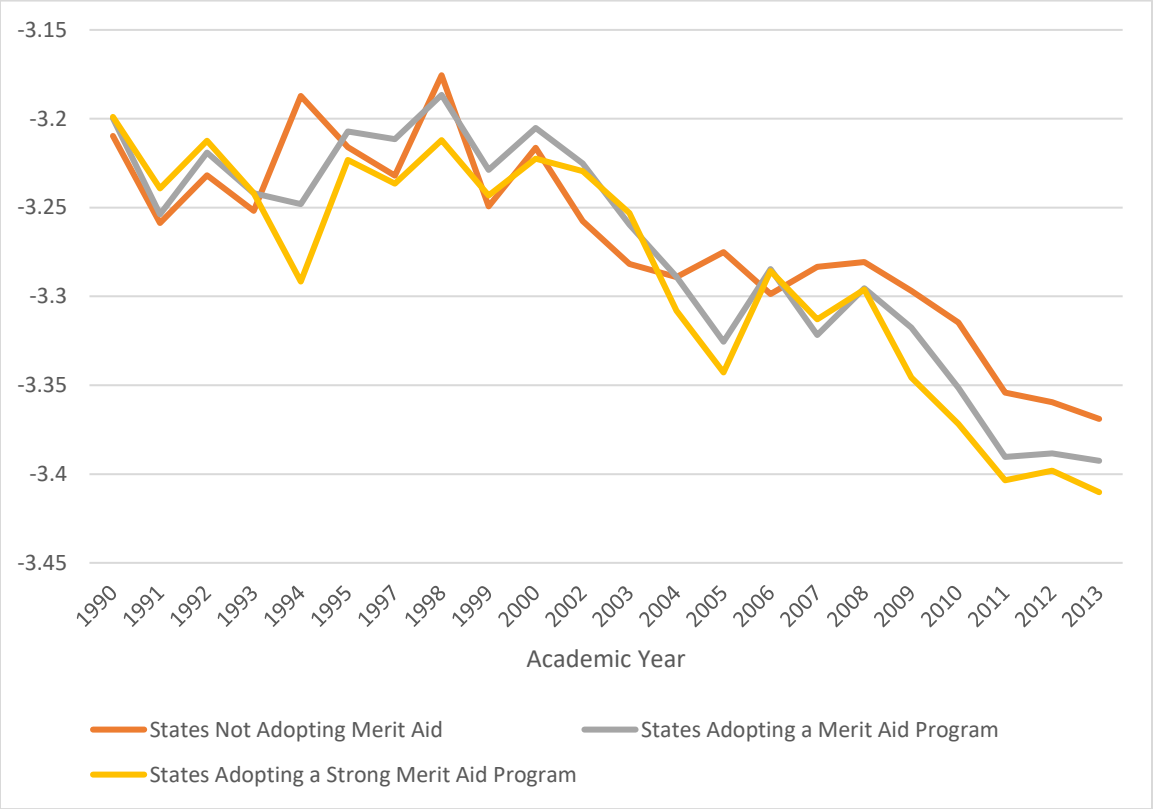


Figure 34. Log of Full-Time Tenured, Tenure-Track Faculty per FTE Student by Academic Year for Institutions in Merit Aid Program Adopting States, Strong Merit Aid Program Adopting States, and States that Did Not Adopt Merit Aid

Table 42 shows the regression results from my first set of analyses. I found statistically insignificant, negative results for all the regressions. Even with removing the bias from including states with institutions that on average do not pass a visual examination of the parallel trends assumption, illustrated in Figure 34, I did not find a statistically significant difference

between institutions affected by merit aid and those that were not. The states that did not pass the visual examination for parallel trends included: Alaska, Arkansas, Florida, Michigan, Mississippi, Nevada, and Tennessee. When I limited the sample to only institutions in states that had adopted a merit aid program to take advantage of the natural control group of those institutions in states that will eventually adopt a merit aid, I still found statistically insignificant, negative results.

Table 42

The Effect of Merit Aid Program Adoption on Full-Time Tenured, Tenure-Track Faculty Employment

	(1)	(2)	(3)
	Base	PT Removal	Staggered
VARIABLES	FT TT Faculty	FT TT Faculty	FT TT Faculty
Merit Aid	0.998	0.999	0.992
	(1.016)	(1.020)	(1.022)
Constant	0.0396***	0.0412***	0.0352***
	(1.066)	(1.067)	(1.100)
Observations	9,584	8,327	2,940
R-squared	0.183	0.182	0.185
Number of Institutions	463	404	139
Year FE	YES	YES	YES
Institution FE	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

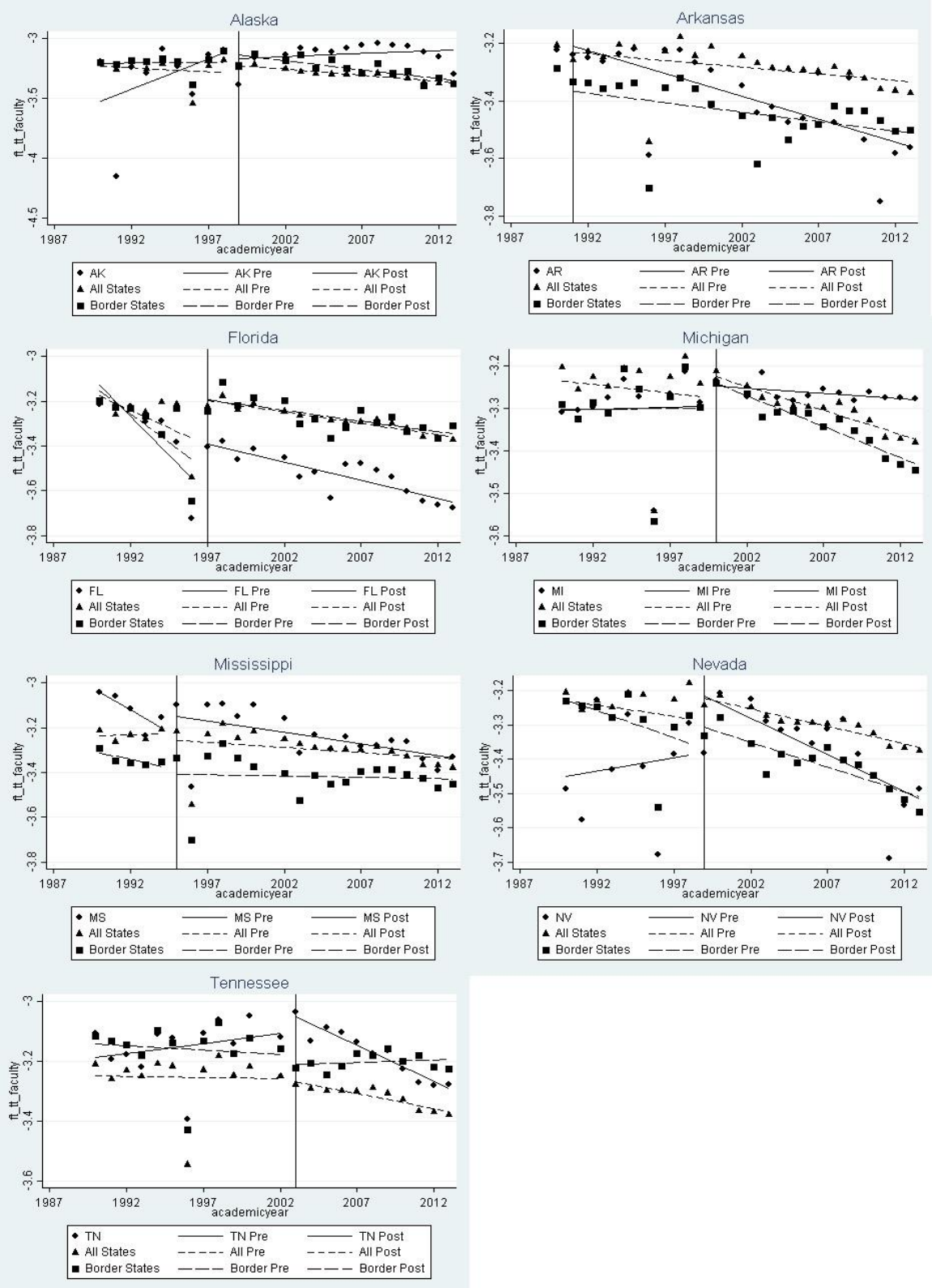


Figure 35. Institutions in States that do not Pass a Visual Examination of the Pre-Treatment Parallel Trends Assumption Concerning Full-Time Tenured, Tenure-Track Faculty

Table 43 shows the results of another set of regression analyses I performed to examine if institutions alter their employment practices after merit aid was adopted. In this set, I included a variable that allowed the first five years after merit aid adoption to be different from the years following that first five-year period. In all three models, for the first five years before adoption there was no statistically significant difference between institutions in states that adopted merit aid and institutions in states that did not or did not yet adopt merit aid. Additionally, the coefficient was negative for each model concerning the first five years. In the subsequent years after the initial five years post adoption, the models that use institutions in states that did not adopt merit aid as a control group yield statistically insignificant, positive results. The base model estimated that merit aid adoption would be associated with 0.4% more FT TT faculty, and the model that removed institutions in states that did not pass a visual examination of the parallel trends assumption estimated that merit aid adoption would be associated with .6% more FT TT faculty relative to institutions that never adopted a merit aid program. In the staggered model, in the time after the first five years post adoption, institutions in states that adopted a merit aid program employed 2.8% more FT TT faculty on average relative to institutions that will, but have not yet, adopted a merit aid program.

Table 43

The Effect of Merit Aid Program Adoption on Full-Time Tenured, Tenure-Track Faculty Employment for the First Five Years Post Adoption

VARIABLES	(1) Base FT TT Faculty	(2) PT Removal FT TT Faculty	(3) Staggered FT TT Faculty
Merit Aid	0.993	0.990	0.992
	(1.015)	(1.020)	(1.022)
Merit After 5 Years	1.011	1.016	1.036**
	(1.016)	(1.021)	(1.017)
Constant	0.0393***	0.0409***	0.0349***
	(1.064)	(1.066)	(1.099)
Observations	9,584	8,327	2,940
R-squared	0.183	0.182	0.186
Number of Institutions	463	404	139
Year FE	YES	YES	YES
Institution FE	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The next set of regression analyses, shown in Table 44, to examine FT TT employment after merit aid adoption includes an additional variable that allows weak and strong merit aid programs to differ. Across all the analyses, there were no statistically significant findings. However, the estimations for the coefficients were mixed across models. In the base model, institutions in states that adopted a weak merit aid program on average employed 0.5% more FT TT faculty relative to institutions in states with no merit aid programs, and institutions in states that adopted a strong merit aid program on average employed 0.6% fewer FT TT faculty relative to institutions in states with no merit aid programs. In the model that removed institutions in states that did not pass a visual examination of the parallel trends assumption, institutions in states that adopted a weak merit aid program on average employed 0.3% fewer FT TT faculty relative to institutions in states with no merit aid programs, and institutions in states that adopted

a strong merit aid program on average employed 0.1% fewer FT TT faculty relative to institutions in states with no merit aid programs. In the staggered all model, institutions in states that adopted a weak merit aid program on average employed 1.3% fewer FT TT faculty relative to institutions in states that had not yet adopted a merit aid program, and institutions in states that adopted a strong merit aid program on average employed 0.5% fewer FT TT faculty relative to institutions in states that had not yet adopted a merit aid program. Institutions in states with a strong merit aid program on average employed 0.1% more FT TT faculty than institutions in states about to adopt a strong merit aid program.

Table 44

The Effect of a Strong Merit Aid Program Adoption on Full-Time Tenured, Tenure-Track Faculty Employment

	(1)	(2)	(3)	(4)
	Base	PT Removal	Staggered All	Staggered Strong
VARIABLES	FT TT Faculty	FT TT Faculty	FT TT Faculty	FT TT Faculty
Merit Aid	1.005	0.997	0.987	
	(1.019)	(1.034)	(1.021)	
Merit Aid X Strong	0.989	1.002	1.008	1.001
	(1.029)	(1.042)	(1.032)	(1.026)
Constant	0.0398***	0.0412***	0.0349***	0.0287***
	(1.069)	(1.072)	(1.110)	(1.186)
Observations	9,584	8,327	2,940	1,831
R-squared	0.183	0.182	0.185	0.206
Number of Institutions	463	404	139	86
Year FE	YES	YES	YES	YES
Institution FE	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 45 shows the results of the test I implemented to look for Granger Causality. No lagged coefficient in any of the models indicated that institutions in states about to adopt merit

aid are statistically significantly different from institutions in states that never adopted merit aid programs.

Table 45

The Effect of a Merit Aid Program Adoption on Full-Time Non-Tenure-Track Faculty Employment Including Lagged Coefficients to Test for Granger Causality

VARIABLES	(1) Base FT TT Faculty	(2) PT Removal FT TT Faculty	(3) Staggered FT TT Faculty
Merit Aid	0.999	0.999	0.992
	(1.019)	(1.019)	(1.031)
Year Lag 1	1.016	1.016	1.007
	(1.018)	(1.018)	(1.024)
Year Lag 2	0.995	0.995	0.994
	(1.020)	(1.020)	(1.023)
Year Lag 3	1.018	1.018	1.011
	(1.017)	(1.017)	(1.020)
Year Lag 4	0.975	0.975	0.978
	(1.037)	(1.037)	(1.037)
Constant	0.0395***	0.0395***	0.0351***
	(1.066)	(1.066)	(1.100)
Observations	9,584	9,584	2,940
R-squared	0.183	0.183	0.185
Number of Institutions	463	463	139
Year FE	YES	YES	YES
Institution FE	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

CHAPTER 5 – CONCLUSION

This final chapter includes four sections. The first section contains an overview of this study including the statement of purpose for this study, research questions, and the data and methods for analysis in this study. The second section contains an interpretation of the findings in light of the research questions and predictions formed around those research questions. The third section contains a discussion of the implications of this study for higher education scholars. The fourth section contains a discussion of the limitations of this study and the implications for future research. The final section contains conclusions as a result of this study.

Overview of This Study

The motivation for this study stemmed from wanting to know whether changes in revenue source would be associated with changes administrative behaviors at higher education institutions. Higher education is complex in that there are many different revenue sources and many different competing areas in which to spend that money (Cohn et al., 1989). For four-year U.S. public institutions, the key revenue sources have been state appropriations (i.e. revenue appropriated to institutions from a state government) and tuition and fees (i.e. revenue from students). In the years following a merit aid program being adopted in a state, the state government paid the some or all of the cost of attendance on behalf of some students. As a result of this change, did institutions view themselves as more dependent on the state as the originating source of the funds or more dependent on the students as the directors of the funds, as the students could choose which institution to attend within a state? As more academically inclined students have a stronger motivation to stay in-state for their higher education (i.e. a merit aid scholarship), would institutions alter their behaviors to appease those students?

The purpose of this study was to analyze whether institutions alter their behavior as their revenue streams change. To understand one facet of this potential change, I measured changes in two institutional behaviors, institutional expenditures[13] and contingent faculty employment, after the state in which an institution is located adopts merit aid program. I created the following research questions to answer for this study.

Research Question 1. How do institutions alter their expenditures after the state in which they reside adopts a merit aid program?

Research Question 2. How do institutions alter their contingent faculty employment[14] after the state in which they reside adopts a merit aid program?

I drew upon multiple theories to explain why merit aid program adoption ought to be related to expenditures and contingent faculty employment. First, resource dependency theory predicted that as resource provider changes, institutions should alter their behavior to appease that resource provider (Pfeffer & Salancik, 1978). Second, Bowen's (20180) revenue theory of cost provided a lens to predict expenditure changes. Institutions ought to behave in a way to enroll as many merit aid earners as possible. Third, internal labor market theory provided a lens to predict contingent faculty employment changes. Institutions ought to employ more contingent faculty to deal with students and not states directing additional funds.

Methodologically, this study utilized the quasi-experimental design of difference-in-difference modeling to analyze the relative difference in institutional behaviors between institutions in states that adopted a merit aid program and institutions in states that did not adopt a merit aid program. Examining as many institutions as possible in merit aid adopting states

[13] Throughout this chapter, expenditures are in terms of FTE student.

[14] Throughout this chapter, employment should be thought of as employees per FTE student.

allows for more generalizability about resource dependence compared to studies that examine just one or two states.

The majority of the data came from the Delta Cost Project, which collected, cleaned, and prepared Integrated Postsecondary Education Data System (IPEDS) data (Desrochers et al., 2015). Additional data from IPEDS and the U.S. Bureau of Economic Analysis were merged onto the Delta Cost Project data. The data spanned from 1987-2013. In this study, the first merit aid program was adopted by Missouri in 1987, and the last merit aid program was adopted by West Virginia in 2002.

Ten total dependent variables were used in this study. Seven of them related to various functional expenditure areas of institutional expenditures. These functional expenditure areas were the amount spent by institution by year on: instruction; research; student services; public service; academic support; institutional support; and unrestricted scholarships. The remaining three dependent variables related to faculty employment. Those were the count by institution by year of part-time faculty, full-time non-tenure-track faculty, and full-time tenure-track faculty. To control for the relative size of institutions, each of these amounts were per full-time-equivalent student for that year at that institution. The key independent variable for this study was merit aid adoption. As with traditional difference-in-difference modeling, the variable is dichotomous. It has the value of zero when the institution is not in a year and state that has merit aid, and it has the value of one when institution is in a state that has adopted merit aid. Institution and year fixed effects and additional control variables concerning other institutional revenue sources and state economic factors were added to help with the precision of the estimations.

Several alternative models were used in the analysis. First, I used a base model that treated all non-merit aid adopting states as a suitable control group. Second, I used a model that removed institutions from the model if the state's average institutional behavior concerning the dependent variable did not pass a visual examination of difference-in-difference's parallel trends assumption. Third, I used a model that took advantage of the staggered nature of merit aid policy adoption by states and allowed the states about to adopt a merit aid program to serve as the control group for those that did.

I also created several robustness tests. With the first test, I examined the first-five year shock of merit aid adoption by including a variable that allows the first five years and the subsequent years post adoption to be different from one another. In the second test, I included a variable that allowed strong merit aid program to be different from weak merit aid programs. For this second robustness test, a fourth model was used to allow the states about to adopt a strong merit aid program to serve as the control group for those that did adopt a strong merit aid program. Lastly, I created a final robustness check that examined whether merit aid adoption was not a shock, but something that institutions prepared for by changing their behaviors before the policy was adopted in their state.

Discussion of Research Findings

The goal of this research is to discover whether institutions alter their behaviors as their revenue streams change. To answer one piece of that question, I utilized merit aid program adoption as it serves as a test case to answer that question. Changes in the percentage of revenue from tuition and fees and the percentage of revenue from state appropriations was very similar for all institutions. The key difference was that a state government began to pay for some or all of the tuition and fees for a subset of students after merit aid adoption. I identified behaviors that

I expected merit aid adoption to effect: functional expenditures and faculty employment. If there were relative differences in these behaviors between institutions in merit aid adopting states and institutions in states that did not adopt a merit aid program, institutions were estimated to have altered their behaviors.

Research Question One

The first research question of this study is: how do institutions alter their expenditures after the state in which they reside adopts a merit aid program? First, the overall analytical results showed that institutions did alter some expenditure behaviors and did not alter others after the state that they reside in adopts a merit aid program. Relative to institutions in states without a merit aid program, institutions in states with a merit aid program spent statistically significantly more on instruction, institutional support, and scholarships. Additionally, institutions in merit aid adopting states also spent more on research and academic support, though it was not statistically significantly more. Institutions in merit aid adopting states had lower expenditures on student services and public services relative to institutions in states that did not adopt a merit aid program, though it was not statistically significantly more.

For merit aid adoption to serve as a good test case for research dependency theory, merit aid should act as an exogenous shock to the system (Hillman et al., 2014; Lowry, 2001). That is, institutional behaviors should not have influenced whether a state would adopt a merit aid program. Drawing on this idea, it could be the case that additional state influences could affect institutional behaviors after merit aid was adopted in a state. Thus, it was necessary to examine the shorter time span immediately after merit aid adoption. An initial five year span was utilized to examine a more immediate shock of merit aid. The tradeoff was that with fewer years, there were fewer observations, which lessened the statistical power of the analysis. In the first five

years after merit aid adoption, the only statistically significant result was that expenditures on scholarships were higher at institutions in states that adopted merit aid relative to institutions in states that did not adopt merit aid. For results that were statistically insignificant, these show that in the first five years after merit aid adoption, institutions in merit aid adopting states spent more on instruction, research, academic support, and institutional support, and they spend less on student services and public services.

Second, the ultimate aim of this research was to discover whether institutions would act more resource dependent on the state, the source of the revenue, or the students, the directors of the revenue. By assuming institutions ought to follow expected behaviors as determined by Bowen's (1980) revenue theory of cost and supporting literature on institutional behavior changes, I would be able to confirm or deny whether or not institutions act more resource dependent on students if the institutions follow that behavior.

Utilizing resource dependency theory (Pfeffer & Salancik, 1978) in tandem with Bowen's (1980) revenue theory of costs, I predicted that institutions in states with a merit aid program would have higher expenditures in instruction, academic support, institutional support, and scholarships than institutions in states without merit aid. In the remaining three categories of research, student services, and public services, I predicted that there would be no change or decreased spending in institutions in states with a merit aid program relative to institutions in states without merit aid. The findings match the predictions fairly well. In the first five years after merit aid adoption, I found higher spending on instruction, research, academic support, institutional support, and scholarships. I expected those results for all expenditure categories except research. In the first five years after merit aid adoption, I found lower spending on student services and public services. As these results confirm nearly all of my predictions,

overall, the findings related to research question one indicate that after a state adopts a merit aid program, institutions in that state behave more resource dependent on students.

Findings for Increased Expenditures. The analyses indicate that institutions in merit aid states, relative to institutions in non-merit aid states, had higher average expenditures on instruction, academic support, institutional support, and scholarships. These results matched what I predicted should have been higher if institutions became more resource dependent on students. However, with the exception of scholarship expenditures, results that were both positive and statistically significant were fairly close to 1. The largest non-scholarship result was that institutions in merit aid adopting states spent about 8% more on institutional support than institutions in states without merit aid. To put that in perspective, for every $1000 spent on institutional support at an institution in a state that did not adopt merit aid, about $1080 on average was spent on institutional support at an institution whose state did adopt merit aid.

These findings reinforce the research of Fowles (2014) and Leslie et al. (2011). As institutions become more reliant on students and their tuition for support, they will alter their spending on areas that entice students to enroll or help with student persistence. Fowles's (2014) analysis found that as institutions become more resource dependent on students the more they spent on education and education related expenses. Leslie et al. found that, at public research I institutions, increases in tuition were associated with large increases instruction, institutional support, and scholarships. That is for every dollar an institution receives from tuition, institutions spend at least $0.10 of that in each of those areas. Increases in tuition were related to all other functional expenditure areas at less than a $0.10 association, and public services had a negative association. The findings from this study also found as institutions become more resource dependent on students, institutions will spend the most on instruction,

institutional support, and scholarships. Additionally, also in line with Leslie et al., I found that institutions will spend less on public services after their state adopts a merit aid program.

Heterogeneity discussion. When examining the heterogeneity of merit aid programs, via the weak/strong dichotomy suggested by Sjoquit & Winters (2012), the findings did not confirm what I predicted. I expected that weak merit aid programs would have some effect on institutional behavior concerning each expenditure category, while strong merit aid programs would have a stronger effect but in the same direction. That was not always the case. In both the expenditure areas of student services and scholarships, weak and strong merit aid programs had different effects.

The analyses show that the adoption of a strong merit aid program is associated with higher expenditures on student services by about 2% more. Unfortunately, what students services expenditures were spent on cannot be disaggregated from the data. If the additional student services expenditures were spent on consumption goods to entice more enrollments (Jacob et al., 2018), then this result would support Bowen's (1980) theory. If the student services expenditures were spent in a way to help students succeed academically (Webber & Ehrenberg, 2010), then this result would go against Bowen's theory.

In general, scholarships were found to be much higher on average, at institutions in states that adopted merit aid. However, that result was influenced strongly by institutions in states with strong merit aid programs. Institutions in states with weak merit aid programs were not statistically different from institutions in states with no merit aid program, and while not statistically significant, the analysis showed lower spending on scholarships at institutions in states with weak merit aid programs relative to institutions in states with no merit aid program. Institutions in states with strong merit aid programs spent on average 36% more on scholarships

than institutions in states without merit aid. To put that in perspective, for every $1000 spent on scholarships at an institution in a state that did not adopt merit aid, about $1360 on average was spent on institutional support at an institution whose state did adopt merit aid.

Findings for No Change of or Decreased Expenditures. The results from the analyses also indicate what institutions spent less money on or did not change their behavior on in light of merit aid adoption in their state. Concerning expenditures on research and public services, there was no statistically significant difference between institutions in states that did and did not adopt merit aid during the time frame of this study. The lack of statistically significant difference in research expenditures and public services expenditures further highlights that institutions are not simply spending more in all areas, because they have more revenue coming in from merit aid earners. Rather, they strategically prioritize the expenditure areas that appease the students who control more of the resources. While there was no statistically significant change regarding academic support, which theory predicted there should have been, the statistically insignificant results indicate higher expenditures on academic support for institutions in merit aid adopting states relative to institutions in states that did not adopt merit aid.

Heterogeneity discussion. When disaggregating weak and strong merit aid programs, both expenditures on student services and on scholarships had a different directional relationship by program type. Concerning student services expenditures, institutions in states with weak merit aid programs spent about 7% less on student services compared to institutions in states with no merit aid programs. This result was what theory predicted we should get concerning student services expenditures. Concerning scholarship expenditures, there was no statistically significant difference between institutions in states with weak merit aid programs or no merit program. The statistically insignificant result showed a negative association between merit aid

adoption and scholarships. This result went against what theory predicted. It could be the case that institutions treat weak merit aid program scholarships as their own scholarships when enticing students to their institution. If that were the case, then institutions could reduce their internal scholarships, thus the negative result. However, the lack of breadth of a weak program would mean that they would not reduce their total scholarship expenditures a statistically significant amount.

Research Question Two

The second research question of this study is how do institutions alter their contingent faculty employment after the state in which they reside adopts a merit aid program? First, the analysis did indicate that institutions in merit aid adopting states altered their contingent faculty employment after merit aid adoption. However, the analysis found mixed results concerning contingent employment. On one hand, the results concerning part-time faculty coincided with what theory predicted. That is, institutions in states that adopted merit aid had higher employment of part-time faculty than institutions in states without merit aid. Indeed, the results indicate that institutions in merit aid adopting states employ 30% more part-time faculty. On the other hand, the results concerning full-time non-tenure-track (FT NTT) faculty indicate there is no statistically significant difference between institutions in states that did and did not adopt a merit aid program. Additionally, the statistically insignificant relationship between merit aid adoption and FT NTT faculty employment was negative[15].

Second, I predicted what the analysis of each faculty type should show if institutions become resource dependent on students in light of internal labor market theory (Doeringer &

[15] There were no statistically significant results in the models that addressed the heterogeneity of merit aid programs. This is likely due to decreased sample sizes for these analyses.

Piore, 1971). If institutions responded to students controlling revenues, institutions in merit aid adopting states ought to employ more contingent faculty and either decrease or have no change to their core faculty employment. The findings from the analysis indicate that the prediction was correct for part-time faculty but incorrect for FT NTT faculty. That is institutions do employ more of the contingent faculty type of part-time faculty after their state adopts merit aid, but they do not employ more of the contingent, FT NTT faculty. Indeed, institutions in states that adopted merit aid employed fewer FT NTT faculty in the first five years after merit aid adoption.

As a final robustness check concerning faculty employment, an analysis concerning the association between merit aid adoption and full-time tenured, tenure-track (FT TT) faculty employment was included. The results indicated that there was no statistically significant difference between institutions in states that did and did not adopt merit aid concerning their employment of FT TT faculty. This results for both FT NTT faculty and FT TT faculty were very similar. It could be that although FT NTT faculty are contingent faculty relative to FT TT faculty, relative to part-time faculty, FT NTT faculty are core faculty and should be counted as such instead. If that were the case, then the prediction for what to expect as institutions become more resource dependent on students was correct. This serves as further evidence that when students direct funds provided by the state, institutions considered themselves resource dependent on the student more than the state.

These findings coincide with the literature on the causes of the changing nature of faculty employment. Cheslock and Callie (2015) discuss that faculty employment is very slow to change. This study found that even for the contingently employed part-time faculty who ought to be able to be hired quickly to respond to sudden shifts in an institution's environment (Capelli & Neumark, 2004; Osterman, 1987), it was not until the period after the first five years of merit

aid adoption that institutions in merit aid adopting states had a statistically significantly different employment of part-time faculty.

Additionally, the findings coincide with internal labor market's (ILM) theory that institutions will employ more part-time faculty as greater uncertainties in resource exist for an institutions (Liu & Zhang, 2007; Priem et al., 1995). What the adoption of a merit aid program means for student enrollments and other funding sources at an institution would largely be an unknown for the years immediately preceding program adoption. It could be the case that students do not respond to the program and do not alter behavior. Though, it could be the case that all students who earn the scholarship all want spots at one specific institution that was previously unaffordable for some. Institutions would not know until after program adoption what the new normal ought to be. To handle that uncertainty, I predicted based on ILM theory, institutions in states that adopted merit aid would employ more part-time faculty relative to institutions in states without merit aid. My prediction was confirmed by my analysis.

ILM theory would also suggest that as institutions become more reliant on students as a key revenue source, they would employ more contingent faculty. I argued that merit aid adoption did increase institutional dependency on students for revenue, so the results should have indicated higher employment of contingent faculty at institutions in states that adopted merit aid relative to institutions in states that did not adopt merit aid. The results from the part-time faculty analysis confirm this prediction, while the results from the FT NTT faculty do not confirm this prediction. However, as I discussed earlier, FT NTT faculty could also be considered core faculty.

The findings though might be a break from Gappa and Leslie's (1993) findings on contingent faculty. They found that institutions will begin to employ part-time faculty in

expectation of an upcoming shift in the environment, especially as the situation becomes dire. The tests performed in this study to examine Granger Causality do not indicate that institutions altered their faculty employment in expectation of a merit aid program adoption in their state.

Limitations of This Study

Although I made attempts to create as robust of models as I was able, data availability concerning full-time faculty employment was an issue in this study. Institutions in the 1990s, the years when most merit aid programs were adopted, did not have to report their counts of faculty types by tenure status, however, some did. This led to data fluctuations from year to year in that time frame. The fluctuations appeared to be systematic though. Being an institution in a merit aid adopting state or non-adopting state did not seem to be confounded with institutional reporting concerning counts of FT NTT and FT TT faculty though. Additionally, the sample size for the variables concerning full-time faculty was much smaller than all other analyses due to allowing institutions to choose whether or not to report in certain years. Indeed, 1996 and 2001 were dropped from the analysis altogether because of limited data.

An additional limitation stemmed from the difference-in-difference design. The difference-in-difference design would require perfectly identical slopes for the treated and untreated groups in order to achieve an unbiased estimate from the regression results. As such, researchers must identify the best counterfactual group that has the closest possible parallel trends to the treated groups to provide the least biased estimates. To facilitate identifying the best possible counterfactual, I examined the pretreatment trends for each dependent variable using average institutional behavior in each state that adopted a merit aid program vs. all other states. If the treated state did not have a trend parallel to the untreated states, I removed the entire state from analysis. However, this dissertation focused on institution-level behavioral

changes, not state-level behavioral changes. As such, when I eliminated one state for not passing a visual examination of the parallel trends assumption, I could have been eliminating institutions that would have passed that visual examination if it was simply a small number of institutions that skewed the average. This would affect the findings by reducing the number of institutions in the treated group. This reduction would have led to less statistical significance for the coefficients as there were fewer observations available to determine if group differences were by chance or not.

I wanted to understand what would happen if institutions were suddenly more resource dependent on students, and I used merit aid adoption as a test case. While merit aid adoption served as an exogenous shock to the traditional higher education state funding system, it does not allow for us to know what would happen if institutions were more resource dependent on students in general. It allows us to know what happened when institutions became more resource dependent on merit aid earners, and merit aid earners are not representative of all students.

Implications for Studies on Resource Dependency Theory and Policy

Contribution to Studies on Resource Dependency Theory

Resource dependency theory serves as a lens to highlight how organizations interact with their environments (Powell & Rey, 2015). More specifically though, resource dependency theory acts as a way to understand why institutions vary their behaviors in response to changes in behavior of their resource providers (Pfeffer & Salancik, 1978). In the context of higher education, resource dependency theory is especially apt as there are many resource providers each with their own expectations of how an institution should serve them (Bowen, 1980). Institutions will act in ways to appease their resource providers in order to ensure the resource providers continue providing. Additionally, the funds from those resource providers might seem

more or less stable relative to the source. Students, as roving customers, can direct their funds to any institution or no institution at all. Therefore, institutions may see revenue from students as far less stable than the revenue source of state appropriations (Liu & Zhang, 2007). While state appropriations may still be distributed at the whims of politicians, institutions in a state still can operate with the assumption that their state legislatures will not appropriate funds to other states. Thus, institutions relying more heavily on revenue directed by students, as opposed to more stable sources, will opt to employ more contingent faculty (Priem et al., 1995).

This study highlights the question of what do institutions do when states pay for all or some of a targeted group's tuition while placing administrative rules on those students concerning what institutions the students may attend. Research showed that additional, academically inclined students (i.e. the recipients of merit aid awards) were more likely to attend an in-state institution as a result of merit aid adoption in a state (Zhang & Ness, 2010), students who were already attending an in-state school might choose a more elite school (Dynarski, 2004; Cornwell et al., 2006), and students who were likely not going to attend college at all chose two-year colleges more often (Dynarski, 2004). That begs the question: would institutions view the tuition as provided by students thus being more resource dependent on them or as an additional source of funds from the state being more resource dependent on the state? If all things were equal and revenue source did not matter, then the analyses in this study should have found no statistically significant differences between institutions in states that did and did not adopt merit aid. However, the findings from this study indicate that institutions do view themselves as more resource dependent on students as a result of merit aid adoption.

Scholars using resource dependency theory as a lens to understand changes in institutions behavior can utilize the information from this study to test other organizational behaviors in light

of revenue stream changes. This study further provides evidence that it is the directors of funds and not the source of the funds that organizations view themselves as resource dependent. In the higher education scholarship, research showed that as institutions became more resource dependent on tuition revenue, institutions put more effort into helping their students graduate (Titus, 2006) and spent more of their money on instruction (Leslie et al., 2011) and education and related expenses (Fowles, 2014). Thus, this study adds to this literature confirming that as students direct more of the funds going to an institution, institutions will react in a way to benefit students.

Policy Implications

This study provides two key policy implications. First, while this study was not intended to analyze changes in institutions after merit aid adoption, some findings highlight that institutions change their behaviors after merit aid adoption. Merit aid adoption highlights that institutions will likely alter their behaviors in response to states gaining, losing, or otherwise significantly altering their merit aid programs. When states merit aid programs for students to attend college, market-like (Dill, 1997; Slaughter & Leslie, 1997; Slaughter & Rhoades, 2004) behaviors take place with institutions viewing students more as customers due to students, not states, directing the funds. Even though institutions seem to direct funds to enhance the student experience, such as focusing on increasing instructional spending and student services, both found to enhance positive outcomes towards student persistence (Webber & Ehrenberg, 2010), there could also be negatives associated with merit aid adoption such as over-employing part-time faculty or increasing expenditures on the consumption function of higher education to draw in more students (Jacob et al., 2018).

Second, this study's findings on changes in resource dependency have implications concerning different systems for funding higher education. While traditionally students pay a portion of total revenue through tuition and fees and states pay a portion of total revenue through appropriated funds, merit aid adoption highlighted that when states also pay a portion of total revenue through tuition and fees for a targeted group of students, institutions will treat that revenue as coming from the students. State legislatures would then want to consider how much control over institutions they would be willing to give up if they create any new programs that give students additional control to direct funds. However, it seems as though many state legislatures had been attempting to gain additional control over institutions as institutions become more tuition reliant (Nisar, 2014). Some states adopted performance based funding, in which institutions must meet certain goals agreed upon between the institution and the state to receive some percentage of additional state appropriations (Nisar, 2014; Tandberg & Hillman, 2014). State legislatures, when thinking through the best way to finance their higher education systems, might want to ensure policies are in place to ensure healthy competition among institutions if they begin funding students directly more than institutions directly.

Implications for Future Research

I decided to measure expenditures and faculty employment per FTE student. However, in future research, it may be better to measure these constructs as proportions. By measuring the variables as proportions, the research could answer questions about institutional priorities as dependencies change. As merit aid adoption is associated with an increase of students who stayed in-state and would have otherwise went out of state, it could be the case that institutions simply put the additional funds towards expenditure areas, but those were not necessarily at the

cost of other functional areas. By measuring these constructs as proportions, whether increases in one expenditure area is associated with decreases in another can be investigated.

Additionally, institutions might not be moving to a more part-time workforce as a result of the resource dependence change, but rather simply handling the influx of new students with part-time employment. An analysis of how institutions alter their ILM after a sudden influx of students would lend support to this study's findings on contingent faculty employment.

Lastly, additional case studies on program heterogeneity would be beneficial to understanding resource dependence changes in light of merit aid adoption. Delving further into specific institutional nuances could support the more generalized findings of this dissertation. For example, some merit aid programs take into account family income while others do not. Cross comparing the institutional support for students who have different financial needs after merit aid adoption at institutions in states whose merit aid programs do and do not take into account family income. Additionally, unpacking the results from the findings on student services expenditures would be helpful in determining whether there was a within state amenities arms race to enroll the students who would have went out of state, to private institutions, or to two-year institutions if merit aid did not exist. Examining this at a state level could provide greater insight into the finding from this study.

Conclusion

The purpose of this study was to analyze whether institutions alter their behavior as their revenue streams change. The purpose of this study was not to study the effects of merit aid program adoption. Rather, merit aid program adoption was utilized to understand what happened when states suddenly appropriated funds to students to attend institutions instead of those funds going to institutions directly. This study achieved its purpose in analyzing merit aid

programs as a test case to understand if institutional behaviors change as revenue streams change. Indeed, institutions do alter their behaviors after the adoption of a merit aid program in their state. While the results in general are not robust enough to utilize the findings to make calculated predictions about how much institutions in another state will change should that state suddenly adopt a large scale, the results are robust enough to expect that institutions will respond as though the funds from tuition are coming from the students and not the state.

REFERENCES

Abadie, A., Athey, S. Imbens, G.W., & Wooldridge, J. (2017). When should you adjust standard errors for clustering? NBER Working Paper No. 24003.

Amacher, R.C. & Meiners, R. E. (2004). *Faulty Towers: Tenure and the Structure of Higher Education.* The Independent Institute. Oakland, CA.

Angrist, J.D. & Pischke, J. (2009). *Mostly harmless econometrics: An empiricist's companion*. Princeton University Press: Princeton, New Jersey.

American Institutes for Research. (2012). The Delta Project at American Institutes for Research. Retrieved May 7, 2013, from http://www.deltacostproject.org/

Archibald, R. B., & Feldman, D. H. (2011). *Why does college cost so much?* Oxford, UK: Oxford University Press.

Arkes, J. (2010). Using unemployment rates as instruments to estimate returns to schooling. Southern Economic Journal, 76(3), 711-722.

Ashenfelter, O. (1978). Estimating the effect of training programs on earnings. *The Review of Economics and Statistics 60*(1), 47-57.

Ashenfelter, O., & Krueger, A. (1994). Estimates of the Economic Return to Schooling from a New Sample of Twins. *The American Economic Review, 84*(5), 1157-1173.

Association of Centers for the Study of Congress (n.d.). *Higher education act*. Retrieved from http://acsc.lib.udel.edu/exhibits/show/legislation/higher-education-act

Autor, D. (2003). Outsourcing at will: The contribution of unjust dismissal doctrine to the growth of employment outsourcing. *Journal of Labor Economics, 21,* 41-42.

Baldwin, R., & Chronister, J. (2001). *Teaching without tenure: Policies and practices for a new era*. Baltimore, MD: Johns Hopkins University Press.

Baumol, W. J. (1993). Health care, education, and the cost disease: A looming crisis for public choice. *Public Choice, 77*, 17–28.

Bertrand, M., Duflo, E., & Mullainathan, S. (2004). How much should we trust differences-in-differences estimates? *The Quarterly Journal of Economics 119*(1), 249-275.

Bettinger, E. & Long, B. (2010). Does cheaper mean better? The impact of using adjunct instructors on student outcomes. *Review of Economics and Statistics, 92*(3), 598-613. http://dx.doi.org/10.1162/REST_a_00014

Binder, M., Ganderton, P. T., & Hutchens, K. (2002). Incentive effects of New Mexico's merit-based state scholarship program: Who responds and how? In D.E. Heller & P. Marin (Eds.). *Who Should We Help? The negative social consequences of merit scholarships*. The Civil Rights Project, Harvard University.

Bok, D. (2003*). Universities in the marketplace: The commercialization of higher education.* Princeton, NJ: Princeton University Press.

Bowen, H. R. (1980). *The cost of higher education*. San Francisco: Jossey-Bass.

Brewer, D. J., Gates, S. M., & Goldman, C. A. (2002*). In pursuit of prestige: Strategy and competition in U.S. higher education.* New Brunswick, NJ: Transaction Publishers.

Brown, J.R., Dimmock, S.G., Kang, J., & Weisbenner. S.J. **(**2014). How university endowments respond to financial market shocks: Evidence and implications. *American Economic Review 104*(3), 931-962.

Bugler, D.T., Henry, G.T., & Rubenstein, R. (1999). *An evaluation of Georgia's HOPE scholarship program: Effects of HOPE on grade inflation, academic performance and college enrollment.* Atlanta, GA: Council for School Performance/Georgia State University.

Capelli, P., & Neumark, D. (2004). External churning and internal flexibility: Evidence on the functional flexibility and core-periphery hypotheses. *Industrial Relations 43*(1), 148-182.

Carbone, J., & Winston, G. C. (2004). Saving, wealth, performance, and revenues in U.S. colleges and universities. *Review of Higher Education, 28*(1), 97–128.

Cheema, J.R. (2014). Some general guidelines for choosing missing data handling methods in educational research. *Journal of Modern Applied Statistical Methods, 13*(2), 52-75.

Chen, R. & St. John, E.P. (2011). State financial policies and college student persistence: A national study. *The Journal of Higher Education, Vol. 82*(5), 629-660.

Cheslock, J. (2006). Applying Economics to Institutional Research on Higher Education Revenues. In M. Paulsen & R. Toutkoushian (Eds.), *What Institutional Research is Learning from the Field of Economics* (pp. 25-41). New Directions for Institutional Research Number 132. San Francisco, CA: Jossey-Bass.

Cheslock, J. & Callie, T. (2011). *How Do Public Higher Education Institutions Adjust Their Salary Structure and Faculty Composition in Response to Financial Challenges?*. Unpublished manuscript, Center for the Study of Higher Education, The Pennsylvania State University, University Park, PA. Retrieved from http://www.ed.psu.edu/educ/cshe/working-papers/WP-11.

Cheslock, J. J., & Gianneschi, M. (2008). Replacing state appropriations with alternative revenue sources: The case of voluntary support. *Journal of Higher Education, 79*(2), 208-229. http://dx.doi.org/10.1353/jhe.2008.0012

Charfauros, K. H., & Tierney, W. G. (1999). Part-Time Faculty in Colleges and Universities: Trends and Challenges in a Turbulent Environment. *Journal of Personnel Evaluation in Education, 13*(2), 141-151.

Clotfelter, C.T. (1996) *Buying the Best: Cost Escalation in Elite Higher Education*. Princeton: Princeton University Press.

Conley, V. M. & Leslie, D. W. (2002). Part-time instructional faculty and staff: Who they are, what they do, and what they think. *Education Statistics Quarterly, 4*(2), 97-103.

Conley, T. G. & Taber. C. R. (2011). Inference with 'difference in differences' with a small number of policy changes. *Review of Economics and Statistics 93*(1), 113-25.

Cornwell, C., Lee, K. H., & Mustard, D. B. (2005). Student responses to merit scholarship retention rules. *Journal of Human Resources, 40*(4), 895-917.

Cornwell, C., Mustard, D. B., & Sridhar, D. J. (2006). The enrollment effects of merit-based financial aid: Evidence from Georgia's HOPE program. *Journal of Labor Economics 24*(4):761-86.

Curs, B. R., Singell, L. D., Jr., & Waddell, G. R. (2007). Money for nothing? The impact of changes in the Pell Grant program on institutional revenues and the placement of needy students. *Education Finance and Policy, 2*, 228-261.

Curs, B. R. & Dar, L. (2010a). *Does state financial aid affect institutional aid? An analysis of the role of state policy on postsecondary institutional pricing strategies*. Paper presentation at the American Educational Finance Association Conference, Richmond, VA.

Curs, B. R. & Dar, L. (2010b). *Does state financial aid affect institutional aid? An analysis of the role of state policy on postsecondary institutional pricing strategies*. Paper presentation at the Western Economics Association International Conference, Portland, OR.

Curtis, J.W. (2014). *The employment status of instructional staff members in higher education, Fall 2011*. Washington, DC: American Assocation of University Professors. Retrieved from https://www.aaup.org/sites/default/files/files/AAUP-InstrStaff2011-April2014.pdf

Curtis, J.W. & Jacobe, M.F. (2006). *AAUP Contingent Faculty Index 2006.* Washington, DC: American Assocation of University Professors. Retrieved from https://www.aaup.org/aaup-contingent-faculty-index-2006

Delaney, J. A. (2007). *The academic consequences of state merit aid: The case of Kentucky* (Doctoral Dissertation). Stanford University, Stanford.

Derochers, D.M. & Hurlburt, S. (2016). *Trends in college spending: 2003-2013: Where does the money come from? Where does it go? What does it buy?* Washington, DC: Delta Cost Project. Retrieved from http://www.deltacostproject.org/sites/default/files/products/15-4626%20Final01%20Delta%20Cost%20Project%20College%20Spending%2011131.406.P0.02.001%20.pdf

Derochers, D.M., Hurlburt, S., & Sun, J. (2015). Delta Cost Project Database 1987-2013 data file documentation. Retrieved April 10, 2017 from http://www.deltacostproject.org/sites/default/files/database/DCP%20Database%20Documentation%201987-2013.pdf

Desrochers, D.M. & Kirshtein, R. (2014). *Labor intensive or labor expensive? Changing staffing and compensation patterns in higher education*. Washington, DC: Delta Cost Project. Retrieved from http://www.deltacostproject.org/sites/default/files/products/DeltaCostAIR_Staffing_Brief_2_3_14.pdf

Desroches, D.M. & Wellman, J.V. (2011). *Trends in college spending: 1999-2009 Where does the money come from? Where does it go? What does it buy?* Washington D.C.: The Lumina Foundation for Education.

Dill, D. D. (1997). Higher education markets and public policy. *Higher Education Policy, 10*(3/4), 167-85.

Doeringer, P. B. & Piore, M. J. (1971). *Internal labor markets and manpower analysis.* Lexington, MA: D. C. Heath and Company.

Doyle, W. R. (2006). Adoption of merit-based student grant programs: An event history analysis. *Educational Evaluation and Policy Analysis 28*(3), 259-285.

Doyle, W. R. (2010). Does Merit-Based Aid "Crowd Out" Need-Based Aid? *Research in Higher Education*, *51*(5), 397–415.

Dur, R. & Glazer, A. (2008). Subsidizing enjoyable education. *Labour Economics, 15*(5), 1023-1039.

Dynarski, S. (2000). "Hope for whom? Financial aid for the middle class and its impact on college attendance. *National Tax Journal Part 2 53*(3), 629-61.

Dynarski, S. (2002). The behavioral and distributional implications of aid for college. *American Economic Review 92*(2), 279–85.

Dynarski, S. (2004). The New Merit Aid. In C Hoxby (Ed.), *College choices: The economics of where to go, when to go, and how to pay for it* (pp. 63-97). Chicago, IL: University of Chicago Press.

Dynarski, S. (2008). Building the Stock of College-Educated Labor. *The Journal of Human Resources 43*(3), 573-610.

Eagan, K. (2007). A national picture of part-time community college faculty: Changing trends in demographics and employment characteristics. *New Directions for Community Colleges, 140*, 5-14. http://dx.doi.org/10.1002/cc.299

Ehrenberg, R. G. (2002). *Tuition rising: Why college costs so much.* Cambridge, MA: Harvard University Press.

Ehrenberg, R. G. & Zhang, L. (2004). *The changing nature of faculty employment*. Unpublished manuscript, School of Industrial and Labor Relations, Cornell University, Ithaca, NY. Retrieved from http://digitalcommons.ilr.cornell.edu/workingpapers/43

Ehrenberg, R. G., & Zhang, L. (2005). Do tenured and tenure-track faculty matter? *Journal of Human Resources, 40*(3), 647-659.

Farrell, P. L. (2004). Who are the students receiving merit scholarships? In D.E. Heller & P Marin (Eds.), *State merit scholarship programs and racial inequality* (pp. 47-76). Cambridge, MA: The Civil Rights Project at Harvard University.

Fethke, G. (2012, April). Why Does Tuition Go Up? Because Taxpayer Support Goes Down. *The Chronicle of Higher Education*. Retrieved from http://chronicle.com/article/Why-Does-Tuition-Go-Up-/131372/

Figlio, D. N., Schapiro, M.O., Soter, K.B. (2015). Are tenure track professors better teachers? *The Review of Economics and Statistics 97*(4), 715-724.

Fitzpatrick, M. D. & Jones, D. (2012) *Higher education, merit-based scholarships and post-baccalaureate migration* (Working Paper No. 18530). Retrieved from http://www.nber.org/papers/w18530.

Fowles, J. (2014). Funding and focus: Resource dependence in public higher education. *Research in Higher Education, 55*(2), 272-287.

Gandara, D., Rippner, J.A., & Ness, E. C. (2017). Exploring the 'how' in policy diffusion: National intermediary organizations' roles in facilitating the spread of performance-based

funding policies in the states. *The Journal of Higher Education, 88*(5), 701-725. doi: 10.1080/00221546.2016.1272089

Gappa, J. M. (1984). *Part-Time faculty: Higher education at a crossroads*. Washington D. C.: Association for the Study of Higher Education.

Gappa, J., and Leslie, D. (1993). *The invisible faculty: Improving the status of part-timers in higher education.* San Francisco: Jossey-Bass.

Getz. M. & Siegfried, J. (1991). Where does the money go? In C.T. Clotfelter, R.G. Ehrenberg, M Getz, & J.J. Siegfried (Eds.) *Economic challenges in higher education* (pp. 261-392). Chicago, University of Chicago Press.

Gillen, A. (2012). *Introducing Bennett Hypothesis 2.0*. Washington, DC: Center for College Affordability and Productivity.

Gillen, Andrew, Why Does Tuition Keep Increasing? (September 20, 2015). Available at SSRN: https://ssrn.com/abstract=2663073 or http://dx.doi.org/10.2139/ssrn.2663073

Goetz, J.W., Mimura, Y., Desai, M., & Cude, B.J. (2008). HOPE or no-HOPE: Merit-based college scholarship status and financial behaviors among college students. *Journal of Financial Counseling and Planning, 19*(1), 2008. Retrieved from https://ssrn.com/abstract=2228195.

Grubb, W. N. (1999). *Honored but invisible: An inside look at teaching in community colleges.* New York: Routledge.

Harrington, J., Munoz, J., Curs, B. R., & Ehlert, M. (2016). Examining the impact of a highly targeted state administered merit aid program on brain drain: Evidence from a regression discontinuity analysis of Missouri's Bright Flight program. *Research in Higher Education, 57*(4), 423-447.

Harter, J.F.R., Wade, J.A., & Watkins, T.G. (2005). An examination of costs at four-year public colleges and universities between 1989 and 1998. *The Review of Higher Education 28*(3), 369-391.

Hawley, Z.B. & Rork, J.C. (2013). The case of state funded higher education scholarship plans and interstate brain drain. *Regional Science and Urban Economics 43,* 242-249. doi:10.1016/j.regsciurbeco.2012.07.003.

Hearn, J.C., Lewis, D.R., Kallsen, L., Holdsworth, J.M., Jones, L.M. (2006). "Incentive for Managed Growth": A case study of incentives-based planning and budgeting in a large public research university. *The Journal of Higher Education 77*(2), 286-316.

Heller, D. E.. (2002). State merit scholarship programs: An introduction. In D.E. Heller & P Marin (Eds.). *Who should we help? The negative social consequences of merit scholarships.* (Pp. 15-22). Cambridge, MA: The Civil Rights Project at Harvard University.

Heller, D. E., & Rasmussen, C. J. (2001, November). *Do merit scholarships promote college access? Evidence from two states*. Paper presented at the Annual Conference of the Association for the Study of Higher Education, Richmond, VA. Retrieved from http://www.personal.psu.edu/faculty/d/e/deh29/papers/papers_index.html

Heller, D. E.. (2004). State merit scholarship programs: An overview. In D.E. Heller & P Marin (Eds.), *State merit scholarship programs and racial inequality* (Pp. 13-22). Cambridge, MA: The Civil Rights Project at Harvard University.

Heller, D. E., & Marin, P. (Eds.). (2004). *State merit scholarship programs and racial inequality*. Cambridge, MA: The Civil Rights Project at Harvard University.

Henry, G. T., Rubenstein, R., & Bugler, D. T. (2004). Is HOPE enough? Impacts of receiving and losing merit-based financial aid. *Educational Policy 18*(5):686-709.

Hickman, D. C. (2009). The effects of higher education policy on the location decision of individuals: Evidence from Florida's bright futures scholarship program. *Regional Science and Urban Economics*, *39*(5), 553–562.

Hillman, N., Tandberg, D., & Gross, J. (2014). Market-based education: Does Colorado's voucher model improve higher education access and efficiency? *Research in Higher Education. 55*(6), 601-625.

Hovey, H. A. 1999. *State spending for higher education in the next decade: The battle to sustain current support*. San Jose, CA: National Center for Public Policy and Higher Education.

Institute for Digital Research and Education (n.d.). *FAQ How do I interpret a regression model when some variables are log transformed?* Retrieved from https://stats.idre.ucla.edu/other/mult-pkg/faq/general/faqhow-do-i-interpret-a-regression-model-when-some-variables-are-log-transformed/

Jacob, B., McCall, B, & Stange, K.M. (2018). College as country club: Do colleges cater to students' preferences for consumption? *Journal of Labor Economics 36*(2), 309-348.

Jaeger, AJ. & Eagan Jr., M.K. (2009). Unintended consequences: Examining the effect of part-time faculty members on associate's degree completions. *Community College Review 36*(3), 167-194.

Jaquette, O. & Parra, E. (2016). The problem with the Delta Cost Project database. *Research in Higher Education 57*, 630-651. DOI 10.1007/s11162-015-9399-2

Kadamus, J. (2016, March 10). *Signs of prosperity or debt? What you need to know about luxury amenities on college campuses.* Retrieved April 10, 2017 from

https://www.noodle.com/articles/college-campus-amenities-financial-burdens-or-boons241.

Kezar, A. & Sam, C. (2013). Institutionalizing equitable policies and practices for contingent faculty. *The Journal of Higher Education 84*(1). 56-87. DOI: 10.1353/jhe.2013.0002.

Kim, E.H., Morse, A., Zingales, L. (2009). Are elite universities losing their competitive edge? *The Journal of Financial Economics 93*, 353-381. DOI: 10.1016/j.jfineco.2008.09.007.

Koshal, R.K., & Koshal, M. (2000). State appropriation and higher education: What is the relationship? *Education Economics, 8*(1), 81-89.

Leslie, D. W., Kellams, S. E., & Gunne, G. M. (1982). *Part-Time Faculty in American Higher Education*. New York: Praeger Publishers.

Leslie, L. L., Slaughter, S., Taylor, B. J., & Zhang, L. (2012). How do revenue variations affect expenditures within U.S. research universities? *Research in Higher Education 53*(6), 614-639.

Liu, X. & Zhang, L. (2007). *What determines employment of part-time faculty in higher education institutions?* Unpublished manuscript, School of Industrial and Labor Relations, Cornell University. Retrieved from http://digitalcommons.ilr.cornell.edu/workingpapers/139/.

Long, B. T. (2004). How do financial aid policies affect colleges? *Journal of Human Resources 39*(4), 1045-1066.

Lowry, R.C. (2001). Governmental Structure, trustee selection, and public university prices and spending: Multiple means to similar ends. *American Journal of Political Science 45*(4), 845-861.

Martin, R.E. (2009). *The revenue-to-cost spiral in higher education*. The John William Pope Center for Higher Education Policy.

McCaarthy, B. (2015, July 18). Prepare to be shocked (and jealous!) at the way college student slive today. *Los Angeles Times*. Retrieved April 10, 2017 from http://www.latimes.com/home/la-hm-college-amenities-20150718-story.html.

Melguizo, T. & Strober, M.H. (2007). Faculty salaries and the maximization of prestige. *Research in Higher Education 48*(6), 633-668. DOI: 10.1007/s11162-006-9045-0.

Morphew, C. C., & Baker, B. D. (2004). The cost of prestige. *The Review of Higher Education, 27*(3), 365–384.

Mortimer, K. P. & Unknown Authors (1985). *Flexibility in academic staffing: Effective Policies and Practices*. ASHE-ERIC Higher Education Report 1, 1985.

Meyer, B.D. (1995). Natural and quasi-experiments in economics. *Journal of Business & Economic Statistics 13*(2), 151-161.

Ness, Erik. (2010). The politics of determining merit aid eligibility criteria: An analysis of the policy process. *Journal of Higher Education, 81*(1), 33–60.

Ness, E. C., & Lips, A. J.A. (2011). Marketing merit aid: The response of flagship campuses to state merit aid programs. *Journal of Student Financial Aid, 41*(1), 3- 17.

Ness, E. & Mistretta, M. (2010). Merit aid in North Carolina: A case study of a "non-event." *Educational Policy, 24*(5), 703–734.

Ness, E. & Noland, B. (2007). Targeted merit aid: Implications of the Tennessee Education Lottery Scholarship Program. *NAFSAA Journal of Student Financial Aid, 37*(1), 7-17.

New Faculty Majority Foundation (n.d.). Issues. Retrieved from April 10, 2017 http://www.nfmfoundation.org/Issues.html.

Newlon, C. (2014 July 31). The college amenities arms race. *Forbes.* Retrieved from https://www.forbes.com/sites/caranewlon/2014/07/31/the-college-amenities-arms-race/#1abd9af94883.

Nisar, M.A. (2014). Higher education governance and performance based funding as an ecology of games. *Higher education 69*, 289-302.

Osterman, P. (1987). Choice of employment systems in internal labor markets. *Industrial Relations, 26,* 30-45.

Perna, L. W. (2000). Differences in college enrollment among African Americans, Hispanics, and Whites. *Journal of Higher Education, 71*, 117–141.

Pfeffer, J. & Salancik, G. R. (1978). *The external control of organizations*. New York: Harper & Row.

Powell, K.K. & Rey, M.P. (2015). Exploring a resource dependency perspective as an organizational strategy for building resource capacity: Implications for public higher education universities. *Management in Education 29*(3), 94-99. DOI: 10.1177/0892020615586805mie.sagepub.com

Quigley, J. M. & Rubinfeld, D. L. (1993). Public Choices in Public Higher Education. In C.T. Clotfelter and M. Rothschild (Eds.). *Studies of Supply and Demand in Higher Education Ed* (Pp. 243-284). Chicago: The University of Chicago Press.

Roemer, R.E. & Schnitz, J.E. (1982). Academic employment as day labor: The dual labor market in higher education. *The Journal of Higher Education 53*(5). 514-531.

Rosenblum, G., & Rosenblum, B. R. (1990). Segmented labor markets in institutions of higher learning. *Sociology of Education, 63*(3), 151-164.

Rudolph, F. (1990). *The American college & university: A history*. Athens, GA: The University of Georgia Press.

Ryan, J. F. (2004). The relationship between institutional expenditures and degree attainment at baccalaureate colleges. *Research in Higher Education, 45*, 97–114.

Sanford, T., Hunter, J. M. (2011) Impact of performance-funding on retention and graduation rates. *Education Policy Analysis Archives, 19* (33). Retrieved April 10, 2017, from http://epaa.asu.edu/ojs/article/view/949

Scott-Clayton, J. (2010). On money and motivation: A quasi-experimental analysis of financial incentives for college achievement. *Journal of Human Resources 46*(3), 614-646.

Shaddish, W.R., Cook, T.D., & Campbell, D.T. (2002). *Experimental and quasi-experimental designs for generalized causal inference*. Belmont, CA: Wadsworth.

Slaughter, S., & Leslie, L. L. (1997). *Academic capitalism: politics, policies and the entrepreneurial university*. Baltimore, MD: John Hopkins University Press.

Singell, L. D., Jr., Waddell, G. R., & Curs, B. R. (2006). Hope for the Pell? The impact of merit-aid on needy students. *Southern Economic Journal 73*, 79-99.

Sjoquist, D.L. & Winters, J.V. (2012). State merit-based financial aid programs and college attainment. *IZA Discussion Paper No. 6801*.

Sjoquist, D. L., & Winters, J. V. (2013). The effects of hope on post-college retention in the Georgia workforce. *Regional Science and Urban Economics, 43*(3), 479–490.

Sjoquist, D.L. & Winters, J.V. (2015a). The effects of state merit aid programs on attendance at elite colleges. *IZA Discussion Paper No. 9371*.

Sjoquist, D. L., & Winters, J. V. (2015b). State merit-based financial aid programs and college attainment. *Journal of Regional Science, 55*(3), 364–390.

Statistics Solutions. (2013). Homoscedasticity. Retrieved from http://www.statisticssolutions.com/homoscedasticity/

St. John, E.P., Musoba, G.D., & Simmons, A.B. (2003). Keeping the promise: The impact of Indiana's Twenty-first Century Scholars Program. *The Review of Higher Education 21*(1), 103-123. *DOI: https://doi.org/10.1353/rhe.2003.0042.*

Tandberg, D. A., & Hillman, N. W. (2014). State higher education performance funding: Data, outcomes, and policy implications. *Journal of Education Finance, 39*(3), 222–243.

Taniguci, H. (2005). The influence of age at degree completion on college wage premiums. *Research in Higher Education 46*(8), 861-881. DOI: 10.1007/s11162-005-6932-8

The Alliance. (2011). Saving noew and saving later: How high school reform can reduce the nation's wasted remediation dollars. Retreived April 10, 2017 from http://all4ed.org/reports-factsheets/saving-now-and-saving-later-how-high-school-reform-can-reduce-the-nations-wasted-remediation-dollars/.

The Delphi Project on the Changing Faculty and Student Success (n.d.). *FAQS*. Retrieved April 10, 2017 from http://www.thechangingfaculty.org/faqs.html.

The Delta Cost Project (2015). *Data dictionary*. Retrieved April 10, 2017 from http://www.deltacostproject.org/sites/default/files/database/Delta_Data_Dictionary_1987_2013.xls

The Trustees of Dartmouth College v. Woodward (17 U.S. 4 1819).

Titus, M.A. (2006). Understanding college degree completion of students with low socioeconomic status: The influence of the institutional financial context. *Research in Higher Education* 47(4), 371-398. DOI: 10.1007/s11162-005-9000-5.

Topal, S. (2013). The Incidence of State Student Aid: Evidence from the Tennessee Education Lottery Scholarships. University of Houston. Retrieved from http://www.uh.edu/~sdtopal/sdtopal_jmp.pdf.

Tuckman, H. P. (1978). Who is part-time in academe? *AAUP Bulletin, 64*(4), 305-315.

Tuckman, H. P. (1981). Part-time faculty: Some suggestions of policy. *Change*, 8-10.

Umbach, P. (2007). How effective are they? Exploring the impact of contingent faculty on undergraduate education. *The Review of Higher Education, 30*(2), 91-123. http://dx.doi.org/10.1353/rhe.2006.0080

Webber, D. A., & Ehrenberg, R. G. (2010). Do expenditures other than instructional expenditures affect graduation and persistence rates in American higher education? *Economics of Education Review, 29*(6), 947-958. doi:16/j.econedurev.2010.04.006.

Winston, G.C. (1999). Subsidies, hieracrchies, and peers: The awkward economics of higher education. *Journal of Economic Perspectives 13*, 13-36.

Winston, G. C. (2004). Differentiation among U.S. colleges and universities. *Review of Industrial Organization, 24*(4), 331–354.

Wooldridge, J. M. (2010). *Econometric analysis of cross section and panel data*. Cambridge, MA: MIT Press.

Zhang, G., Min, Y., Frillman, S., Anderson, T., & Ohland, M. (2006, Oct). Student strategies for protecting merit-based scholarships: Grades, courseload, and major choice. In *Frontiers in education conference, 36th annual* (p. 20-26).

Zhang, L. (2009). Does state funding affect graduation rates at public four-year colleges and universities? *Educational Policy, 23*, 714–731.

Zhang, L. (2011). Does merit-based aid affect degree production in stem fields? Evidence from Georgia and Florida. *The Journal of Higher Education, 82*(4), 389-415.

Zhang, L. & Ehrenberg, R. G. (2010). Faculty employment and R&D expenditures at research universities. *Economics of Education Review, 29*(3), 329-337.

Zhang, L., Hu, S., & Sensenig, V. (2013). The effect of Florida's Bright Futures Program on college enrollment and degree production: An aggregated-level analysis. *Research in Higher Education, 54*(7), 746-764.

Zhang, L. & Liu, X. (2010). Faculty employment at four-year colleges and universities. *Economics of Education Review, 29*, 543-552.

Zhang, L. & Ness, C.E. (2010). Does state merit-based aid stem brain drain? *Educational Evaluation and Policy Analysis 32*(2), 143-165.

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