

THE FINANCIAL BENEFITS AND BURDENS OF PERFORMANCE FUNDING: HOW INCENTIVE
POLICIES RESTRUCTURE STATE SPENDING ON HIGHER EDUCATION

by

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(Under the Direction of Robert K. Toutkoushian)

ABSTRACT

Over the last decade, policymakers have revisited performance funding as a means to address issues of accountability and productivity in American higher education. By tying state appropriations directly to institutional outcomes, performance funding provides financial incentives that are intended to inspire changes in institutional behavior and ultimately lead to improved outcomes.

The underlying theory of action behind performance funding is rooted in resource dependency: financial incentives will lead to changes in institutional behavior that will ultimately improve student outcomes. However, very little of the performance funding literature addresses the actual restructuring of state funds as a result of these incentives (Kelchen & Stedrak, 2016; Rabovsky, 2012). As such, the impact of performance funding policies on state spending and institutional resources merits further attention because (1) restructuring state funding constitutes the underpinnings of performance funding, yet we know very little about these financial incentives, and (2) the primary arguments in favor of and in opposition to performance funding are rooted in potential financial outcomes that remain untested.

Guided by principal-agent theory and the theory of social construction and policy design, this dissertation research examines how performance funding policies restructure state funding for higher education. Using a differences-in-differences research design, I explore changes in state-level spending and institution-level resources associated with performance funding implementation. Furthermore, through an extensive data collection effort, this study distinguishes between nine different types of performance funding policies, and incorporates the amount of funding each state ties to performance outcomes. This effort addresses a notable limitation of the existing performance funding literature. Finally, this dissertation research explores the effect heterogeneity of performance funding across institution types, investigating which institutions benefit from performance funding which are burdened.

Findings of this study suggest that performance funding has little effect on the total state spending on higher education, but notably impacts how state appropriations are distributed to institutions. Indeed, high-resource institutions are more likely to benefit directly from performance funding (i.e., experience an increase in funding) while low-resource institutions are more likely to experience financial burdens (i.e., funding decreases). Moreover, findings also suggest that these results are not accompanied by similar changes in bachelor's degree production. That is, the institutions that are likely to receive increases in funding are no more likely to increase the number of bachelor's degrees conferred following performance funding implementation.

This study, for the most part, provides evidence in support of the claim that performance funding policies create systems of winners and losers. This dissertation research fills three notable gaps in the existing literature: (1) it expands knowledge regarding how

performance funding restructures state funding; (2) it systematically incorporates policy design elements overlooked by the existing scholarship; and (3) it examines how the effects of performance funding vary across institution types.

INDEX WORDS: Higher Education, State Policy, Policy Design, Performance Funding,
Incentives

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DEDICATION

For my husband, Chase: the joy of my life.

And for my mother, Julia, who taught me to write.

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TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	v
LIST OF TABLES	ix
LIST OF FIGURES	xi
CHAPTER	
1 Introduction	1
2 Literature Review and Conceptual Frameworks	7
Performance Funding	7
State Spending on Higher Education	22
Allocation of State Funds to Postsecondary Institutions	28
Impacts of State Appropriations	31
Summary of Literature Review	34
Conceptual Frameworks	34
3 Data and Methodology	53
Dependent Variables	53
Independent Variables	55
Methodology	62
Limitations	69
4 Results	74

Phase One: State-level Results	74
Phase Two: Institution-level Results	87
5 Discussion and Conclusion	138
Principal-agent Explanation	140
Theory of Social Construction and Policy Design	143
Policy Design Hypotheses	146
Findings for Minority Serving Institutions	148
Findings for Rural Institutions	148
Performance Funding Policy Highlights and Implications	149
Policy Recommendations	156
Future Research	158
Conclusion	159
REFERENCES	161
APPENDICIES	
A Performance Funding Policy Design Descriptions by State	180
B Performance Funding Policy Design Summary	204
C Variables, Definitions, and Sources	209
D State-level Supplementary Tables and Robustness Checks	212
E Institution-level Supplementary Tables and Robustness Checks	219

LIST OF TABLES

	Page
Table 3.1: States with Performance Funding Policies for Four-year Institutions, 1994-2014	72
Table 3.2: Performance Funding Policy Designs in the States	72
Table 4.1: State-level Variables Summary Statistics	107
Table 4.2: Estimates of Performance Funding Impact on State-level Spending on Higher Education	108
Table 4.3: Estimates of Performance Funding Impact on Outcome Variable Denominators.....	109
Table 4.4: Estimates of Performance Funding Impact on State-level Spending on Higher Education, by Policy Design Element.....	110
Table 4.5: Estimates of the Impact of Performance Funding Dosage on State-level Spending on Higher Education.....	112
Table 4.6: Estimates of the Impact of Performance Funding Dosage on State-level Spending on Higher Education, by Policy Design.....	114
Table 4.7: Estimates for the Impact of PF GENERAL on State-level Outcomes, by Alternative Counterfactuals.....	115
Table 4.8: Lead-lag Estimates for State-level Outcome Variables	117
Table 4.9: Institution-level Variables Summary Statistics	118
Table 4.10: Estimates of Performance Funding Impact on STATE APP INST, by Institution Type.....	119

Table 4.11: Estimates of Performance Funding Impact on STATE APP INST, by Institution Type and Policy Design	121
Table 4.12: Estimates of the Impact of Performance Funding Dosage on STATE APP INST, by Institution Type	123
Table 4.13: Estimates of the Impact of Performance Funding Dosage on STATE APP INST, by Institution Type and Policy Design	125
Table 4.14: Estimates of the Impact of Performance Funding on STATE APP INST, by Alternative Counterfactuals and Institution Type	127
Table 4.15: Lead-lag Estimates of the Impact of Performance Funding on STATE APP INST, by Institution Type	130
Table 4.16: Estimates of Performance Funding Impact on Bachelor’s Degree Production per 100 Students, by Institution Type.....	131
Table 4.17: Estimates of Performance Funding Impact on Bachelor’s Degree Production per 100 Students, by Institution Type and Policy Design	135

LIST OF FIGURES

	Page
Figure 3.1: Average and Maximum Percent of State Appropriations Tied to Performance	
Outcomes	73
Figure 3.2: Number of States Operating Performance Funding Policies Targeting Four-year	
Institutions	73
Figure 4.1: Average Percent of State Spending on Higher Education, by Performance Funding	
Status	135
Figure 4.2: Average State Appropriations per FTE, by Performance Funding Status	135
Figure 4.3: Average Number of FTE Students Enrolled, by Performance Funding Status	136
Figure 4.4: Total State Appropriations (in millions), by Performance Funding Status	136
Figure 4.5: Average State Appropriations per \$1,000 of Personal Income, by Performance	
Funding Status.....	137
Figure 4.6: Average Institution-level State Appropriations per Student, by Performance Funding	
Status	137

Chapter 1 Introduction

Declining state financial support for public higher education and the growing demand for college graduates has resulted in a resurgence of performance funding policy implementation over the past decade. Recently viewed as a policy solution for these two key issues in U.S. higher education, performance funding provides both a financial incentive for postsecondary improvement and a mechanism through which to hold higher education institutions accountable by linking state appropriations directly to institutional outcomes.

While state appropriations to higher education have increased in real terms, this growth has not kept pace with increases in postsecondary enrollment, growth in state budgets, or state spending in other areas such as K-12 education and Medicaid (Kane, Orzag, Apostolov, Inman, & Reschovsky, 2005; McLendon, Hearn, & Mokher, 2009; McLendon, Mokher, & Doyle, 2009; Tandberg, 2007). A recent Grapevine report indicated that state spending on average for the 2015-2016 fiscal year is up for the first time since 2009, but has not yet returned to pre-recession levels. Though spending on average has increased, there are still many states in which higher education funding continues to decline (Grapevine, 2016). Furthermore, state appropriations have become a much smaller portion of postsecondary institutions' revenues, with tuition increasingly making up the difference (Kane, et al., 2005).

Shrinking state financial support and growing costs of higher education have provided at least part of the impetus for a national focus on college completion. In addition, college completion has become a top policy priority as a result of growing dissatisfaction with higher

education productivity, greater demand for accountability in the public sector, an evolving American workforce and subsequent need for more educated workers, and the decline of the U.S. in global rankings of educated citizens (Hauptman, 2012; Kelly & Schneider, 2012; Perna & Finney, 2014). College completion and degree attainment was a key policy focus of the Obama administration, and continues to be a priority for several state governments (e.g., Texas' Closing the Gaps initiative, Tennessee's Complete College Tennessee Act, Oregon's 40/40/20 goal, Arizona's Double the Numbers program) as well as dozens of intermediary organizations and philanthropic foundations (e.g., National Governors Association, Southern Regional Education Board, Lumina Foundation, Bill and Melinda Gates Foundation, Complete College America¹). Performance funding has been one of the chief policy levers of the "completion agenda" and has been widely supported by these policy actors.

The underlying theory of action behind performance funding is rooted in resource dependency: financial incentives will lead to changes in institutional behavior that will ultimately improve student outcomes. However, very little of the performance funding literature addresses the actual restructuring of state funds as a result of these incentives (Kelchen & Stedrak, 2016; Rabovsky, 2012). Nearly all of the performance funding-related research is devoted to the policies' development and implementation (e.g., McLendon, Hearn, & Deaton, 2006), impact on institutional behavior (e.g., Dougherty & Reddy, 2011), or overall effectiveness regarding the improvement of student outcomes (e.g., Tandberg & Hillman, 2014).

¹ Complete College America recently removed performance funding from its list of "Game Changers." However, their enthusiastic support for performance funding in the recent past is noteworthy (CCA, 2013).

The impact of performance funding policies on state spending and institutional resources merits further attention because (1) restructuring state funding constitutes the underpinnings of performance funding, yet we know very little about these financial incentives, and (2) the primary arguments in favor of and in opposition to performance funding are rooted in potential financial outcomes that remain untested. For example, some argue that performance funding offers institutions the opportunity to earn new money, while others suggest that performance funding is an excuse to punish institutions and keep state funding for higher education low (Dougherty & Reddy, 2011). Some researchers have also suggested that performance funding policies create systems of winners and losers by financially favoring some institutions over others (Rabovsky, 2012). Finally, some scholars have speculated that performance funding may have little to no impact on state funding for higher education. Instead, it may be the case that performance funding is more symbolic, simply giving the appearance of accountability to appease the demands of external stakeholders without jeopardizing institutions' resources (Rabovsky, 2012; Tandberg & Hillman, 2014).

This study investigates the impact of performance funding policies on state funding for higher education through both state-level and institution-level analyses. First, I examine how performance funding affects state-level spending for higher education using three outcome variables: portion of state spending on higher education, state appropriations per full-time equivalent (FTE) student, and state appropriations per \$1,000 of personal income. Each of these outcomes provides a limited view of state-level spending changes on its own; by exploring all three, this study provides a comprehensive review of the state-level spending changes associated with performance funding implementation.

Secondly, this study assesses the impact of performance funding on institution-level resources allocated from the state, defined as state appropriations per student. The institution-level analysis explores the performance funding effect heterogeneity across institution types. Few performance funding studies differentiate the analysis by institutional characteristics, constituting a sizable gap in the literature. It may be the case that performance funding policies favor some institution types over others. For instance, high-resource institutions that have historically performed well on performance funding metrics and are better positioned to make institutional changes to meet state goals may easily reap financial benefits relative to low-resource institutions that must make notable changes to programming, instruction, or even admissions to meet state goals. As such, this study will investigate how performance funding policies impact state appropriations for institutions of different missions, levels of selectivity, student populations, and degrees offered.

In both phases of this study, I incorporate a variety of performance funding treatment definitions. A key shortcoming of the existing performance funding literature is the generic policy definition typically used, by which scholars consider all performance funding policies as the same. As will be explained in detail in Chapter 2, performance funding policies vary considerably from one another; as such, the singular definition is inappropriate. To overcome this limitation I collected extensive data on the performance funding policies explored in this study. I gathered this information from legislative bills, state budget documents, system-level resources, as well as existing case studies. This study makes a considerable contribution to the performance funding literature by exploring the effects of nine different policy treatments.

This study poses the following research questions:

1. How do performance funding policies affect state-level spending on higher education?
 - a. How do these effects vary by policy design elements?
2. How do performance funding policies impact institution-level resources from the state?
 - a. How do these effects vary by institution type?
 - b. How do these effects vary by policy design elements?

To answer these research questions, I utilize a difference-in-differences research design and a panel dataset I constructed from several publicly available data sources. The panel data span the years 1986-2014 and include 20 treated states and 28 control states, and the four-year institutions therein. This study contributes to both the growing body of performance funding literature as well as the research related to state spending on higher education and the allocation of state funds to postsecondary institutions. Ultimately, this dissertation research fills three notable gaps in the performance funding literature: (1) it expands knowledge regarding how performance funding restructures state funding; (2) it systematically incorporates policy design elements overlooked by the existing scholarship; and (3) it examines how the effects of performance funding vary across institution types.

This dissertation is structured as follows. Chapter 2 provides a review and critique of the performance funding literature including: the history of the policy; reasons for support and opposition; and, research related to the development of performance funding, institutional responses to performance funding, and the impact or effectiveness of performance funding. This is followed by a discussion of two strands of relevant research: state spending on higher education and the allocation of state funds to postsecondary institutions. The second part of Chapter 2 is a discussion of the conceptual frameworks guiding the present study: principal-

agent theory, the theory of social construction and policy design, and a series of hypotheses related to the various policy design elements.

In Chapter 3, I outline the data and methods I used to answer the research questions as well as the limitations of the study. In particular, I discuss the construction of the panel dataset, treatment definitions and periods of treatment, counterfactuals, and the robustness checks/sensitivity analyses conducted to verify the findings. Chapter 4 presents the results of this study in two phases. Phase One addresses the state-level analyses and results; Phase Two discusses the institution-level findings, including the effect heterogeneity across institution types. Both phases discuss treatment effects across the policy design elements at length. Chapter 5 concludes with implications for theory and policy as well as directions for future research.

Chapter 2 Literature Review and Conceptual Frameworks

In the following section I present the scholarship pertaining to performance funding: arguments for and against its implementation in higher education; its history of adoption, abandonment, and re-adoption; and, the research literature addressing policy development as well as the impacts of performance funding on institutional behavior and student achievement. I then provide my critiques of the performance funding literature and discuss how this study addresses gaps in the scholarship. Following this discussion, I examine two additional strands of related literature (1) determinants and impacts of state funding for higher education and (2) the allocation of state funds to postsecondary institutions and the relative equity of funding allocations across institution types.

After the literature review, I present the theories guiding the study: principal agent theory and the theory of social construction and policy design. Additionally, I discuss a series of hypotheses related to the performance funding design elements.

Performance Funding

Performance funding is typically defined as a direct connection between institutional outputs or outcomes and state appropriations. The underlying theory of action behind performance funding suggests that financial incentives will encourage institutional leaders to change behaviors (i.e., implement new programs and support services) which will then lead to improvements in outcomes tied to funding, such as retention and graduation rates, licensure exam scores, faculty productivity, and job placement (Burke, 2001; McLendon & Hearn, 2013).

This logic suggests that if institutions are primarily funded based on student enrollment, as is the case under many (non-performance based) funding formulas, increasing enrollment will be an institutional priority, perhaps at the expense of student success (Auguste, Cota, Jayaram, & Laboissiere, 2010; Walters, 2012). On the other hand, if institutions are funded on the basis of student outcomes, they will focus energy and resources on supporting students, thereby leading to improvements in desired outcomes (Dougherty & Reddy, 2011).

Arguments For and Against Performance Funding

Performance funding is increasingly viewed as a key policy solution to both rising educational costs and unsatisfactory performance regarding student achievement in higher education. As higher education policy is increasingly focused on improving college completion to address the needs of the American workforce and economy, dozens of national policy organizations, regional compacts, and state and federal government agencies have supported performance funding to specifically incentivize greater degree production (AASCU, 2014; CCA, 2013; SREB, 2010; The White House, 2009; U.S. Department of Education, 2010). Though there are many proponents of performance funding, strong opponents also exist—primarily individuals from higher education communities (institutional leaders, practitioners, faculty, higher education scholars, etc.).

The most frequent argument in support of performance funding is precisely the underlying theory of resource dependency. Supporters often suggest that enrollment-based funding formulas incentivize institutions to solely increase enrollments and ignore student achievement (Auguste, et al., 2010; Complete College America, 2013; US Department of Education, 2011). Instead, performance funding provides a strategic approach to state

budgeting and institutional planning that better aligns state and institutional goals (Burke, 1998a; Hearn, 2015; Perna & Finney, 2014). Secondly, performance funding policies provide states the opportunity to demonstrate greater strides toward accountability in higher education and thereby respond to the concerns of many external stakeholders (Burke, 1998a). Performance funding advocates also believe that these policies will increase efficiency and quality and meet workforce needs (Burke, 1998a; Dougherty, Jones, Natow, Pheatt, & Ready, 2013). In some cases, higher education officials number among those in support of performance funding policies suggesting they create opportunities for institutions to earn additional state funds and to showcase successes (Dougherty & Reddy, 2011).

Arguments against performance funding seem to outnumber number the key supportive positions. For starters, many stakeholders reject the need for financial incentives to make student success an institutional priority. Walters (2012) reminds performance funding advocates that institutional leaders and faculty are, in fact, concerned with student achievement regardless of how state funds are allocated and are not solely interested in maximizing enrollment. Rutherford and Rabovsky (2014) claim that the “incentive” argument is flawed: assuming financial incentives will lead to changes in outcomes suggests that institutional leaders fully understand the problem, know how to solve it, have the capacity to do so, but simply refuse to act unless incentivized financially (pp. 204-205). Secondly, performance funding formulas are complex and costly to implement. Implementing performance funding is met with great challenges in assessing performance, measuring quality, incorporating differences in institutional mission, collecting data, and can impose great compliance costs on institutions (Burke, 1998a; Dougherty & Reddy, 2011). Some stakeholders

present concerns that performance funding policies will narrow institutional missions, water down academic standards, and diminish access (Dougherty & Reddy, 2011). Others argue that performance funding provides an excuse for states to keep funding for higher education low and to reduce campus autonomy (Dougherty & Reddy, 2011). Finally, some scholars suggest that performance funding policies could disproportionately punish poor institutions and lead to institutional budget instability (Burke, 1998a).

Adoption, Abandonment, and Re-adoption: 1979-2017

Performance funding operation has waxed and waned considerably since the late 1970s, when the first performance funding policy was implemented in Tennessee (Rubin & Hagood, forthcoming). Performance funding policies grew in popularity in the 1990s during a period of governmental restructuring and efforts toward greater accountability (Alexander, 2000; McLendon, Hearn, & Deaton, 2006). These early performance funding policies typically provided a bonus over and above the base state funding and allocated a relatively small portion of funds (usually less than 5 percent) based on performance (Dougherty & Natow, 2011; Hearn, 2015). Following this initial wave, many performance funding programs were abandoned due to insufficient state funds, turnover in state leadership, complicated formulas/metrics, inadequate data and challenges in data collection, and opposition from higher education communities (Dougherty, Natow, & Vega, 2012). Dougherty and Natow (2015) reported that 21 states adopted performance funding policies between 1979 and 2000 and there were 13 new adoptions after 2006; 24 of these policies were discontinued and 19 were then readopted (although the exact counts of performance funding policies varies due to the inconsistent definitions of what constitutes performance funding).

A renewed interest in performance funding has emerged since the mid-2000s, due in part to tightening state budgets, rising cost of higher education, and the increasing focus on improving college completion (Complete College America, 2013; Dougherty & Natow, 2015). This second wave of performance funding has brought with it some new, perhaps more aggressive, policy designs. These new performance policies, dubbed “Performance Funding 2.0” or outcomes based funding, are typically embedded within base state appropriations, often tie a much larger portion of funds to performance (up to 25 percent, and nearly 100 percent in the cases of Tennessee and Ohio), and are more focused on student progression and degree completion (Dougherty & Natow, 2015; Hearn, 2015; Snyder, 2015; Snyder & Fox, 2016). However, it is important to note that many policies that have been adopted in the second wave resemble Performance Funding 1.0 policies. Snyder (2015) counts only two states that have adopted robust performance funding policies (those that are embedded in base funding, tie substantial portions of funds to performance, focus on completion/attainment), while the majority still operate what she calls “rudimentary” performance funding (bonus funding, low levels of funding, completion/attainment is not prioritized). By Dougherty and Natow’s (2015) count, there are 30 states currently operating performance funding in some capacity, with several states considering adoption.

Performance Funding Research Literature

Much of the performance funding-related research addresses predictors and antecedents to policy adoption; the development, design, and implementation of performance funding policies; and various impacts of performance funding as well as the overall

effectiveness of the policies in terms of improving outcomes. The literature addressing each of these areas is discussed below.

Predictors of Policy Adoption

States adopt performance funding policies for a variety of reasons—many related to political factors, governance structures, and higher education costs and characteristics. Adoption of the early performance funding policies was largely a product of the accountability movement but was also seen as a way to provide new money to higher education institutions (Dougherty, Natow, Jones, Lahr, Pheatt, & Reddy, 2014). States that adopted early versions of performance funding typically had Republican-controlled state legislatures and less centralized higher education governance structures (McLendon, Hearn, & Deaton, 2006). The second wave of performance funding prioritized the improvement of institutional outcomes, rather than providing new money to institutions (Dougherty et al., 2014). Governors played a more central role in advocating for performance funding in the latest iteration of policy adoption (Dougherty & Natow, 2015). Furthermore, intermediary organizations, like Complete College America, have played a significant, and largely unprecedented, part in supporting and implementing the most recent performance funding policies (Gàndara, Rippner, & Ness, 2017).

Development, Design, and Implementation

The vast majority of performance funding related literature examines the development, design, and implementation of the policies. Notably, Kevin Dougherty and colleagues (e.g., Dougherty & Natow, 2010, 2015; Dougherty et al., 2013; Dougherty et al., 2014; Dougherty & Reddy, 2011) provide case studies of performance funding policies within several states. This body of research examines events leading up to policy consideration or adoption, the influence

of policy opponents and advocates, and the roles stakeholders involved in the policymaking process. This research also describes several design elements incorporated in performance funding policies (e.g., performance metrics included, allocation mechanisms, level of funding tied to performance) as well as the implementation process of performance funding in several states.

Given the volatile history of performance funding policies, researchers have been particularly interested in how design elements and implementation processes impact the longevity of a policy. Dougherty and colleagues and other scholars find that the longevity and stability of performance funding policies are associated with the involvement of higher education stakeholders in the policy process (Burke, 2000; Dougherty et al., 2013; Serban, 1998); policy designs that incorporate few, simple performance indicators that are relevant to institutions' missions (Layzell, 1999; Serban, 1998; Schmidt, 1999); an appropriate amount of funding linked to performance—small enough to protect against budget instability and large enough to motivate improvement (Bogue & Johnson, 2010; Burke, 2000; Dougherty et al., 2012); and gradual policy implementation that allows for institutional planning (Bogue & Johnson, 2010; Dougherty & Reddy, 2011). However, many of these design and implementation characteristics remain absent from the quantitative analyses of performance funding effectiveness.

Impacts and Effectiveness of Performance Funding

Though performance funding has become a popular policy solution for the second time in recent history, there is little empirical evidence of its effectiveness in improving outcomes

tied to financial incentives. However, several scholars have demonstrated that performance funding policies have led to positive intermediate outcomes.

Dougherty and Reddy (2011) found that performance funding led to increased awareness of state goals on college campuses, increased use of data in decision-making, institutional learning, and the development and improvement of student support services. Bogue and Johnson (2010) found that performance funding in Tennessee led to an increase in program accreditation. Likewise, Ness, Deupree, and Gàndara (2015), in their case study of four institutions in Tennessee, found considerable campus activity in college completion/degree attainment efforts, following the latest implementation of performance funding. Completion efforts ranged from simple policy revisions, such as eliminating graduation fees, to multifaceted strategic plans involving academic advising, course redesign, and data analytics.

A handful of studies use rigorous quantitative methods to examine the effectiveness of performance funding at improving student outcomes, like progression and graduation. Generally, these studies find little to no evidence that performance funding improves retention and graduation rates (Rutherford & Rabovsky, 2014; Sanford & Hunter, 2011), certificate and associate degree production (Hillman, Tandberg, and Fryar, 2015; Tandberg, Hillman, & Barakat, 2014), or baccalaureate degree production (Hillman, Tandberg, and Gross, 2014; Tandberg & Hillman, 2014). However, some evidence suggests that performance funding has led to an increase in short-term certificates (Hillman, Tandberg, & Fryar, 2015) and greater institutional spending on instructional services (Rabovsky, 2012). Additionally, some researchers found that performance funding policies that embed funds within base state funding are slightly more effective at improving student outcomes than performance funding

bonuses (Rutherford & Rabovsky, 2014) and performance funding is more effective the longer the policy is operational (Hillman, Tandberg, & Gross, 2014).

Some scholars have begun to examine alternative or unintended impacts of performance funding on institutions and students. Dougherty and Reddy (2011) suggest that performance funding policies may impose compliance costs, narrow institutional mission, restrict student admissions, lead to grade inflation, and weaken academic standards. Indeed, Umbricht, Fernandez, and Ortagus (2015) found that performance funding in Indiana is associated with decreased admissions rates and increased selectivity at public universities. And, Kelchen and Stedrak (2016) suggested that institutions subject to performance funding policies may be strategically targeting wealthier students, evidenced by declines in revenues from Pell Grants and changes in institutional expenditures on student financial aid.

Performance Funding and State Appropriations

Few studies examine how state funding is restructured under performance funding policies and the subsequent impact on institutions and students (Hutado, 2015; Jones, 2015; Kelchen & Stedrak, 2016; Rabovsky, 2012; Yancey, 2002). As mentioned above, the primary impetus for and underlying theory of action behind performance funding is the creation of financial incentives; as such, this topic merits further attention.

Rabovsky (2012) investigated the impact of performance funding policies on the relationship between state appropriations and institutional performance and found little connection between state-allocated funds and performance metrics. In fact, he found that even under performance funding policies, state appropriations were still very strongly related to student enrollment. This is not surprising, however, as this study primarily examined the earlier

types of performance funding policies, which were used in conjunction with enrollment-based funding formulas (Hearn, 2015).

Yancy (2002) and Hurtado (2015) investigated the impact of performance funding on horizontal fiscal equity (i.e., similar funding for similar institutions) for community colleges in Florida and Ohio, respectively. Both authors found greater inequity in the distribution of state funding under performance funding policies and found that inequities increased over time in both states. However, these studies were primarily descriptive and causal conclusions should be avoided.

Kelchen and Stedrack's (2016) study, so far, provides the most significant contribution to the literature addressing the relationship between performance funding and state appropriations. These authors investigated the impact of performance funding policies on a variety of institutional revenue and expenditure patterns to determine responses to incentive policies. Though their investigation of state appropriations was a small part of the study overall, their findings provide important insights. Most notably, the authors found that performance funding had a positive and significant impact on state appropriations, but this effect faded over time. In the year immediately following performance funding implementation, four-year institutions subject to the policy received on average \$107 more per FTE in state appropriations than did institutions not subject to the policy. However, employing a two-year lag following implementation revealed negative effects or no effects on state appropriations per FTE.

While this study investigates differences in outcomes between two- and four-year institutions, the authors do not examine variation across institution types—do all four-year institutions experience the same result? Considering the wide variation in institutional

characteristics within the four-year sector, potential effect heterogeneity should be investigated. Furthermore, the authors do not distinguish between the various types of performance funding policies—this limitation is discussed in more detail below.

Performance Funding Effect Heterogeneity Across Institution Types

Few studies examine variations in impact of performance funding policies across institutional types. Some studies distinguish between two-year and four-year institutions (Kelchen & Stedrak, 2016), but generally, institutional effect heterogeneity remains overlooked.

Importantly, Ness, Deupree, and Gàndara (2015) revealed great institutional differences within both the two-year and four-year sectors regarding the campus responses to performance funding policies and perceived inequities. Their findings suggest that institutions' perceptions of performance funding as well as their initial performance were related to available resources, academic preparedness of the student body, as well as political connections and influence within the state. The institutions that enrolled students with fewer obstacles and were more academically prepared for college, had greater resources, and wielded political influence not only fared better under performance funding policies but also viewed the policies positively. On the other hand, institutions that incurred greater challenges and did not benefit from political connections perceived the policy to disadvantage them and favor others. The latter institutions also did not perform as well under the performance funding policies, at least initially.

Gàndara (2016) likewise demonstrated that some institutions benefit while others are burdened by performance funding in the policy process. For instance, she found that institutions in Colorado, while all having a “seat at the table” during the development stage, not

all voices had equal impact. Institutions with greater resources and political connections were more likely to benefit from the design of the policy. Likewise, flagship institutions in Texas were better off than non-flagships in terms of the performance funding policy specifications.

Callahan, Meehan, and Shaw (2017) found evidence of differing institutional responses to performance funding policies in Tennessee, Indiana, and Ohio such that institutions tended to respond in ways consistent with their missions. For instance, four-year institutions focused resources on degree completion while two-year institutions honed in on underserved populations in response to performance funding. Notably, highly selective institutions did not exhibit changes in behavior (e.g., program implementation, redirection of resources) in response to performance funding, likely because of the availability of other stable revenue sources.

Finally, Jones (2015) and Jones et al. (2017) present important examinations of the unique challenges that MSIs face under performance funding policies. Due to historic underfunding, discrimination, and the fact that performance funding policies often do not take into consideration unique MSI missions, these institutions are often disproportionately disadvantaged relative to their predominantly white institution (PWI) counterparts. Jones (2015) describes the difficulty of one MSI in being able to report timely and accurate data and address state goals of increasing minority enrollment (which for this institution meant more white students). Furthermore, officials at the institution in question felt the policy unfairly held them to the same standard as other institutions, despite the considerable inequitable treatment in the past. Many felt they needed more funding just to maintain current levels of performance, much less improve according to the specifications of the policy.

In terms of the financial implications of performance funding for MSIs, Jones et al. (2017) found mixed results. According to descriptive analyses in a few states, some MSIs experienced increases in funding while others experienced declines following performance funding implementation. Although, the financial gains observed for MSIs under performance funding paled in comparison to that of the selective, research, PWIs. A recurring theme throughout this work is the inequities in resources available to MSIs relative to PWIs. For example, the institutions that received the greatest per student funding from the state were also the institutions with the greatest endowment. The authors argue that performance funding policies seem to perpetuate these funding inequities. Moreover, institutional resources are not solely fiduciary. Jones et al. (2017) noted that some MSIs underperformed according to the performance funding policy in part because they were not authorized to offer certain degree programs.

Critique of Performance Funding Research Literature

There are several significant gaps in the performance funding research that I address in this study: the impact of performance funding policies on state higher education spending and institutional resources; the effect heterogeneity across institution types; and the treatment effects of various performance funding policy design elements.

The impact of performance funding policies on state spending and institutional resources merits further attention for a few reasons. First, restructuring funding allocations constitutes the underpinnings of performance funding—if financial incentives are present, then changes in behavior will lead to improved outcomes—yet, we know very little about these financial incentives. Second, the primary arguments in favor of and opposed to performance

funding are rooted in potential financial outcomes that remain untested. The present study fills this gap in the literature by examining the impact of performance funding on state higher education spending as well as the distribution of state funds across public higher education institutions.

Furthermore, this study determines the extent to which these outcomes vary across institution types. Despite the clear potential performance funding has to disadvantage some institutions and favor others, as presented above, the performance funding evaluation literature has not examined effect heterogeneity across institution types. As such, it is vital that the performance funding scholarship examines variation in the impact of performance funding by institutional mission, type, selectivity, student population, location, and political power. The present study will examine the extent to which performance funding financially favors and/or disadvantages some institutions.

One of the greatest problems with the performance funding research literature is the inconsistent and non-nuanced definition of the performance funding “treatment.” Performance funding policies vary considerably between states, change substantially over time, and differ on a multitude of dimensions. Nearly all of the research literature presented above defines performance funding in a binary manner: performance funding is present or it is not. This does not accounts for the notable variation in the policies across states, resulting in an ambiguous application of treatment, which may be related to the finding that performance funding is generally ineffective.

Performance funding policies vary in the amount of funding tied to performance, how funding is allocated, how performance is measured, the number and type of performance

indicators utilized, the higher education sectors that are subject to the policy, the individuals who are involved in creating/implementing the policy, etc. To illustrate, some states like Minnesota and Virginia affirm performance funding policies in the legislature but the policies remain unfunded for several years (Gorbunov, 2013). Tennessee, on the other hand, has consistently funded its performance funding program for over 30 years and now ties 100 percent of state appropriations to performance outcomes. In Illinois, Ohio, and Indiana, performance funds are a part of the base state funding, while performance funds in Arizona and Michigan are allocated as a bonus (Snyder, 2015). Interestingly, in the 1990s, Washington State's performance funding policy withheld regular state appropriations and required institutions to earn them back through desired performance and outcomes (Dougherty, Natow, & Vega, 2012); this policy was abandoned and readopted as a bonus available to community colleges in 2007 (Hillman, Tandberg, & Fryar, 2015).

Some states operate performance funding for two-year schools (Washington, Texas), or four-year schools (Pennsylvania, Maine), or both (Tennessee, Indiana) (Dougherty & Natow, 2015; Snyder, 2015). Some performance funding policies offer a premium for the success of at-risk students or the production of degrees in particular fields. While scholars agree that the most common performance metric is related to degree completion (Burke, 2001; Tandberg & Hillman, 2014), states vary considerably on the number and type of outcomes tied to funding as well as the portion of funds tied to each outcome (Burke, 2001). For instance, South Carolina's performance funding policy had 37 performance metrics while Florida's program in the late 1990s had only three.

Clearly, utilizing a binary codification of performance funding implementation is a problem if we are to truly understand the impacts of the policy. Counting all of the performance funding policies as the same treatment is not likely going to produce reliable results. One study (Rutherford & Rabovsky, 2014) takes into consideration a single difference in policy design—whether or not performance funding was allocated as a bonus or as a part of the base state funding. While this is certainly an improvement to the binary definition used in all other studies, clearly there is a multitude of additional ways these policies vary. This dissertation research utilizes several definitions of performance funding that incorporates many of the differing policy design features and policy nuances discussed here.

State Spending on Higher Education

As this study examines the impact of performance funding on state spending and institutional revenues from the state, it is important to illustrate what is known about state spending on higher education as well as the allocation of state funds to postsecondary institutions. Below, I explore each of these areas as well as the known benefits of state higher education spending on institutions, students, and states.

States typically take one of two approaches to financing public higher education. Either broad subsidies in the form of direct appropriations to institutions are used to keep tuition rates low for all students, or targeted subsidies in the form of generous financial aid are used to encourage students on the margin of attending college to enroll (Hearn & Longanecker, 1985; Hossler, Lund, Ramin, Westfall, & Irish, 1997; Toutkoushian & Shafiq, 2010). The former approach, the broad subsidization model, is criticized for allocating funds to students who would attend college even without the subsidy, but is considered to be politically popular as

middle and upper class families benefit from this arrangement (Toutkoushian & Shafiq, 2010). The latter approach, the tuition rationalization model, is more efficient and better demonstrates the cost of higher education (Hearn & Longanecker, 1985), but is criticized for inducing “sticker shock” to low income students who may not be aware of available options to finance higher education (Hossler, et al., 1997).

There are several ways states subsidize higher education (direct appropriations, need-based financial aid, broad merit-based financial aid programs, capital spending), but since the present study is concerned with an allocation mechanism of appropriations, the following discussion of state funding for higher education will focus on direct appropriations to institutions. Depending on the financing approach used within a state, of the two listed above, states’ total direct appropriations to higher education will vary. Indeed, state spending on higher education varies considerably across states (Lowry, 2001) and is also influenced by states’ economic conditions (Humphreys, 2000; Leslie & Ramey, 1986; McLendon, Hearn, & Mokher, 2009; McLendon, Tandberg, & Hillman, 2014; Toutkoushian & Hollis, 1998), population demographics (Lowry, 2001; McLendon, Tandberg, & Hillman, 2014; Tandberg, 2007, 2010; Toutkoushian & Hollis, 1998), spending on other social services like K-12 education or Medicaid (Hovey, 1999; Kane et al., 2005; Okunade, 2004; Tandberg, 2007, 2010), political factors (Archibald & Feldman, 2006; McLendon, Hearn, & Mokher, 2009; McLendon, Heller, & Young, 2005; McLendon, Tandberg, & Hillman, 2014; Ness & Tandberg, 2013; Tandberg, 2006, 2007, 2008, 2010; Tandberg & Ness, 2011), and characteristics of states’ higher education systems (Hearn, Griswold, & Marine, 1996; Koshal & Koshal, 2000; Leslie & Ramey, 1986; McLendon,

Hearn, & Mokher, 2009; McLendon, Mokher, & Doyle, 2009; McLendon, Tandberg, & Hillman, 2014). Each of these determinants of state spending on higher education is discussed below.

State Characteristics

Scholars agree that states with healthy economies—low unemployment rates, higher gross state product, more per capita wealth, higher median income—are more generous toward higher education (Humphreys, 2000; Kane et al., 2005; Koshal & Koshal, 2000; Lowry, 2001; McLendon, Hearn, & Mokher, 2009; McLendon, Tandberg, & Hillman, 2014; Toutkoushian & Hollis, 1998). However, during times of economic downturn, higher education is especially vulnerable to budget cuts, often viewed as an area where states can balance the budget (Delaney & Doyle, 2011; Hovey, 1999). Since higher education institutions have alternative revenue sources (e.g., tuition), they are often at greater risk for cuts than are other budget areas (Humphreys, 2000; Kane et al., 2005; Okunade, 2004; Toutkoushian & Hollis, 1998).

State population demographics certainly play an important role in higher education spending. For instance, states with larger populations in general and greater proportions of college-aged students tend to spend more on higher education (McLendon, Tandberg, & Hillman, 2014; Rizzo, 2005; Toutkoushian & Hollis, 1998; Weerts & Ronca, 2007); although, these states tend to spend less per student as investment in higher education has generally not kept pace with enrollment growth (Koshal & Koshal, 2000; McLendon, Mokher, & Doyle, 2009). On the other hand, states with higher populations of adults over the age of 65 are likely to spend more on healthcare and less on higher education (Lowry, 2001). Additionally, states with

high populations of low-income citizens and low educational attainment typically spend less on higher education than states with wealthier and more educated citizenries (Tandberg, 2010).

Researchers have recently investigated the role of political factors in state spending on higher education. For instance, state culture and political ideology play an important role in how its citizens and elected officials prefer to spend state money (Tandberg, 2007; Heck, Lam, & Thomas, 2014). Heck, Lam, and Thomas (2014), for example, demonstrated that cultural constructs, as defined by Elazar (1984), help explain differences in state spending on higher education as well as differences in postsecondary outcomes like graduation rates. Regarding political ideology, some scholars find that states with a more liberal citizenry spend more on higher education (McLendon, Tandberg, & Hillman, 2014).

Other political factors that positively influence state spending on higher education include the presence of Democratic governors and legislators (McLendon, Hearn, & Mokher, 2009; McLendon, Tandberg, & Hillman, 2014); legislative professionalism and use of term limits for legislators (McLendon, Hearn, & Mokher, 2009); voter turnout (Rizzo, 2005); and the presence of higher education lobbyists or interest groups within a state (McLendon, Hearn, & Mokher, 2009; Tandberg, 2007, 2010). McLendon, Tandberg, and Hillman (2014) found a negative relationship between electoral competition and higher education spending. And, Archibald and Feldman (2006) found that Tax and Expenditure Limitations (TEs) had a significant, negative impact on higher education spending—either because the policies reduced overall state spending or impacted the composition of the state budget with a disproportionate, negative impact on higher education.

Scholars have consistently shown patterns in state spending on higher education by geographic region. Hearn, Griswold, and Marine (1996) demonstrated that tuition and financial aid levels were higher in the Northeast and Midwest states and lower in the Southwest. Koshal and Koshal (2000) likewise found that tuition rates are higher and appropriations are lower in New England. Okunade (2004) found regional differences regarding changes in the share of state budgets directed for higher education such that Pacific states demonstrated the least amount of growth. Toutkoushian and Hollis (1998) showed that variation across geographic region in state appropriations could be linked to regional differences in legislative demand for higher education, which is primarily related to economic and demographic factors.

Federal policies can also impact state spending on higher education. For instance, Delaney (2011) found that federal academic earmarks were positively and significantly associated with state spending for higher education appropriations. Many scholars suggest that one reason that states prioritize Medicaid spending over higher education spending is the incentive provided by the federal matching program (Ehrenberg, 2005; Kane et al., 2005; Tandberg, 2007). As states spend more on Medicaid, they will receive more federal funds for the program. However, federal funds can be seen as a way to offset declines in state spending on higher education—as state appropriations decline, federal financial aid can be used to offset the subsequent increases in tuition (Kane et al., 2005).

Higher Education Characteristics

Characteristics of postsecondary education systems within a state also importantly influence state spending. For example, states with a greater share of postsecondary participation in private schools tend to spend less on higher education in the form of direct

appropriations (McLendon, Hearn, & Mokher, 2009; McLendon, Mokher, & Doyle, 2009). And, states with a greater share of postsecondary students enrolled in the two-year sector will likely have lower educational costs.

Scholars have recently shown how higher education governance structures impact policymaking and state spending on higher education; however, the findings from this research are mixed. Some researchers find that more centralized governance structures are negatively associated with state spending on higher education (Ness & Tandberg, 2013; Tandberg, 2007), while others find that decentralized governing arrangements are negatively associated with state funding for higher education (Lowry, 2001). McLendon, Hearn, and Mokher (2009) and McLendon, Tandberg, and Hillman (2014) find no impact of governance structures on state spending for higher education, but do find that coordinating boards are associated with less investment in merit-based financial aid.

Researchers have consistently shown that tuition is negatively related to state appropriations (Koshal & Koshal, 2000; Okunade, 2004; Tandberg, 2007, 2008). Koshal and Koshal (2000) found that a 10 percent increase in tuition led to a 3.1 percent decrease in state appropriations; similarly, Okunade (2004) found that an increase in state appropriations of \$100 per FTE led to a \$40 decrease in tuition per FTE. Additionally, Delaney and Kearney (2015) found that the introduction of a guaranteed tuition policy in Illinois led to a 20 percent decrease in state appropriations.

Some scholars posit that the presence of broad-based merit scholarships may relieve states of pressure to fund higher education, however McLendon, Hearn, and Mokher (2009) find no impact of these types of programs on state spending for higher education. Okunade

(2004) finds that state financial aid is positively related to state appropriations such that an increase of 10 percent in state appropriations led to a 0.21 percent increase in state financial aid.

Finally, scholars have demonstrated that changes in educational delivery costs are associated with greater state spending for higher education. For instance, enrollment growth has been shown to marginally increase state appropriations, particularly when funding formulas are used (Leslie & Ramey, 1986; Okunade, 2004). And, faculty salaries, one of the largest higher education expenditures, have been shown to significantly influence state appropriations for higher education (Toutkoushian & Hollis, 1998).

Allocation of State Funds to Postsecondary Institutions

Clearly there are a variety of state characteristics—economic conditions, population demographics, politics—as well as postsecondary structural elements that influence state spending on higher education in the form of direct appropriations. Interestingly, there are far fewer studies that investigate the determinants of state funding allocations to institutions (Coughlin & Erekson, 1986; Leslie & Ramey, 1986; Titus, Vamosiu, & Gupta, 2015; Toutkoushian & Hollis, 1998; Weerts & Ronca, 2006; Weerts, 20014), and even less that examine the distribution of state appropriations across institutions (Cheslock & Gianneschi, 2008; McLendon, Mokher, & Doyle, 2009). Below I discuss the determinants of state funds allocated to institutions and the relative equity of the distribution of state resources across institutions.

State appropriations vary considerably across postsecondary institutions (McLendon, Mokher, & Doyle, 2009; Schneider & Klor de Alva, 2011). Researchers have demonstrated that the allocation of state funding to higher education institutions is primarily based on

appropriations received in the prior year, faculty salaries, student enrollment growth, and other factors that generally influence educational costs (Leslie & Ramey, 1986; Hearn 2015; Titus, et al., 2015; Toutkoushian & Hollis, 1998). Depending on the type of educational services offered, institutional costs vary, which may explain some of the variation in state funding across institutions. For example, graduate programs are more expensive than undergraduate programs, four-year institutions typically offer more costly experiences than two-year institutions, and degree offerings in Science, Technology, Engineering, and Mathematics (STEM) fields tend to incur greater costs than degrees in the humanities and social sciences (McLendon, Mokher, & Doyle, 2009).

Institution type and mission can impact the funding received from the state, leading to potential inequities. For instance, several scholars have demonstrated that public historically black colleges and universities (HBCUs) have been historically underfunded compared to other public state institutions (Boland & Gasman, 2014; Jones, 2015; Lee & Keys, 2013; Minor, 2008). Public HBCUs tend to be more reliant upon state and federal financial support as their endowments and funds from private giving are considerably lower than their PWI counterparts (Jones, 2015). Moreover, since many public HBCUs serve low-income students, relying on tuition increases as an alternative revenue source presents a challenge (Jones, 2015).

McLendon, Mokher, and Doyle (2009) demonstrated that states tend to privilege research universities over non-research universities by allocating \$2,549 more in state appropriations on average to research universities than non-research universities. Notably, the authors found that an institution's proximity to the state capitol and having alumni serve on legislative appropriations committees (which more often occurred at research universities)

positively influenced state appropriations at the institution level. This study is extremely helpful in understanding both the determinants of state funding allocations to institutions and the favoring of some institution types over others. However, the study is limited by a cross-sectional design and binary categorization of institutional types (research and non-research).

State appropriations to institutions are also related to elements like successful athletic programs, institutional quality, and community engagement (Coughlin & Erekson, 1986, Humphreys, 2003; McLendon, Mokher, & Doyle, 2009; Weerts, 2014; Weerts & Ronca, 2006). Coughlin and Erekson (1986) and Humphreys (2003) found that successful athletics programs were positively associated with state appropriations. Coughlin and Erekson (1986) also demonstrated that measures of institutional quality, such as faculty rankings and student academic achievement, were positively associated with institutional revenues from the state. Finally, Weerts and Ronca (2006) and Weerts (2014) suggested that community engagement programs may be positively related to state funding allocations as such efforts might legitimize higher education spending for legislators and taxpayers.

Finally, the distribution of state funding across public institutions can depend on allocation mechanisms employed. Typically, states allocate appropriations to colleges and universities either through base-plus budgeting, formula funding, performance funding, or a combination of these (Hearn, 2015). Base-plus funding allocates funds to institutions through marginal changes to the previous year's allotment. Adjustments are based on changes in educational costs (e.g., enrollment growth, new degree offerings) and are typically implemented as blanket percentage increases across institutions (Hearn, 2015). However, Hearn (2015) suggests that institutions with greater political influence may successfully secure

greater funding increases than less politically connected institutions. As such, the potential exists for greater inequity in the distribution of state resources across institutions under base-plus funding arrangements.

Formula funding systematically allocates funds to institutions through a mathematical formula based on instructional costs (McKeown-Moak, 1999). Formula funding is designed to be a more transparent and objective method of allocating state funds in the hopes that institutions might be funded more equitably (Bogue & Johnshon, 2010; McKeown-Moak, 1999). However, formula funding is still subject to human bias and political influence as the terms of the formula (metrics, weights, etc.) are negotiated and often are a result of compromise (Hearn, 2015; McKeown-Moak, 1999).

Performance funding, as has already been discussed at length, allocates funds on the basis of outcomes. Since institutions vary considerably according to available resources, student populations, and institutional performance, the potential exists for performance funding to produce inequities (Burke, 1998b).

Impacts of State Appropriations

State funding for higher education has been shown to significantly impact institutions, students, as well as states. Several scholars have demonstrated that state appropriations can improve access to higher education by reducing the cost of attendance (Perna & Titus, 2004; Toutkoushian & Hillman, 2012). Perna and Titus (2004) found that as state appropriations increase and tuition prices decrease, students are more likely to enroll in in-state, public institutions. Likewise, Toutkoushian and Hillman (2012) found that increases in state appropriations led to increases in overall college-going rates within states. Declines in state

appropriations can negatively impact access to higher education as such declines are typically followed by increases in tuition (Koshal & Koshal, 2000, Okunade, 2004; Tandberg, 2007, 2008). It is important to note that the financial aid literature demonstrates that low-income students are more sensitive to changes in tuition prices and are less likely to enroll when faced with price increases (Heller, 2013).

State appropriations are positively associated with student outcomes like degree completion (Titus, 2006, 2009; Zhang, 2009) and can help foster student learning through improved quality of educational services (Hearn & Holdsworth, 2002). State funding helps support faculty salaries and thereby directly impacts student learning and classroom experiences. Cuts in state funding for higher education can lead to larger class sizes, greater reliance on contingent faculty, reduction in course offerings or degree programs, and delayed graduation. (Kane et al., 2005). Titus (2009) finds that for every ten percent increase in per capita appropriations to higher education, bachelor's degree production rises by three percent. As a result, declines in state funding can also lead to reductions in degree production.

State appropriations constitute a large portion of revenue for public institutions (Lowry, 2001); declines from this key revenue source negatively impact institutional capacity for research, instruction, and public service. Furthermore, declines in state funding can negatively impact institutions' ability to secure alternative resources like private giving (Cheslock & Gianneschi, 2008).

Not only can state support for higher education significantly impact students and institutions, states themselves are key beneficiaries of higher education spending. Some scholars have shown that higher education institutions are important drivers of state

economies. Tripp Umbach (2004) concluded that Pennsylvania State University is the greatest economic contributor in the state of Pennsylvania. From the economic impact of alumni living in the state to the business operations of the university itself, the study concluded that for every \$1 in state appropriations, Penn State returned \$1.56 in tax revenue. Similarly Dorfman found that the University of Georgia generates approximately \$4.4 billion in annual economic impact for the state of Georgia, which the author claimed was a conservative estimate [see Fahmy (2016)]. Furthermore, as state citizens earn college degrees, considerable spill over benefits accrue to local communities and state economies (McMahon, 2009; Paulsen, 2001). For instance, postsecondary degree attainment is associated with greater civic engagement, stronger tax bases, and lower crime rates (Baum, Ma, Payea, 2010). Considering the positive relationship between state appropriations and degree completion (Titus, 2006, 2009), it is clear that states reap tremendous benefits from investing in higher education.

Clearly, declines in state funding can harm postsecondary institutions and students; to the extent that performance funding exacerbates declines in state spending on higher education, a greater potential exists for the described negative outcomes to materialize. Moreover, if performance funding indeed favors some institutions over others, negative outcomes may be concentrated at the most vulnerable institutions. Or it could be the case that, performance funding policies provide funding increases, as Kelchen and Stedrak (2016) demonstrated, and thus importantly benefit postsecondary students and institutions, as well as state economies.

Summary of Literature Review

Performance funding is an increasingly popular policy solution to improve accountability and achievement in higher education. However, there is little research that examines how these policies actually restructure state funding for higher education. This dissertation research addresses this shortcoming of the performance funding literature by investigating the impact of performance funding policies on state higher education spending and institutional revenues from the state. This research also examines the impact of key performance funding policy design elements that have yet to be considered in other quantitative studies as well as variations in performance funding effects across institutions.

The discussion above demonstrates that there are many factors that influence state spending on higher education and institutional resources from state appropriations. This study will take into consideration these well-established predictors of state spending on higher education by including state-level controls for economic conditions, population demographics, and structural elements of postsecondary systems, as well as institution-level controls for mission, selectivity, degree offerings, and student body characteristics.

Conceptual Frameworks

To explain the impact of performance funding policies on state higher education spending, the allocation of state appropriations to institutions, and the extent to which some institution types are favored financially under performance funding regimes, I rely on principal-agent theory, theory of social construction and policy design, as well as a series of hypotheses related to specific performance funding policy design elements.

Before I discuss each of these frameworks and how they illuminate the findings of this study, it is important to clarify the expected favoritism of certain institutional types. I hypothesize that performance funding policies will favor “high-resource” institutions over “low-resource” institutions primarily due to variations in institutional capacity to address state goals. I consider high-resource institutions to be those that are less dependent upon state funding and already perform well based on typical performance funding metrics. These include research universities; more prestigious/selective institutions; and institutions with stable undergraduate enrollment, wealthier students and alumni, and greater student success rates like degree completion. I consider low-resource institutions to be those that are more dependent upon state resources and that will struggle under performance funding policies, both in terms of past success rates and capacity for institutional change. These include institutions that have open access admissions or are non-selective; have more contingent faculty; greater populations of low-income, minority, or non-traditional students; less stable enrollment; and lower success rates like degree completion. These institutional characterizations are taken from literature that addresses resource dependency and alternative revenue streams for postsecondary institutions (Cheslock & Gianneschi, 2008; DiMaggio & Powell, 1985; Pfeffer & Salancik, 1978, 1993); relationships between institutional characteristics (mission, resources, power) and student achievement (Engle & O’Brien, 2007); and political power of higher education institutions in the policy process (McLendon, Mohker, & Doyle, 2009).

Alternative “favoritism” outcomes are certainly possible under performance funding policies, depending on how the policies are designed. Specifically, low-resource institutional types may be favored under policies that evaluate performance on a “value-added” basis since

these institutions will likely have more room to improve than will the high-resource institutions. However, high-resource institutions will be better positioned to exert more political power than low-resource institutions; thus, performance funding policies may be designed to benefit high-resource institutions.

Ness, Deupree, and Gándara's (2015) findings are helpful in understanding the potential differences in outcomes across institutional types. Interestingly, the authors found considerable differences in the perceptions of equity of performance funding even among research universities. The University of Tennessee, Knoxville (UT) seemed to be positioned to perform well under performance funding. This institution has an academically strong student body, ample resources, and substantial political influence within the state. However, individuals from Middle Tennessee State University (MTSU) claimed that the institution had been historically disadvantaged in terms of state funding and feared greater inequities under performance funding. Many MTSU officials described UT as favored by the state.

Interestingly, Pellissippi State Community College, enjoyed many of the "high-resource" benefits like UT. Unlike the typical depiction of a community college, Pellissippi State enrolls more academically prepared students, fewer low-income students, and also exhibits significant political connections. This institution had a positive perception of performance funding and also seemed to benefit from the policy, at least at first. In contrast, Southwest Tennessee Community College, an MSI, discussed severe disadvantages in relation to other Tennessee institutions. Officials from Southwest believed that the performance funding policy assumed that everyone started on a level playing field; given their students' poverty and poor academic preparation, institution leaders felt considerably disadvantaged by the performance funding

policy. In some ways, these findings support the characterization that I described above; however, the findings also demonstrate that the characterizations may not always fit—specifically, community colleges may be categorized as “high-resource” and research universities may be categorized as “low-resource” depending on other characteristics.

The following discussion of theoretical frameworks will address additional policy design elements and their potential impacts as well as the role of political power in the policy design process. It is important to note that the determinants of state spending effort and institution-level appropriations discussed in the literature review will have important impacts on the outcome variables of interest in this study and will play a part in each of the explanatory frameworks discussed below. As I present each framework below, I demonstrate the interrelatedness of state economic, demographic, and higher education characteristics; principal-agent relationships; institutional performance; policy design; and the preference of elected officials in explaining potential outcomes.

Principal-agent Theory

Principal-agent theory (PAT), with origins in economics and political science, involves a hierarchical or contractual relationship between a principal and an agent (Eisenhardt, 1989; McLendon, 2003; Moe, 1984; Stiglitz, 2008). The principal enlists an agent with specialized knowledge and skills to perform a task. However, two important problems exist: neither party has access to perfect information (the principal cannot continually monitor the agent’s activities and the agent may have an unclear understanding of the principal’s wishes) and both parties have divergent interests and preferences for risk taking. The agent, then, may shirk responsibilities to the principal and maximize his utility according to his own risk preferences.

As such, the principal must monitor the agent's activities and provide incentives or sanctions to more closely align the agent's interest with that of the principal.

It is important to distinguish between the underlying assumptions that stem from the theory's two origins (Lane & Kivisto, 2008). PAT in economics emphasizes the type of contract that facilitates the principal-agent relationship and is largely concerned with the welfare of the principal (McLendon, 2003; Stiglitz, 2008). A behavior-based contract rewards agents for particular activities (e.g., a salary); a performance-based contract rewards agents for accomplishing a goal (e.g., commission). It is the job of the principal to choose the most efficient contract—one that will empower the agent to accomplish the task but also protect the best interest of the principal, particularly regarding the investment of the principal's resources.

For political scientists, PAT explains a hierarchical relationship between governments and government agencies. In this context, government officials create agencies to carry out the wishes of the voters. The two primary problems of economic PAT still exist: information asymmetries and divergent goals. The agent is advantaged by its specialization and the principal lacks perfect information regarding the agent's behavior. The principal must monitor and incentivize the agent to efficiently use government resources to accomplish state goals. PAT in the political science context is focused on the oversight mechanisms used to monitor the agent rather than the contract in economic PAT (McCubbins & Schwartz, 1984).

PAT in the higher education context typically explains the relationship between the state government (principal) and higher education agency (agent) or between governing boards (principal) and institutions (agents) (Kivisto, 2005; Lane & Kivisto, 2008; McLendon, 2003). Though state support for higher education has undoubtedly declined, public higher education

agencies and institutions still receive a considerable amount of funding from states and are thus responsible to the state government and taxpayers. Higher education institutions have historically enjoyed a great deal of autonomy from state oversight (Lane & Kivisto, 2008), but public colleges and universities are increasingly subject to greater scrutiny and new accountability measures (Alexander, 2000; Dougherty & Natow, 2015).

Principal-agent theory helps illuminate the impetus behind performance funding implementation. States want institutions (collectively and individually) to improve in a variety of ways—performance funding is used as a reward for desired outcomes, a punishment in response to less-than-desired outcomes, and as an oversight mechanism by which the principal has greater access to information regarding the agents' use of resources and progress toward the principal's goals. In other words, performance funding should reduce agents' shirking and minimize information asymmetries. PAT offers some explanation for why performance funding states will spend more, less, or have no change in spending.

It is important to note that there are two levels of principal-agent relationships explored in this study. The first supports the state-level analysis such that state legislators that determine the total funding allocation for public higher education across the state are the principal and the agent is either the higher education governing/coordinating body or the collection of public higher education institutions. The second highlights the relationship between the higher education governing body (principal) and the institutions (agent) for the institution-level

analysis. Since it is often the case that the governing body distributes funding to the institutions it is appropriate to consider this entity as the principal in the institution-level analysis².

Performance funding states will spend more on higher education to either reward agents for accomplishing the principal's goals or to expand the agent's capacity so that achieving the goals is possible (Dougherty et al., 2013; Kivisto, 2005)—although, performance funding policies have rarely been used to build up institutions' capacity for improvement (Dougherty et al., 2013; Ness et al., 2015). Additionally, the state may “reward” higher education agencies or institutions by not imposing punishments, resulting in little to no change in funding, which is most likely if the state embeds performance funds in base appropriations. A decline in state spending or in institutional appropriations associated with performance funding will result from poor performance. In this case, principals will impose sanctions to better align the agents' goals with the state, minimize shirking, and encourage a better use of the principal's resources.

To the extent that changes in funding vary across institution types (i.e., high-resource institutions are favored over low-resource institutions), PAT would suggest this is due to variation in performance such that funds are diverted to institutions that are best investing the principal's resources and are making progress toward the principal's goals. However, poor performance is also related to institutional capacity, which includes available resources; diverting funds away from low-resource or underperforming institutions may further limit their

² It is important to note that Michigan does not have a governing or coordinating body of higher education. Instead, the state legislature allocates funding directly to the institutions. In this case, the state legislature would be considered the principal for both the state- and institution-level analyses.

ability to meet the principal's goals. PAT fails to consider such influences in the explanation of rewards and punishments.

This lens assumes that changes in state appropriations associated with performance funding are a direct result from changes in institutional performance. However, it is likely that observed changes are also related to policymakers' preferences and/or specific performance funding policy design elements.

Theory of Social Construction and Policy Design

The political science and public policy literature claims that policymakers make choices on the basis of their own values and beliefs (Schneider & Ingram, 1991), available resources and present constraints (McDonnell & Elmore, 1987), how policy problems are defined (Kingdon, 1984; McDonnell & Elmore, 1987), desires of their constituents (Clotfelter, 1976; Holcombe, 1989), as well as characteristics of policy targets (Schneider & Ingram, 1993). Political factors play an important role in decisions regarding state funding allocations to higher education. Lobbyists and interest groups, political power of postsecondary institutions or systems, connections between policymakers and higher education (alumni status, athletic programs, etc.) have been shown to affect state spending for higher education as well as institutional funding allocations (Coughlin & Ereksan, 1986; Humphreys 2003; McLendon, Mokher, & Doyle, 2009; Ness & Tandberg, 2013; Tandberg, 2007). Thus, changes in state appropriations for higher education associated with the implementation of performance funding may be explained by the policymakers' choices and preferences. Specifically, Schneider and Ingram's (1993) framework of social construction and policy design may illuminate possible performance funding outcomes as they relate to political maneuvering.

Schneider and Ingram (1993) claim that public policy distributes both benefits (e.g., subsidies, tax credits) as well as burdens (e.g., fines, imprisonment) to particular target populations. The authors posit that policymakers will choose policy instruments on the basis of the political power and public opinion of the policy target in question. Specifically, according to the framework, policy instruments are generally chosen such that benefits are distributed to target populations that are politically powerful and positively viewed (what Schneider and Ingram call the “advantaged”) and burdens are distributed to target populations that are politically weak and negatively viewed (called “deviants”). This arrangement is advantageous for policymakers since benefits for the “advantaged” will be well received by the group itself as well as the public, who finds the group “deserving.” As for the “deviants,” though the burdens will not be well received by the group, the target population will be unable to wield political power to demand better treatment, and the public will consider the policy choice favorable.

For the target populations that are politically powerful but negatively viewed (“contenders”) or politically weak and positively viewed (“dependents”), tensions can occur between the policy instrument choices and the reception by the targets and the public. Examples of “contenders” include the wealthy, big business, or large unions; these groups have significant political power but are often viewed negatively by the public. Policymakers will be torn between distributing benefits to please the group and burdens to please the public. Examples of “dependents” include children, mothers, and the disabled. While these groups are positively viewed by the public, they are often unorganized and unable to exercise political

influence³. As such, policymakers will similarly experience tension between distributing benefits that will be publicly supported, but will have a difficult time gaining political momentum.

Within this framework, public higher education as a target of state policy could be considered a “contender”—a target population that is politically powerful, yet negatively viewed by the public. While this categorization does not fit perfectly, there is some evidence to support this classification.

In terms of being politically powerful, while public higher education institutions are responsible to state governments—providers of both funding and power to grant degrees—colleges and universities have been historically autonomous from legislative control. Higher education’s professional and specialized workforce, complex organizational structure and production technology, use of peer review for quality control, and diminishing reliance on state fiscal resources prevent strict oversight from the state into the affairs of higher education (Lane & Kivisto, 2008). Furthermore, scholars have shown that higher education lobbyists and interest groups are successful in securing state funding (Tandberg 2006, 2007; Ness & Tandberg, 2013) and politically connected institutions also accrue financial benefits from their political power (McLendon, Mokher, & Doyle, 2009). However, as higher education has come under increased scrutiny (Alexander, 2000; Zumeta, 1998) and is more vulnerable to budget cuts than other state services (Tandberg, 2007), higher education may be weakening in its political power.

Regarding public perception of higher education, the Pew Research Center (Taylor, Parker, Fry, Cohn, Wang, Velasco, & Dockterman, 2011) found that the majority of Americans

³ Although, recent political demonstrations and protests might suggest otherwise, as a number of citizens who are disabled and reliant on Medicaid have been influential in preventing the repeal of the Affordable Care Act (Reilly, 2017).

(57 percent) believe that higher education fails to provide a good value for its cost; and, only 22 percent believe that most people can afford a college education (down from 37 percent 25 years prior). However, 86 percent of college graduates consider higher education as a good investment for themselves. Another Pew Research Center (2012) survey shows that while the majority of Americans (60 percent) believe that colleges “have a positive effect on the way things are going in the country,” only 46 percent of conservative Republicans and 38 percent of Tea Party sympathizers agreed. In an updated poll, Pew Research Center (2017) found an increasing partisan divide regarding views of colleges and universities: 72 percent of democrats said colleges and universities have a positive effect on the county (compared to only 36 percent of republicans), whereas 58 percent of republicans said colleges and universities have a *negative* effect on the county (compared to only 19 percent of democrats).

Schneider and Ingram suggest that for “contenders,” since tensions will arise in allocating benefits or burdens, policymakers prefer to enact policies that grant benefits only noticed by the group itself and/or policies that appear to the public to impose burdens but in reality have few negative effects. As such, performance funding generally may be a way for policymakers to distribute burdens to higher education (reduction in funding); or simply provide the appearance of burden to the public, but in reality impose little to no negative effect. There is increased pressure for policymakers to make higher education more accountable, like many other sectors of government (Burke, 2001). However, policymakers may not want to impose the strict measures they boast about to their external stakeholders. So, performance funding appeases external stakeholders by giving the appearance of strict accountability, while policymakers reign in the policy, preventing it from harming the

institutions. In many ways, there is explicit evidence of such action through the implementation of hold-harmless and stop-loss provisions.

This application does not perfectly fit the context of the present study, however. Not all performance funding policies will similarly distribute benefits or burdens. For instance, the initial wave of performance funding was focused on finding new money for higher education (Dougherty & Reddy, 2011), a potential benefit rather than a burden. Additionally, performance funding policies that tie miniscule portions of funding to outcomes only offer marginal (financial) benefits or burdens and may not be truly noticed or felt by the target population. It is important to note that there are a variety of benefits and burdens from performance funding. For instance, benefits include not only increases in funding but also the ability to publicize successes and burdens consist of declines in funding as well as compliance costs, particularly related to data collection and reporting (Dougherty & Reddy, 2011). However, since this study is focused on the financial outcomes of performance funding, the discussion of benefits and burdens will be limited to increases and decreases in funding (both state-level spending and institution-level appropriations).

At the institution level, benefits and burdens may be distributed differently within higher education systems where more powerful, more favorably viewed (constructed as “deserving”) institutions receive benefits, and weaker, more negatively viewed institutions (constructed as “undeserving”) incur more burdens. While Hovey (1999) suggests that state policymakers will have little incentive to financially favor some institutions over others due to equal representation across the state (p. 40), several authors have demonstrated that the funding process for higher education is highly political, subject to personal preferences and

biases of policymakers. In particular, McLendon, Mokher, and Doyle (2009) demonstrated that research universities are financially favored over others within states according to policymaker preferences and political power of institutions. In relation to performance funding policies specifically, Jones (2015) illustrated that MSIs can be severely disadvantaged and Ness et al. (2015) found that institutional characteristics and political connections importantly influenced at least the perceived distribution of benefits and burdens.

Public opinion of different types of postsecondary institutions is less straightforward than the public opinion of higher education writ large. Perhaps research universities are positively viewed because they typically have higher student achievement/success rates and as such may be seen as more “deserving” of taxpayers’ support. Additionally, considering the fact that large, research institutions are strong economic drivers in states and communities this may also contribute to a positive construction. Alternatively, these institutions may be viewed negatively as elitist, liberal, too expensive, and inaccessible. They may be seen as undeserving of state funds since they have less financial need. Open access institutions, on the other hand, might be negatively viewed for unsatisfactory student success rates, and thus seen as “undeserving” of state support. Or, perhaps they are positively viewed as providing access to higher education and serving underrepresented populations.

Social constructions of the student populations that institutions enroll may also play a part in how postsecondary institutions are viewed. For instance, low-income and minority students are often negatively constructed. Consider Schneider and Ingram’s (1993) example of low-income students having to jump through excessive hoops to prove they are poor in order to receive financial aid. Moreover, general trends in financial aid policy have shifted to benefit

middle- and upper-middle class students and families—broad based merit aid programs, tax credits, and expansion of federal loans to wealthier families (Dynarski, 2000; Hansen, 1983; Ness, 2010)—also indicate a preference for higher-income students. Finally, policies that unfavorably target undocumented students (Reich & Mendoza, 2008) and the historic mistreatment of MSIs, generally, speak to negative social constructions of racial and ethnic minorities and the institutions that serve them.

Taken together, the combinations of political power and public opinion (or maybe just the opinion/preference of the policymakers) may have varying impacts on the distribution of state funds via performance funding. If decreases in higher education appropriations are observed (the distribution of burdens) the framework suggests this is due to political weakness of the target (either higher education in general or specific institutions) and/or the extent to which the target is viewed unfavorably or as undeserving of state funds. On the other hand, increases in appropriations (the distribution of benefits) will be associated with political power and/or the view that the target group is deserving of state support. If little to no change in funding is observed in relation to performance funding, this may be evidence of policymakers creating the appearance of burdens for an unfavorably viewed policy target, but preventing negative outcomes for a politically powerful entity.

Performance Funding Policy Design Hypotheses

The impact of performance funding on state appropriations (at state and institution levels) will not only be determined by institutional performance and/or policymakers' preferences, but also the details of the policy design. There will not be a uniform impact of "performance funding," rather appropriations will likely increase, decline, or exhibit little

change as a result of key design elements, discussed below. Below I discuss potential outcomes that are possible under certain design elements; these will be discussed in terms of change versus no change and/or positive change versus negative change in state appropriations.

(1) Method of Allocation: Bonus or Base

The method of allocation of performance funds can provide some insights regarding potential changes in both state- and institution-level funding. For instance, performance funding policies that allocate funds as a bonus (i.e., allocate new funding on the basis of performance), at best, could lead to an increase in state appropriations or, at worst, no change in state appropriations. Base allocation of performance funds (i.e., the redistribution of existing state funds), on the other hand, could feasibly go in a variety of ways, depending on the specifications of the formula. Base allocations could result in a decline in funding for unsatisfactory performance, could result in no change in funding due to achieving desired outcomes or maintaining performance levels, or could lead to an increase in state appropriations if the policy provides the opportunity for institutions to earn more for satisfactory/exemplary performance.

(2) Budget Protection Provisions

Some performance funding policies include stop-loss or hold-harmless provisions to protect institutions' budgets as they adjust to new funding arrangements. Additionally, some performance funding policies are implemented gradually over time for the same reason. These policy specifications will result in little change in state or institution-level appropriations, at least initially. As performance funding becomes fully implemented, however, these provisions will have less of an impact and greater changes in funding levels may be observed.

(3) Definition of Performance

How performance is evaluated will play an important role in the allocation of funds. For instance, performance funding policies may measure performance as “value added,” such that to receive funds, institutions must demonstrate year-over-year improvement. This arrangement may actually disadvantage high-resource institutions that already perform well and have little room for improvement. However, high-resource institutions will also have greater capacity to make changes leading to improvement compared to low-resource institutions.

Alternatively, performance may be considered as reaching or maintaining a specified target or threshold. The impact of this arrangement on funding will depend on each institutions’ starting point, how targets are defined, and who is responsible for setting the targets. For instance, targets may be set purposefully low so that they are easily reached. Or, they could be set impossibly high as a means to distribute financial burdens. Furthermore, policymakers or institutions themselves may set the thresholds—this approach may certainly impact how performance is defined and subsequently rewarded.

Performance funding policies may allocate funds based on the raw output of performance metrics such that funding is awarded for each unit of output. For example, Tennessee’s policy is based on a points system by which points are awarded based on outcomes like the number of degrees conferred. In these cases, high-resource institutions will likely benefit considering they typically already have relatively high outputs on a number of commonly-used performance metrics. Moreover, increases or decreases in funding would be possible under a raw output/points system policy.

Finally, performance funding policies may reward institutions that outperform others, thereby creating a competition for state funds. For example, Pennsylvania's performance funding policy divides funds between all schools that achieved a certain threshold on performance metrics, but if one institution outperforms all others it will receive all the available funding (Hillman, Tandberg, & Gross, 2014). So, even if Institution A performs adequately it may not receive any performance funding if outperformed by Institution B. Performance funding policies that create a competitive environment will likely favor high-resource institutions over the low-resource institutions. However, it is important to note, that a competition for funds may ensue regardless of an explicit policy design if no new money for higher education is allocated.

Since institutions within the same state may experience different effects according to the performance measurement design element, it is less clear how these features will impact state-level spending.

(4) Performance Funding "Dosage"

The proportion of state appropriations tied to performance will have an important impact on observed changes in state-level spending as well as appropriations allocated to institutions. As the magnitude of funding tied to performance increases, the more funding is at stake and likely greater changes will be observed in state-level spending and institution-level appropriations. The direction of the change will depend on an institution's performance or policymaker preferences, all else equal. Additionally, the magnitude of performance funds may also be related to the favoring of one institution type over another. In other words, if a small percentage of funds is tied to performance, then little change will be observed in institution-

level allocations and whatever inequity existed prior to performance funding implementation will likely remain intact and not exacerbated. On the other hand, if a large portion of funds is tied to performance, considering the variation between institutions regarding available resources and student achievement, inequity will likely be exacerbated since low-resource institutions will have the least capacity to improve student outcomes.

There are additional policy design elements that will likely impact state funding for higher education—for instance, the types of metrics used and the portion of funds tied to each, whether or not postsecondary institutions were involved in the policy design process, or differentiating performance metrics or metric weights across institution types according to mission. However, including all design elements of performance funding policies is beyond the scope of this dissertation. What I have included here represents the most significant policy design features related to the restructuring of funds.

Summary of Frameworks

PAT explains changes in funding allocations associated with performance funding as directly connected to changes in higher education performance. In other words, if increases in funding are observed, PAT would suggest the agent has behaved as the principal desires and the principal rewarded the agent. If, however, a reduction in funds associated with performance funding is observed, PAT suggests this would be evidence of punishment; and, no change in funding would be a result of maintaining performance or evidence of good performance being “rewarded” through the lack of punishment.

Schneider and Ingram’s framework, on the other hand, would suggest that increases in funding is a result of distributing benefits to deserving populations and decreases in funding is

the distribution of burdens to undeserving populations—and these distinctions are based upon the target population’s power and public opinion. In other words, this framework would suggest that policymakers choose the outcome for each institution based on what is politically palatable. There is some notable overlap between the two frameworks. If institutions are performing well, then they may also be viewed as deserving of public funds; or, institutions may be viewed as undeserving if they are not performing well. Finally, specific policy design elements impose limitations on what is possible or likely in terms of the impact of performance funding on higher education appropriations.

Allocating state funds to higher education is political, regardless of the funding mechanism in place (McKeown-Moak, 1999). Under performance funding regimes, changes in funding will likely result from a combination of institutional performance, policymaker preferences, specific policy design elements, and other state and higher education conditions.

Chapter 3 Data and Methodology

This study investigates the impact of performance funding policies, of various types, on three state-level measures of higher education spending (percent of state budgets allocated to higher education, state appropriations per FTE, and state appropriations per \$1,000 of personal income) as well as institution-level state appropriations per student. At the institution level, I also explore how state appropriations per student vary across institution types and the extent to which some institutions are favored over others under performance funding regimes. The data and methodological framework used to conduct this research are detailed below.

I assembled a panel dataset from a variety of public sources including the National Center for Education Statistics (NCES) particularly the Integrated Postsecondary Education Data System (IPEDS), State Higher Education Executive Officers (SHEEO), National Association of State Budget Officers (NASBO), National Association of State Student Grant and Aid Programs (NASSGAP), Southern Regional Education Board (SREB), Education Commission of the States (ECS), National Governor's Association (NGA), U.S. Bureau of the Census, U.S. Bureau of Labor Statistics (BLS), and the Bureau of Economic Analysis (BEA). The panel consists of all U.S. states and the public, four-year institutions therein, and spans 1986 to 2014.

Dependent Variables

For the first phase of this study, I investigate the impact of various performance funding policies on three state-level outcome variables: percent of state budgets allocated to higher education (here forth HIGHER-ED SHARE), state appropriations per FTE (here forth STATE APP

FTE), state appropriations per \$1,000 of personal income (here forth STATE APP 1000). All financial data is adjusted for inflation. It is important to note that each measure of state-level support can be influenced by the denominator that is used to standardize the measure across states: alternative state spending priorities/total state budget, higher education enrollment, and fluctuations in personal income. As such, each variable may exhibit changes in different directions simultaneously due to changes in its denominator.

It is also important to point out that the outcome measures also differ in terms of their numerators. HIGHER-ED SHARE comes from NASBO and is based on state expenditures; the other two measures use state appropriations from SHEEO. Appropriations are funds that have been approved for higher education, while expenditures are funds that were actually spent. Moreover, the NASBO data includes federal funding; and, some inconsistencies arise from state to state as to what is included in higher education spending. For example, some states in some years might include tuition and fees or employer contributions to pensions while others do not. The SHEEO data, on the other hand, are limited to state support for public higher education, excluding local appropriations and federal funding. Although it should be noted that the earlier data collection by SHEEO may not be consistent with the data that has been collected since 2000 due to minor changes in the survey administered to states (S. Laderman, personal communication, June 22, 2016).

By exploring all three outcomes, the Phase One analysis provides a more complete picture of state-level higher education spending patterns than would be provided by only one of the dependent variables. This initial phase determines the extent to which performance funding policies impact total available state funding for higher education.

Phase Two of the study examines the impact of performance funding policies on state appropriations per student at the institution level (here forth STATE APP INST), adjusted for inflation. This alternative specification illustrates how performance funding policies impact institutions' available resources. It may be the case that performance funding has little impact on state-level higher education spending, but may affect how funds are distributed across institutions. Also, as part of the institution-level analysis, I examine the effect heterogeneity across institution types—for example, how treatment effects differ for research universities as compared to master's level institutions. It may be the case that institutions are affected differently according to mission, type, selectivity, student body characteristics, and existing resources. To determine whether or not certain types of institutions are favored financially over others under performance funding regimes, I restrict the analysis to the following institution types: research universities, master's and baccalaureate institutions (Carnegie Classification from IPEDS); highly selective, less selective, and non-selective institutions (Barron's Index); minority serving institutions (IPEDS); and rural institutions (IPEDS). Phase Two employs both institution-level and state-level data.

In both phases of this study, I begin with a simple definition of performance funding (a state either has performance funding or it does not) as the treatment. Subsequently, I utilize more nuanced definitions of performance funding to examine the impact of various policy designs on the outcome variables.

Independent Variables

The independent variable of interest in both phases of this study is the implementation of performance funding generally defined (here forth PF GENERAL), and the presence of policy

design elements related to funding allocation mechanisms, budget protections, how performance is measured, and the portion of appropriations tied to performance metrics.

Funding allocation mechanisms include tying new funding to performance outcomes (bonus) and redistributing existing funding on the basis of performance (base). Budgetary provisions include a grace period in which performance outcomes are evaluated but not funded (hold-harmless), limiting the amount of funding that can be lost (stop-loss), and averaging performance outcomes over a number of years to prevent instability from year-to-year spikes/drops (rolling averages). Measuring performance includes requiring institutions to demonstrate year-over-year improvement (improve), meet a certain target or threshold (meet target), or outperform other institutions (compete). In addition, some policies base performance funding on the actual performance-related output, like number of degrees produced (raw number). To account for the intensity of performance funding policies, I also include the portion of state appropriations tied to performance outcomes (dosage).

To collect the policy design data described above, I began with case studies, research articles, and policy briefs that provide policy details for select states (Burke & Serban, 1998a, 1998b; Burke & Modarresi, 1999; Burke, Minnassians, & Lessard, 2000; Burke & Minnassians, 2001, 2002, 2003; Dougherty & Natow, 2010, 2015; Dougherty, Natow, Jones, Lahr, Pheatt, & Reddy, 2014; Dougherty & Reddy, 2011; Davies, 2014; Snyder, 2015; Snyder & Fox, 2016, and others). Building from this body of work, I confirmed the specifications described in the existing research and collected additional policy details from state legislative bills, budget documents, and state and system documents. In addition, I supported this information with press releases and news articles. For policies in place in the 1990s and early 2000s, I relied upon the Internet

Archive (<https://archive.org/index.php>) to find sources not currently available online. I

corresponded with state/system higher education finance/policy officials via email and phone to corroborate my findings and/or fill in the gaps of my data collection.

Through this process, I was able to identify the policy design elements in place each year of operation as well as document major policy changes over time. I also used this data collection effort to confirm/establish the implementation periods of each policy, discussed in more detail in the Treated and Control Units section below (see Table 3.1). Of particular importance is the collection of annual funding tied to performance—a key element that has been thus far excluded from the performance funding literature. In most cases, I was able to identify the exact dollar amount tied to outcomes each year. In a few instances, I made estimates based on the available information; for example, if the dollar amount was not available but a portion of funds was established I was able to calculate the dollar amount using state/system total operating budgets. Performance funding dosage is the percent of state appropriations linked to performance outcomes⁴.

I coded each performance funding state according to the policy design in each year of implementation. As performance funding policies change, sometimes substantially, over time, the design elements within each category are not mutually exclusive⁵. Each of the design elements is constructed as a dummy variable (i.e., base = 1 for states and years in which

⁴ In some cases, this is an underestimate of performance funding dosage because SHEEO state appropriations is inclusive of dollars appropriated to two-year institutions and for some states, the performance funding dollar amount is only for four-year institutions. In other cases, dosage may be somewhat of an overestimate as some states include both two-year and four-year funding for performance in the dollar amount collected.

⁵ Ohio's policy allocated performance funds as a bonus from fiscal year 1998 to 2009 and utilized a base funding mechanism from fiscal year 2010 forward.

performance funding reallocated existing funds, 0 otherwise), with the exception of dosage, which is a continuous variable.

Out of the 20 performance funding states, 12 have base allocation mechanisms and 11 have bonus structure. Regarding budgetary provisions, four states have a hold-harmless or stop-loss provision and six utilize rolling averages. Nine states measure performance on the basis of improvement, nine on the basis of meeting targets, four based on raw numbers of output, and five with a competitive performance arrangement (see Table 3.2).

It is important to note that the policy design specifications were made based on explicit descriptions in the policy-related documents and sources. It may be the case that the implementation of the policies produced different arrangements than those specified by the policy descriptions. For example, policies that require institutions to demonstrate improvement may actually reward institutions that improve the most, thereby operating a competitive policy rather than an improve policy. This may be the case especially for states that redistribute existing funding on the basis of performance. If all institutions improve or meet targets as required and no new funding is allocated by the state, then the distribution of funding may not be solely dependent upon meeting the policy requirements, but may also depend on an institution's performance relative to other institutions in the state. So while a number of alternative outcomes are possible depending on the collective performance of institutions and other factors affecting state budgets, the policy design designations are based on the stipulations explicit in the policy, with a few noted exceptions.

Performance funding dosage ranges from 0.1 percent to 67.1 percent for the state-level figures (see Figure 3.1) and ranges from 0.2 percent to 90.2 percent for the institution-level

figures⁶. See Appendix A for details and sources for each state's performance funding policy and Appendix B for a summary of this information.

State-level Control Variables

The literature review illustrated a variety of state conditions and characteristics that influence state-level funding for higher education. Accordingly, the models employed in this study control for state economic conditions, population demographics, political factors, and higher education system characteristics. Scholars have consistently shown that states with healthier economies spend more on higher education: to control for states' economic conditions I include unemployment rate, per capita gross domestic product (GDP), and per capita personal income. The latter two variables are adjusted for inflation.

State population demographics are also related to higher education spending. For instance, higher education participation rates are associated with the age distribution of a state's population and the educational attainment of its citizens. States with greater educational attainment will not only have higher postsecondary participation rates but also greater political support for spending taxpayer dollars on higher education. The models used for this study control for the portion of the state's population that is of traditional college age (18 to 24-years-old) as well as the portion of the state's adult population (aged 25 to 64) with a bachelor's degree or higher.

⁶ While some states report tying 100 percent of state appropriations to performance outcomes, this does not always mean the total state appropriations allocated. In some cases, the percentage of funding tied to performance that is discussed in the media, policy briefs, etc., is actually the portion of operational funds, rather than all funding, and the denominator used for this portion varies considerably across states. As such, I calculated the performance funding dosage so that every state has the same denominator (for the state level it is total state appropriations from SHEEO and for the institution level I used state appropriations from IPEDS aggregated at the state level) and the numerator is the dollar amount tied to performance outcomes as reported in state budget documents.

Political characteristics have been shown to impact state appropriations for higher education. Scholars have found that Republican-controlled states (Republican governor and/or higher proportion of Republican legislators) tend to spend less in general and spend less on higher education in particular than Democratic-controlled states. As such, I include the proportion of Republican legislators and whether or not the governor is Republican. Additionally, considering the important role of public opinion in policy decisions addressed in Chapter 2, I include a measure of citizen ideology (Berry, et al., 1998, *revised 1960-2013 citizen ideology series*) to account for the public's view of higher education with the assumption that more conservative citizenries will have more negative views of higher education (Pew Research Center, 2012, 2017). The citizen ideology index is based on state congressional delegation voting records, congressional election outcomes, partisan division of state legislatures, the governor's party, and other measures related to voters (Berry, Ringquist, Fording, & Hanson, 1998). The greater the number, the more conservative the citizenry.

Characteristics of higher education systems will importantly affect state spending effort for postsecondary education. States with greater participation in the four-year sector or the public sector will spend more on higher education appropriations, generally. I include controls for the percent of postsecondary students enrolled in public institutions and four-year institutions. States that spend more on financial aid may spend less on higher education in the form of appropriations; so, I include controls for state financial aid per college-aged person in the state (adjusted for inflation) as well as percent of state financial aid that is need-based. Tuition rates typically have an inverse relationship with higher education appropriations, so as tuition rates for four-year institutions increase on average, state-level appropriations are

expected to decrease. I control for net tuition revenue per FTE (adjusted for inflation), this accounts for one of the largest sources of revenue for institutions, net of institutional aid. These higher education control variables are lagged by one year, due to the timing of state budget decisions. Finally, I include controls for other major areas of states spending, namely the portion of state spending on K-12 education and Medicaid.

Institution-level Control Variables

Chapter 2 also outlined several institutional characteristics that impact state appropriations at the institution level. For instance, I control for a variety of institutional inputs that are known to impact state appropriations: total fall enrollment, percent of graduate students enrolled, average faculty salary (adjusted for inflation), and percent of full-time faculty. I also control for revenue from tuition and fees (adjusted for inflation) as well as the percent of institutional revenue from state appropriations to demonstrate institutions' dependence on state resources. As performance funding policies fund institutions on the basis of outcomes, I control for the number of bachelor's degrees awarded per 100 students enrolled (bachelor's degree production is one of the most common performance funding outcomes). Additionally, student population characteristics are correlated with institutional performance and available resources. I include controls for the portion of undergraduates that are enrolled part time (a potentially at-risk population) and the portion of undergraduate minority students. Each of these institution-level variables is lagged by one year to account for the timing of state budget cycles. See Appendix C for a complete list of variable definition and sources.

Methodology

Policy analysis or program evaluation studies often employ a difference-in-difference (DD) estimation strategy, which “treats the introduction of [a policy] as a plausible source of exogenous variation” (Tandberg & Hillman, 2014, p. 230). This approach compares changes in outcomes before and after policy implementation for a treated group (exposed to treatment or subject to the policy) and for a control group (not exposed to treatment). This quasi-experimental research design removes bias that may result from permanent differences between the treated and control groups or from trends over time (Wooldridge, 2007). The DD framework assumes that the differences observed between groups and over time are *caused* by the policy implementation and that nothing else influenced the observed change. As such, the treated and control groups should exhibit similar trends in the pre-treatment period so that changes observed post-treatment can be attributed to the policy implementation, otherwise known as the parallel trends assumption (Delaney & Kearney, 2015). This is a rather strong assumption, however, and must be tested through the utilization of well-defined control groups and a series of robustness checks.

Treated and Control Units

In Phase One of this study, treated units are states that implemented a performance funding policy targeting four-year institutions (here forth PF states) and control units are states that never implemented any type of performance funding policy targeting four-year institutions (here forth non-PF states). Phase Two defines treated units as four-year institutions subject to a performance funding policy and control units are four-year institutions that have never been

subject to a performance funding policy. In both phases, I explore several different control groups, or counterfactuals, described in more detail below.

States are counted as treated ($n = 20$) for the years in which the performance funding policy was funded (see Table 3.1). This sample of treated states includes all performance funding policies targeting four-year institutions that were implemented from 1994 to 2014. To identify treated states, I began with Tandberg and Hillman's (2014) list of performance funding states, since they limited their treated group to performance funding policies targeting four-year institutions. In addition, they identify the years in which the policies were *funded*, as opposed to adopted. Moreover, Tandberg and Hillman's identification of performance funding states is the most thoroughly researched compared to other existing scholarship. Tandberg and Hillman's list does not include performance funding policies implemented after FY 2013; as such, I used Snyder (2015) and Snyder and Fox (2016) to identify additional performance funding states.

After establishing a base list of states and implementation years from these sources, I corroborated this information with my own data collection efforts. As mentioned above, I examined state budget documents, legislative bills, state and system-level higher education documents/policy briefs, and corresponded with higher education officials in various states to establish the existence of performance funding as well as the implementation periods of the policies.

There are some instances in which my data collection efforts do not match Tandberg and Hillman's identification of performance funding states. For example, Virginia, Idaho, and New York are excluded from this study even though Tandberg and Hillman (2014) count them

as funded policies for four-year institutions. Virginia's policy only rewards select institutions with institutional autonomies rather than state funding (Leslie & Berdahl, 2008). In regards to Idaho's policy, is Dougherty and Natow (2015) claim that questions remain as to whether Idaho ever actually had performance funding. Furthermore, the least questionable piece of Idaho's policy targeted technical colleges (K. Dougherty, personal communication, January 30, 2017) and thus is not well suited for this study. Many scholars agree that New York funded performance funding for both SUNY and CUNY institutions in the early 2000s. However, I have not been able to locate the level of detailed information for this state as I have for others, making it difficult to meaningfully incorporate these policies.

In addition, Tandberg and Hillman (2014) define Indiana's performance funding policy as funded from 2007 onward—this is likely due to the fact that the earlier policy did not tie funding to student outcomes. Since the present study is not limited by the types of outcomes that are tied to performance funding, I define Indiana as funded since FY 2004. It is also important to note that Tandberg and Hillman (2014) define Kansas' performance funding as funded from 2002 to 2005; however, according to Kansas statute 74-3202d (revised in 2014), 2002 was the adoption year and the intention to tie performance agreements to state funding was for FY 2006. This is corroborated in the Governor's Budget Reports (KA Division of the Budget, 2007, 2008, 2009, 2010). Refer to Table 3.1 for a complete list of treated states and the years of operation for implemented performance funding policies; see Figure 3.2 for the number of states with operational performance funding policies, as defined by this study, in a given year.

Treatment

The key treatment in this study is the implementation of performance funding policies: PF GENERAL, bonus, base, hold-harmless/stop-loss, rolling averages, improve, meet target, raw numbers, and compete. While most performance funding research defines all performance funding policies as the same, it is clear from the discussion in Chapter 2 that these policies vary tremendously. As such, I consider each policy design element as a separate treatment. Performance funding dosage is considered an extension of the PF GENERAL treatment and is utilized in a panel regression model with fixed effects. The reader should refer to Table 3.2 for the policy designs by state, as well as Appendix A for a detailed discussion of each treatment and Appendix B for a summary of the state policy narratives.

Treatment Periods

The pre- and post-treatment periods vary across states, so there is no singular pre-treatment or post-treatment period for this study. I created a policy variable that indicates the period(s) in which each policy is funded in each treated state (discussed in more detail below).

It is important to note that there are several treated states with intermittent periods of treatment—many of which implemented performance funding, abandoned the policy, and re-adopted a new policy. I employ a variety of specifications to examine how this fluctuation in operation impacts the outcome. For example, I test one implementation period at a time, combine implementation periods, count the time between implementation periods as treated, and exclude these states altogether.

Models

The first model I employ for Phase One (state-level) is as follows:

$$(1) y_{st} = \alpha + \beta PF\ GENERAL + \rho X_{st} + \gamma_s + \eta_t + \varepsilon_{st}$$

where y_{st} is the outcome for state s in year t and α is the constant term. PF GENERAL is the policy variable of interest that is equal to one for treated states, those that implemented *any* kind of performance funding policy targeting four-year institutions, during the period the performance funding policy was funded. The coefficient of the policy variable of interest is interpreted as the impact of performance funding on state spending in treated states with respect to state spending in control states.

This model also controls for the state-level variables described above (X_{st}) as well as state fixed effects (γ_s) and year fixed effects (η_t). State fixed effects are unobserved, time invariant characteristics that can impact the outcome variables (e.g., state culture). Similarly, year fixed effects vary over time, but do not vary between states (e.g., influence of federal policies). The state and year fixed effects reduce biases not accounted for in the other control variables (Wooldridge, 2007).

Due to the panel design of this study, the error term (ε_{st}) is serially correlated, meaning the error in year one is correlated with the error in year two, and so on. This correlation can inflate standard errors and bias the estimates. To correct for this correlation, I cluster the standard errors at the state level (Drukker, 2003; Imbens & Wooldridge, 2008).

The models I use to test the different types of performance funding treatment are similar to model 1, except PF GENERAL is replaced by DESIGN ELEMENT (bonus, base, stop loss/hold harmless, rolling average, improve, meet target, raw numbers, and compete).

$$(2) y_{st} = \alpha + \beta DESIGN\ ELEMENT + \rho X_{st} + \gamma_s + \eta_t + \varepsilon_{st}$$

In each of these cases, the treated group becomes the set of states whose performance funding policy includes the design element in question. As an example, for base policies, DESIGN ELEMENT is equal to one in the states and years that base policies are implemented, and 0 otherwise. The control group remains all states without performance funding policies targeting four-year institutions.

To explore the role of performance funding dosage, I run a series of panel regressions with fixed effects, utilizing the percentage of state appropriations tied to performance outcomes as the independent variable of interest:

$$(3) y_{st} = \alpha + \beta PF\ GENERAL\ X\ DOSAGE + \rho X_{st} + \gamma_s + \eta_t + \varepsilon_{st}$$

PF Dosage is equal to the portion of state appropriations tied to performance outcomes in the states and years in which performance funding is funded, zero otherwise, and is interacted with PF GENERAL. I run these models for all 20 treated and 28 control states; I also run these models limited to the 20 treated states to narrow in on the effects of increasing the performance funding dosage among the general group of treated states.

I use similar models for Phase Two (institution-level), but these models account for institution-level data:

$$(4) y_{ist} = \alpha + \beta PF\ GENERAL + \rho X_{st} + \sigma Z_{ist} + \gamma_i + \eta_t + \varepsilon_{ist}$$

$$(5) y_{ist} = \alpha + \beta DESIGN\ ELEMENT + \rho X_{st} + \sigma Z_{ist} + \gamma_i + \eta_t + \varepsilon_{ist}$$

where y_{ist} is the outcome for institution i in state s in year t ; the policy variables are as defined for model one; X_{st} contains the state-level control variables described above; Z_{ist} contains the institution-level control variables described above; and γ_i and η_t are institution and year fixed

effects, respectively. I cluster the standard errors at the institution level to correct for serial correlation. Policy design elements are incorporated in the same way as described for state-level analysis.

As with the state-level analysis, I also run institution-level panel regressions to explore performance funding dosage effects:

$$(6) y_{ist} = \alpha + \beta DOSAGE + \rho X_{st} + \sigma Z_{ist} + \gamma_i + \eta_t + \varepsilon_{ist}$$

Counterfactuals

I employ a variety of control groups, or counterfactuals, to determine what would have happened in performance funding states in the absence of treatment. The primary counterfactual is all states (and the four-year institutions therein for Phase Two) that never implemented a performance funding policy of any kind targeting four-year institutions ($n = 28$)⁷ and the pre-treatment years of the treated groups. In other words, changes in the dependent variables are compared both before and after treatment for treated and control states.

Since there are notable baseline differences between the treated and control groups, I explore a variety of more narrowly defined counterfactuals in an attempt to reduce these baseline differences. For instance, I compare treated and control groups within states that are more conservative and then for states that are more liberal, since scholars have shown that preferences for state spending and public opinion of higher education differ according to political party affiliation and ideology. I repeat this same comparison for states that are Republican-controlled versus Democratic-controlled.

⁷ I exclude Nebraska due to its unicameral legislative structure, which prevents the inclusion of legislative political variables. I also exclude New York as it is considered to have had a performance funding policy during the years of this study, but detailed information collected for all other states was not available.

Since higher education governing boards play a key role in advocating for state appropriations, it is likely that differences will occur according to governance structure. As such, I compare treated and control groups in states with coordinating boards and then in states with consolidated governing boards. McLendon, Hearn, and Deaton (2006) suggest that more consolidated governance structures are more likely to protect the interests of the institutions, and as such may be better positioned to avoid declines in funding and/or distribute funding more fairly across institutions relative to less centralized forms of governance.

In addition, McLendon, Hearn, and Deaton (2006) also found that Republican states and states with coordinating boards were more likely to adopt performance funding policies in the first place. So it may be the case that the treated units are systematically different than the untreated units; these control group specifications will further help isolate the impact of the treatment.

Finally, I employ region-specific control groups (e.g., Northeast, Midwest), as it has been consistently shown that state appropriations vary considerably across geographic region.

Robustness Checks and Sensitivity Analyses

I test the sensitivity of the treatment periods, by considering the various implementation times of some policies. I run state-specific DD models to further test the robustness of the individual policy types. Lastly, I run lead-lag models to test the parallel trends assumption.

Limitations

As with all studies, there are a few limitations of this research. First, isolating the impact of the performance funding treatment is a challenge; while the approach I have outlined

describes several ways in which I will account for confounding factors that influence state funding for higher education, there are still many unmeasured elements that are known to influence state appropriations for higher education at the state and institutional level. For instance, the relationships between legislators and institutions (e.g., alumni status, in-district institutions) have been shown to importantly influence the allocation of funds to postsecondary institutions (McLendon, Mokher, & Doyle, 2009; Tandberg, 2007).

Furthermore, these models do not account for other state-level higher education initiatives that are accompanied by new investments/divestments in higher education. As an example, consider Tennessee's Promise initiative, which entirely funds tuition in the two-year sector. It is likely that this and similar large-scale initiatives in other states (decentralization efforts in Oregon, institutional consolidations in Georgia, etc.) will also have an impact on the dependent variables investigated in this study. While the models described account for many of the known and measureable elements that influence state funding for higher education, for additional bias via state/institution and year fixed effects, and utilizes a variety of control group specifications to isolate the impact of treatment, there still may be other unaccounted for elements that bias the results.

Additionally, there are additional performance funding policy design elements that are not explored in this study (for instance, the specific performance metrics and higher education involvement in the policy process), but may have important impacts on state funding. I will not be incorporating all possible performance funding policy design elements.

Lastly, as mentioned above, there are some inconsistencies with the state-level dependent variables. The three state-level outcomes differ from one another both in how state

spending is measured and how the variables are constructed, which may lead to challenges in interpreting treatment effects. However, taken together, the collection of state-level outcomes provide a more comprehensive view of treatment effects on state spending.

Table 3.1. States with Performance Funding Policies for Four-year Institutions, 1994-2014

State	Fiscal years in which policy was funded
Arizona	2013--
Arkansas	2013--
Colorado	1995-1998; 2001-2002
Indiana	2004--
Kansas	2006-2009
Kentucky	1996-1998
Louisiana	2009--
Michigan	2013--
Minnesota	1997
Missouri	1994-2001
New Jersey	2000-2002
New Mexico	2013--
Ohio	1998--
Oklahoma	2013-2014
Oregon	2012-2014
Pennsylvania	2001--
South Carolina	1998-2002
South Dakota	1998-2003; 2005; 2013
Tennessee*	2012--
Texas	2009-2011

Notes: Data was collected by the author from state legislative bills, budget documents, personal communication with state and system administrators, state and system documents, etc.

* TN began its first PF in 1979, but only the second iteration of PF, adopted in 2010, will be considered in this study

Table 3.2. Performance Funding Policy Designs in the States

PF Policy Designs	States with policy design
Allocation method	
Base	AZ, AR, IN, LA, MN, NM, OH, OR, PA, SC, SD, TN
Bonus	AZ, CO, IN, KS, MI, MO, NJ, OH, OK, SD, TX
Budgetary provisions	
Hold harmless/stop loss	AR, OH, TN, SC
Rolling Averages	AR, AZ, IN, NM, OH, TN
Measuring Performance	
Improve	AR, AZ, CO, IN, KS, KY, MN, OK, TX
Meet target	AR, CO, KY, LA, MO, NJ, PA, SC, SD
Raw numbers	MO, OH, OR, TN
Compete	MI, NM, OH, PA, TN

Notes: Data collected by the author from state legislative bills, budget documents, personal communication with state and system administrators, state and system documents, etc.

Performance funding states are limited to the policies targeting four-year institutions.

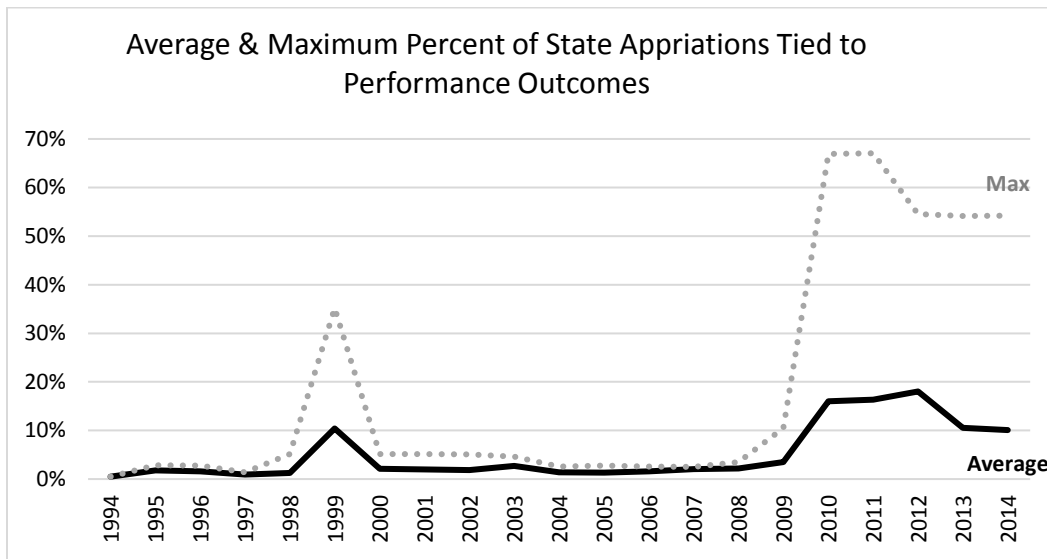


Figure 3.1. Average and Maximum Percent of State Appropriations Tied to Performance Outcomes⁸

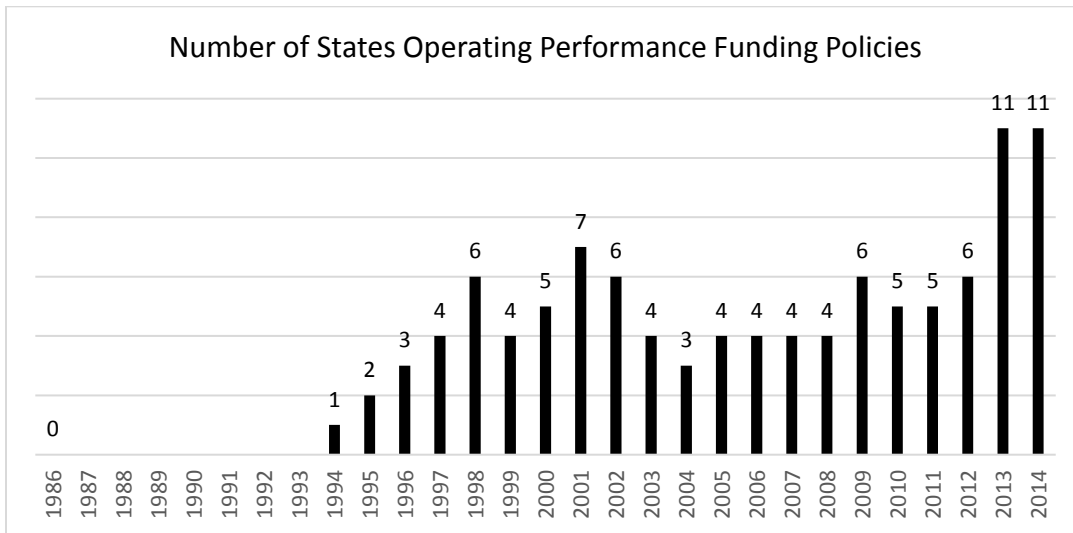


Figure 3.2. Number of States Operating Performance Funding Policies Targeting Four-year Institutions

⁸ Performance funding policies are limited to those targeting four-year institutions. Spike in 1999 is due to South Carolina’s policy; spike in 2010 is due to Ohio’s policy.

Chapter 4 Results

Overall, I find the effects of performance funding at the state level are mixed. The three state-level variables are not similarly affected; where I do find treatment effects, however, they are relatively small and consistently negative. At the institution level, I find strong evidence that performance funding policies financially benefit research and highly selective institutions, while imposing financial burdens on non-research and non-highly selective institutions. Institution-level findings vary across institution types and policy designs, in most cases as expected.

What follows is a discussion of state-level (Phase One) and institution-level (Phase Two) results. In each section I discuss descriptive analyses and trends over time; results of basic models that utilize the general performance funding policy definition; results of the policy design treatment effects, including performance funding dosage; and, a series of robustness checks and sensitivity tests conducted to solidify the findings.

Phase One: State-level Results

As discussed in Chapter 3, I explored three outcome variables at the state level: HIGHER-ED SHARE (the percent of state budget expenditures on higher education, from NASBO), STATE APP FTE (state appropriations per FTE, from SHEEO), and STATE APP 1000 (state appropriations per \$1,000 of personal income, from SHEEO and BEA). None of these outcomes provides a perfect picture of state funding for higher education on its own, but together present a more comprehensive understanding of states' financial support for public higher education.

Descriptive Analysis

On average, states spend 12% of their budgets on higher education. This has remained relatively stable over time (see Figure 4.1). On average, PF states spend a greater portion on higher education (12.6%) than non-PF states (11.5%) (see Table 4.1).

States appropriate \$8,412.21 per FTE (in 2014 dollars) on average. This has generally declined since the late 1980s, with periods of notable fluctuation. More recently, STATE APP FTE has increased following a period of severe decline associated with the Great Recession (see Figure 4.2). Overall, PF states and non-PF states follow a similar trend with the PF states consistently appropriating fewer dollars per FTE than non-PF states. It is important to note that PF states enroll more FTE students than non-PF states, thus explaining the different patterns for HIGHER-ED SHARE and STATE APP FTE (see Figure 4.3).

From the late 1980s to early 2000s, total state appropriations for higher education were steadily on the rise; notable declines are observed in the early 2000s and following 2008. Since 2013, state appropriations have begun to recover from the recession. From the late 1980s through the 1990s, PF states appropriated more total dollars to higher education than non-PF states; however, this gap has narrowed since the early 2000s. As of 2013, non-PF states outspent PF states, on average (see Figure 4.4). This is notable considering the more recent performance funding policies typically tie greater funds to performance outcomes than the policies of the 1990s (with the exception of South Carolina's policy) (refer to Figure 3.1).

On average, states spend \$7.32 on higher education per \$1,000 of personal income. This has declined steadily since the late 1980s—around \$9.00 in 1986 to a little over \$5.00 in 2014

(Figure 4.5). PF and non-PF states follow a similar trend over time, with non-PF states spending slightly more per \$1,000 than PF states.

In regards to the control variables, important differences are observed between PF and non-PF states. On average, PF states have a lower GDP, higher unemployment rates, lower per capita income, greater spending on K12 and healthcare, greater portion of republican legislators, more conservative ideology, a slightly less educated citizenry, higher enrollment in public postsecondary schools, greater spending on financial aid, and a smaller portion of financial aid based on need compared to non-PF states. This descriptive analysis is consistent with other performance funding-related research.

Difference-in-differences Models

The models I used to estimate the impact of performance funding on state spending on higher education (all three outcomes) fit the data relatively well, according to the R-squared statistics. Given the fixed-effects design of the models, I provide both within and overall R-squared values.

Generic PF Definition

I find little impact of performance funding on the three state spending outcome variables. Where I do find effects at the state level, they are consistently negative. Results are presented in Table 4.2.

I find that PF GENERAL (equal to 1 for the state years in which any type of performance funding policy targeting the four-year sector was funded, 0 otherwise) has no impact on STATE APP FTE or on STATE APP 1000. There is a statistically significant, negative impact on HIGHER-ED SHARE, such that the implementation of performance funding policies of any kind targeting

the four-year sector leads to a decline in HIGHER-ED SHARE by 1.4 percentage points ($p < 0.05$), compared to HIGHER-ED SHARE in non-PF states. While an effect of this magnitude seems negligible, considering the average HIGHER-ED SHARE is 12 percent, this impact is somewhat noteworthy. It is important to note, however, that when controlling for the previous year's HIGHER-ED SHARE, the decline associated with performance funding was only 0.65 percentage points ($p < 0.05$).

It is somewhat surprising to find that few of the control variables have significant effects on the state spending outcomes, especially in the HIGHER-ED SHARE model. Where significant effects are observed, they impact the outcome variables as expected. For instance, the percent financial aid directed toward need-based funding is negatively associated with HIGHER-ED SHARE. As states spend more on financial aid, they may spend less in higher education appropriations; this may especially be the case for states with large need-based financial aid programs. Unemployment rates, portion of state spending on K-12 education, and net tuition negatively impact STATE APP FTE. Conversely, STATE APP FTE is positively associated with GDP per capita. Interestingly, as citizen ideology increases (i.e., citizenries become more conservative), STATE APP 1000 also increases. One would expect that conservative citizenries would not support increased state spending on higher education; perhaps this effect is related to decreases in personal income. STATE APP 1000 also increases as the portion of a state's working-age population with a bachelor's degree or higher increases.

Considering there is a negative impact on HIGHER-ED SHARE, but not for the other state spending variables, it may be the case that the decline observed is related to changes in overall state budgets, rather than the amount spent on higher education. However, further analysis

related to this possibility suggest that this is not likely (Table 4.3). If, for HIGHER-ED SHARE, the effects observed were driven by the growth in total state expenditures as opposed to a decrease in spending on higher education, then it is reasonable to assume that these effects would be observed in other state spending areas, namely K-12 education and Medicaid (Tandberg, 2007). However, the implementation of performance funding does not impact these alternative outcomes. Likewise, if growth in enrollment was driving the negative impact on STATE APP FTE, rather than a decline in state appropriations, then the implementation of performance funding would be associated with an increase in FTE enrollment, which is not observed. These findings do not suggest that the original effects observed are driven by changes in the denominators.

Perhaps these differences in state-level outcomes come from differences in the definition of state spending/state appropriations for higher education, as discussed in Chapter 3. Consider also the differences in fluctuation over time of these two variables: HIGHER-ED SHARE does not change much over a 30-year span, while STATE APP FTE exhibits greater volatility.

Policy Design Treatment Effects

Following the analysis of PF GENERAL, I redefined treatment to be the implementation of policies that contain the various design elements discussed in Chapter 3: bonus, base, stop-loss/hold-harmless, rolling average, improve, meet target, raw numbers, and compete. I also ran additional panel regressions with fixed effects to test the impact of performance funding dosage. Overall, I find notable effects for base policies (those that allocate existing or base funds on the basis of performance), meet target policies (those that require institutions to meet

a certain threshold of performance), compete policies (those that utilize a competitive measure of performance), and for policies with a larger dosage (those that allocate larger portions of state appropriations according to performance outcomes).

Results for various design elements are presented in Table 4.4. For brevity, the coefficients of the covariates are not presented in this table; the coefficient of interest (the policy element), its t-statistic, the total observations in the model and the R-squared statistics are provided. Each model includes state control variables, and state and year fixed effects. The full dosage models are presented in Table 4.5; and, an abbreviated table for the interaction of dosage with additional policy design elements is provided in Table 4.6.

Base policies negatively impact HIGHER-ED SHARE with a greater magnitude than PF GENERAL: the implementation of base policies leads to a decline in HIGHER-ED SHARE by 2.6 percentage points ($p < 0.001$), compared to HIGHER-ED SHARE in non-PF states. Additionally, HIGHER-ED SHARE declines by 1.4 percentage points ($p < 0.05$) when meet target policies are implemented and 1.5 percentage points ($p < 0.05$) when compete policies are implemented, compared to HIGHER-ED SHARE in non-PF states.

This analysis reveals that the negative effects of performance funding on HIGHER-ED SHARE are largely driven by base policies, highlighting the distinct differences between performance funding policy types. It is important to note that these models do not distinguish between the effects of the “base” and the effects of “performance funding.” One strategy to accomplish this might be the interaction between the performance funding treatment variable and the policy design treatment variables; however, given that the base treatment variable is identical to the performance funding treatment variable for states with a base design, these

two variables are collinear and thus dropped from the models. These results should not be interpreted as an isolation of the policy design elements, especially as multiple design elements exist simultaneously, rather the effects of performance funding policies among states that have a key design element in common.

To determine the impact of the performance funding dosage on state-level spending outcomes, I ran panel regression models with fixed effects, utilizing the interaction of PF GENERAL with dosage (percent of state appropriations tied to performance outcomes) as the independent variable of interest. Generally, I found a significant and negative impact on STATE APP FTE, but no effect for the other state-level outcomes (Table 4.5).

For each percentage point increase in dosage, STATE APP FTE declines by \$1,083.0 ($p < 0.01$). When controlling for the inclusion of two-year PF funding dollars in the portion of funds tied to performance outcomes, this effect largely remains though decreases slightly in magnitude (see Appendix D, Table D1).

The interaction of other design elements with dosage reveals that the impact of funding portion is concentrated among policies with base, raw number, and compete design elements. As PF dosage increases by one percentage point among states with base policies, STATE APP FTE declines by \$1,050.40 ($p < 0.01$), compared to STATE APP FTE in non-PF states (Table 4.6). States utilizing a raw number policy exhibit a decline of \$1,039.20 ($p < 0.05$) in STATE APP FTE for each percentage point increase in dosage, relative to non-PF states. Lastly, for states with compete policies, a one-percentage point increase in dosage leads to a \$1,189.50 ($p < 0.01$) decline in STATE APP FTE.

Though dosage did not have an effect on HIGHER-ED SHARE, sizeable impacts emerge for states with specific policy types. A large, negative effect on HIGHER-ED SHARE is observed for the combination of dosage and bonus policies. While this may be somewhat surprising, several states' bonus performance funding policies were implemented to make up for otherwise declining funds, and in many cases did not lead to a net gain in funding. Meet target policies are also associated with a large decline in HIGHER-ED SHARE as dosage increases; this effect is largely driven by the policies implemented in Tennessee and South Carolina—two policies that have tied the largest portion of funding to performance.

Alternative Counterfactuals

As mentioned in Chapter 3, I explored alternative counterfactuals to approximate better comparisons between the treated and control groups. I investigated performance funding treatment effects among states with similar higher education governance structures, political party leadership, citizen ideology, and geographic region. Abbreviated results are presented in Table 4.7.

In terms of higher education governance structure, I find no difference in state spending between PF states and non-PF states that have consolidated governing boards. However, among states with coordinating boards, the implementation of performance funding (generally defined, for all policies targeting the four-year sector) leads to a decline in HIGHER-ED SHARE by 1.5 percentage points ($p < 0.05$) compared to HIGHER-ED SHARE in non-PF states. This is consistent with my expectations: that consolidated governing boards, as a stronger representative of higher education interests, are better positioned to prevent declines in funding associated with performance funding (McLendon, et al., 2006). Coordinating boards, on

the other hand, have less power and thus may be unable to prevent the negative effects of performance funding.

In regards to political leadership, I looked at the partisan make-up of state legislatures. Surprisingly, no effects for HIGHER-ED SHARE or STATE APP FTE are observed among democratic- or republican-controlled states. However, among democratically-controlled states, performance funding is associated with a decline in STATE APP 1000 of \$0.56 ($p < 0.05$), relative to non-PF, democratically-controlled states.

Among states with more conservative citizenries, those that implement performance funding spend a similar amount on higher education than those without performance funding. Similarly, among liberal states, those that implement performance funding spend a similar amount than liberal states without performance funding.

Given that republican-controlled states are more likely to adopt performance funding policies (McLendon, Hearn, & Deaton, 2006), spending patterns among republican-controlled states typically do not favor higher education, and the growing criticism of higher education by republicans and conservatives (Pew Research Center, 2012, 2017), I expected to find the negative impacts of performance funding concentrated among republican-controlled states and states with more conservative citizens. The unexpected negative treatment effects among democratically controlled states might be driven by key southern states that have become more republican-controlled in recent years (namely, South Carolina, Tennessee, and Texas) but still have slightly less than 50 percent republican legislators from 1986 to 2014.

Finally, I ran models for each of the four major geographic regions of the US: Midwest, Northeast, South, and West. It seems the negative effects of performance funding on HIGHER-

ED SHARE are concentrated in the South: performance funding states in the South spend 3.2 percentage points less ($p < 0.01$) on higher education compared to non-performance funding states in the South. This is not necessarily surprising considering the two of the three most aggressive performance funding policies are located in the South: Tennessee and South Carolina.

State-level Robustness Checks

I employed a variety of robustness checks to test the results of the state-level models. I ran models that tested the sensitivity of the various years of performance funding implementation as well as the inclusion/exclusion of certain PF states with unusual implementation patterns. In addition, I explored the impact of performance funding implementation in each treated state individually to further determine differences in treatment effects. I ran lead-lag models to rule out the influence of pre-existing trends and to determine the short- and long-term effects of performance funding implementation. Results of the robustness checks are primarily presented in Appendix D, with the exception of the lead-lag models presented in Table 4.8.

Alternative Treatment Periods. One challenge in the design of this study is that performance funding policies are implemented at different times in different states, and in some cases for multiple periods. The primary models compare state spending outcomes in PF states to non-PF states in years when the policy is implemented to all years in which the policy is not implemented. To test the robustness of the results to the various implementation times in some states, I ran models that excluded post-implementation years—that is, for states that

abandoned performance funding, the years after the policy were dropped from the model. Findings related to HIGHER-ED SHARE were robust to this exclusion (Appendix D, Table D2).

There were a few states with unusual implementation characteristics: Arkansas, Minnesota, and Tennessee. Arkansas' and Minnesota's policies were only implemented for one year and Tennessee has had two performance funding policies, one of which is beyond the scope of this dissertation due to its early implementation. I ran models with and without these states to test the sensitivity of the models to these states. I find that excluding these states produced similar results as the original models (Table D2).

State-specific Models. I defined policy variables specific to each PF state and then ran DD models that compared outcomes in each state to all other non-PF states. For these models, the period examined was limited to 10 years before/after the policy implementation (Appendix D, Table D3).

For HIGHER-ED SHARE, nine out of the 20 treated states exhibited negative effects of performance funding, compared to non-PF states; one state (Oklahoma) actually exhibited positive effects of performance funding implementation on HIGHER-ED SHARE. Eight of the treated states experienced declines in STATE APP FTE associated with performance funding implementation; noteworthy states include New Mexico ($b = -\$1,654.00$, $p < 0.001$), South Carolina ($b = -\$977.40$, $p < 0.001$), and Tennessee ($b = -\$839.90$, $p < 0.01$). Two states exhibited positive effects: Missouri and South Dakota. Interestingly, several states exhibited negative effects of performance funding on STATE APP 1000—up to this point, few effects had been observed on this outcome variable. The results of the state models suggest that the overall findings presented above are not driven by just one or two states.

Colorado and South Dakota had multiple implementation periods, so I tested individual state models with different treatment period specifications (Appendix D, Table D4). For Colorado, I tested the first treatment alone, the second treatment alone, and then defined treatment as continuous across both periods. It seems the second policy had a greater impact in the single state model, such that STATE APP FTE and STATE APP 1000 are negatively associated with the implementation of this policy, whereas the first iteration of performance funding in Colorado actually had a positive impact on HIGHER-ED SHARE. For South Dakota, I ran models excluding the 2005 and 2013 years of implementation; excluding the final two years produces similar results. This is not surprising, as the final two years for which there is evidence of performance funding in South Dakota seem to be isolated incidents.

Lead-lag Models. To test the parallel trends assumption (i.e., for pre-existing trends leading up performance funding implementation), I ran a series of lead-lag models in which I replaced the policy variable of interest with a series of time dummy variables (1, 2, 3, 4, and 5+ years before and after implementation, with the year of implementation as the reference category). Not only do these models allow me to test for pre-existing trends, they also show the long and short-term effects of performance funding. Abbreviated results are presented in Table 4.8.

I did not find evidence of pre-existing impacts of PF GENERAL on any of the outcome variables. For HIGHER-ED SHARE, there is a lingering negative effect one year after performance funding was implemented. It is noteworthy that there does not seem to be any long-term effects of the treatment. The primary effect is observed in the first few years of implementation.

Discussion of State-level Results

Generally, I find that performance funding is associated with declines in state spending on higher education. However, out of three outcome variables, only HIGHER-ED SHARE consistently declines as a result of performance funding implementation. STATE APP FTE only exhibits declines when PF dosage is sufficiently high and few effects are found for STATE APP 1000. While it is possible that changes in overall state budgets and/or higher education enrollment could be driving the outcomes that are observed, further analysis suggests this is not the case. Despite the somewhat mixed state-level results, the effects that are observed are consistently negative (with the exception of some individual states) and are robust to a variety of alternative specifications.

I found that the negative effects of performance funding on HIGHER-ED SHARE largely occur for base policies and are more severe for higher dosage policies—suggesting that when more or existing resources are at stake, states are more likely to spend less on higher education. In addition, I find the negative effects are concentrated in states with coordinating governance structures, states that are democratically controlled, and/or located in the South. It is important to note that these state-level measures of spending on higher education are somewhat blunt for testing the impact of performance funding policies that target four-year institutions. These large state-level measures encompass a variety of spending areas that are not necessarily germane to the specific questions of this study. For instance, all three outcome variables include spending in the two-year sector. Moreover, there are some concerns as to the reliability of the state-level outcome variables, discussed in Chapter 3.

The purpose of the state-level analysis was to determine whether or not performance funding policies lead to changes in the overall availability of state funding for higher education. While there are certainly limitations of Phase One, it still provides important information regarding the relationship between performance funding policies and state-level spending on higher education. This analysis informs the next phase of the study, which is to examine how performance funding treatment effects vary across institutional types. It is reasonable to assume going forward that the changes observed at the institution-level will not be entirely driven by changes at the state level, since the state-level findings are mixed, relatively small in magnitude, and generally imprecise measurements of state-spending on public, four-year higher education. That said, it will be important to pay close attention to the impact of performance funding among states with base, meet target, and compete design elements, as well as high-dosage policies, given the consistent, negative effects observed at the state level.

Phase Two: Institution-level Results

The outcome variable for the second phase of this study is STATE APP INST (state appropriations per student, from IPEDS). While I used a similar, state-level dependent variable in Phase One (STATE APP FTE), this institution-level variable is a more precise measurement of the primary outcome of interest. STATE APP INST is the dollar amount an institution received from the state per student; funding for two-year institutions is not a conflicting factor as with the state-level variables. While the exact sources of the state appropriations are not identified (e.g., tax revenue, federal funding), STATE APP INST provides sufficient information on a key funding source for public institutions.

This section begins with details of data considerations for Phase Two, followed by descriptive analysis of STATE APP INST. From here, I present the DD models, first with a discussion of the impact of performance funding (generally defined) on all public, four-year institutions. Then, I illustrate the effect heterogeneity of PF GENERAL across institution types: research, master's, bachelor's, highly selective, selective, non-selective, rural, and MSIs. Next, I examine the treatment effects across the performance funding design elements: base, bonus, hold harmless/stop loss, rolling average, improve, meet target, raw numbers, and compete. The impact of performance funding for these primary DD models are presented in reference to similar institution types in non-PF states.

Following the discussion of the primary DD models, I provide results for models utilizing alternative counterfactuals. In this section, I reduce baseline differences between treated and control groups by examining treatment effects across states with similar higher education governing structures, political leadership/citizen ideology, and geographic region.

To solidify the findings discussed in this section, I discuss a series of robustness checks and sensitivity analyses conducted for the institution-level models, as conducted in Phase One. Lastly, I conclude the chapter with a summary of the institution-level analysis and how these findings concord (or not) with the state-level results.

Data Considerations

There are 428 public, four-year institutions included in Phase Two of this study. I did not include medical schools, four-year schools that granted primarily associate's degrees, institutions that received little to no state funding (military institutions, tribal institutions), and institutions in Pennsylvania that are not a part of the Pennsylvania System of State Higher

Education⁹. Moreover, institutions in Colorado were not included in the primary institution-level models due to a restructuring of state appropriations in 2006¹⁰. To test the robustness of the findings, I ran models with Colorado (up to year 2006) and without Colorado as well as a state-specific model to test Colorado's performance funding policies. Institutions in New York and Nebraska are also excluded, as explained in Chapter 3. Institutions with several years of missing data were not included in the final sample. Lastly, for some institutions STATE APP INST was either very small or very large. To prevent these outliers from influencing the results, I did not include institutions whose STATE APP INST was below the first percentile or above the 99th percentile.

For the small number of institutions that reported data to IPEDS in a parent-child arrangement, all institution-level data were collapsed to the parent reporting level as described by Jaquette and Parra (2014). The other option for dealing with this issue is to allocate the data reported at the parent level to the child institutions; as this method could easily result in inaccurate measurements for key variables, I chose instead to collapse at the parent level. Collapsing the data to the parent reporting level alleviates many of these concerns regarding accuracy.

Descriptive Analysis

In keeping with state level observations, PF states consistently appropriate fewer dollars per student than non-PF states. On average, states spend \$6,456 per student (in 2014 constant

⁹ These are the only Pennsylvania institutions subject to performance funding and most non-PASSHE schools did not report state appropriations in IPEDS for several years.

¹⁰ In 2004, CO adopted the College Opportunity Fund bill, which created a voucher system for state funding for higher education. As a result, state funding was allocated in two ways: stipends for students (recorded as tuition) and fee for service (recorded as other revenue). As such, state appropriations are not reported in IPEDS for Colorado institutions from 2006 onward.

dollars). Funding per student has generally decreased over the period observed in this study, notably declining since 2008 (see Figure 4.6). In 2014, the average state appropriations per student was \$4,614 for PF-states and \$6,440 for non-PF states. Summary statistics are presented in Table 4.9.

There are some noteworthy differences between PF and non-PF states in terms of the control variables. Institutions in PF states have slightly greater tuition and fee revenue on average, enroll a greater portion of part-time students, have a lower average faculty salary, and produce fewer bachelor's degrees per 100 students on average compared to non-PF states. In terms of the institutional make-up of PF and non-PF states, there are 219 four-year institutions in the PF states and 209 in the non-PF states; the proportions of institution types are similar across PF and non-PF states. Although, PF states have a slightly smaller proportion of bachelor's, highly selective, and selective institutions and a greater proportion of non-selective institutions, compared to non-PF states.

Difference-in-Differences Models

The DD models utilized for the institution-level analysis include both institution and state control variables, institution fixed effects, and year fixed effects. Given the fixed effects design of the models, I report both the within and overall R-squared values.

Generic PF Definition

I find that PF GENERAL (equal to 1 for the state years in which any type of PF policy was funded, 0 otherwise) does not have a statistically significant effect on STATE APP INST for all institutions, but exhibits notable (and varied) impacts across institutions. Performance funding implementation is associated with declines in STATE APP INST for non-research, non-highly

selective, and rural institutions and associated with increases in STATE APP INST for research institutions, compared to similar institutions in non-PF states. Results are presented in Table 4.10.

I do not find significant effects of performance funding implementation for all four-year institutions on average; however, notable treatment effects emerge across the institution types. For research institutions, STATE APP INST increases by \$388.10 ($p < 0.001$) following performance funding implementation, compared to research institutions in non-PF states. Likewise, STATE APP INST at highly selective institutions increases by \$559.30 ($p < 0.01$) relative to highly selective institutions in non-PF states. In contrast, master's, bachelor's, and less selective institutions exhibit declines in STATE APP INST following performance funding implementation of \$266.40 ($p < 0.001$), \$264.40 ($p < 0.05$), and \$332.30 ($p < 0.001$), respectively, compared to similar institutions in non-PF states. In addition, rural institutions also experienced a decline in STATE APP INST associated with performance funding implementation ($b = -\$256.60$, $p < 0.05$). Significant effects were not observed for nonselective or minority serving institutions.

There is overlap between the institution categories. For example, an institution can be classified as research and less selective. I ran models with different combinations of institution types and selectivity. The effects of PF GENERAL on STATE APP INST are more potent when combining these institutional characteristics. Performance funding implementation negatively affects less selective master's institutions ($b = -\$352.90$, $p < 0.001$) and positively affects highly selective research institutions ($b = \$799.00$, $p < 0.001$), compared to similar institutions in non-

PF states (Appendix E, Table E1). Moreover, nonselective rural institutions exhibit declines in STATE APP INST of \$508.70 ($p < 0.05$), compared to similar institutions in non-PF states.

It is not necessarily surprising, although notable, to find positive effects of performance funding policies at research/highly selective institutions and negative effects at non-research, non-highly selective, and rural institutions. As mentioned in Chapter 2, I expected performance funding policies to benefit highly resourced institutions and burden resource-poor institutions. It is also important, however, to point out the indirect benefits and burdens that performance funding policies may impose. For example, the lack of effect for MSIs or nonselective institutions might be interpreted as a benefit since funding decreases are absent, or perhaps a burden in light of not receiving an increase in funding. Here forth, I will discuss the both the direct/explicit financial benefits and burdens of performance funding (observed increase or decrease in STATE APP INST) as well as the indirect/implicit effects (lack of an increase or decrease).

Policy Design Treatment Effects

As with the state-level analysis, I utilized a variety of performance funding treatment definitions: bonus, base, stop-loss/hold-harmless, improve, meet target, raw numbers, and compete. I also ran panel regression models with fixed effects to test the impact of performance funding dosage. I find that the impact of performance funding varies by policy design; however, consistent with the findings above, increases in funding are only observed for research and/or highly selective institutions while decreases in funding are exhibited only among non-research, non-highly selective, rural, and minority serving institutions. Abbreviated policy design models are found in Table 4.11.

Across all four-year institutions, base policies led to a decline in STATE APP INST of \$559.80 ($p < 0.001$) on average, compared to all public, four-year institutions in non-PF states. Conversely, bonus policies are associated with an increase in STATE APP INST ($b = \$179.50$, $p < 0.05$) across all four-year institutions, relative to four-year institutions in non-PF states. Regarding the measurement of performance, meet target policies ($b = -\$285.30$, $p < 0.05$) and compete policies ($b = -\$708.10$, $p < 0.001$) also exhibited negative impacts on STATE APP INST across all public, four-year institutions. With the exception of bonus policies, the treatment effects observed across the policy design elements are consistent with the state-level findings and might be driven by changes in overall state spending on higher education.

Results for the policy designs across institution types are consistent with those described for PF GENERAL: research and highly selective institutions only experience direct positive effects of performance funding on STATE APP INST, while master's, bachelor's, less selective, non-selective, rural, and minority serving institutions only experience direct negative effects of performance funding.

When it comes to the funding allocation mechanisms, base policies negatively impact STATE APP INST for nearly all of the non-research, non-highly selective institution types, compared to similar institution types in non-PF states. For these non-research/non-highly selective institutions base policy implementation is associated with a decrease in STATE APP INST of around \$500 on average ($p < 0.001$). Notably, MSIs exhibit a decline of \$877.30 ($p < 0.05$) associated with performance funding implementation, relative to MSIs in non-PF states. Conversely, STATE APP INST increases by \$584.40 ($p < 0.05$) for highly selective institutions when base policies are implemented compared to highly selective institutions in non-PF states.

While base policies were associated solely with declines in funding at the state level, it appears that performance funding policies with base allocation mechanisms distribute both financial benefits and burdens across institution types.

Bonus policies are associated with positive impacts on STATE APP INST for research ($b = \$448.20$, $p < 0.001$) and highly selective institutions ($b = \$559.70$, $p < 0.01$). No effects are observed for master's, bachelor's, less selective, non-selective, rural, or minority serving institutions; this may be interpreted as a potential financial burden as these institutions do not experience an increase in funding.

In terms of the budget protection provisions, few significant effects are observed. As hold harmless and stop loss provisions are often used in conjunction with base policies (there is no need for budget protection when new money is tied to performance), findings suggest that these provisions, in some cases, prevent the manifestation of the negative impacts of performance funding. For highly selective institutions, hold harmless/stop loss provisions are actually associated with a direct financial benefit ($b = \$923.90$, $p < 0.001$). It is somewhat surprising to find that even for policies that utilize these budget protection provisions, nonselective institutions continue to experience direct negative effects of performance funding, likewise for bachelor's institutions under performance funding policies that utilize a rolling average specification.

Improve policies exhibited positive effects for research institutions ($b = \$464.90$, $p < 0.05$). This is somewhat surprising since research institutions may have less room for improvement than other institution types, considering their typically high graduation rates, etc. It is important to note that some improvement policies also reward institutions that maintain

satisfactory levels of performance without having to continually improve. For example, Arkansas' policy is based on improvement, but institutions do not have to improve every year for every performance metric; and, Kansas' policy required institutions to either maintain the baseline or improving (see Appendix A). In addition, the lack of effect for other institution types may result from funding not decreasing; in other words, other institutions may be rewarded for annual performance improvement by not losing funding. Nevertheless, it is striking that the direct financial benefit is concentrated at research institutions.

Meet target policies are associated with a decline in STATE APP INST for master's ($b = -\$469.70$, $p < 0.001$), less selective ($b = -\$470.80$, $p < 0.001$), and non-selective ($b = -\$398.70$, $p < 0.05$) institutions, compared to similar institutions in non-PF states. Conversely, meet target policies are associated with funding increases for research ($b = \$464.90$, $p < 0.05$) and highly selective institutions ($b = \$610.90$, $p < 0.01$), relative to similar institution types in non-PF states. Much like performance funding policies that utilize a base allocation mechanism, meet target policies distribute both benefits and burdens across four-year institution types.

Policies that incorporate raw performance output are associated with an increase in STATE APP INST for research institutions ($b = \$599.10$, $p < 0.01$) and highly selective institutions ($b = \$1,141.70$, $p < 0.001$) compared to similar institutions in non-PF states. Statistically significant effects of raw number policies are not observed for all other institution types. Perhaps these performance funding policies are better at preventing financial burdens than others; however, direct financial benefits still accrue to the highly resourced institution types.

Lastly, compete policies have a strong, negative impact on STATE APP INST for every four-year institution type not designated as research or highly selective institution type. The

magnitude of the effect of compete policies is among the largest of the treatment effects observed thus far, often greater than \$1,000. Notably, MSIs exhibit a \$1,420.60 decline in STATE APP INST ($p < 0.05$) relative to MSIs in non-PF states. It is important to note that I defined compete policies both with and without the state of Tennessee. While Tennessee's policy does not explicitly state that institutions must compete for funds, the policy is implemented such that whichever institution's performance output is greatest benefits the most (see Appendix A). When Tennessee is excluded from compete policies, the magnitude of the treatment effect was slightly larger than the results presented in Table 4.11.

I am somewhat surprised that positive effects of compete policies are not observed for research and highly selective institutions. Considering that the state-level results reveal a notable negative impact of compete policies on HIGHER-ED SHARE, it may be the case that the results observed here are driven by changes at the state level such that the decline observed most significantly impacts non-research and non-highly selective institutions. Recall that only five states have a compete policy, so it may be the case that state-specific trends are also driving these outcomes. Pennsylvania is one of the states with a compete policy; and, as will be discussed in detail below, Pennsylvania's policy exhibits strong negative effects across all institution types.

In most of these cases, the treatment effects across policy design elements are about what I expected. What is especially noteworthy is the fact that the direct positive effects consistently accrue to the research and highly selective institutions exclusively, while the direct negative effects are limited to the contexts of non-research and non-highly selective institutions.

As in Phase One of this study, I also investigated the impact of performance funding dosage on STATE APP INST (Table 4.12). Recall that performance funding dosage is the portion of state appropriations tied to performance outcomes. For Phase Two, I used institution-level state appropriations aggregated to the state level to create this variable, providing a more precise measure of dosage than the measure used in the state-level analysis.

The dosage models reveal similar patterns of benefits and burdens of performance funding discussed thus far. Among research institutions, as dosage increases by one percentage point, STATE APP INST increases by \$658.90 ($p < 0.05$), compared to research institutions in non-PF states. Likewise, among highly selective institutions, STATE APP INST increases by \$1,276.00 ($p < 0.001$) as dosage increases by one percentage point, relative to highly selective institutions in non-PF states. For master's institutions, as dosage increases by one percentage point, STATE APP INST decreases by \$1,060.10 ($p < 0.01$), relative to master's institutions in non-PF states. Similar effects are observed for bachelor's institutions ($b = -\$913.10$, $p < 0.01$) and less selective institutions. ($b = -\$780.10$, $p < 0.01$). Recall that some states' performance funding dollars are inclusive of those allocated to two-year institutions. As this specification inflates performance dosage for some states, I ran additional models controlling for the inclusion of two-year schools' funds. Results are robust to this inclusion, although the magnitude of the coefficients is slightly smaller in some cases (see Appendix E, Table E2).

As in Phase One, I also examined the interaction of dosage with the policy design elements related to allocation of funds and measurement of performance (Table 4.13). For the most part, these models reveal similar findings as the policy design elements discussed above; however, as dosage increases, STATE APP INST decreases or increases with greater magnitude,

according to the type of four-year institution. This is not surprising: as performance funding intensity increases and more funding is at stake, the financial consequences become more severe.

Alternative Counterfactuals

To reduce the baseline differences between the treated and control groups, I utilized a variety of more narrowly defined comparison groups. As I did for the state-level analysis, I examined treatment effects across states with similar higher education governance structures, political party leadership/citizen ideology, and geographic region. Abbreviated results are presented in Table 4.14.

Institutions in states with consolidated governing boards and those in states with coordinating boards exhibit similarly negative treatment effects. For institutions subject to both types of governance structures, performance funding is associated with decreases in state appropriations per student only for non-research, non-highly selective institutions. However, performance funding policies in states with coordinating boards also tend to favor research ($b = \$335.40$, $p < 0.05$) and highly selective institutions ($b = \$734.20$, $p < 0.001$), which is not observed for institutions subject to consolidated governance structures. This is somewhat surprising; I expected consolidated governing boards might mitigate the potential negative impacts of performance funding through their advocacy on behalf of institutions (McLendon, Hearn, & Deaton, 2006). Interestingly, financial benefits and burdens emerge across institutions under coordinating board arrangements, but only declines in funding are observed for institutions under consolidated governing boards.

I find some notable differences in outcomes across political party lines. In republican-controlled states, research ($b = \$442.30, p < 0.01$) and highly selective institutions ($b = \$577.70, b < 0.05$) exhibit increases in funding, relative to similar institution types in republican-controlled, non-performance funding states. Master's ($p < -\$371.20, p < 0.001$), bachelor's ($b = -\$373.60, p < 0.05$), less selective ($b = -\$342.40, p < 0.01$), and non-selective institutions ($b = -\$279.90, p < 0.05$) all experience declines in funding following performance funding implementation, compared to similar institution types in republican-controlled, non-performance funding states. In democratic-controlled states, on the other hand, only increases in state appropriations per student are associated with performance funding implementation. These positive effects are, again, limited to the contexts of research ($b = \$585.40, p < 0.001$) and highly selective institutions ($b = \$501.00, p < 0.05$). So while democratic-controlled states might be better at preventing performance funding policies from distributing direct financial burdens, it is still only the highly resourced institutions that benefit from the policy.

The geographic region models do not reveal region-specific effects of performance funding, as seen in the state-level analysis. Most of the institution-level effects are observed in the Northeast and Midwest, which may be driven by the notable effects observed for Pennsylvania and Ohio, respectively. In regards to the South, it is surprising to see there is only a positive impact for research universities, considering the negative state-level impacts concentrated in this region. Perhaps the negative impact observed at the state level is related to changes in the two-year sector, rather than the four-year sector.

Institution-level Robustness Checks

As with the state-level analysis, I ran a series of robustness checks and sensitivity analyses to verify the findings discussed in Phase Two. I tested the sensitivity of alternative years of performance funding implementation and the inclusion/exclusion of some states with unusual implementation periods. I also ran state-specific models to further test the differences in the policy types. Lastly, I ran lead-lag models to test the parallel trends assumption. Results can be found in Appendix E.

For the most part, the institution-level findings are robust to the specifications discussed below; however, given the large number of models I ran, some minor changes did occur. Despite these minor changes, the general findings stand: where direct financial benefits are associated with performance funding implementation they are concentrated at research or highly selective institutions, while direct financial burdens associated with performance funding are concentrated at non-research, non-highly selective institutions, rural institutions, and/or MSIs.

Alternative Treatment Periods. As explained in the state-level analysis section, performance funding policies have multiple implementation periods in some states. To address this timing issue, I first ran models that only used the pre-treatment years and the implementation years of the policies, ignoring the post-treatment years (thus examining the sensitivity of the models for states that abandon performance funding). The findings discussed above are robust to removing the post-implementation years for the states that abandoned their performance funding policy (Table E3).

Secondly, I left out a few states that had unique or challenging implementation periods, as explained in Phase One: Arkansas, Minnesota, and Tennessee. The institution-level findings are robust to the exclusion of these states. Thus, the institution-level results do not seem to be overly sensitive to just a few states' policy quirks.

State-specific Models. I ran individual state models to further test the impact of performance funding on STATE APP INST and the effect heterogeneity of the various policy types. When looking at institutions overall, I find performance funding policies have negative effects in five states and positive effects in one (Table E4).

For the most part, the treatment effects across institution types in the individual state models follow the same patterns observed in the primary analysis, though not in every case. Given the large number of models, this is not necessarily surprising. Of note, however, is the consistent and large negative effect of performance funding in Pennsylvania. All institution types in this state experience negative impacts of performance funding (with the exception of highly selective institutions, as none of the PASSHE institutions are categorized as highly selective). Pennsylvania's policy has been in place since fiscal year 2001 and is one of the few policies with an explicit competitive performance arrangement. According to the 2015 SHEF report, Pennsylvania had the fourth greatest percentage decrease in state appropriations per FTE in the nation. These negative findings are consistent with the state-level analysis, which showed declines in both HIGHER-ED SHARE AND STATE APP FTE for Pennsylvania.

On the other hand, a few states exhibited increases in STATE APP INST associated with performance funding implementation for institutions not yet experiencing direct financial

benefits; for instance, Kentucky's and Missouri's policies exhibit positive effects for master's institutions.

Colorado and South Dakota both had multiple treatment periods, so I ran a few different models for each state separately to test each instance of performance funding (Table E5). As mentioned in Phase One, Colorado's policy was funded 1995-1998 and again 2001-2003. I examined the first iteration, then the second iteration, and then defined the treatment period as continuous from 1995 to 2003. Colorado's second policy in the early 2000s seems to have had greater negative impacts for a variety of institutions compared to its initial policy in the early 1990s. This is consistent with the state-level findings. For South Dakota, I left out two years of implementation (2005 and 2013). Excluding these two years shows no statistically significant effects of South Dakota's performance funding policy; the negative impact for master's institutions observed when all funding years are included must be driven by one of the more recent years of implementation.

This state-specific analysis underscores the differences across performance funding policies and also shows that the effects observed in the primary analysis are not isolated to just a few states. While it is possible that the treatment effects observed in this study may be driven by other policies implemented around the same time as performance funding, the fact that multiple states at various times show similar treatment effects suggests that these findings are driven, at least in part, by performance funding implementation.

Lead-lag Models. I ran lead-lag models to test the parallel trends assumption of DD models first for PF GENERAL (Table 4.15). In each of the lead-lag models, I replaced the policy variable with a series of dummy variables for the years leading up to performance funding

implementation and the years following. I do not find any violation of the parallel trends assumption; that is, the treatment effects noted above did not occur in the years leading up to the policy implementation. However, there is some evidence that for master's and less selective institutions, a leading positive trend was reversed following performance funding implementation. Moreover, both of these institution types exhibit sustained negative treatment effects for several years following performance funding implementation.

Notably, MSIs show delayed negative effects of performance funding ($b = -750.20$, $p < 0.01$), relative to MSIs in non-performance funding states, beginning two years after the policy was implemented. These negative effects for MSIs are sustained for several years.

Summary of Institution-level Results

The institution-level analysis reveals notable effect heterogeneity of performance funding policies across institution types and across policy design elements. I find that performance funding policies, generally defined, have a positive impact on STATE APP INST for research and highly selective institutions, but demonstrate negative effects for the non-research, non-highly selective, and rural. These findings hold up across the policy design treatment effects. Some design elements, like bonus allocation mechanisms or improvement performance evaluations, are associated with positive impacts on STATE APP INST. In these cases, increases in STATE APP INST still only occur for research and highly selective institutions. Other design elements, like base and compete, are consistently associated with negative impacts on STATE APP INST, only for non-research/non-highly selective institutions, rural institutions, and MSIs. These institution-level findings are robust to a variety of model specifications and sensitivity analyses.

It is clear from this second phase of analysis that important and consequential performance funding effects exist for institutions, even if these effects are not consistently apparent at the state level. On the other hand, it may be the case in some instances—especially for base, competitive, and/or high dosage policies—that institution-level effects are driven by changes observed at the state level. However, even if this is the case, it is clear that performance funding does not impact all institutions similarly, regardless of whether the change occurs at the state level or is a result of funding redistribution.

The institution-level analysis demonstrates that performance funding policies favor some institutions over others, one of the key criticisms of performance funding and one of the motivating questions of this study. It may be the case that some institutions benefit as a direct result of good/improved performance, as is typically the intention of the policies. Research and highly selective institutions may perform well, thus experiencing an increase in state appropriations. To test for this possibility, I ran DD models with bachelor's degree production (number of bachelor's degrees awarded per 100 students) as the dependent variable, anticipating a positive association between performance funding implementation and bachelor's degree production for research and highly selective institutions (Tables 4.16 and 4.17). To allow enough time to observe changes in bachelor's degree production, I lagged the policy variable by four years. Interestingly, I found that performance funding implementation had a positive impact on bachelor's degree production primarily at bachelor's institutions, with no effects observed at research or highly selective institutions. The effects for bachelor's institutions increase in magnitude when bonus policies or raw number policies are implemented.

There are a couple of things to note. First, not all performance funding policies use bachelor's degree production as a performance outcome, though this is the most common outcome of interest. So just because bachelor's degree production seems unaffected by performance funding implementation, this does not mean that institutions are underperforming in other areas. Moreover, research and highly selective institutions may have little room to improve bachelor's degree production and may benefit from performance funding by simply maintaining current levels of production. Second, the models I used were not built to estimate the impact of performance funding on bachelor's degree production; the R-squared statistics are much lower in these models than in the funding models presented. Despite these caveats, it is troubling to see improved performance associated with performance funding implementation at institutions that do not seem to reap financial benefits, or worse, experience direct financial burdens.

On the other hand, the distributions of financial benefits and burdens may result from the idea that some institutions are more deserving than others, based on the social construction of the policy targets. While it is clear that some policy designs do indeed impose burdens while others provide benefits, it is not clear from this study whether the goals set or performance indicators utilized are *intended* to favor some institutions over others. Consider, however, that master's and highly selective institutions both demonstrate improvements in bachelor's degree production under meet target policies, relative to master's and highly selective institutions in non-PF states; however, master's institutions incur direct financial burdens while highly selective institutions remain unaffected (perhaps a financial benefit) associated with performance funding implementation. This suggests, perhaps, that these

outcomes are not purely based on an institution's performance, but rather might be baked in to how the policy was designed in terms of who *should* benefit. The next chapter will further discuss the theoretical and policy implications of these results.

Table 4.1. State-level Variables Summary Statistics

Variables	ALL		PF states		Non-PF states	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
HIGHER-ED SHARE	0.120	0.054	0.126	0.052	0.115	0.055
STATE APP FTE	8,412.210	2,621.735	7,777.593	1,766.669	8,865.507	3,011.173
STATE APP 1000	7.320	2.644	7.163	2.298	7.432	2.862
GDP per capita	37,594.530	11,778.250	35,783.380	9,983.859	38,888.210	12,757.770
Unemployment rate	5.768	1.888	5.937	1.776	5.648	1.956
Per capita income	29,042.550	10,325.070	27,867.760	9,536.276	29,881.690	10,781.060
% state spending on K12	0.212	0.055	0.221	0.049	0.206	0.059
% state spending on Medicaid	0.176	0.067	0.191	0.066	0.165	0.065
% republican governors	0.511	0.500	0.528	0.500	0.500	0.500
% republican legislators	0.468	0.163	0.488	0.133	0.454	0.180
Citizen ideology	50.344	15.007	46.557	10.939	53.050	16.831
% adult population with bachelor's degree+	0.277	0.060	0.267	0.057	0.284	0.061
% population aged 18-24	0.101	0.009	0.101	0.007	0.102	0.011
% college students enrolled in 4-year inst	0.667	0.134	0.664	0.110	0.670	0.149
% college students enrolled in public inst	0.784	0.123	0.799	0.100	0.773	0.136
Net tuition revenue per FTE	4,419.112	2,430.159	4,366.029	1,917.911	4,457.029	2,738.547
Financial aid per college-aged person	230.030	288.951	254.979	324.190	212.209	259.637
% financial aid based on need	0.628	1.613	0.602	0.320	0.647	2.095
Number of states	48		20		28	

Notes: See Appendix C for variable definitions; PF states = states in which performance funding policies targeting four-year institutions were funded; all financial data in in 2014 constant dollars.

Table 4.2. Estimates of Performance Funding Impact on State-level Spending on Higher Education

Variables	HIGHER-ED SHARE	STATE APP FTE	STATE APP 1000
PF GENERAL	-0.0140* (-2.64)	-95.13 (-0.68)	-0.00516 (-0.05)
GDP per capita (1000s)	-0.000446 (-0.39)	75.75* (2.15)	-0.0218 (-0.79)
Unemployment rate	-0.00179 (-1.21)	-261.0*** (-4.63)	-0.0773 (-1.19)
Per capita income (1000s)	0.000800 (0.45)	44.13 (0.83)	0.0140 (0.29)
% state spending on K12 ed.	0.0421 (0.70)	-3140.7* (-2.21)	-0.264 (-0.24)
% state spending on Medicaid	0.0274 (0.50)	370.4 (0.26)	-0.514 (-0.41)
% republican governors	0.00283 (1.26)	97.54 (0.99)	0.0417 (0.47)
% republican legislators	0.0160 (0.69)	1502.8 (1.67)	-0.877 (-1.09)
Citizen ideology	0.000153 (0.65)	14.14 (1.13)	0.0172* (2.05)
% adult population with bachelor's degree†	0.0508 (0.72)	-3078.7 (-1.44)	4.479* (2.22)
% population aged 18-24†	0.624 (1.38)	-10031.5 (-1.17)	-13.05 (-1.59)
% college students enrolled in 4-year inst†	-0.0314 (-0.56)	-464.8 (-0.30)	-1.851 (-1.37)
% college students enrolled in public inst†	-0.0154 (-0.37)	287.8 (0.16)	2.590 (1.65)
Net tuition revenue per FTE† (1000s)	0.00470 (1.57)	-248.2* (-2.56)	-0.251*** (-3.55)
Financial aid per college-aged person†	0.00000538 (1.12)	-0.126 (-0.60)	0.00000337 (0.02)
% financial aid based on need†	-0.0128* (-2.14)	-194.5 (-0.72)	-0.318 (-1.42)
_cons	0.0574 (0.66)	9926.0*** (4.05)	9.502*** (4.98)
N	1152	1152	1152
R-squared within	0.11	0.59	0.62
R-squared overall	0.02	0.36	0.21
State fixed effects	YES	YES	YES
Year fixed effects	YES	YES	YES

Table 4.2. Continued

Notes: * p<0.05, ** p<0.01, *** p<0.001; † = lagged one year; t statistics in parentheses; PF GENERAL = 1 for states and years in which any type of performance funding policy targeting four-year institutions was funded; financial data in 2014 constant dollars.

Table 4.3. Estimates of Performance Funding Impact on Outcome Variable Denominators

Treatment Variables	% state spending on K- 12	% state spending on Medicaid	FTE Student Enrollment	Per capita income (1000s)
PF GENERAL	0.00388	-0.00117	7093.4	-0.400
T-statistic	(0.59)	(-0.14)	(1.34)	(-1.30)
N	1152	1152	1152	1152
R-squared within	0.16	0.53	0.43	0.99
R-squared overall	0.01	0.30	0.02	0.91
State-level controls	YES	YES	YES	YES
State fixed effects	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES

Notes: * p<0.05, ** p<0.01, *** p<0.001; PF GENERAL = 1 for states and years in which any type of performance funding policy targeting four-year institutions was funded; all financial data in 2014 constant dollars.

Table 4.4. Estimates of Performance Funding Impact on State-level Spending on Higher Education, by Policy Design Elements

Design Element Models	HIGHER-ED SHARE	STATE APP FTE	STATE APP 1000
Bonus Coefficient	-0.00557	117.4	0.0423
T-statistic	(-1.07)	(0.86)	(0.33)
N	1116	1116	1116
R-squared within	0.10	0.57	0.61
R-squared overall	0.02	0.35	0.19
Base Coefficient	-0.0258***	-270.2	-0.0384
T-statistic	(-3.81)	(-1.16)	(-0.22)
N	1102	1102	1102
R-squared within	0.13	0.58	0.62
R-squared overall	0.01	0.35	0.22
Hold harmless/Stop loss			
Coefficient	-0.0191	-46.68	0.340*
T-statistic	(-1.71)	(-0.26)	(2.20)
N	1078	1078	1078
R-squared within	0.11	0.57	0.61
R-squared overall	0.01	0.36	0.18
Rolling Average Coefficient	-0.0122	-58.01	0.288
T-statistic	(-1.61)	(-0.21)	(1.03)
N	1076	1076	1076
R-squared within	0.10	0.57	0.62
R-squared overall	0.02	0.36	0.19
Improve Coefficient	-0.00868	-101.1	0.0144
T-statistic	(-1.12)	(-0.67)	(0.07)
N	1088	1088	1088
R-squared within	0.10	0.57	0.61
R-squared overall	0.03	0.35	0.18
Raw Number Coefficient	-0.0134	170.8	0.218
T-statistic	(-1.08)	(0.80)	(1.35)
N	1086	1086	1086
R-squared within	0.10	0.58	0.62
R-squared overall	0.02	0.35	0.18
Meet Target Coefficient	-0.0138*	-96.10	-0.0640
T-statistic	(-2.21)	(-0.41)	(-0.49)
N	1110	1110	1110
R-squared within	0.11	0.57	0.61
R-squared overall	0.01	0.36	0.22

Table 4.4. Continued

Design Element Models	HIGHER-ED SHARE	STATE APP FTE	STATE APP 1000
Compete Coefficient	-0.0147*	-303.7	0.224
T-statistic	(-2.68)	(-1.07)	(1.43)
N	1091	1091	1091
R-squared within	0.11	0.58	0.62
R-squared overall	0.01	0.37	0.20

Notes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; each design element = 1 in the states and years in which performance funding policies targeting four-year institutions with that design element are funded; financial data in 2014 constant dollars. This abbreviated table displays the coefficient and t-statistics for the independent variables of interest as well as the number of observations and R-squared statistics for each full model; all models include state-level controls and state and year fixed effects.

Table 4.5. Estimates of the Impact of Performance Funding Dosage on State-level Spending on Higher Education

Variables	HIGHER-ED SHARE	STATE APP FTE	STATE APP 1000
Dosage	-0.0521 (-1.47)	-1083.0** (-2.81)	-0.122 (-0.20)
GDP per capita (1000s)	-0.000627 (-0.52)	74.80* (2.10)	0.00209 (0.04)
Unemployment rate	-0.00173 (-1.15)	-260.9*** (-4.66)	-0.184* (-2.17)
Per capita income (1000s)	0.00103 (0.54)	44.68 (0.83)	-0.0746 (-0.87)
% state spending on K12 ed.	0.0446 (0.74)	-3048.1* (-2.15)	-1.201 (-0.59)
% state spending on Medicaid	0.0284 (0.53)	371.4 (0.26)	1.847 (1.33)
% republican governors	0.00291 (1.26)	97.14 (0.99)	-0.0388 (-0.34)
% republican legislators	0.0120 (0.54)	1489.2 (1.65)	-2.173 (-1.56)
Citizen ideology	0.000121 (0.51)	13.97 (1.11)	-0.0203 (-1.52)
% adult population with bachelor's degree†	0.0372 (0.51)	-3283.5 (-1.53)	0.0586 (0.02)
% population aged 18-24†	0.610 (1.32)	-10189.8 (-1.18)	-7.229 (-0.37)
% college students enrolled in 4-year inst†	-0.0323 (-0.56)	-559.9 (-0.36)	-4.882 (-1.68)
% college students enrolled in public inst†	-0.0183 (-0.43)	246.9 (0.13)	0.365 (0.13)
Net tuition revenue per FTE† (1000s)	0.00435 (1.45)	-253.1* (-2.60)	-0.334** (-3.03)
Financial aid per college-aged person†	0.00000507 (1.02)	-0.132 (-0.62)	0.0000465 (0.45)
% financial aid based on need†	-0.0123* (-2.06)	-189.9 (-0.70)	-0.717* (-2.14)
_cons	0.0682 (0.75)	10108.7*** (4.09)	18.05*** (4.45)

Table 4.5. Continued

Variables	HIGHER-ED SHARE	STATE APP FTE	STATE APP 1000
N	1152	1152	480
R-squared within	0.10	0.59	0.69
R-squared overall	0.02	0.36	0.64
State fixed effects	YES	YES	YES
Year fixed effects	YES	YES	YES

Notes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; † variables lagged by one year; ‡ statistics in parentheses; Dosage is the percent of state appropriations tied to performance outcomes for performance funding policies targeting four-year institutions; all financial data is in 2014 constant dollars.

Table 4.6. Estimates of the Impact of Performance Funding Dosage on State-level Spending on Higher Education, by Policy Design

Policy Design Models	HIGHER-ED SHARE	STATE APP FTE	STATE APP 1000
Dosage X Bonus	-0.352**	3660.9	-4.474
T-statistic	(-2.90)	(0.71)	(-0.90)
N	1152	1152	1152
R-squared within	0.10	0.59	0.62
R-squared overall	0.03	0.36	0.21
Dosage X Base	-0.0496	-1050.4**	-0.385
T-statistic	(-1.44)	(-2.75)	(-1.04)
N	1152	1152	1152
R-squared within	0.10	0.59	0.62
R-squared overall	0.02	0.36	0.22
Dosage X Improve	-0.373	-2276.2	2.086
T-statistic	(-1.57)	(-0.25)	(0.22)
N	1152	1152	1152
R-squared within	0.10	0.59	0.62
R-squared overall	0.03	0.36	0.21
Dosage X Raw Number	-0.0153	-1039.2*	-0.277
T-statistic	(-1.40)	(-2.55)	(-0.93)
N	1152	1152	1152
R-squared within	0.10	0.59	0.62
R-squared overall	0.03	0.36	0.22
Dosage X Meet Target	-0.345***	-1225.4	-1.447
T-statistic	(-10.46)	(-0.93)	(-0.72)
N	1152	1152	1152
R-squared within	0.13	0.59	0.62
R-squared overall	0.03	0.35	0.21
Dosage X Compete	-0.0212	-1189.5**	-0.321
T-statistic	(-1.89)	(-2.95)	(-0.91)
N	1091	1091	1091
R-squared within	0.10	0.58	0.62
R-squared overall	0.02	0.37	0.21

Notes: * p<0.05, ** p<0.01, *** p<0.001; dosage X design element is the percent of state appropriations tied to performance outcomes for performance funding policies with that design element (performance funding policies targeting four-year institutions); all financial data in 2014 constant dollars. This abbreviated table displays the coefficient and t-statistics for the independent variables of interest as well as the number of observations and R-squared statistics for each full model; all models include state-level controls and state and year fixed effects.

Table 4.7. Estimates for the Impact of PF GENERAL on State-level Outcomes, by Alternative Counterfactuals

Comparison Groups	DD Models	HIGHER-ED SHARE	STATE APP FTE	STATE APP 1000
Consolidated governing boards	PF GENERAL	-0.0192	82.99	0.00116
	T-statistic	(-1.78)	(0.35)	(0.01)
	N	480	480	480
	R-squared within	0.25	0.64	0.72
	R-squared overall	0.01	0.13	0.27
Coordinating governing boards	PF GENERAL	-0.0150*	-175.2	-0.00180
	T-statistic	(-2.47)	(-1.09)	(-0.01)
	N	624	624	624
	R-squared within	0.17	0.60	0.58
	R-squared overall	0.15	0.47	0.20
Republican	PF GENERAL	-0.00565	238.7	0.324
	T-statistic	(-1.13)	(1.19)	(1.89)
	N	525	525	525
	R-squared within	0.30	0.69	0.77
	R-squared overall	0.06	0.54	0.05
Democratic	PF GENERAL	-0.0230	-90.91	-0.557*
	T-statistic	(-2.05)	(-0.52)	(-2.77)
	N	650	650	650
	R-squared within	0.11	0.56	0.55
	R-squared overall	0.11	0.38	0.36
Conservative	PF GENERAL	-0.00977	46.52	-0.0856
	T-statistic	(-1.41)	(0.34)	(-0.55)
	N	675	675	675
	R-squared within	0.18	0.58	0.65
	R-squared overall	0.16	0.44	0.31
Liberal	PF GENERAL	-0.0160	-287.6	-0.0412
	T-statistic	(-1.64)	(-0.91)	(-0.18)
	N	525	525	525
	R-squared within	0.25	0.67	0.68
	R-squared overall	0.00	0.38	0.25
Midwest	PF GENERAL	-0.00215	206.0	0.262
	T-statistic	(-0.47)	(1.87)	(1.54)
	N	264	264	264
	R-squared within	0.58	0.79	0.82
	R-squared overall	0.31	0.43	0.18

Table 4.7. Continued

Comparison Groups	DD Models	HIGHER-ED SHARE	STATE APP FTE	STATE APP 1000
Northeast	PF GENERAL	-0.0112	-378.0	-0.197
	T-statistic	(-1.56)	(-1.41)	(-1.79)
	N	240	240	240
	R-squared within	0.32	0.81	0.83
	R-squared overall	0.19	0.22	0.18
South	PF GENERAL	-0.0318**	-236.1	-0.562**
	T-statistic	(-3.72)	(-0.73)	(-3.10)
	N	336	336	336
	R-squared within	0.35	0.64	0.63
	R-squared overall	0.12	0.31	0.20
West	PF GENERAL	-0.00631	239.8	0.175
	T-statistic	(-0.45)	(1.42)	(1.19)
	N	264	264	264
	R-squared within	0.43	0.70	0.74
	R-squared overall	0.07	0.60	0.31

Notes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; PF GENERAL = 1 in the states and years in which performance funding policies targeting four-year institutions are funded; financial data in 2014 constant dollars. Comparison Group describes the treated and control states included in the models (i.e., West includes only states in the western region of the US). This abbreviated table displays the coefficient and t-statistics for the independent variables of interest as well as the number of observations and R-squared statistics for each full model; all models include state-level controls and state and year fixed effects.

Table 4.8 Lead-lag Estimates for State-level Outcome Variables

Lead-lag Time Dummy Variables	HIGHER-ED SHARE	STATE APP FTE	STATE APP 1000
5+ years before PF	0.00726 (0.93)	91.92 (0.38)	0.0688 (0.37)
4 years before PF	0.00992 (1.26)	214.6 (1.14)	0.366* (2.31)
3 years before PF	0.00754 (1.15)	161.1 (0.85)	0.250 (1.64)
2 years before PF	0.00197 (0.32)	36.49 (0.25)	0.0855 (0.65)
1 year before PF	0.00502 (0.97)	114.4 (1.02)	0.0397 (0.35)
1 year after PF	-0.0179* (-2.07)	72.35 (0.47)	-0.0296 (-0.18)
2 years after PF	-0.00728 (-0.98)	77.92 (0.32)	-0.0723 (-0.31)
3 years after PF	-0.000988 (-0.13)	-33.20 (-0.12)	-0.0379 (-0.13)
4 years after PF	-0.00804 (-0.76)	-204.8 (-0.66)	-0.179 (-0.55)
5+ years after PF	0.000621 (0.07)	-372.0 (-1.38)	-0.0657 (-0.22)
N	1152	1152	1152
R-squared within	0.11	0.59	0.62
R-squared overall	0.02	0.34	0.20
State-level controls	YES	YES	YES
State fixed effects	YES	YES	YES
Year fixed effects	YES	YES	YES

Notes: * p<0.05, ** p<0.01, *** p<0.001; t statistics in parentheses; PF = performance funding targeting four-year institutions; the year of PF implementation is the reference category; financial data in 2014 constant dollars.

Table 4.9. Institution-level Variables Summary Statistics

Variable	ALL		PF states		Non-PF states	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
State app per student	6,456.19	2,722.63	5,947.08	2,492.40	6,990.96	2,849.01
% rev from state app	0.37	0.12	0.37	0.11	0.38	0.13
Tuition & fee revenue	5,089.38	2,461.05	5,258.87	2,500.34	4,912.27	2,406.81
Fall enrollment	11,982.39	10,365.37	12,103.55	10,923.00	11,855.17	9,744.88
% part time students	0.24	0.15	0.25	0.15	0.23	0.15
% graduate students	0.15	0.10	0.15	0.10	0.14	0.10
% minority students	0.19	0.24	0.19	0.22	0.20	0.25
Faculty salary	70,813.22	18,544.88	70,062.38	18,030.16	71,603.81	19,041.43
% full-time faculty	0.72	0.18	0.72	0.18	0.72	0.18
Bachelor's degrees per 100 students	13.26	3.92	12.62	3.45	13.92	4.25
% MSI	0.14	0.34	0.13	0.33	0.14	0.35
% Rural	0.18	0.38	0.19	0.39	0.17	0.37
% Research	0.34	0.47	0.35	0.48	0.33	0.47
% Masters	0.59	0.49	0.59	0.49	0.58	0.49
% Bachelors	0.18	0.39	0.16	0.37	0.20	0.40
% Highly selective	0.20	0.40	0.18	0.39	0.22	0.41
% Selective	0.47	0.50	0.44	0.50	0.50	0.50
% non-selective	0.33	0.47	0.37	0.48	0.28	0.45
Number of institutions	428		219		209	

Notes: See Appendix C for variable definitions; PF states = states in which performance funding policies targeting four-year institutions were funded; all financial data in 2014 constant dollars.

Table 4.10. Estimates of Performance Funding Impact on STATE APP INST, by Institution Type

Variables	All institutions	Research	Master's	Bachelor's
PF GENERAL	-87.53 (-1.17)	388.1*** (3.45)	-266.4*** (-3.62)	-264.4* (-2.31)
% revenue from state app.	10751.0*** (11.77)	13351.5*** (8.57)	11218.3*** (12.68)	11214.9*** (4.78)
Tuition & fees†	-0.209*** (-3.63)	-0.170* (-2.12)	-0.0759 (-1.70)	-0.0365 (-0.38)
Fall enrollment†	-0.110*** (-4.72)	-0.0817** (-2.97)	-0.0797*** (-3.60)	-0.172 (-1.49)
% part time students	-3245.8*** (-6.12)	-2091.6 (-1.80)	-3664.5*** (-6.41)	-4135.9*** (-5.93)
% graduate students	-106.5 (-0.22)	425.7 (0.42)	-434.3 (-0.79)	123.2 (0.09)
% minority students	2691.4** (2.86)	8179.5*** (5.22)	462.4 (0.47)	772.0 (0.58)
BA degrees per 100 students	111.7*** (7.52)	152.9*** (5.33)	118.0*** (9.01)	57.89* (2.11)
Faculty salary	0.0239*** (3.80)	0.0177 (1.97)	0.0362*** (5.08)	0.0426* (2.32)
% full-time faculty	73.24 (0.40)	-58.12 (-0.17)	281.3 (1.54)	717.3** (2.99)
_cons	-294.2 (-0.23)	-2481.9 (-0.97)	-1215.9 (-1.03)	-2940.5 (-1.34)
N	8928	3459	5839	1683
R-squared within	0.58	0.64	0.62	0.54
R-squared overall	0.04	0.00	0.44	0.54
State-level control variables	YES	YES	YES	YES
Institution fixed effects	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES

Table continues

Table 4.10. Continued

Variables	Highly Selective	Less Selective	Non-selective	Rural	MSI
PF GENERAL	559.3** (3.40)	-332.3*** (-4.44)	-178.2 (-1.67)	-265.6* (-2.00)	-256.4 (-1.03)
% revenue from state app.	15177.1*** (6.56)	12142.1*** (14.09)	8533.8*** (5.95)	14362.1*** (13.78)	9886.6*** (4.78)
Tuition & fees†	-0.123 (-1.34)	-0.0803 (-1.46)	-0.217** (-3.32)	-0.0728 (-0.84)	-0.163 (-1.78)
Fall enrollment†	-0.0595 (-1.70)	-0.127*** (-4.46)	-0.128*** (-3.95)	-0.161* (-2.54)	-0.122** (-2.80)
% part time students	-4710.7** (-2.79)	-2417.9*** (-3.64)	-2328.5** (-2.87)	-4417.8*** (-5.07)	-2425.2 (-1.78)
% graduate students	865.6 (0.65)	-54.39 (-0.11)	47.67 (0.05)	285.4 (0.27)	98.02 (0.07)
% minority students	6155.8 (1.90)	1354.7 (1.19)	1787.5 (1.37)	5236.3*** (3.74)	-260.4 (-0.15)
BA degrees per 100 students	140.1*** (4.51)	129.1*** (7.69)	87.97*** (3.99)	76.75** (3.07)	155.0*** (6.18)
Faculty salary	-0.0116 (-1.06)	0.0249** (3.07)	0.0382*** (4.10)	0.00742 (0.72)	0.0412* (2.28)
% full-time faculty	-811.3 (-1.67)	197.2 (0.82)	247.1 (0.96)	457.3 (1.63)	404.0 (0.89)
_cons	-3505.3 (-1.11)	-835.8 (-0.55)	222.1 (0.12)	-907.0 (-0.55)	-6611.4 (-1.90)
N	2035	4731	2947	1646	1379
R-squared within	0.63	0.66	0.53	0.63	0.57
R-squared overall	0.00	0.10	0.14	0.07	0.33
State-level control variables	YES	YES	YES	YES	YES
Institution fixed effects	YES	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES	YES

Notes: * p<0.05, ** p<0.01, *** p<0.001; † = lagged one year; t statistics in parentheses; PF GENERAL = 1 for institutions and years in which any type of performance funding policy targeting four-year institutions was funded; financial data in 2014 constant dollars.

Table 4.11. Estimates of Performance Funding Impact on STATE APP INST, by Institution Type and Policy Design

Policy Design Models	All institutions	Research	Master's	Bachelor's	Highly Selective	Less Selective	Non-selective	Rural	MSI
Base	-559.8***	192.9	-597.3***	-476.0**	584.4*	-589.4***	-587.2***	-553.4**	-877.3*
T-statistic	(-5.26)	(1.11)	(-6.02)	(-2.96)	(2.13)	(-6.15)	(-3.53)	(-2.94)	(-2.09)
N	8374	3188	5596	1608	1919	4547	2693	1558	1317
R-squared within	0.59	0.64	0.63	0.54	0.63	0.66	0.54	0.62	0.58
R-squared overall	0.03	0.00	0.42	0.55	0.00	0.10	0.14	0.06	0.30
Bonus	179.5*	448.2***	54.01	-127.5	559.7**	-50.02	66.38	29.90	203.8
T-statistic	(2.48)	(3.59)	(0.75)	(-1.22)	(2.93)	(-0.58)	(0.62)	(0.19)	(1.09)
N	9269	3338	5545	1628	1998	4500	2771	1554	1339
R-squared within	0.56	0.62	0.62	0.53	0.62	0.64	0.51	0.61	0.57
R-squared overall	0.01	0.00	0.42	0.56	0.00	0.08	0.10	0.04	0.27
Hold harmless/Stop loss	3.000	349.7	-192.8	-452.1	923.9***	-264.2	-328.9*	373.7	-134.5
T-statistic	(0.02)	(1.88)	(-1.61)	(-1.50)	(4.07)	(-1.20)	(-1.98)	(1.91)	(-0.75)
N	8919	3227	5310	1553	1908	4370	2641	1497	1281
R-squared within	0.57	0.62	0.62	0.53	0.62	0.64	0.53	0.61	0.59
R-squared overall	0.01	0.00	0.40	0.56	0.00	0.09	0.08	0.04	0.24
Rolling Average	-71.98	333.0	-14.49	-585.8*	446.7	-582.6**	-200.8	-249.6	-206.9
T-statistic	(-0.54)	(1.52)	(-0.10)	(-2.09)	(1.17)	(-3.12)	(-1.00)	(-0.91)	(-0.83)
N	8897	3156	5359	1565	1911	4345	2641	1505	1285
R-squared within	0.57	0.63	0.62	0.53	0.63	0.64	0.52	0.61	0.59
R-squared overall	0.01	0.00	0.40	0.57	0.00	0.08	0.11	0.05	0.23
Improve	158.5	429.3**	104.6	-200.6	468.0	-93.29	122.3	-125.4	305.2
T-statistic	(1.62)	(2.79)	(1.05)	(-0.95)	(1.65)	(-0.77)	(0.79)	(-0.67)	(1.25)
N	8981	3173	5447	1574	1927	4389	2665	1521	1320
R-squared within	0.57	0.63	0.61	0.53	0.62	0.64	0.51	0.61	0.57
R-squared overall	0.01	0.00	0.41	0.56	0.00	0.08	0.12	0.04	0.26

Table 4.11. Continued

Policy Design Models	All institutions	Research	Master's	Bachelor's	Highly Selective	Less Selective	Non-selective	Rural	MSI
Meet Target	-285.3*	464.9*	-469.7***	-165.2	610.9**	-470.8***	-398.7*	-376.4	-638.5
T-statistic	(-2.52)	(2.04)	(-4.69)	(-0.98)	(2.80)	(-4.56)	(-2.28)	(-1.93)	(-1.66)
N	8415	3158	5633	1618	1971	4539	2662	1560	1331
R-squared within	0.58	0.63	0.62	0.53	0.64	0.64	0.53	0.62	0.58
R-squared overall	0.03	0.00	0.40	0.54	0.00	0.10	0.13	0.06	0.29
Raw Number	258.8	599.1**	195.7	-337.5	1141.7***	-125.8	-147.5	218.1	85.73
T-statistic	(1.94)	(2.87)	(1.45)	(-1.40)	(4.73)	(-0.65)	(-0.94)	(1.05)	(0.30)
N	9017	3259	5352	1575	1950	4396	2671	1513	1295
R-squared within	0.57	0.63	0.63	0.53	0.62	0.65	0.53	0.62	0.59
R-squared overall	0.01	0.00	0.40	0.56	0.00	0.09	0.09	0.05	0.23
Compete	-708.1***	153.3	-1017.8***	-1030.9***	522.8	-751.1***	-815.3***	-731.0*	-1254.7*
T-statistic	(-5.22)	(0.78)	(-8.84)	(-4.09)	(1.60)	(-5.13)	(-4.86)	(-2.25)	(-2.33)
N	8366	3243	5479	1561	1907	4487	2707	1538	1298
R-squared within	0.58	0.62	0.63	0.53	0.62	0.65	0.54	0.62	0.58
R-squared overall	0.03	0.00	0.39	0.55	0.00	0.09	0.09	0.06	0.27

Notes: * p<0.05, ** p<0.01, *** p<0.001; each design element = 1 in the states and years in which performance funding policies targeting four-year institutions with that design element are funded; financial data in 2014 constant dollars. This abbreviated table displays the coefficient and t-statistics for the independent variables of interest as well as the number of observations and R-squared statistics for each full model; all models include institution-level controls, state-level controls and institution and year fixed effects.

Table 4.12 Estimates of the Impact of Performance Funding Dosage on STATE APP INST, by Institution Type

Variables	All institutions	Research	Master's	Bachelor's
DOSAGE	-302.1 (-1.47)	658.9* (2.26)	-1060.1** (-2.75)	-913.1** (-2.96)
% revenue from state app.	11034.0*** (12.23)	13476.2*** (8.59)	11237.0*** (12.57)	11182.1*** (4.78)
Tuition & feest	-0.188*** (-3.58)	-0.156 (-1.95)	-0.0693 (-1.56)	-0.0309 (-0.31)
Fall enrollment†	-0.110*** (-4.95)	-0.0827** (-2.95)	-0.0786*** (-3.53)	-0.174 (-1.49)
% part time students	-3046.4*** (-6.28)	-2056.8 (-1.77)	-3632.7*** (-6.32)	-4145.4*** (-5.93)
% graduate students	-74.88 (-0.15)	499.8 (0.49)	-426.8 (-0.77)	33.77 (0.02)
% minority students	2703.1** (3.03)	8445.2*** (5.28)	455.5 (0.46)	842.4 (0.64)
BA degrees per 100 students	109.3*** (7.83)	156.5*** (5.42)	117.3*** (8.94)	57.02* (2.08)
Faculty salary	0.0221*** (3.74)	0.0179* (1.99)	0.0367*** (5.15)	0.0425* (2.31)
% full-time faculty	14.24 (0.08)	-47.24 (-0.14)	244.8 (1.35)	701.4** (2.90)
_cons	110.4 (0.09)	-2606.1 (-1.00)	-994.5 (-0.83)	-2702.8 (-1.23)
N	9713	3459	5839	1683
R-squared within	0.58	0.63	0.62	0.54
R-squared overall	0.02	0.00	0.43	0.54
State-level controls	YES	YES	YES	YES
Institution fixed effects	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES

Table continues

Table 4.12 Continued

Variables	Highly Selective	Less Selective	Non-selective	Rural	MSI
DOSAGE	1276.0*** (3.76)	-940.9*** (-3.59)	-442.1 (-1.41)	106.9 (0.26)	-1377.3 (-1.14)
% revenue from state app.	15160.8*** (6.54)	12117.9*** (13.97)	8551.7*** (5.94)	14399.0*** (13.74)	9898.7*** (4.74)
Tuition & fees†	-0.110 (-1.16)	-0.0804 (-1.46)	-0.221*** (-3.38)	-0.0672 (-0.77)	-0.167 (-1.79)
Fall enrollment†	-0.0538 (-1.52)	-0.125*** (-4.37)	-0.129*** (-4.02)	-0.158* (-2.48)	-0.126** (-2.88)
% part time students	-4758.0** (-2.77)	-2391.2*** (-3.53)	-2314.8** (-2.85)	-4321.6*** (-4.91)	-2519.3 (-1.84)
% graduate students	856.5 (0.63)	-107.0 (-0.22)	82.62 (0.08)	239.6 (0.23)	156.4 (0.11)
% minority students	6347.4 (1.93)	1205.8 (1.05)	1909.9 (1.50)	5418.5*** (3.76)	-232.5 (-0.13)
BA degrees per 100 students	145.4*** (4.58)	126.6*** (7.52)	87.07*** (3.95)	73.74** (2.95)	153.9*** (6.18)
Faculty salary	-0.00858 (-0.76)	0.0254** (3.11)	0.0394*** (4.21)	0.00789 (0.76)	0.0410* (2.25)
% full-time faculty	-753.2 (-1.53)	156.0 (0.65)	225.0 (0.89)	432.8 (1.54)	403.1 (0.89)
_cons	-3556.4 (-1.08)	-355.3 (-0.23)	377.2 (0.21)	-779.6 (-0.46)	-6480.7 (-1.89)
N	2035	4731	2947	1646	1379
R-squared within	0.62	0.65	0.53	0.63	0.57
R-squared overall	0.00	0.10	0.14	0.07	0.34
State-level controls	YES	YES	YES	YES	YES
Institution fixed effects	YES	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES	YES

Notes: * p<0.05, ** p<0.01, *** p<0.001; † variables lagged by one year; t statistics in parentheses;

Dosage is the percent of state appropriations aggregated at the state level tied to performance outcomes for performance funding policies targeting four-year institutions; all financial data is in 2014 constant dollars.

Table 4.13 Estimates of the Impact of Performance Funding Dosage on STATE APP INST, by Institution Type and Policy Design

Policy Design Models	All institutions	Research	Master's	Bachelor's	Highly Selective	Less Selective	Non-selective	Rural	MSI
Dosage X Base	-387.7	760.2*	-1155.4**	-1235.1**	1541.4***	-1027.8**	-730.3	-150.0	-1540.5
T-statistic	(-1.57)	(2.24)	(-2.99)	(-2.99)	(4.53)	(-2.82)	(-1.97)	(-0.24)	(-1.23)
N	9159	3188	5596	1608	1919	4547	2693	1558	1317
R-squared within	0.58	0.64	0.62	0.54	0.63	0.65	0.53	0.62	0.58
R-squared overall	0.02	0.00	0.41	0.54	0.00	0.10	0.14	0.07	0.31
Dosage X Bonus	4740.0	13489.6**	-912.6	-6653.0*	38711.7***	-2333.0	417.7	3021.5	13956.4
T-statistic	(1.70)	(2.92)	(-0.33)	(-2.06)	(4.19)	(-0.86)	(0.10)	(0.43)	(1.40)
N	9269	3338	5545	1628	1998	4500	2771	1554	1339
R-squared within	0.56	0.62	0.62	0.53	0.62	0.64	0.51	0.61	0.57
R-squared overall	0.01	0.00	0.42	0.56	0.00	0.08	0.10	0.04	0.26
Dosage X Improve	4523.9	12192.5*	3268.2	-11020.9	21423.0	-6278.7	2986.2	-2119.9	15227.9
T-statistic	(1.20)	(2.11)	(0.83)	(-1.41)	(1.97)	(-1.41)	(0.57)	(-0.31)	(1.40)
N	8981	3173	5447	1574	1927	4389	2665	1521	1320
R-squared within	0.57	0.63	0.61	0.53	0.62	0.64	0.51	0.61	0.57
R-squared overall	0.01	0.00	0.41	0.56	0.00	0.08	0.12	0.04	0.26
Dosage X Meet Target	-1785.2**	767.8	-2770.2**	-544.8	1264.8	-2539.9**	-2212.2	-1256.7	-2867.9
T-statistic	(-2.63)	(0.89)	(-2.98)	(-0.63)	(1.40)	(-2.82)	(-1.32)	(-0.93)	(-0.94)
N	9172	3158	5633	1618	1971	4539	2662	1560	1331
R-squared within	0.57	0.63	0.62	0.53	0.63	0.64	0.52	0.61	0.58
R-squared overall	0.02	0.00	0.40	0.54	0.00	0.10	0.13	0.06	0.31
Dosage X Raw Number	-107.9	673.3*	-279.3	-1036.1***	1229.7**	-655.4*	-313.5	601.5	-460.8
T-statistic	(-0.50)	(2.18)	(-1.00)	(-3.81)	(3.38)	(-2.46)	(-0.99)	(1.69)	(-1.08)
N	9017	3259	5352	1575	1950	4396	2671	1513	1295
R-squared within	0.57	0.62	0.62	0.53	0.61	0.65	0.53	0.62	0.59
R-squared overall	0.01	0.00	0.40	0.56	0.00	0.09	0.09	0.05	0.23

Table 4.13 Continued

Policy Design Models	All institutions	Research	Master's	Bachelor's	Highly Selective	Less Selective	Non-selective	Rural	MSI
Dosage X Compete	-379.8	585.7	-1306.4*	-1296.9**	1062.2**	-1007.4***	-522.8	120.4	-1861.3
T-statistic	(-1.69)	(1.92)	(-2.39)	(-2.65)	(2.91)	(-3.44)	(-1.57)	(0.26)	(-1.29)
N	9101	3243	5479	1561	1907	4487	2707	1538	1298
R-squared within	0.57	0.62	0.62	0.53	0.62	0.64	0.53	0.61	0.58
R-squared overall	0.02	0.00	0.39	0.55	0.00	0.10	0.11	0.07	0.30

Notes: * p<0.05, ** p<0.01, *** p<0.001; dosage X design element is the percent of state appropriations (aggregated at the state level) tied to performance outcomes for performance funding policies with that design element (performance funding policies targeting four-year institutions); all financial data in 2014 constant dollars. This abbreviated table displays the coefficient and t-statistics for the independent variables of interest as well as the number of observations and R-squared statistics for each full model; all models include state-level controls and state and year fixed effects.

Table 4.14. Estimates of the Impact of Performance Funding on STATE APP INST, by Alternative Counterfactuals and Institution Type

Comparison Group	DD Models	All institutions	Research	Master's	Bachelor's	Highly Selective	Less Selective	Non-selective	Rural	MSI
Consol. governing boards	PF GENERAL	-158.7	161.3	-213.0*	-362.8*	579.8	-197.5*	-167.0	-498.4	0
	T-statistic	(-1.19)	(0.85)	(-2.05)	(-2.58)	(1.11)	(-2.24)	(-1.24)	(-1.72)	(.)
	N	2883	1085	1497	788	663	1444	776	498	207
	R-sq within	0.59	0.71	0.71	0.54	0.69	0.72	0.58	0.72	0.84
	R-sq overall	0.08	0.03	0.56	0.52	0.03	0.21	0.29	0.29	0.47
Coord. governing boards	PF GENERAL	-141.7	335.4*	-294.6***	-161.0	734.2***	-368.2***	-276.3*	-254.2	-296.3
	T-statistic	(-1.78)	(2.42)	(-3.41)	(-1.42)	(4.44)	(-3.89)	(-2.61)	(-1.52)	(-1.24)
	N	6420	2207	4074	850	1231	3051	2138	993	1152
	R-sq within	0.59	0.63	0.61	0.66	0.68	0.66	0.57	0.63	0.55
	R-sq overall	0.00	0.00	0.33	0.72	0.00	0.03	0.10	0.00	0.35
Republican	PF GENERAL	-118.9	442.3**	-371.2***	-373.6*	577.7*	-342.4**	-279.9*	-433.5	-398.8
	T-statistic	(-1.29)	(3.05)	(-4.10)	(-2.30)	(2.57)	(-3.24)	(-2.22)	(-1.88)	(-1.21)
	N	3636	1514	1903	646	989	1485	1162	481	172
	R-sq within	0.63	0.68	0.74	0.70	0.69	0.72	0.69	0.76	0.85
	R-sq overall	0.05	0.03	0.46	0.47	0.00	0.08	0.17	0.51	0.33
Democratic	PF GENERAL	156.5	585.4***	37.77	131.8	501.0*	5.241	179.8	20.30	73.52
	T-statistic	(1.88)	(4.92)	(0.42)	(0.87)	(2.68)	(0.06)	(1.30)	(0.13)	(0.48)
	N	5912	1873	3867	992	1046	3102	1764	1120	1207
	R-sq within	0.57	0.66	0.60	0.55	0.68	0.64	0.50	0.65	0.57
	R-sq overall	0.00	0.01	0.41	0.59	0.04	0.09	0.13	0.02	0.28
Conservative	PF GENERAL	138.2	501.5***	-29.08	-182.4	588.1**	-147.7	35.58	-60.71	160.6
	T-statistic	(1.80)	(3.81)	(-0.43)	(-1.59)	(3.31)	(-1.77)	(0.34)	(-0.44)	(1.04)
	N	5436	2201	3246	914	1230	2379	1827	851	907
	R-sq within	0.58	0.63	0.63	0.62	0.63	0.68	0.54	0.67	0.60
	R-sq overall	0.03	0.00	0.45	0.47	0.01	0.03	0.33	0.06	0.37

Table 4.14. Continued

Comparison Group	DD Models	All institutions	Research	Master's	Bachelor's	Highly Selective	Less Selective	Non-selective	Rural	MSI
Liberal	PF GENERAL	-427.0***	-90.68	-624.4***	-403.9*	-50.63	-462.2***	-576.9***	-382.8	-1223.5*
	T-statistic	(-4.00)	(-0.43)	(-5.69)	(-2.59)	(-0.23)	(-3.48)	(-3.67)	(-1.41)	(-2.75)
	N	4277	1258	2593	769	805	2352	1120	795	472
	R-sq within	0.65	0.75	0.70	0.61	0.75	0.70	0.69	0.67	0.70
	R-sq overall	0.00	0.00	0.31	0.54	0.08	0.07	0.01	0.04	0.10
Midwest	PF GENERAL	75.32	212.8	52.18	-234.3*	739.5*	-99.40	-99.16	474.6*	701.6
	T-statistic	(0.72)	(1.35)	(0.75)	(-2.40)	(2.36)	(-0.91)	(-1.34)	(2.92)	(0.56)
	N	2511	1021	1295	459	668	1055	788	336	51
	R-sq within	0.67	0.75	0.77	0.79	0.76	0.76	0.79	0.87	0.97
	R-sq overall	0.09	0.05	0.64	0.73	0.18	0.01	0.01	0.28	0.21
Northeast	PF GENERAL	-429.3**	-599.3*	-641.0***	39.84	-530.2*	-406.4*	6.183	-330.6	-2538.0
	T-statistic	(-3.03)	(-2.69)	(-3.97)	(0.13)	(-2.64)	(-2.23)	(0.03)	(-1.49)	(-1.65)
	N	1480	332	1037	247	257	937	286	338	151
	R-sq within	0.71	0.84	0.73	0.83	0.73	0.74	0.85	0.78	0.79
	R-sq overall	0.02	0.02	0.20	0.41	0.61	0.01	0.17	0.07	0.25
South	PF GENERAL	197.3*	796.7***	-54.58	31.43	580.2*	27.48	238.9	-73.15	218.8
	T-statistic	(2.15)	(5.87)	(-0.61)	(0.18)	(2.40)	(0.30)	(1.61)	(-0.42)	(1.18)
	N	4108	1534	2606	733	896	1903	1309	783	911
	R-sq within	0.58	0.65	0.62	0.62	0.65	0.68	0.53	0.66	0.60
	R-sq overall	0.02	0.00	0.39	0.49	0.01	0.02	0.33	0.00	0.42
West	PF GENERAL	32.75	-31.33	-79.48	-626.9	-448.2	193.7	-139.6	-939.3	628.9
	T-statistic	(0.19)	(-0.13)	(-0.39)	(-1.86)	(-1.50)	(0.99)	(-0.39)	(-2.29)	(1.51)
	N	1502	548	853	204	190	812	500	165	266
	R-sq within	0.75	0.80	0.79	0.86	0.92	0.83	0.69	0.78	0.88
	R-sq overall	0.09	0.27	0.55	0.78	0.05	0.26	0.03	0.00	0.54

Table 4.14. Continued

Notes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; PF GENERAL = 1 in the states and years in which performance funding policies targeting four-year institutions are funded; financial data in 2014 constant dollars. Comparison Group describes the treated and control states included in the models (i.e., West includes only states in the western region of the US). This abbreviated table displays the coefficient and t-statistics for the independent variables of interest as well as the number of observations and R-squared statistics for each full model; all models include state-level controls and state and year fixed effects.

Table 4.15 Lead-lag Estimates of the Impact of Performance Funding on STATE APP INST, by Institution Type

Lead-lag Time Dummy Variables	All institutions	Research	Master's	Bachelor's	Highly Selective	Less Selective	Non-selective	Rural	MSI
5+ years before PF	61.35 (0.72)	-349.5* (-2.24)	246.2** (2.85)	140.0 (0.81)	-172.7 (-0.68)	174.8 (1.81)	32.20 (0.20)	204.7 (0.98)	83.15 (0.25)
4 years before PF	146.0* (2.27)	-48.55 (-0.43)	205.4** (2.76)	314.0* (2.37)	160.3 (0.93)	225.0** (2.60)	49.91 (0.45)	126.8 (0.74)	5.102 (0.02)
3 years before PF	69.88 (1.23)	-140.8 (-1.45)	174.3* (2.52)	251.7 (1.98)	102.0 (0.64)	138.5* (2.14)	5.293 (0.05)	113.2 (0.72)	-169.3 (-0.70)
2 years before PF	-49.93 (-1.02)	-245.7** (-3.29)	49.80 (0.77)	168.9 (1.30)	-61.45 (-0.54)	40.96 (0.77)	-102.8 (-1.00)	-8.831 (-0.07)	-334.9 (-1.45)
1 year before PF	-16.28 (-0.45)	-224.9** (-3.29)	77.03 (1.76)	131.9 (1.22)	-38.50 (-0.42)	40.03 (0.87)	-55.15 (-0.82)	44.28 (0.45)	-200.6 (-1.09)
1 year after PF	-11.78 (-0.20)	167.3 (1.44)	-108.3 (-1.92)	-38.52 (-0.34)	485.2* (2.35)	-180.0** (-2.97)	-114.5 (-1.39)	-25.51 (-0.17)	-414.7 (-1.75)
2 years after PF	-12.54 (-0.19)	134.9 (1.06)	-148.5* (-2.10)	30.04 (0.22)	439.1 (1.81)	-195.5** (-2.77)	-88.66 (-0.82)	44.38 (0.22)	-750.2** (-2.86)
3 years after PF	-86.30 (-1.09)	197.7 (1.30)	-243.2** (-3.06)	-142.5 (-0.86)	765.6** (2.76)	-302.9*** (-3.45)	-289.3* (-2.37)	-117.7 (-0.57)	-718.5* (-2.25)
4 years after PF	-159.5 (-1.85)	126.6 (0.70)	-351.4*** (-4.37)	-192.0 (-1.09)	484.1 (1.61)	-373.6*** (-3.95)	-397.2** (-3.20)	-222.5 (-0.94)	-906.0** (-3.06)
5+ years after PF	-247.5* (-2.20)	41.71 (0.19)	-531.4*** (-5.25)	-45.78 (-0.19)	276.5 (0.84)	-494.2*** (-4.10)	-534.8** (-3.23)	-125.8 (-0.55)	-844.1* (-2.12)
N	9713	3459	5839	1683	2035	4731	2947	1646	1379
R-squared within	0.58	0.64	0.63	0.54	0.63	0.66	0.53	0.63	0.58
R-squared overall	0.02	0.00	0.42	0.54	0.00	0.10	0.14	0.07	0.32
Inst. & state controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
State & Year fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES

Notes: * p<0.05, ** p<0.01, *** p<0.001; t statistics in parentheses; PF = performance funding targeting four-year institutions; the year of PF implementation is the reference category; financial data in 2014 constant dollars.

Table 4.16. Estimates of Performance Funding Impact on Bachelor's Degree Production per 100 Students, by Institution Type

Variables	All institutions	Research	Master's	Bachelor's
PF GENERAL‡	0.209 (1.74)	0.0201 (0.11)	0.226 (1.49)	0.602* (2.22)
% rev from state app	1.805 (1.53)	0.499 (0.50)	1.462 (1.37)	5.134 (1.30)
Tuition & fees†	0.0000730 (1.53)	0.0000406 (0.86)	0.000192** (2.62)	0.000194 (1.14)
Fall enrollment†	-0.0000226 (-0.81)	-0.0000191 (-0.83)	-0.0000645 (-0.98)	0.000348** (3.01)
% part time students	-7.516*** (-6.62)	-5.257** (-2.85)	-5.730*** (-3.83)	-13.30*** (-7.81)
% graduate students	-5.430*** (-3.47)	-2.649 (-1.68)	-7.268*** (-3.51)	-17.43*** (-3.66)
% minority students	-2.381 (-1.12)	1.900 (1.01)	-5.655*** (-3.40)	-1.117 (-0.18)
Faculty salary	-0.00000900 (-1.07)	-0.000000372 (-0.03)	0.00000339 (0.29)	-0.0000138 (-0.48)
% full-time faculty	1.012** (2.79)	0.637 (1.33)	0.898* (2.13)	2.473** (3.33)
_cons	13.66*** (15.59)	13.22*** (10.77)	13.25*** (11.79)	10.32*** (3.85)
N	10129	3604	6089	1754
Within R-squared	0.27	0.31	0.28	0.35
Overall R-squared	0.24	0.13	0.24	0.17
State-level controls	YES	YES	YES	YES
Institution fixed effects	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES

Table continues

Table 4.16. Continued

Variables	Highly Selective	Less Selective	Non-selective	Rural	MSI
PF GENERAL‡	0.229 (1.06)	0.181 (1.16)	0.339 (1.50)	0.287 (1.14)	0.0927 (0.27)
% rev from state app	-0.242 (-0.15)	-0.957 (-0.92)	5.979* (2.48)	1.156 (0.50)	1.911 (1.28)
Tuition & fees†	0.0000579 (1.18)	0.0000933 (1.20)	-0.0000137 (-0.10)	0.0000802 (0.70)	0.000214 (1.14)
Fall enrollment†	-0.00000963 (-0.37)	-0.0000376 (-1.16)	-0.00000565 (-0.08)	0.0000869 (1.16)	-0.000164 (-1.31)
% part time students	-7.473*** (-3.53)	-7.526*** (-5.11)	-7.628*** (-3.96)	-9.984*** (-6.71)	-2.964 (-1.19)
% graduate students	-4.839** (-2.74)	-9.934*** (-6.56)	0.670 (0.21)	-5.527 (-1.70)	3.001 (0.74)
% minority students	-1.801 (-0.50)	-3.389* (-2.12)	-2.020 (-0.48)	-10.37*** (-3.85)	-2.044 (-0.57)
Faculty salary	-0.00000878 (-0.60)	-0.00000101 (-0.10)	-0.00000669 (-0.37)	-0.0000165 (-1.05)	0.0000228 (1.06)
% full-time faculty	-1.070 (-1.31)	0.953 (1.93)	1.736** (2.99)	1.411 (1.79)	2.937** (2.73)
_cons	17.82*** (11.52)	15.30*** (15.47)	9.050*** (4.75)	14.68*** (8.60)	6.886* (2.19)
N	2121	4929	3079	1715	1455
Within R-squared	0.39	0.33	0.24	0.27	0.30
Overall R-squared	0.41	0.27	0.18	0.25	0.04
State-level controls	YES	YES	YES	YES	YES
Institution fixed effects	YES	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES	YES

Notes: * p<0.05, ** p<0.01, *** p<0.001; † = lagged by one year; ‡ = PF GENERAL is lagged by four years; PF GENERAL = 1 for institutions and years in which performance funding policies targeting four-year institutions are funded; all financial data in 2014 constant dollars

Table 4.17. Estimates of Performance Funding Impact on Bachelor's Degree Production per 100 Students, by Institution Type and Policy Design

Policy Design Models	All institutions	Research	Master's	Bachelor's	Highly Selective	Less Selective	Non-selective	Rural	MSI
Base ‡	0.0385	-0.293	0.163	-0.0212	0.341	0.00861	0.0413	0.125	0.334
T-statistic	(0.22)	(-0.79)	(0.79)	(-0.05)	(0.65)	(0.04)	(0.13)	(0.33)	(0.92)
N	9629	3361	5883	1685	2016	4773	2840	1634	1402
R-squared within	0.27	0.31	0.28	0.34	0.39	0.33	0.22	0.27	0.30
R-squared overall	0.23	0.07	0.25	0.17	0.39	0.25	0.17	0.28	0.03
Bonus ‡	0.285	0.0244	0.275	1.017**	0.190	0.323	0.441	0.448	-0.0498
T-statistic	(1.92)	(0.13)	(1.32)	(3.38)	(0.84)	(1.49)	(1.74)	(1.45)	(-0.11)
N	9886	3560	5903	1721	2100	4791	2995	1664	1434
R-squared within	0.27	0.31	0.27	0.35	0.39	0.32	0.23	0.27	0.29
R-squared overall	0.24	0.11	0.23	0.16	0.41	0.26	0.17	0.24	0.03
Improve ‡	-0.0544	-0.133	-0.0407	0.488	-0.286	0.0912	-0.0252	0.185	-0.609
T-statistic	(-0.24)	(-0.46)	(-0.14)	(1.13)	(-0.86)	(0.30)	(-0.07)	(0.37)	(-1.22)
N	9570	3389	5798	1661	2028	4684	2858	1623	1416
R-squared within	0.27	0.31	0.28	0.35	0.39	0.33	0.23	0.27	0.29
R-squared overall	0.23	0.06	0.23	0.16	0.37	0.25	0.17	0.26	0.03
Meet target ‡	0.371**	0.0366	0.404*	0.568	0.586*	0.202	0.545	0.309	0.690
T-statistic	(2.61)	(0.12)	(2.46)	(1.62)	(2.53)	(1.03)	(1.92)	(1.10)	(1.90)
N	9760	3394	5964	1711	2081	4811	2868	1656	1423
R-squared within	0.27	0.30	0.28	0.33	0.39	0.33	0.22	0.27	0.30
R-squared overall	0.24	0.07	0.25	0.17	0.40	0.25	0.17	0.28	0.03
Raw number‡	0.559*	0.274	0.660	1.358**	0.217	0.725**	0.903*	0.670**	1.369*
T-statistic	(2.50)	(1.20)	(1.47)	(3.30)	(0.57)	(2.76)	(2.42)	(2.88)	(2.37)
N	9627	3465	5730	1670	2056	4683	2888	1624	1396
R-squared within	0.26	0.31	0.27	0.34	0.39	0.32	0.22	0.26	0.29
R-squared overall	0.23	0.09	0.24	0.15	0.41	0.26	0.16	0.25	0.03

Table 4.17. Continued

Policy Design Models	All institutions	Research	Master's	Bachelor's	Highly Selective	Less Selective	Non-selective	Rural	MSI
Compete ‡	-0.0151	0.0216	-0.0242	0.506	-1.150***	0.0541	0.269	0.244	0.392
T-statistic	(-0.07)	(0.07)	(-0.09)	(0.61)	(-3.47)	(0.22)	(0.67)	(0.51)	(0.47)
N	9664	3443	5812	1657	2008	4749	2907	1638	1391
R-squared within	0.27	0.31	0.28	0.34	0.39	0.33	0.22	0.27	0.30
R-squared overall	0.24	0.10	0.25	0.16	0.39	0.27	0.18	0.28	0.03

Notes: * p<0.05, ** p<0.01, *** p<0.001; ‡ = all policy variables are lagged by four years; each design element = 1 in the states and years in which performance funding policies targeting four-year institutions with that design element are funded; financial data in 2014 constant dollars. This abbreviated table displays the coefficient and t-statistics for the independent variables of interest as well as the number of observations and R-squared statistics for each full model; all models include institution-level controls, state-level controls and institution and year fixed effects.

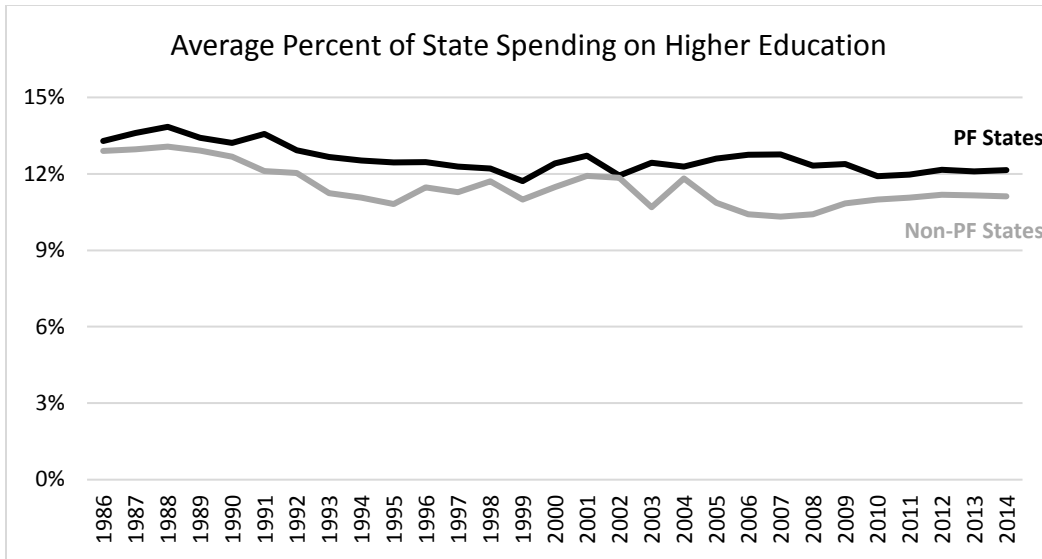


Figure 4.1. Average Percent of State Spending on Higher Education, by Performance Funding Status¹¹

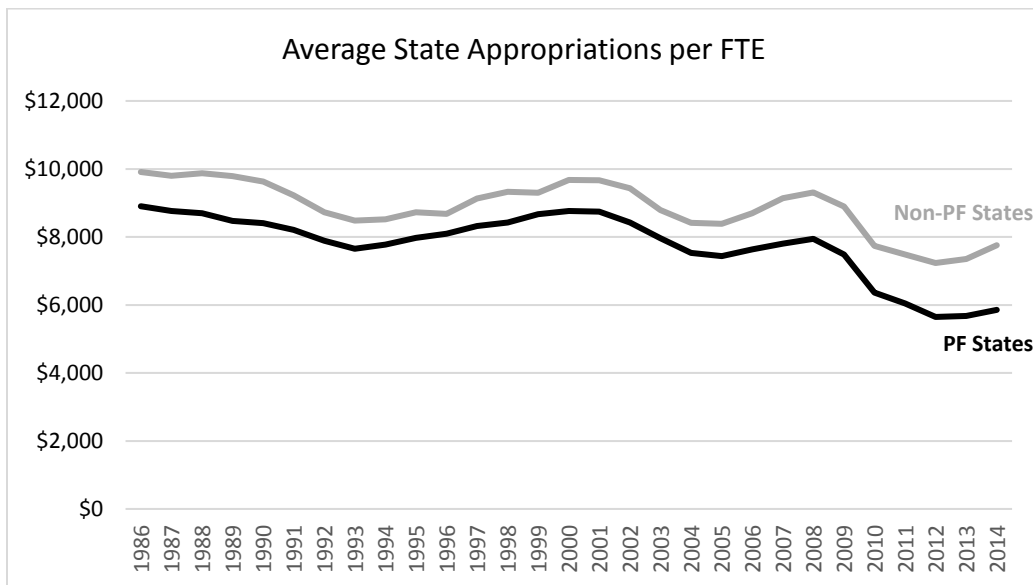


Figure 4.2. Average State Appropriations per FTE, by Performance Funding Status

¹¹ For Figures 4.1 and 4.2: PF = performance funding. PF states are those that ever implemented performance funding targeting four-year institutions and non-PF states are those that never implemented performance funding targeting four-year institutions. Years do not reflect years of policy implementation.

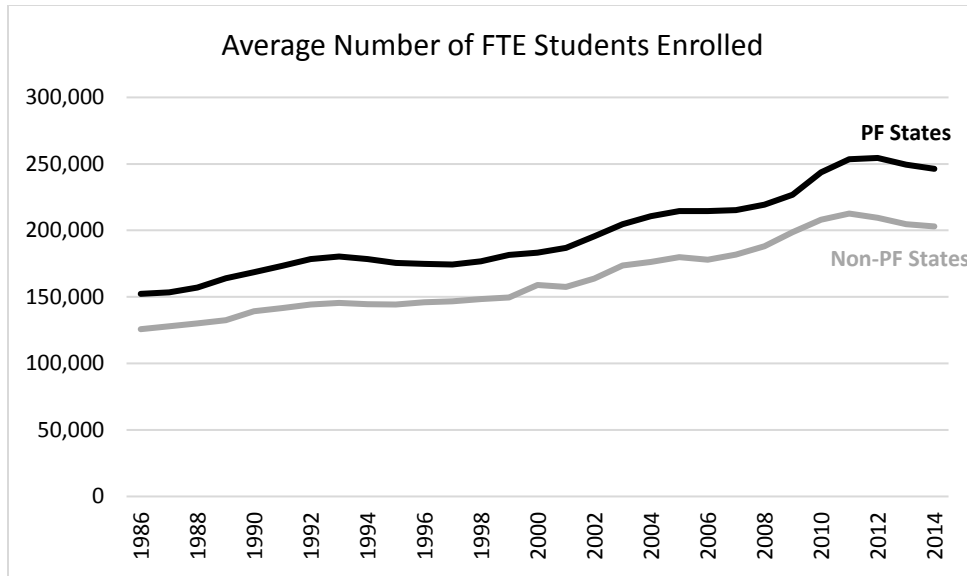


Figure 4.3. Average Number of FTE Students Enrolled, by Performance Funding Status¹²

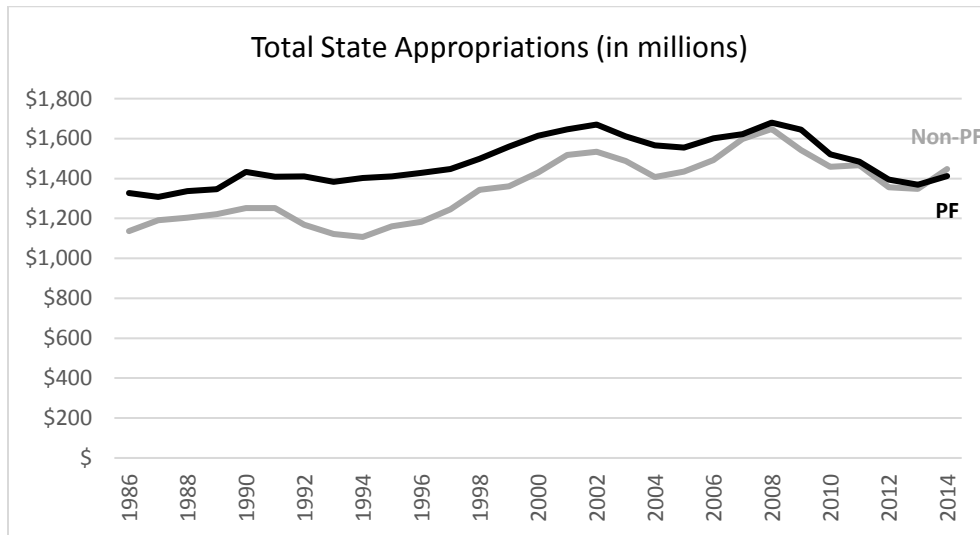


Figure 4.4. Total State Appropriations (in millions), by Performance Funding Status

¹² For Figures 4.3 and 4.4: PF = performance funding. PF states are those that ever implemented performance funding targeting four-year institutions and non-PF states are those that never implemented performance funding targeting four-year institutions. Years do not reflect years of policy implementation.

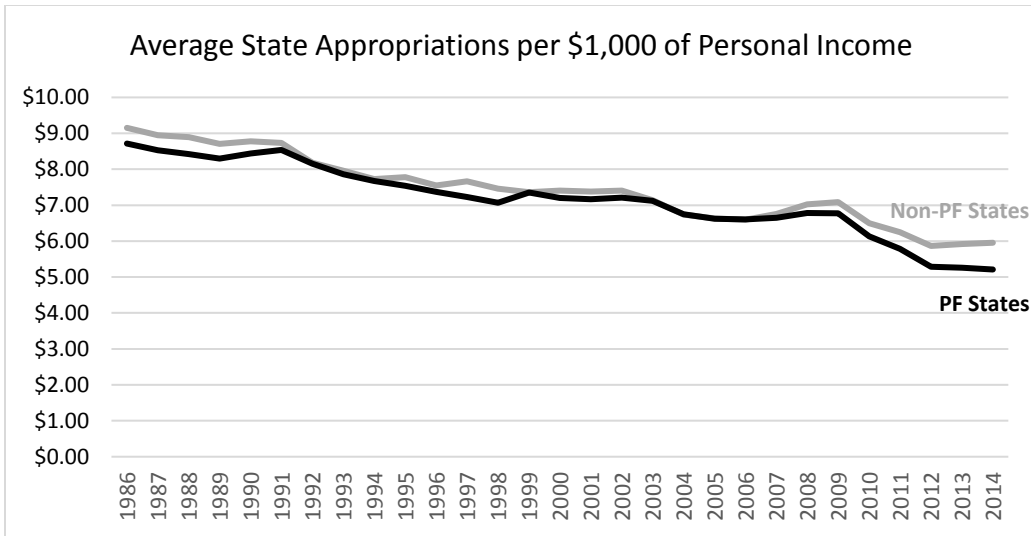


Figure 4.5. Average State Appropriations per \$1,000 of Personal Income, by Performance Funding Status¹³

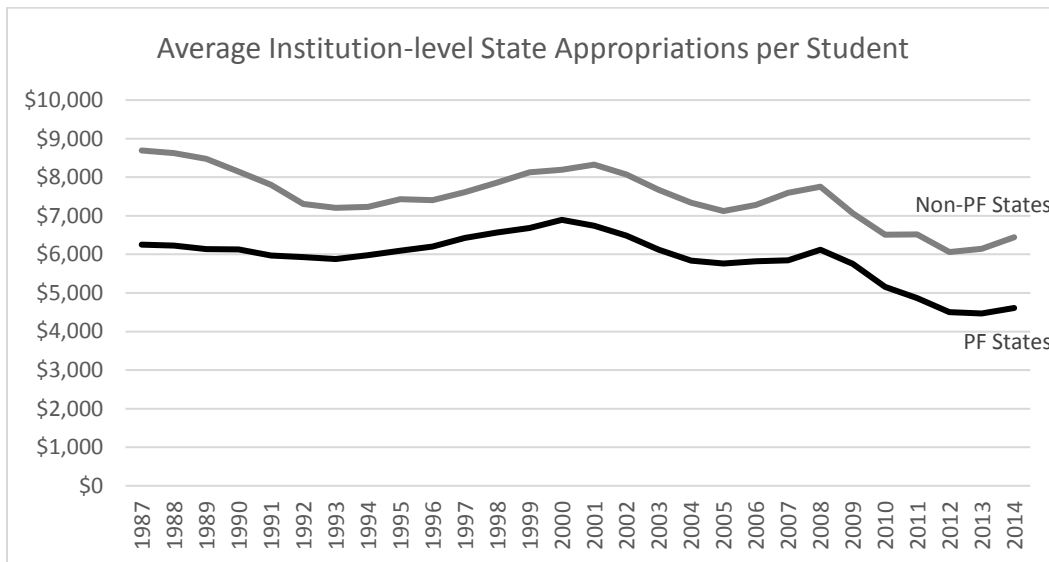


Figure 4.6. Average Institution-level State Appropriations per Student, by Performance Funding Status

¹³ For Figures 4.5 and 4.6: PF = performance funding. PF states are those that ever implemented performance funding targeting four-year institutions and non-PF states are those that never implemented performance funding targeting four-year institutions. Years do not reflect years of policy implementation.

Chapter 5 Discussion and Conclusion

This dissertation research explored how performance funding policies restructure state higher education spending, both in terms of the total state funding available for public higher education and the allocation of funds to institutions. Through an extensive data collection effort, I was able to incorporate several policy design elements into my panel regressions, overcoming a notable weakness in the existing performance funding literature. This exploration into the policy design elements allowed me to determine how performance funding differs from one state to another and how those differences lead to variations in state funding. Finally, I explored the performance funding effect heterogeneity across institution types—according to mission, degree level, selectivity, and student body characteristics—revealing notable differences in treatment across policy targets.

This research helps navigate the speculation within the broader performance funding discourse. As mentioned in Chapters 1 and 2, there are several financially motivated reasons performance funding is supported or opposed. Some suggest that performance funding provides the opportunity to earn new money, while others claim that performance funding provides an excuse to cut funding from higher education or creates a system of winners and losers. There is also an existing theory that performance funding does not change funding, but rather serves a more symbolic purpose.

The results of this study suggest that performance funding is associated with little change in state-level spending on higher education. However, where statistically significant

effects are observed, we see a slight decrease in the portion of state budgets allocated to public higher education. In addition, as performance funding dosage increases, state appropriations per FTE decline. The institution-level findings suggest that the impact of performance funding on state appropriations per student varies across institution types and policy designs. Notably, where direct financial benefit are observed (i.e., increases in state appropriations per student) they are limited to the context of research and/or highly selective institutions. Conversely, where direct financial burdens are observed, they are limited to non-research and non-highly selective institutions.

Taken together, this dissertation research provide evidence in support of many performance funding criticisms: performance funding can lead to slight cuts to higher education funding at the state level and facilitate the creation of winners and losers among institutions.

Regarding policy design, this study reveals important differences between performance funding policy types. I find that base policies are more likely to be associated with declines in funding, at both the state and institution levels, while bonus policies are more likely to exhibit positive effects for some institution types. Moreover, I find that the budget protection provisions (hold harmless, stop loss, and rolling average design elements) are generally effective at mitigating the potential negative effects of performance funding. In terms of how performance is measured, I find the most interesting effects at the institution level. Policies requiring institutions to demonstrate improvement year over year are associated with increases in state appropriations per student, but only for research institutions. Policies that set a target or a threshold for performance outcomes facilitate funding increases for high resource institutions and decreases in funding for many low resource institutions. It may be the case that

the targets set favor high resource institutions over low resource institutions. The policies that determine funding based on the raw output of performance metrics (e.g., number of degrees produced) positively impact research and highly selective institutions, again likely because these institution types historically have had exemplary performance outputs. Compete policies have an overall negative impact on state appropriations per student and this impact is concentrated at the non-research, non-highly selective institutions. Finally, regarding performance funding dosage, I find that as the portion of funding tied to performance outcomes increases, the impacts described above increase in magnitude. Below I discuss these findings in the context of the conceptual frameworks guiding this study.

Principal-agent Explanation

Recall that there are two principal-agent relationships leveraged in this study: (1) relationships between state policymakers and higher education agencies/collective public four-year institutions and (2) between higher education agencies and institutions. Assuming the state-level findings are driven by performance funding implementation, PAT would suggest that state policymakers, as the principal, utilize performance funding policies to reduce the portion of the state budget for higher education due to unsatisfactory performance of public higher education. This budget reduction is concentrated in states with base performance funding policies; so, by creating a policy that redistributes funds on the basis of performance, or even withholds funds that are earned back conditional on adequate performance, principals impose sanctions on agents supposedly for lacking performance.

It may be the case, however, that the reduction in HIGHER-ED SHARE is not associated with state-level performance improvement and that performance funding is simply used as the

mechanism through which to legitimize changes in funding. When the performance funding dosage is sufficiently high, I observe decreases in state appropriations per FTE, suggesting that as more by funding is at stake, declines become more severe.

Consider the differences in outcomes for states with consolidated governing boards versus states with coordinating boards for higher education. For the state-level analysis, these governing boards play the part of the agent. States with consolidated governing boards do not experience a change in state funding associated with performance funding implementation. As consolidated governing boards typically have greater oversight over the higher education institutions, it may be the case that consolidated governing boards are more effective at supporting institutions and/or enforcing mandates to meet state goals. The lack of a negative impact in this context may be interpreted as a reward for adequate performance. On the other hand, states with coordinating boards experience a decline in HIGHER-ED SHARE related to performance funding implementation. Coordinating boards typically have less oversight and influence over the institutions; it may be the case that these agents are less able to motivate institutions or expand institutions' capacity to meet state goals.

While it is not clear that performance funding is the key or sole driver in the small, negative impacts of performance funding on state higher education spending, PAT offers some insight as to why states with incentive policies might decrease higher education budgets.

The second principal-agent scenario considers the relationship between the governing body and the institutions and supports the institution-level analysis. While the state legislature still determines higher education funding, it is often the higher education agencies that distribute those funds to the institutions. In states where this is not the case (Michigan, for

instance), the principal can still be thought of as the state legislature. PAT would suggest that the institution-level findings are mixed due to variations in performance outcomes across institutions. Direct (or indirect) financial benefits are observed for institutions that exhibit sufficient performance, according to the specific policy implemented. Financial burdens, on the other hand, result from inadequate performance by the institutions.

However, I find that the implementation of performance funding is associated with increases in bachelor's degree production primarily for the institutions that are more likely to experience declines in funding. Perhaps performance funding policies are designed in such a way that prevents rewarding non-research/non-highly selective institutions for improvements but enhances the rewards of research and highly selective institutions for maintaining the status quo. For example, bachelor's institutions subject to performance funding increase degree production relative to bachelor's institutions in non-PF states; however, they are still more likely to experience a decline in funding associated with performance funding implementation. This may result from an improvement in degree production that was not enough to earn additional funding or prevent funding decreases. Perhaps targets were set such that the improvement did not reach the set threshold; or maybe these institutions improved but did not outperform other institutions as required by the policy in question.

On the other hand, research or highly selective institutions may not need to increase degree production to meet the goals set by the state; just by maintaining current production levels, these high-resource institutions receive direct financial benefits from performance funding. Callahan, Meehan, and Shaw (2017) demonstrate that highly selective institutions were less likely to change behavior as a result of performance funding in Tennessee, Ohio, and

Indiana. The authors posit that wealthy institutions were likely to be affected by financial incentives related to state appropriations, considering their access to revenues from other sources. So while technically performance funding policies reward “good performance” and punish “bad performance”, rewards may not be directly related to demonstrated improvements. PAT suggests that increases result from adequate performance, but it is vital to consider how and by whom “adequate performance” is determined. Here, the theory of social construction and policy design may help further illuminate the findings.

Theory of Social Construction and Policy Design

The theory of social construction and policy design posits that benefits or burdens of public policy are distributed to policy targets based on two key factors: the political power of the policy target and how favorably the target is viewed. These two elements work together to construct the relative deservedness of the policy target in question. In the context of this study, this theory helps to make sense of which targets “deserve” state funding.

For the state-level portion of this study, social construction theory would suggest that higher education as an agency of the state experiences burdens brought on by performance funding implementation either due to a weakening of political power or a negative opinion of public higher education. One might presume that as republicans/conservatives are more likely to have a negative view of higher education in the U.S. (Pew Research Center, 2017), that the declines in state funding would be concentrated in republican/conservative states. I find instead that this is not the case as the negative effects of performance funding are concentrated in democratically-controlled states. Regarding political power, higher education in general might be less powerful than it once was, leaving it more vulnerable to budget cuts.

Consider for example the increased scrutiny, accountability, and oversight higher education has undergone in the last few decades. If this is the case, performance funding would serve as the vehicle to both determine deservedness of and impose burdens on public higher education as a policy target.

Consolidated governing boards seem to be more effective at preventing a negative impact on state funding; perhaps public higher education in these states has more political power with which to avoid budget cuts. Conversely, coordinating boards, typically viewed as a weaker representative of higher education interests, do not seem to be able to mitigate the negative effects of performance funding. Taken together, perhaps the decline in funding is related to political power instead of public opinion.

It may be the case that performance funding does not cause a decline in state funding, especially considering that few effects are observed for STATE APP FTE or STATE APP 1000. If this is the case, social construction theory would suggest that performance funding is actually meant to provide the appearance of a burden, while actually protecting the policy target. This would suggest that higher education as a target is negatively viewed, yet politically powerful, according to Schnieder and Ingram's (1993) typology of policy targets.

At the institution level, it is clear that the institution types that are typically considered politically powerful are the ones that receive direct financial benefits associated with performance funding while those that tend to be less politically connected consistently receive direct financial burdens. Perhaps the distribution of benefits and burdens are also related to how these institutions are viewed, but this is more difficult to discern. Considering the partisan divide over the opinion of higher education in the U.S., one would expect financial burdens to

be concentrated in republican-controlled states or in states with predominately conservative citizenries; the findings support this assumption in some cases.

While there are several examples of declining funding associated with performance funding in republican states, these burdens are concentrated at non-research, non-highly selective institutions and financial benefits are observed for research and highly-selective institutions; there is not an across-the-board burden for all higher education institutions. Perhaps the institutions that benefit from performance funding are constructed as deserving on the basis of their performance or perceived performance. Perhaps the effect heterogeneity of performance funding concentrated in republican/conservative states is related to the political power of the institutions; it may be the case that some institutions are able to wield power to prevent funding decreases, despite a negative public opinion.

It is somewhat surprising to find any increases in funding in republican-controlled states, considering the growing criticisms of higher education by republican policymakers especially. Consider Wisconsin Governor Scott Walker's massive budget cuts and repeal of tenure protections (Rupar, 2016). Also notable is the increasing partisan divide in the view of higher education by republicans as compared to democrats (Pew Research Center, 2017). However, it is important to note that effects of performance funding are explored in this study through 2014, and the stark republican-concentrated criticism of higher education has been a more recent phenomenon. Moreover, the gubernatorial push for performance funding policies has been a recent development as well, while performance funding policies of the 1990s and early 2000s were largely efforts led by state legislators and higher education communities.

In democratically-controlled states, no direct burdens are observed; however, financial benefits are observed for research institutions. This suggests that higher education may benefit from a positive public opinion, generally, while the more powerful institutions continue to benefit directly. Interestingly, states with liberal citizenries do not follow the same pattern—financial burdens are observed for several institution types. This may be related to some states with more liberal citizenries being governed by predominately republican legislators.

It is especially interesting to consider again the performance outcomes across institution types. Wealthy institutions are more likely to benefit from performance funding policies, despite the lack of observed improvement in degree production, whereas poorer institutions are more likely to demonstrate improvement, yet still receive financial burdens. In light of the theory of social construction and policy design, this suggests that performance funding policies are designed to benefit high-resource, politically connected institutions and burden low-resource, politically weak institutions. These findings are consistent with the scholarship that demonstrates that wealthy institutions are more likely to have a seat at the table and have a voice during the performance funding policy development process (Gàndara, 2016; Ness, Deupree, & Gàndara, 2015; Jones et al., 2017). As such, performance funding is often designed with the wealthiest institutions in mind—perhaps resulting in policies that reward the status quo for high-resource institutions, but are not sensitive enough to detect improvements/successes for low-resource institutions.

Policy Design Hypotheses

For the most part, my findings align with the hypotheses presented in Chapter 2. Base policies were more likely to be associated with declines in funding, while bonus policies were

more likely to be associated with funding increases. Budget protection provisions in most cases were effective at preventing negative impacts to funding. Regarding the performance measurements, I actually find high-resource institutions benefit from improve policies; I initially thought that these institutions may have less room to improve and may be burdened in this context. It may be the case that these policies allowed high achieving institutions to maintain existing performance levels without requiring continual improvement, as is the case for Kansas' policy.

Regarding meet target policies, I predicted varying effects depending on how targets were set. Indeed, this is what I find—that high resource institutions subject to meet target policies receive financial benefits while low resource institutions are more likely to incur burdens. It may be the case that targets are inappropriately or unfairly set, with the high-resource institution context serving as the norm rather than taking into consideration the unique context of other institutions, especially those with fewer resources.

Raw number policies were only associated with increases in funding for highly selective institutions, while no effects were observed for non-research/non-highly selective institutions. Compete policies had an overwhelming negative impact on state funding, even at the state level. Since only five states had competitive elements in their performance funding policy, these findings are likely driven by the severe funding declines in Pennsylvania.

Lastly, as hypothesized in Chapter 2, as the performance funding dosage increases the magnitude of impact on state funding also increases. As more funds are at stake, the greater the benefit or burden, depending on the context.

Findings for Minority Serving Institutions

Of particular interest to many researchers is the specific impact of performance funding policies on MSIs. This study finds that in regards to changes in funding, MSIs subject to performance funding fare about as well as MSIs in non-PF states, at least at first. The lead-lag analysis, however, reveals delayed and sustained negative effects for MSIs. These findings are consistent with the scholarship that has determined inequities in performance funding policies, especially for MSIs (Jones, 2016; Jones et al., 2017). Considering the negative social construction of minority students and the institutions that serve them as discussed in Chapter 2, these findings suggest that MSIs are constructed as “undeserving” of funding. Moreover, these findings are disconcerting considering the historic underfunding and discrimination against MSIs. Policymakers should consider a more equitable distribution of funding, especially when they are willing to be innovative regarding finance policy. As an example, Oklahoma’s performance funding policy was implemented with the purpose of achieving a more equitable distribution of funding and included equity adjustments. Across institution types in Oklahoma, no significant declines occurred relative to institutions in non-PF states (Appendix E, Table E4).

Findings for Rural Institutions

Rural institutions frequently were the recipient of direct financial burdens associated with performance funding policies. Considering the broader challenges rural institutions face, from academic preparation of typically place-bound students to limited resources such as broadband connection, the fact that these institutions were often the recipients of financial burdens is also concerning (Swisher, 2016). If performance funding policies are imposing greater burdens on rural institutions, this may be detrimental to access to higher education in

these areas. It may be the case that declining enrollment in rural areas is driving the decreases in funding associated with performance funding. Many of the newer performance funding policies utilize metrics that are reliant on student volume. For example, if institutions are funded on the number of degrees produced, they will likely lose funds as their enrollment declines. Policymakers should keep be cognizant of the specific needs and challenges of rural institutions and avoid imposing additional burdens.

Performance Funding Policy Highlights and Implications

This dissertation research has highlighted several different types of performance funding policies. This section will discuss some of those policies and present policy implications and recommendations.

Performance Funding Policy Highlights

The data collection effort through which I gathered the details of the 20 treated states in this study revealed interesting elements of performance funding policies. While the classic definition of performance funding has been a “tight link” between state funding and institutional outcomes, I found many policies that did not appear to provide a tight link at all. For example, several policies are designed in such a way that performance outcomes are used to create the legislative budget request, and not necessarily dictate the funding allocation. It is not clear how much consideration policymakers give to the outcomes when deciding the final higher education budget in these contexts. Moreover, some policies are designed such that institutions are granted a portion of the final budget once it is decided based on their performance. So while their performance may improve, their funding may still decline based on what the state legislature passes—this does not guarantee a tight link.

For example, in Arizona’s policy, performance outcomes were used to create the budget request to the legislature, not necessarily used to make the funding allocations. It is not clear to what extent these performance outcomes are actually used by the legislature; knowing how higher education budgets are formed, it may very well be the case that the legislature funds whatever is available rather than letting the performance outcomes drive the funding. In addition, Tennessee’s current policy also uses performance outcomes to make budget requests; however, according to a THEC representative, the legislature typically follows the requests as submitted (S. Gentile, personal communication, December 13, 2016).

Moreover, some policies were so complicated it was difficult to see a tight link between funding and outcomes. Consider Arkansas’s policy—one of the more complicated policy designs explored in this study. This policy incorporates a point system with several metrics (some of which are optional) that seems to provide ample room for failure as institutions only have to demonstrate improvement for 60 percent of the metrics. Moreover, institutions slated to lose funding are able to retain it through a proposal submission process. It seems this policy provides several options for funding to not be directly linked to outcomes.

Some performance funding policies required institutions to meet a minimum level of compliance, in addition to the performance outcomes, before they were eligible for funding. This was the case for policies that either allocated new funding on the basis of performance or allocated a relatively small portion of base budgets according to performance. For example, Kansas’ policy required institutions to submit a performance plan and demonstrate “directional improvement” before they could be eligible for performance funding consideration. Michigan’s policy requires institutions to not raise tuition rates more than 3.2 percent in order to be

eligible for funds. Non-compliant institutions must forfeit their funds to compliant institutions. It is interesting that the policy includes a tuition restraint—it may be more profitable for institutions to raise tuition and not receive the funding increase from the state.

In contrast to Michigan, Louisiana’s policy not only incentivizes institutions via funding, the opportunity to gain institutional autonomies in exchange for performance outcomes is also a part of the policy. Institutions meeting GRAD Act requirements are able to increase tuition by 10 percent. However, it may be the case that increasing tuition substantially may have negative impacts on the overall state and institution completion goals. A BOR official remarked that the tuition incentive was more important to campuses than the 15 percent of state funds potentially at risk. However, as institutions gained the authority to raise tuition by 10 percent in exchange for meeting performance goals, the state proceed to cut institutional budgets by approximately that amount (K. Kirkpatrick, personal communication, February 3, 2017).

Some states’ policy documents addressed potential benefits and burdens of the policy directly. Michigan’s policy explicitly states that smaller institutions will have a harder time reaching set goals (they must be in the top 20 percent among their national peers in the performance elements) especially in regards total degree completions. Notably, Arkansas’ policy provides the opportunity for successful institutions to win over lost funding from poor-performing institutions. This is a particularly interesting case in regards to benefits and burdens—burdens can be avoided in a variety of ways, but an institution must be able to submit a compelling proposal to avoid declines in funding. It is important to note that many of the administrative roadblocks that may prevent institutions from receiving funding or performing well in the first place (i.e., collecting adequate data) may also inhibit a solid

proposal submission. The opportunity exists for strong institutions to take money directly from weak institutions; and, much of this is subjective as it is based on a proposal review process.

It is important to note that not all states' policies were developed from the top down. Missouri's performance funding policy, in place from 1994 to 2002, was developed by the Coordinating Board for Higher Education in partnership with the campuses; this policy was not mandated via legislation. Similarly, New Jersey's policy judged performance based on pre-established benchmarks that were developed by the Commission on Higher Education in consultation with the institutions. Pennsylvania's policy was also adopted by their Board of Governors and was not mandated by the legislature. According to the findings of this study, Missouri's policy is associated with increases in state-level spending per FTE, while Pennsylvania's policy is associated with negative effects at both the state and institution levels.

Some policies made efforts toward a more equitable distribution of funds. For instance, Arkansas' policy limited its dosage unless institutions received at least 75 percent of their requested budget from the legislature. Until this was achieved, performance funding could not exceed 10 percent of state appropriations. While this never happened, Arkansas' governor has recently expressed a desire to tie 100 percent of state funding to performance outcomes. New Mexico's policy awarded performance points, which took into consideration degree program costs. Oklahoma's policy provided equity adjustments in funding for institutions that were one standard deviation below the system average per FTE. This seems to anticipate that some schools may not perform as well based on size, mission, and student population. New Mexico's policy is associated with declines in per student funding at non-research, non-highly selective institutions. Oklahoma's policy, however, did not significantly affect funding for its institutions.

Arizona's policy is only evaluated for one year of implementation in this study and therefore not enough information is provided to fully understand its impact.

Policy Implications

It is clear from this dissertation research that not all performance funding policies are created equal nor do they treat institutions equally. How these policies are designed have important implications for state spending and institutions' available resources. For example, policies that redistribute existing funds had a consistent negative impact on state funding for higher education, whereas policies that introduced new funding had a positive impact in some contexts. Importantly, budget protection provisions seem to have prevented some of the negative impacts of base policies. In addition, how performance is measured matters. This study would suggest that fewer direct financial burdens occur under policies requiring institutions to demonstrate improvement or policies based on raw performance output, whereas meet target policies and compete policies are more likely to be associated with declines in funding.

The difference in treatment effects across institution types are likely related to the power and influence of the individual institutions. As such, it is important to consider who has a seat at the table and a voice in policy development. It may be the case that performance metrics are inappropriate for some institutions. For example, when targets are set for performance outcomes, do they make sense in the context of each institution? Alternatively, are targets set with the high-resource institution context in mind? Considering the preliminary findings related to degree production, it does not make sense to reward wealthy institutions for maintaining the status quo and either not reward or punish low-resource institutions when

they are indeed making improvements. If the improvements are not great enough, perhaps the policy design needs to be revisited.

Relatedly, Callahan, Meehan, and Shaw (2017) found that while most institutions in Tennessee, Ohio, and Indiana responded to performance funding policies with a slew of activity, highly selective institutions were much less likely to change any behavior. This suggests the policy design does not in fact produce an incentive for the wealthiest institutions; however, combined with the findings of this dissertation research, high-resource institutions are more likely to be rewarded under performance funding policies. Perhaps degree attainment is not an area in which these institutions need improvement, but they could likely improve in other areas. Jones et al. (2017) recommends that high-resource institutions should be incentivized to expand access to marginalized populations and held accountable for these students' experiences and success. If high-resourced institutions are funded based on what they are already doing well—requiring no change, innovation, or new efforts—and financially benefiting according to the historical funding preferences of state legislators, institutional characteristics, and student body, the financial incentives may be ineffective. Moreover, if the same (or similar) standards are imposed on low-resource institutions without considering their broader context, this same effort harms the institutions that need state funding most. Finally, considering that these low-resource institutions seem to actually respond well to the financial incentives, not rewarding these efforts and gains will eventually erode the power of the incentive altogether.

It is more economically efficient to use state dollars for the institutions that do not have additional funding sources. When states funnel more money to the high-resource institutions that are able to raise tuition rates and have stable endowments, they are sending money to

institutions that can more easily obtain funding from other places. Instead, states should focus on funding the institutions that are underfunded, do not have access to many other funding sources, and need to expand their capacity for addressing state goals. However, while this makes economic sense, it may not lead to political success (McConnell, 2010). Being able to funnel state dollars to an institution that has outstanding credentials is likely more politically expedient than using taxpayer dollars to support an institution whose success may be less obvious. Moreover, efforts by policymakers to level out funding inequities, especially for marginalized student populations, are not always politically popular. Gàndara (2016) notes the original intention of Colorado's latest performance funding iteration was to provide more equitable opportunities for funding in light of historic underfunding for MSIs. However, the version of the policy that was passed did not include these specifications.

In addition to being economically inefficient, funneling resources to institutions that are less dependent upon state appropriations and have less room for increasing degree production is not a promising strategy to improve college completion. At the same time, funding is reduced for institutions that have the most potential for contributing to states' credentialing efforts and would benefit from expanding capacity to support students. Perhaps a more equitable distribution of state funding—one that takes into consideration institutions' total available resources when making allocation decisions and expands the capacity of underfunded institutions—would be a more effective and strategic approach to higher education finance for the purposes of improving degree attainment.

Policy Recommendations

Based on this dissertation research, these policies have differential effects that depend on specific design elements and institutional contexts. Additionally, performance funding policies can lead to institutional action and in some cases are associated with improvement in performance outcomes. However, it seems that not all institutions are equally incentivized to action nor rewarded equitably for those efforts. The following consists of policy recommendations on the basis of this dissertation research:

1. Policymakers should better understand the various higher education contexts and policies should not be shaped solely by wealthy institutions. Policymakers should bring diverse institutional leaders to the table during the development stage and provide a platform for all voices to be heard and incorporated. If funding mechanisms continue to reinforce inequities under the guise of who is considered deserving, progress toward the goals of increased educational attainment may be inhibited.
2. Performance funding policies should incentivize improvement, not reward institutions for existing status. For wealthy institutions that already have high achievement rates, policymakers should find other areas of improvement. For instance, Jones et al. (2017) suggest incentivizing these institutions to enroll and support more marginalized student populations.
3. Performance funding policies should be used to expand institutional capacity where necessary and possible. Where the low-resource institutions show improvement, reward them generously: in part as a reward for outcomes and in part for expanding capacity for continued improvement.

4. Use performance funding as an opportunity to correct funding inequities, rather than perpetuate them.
5. In regards to specific policy designs, policies should utilize budget protection provisions like hold harmless or stop loss provisions to avoid the negative impacts of redistributing existing funds; avoid competitive models—if institutions demonstrate improvement, they should be rewarded (or at least not punished); the level of funding should be chosen carefully as the impact of performance funding related to other design elements are exacerbated when more funding is at stake.

It is important to mention that performance funding policies are popular for a reason: they are politically palatable in a climate that values accountability. It may not be politically feasible to provide more funding to institutions that are not making huge strides. It may be easier to convince policymakers to support already successful institutions. While this line of thinking has practical issues, it may be politically successful and therefore more likely to continue (McConnell, 2010). Making these policy recommendations politically appealing will increase the likelihood of their consideration and implementation. If institutions can better tell their stories—success in their context and how that plays a part in the broader good of the state—perhaps this will help garner political support. Additionally, appealing to the desires for fiscal responsibility, there is an argument to be made in terms of what is economically efficient.

Future Research

This dissertation research lays the groundwork for future scholarship. By systematically incorporating the policy design elements of performance funding into the regression models, I have overcome a substantial limitation of the existing performance funding literature. These

data will be immensely helpful in continued analysis of performance funding's impact on a variety of additional outcomes and how those impacts vary according to policy design. For example, how does performance funding policy design impact degree production; retention, progression, and graduation rates; general enrollment and enrollment of marginalized student populations; institutional selectivity and admission yield; alternative funding sources for institutions; etc.

While this study establishes important patterns in terms of the institutions types that benefit or not from performance funding, it does not determine whether or not the increase in funding for one institution happens at the expense of another institution in the same state. The comparisons made in this study are between similar institution types in PF and non-PF states, rather than all institutions in the same state. This is the next logical step for this line of inquiry: are the benefits and burdens happening simultaneously?

What are the motivations behind the policy designs? Are the performance funding policies intended to have the differential effects observed in this study? Gándara's (2016) qualitative work around this question is important for understanding the policies' intentions. While quantitative work such as this dissertation research provides useful trends and patterns, it does not allow the exploration of the policymakers' motivations. These two methods together would illuminate important information about how well these policies are working and how well they are designed.

Conclusion

This dissertation research fills three noteworthy gaps in the existing performance funding literature. First, I examined how performance funding policies restructure state

appropriations, both at the state-level and institution-level. Second, I systematically incorporated specific policy design elements into my quantitative analysis. Lastly, I explored the effect heterogeneity of performance funding across institution types, exposing the system of winners and losers created by these incentive policies.

This study provides evidence in support of many performance funding criticisms. Namely, that performance funding policies are associated with declines in funding at both the state and institution levels. Across institutions, performance funding policies seem to perpetuate funding inequities whereby the wealthiest institutions receive direct financial benefits and the poorest institutions receive financial burdens. These patterns in funding occur in spite of evidence that suggests improvements in bachelor's degree production, arguably the primary impetus of performance funding, are concentrated at the institutions whose funding is more likely to decline. So while performance funding advocates often argue that financial incentives are necessary to inspire desired outcomes, it seems performance funding policies may actually be used to legitimize funding inequities.

Not only is this disconcerting in regard to the historic funding inequities across higher education institutions, especially for minority serving institutions, this approach may be detrimental to the completion agenda writ large. High-resource institutions are likely only able to make marginal increases in degree production as these institutions typically have little room to increase enrollment and/or improve completion rates. Low-resource institutions, on the other hand, have the potential to significantly increase degree attainment. However, this will likely depend on an expansion of resources and capacity.

Performance funding policies will likely remain popular among state policymakers for the foreseeable future. To maximize the potential impact on college completion outcomes and leverage the power of financial incentives, whether real or perceived, these policies should aim to correct historic funding inequities, expand the capacity of underfunded institutions, and incentivize action and progress for all institution types, including the highest resourced institutions.

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Appendix A
Performance Funding Policy Descriptions by State

ARIZONA

The Board of Regents governs the three public, four-year institutions in Arizona. In 2011, the Arizona legislature adopted a performance funding policy, and in fiscal year 2013 it was first funded (Arizona Higher Education Budget Reconciliation Bill, 2011). Minor updates occurred in 2013 and 2014 (e.g., adjustments to credit hour thresholds). Performance funding in AZ has allocated both new money and existing funds on the basis of performance. In FY 2013, \$5 million in new funding was allocated on the basis of performance (AZ JLBC, 2014); for both FY 2014 and 2015 \$5 million was withheld at the beginning of the fiscal year to then be redistributed (AZ JLBC, 2015, 2016). The FY 2017 ABOR Budget Baseline Report says: “Unlike the first \$5,000,000 that became part of universities’ base budgets [in FY 2013], the second \$5,000,000 has been retained in ABOR’s budget at the beginning of each fiscal year to be redistributed again in a manner similar to the performance funding model of the prior year” (AZ JLBC, 2016, p. 444). According to Snyder and Fox (2016), Arizona did not fund performance funding in FY 2016.

For the years in which AZ’s policy was operational, performance was measured by demonstrated improvement in three areas: degrees, credit hours, and external funding for research. The funding formula examined three-year moving averages beginning two years prior to the current fiscal years. For example, the FY 2013 budget request was based on the average annual change for 2008-09, 2009-10, and 2010-11 compared to average of outcomes in 2007-08, 2008-09, and 2009-10 (ABOR, 2014). A fifteen percent premium was awarded for STEM and other high demand degrees conferred (ABOR, 2014).

It is important to note that performance funding in Arizona is (supposed to be) used to develop the funding request to the legislature, although, according to several baseline reports this may not have happened as intended. To read more about Arizona’s policy see Washington State Auditor’s Office (2014). Arizona’s policy applies to four-year institutions only (see Dougherty & Natow, 2015 and NCSL, 2017).

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ARKANSAS

The Arkansas Department of Higher Education serves as the administrative arm of the Arkansas Higher Education Coordinating Board, which oversees 11 four-year, public institutions. Performance funding was adopted in Arkansas in 2011 and funding began in FY 2014 (AR SB 766). An overhaul of the performance funding policy has been a recent priority of Arkansas governor, Asa Hutchinson (Musa, 2016).

The policy currently implemented reallocates a portion of the base budget on the basis of performance. The original intention for the policy was to gradually increase the portion of funds tied to performance by 5 percent each year until reaching 25 percent in FY 2018 (NCSL, 2017). However, performance funding has remained 10 percent of state appropriations since FY 2014 (Arkansas Department of Higher Education, 2012, 2014a, 2014b, 2016) due to Act 1397 in 2013 which stated that the outcomes-based funding component would not exceed 10 percent unless all institutions were funded at a minimum of 75 percent of needed state funding (Arkansas Higher Education Coordinating Board, 2015). Recent proposals by the governor seek to tie 100 percent of appropriations to outcomes in a similar manner as the state of Tennessee.

Performance is measured through the improvement in three types of outcomes: mandatory, compensatory, and optional. All institutions are funded on the basis of credentials earned, STEM credentials earned, and student progression. Institutions can choose up to six additional metrics out of a list of optional metrics, five of which are related to degree completion. One compensatory metric—enrollment of Pell recipients—can also be included. Institutions must demonstrate an improvement in three-year rolling averages to earn 100 percent of their performance funds. Improvement is considered any positive change in outcome averages (Arkansas Department of Higher Education, 2016b). One particular measure, bachelor and total credentials earned, is measured against achieving the preset goal of increasing degrees conferred by 4.73 percent each year above the baseline in 2010 (Arkansas Department of

Higher Education, 2016b). If institutions do not improve—either remain the same or decline—they will lose points (points system discussed in detail below) ultimately leading to a small decrease in funding.

A premium is offered for low-income students in the form of additional points earned for the enrollment of Pell grant recipients. However, this premium does not allow institutions to earn additional funding; rather, the extra points earned by Pell students may offset points lost in other areas (Arkansas Department of Higher Education, 2016b). Institutions have the option of choosing credentials earned by minority students, non-traditional students, remedial students, transfer students, and credentials in other high demand areas.

Funding is awarded on the basis of earning a maximum of 10 points—one point for each of the mandatory, compensatory, and optional performance metrics. Institutions that earn at least six points receive 100 percent of their performance funds. For bachelor and total credentials, each point is earned based on increasing credentials by 4.73 percent as mentioned above. For other metrics, the point is earned on the basis of improvement in the three-year rolling average. Institutions that score below six points are able to submit an improvement plan to ADHE. Upon approval of the improvement plan, the institution may retain its performance funding. If a performance plan is not submitted or approved by ADHE, that institution's funds are redistributed on a competitive basis to other institutions that met the points requirement (T. Smith, personal communication, December 28, 2016; Arkansas Higher Education Coordinating Board, 2015). If an institution repeatedly earns fewer than six points performance funds will be reduced gradually (T. Smith, personal communication, December 28, 2016).

It is important to note that Serban and Burke (1998) consider Arkansas to have operated performance funding in the late 1990s. However, it may be the case that the funds intended for performance rewards were not actually allocated on the basis of performance (Serban & Burke, 1998). As such, Arkansas' early policy is not included. Arkansas also operates performance funding for the two-year sector.

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COLORADO

The Colorado Commission on Higher Education and Department of Higher Education oversee 14 public, four-year institutions. In addition, six governing boards govern the 14 universities. Performance funding in Colorado has had a volatile history. First adopted in 1994 (CO HB 94-1129) and funded from FY 1995 to 1997 (Bridges, 1999; Serban & Burke, 1998); this was followed by a second implementation of performance funding adopted in 1999 (CO HB 99-229) and funded from FY 2001 to FY 2003 (Burke, 2002). Most recently, Colorado adopted a new outcomes-based funding model in 2014, with funding beginning in FY 2016 (CO HB 1319). This research focuses on the first two iterations of performance funding.

For both the first two policies, only new funds were allocated on the basis of performance (i.e., bonus funding) (Bridges, 1999). Funding ranged from a low of \$5,300,000 in FY 1996 to a high of \$20,697,239 in FY 2002 (Burke, 2002).

In the first round of performance funding, performance was measured on the basis of increases in performance metrics. In the second round of performance funding, performance was measured on the basis of meeting benchmarks as described by the Quality Indicator System; metrics include graduation rates, faculty teaching load, retention rates, licensure exam scores, institutional support expenditures, availability of general education courses, and two additional institution-specific metrics (CCHE, 2002). Points are awarded for each of the performance metrics. The percentage of performance is calculated by dividing the actual outcome by the expected outcome (based on national peer benchmarks) (CCHE, 2002). For the first policy, I count measuring performance as demonstrating improvement; for the second, I count

measuring performance as meeting a target due to the use of benchmarking. The success of minority students is included as a metric. Two-year institutions are also subject to performance funding. The funding levels provided in each year are inclusive of the funds allocated to two-year schools.

On an interesting note, I corresponded with an individual at the Colorado Department of Higher Education, but her information did not line up with the budget and legislative documents collected or the past work that has been done on Colorado's performance funding policies. It may be the case that she is most familiar with the current outcomes-based funding arrangement; she suggested that it was not until 2014 that Colorado actually had performance funding. Whatever had been in place in the 1990s/early 2000s was not really performance funding (K. Weaver, personal communication, January 1, 2017).

It is important to note about Colorado the major change in state funding for higher education as a result of the 2004 College Opportunity Fund bill. College Opportunity Fund created a voucher system such that state funding would be allocated in two ways: stipends for students and fee for service.

For more information on the development and demise of Colorado's first two performance funding policies see Burke and Serban (1998), Bridges (1999), and Burke (2002). For more information on Colorado's most recent outcomes-based policy see Gàndara (2016).

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INDIANA

The Indiana Commission on Higher Education (ICHE) oversees and coordinates Indiana's public universities and colleges. The Commission oversees both the operating and capital budget requests. In addition, the ICHE has created and managed the changes and policy decisions in regards to performance funding; unlike many other states, performance funding was not a result of legislative mandates or laws in Indiana (ICHE, 2015). Indiana's performance funding policy has been promoted as best practice by a number of organizations (e.g. Complete College America, HCM Strategists). Performance funding began in 2003 as a way for institutions experiencing stagnant enrollment to earn new funding via research related activities. In 2007,

performance funding expanded to include all institutions and provide funding bonuses on the basis of student outcomes, in addition to research activity. Performance funding has been funded in Indiana since FY 2004 and has experienced notable policy changes in 2007, 2009, and 2011.

Since performance funding began as a way to earn new funding, only new monies were allocated on the basis of performance from FY 2004 to FY 2010. In FY 2011, no new funding was available so a portion of base funding was reallocated on the basis of performance (HCM Indiana, 2011). Performance funding began at \$6.2 million in FY 2004 and reached its peak in FY 2015 at \$77 million. It is important to note that when performance funding became part of institutions' base budgets Indiana experienced substantial budget cuts. In some years, the funding "added back" via performance funding did not make up for budget losses (ICHE, 2015). Specifically, in FYs 2010, 2011, 2012, and 2013 budget reductions were implemented such that there was a net loss in state appropriations despite the inclusion of performance funds.

As mentioned, performance was measured in regards to research activity only for the institutions at enrollment capacity for the first few years. The sole outcome metric at that time was change in research expenditures (from gift aid, grant funds, or private funds/contracts) (ICHE 2015a). For the 2007-09 biennial budget, performance funding expanded to all institutions on the basis of student outcomes. Performance was measured in terms of changes in overall degree production, on-time graduation rates, two year transfer (for community colleges only), and research activity. Changes were calculated over a period of time rather than year to year to prevent dramatic changes that can occur in year's time (ICHE 2015a).

In the 2009-2011 biennium, ICHE added a metric for overall degree completion for "at-risk" students (Pell grant recipients). Other changes in this biennium include the transition from credit hours attempted to credit hours completed in the enrollment portion of the funding formula. Instead of counting students at the beginning of the semester, the formula counted the students that completed the course with a passing grade. This was gradually implemented. Indiana also operates a performance funding policy for two-year institutions. The levels of funding provided here are inclusive of the funds allocated to two-year institutions.

An interesting note about Indiana's performance funding policy is the outcome metrics were only measured for in-state students. ICHE (2015a) argued that the state goal was to improve college completion for Indiana's workforce and economy; as such, they remained focused only on residents of Indiana.

It is important to note that Tandberg and Hillman (2014) define Indiana's performance funding policy as funded from 2007 onward—this is likely the case due to the fact that the earlier policy did not tie funding to student outcomes. Since this dissertation research is not limited by the types of outcomes that are tied to performance funding, I define Indiana as funded since FY

2004. For a detailed history on performance funding in Indiana, see the ICHE (2015) report. Additional sources on Indiana's performance funding include Dougherty, et al. (2014a, 2014b); Dougherty and Natow (2015); and Reddy et al. (2014).

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KANSAS

The Kansas Board of Regents governs six public universities and serves in a coordinating capacity for all other public higher education institutions. Performance funding was adopted in 2002 (K.S.A 74-3202d, revised 2014) and funded from FY 2006 to 2009. Performance funding was based on institutions' compliance with performance agreements negotiated between the Board and the institution (KA BOR, 2003). Institutions agree to the terms of the performance agreement and then provide an annual report/plan. Only new funding was tied to performance agreements; so, in years where no new funding was allocated, performance funding was not funded. While Kansas' institutions have submitted performance plans every year since 2006, new funds were only available from 2006 to 2009 (KA Division of the Budget, 2007, 2008, 2009, 2010).

To be in compliance with the performance agreements, institutions had to show "directional improvement." Depending on the level of compliance, institutions could earn either zero, 60-80, or 100 percent of new funds available (KA BOR, 2003). Institutions that did not submit a performance plan would receive zero percent of the new funds. In 2011, institutions were rewarded for either maintaining the baseline or improving. Institutions could earn either zero, 90, or 100 percent of new funds depending on the level of compliance (KA BOR, 2003).

Performance funding began at \$11.6 million in FY 2006 and peaked at \$19.9 million for four-year institutions in FY 2009. Karla Wiscombe at the BOR had this to say about performance funding in Kansas: "The short answer is there have been very little new funds for higher education in Kansas, therefore the effects have been minimal. There have only been a few instances where all institutions did not meet the requirements for 100% of new funding, which makes the issue fairly void of any information. Kansas does not have a true performance-based funding model" (K. Wiscombe, personal communication, January 17, 2017). I still include Kansas in this study as some funds were allocated on the basis of performance. Both two- and four-year institutions were subject to the performance agreements.

It is important to note that Tandberg and Hillman (2014) define Kansas' performance funding as funded from 2002 to 2005; however, according to Kansas statute 74-3202d (revised in 2014), 2002 was the adoption year and the intention to tie performance agreements to state funding was for FY 2006. This is corroborated in the Governor's Budget Reports (KA Division of the Budget, 2007, 2008, 2009, 2010).

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KENTUCKY

Kentucky's performance funding policy was adopted in 1994 and first funded in FY 1996 (Serban & Burke, 1998). This policy allocated new funds on the basis of performance (as a bonus). It was funded for three years: from FY 1996 to 1998. Performance was measured on the basis of institutional improvements in outcomes; some metrics, on the other hand, were measured on the basis of meeting targets (Serban & Burke, 1998). For this reason, Kentucky is counted as measuring performance as both improvements and meeting targets.

Performance was measured in five areas: persistence of students, student outcomes, periodic comprehensive student assessment, quality of research/service programs, and campus management (Burke, 2002). Many performance metrics were utilized—from retention and graduation rates to satisfaction of alumni and success rates on licensure exams. Burke (2002) reports 26 metrics used in Kentucky's performance funding program. Metrics were common to all campuses but institutions were permitted to choose their own weights for the metrics. For some metrics (e.g., retention rates), performance was measured for the entire student body and then again for certain populations (e.g., minority students).

Performance funding started out at \$18 million and declined rapidly over the next two years of funding—just \$3.3 million in 1997 and \$2.6 million in 1998 (Burke, 2002; Serban & Burke, 1998). This policy applied to four-year universities only.

Kentucky has been in the news recently regarding new efforts for an outcomes based funding policy. Kentucky governor Matt Bevin announced his priority to both implement performance funding for higher education and substantially cut funding. In addition, at a recent press conference, Bevin emphasized the importance of rewarding degree programs that led to high demand jobs in Kentucky: “There is not going to be money just for the sake of existence...The net result of putting public tax dollars into education is to ensure that we are graduating people that can go into the workforce and get out of their parent’s basement, among other things” (Williams, 2016). He stated that degrees in literature would not be funded at the same level as engineering degrees, suggesting a greater economic value for graduates of STEM programs.

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LOUISIANA

The Louisiana Board of Regents (BOR) oversees four higher education systems: Louisiana Community and Technical College System, Louisiana State University System, Southern University System, and the University of Louisiana System. Performance funding has been in place in Louisiana since 2009. In 2011, performance funding was linked to outcomes negotiated in the GRAD Act (LA HB 2010 1171; LA HB 2011 549). Under the GRAD Act institutions were able to earn tuition setting authority, other institutional autonomies, and a portion of state appropriations was at stake for adequately meeting the goals outlined in institution performance agreements.

Both new funds and base funding were subject to cuts on the basis of performance (LA BOR, 2012). In addition, the performance funding policy included a hold harmless provision to protect budgets from substantial losses (LA BOR, 2012). Performance is measured on the basis of institutions meeting preset targets, primarily related to degree production, that are negotiated between the BOR and the institution. Success metrics include retention rates, graduation rates, degree production, professional school entrance exam scores, and placement rates of graduations. Retention and graduation rates are target measures (required) while outcomes like placement of graduates are optional (LA BOR, 2011 Grad act report). Louisiana’s policy counts the success of adult students, minority students, low-income students, and STEM degree completers in addition to the success of the student body overall (LA BOR, 2012).

According to the BOR, 15 percent of the operating budget was at stake under performance funding (K. Kirkpatrick, personal communication, February 3, 2017). If institutions did not meet

their goals, they would lose 15 percent of their base budgets. However, they were given the opportunity to earn at most 75 percent of these funds back by submitting an improvement plan (L. Parker, personal communication, February 13, 2017). Much like Arkansas, if institutions did not submit an improvement plan the funding lost was redistributed to the other institutions (K. Kirkpatrick, personal communication, February 3, 2017). Institutions that met their performance goals were able to keep all of the funding allocated by the state.

The amount of funding tied to performance outcomes is an estimate, based on Board of Regents budget documents. I calculated the 15 percent of general fund direct that was at stake since FY 2009. However, it is important to point out that this funding may be an overestimate or an underestimate of the funding at stake. When the legislature provides additional funds to a campus, those funds are counted as general direct funds, but are not subject to GRAD Act performance. On the other hand, when substantial cuts have been made to the general fund direct, they have been made up in other funding categories. According to the Board of Regents, it is unclear whether or not those “make-up” funds would be subject to GRAD Act performance. This happened in 2013-14, a year in which all institutions kept their GRAD Act funding (L. Parker, personal communication, February 13, 2017). Both two-year and four-year institutions are subject to the GRAD Act.

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MICHIGAN

Michigan has 15 public, four-year postsecondary institutions. Each has its own governing board and there is no centralized governing or coordinating agency. State appropriations for each institution is decided upon by the legislature. Performance funding in Michigan resulted from a compromise between the House, Senate, and executive branch, following a 15 percent budget cut to higher education appropriations in FY 2012 (Jen, 2014). Beginning in FY 2013, all new funding was allocated on the basis of performance (Jen, 2014; PF in 11 states). While performance funding supplied new funds to institutions, increases in funding did not make up for the 15 percent loss in FY 2012. The amount of funding tied to performance began at \$27.2 million in FY 2013, rose slightly to \$27.9 million in FY 2014 and \$37.3 in FY 2015 (Jen, 2014).

Performance is based on six metrics: undergraduate degree completions in critical skills areas, research and development expenditures, six-year graduation rate, total degree completions,

institutional support expenditures as a percentage of total core expenditures, and Pell Grant student enrollment (Jen, 2014). Performance is measured by comparison to national peers. Institutions that rank in the top 20 percent of their national peer group are awarded the most points, followed by institutions that are above the national median in their peer group. The least amount of points is awarded to institutions that demonstrate improvement over a three-year period (Bowerman & Jen, 2012; Jen, 2014). Michigan is coded as having a competitive arrangement for measuring performance; however, it is the only state that compares performance directly to national peers. I chose to code this as competitive rather than meeting a target because the institutions are rewarded for outperforming other institutions, creating a moving target. For degrees produced in critical areas and research and development expenditures, performance is measured on the basis raw numbers and are not compared to national peers (Jen, 2014). According to NCSL, performance funding is in place for two-year schools as well. The funding levels used here are not inclusive of the funding allocated to two-year schools.

It is important to note that the performance funding formula utilizes IPEDS data, leading to a substantial lag in data availability. For instance, the FY 2015 funding is based on outcomes from FY 2011 (Jen, 2014). As such, this arrangement raises concerns about the ability to motivate institutional behavior and outcomes.

There are a variety of requirements institutions must meet to be eligible to receive performance funding. For example, institutions cannot raise tuition more than 3.2 percent and they must implement transfer articulation agreements. Non-compliant institutions must forfeit their funds to compliant institutions. It is interesting that the policy includes a tuition restraint—it may be more profitable for institutions to raise tuition and not receive the funding increase from the state.

One last note of importance: the performance funding documentation in Michigan explicitly states that smaller institutions will have a harder time reaching the top 20 percent among their national peers, particularly in regards to total degree completions. They use a gross measure of degree productivity without controlling for university size. This is a particularly interesting element in light of the potential benefits and burdens distributed by this policy.

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MINNESOTA

Minnesota only had performance funding in place for one year. It was adopted in 1995 and was funded only in FY 1997 (Burke, 2002). For that one year, performance funding was a part of the base budget and allocated \$8.5 million on the basis of performance (Serban & Burke, 1998). Performance was measured in regards to institutional improvement.

Recently, Minnesota has implemented a new outcomes-based funding formula, according to NCSL. This most recent policy was first funded in FY 2015, which is beyond the scope of this research.

Minnesota seems to have run separate performance funding policies for the University of Minnesota and Minnesota State Colleges and Universities (Burke, 2002). The funding in FY 1997 is inclusive of both the University of Minnesota and Minnesota State Colleges and Universities, which includes community colleges. (Serban & Burke, 1998)

MISSOURI

Missouri has a decentralized higher education structure. The Coordinating Board for Higher Education (CBHE) oversees Missouri's public institutions, and each school has its own governing board. Performance funding was developed by the CBHE in partnership with the campuses and was not mandated via legislation (Stein & Fajen, 1995). The development of performance funding —known as the Funding for Results initiative—began in 1989 and was first funded in FY 1994. It was funded for eight years; no performance funds were allocated in FY 2002.

Performance funding was offered as a bonus to institutions (new funding) that was not to exceed 5 percent of the higher education budget. Performance funding was included as part of the core budget rather than a line item to prevent an easy removal by the legislature (Stein & Fajen, 1995).

Five performance indicators and two indicators of quality inputs were initially used: freshman success rates, success of underrepresented groups, performance of graduates, attainment of graduation goals, successful transfer, admitted students, and prospective teachers. In 1995, a greater focus on teaching and learning outcomes were incorporated into the formula. For some metrics, target goals were decided upon and for others, raw numbers were used to determine the level of performance. For this reason, Missouri is counted as measuring performance via meeting targets and based on raw output.

The level of funding tied to performance began at \$3 million in FY 1994 and peaked at \$11 million in FY 1999.

Performance metrics included the success of underrepresented student populations as well as degree production in high demand areas (Stein, 2002); however, these were included as stand-

alone metrics and not rewarded over and above the other metrics. Missouri also operated a performance funding policy for two-year institutions.

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NEW JERSEY

New Jersey's Commission on Higher Education served as the coordinating and planning agency for New Jersey's 31 public colleges and universities and was responsible for the creation of performance funding in the late 1990s. In 2011, however, Governor Chris Christie abolished the Commission on Higher Education and transferred all powers, functions, and duties to the Secretary of Higher Education.

The CHE began developing performance funding in FY 1997 with the support of the governor (NJ CHE, 2000); the policy was funded from FY 2000 to FY 2002 (NJ CHE, 2000, 2001; NJ Office of Management and Budget, 2000, 2001; NJ CHE, 2002). Under the performance funding policy, institutions were eligible to earn up to one percent of operating aid, as new funding over and above the base state allocation. Institutions' performance was judged based on pre-established benchmarks, developed by the CHE in consultation with the institutions (NJ CHE, 2001). Performance metrics existed in four areas: graduation rates, transfer and articulation, efficiency and effectiveness, and diversified revenues (NJ CHE, 2000). Funding allocated on the basis of performance was relatively small in New Jersey. At its peak, \$8.7 million was available as a performance bonus in FY 2002. According to Gorbunov (2013), no funding was allocated for performance in FY 2003. Additionally, performance funding is absent from the FY 2003 Budget in Brief. New Jersey operated a performance funding policy for the two-year sector as well. The funding included here does not include funds allocated to two-year institutions.

It is important to note that each year, a certain amount of money was made available for performance funding, but institutions did not necessarily earn all of the available funds. Based on the information available, I have included the amount of funding that was made available, rather than the amount that institutions earned.

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NEW MEXICO

Performance funding was developed in New Mexico by the Department of Higher Education (NMDHE), in consultation with the institutions, at the behest of the Legislative Finance Committee and the governor (NMDHE, 2013). Performance funding was implemented in FY 2013 in New Mexico; this policy reallocates a portion of the base budget on the basis of achieving performance outcomes. To do so, a portion of funds are withheld from institutions initially, and funding was earned back on the basis of performance. Institutions can earn more funding or less funding back.

Performance metrics are primarily related to degree production—overall degree production, degree production for financially at-risk students, and degree production in STEM and health fields (NMDHE, 2013). Performance on these metrics is converted to points, which take into account degree program costs, and funds are allocated in proportion to the points earned such that the institution that earns the most points gets the most funds. Institutions earning fewer points will get fewer dollars. Institutions will only lose the entire portion of funding if they stop producing degrees altogether (NMDHE, 2013). The points are awarded on the basis of raw numbers of degree output and greater points are awarded for financially at-risk students as well as degrees produced in STEM fields (NM Legislative Finance Committee, 2014).

Funding is “earned back” if an institution’s share of points increases from one time period to another. A three-year rolling average is used to assess changes in an institution’s share of points awarded (i.e., the average percent of total points in 2009-10, 2010-11, and 2011-12 is compared to the average percent of total points in 2010-11, 2011-12, and 2012-13). If an institution’s percentage increases, they will earn back more than the portion of funds originally held back; if an institution’s percentage decreases they will earn back less than what was originally held back. While there are several elements involved in measuring performance, I

coded New Mexico as competing for funds since funds are ultimately allocated on the basis of an institution's position relative to the other institutions in the state (NMDHE, 2013).

The amount of funding tied to performance was approximated by calculating five percent of all Instruction and General (I&G) appropriations (NM Legislative Finance Committee, 2012, 2013a, 2013b, 2014). In FY 2013, New Mexico allocated \$30.8 million on the basis of performance and \$20.8 million in FY 2014. In FY 2015, 10 percent of all I&G appropriations were allocated on the basis of performance (NM Legislative Finance Committee, 2014). New Mexico also operated a performance funding policy for the two-year sector.

It is important to point out the implications for benefits and burdens to be distributed by New Mexico's policy. Since funding is distributed on the basis of an institution's share of system-wide degree production, necessarily some institutions will "win" and others will "lose".

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OHIO

Performance funding has been operational in Ohio since FY 1998. In the late 1990s, Ohio implemented a variety of challenge programs to incentivize higher education improvements: success challenge, access challenge, research challenge, and jobs challenge. Each offered a small incentive for improvement. The success challenge was focused on degree and course completion and is thus the focus of the related performance funding research. In 2009, Ohio overhauled its performance funding program in the biennial budget bill, HB 1 (Dougherty & Natow, 2015) as to develop a new funding formula that was primarily driven by outcomes instead of enrollment. In 2012, Governor Kasich pushed the development of the formula even

further to rely less on enrollment (Dougherty & Natow, 2015). Performance funding went from tying two percent (or less) of state funds to performance to allocating nearly all funds on the basis of degree and course completions. Ohio's most recent performance funding policy has been widely considered best practice by many higher education organizations (CCA, HCM, etc.).

Ohio's original performance funding policy (FY 1998-2009) allocated funds tied to performance as a bonus, over and above the base state appropriation (Carey, 2014). During that time, performance funding peaked at \$56.1 million in FY 2005, approximately 2.3 percent of total general fund revenue for the Ohio Board of Regents. More recently, base funding has been reallocated according to performance outcomes and amounts to approximately 80 percent of total state funding, according to the operating budget from the Ohio Department of Higher Education (2009, 2011, 2013, 2014).

From 1998 to 1999, performance was measured in terms of undergraduate degree completion for at-risk students. In 2000, timely degree completion was added as a performance metric. According to Ohio Board of Regents (2001), funding was distributed in proportion to each institution's share of total statewide degrees awarded to at-risk students and the share of total bachelor's degrees awarded within four years. This suggests that the raw number of graduates drives the measurement of performance, but the allocation of funding depends on producing more graduates than other institutions.

A similar arrangement is used for the most recent outcomes-based policy. Performance metrics currently utilized include course and degree completions, weighted by program costs. According to HCM Indiana (2011), Ohio "allocates money based on institutions' contribution to overall system performance, with no predetermined goal or improvement target established." In addition, the current formula incorporates a number of indicators and weights that take into consideration institutional mission and degree costs. They argue that the policy allows institutions to take advantage of their strengths. Since FY 2010, extra weight has been applied to degrees earned in STEM fields and at-risk students. Taking all of this into consideration, Ohio is coded as measuring performance via raw numbers (as opposed to year over year increases) and compete for funds.

For the most recent policy, a stop loss provision was included to prevent institutions from losing too much money during the transition to a new formula (Carey, 2014). As of FY 2014, the stop loss was no longer in place.

The exact dollar amounts tied to performance (Appendix B) are taken from Dougherty and Natow (2015) for FY 1998-2009. The amounts allocated from FY 2010 are calculated from the operating budgets provided by the Ohio Department of Higher Education (2009, 2011, 2013, 2014). Ohio also has performance funding for the two-year sector.

See Dougherty and Natow (2015) for more details on the development of Ohio's performance funding policies.

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OKLAHOMA

The Oklahoma State System of Higher Education consists of 13 four-year, public institutions, as well as 12 community colleges, which are coordinated by the Oklahoma State Regents for Higher Education; each institution is governed by its own Board of Regents. Performance funding was adopted in 2012 by the Oklahoma State Regents of Higher Education following recommendations by the Council of Presidents; the policy was first funded in FY 2013. Only new money is tied to performance outcomes (NCSL, Jones, 2013; OK SSHE, 2013, 2014; OK SRHE, 2016); however, new funding was not available for FY 2015 through FY 2017. In FY 2013, \$1.9 million was allocated on the basis of performance (this was transferred from the Brain Gain initiative, so it was not new funding from the state but it was new to institutional budgets) and \$10 million in FY 2014 (OK SRHE, 2016).

Performance metrics include first year retention, retention for Pell recipients, earning 24 credits in the first year, graduation rates, degrees conferred, and program accreditation. Performance was measured based on increases in these outcomes, not simply the raw output (OK SRHE, 2016).

Since this policy provided funds in the form of a bonus, budget protection provisions were not necessary. However, Oklahoma's policy did provide equity adjustments in funding for institutions that were one standard deviation below the system per FTE average (OK SRHE, 2016). This seems to anticipate that some schools may not perform as well based on their size, mission, and student population. Performance funding is in place for both two- and four-year institutions. Funding likely includes for all institutions as the System includes colleges and universities.

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OREGON

When Oregon's performance funding policy was first implemented, it was facilitated by the Oregon University System. However, as of 2015 the OUS has been dissolved along with the Board of Higher Education. Individual governing boards were created and the Higher Education Coordinating Commission, which was established in 2011, now serves as a coordinating entity providing more autonomy to the campuses. Information about Oregon's performance funding policy that was in place from FY 2012 to FY 2014 was obtained through the Internet Archive. Recently, a new performance funding policy has been considered in the midst of this new governance structure (NCSL).

Oregon's performance funding policy, the Student Success Initiative, was funded FY 2012 through FY 2014 (OUS, 2010, 2011, 2012, 2013). Base funding was held back from institutions, given the "final appropriations [were] sufficient" and then redistributed on the basis of performance. Performance was measured in terms of the total number of degrees conferred and the number of degrees earned by underrepresented and rural students (coded as raw numbers) (OUS, 2012, 2014). Performance funding began at \$3.1 million in FY 2012 and ended at \$3.6 million in FY 2014.

It is important to note that Oregon offered a retention incentive in FY 2009 and FY 2010 (OUS, 2008). However, these funds were not a reward for achieving particular outcomes. Rather, they were designed to fund the development of initiatives that would improve retention. As such, they are excluded from the present analysis.

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PENNSYLVANIA

The Pennsylvania State System of Higher Education (PASSHE) consists of 14 universities and is governed by the Board of Governors. Pennsylvania has one of the longest operating performance funding policies. It was first adopted in 2000 by the Board of Governors (PASSHE's policy is not mandated by the legislature) and it was first funded in FY 2001 at \$2 million (PA Office of the Budget, 2001; A. Paliotta, personal communication, January 17, 2017). Funding is reallocated from the base Education & General (E&G) budget. Performance funding so far has peaked at \$39.9 million in FY 2012.

At first, performance funding was based on 12 indicators. In 2002, however, the Board of Governors adopted a more robust methodology to distribute performance funding; this method used eight indicators (A. Paliotta, personal communication, January 17, 2017). The eight indicators were scored out of three levels of performance—did not meet goal, met goal, significantly exceeded goal. The performance metrics include degrees awarded, second-year persistence, graduation rates, faculty productivity (as measured by credit hour production), employee diversity, instructional cost, faculty with terminal degrees, and personnel compensation ratio (Cavanaugh & Garland, 2012). Performance is measured on the basis of institutions meeting pre-set targets. If the target is not met, the institution does not receive performance funding. If more than one institution meets their targets they all split the funding. If one or a few institutions outperform the others they receive the funding. As such, PASSHE institutions must compete with one another for funds. If institutions improve and meet their targets, but are outperformed by another institution, they do not receive performance funds (Hillman et al, 2014). Two year institutions are not included, as performance funding in Pennsylvania is a system initiative rather than a state mandate.

Note: the dollar amount tied to performance each year was taken from PASSHE budget documents (PA Office of the Budget, 2000, 2001, 2002; PA Office of the Governor 2003; PASSHE, 2010, 2011, 2012, 2013, 2014, 2015); however, a funding amount was not available for FY 2002, 2003, or 2004. As such I estimated the funding based on the \$2 million that we know was allocated in FY 2001 and the \$21.7 million that was allocated in FY 2005.

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SOUTH CAROLINA

South Carolina's performance funding program received a lot of attention when it was developed as it was the first performance funding policy to (attempt to) tie 100 percent of state funding to performance outcomes. It was first adopted by the state legislature in 1996 (Act 359), which required the South Carolina Commission on Higher Education to create a funding formula to allocate funds on the basis of performance; it was funded FY 1998 through FY 2002. While the law required 100 percent of funds in FY 2000, the most funding that was tied to outcomes was \$265.7 million (38 percent of state appropriations) in FY 1999. In other years, performance funding did not exceed three percent of state appropriations (SC Legislative Audit Council, 2001, 2003).

During its years of operation, there were 37 performance indicators, grouped into nine critical areas: mission focus, quality of faculty, classroom quality, institutional cooperation and collaboration, entrance requirements, graduates' achievements, user-friendliness, and research funding. Some performance indicators were basic compliance (e.g., create a strategic plan). Points were awarded based on institutions meeting, not meeting, or exceeding expectations. As such, South Carolina's policy is coded as measuring performance by meeting a target. In some cases, institutions could choose their own benchmarks (SC Legislative Audit Council, 2001).

As such a large amount of funding was intended to be allocated on the basis of performance, the formula was phased in over time and a stop-loss provision was in place for FY 1998 and 1999 (SC Legislative Audit Council, 2001). Policy was in place for both two-year and four-year institutions. Funding levels are inclusive of the two-year allocation of performance funds.

The audit conducted in 2001 by the Legislative Audit Council found a number of issues with the policy and recommended that the law be changed regarding the amount of funding tied to performance to prevent “extreme” fluctuations in state appropriations. The Council also had concerns about South Carolina institutions not starting out on a “level playing field.” Ultimately this policy was abandoned due to declining funds for higher education in general (SC Legislative Audit Council, 2003).

South Carolina Sources

Act 359 is found in South Carolina Code of Laws Unannotated Title 59-Education Chapter 103 Article 1. See: <http://www.scstatehouse.gov/code/t59c103.php>

South Carolina Legislative Audit Council. (2001, June). *A review of the higher education performance funding process*. [LAC/00-5]. Legislative Audit Council: Columbia, SC.

South Carolina Legislative Audit Council, (2003, February). *Follow-up: A review of the higher education performance funding process*. Columbia, SC.

SOUTH DAKOTA

According to Burke and Minnasains (2003), South Dakota first adopted performance funding in 1997 and was in place through 2003. This policy was funded from FY 1998 to 2003 at 5 percent of general fund and tuition based on performance outcomes (SD BOR 1998, 1999, 2000, 2001, 2002, 2003, 2005). The policy was funded intermittently—funding is observed in FY 2005 and again in FY 2013. Outlined below is the information I have collected from Board of Regents fact books.

Performance funding was in part funded by new money and in part by reallocating existing state funds (SD BOR, 1998, 1999). Performance was measured in terms of institutions meeting Board-set targets. The fact books suggest that five percent of general funds and tuition were tied to performance from FY 1998 to 2003; then, in FY 2005, \$250,000 of new state funding and another \$250,000 from institutional budgets was allocated on the basis of performance. Interestingly, in FY 2011, a negative amount of money is listed under performance funding (-\$500,000). Then, in FY 2013, \$3 million in new funding and \$3 million in institutional budgets was allocated on the basis of performance in a new pilot program, according to PF in 11 states and Snyder (2015). However, this funding in FY 2013 is not found in the fact book or the operating budget documents. The funding tied to performance in this study are approximated for FY 1998 through 2003 based on the general fund appropriations outlined in the SD BOR fact books.

South Dakota Sources

- South Dakota Board of Regents. (1998). Factbook FY 1998. Retrieved from <https://www.sdbor.edu/mediapubs/factbook/Pages/default.aspx> [using Internet Archive]
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- South Dakota Board of Regents. (2004). Factbook FY 2004. Retrieved from <https://www.sdbor.edu/mediapubs/factbook/Pages/default.aspx>
- South Dakota Board of Regents. (2005). Factbook FY 2005. Retrieved from <https://www.sdbor.edu/mediapubs/factbook/Pages/default.aspx>

TENNESSEE

Tennessee was the first state to adopt performance funding in 1979. This policy provided a bonus to institutions based on performance outcomes. In 2010, a new outcomes-based funding policy was adopted as part of the Complete College Tennessee Act (THEC, 2015). The first policy is outside of the scope of the current research due to its early beginning. As such, only the latter policy is included.

The Tennessee Higher Education Commission is the coordinating board for all public higher education in the state and has facilitated the creation and implementation of performance funding policies.

The outcomes-based policy was first funded in FY 2012 (S. Gentile, personal communication, December 13, 2016) and funds nearly 100 percent of state appropriations on the basis of outcomes, with the exception of funding for maintenance and the 5.45 percent bonus from the original performance funding formula that is still in place (now called Quality Assurance). The funding formula was phased in over a period of three years to allow the new formula to be “calibrated” to the former, predominately enrollment-based formula. During this period, gap funding was provided (to make up for where the new formula was not completely calibrated to the old formula) and a hold harmless provision was utilized to allow the institutions to adjust to the new formula (S. Gentile, personal communication, December 13, 2016).

Performance outcomes for universities include accumulation of 24, 48, and 72 credit hours, research and service expenditures, transfers out with at least 12 credit hours, degrees conferred (by level), degrees per 100 FTE, and six-year graduation rates (THEC, 2015). Institutions are awarded points according to their performance each year—the points are based on the raw output of each metric, they are scaled across categories, and weighted according to institutional mission, and premiums for adult and low-income students are applied. The total points are then multiplied by the SREB average faculty salary to generate the funding recommendation. The outcomes-based funding formula is used both to request funds from the governor and to appropriate funds from the legislature. According to THEC officials, the legislature has allocated the funding that has been requested via the new formula (S. Gentile, personal communication, December 13, 2016).

While Tennessee's policy clearly measures performance on the basis of raw output, the implementation of this policy actually imposes a competitive arrangement between institutions as the institution with the greatest output benefits the most (cite THEC website). As such, Tennessee is coded as both a raw number and compete policy.

The amount of funding tied to performance is taken from the total appropriations for universities found in the Tennessee Higher Education Commission 2015-16 fact book. According to a THEC official, it is correct to include the total appropriation in the amount tied to performance (S. Gentile, personal communication, January 1, 2017). In addition, performance funding is in place for two-year institutions.

Tennessee Sources

Tennessee Higher Education Commission. (2015). *Tennessee higher education commission outcomes-based funding formula*. Retrieved from <https://www.tn.gov/assets/entities/thec/attachments/1-Outcomes Based Formula Narrative - for website.pdf>

Tennessee Higher Education Commission. (2015). 2010-15 Outcomes Based Funding Formula. <https://www.tn.gov/thec/article/2010-2015-funding-formula>

TEXAS

Texas is typically counted as only having performance funding for two-year institutions. However, Tandberg and Hillman (2014) include Texas in their study of four-year institutions as some funding was allocated on the basis of performance to four-year institutions even though performance funding has not been officially recognized in law. The Texas Higher Education Coordinating Board has advocated for performance funding for the four-year sector but it has not been adopted by the legislature (Gàndara, 2016). I was able to locate funding tied to performance in the appropriations bills for FY 2009, 2010, and 2011. However, there were

some discrepancies in regards to how much money was tied to performance between the appropriations bills and other THECB documents (TX Legislative Budget Board Staff, 2013). I used the amounts listed in the appropriations bills (TX HB 1, 2007; TX SB 1, 2009): \$100,000,000 in FY 2009 and \$65,000,000 in both FY 2010 and 2011.

Performance funding was allocated as a bonus for improvement on outcomes related to degree production (TX Legislative Budget Board Staff, 2013). Extra incentives were provided for degrees produced in high-demand areas and those earned by “at-risk” students. Texas operates PF for two-year sector.

Texas Sources

Texas Legislative Budget Board Staff. (2013). Financing higher education in Texas. [Legislative primer, 5th edition]. Retrieved from http://www.lbb.state.tx.us/Documents/Publications/Primer/690_Higher_Education_Finance.pdf

Texas House Bill No. 1, eightieth legislature regular session, 2007

Texas Senate Bill No. 1, eighty-first legislature regular session, 2009

Appendix B

Performance Funding Policy Designs Summary

State	Fiscal year adopted	Fiscal years funded	Allocation method	Budgetary Provisions	Measuring Performance	Funding
Arizona	2011	2013--	bonus & base	3-year rolling averages	Improve	FY 2013: \$5,000,000 FY 2014: \$5,000,000 FY 2015: \$5,000,000
Arkansas	2012	2013--	base	hold harmless; rolling average	improve/ meet target	FY 2013: \$19,697,492 FY 2014: \$40,006,106 FY 2015: \$40,320,284
Colorado	1994	1995-1998; 2001-2003	bonus		improve/ meet target	FY 1995: \$14,500,000 FY 1996: \$5,300,000 FY 1997: \$6,200,000 FY 1998: \$4,600,000 FY 2001: \$12,600,000 FY 2002: \$20,697,239 FY 2003: \$20,035,943
Indiana	2003	2004--	bonus & base	rolling average	improve	FY 2004: \$6,200,000 FY 2005: \$12,300,000 FY 2006: \$8,700,000 FY 2007: \$18,800,000 FY 2008: \$10,600,000 FY 2009: \$32,700,000 FY 2010: \$17,400,000 FY 2011: \$27,800,000 FY 2012: \$61,000,000 FY 2013: \$61,000,000 FY 2014: \$66,000,000 FY 2015: \$77,000,000

State	Fiscal year adopted	Fiscal years funded	Allocation method	Budgetary Provisions	Measuring Performance	Funding
Kansas	2002	2006-2009	bonus		improve/ maintain baseline	FY 2006: \$11,643,908 FY 2007: \$17,426,595 FY 2008: \$28,529,005 FY 2009: \$19,952,667
Kentucky	1994	1996-1998	bonus		improve/ meet target	FY 1996: \$18,000,000 FY 1997: \$3,300,000 FY 1998: \$2,600,000
Louisiana	2009	2009--	base		Meet target	FY 2009: \$176,877,501 FY 2010: \$113,587,019 FY 2011: \$122,810,227 FY 2012: \$113,215,432 FY 2013: \$104,186,493 FY 2014: \$52,496,968
Michigan	2012	2013--	bonus		compete	FY 2013: \$27,200,000 FY 2014: \$27,953,100 FY 2015: \$37,318,750
Minnesota	1995	1997	base		improve	FY 1997: \$8,500,000
Missouri	1994	1994-2001	bonus		meet target/raw numbers	FY 1994: \$3,000,000 FY 1995: \$4,300,000 FY 1996: \$7,000,000 FY 1997: \$10,644,874 FY 1998: \$6,112,446 FY 1999: \$11,000,000 FY 2000: \$6,563,140 FY 2001: \$7,974,324
New Jersey	1999	2000-2002	bonus		meet target	FY 2000: \$8,000,000 FY 2001: \$8,300,000 FY 2002: \$8,700,000

State	Fiscal year adopted	Fiscal years funded	Allocation method	Budgetary Provisions	Measuring Performance	Funding
New Mexico	2013	2013--	base	rolling average	improve; raw numbers; compete	FY 2013: \$30,766,560 FY 2014: \$20,799,000
Ohio	1998	1998--	bonus & base	stop loss; rolling average	raw numbers	FY 1998 2,000,000 FY 1999 4,000,000 FY 2000 20,068,104 FY 2001 48,741,000 FY 2002 47,041,000 FY 2003 47,041,000 FY 2004 51,113,077 FY 2005 56,113,077 FY 2006 52,601,934 FY 2007 52,601,934 FY 2008 53,653,973 FY 2009 53,653,973 FY 2010: \$1,288,454,207 FY 2011: \$1,292,511,368 FY 2012: \$1,056,075,313 FY 2013: \$1,065,778,634 FY 2014: \$1,098,981,446
Oklahoma	2012	2013-2014	bonus		improve	FY 2013: \$1,871,433 FY 2014: \$9,000,000
Oregon	2007	2012-2014	base		improve/raw numbers	FY 2009: \$1,718,250 FY 2010: \$1,033,500 FY 2012: \$3,120,810 FY 2013: \$3,249,233 FY 2014: \$3,368,842

State	Fiscal year adopted	Fiscal years funded	Allocation method	Budgetary Provisions	Measuring Performance	Funding
Pennsylvania	2000	2001--	base		meet target/ compete	FY 2001: \$2,000,000 FY 2002: \$4,718,210 FY 2003: \$9,153,340 FY 2004: \$17,391,360 FY 2005: \$21,700,000 FY 2006: \$31,200,000 FY 2007: \$37,400,000 FY 2008: \$38,700,000 FY 2009: \$39,880,720 FY 2010: \$35,600,000 FY 2011: \$35,600,000 FY 2012: \$35,900,000 FY 2013: \$36,600,000 FY 2014: \$37,000,000
South Carolina	1996	1998-2002	base	stop loss; phase in	meeting target	FY 1998: \$4,625,033 FY 1999: \$265,668,818 FY 2000: \$25,794,241 FY 2001: \$27,080,920 FY 2002: \$1,467,397
South Dakota	1997	1998-2003; 2005; 2013	base & bonus		meeting target	FY 1998: \$5,593,433 FY 1999: \$5,838,395 FY 2000: \$6,051,649 FY 2001: \$6,272,356 FY 2002: \$6,584,113 FY 2003: \$6,910,839 FY 2005: \$500,000 FY 2013 \$3,000,000
Tennessee	2010*	2012--	base	rolling average; phase in	raw numbers/ compete	FY 2012: \$494,498,500 FY 2013: \$519,504,400 FY 2014: 559,688,100

State	Fiscal year adopted	Fiscal years funded	Allocation method	Budgetary Provisions	Measuring Performance	Funding
Texas	2009	2009-2011	base	hold harmless; rolling average	improve	FY 2009: \$100,000,000 FY 2010: \$65,000,000 FY 2011: \$65,000,000

Notes: Allocation methods include bonus (funding is new/allocated over and above regular appropriations) and base (existing funding is redistributed). Budgetary provisions include hold harmless (a grace period in which performance outcomes are evaluated but not funded), stop loss (caps the amount of funding that can be lost), and rolling averages (performance outcomes are averaged over a number of years to prevent instability from year-to-year spike/drops). Measuring performance includes improve (outcomes must improve each year), meet target (outcomes must meet a certain threshold), raw numbers (funding is based on unit production of outcomes), and compete (institutions are funded if they outperform other institutions). Premiums include degree premiums (extra funds for degrees produced in high-demand fields) and student premiums (extra funds for outcomes of minority, low-income, underprepared, and/or rural students).

Data was collected by the author from state legislative bills, budget documents, personal communication with state and system administrators, state and system documents, etc.

* Tennessee's first PF policy was implemented in 1979 and is ongoing. This policy is outside of the scope of this study.

Appendix C

Variables, Definitions, and Sources

Variables*	Definition	Source
<i>Dependent Variables</i>		
HIGHER-ED SHARE	Portion of state budgets spent on higher education	NASBO
STATE APP FTE	State appropriations per full time equivalent student	SHEEO
STATE APP 1000	State spending on higher education per \$1000 of personal income	SHEEO, Bureau of Economic Analysis
STATE APP INST	Total state and local support per student enrolled in fall terms	IPEDS
<i>Independent Variables</i>		
Unemployment rate	Portion of the labor force that is unemployed	Bureau of Labor Statistics
Per capita gross domestic product	Per capita GDP by state	Bureau of Economic Analysis
Per capita personal income	Per capita personal income by state	Bureau of Economic Analysis
College-aged population	Proportion of state population 18-24 years old	US Census Bureau, Current Population Survey
% adult population with bachelor's degree	Proportion of state population aged 25-64 with bachelor's degree or higher	US Census Bureau, Current Population Survey
Republican Governor	1 if governor is Republican; 0 otherwise	NGA
Republican Legislature	Percentage of Republican legislators in both houses combined	NCSL
Citizen Ideology	State-level measures of citizen ideology in terms of conservatism and liberalism	Inter-University Consortium for Political and Social Research

Variables	Definition	Source
% college students enrolled four-year institutions	Percentage of all postsecondary students within a state enrolled in four-year institutions	NCES, SREB
% enrolled in public institutions	Percentage of all postsecondary students within a state enrolled in public institutions	NCES, SREB
Net Tuition revenue per FTE	Revenue from tuition dollars, less institutional aid/scholarships	SHEEO
State financial aid spending per college-aged person	Total amount spent on financial aid per person aged 18-24	NASSGAP, SREB
% financial aid based on need	Portion of state financial aid awarded based on student need	NASSGAP
% of total revenue from state appropriations	Portion of total operating revenue that comes from state appropriations	IPEDS
Tuition and fees	In-state tuition and fees charged	IPEDS
Fall enrollment	Total students enrolled in fall terms	IPEDS
% part-time undergraduates	Proportion of undergraduate population enrolled part time	IPEDS
% minority undergraduates	Proportion of undergraduate students that are Black/African-American or Hispanic/Latino	IPEDS
% graduate students	Percent of total student body that is graduate students	IPEDS
Faculty salary	Average salary for full-time faculty	IPEDS
% of full-time faculty	Proportion of faculty that are considered full-time	IPEDS
Bachelor's degrees awarded per 100 students enrolled	Total number of bachelor's degrees conferred per 100 enrollees	IPEDS
Research, Master's, Bachelor's	Indicators for institution type, taken from Carnegie Classifications	IPEDS
Rural	1 if institution is in a rural location; 0 otherwise.	IPEDS
MSI status	1 if institution serves primarily minorities (includes Hispanic Serving Institutions and Historically Black Colleges and Universities); 0 otherwise	IPEDS

Variables	Definition	Source
Non-selective	Institutions that have a Barron's index of greater than 4	Barron's Admissions Competitiveness Index
Less-selective	Institutions that have a Barron's index = 4	Barron's Admissions Competitiveness Index
Selective	Institutions that have a Barron's index less than 4	Barron's Admissions Competitiveness Index

* All financial data is in constant 2014 dollars

Appendix D
State-level Supplementary Tables and Robustness Checks

Table D1. Estimates of the Impact of Performance Funding Dosage on HIGHER-ED SHARE and STATE APP FTE (including controls for inclusion of two-year sector performance funding)

Variables	HIGHER-ED SHARE	STATE APP FTE	STATE APP 1000
Dosage	-0.0458 (-1.54)	-1024.9* (-2.47)	-0.272 (-0.48)
Dosage includes 2 year funding	-0.0125* (-2.12)	-115.5 (-0.48)	0.263 (2.04)
GDP per capita (1000s)	-0.000580 (-0.48)	75.23* (2.10)	-0.00122 (-0.02)
Unemployment rate	-0.00165 (-1.11)	-260.2*** (-4.65)	-0.185* (-2.20)
Per capita income (1000s)	0.000983 (0.52)	44.24 (0.82)	-0.0710 (-0.84)
% state spending on K12 ed.	0.0414 (0.69)	-3078.2* (-2.16)	-1.022 (-0.52)
% state spending on medicaid	0.0323 (0.61)	407.0 (0.29)	1.735 (1.32)
% republican governors	0.00294 (1.32)	97.39 (0.99)	-0.0392 (-0.34)
% republican legislators	0.0144 (0.64)	1511.7 (1.68)	-2.334 (-1.68)
Citizen ideology	0.000138 (0.59)	14.13 (1.13)	-0.0218 (-1.63)
% adult population with bachelor's degree [†]	0.0423 (0.58)	-3237.0 (-1.51)	-0.128 (-0.05)
% population aged 18-24 [†]	0.628 (1.37)	-10022.2 (-1.17)	-9.156 (-0.45)
% college students enrolled in 4-year inst [†]	-0.0355 (-0.62)	-589.5 (-0.38)	-4.831 (-1.73)
% college students enrolled in public inst [†]	-0.0160 (-0.38)	267.9 (0.14)	0.258 (0.10)
Net tuition revenue per FTE [†] (1000s)	0.00464 (1.53)	-250.4* (-2.57)	-0.359** (-3.31)

Table D1. Continued

Variables	HIGHER-ED SHARE	STATE APP FTE	STATE APP 1000
Financial aid per college-aged person†	0.00000525 (1.08)	-0.131 (-0.62)	0.0000375 (0.37)
% financial aid based on need†	-0.0126* (-2.08)	-192.2 (-0.71)	-0.709* (-2.20)
N	1152	1152	480
R-squared within	0.11	0.59	0.69
R-squared overall	0.02	0.36	0.65
State fixed effects	YES	YES	YES
Year fixed effects	YES	YES	YES

Notes: * p<0.05, ** p<0.01, *** p<0.001; † variables lagged by one year; t statistics in parentheses; Dosage is the percent of state appropriations tied to performance outcomes for performance funding policies targeting four-year institutions; all financial data is in 2014 constant dollars.

Table D2. Sensitivity Analysis: Alternative Treatment Periods

	Policy variable and model statistics	HIGHER- ED SHARE	STATE APP FTE	STATE APP 1000
Original Models	PF GENERAL	-0.0140*	-95.13	-0.00516
	T-statistic	(-2.64)	(-0.68)	(-0.05)
	N	1152	1152	1152
	R-squared within	0.11	0.59	0.62
	R-squared overall	0.02	0.36	0.21
Implementation Years Only	PF GENERAL	-0.0134**	-129.0	-0.144
	T-statistic	(-3.26)	(-0.77)	(-0.96)
	N	1082	1082	1082
	R-squared within	0.14	0.56	0.60
	R-squared overall	0.03	0.36	0.16
Without Select States (AR, MN, TN)	PF GENERAL	-0.0153**	-100.4	-0.00970
	T-statistic	(-2.76)	(-0.67)	(-0.08)
	N	1080	1080	1080
	R-squared within	0.13	0.60	0.62
	R-squared overall	0.03	0.35	0.12

Notes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; PF GENERAL = 1 in the states and years in which performance funding policies targeting four-year institutions are funded; financial data in 2014 constant dollars. Original Models can be found in Table 4.2; Implementation Years Only models exclude post-treatment years in which performance funding policies targeting four-year institutions were not funded; Without Select States models exclude AR, MN, and TN due to odd implementation characteristics. This abbreviated table displays the coefficient and t-statistics for the independent variables of interest as well as the number of observations and R-squared statistics for each full model; all models include state-level controls and state and year fixed effects.

Table D3. Estimates of PF GENERAL Impact on State-level Higher Education Spending, for Individual State Models

State Models	HIGHER-ED SHARE	STATE APP FTE	STATE APP 1000
AZ PF	0.0128	-349.2	-0.752**
T-statistic	(1.60)	(-1.05)	(-2.80)
N	319	319	319
R-squared within	0.15	0.69	0.55
R-squared overall	0.00	0.46	0.60
CO PF	0.00319	83.29	-0.0529
T-statistic	(0.75)	(0.54)	(-0.38)
N	551	551	551
R-squared within	0.23	0.46	0.59
R-squared overall	0.01	0.33	0.13
IN PF	-0.0142*	365.6	0.756**
T-statistic	(-2.35)	(1.23)	(3.50)
N	580	580	580
R-squared within	0.25	0.61	0.55
R-squared overall	0.00	0.44	0.16
KS PF	0.000648	-409.5*	0.0649
T-statistic	(0.13)	(-2.46)	(0.54)
N	522	522	522
R-squared within	0.29	0.63	0.56
R-squared overall	0.00	0.43	0.38
KY PF	-0.0325***	-825.4**	-0.787***
T-statistic	(-5.12)	(-3.42)	(-5.29)
N	551	551	551
R-squared within	0.23	0.44	0.56
R-squared overall	0.02	0.35	0.04
LA PF	-0.0107	-301.0	-1.666***
T-statistic	(-1.18)	(-0.67)	(-7.02)
N	435	435	435
R-squared within	0.29	0.67	0.59
R-squared overall	0.02	0.47	0.53
MI PF	-0.0211*	-312.0	-0.485*
T-statistic	(-2.13)	(-1.01)	(-2.21)
N	319	319	319
R-squared within	0.14	0.69	0.56
R-squared overall	0.01	0.50	0.63

Table D3. Continued

State Models	HIGHER-ED SHARE	STATE APP FTE	STATE APP 1000
MN PF	-0.00408	-32.07	-0.559
T-statistic	(-0.58)	(-0.10)	(-1.88)
N	232	232	232
R-squared within	0.34	0.54	0.55
R-squared overall	0.14	0.35	0.40
MO PF	0.00300	620.8**	0.318
T-statistic	(0.59)	(3.07)	(1.65)
N	638	638	638
R-squared within	0.23	0.52	0.58
R-squared overall	0.03	0.41	0.02
NJ PF	0.00836	-66.68	-0.255
T-statistic	(1.75)	(-0.34)	(-1.95)
N	667	667	667
R-squared within	0.22	0.56	0.61
R-squared overall	0.02	0.42	0.01
NM PF	-0.00818	-1654.0***	-1.287***
T-statistic	(-1.19)	(-7.84)	(-5.79)
N	319	319	319
R-squared within	0.16	0.69	0.54
R-squared overall	0.01	0.42	0.60
OH PF	-0.00925*	290.2	0.584**
T-statistic	(-2.07)	(1.50)	(3.46)
N	696	696	696
R-squared within	0.21	0.59	0.64
R-squared overall	0.01	0.43	0.02
OK PF	0.0459***	-658.1*	-0.574***
T-statistic	(6.77)	(-2.28)	(-3.84)
N	319	319	319
R-squared within	0.16	0.69	0.56
R-squared overall	0.00	0.49	0.64
OR PF	-0.0909***	-683.0*	-0.296
T-statistic	(-11.57)	(-2.12)	(-1.46)
N	348	348	348
R-squared within	0.28	0.68	0.60
R-squared overall	0.00	0.44	0.57

Table D3. Continued

State Models	HIGHER-ED SHARE	STATE APP FTE	STATE APP 1000
PA PF	-0.0256***	-817.7***	0.138
T-statistic	(-4.46)	(-5.04)	(0.88)
N	667	667	667
R-squared within	0.21	0.59	0.61
R-squared overall	0.00	0.45	0.03
SC PF	-0.0385***	-977.4***	-0.279
T-statistic	(-6.13)	(-4.62)	(-1.50)
N	667	667	667
R-squared within	0.23	0.57	0.62
R-squared overall	0.02	0.43	0.01
SD PF	-0.0135**	625.2*	-0.240
T-statistic	(-3.09)	(2.75)	(-1.32)
N	696	696	696
R-squared within	0.20	0.57	0.62
R-squared overall	0.01	0.39	0.04
TN PF	-0.00126	-839.9**	-0.631**
T-statistic	(-0.15)	(-2.92)	(-3.62)
N	348	348	348
R-squared within	0.19	0.67	0.58
R-squared overall	0.01	0.54	0.63
TX PF	-0.0179**	-283.1	-0.518**
T-statistic	(-3.25)	(-1.16)	(-2.87)
N	435	435	435
R-squared within	0.28	0.67	0.59
R-squared overall	0.02	0.48	0.51

Notes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; Each STATE PF policy variable = 1 in the years in which that state's performance funding policies targeting four-year institutions was funded; control group includes all non-PF states; financial data in 2014 constant dollars. This abbreviated table displays the coefficient and t-statistics for the independent variables of interest as well as the number of observations and R-squared statistics for each full model; all models include state-level controls and state and year fixed effects.

Table D4. Sensitivity of CO and SD Policy Implementation Periods

Alternative State Models	HIGHER-ED SHARE	STATE APP FTE	STATE APP 1000
CO PF 1995-1998	0.0199*	464.8	0.535
T-statistic	(2.66)	(1.32)	(1.91)
N	667	667	667
R-squared within	0.20	0.57	0.63
R-squared overall	0.01	0.41	0.04
CO PF 2001-2003	-0.0155*	-231.4	-0.435**
T-statistic	(-2.24)	(-1.33)	(-2.80)
N	667	667	667
R-squared within	0.20	0.57	0.63
R-squared overall	0.01	0.41	0.04
CO PF 1995-2003	-0.0181***	162.8	-0.00884
T-statistic	(-4.46)	(0.51)	(-0.04)
N	667	667	667
R-squared within	0.21	0.57	0.63
R-squared overall	0.01	0.41	0.05
SD PF 1998-2003	-0.0260***	539.3*	-0.517*
T-statistic	(-6.51)	(2.18)	(-2.40)
N	667	667	667
R-squared within	0.22	0.55	0.60
R-squared overall	0.02	0.39	0.03

Notes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; Each PF policy variable = 1 in the state and years specified; control group includes all non-PF states; financial data in 2014 constant dollars. This abbreviated table displays the coefficient and t-statistics for the independent variables of interest as well as the number of observations and R-squared statistics for each full model; all models include state-level controls and state and year fixed effects.

Appendix E
Institution-level Supplementary Tables and Robustness Checks

Table E1. Estimates of the Impact of Performance Funding on STATE APP INST, by Institution-type Combinations

Policy variable and model statistics	Research & Highly Selective	Master's & Highly Selective	Bachelor's & Highly Selective	Rural & Highly Selective	MSI & Highly Selective
PF GENERAL	799.0***	22.51	-11.12	-368.8	NA
T-statistic	(5.28)	(0.18)	(-0.04)	(-1.87)	
N	1306	704	184	236	
R-squared within	0.69	0.77	0.87	0.83	
R-squared overall	0.01	0.72	0.85	0.03	

Policy variable and model statistics	Research & Less Selective	Master's & Less Selective	Bachelor's & Less Selective	Rural & Less Selective	MSI & Less Selective
PF GENERAL	-55.18	-352.9***	-131.1	-204.8	-276.3
T-statistic	(-0.35)	(-4.18)	(-0.88)	(-1.11)	(-1.13)
N	1465	3276	566	748	513
R-squared within	0.68	0.69	0.72	0.75	0.71
R-squared overall	0.04	0.30	0.45	0.17	0.15

Policy variable and model statistics	Research & Non-selective	Master's & Non-selective	Bachelor's & Non-selective	Rural & Non-selective	MSI & Non-selective
PF GENERAL	295.4	-248.6	-216.7	-508.7*	-226.0
T-statistic	(1.78)	(-1.69)	(-1.30)	(-2.37)	(-0.98)
N	688	1859	933	662	841
R-squared within	0.72	0.54	0.53	0.60	0.55
R-squared overall	0.02	0.53	0.56	0.71	0.50

Notes: * p<0.05, ** p<0.01, *** p<0.001; PF GENERAL = 1 in the states and years in which performance funding policies targeting four-year institutions are funded; financial data in 2014 constant dollars. This abbreviated table displays the coefficient and t-statistics for the independent variables of interest as well as the number of observations and R-squared statistics for each full model; all models include institution-level controls, state-level controls and institution and year fixed effects.

Table E2. Estimates of the Impact of Performance Funding Dosage on Institution-level State Appropriations per Student (includes controls for two-year sector performance funding)

Variables	All institutions	Research	Master's	Bachelor's
DOSAGE	-198.6 (-0.99)	657.5* (2.25)	-631.2* (-2.15)	-638.7 (-1.89)
Dosage includes funding for 2-year sector	-376.9*** (-3.52)	29.64 (0.15)	-480.6*** (-4.33)	-331.1* (-2.35)
% revenue from state app.	11095.6*** (12.31)	13463.5*** (8.52)	11267.0*** (12.65)	11269.8*** (4.80)
Tuition & fees†	-0.196*** (-3.70)	-0.156 (-1.94)	-0.0872 (-1.95)	-0.0390 (-0.41)
Fall enrollment†	-0.110*** (-4.96)	-0.0828** (-2.94)	-0.0804*** (-3.63)	-0.172 (-1.48)
% part time students	-3145.3*** (-6.43)	-2056.2 (-1.77)	-3786.2*** (-6.52)	-4256.4*** (-6.04)
% graduate students	-17.37 (-0.04)	491.0 (0.48)	-376.8 (-0.69)	137.7 (0.10)
% minority students	2690.8** (3.02)	8441.5*** (5.29)	430.2 (0.44)	775.7 (0.59)
BA degrees per 100 students	109.0*** (7.81)	156.5*** (5.42)	116.8*** (8.86)	56.00* (2.04)
Faculty salary	0.0211*** (3.59)	0.0179* (1.98)	0.0348*** (4.91)	0.0428* (2.32)
% full-time faculty	50.30 (0.29)	-47.36 (-0.14)	319.8 (1.77)	715.8** (2.98)
_cons	31.89 (0.03)	-2616.3 (-1.00)	-1265.1 (-1.09)	-2740.7 (-1.25)
N	9713	3459	5839	1683
R-squared within	0.58	0.63	0.63	0.55
R-squared overall	0.02	0.00	0.45	0.55
State-level controls	YES	YES	YES	YES
Institution fixed effects	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES

Table continues

Table E2. Continued

Variables	Highly Selective	Selective	Non-selective	Rural	MSI
DOSAGE	1210.1*** (3.86)	-706.4** (-2.82)	-391.8 (-1.26)	466.5 (1.41)	-672.0 (-0.68)
Dosage includes funding for 2-year sector	210.7 (0.69)	-530.3*** (-4.83)	-410.5* (-2.43)	-664.3** (-3.35)	-1149.9 (-1.51)
% revenue from state app.	15110.6*** (6.46)	12185.0*** (14.07)	8618.3*** (6.00)	14587.3*** (14.20)	9862.0*** (4.75)
Tuition & fees†	-0.108 (-1.15)	-0.0882 (-1.61)	-0.236*** (-3.62)	-0.0902 (-1.05)	-0.176 (-1.89)
Fall enrollment†	-0.0543 (-1.53)	-0.126*** (-4.40)	-0.128*** (-3.98)	-0.165* (-2.61)	-0.128** (-2.83)
% part time students	-4760.6** (-2.78)	-2530.1*** (-3.74)	-2459.2** (-2.98)	-4675.9*** (-5.28)	-2514.5 (-1.85)
% graduate students	852.4 (0.63)	85.11 (0.17)	76.93 (0.08)	261.9 (0.25)	-248.8 (-0.20)
% minority students	6278.9 (1.93)	1291.1 (1.13)	1716.1 (1.35)	5161.4*** (3.74)	-556.8 (-0.33)
BA degrees per 100 students	144.6*** (4.58)	125.6*** (7.47)	87.10*** (3.92)	75.65** (3.05)	154.5*** (6.04)
Faculty salary	-0.00885 (-0.79)	0.0235** (2.89)	0.0374*** (3.98)	0.00799 (0.79)	0.0382* (2.25)
% full-time faculty	-774.4 (-1.58)	185.0 (0.78)	268.8 (1.06)	488.1 (1.78)	408.5 (0.92)
_cons	-3600.9 (-1.10)	-706.6 (-0.47)	383.2 (0.21)	-1066.0 (-0.64)	-6704.2 (-1.97)
N	2035	4731	2947	1646	1379
R-squared within	0.62	0.66	0.53	0.63	0.57
R-squared overall	0.00	0.10	0.14	0.07	0.32
State-level controls	YES	YES	YES	YES	YES
Institution fixed effects	YES	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES	YES

Notes: * p<0.05, ** p<0.01, *** p<0.001; † variables lagged by one year; ‡ statistics in parentheses; Dosage is the percent of state appropriations aggregated at the state level tied to performance outcomes for performance funding policies targeting four-year institutions; all financial data is in 2014 constant dollars.

Table E3. Sensitivity Analysis: Alternative Treatment Periods

	Policy variable and model statistics	All institutions	Research	Master's	Bachelor's	Highly Selective	Less Selective	Non-selective	Rural	MSI
Original models	PF GENERAL	-87.53	388.1***	-266.4***	-264.4*	559.3**	-332.3***	-178.2	-265.6*	-256.4
	T-statistic	(-1.17)	(3.45)	(-3.62)	(-2.31)	(3.40)	(-4.44)	(-1.67)	(-2.00)	(-1.03)
	N	8928	3459	5839	1683	2035	4731	2947	1646	1379
	R-sq within	0.58	0.64	0.62	0.54	0.63	0.66	0.53	0.63	0.57
	R-sq overall	0.04	0.00	0.44	0.54	0.00	0.10	0.14	0.07	0.33
Implementation years models	PF GENERAL	-185.1**	289.1*	-387.4***	-273.0*	383.0*	-418.3***	-225.5	-275.2	-426.3
	T-statistic	(-2.66)	(2.44)	(-4.99)	(-2.10)	(2.15)	(-5.39)	(-1.77)	(-1.76)	(-1.42)
	N	9082	3288	5445	1535	1842	4462	2778	1543	1300
	R-sq within	0.56	0.61	0.61	0.52	0.62	0.64	0.51	0.60	0.56
	R-sq overall	0.03	0.00	0.40	0.57	0.00	0.11	0.11	0.07	0.33
Without select states (AR, MN, TN)	PF GENERAL	-92.08	385.0**	-285.7***	-258.6*	522.2**	-351.2***	-169.6	-266.5*	-255.8
	T-statistic	(-1.29)	(3.35)	(-3.69)	(-2.17)	(3.12)	(-4.51)	(-1.56)	(-2.01)	(-0.99)
	N	9044	3270	5369	1528	1845	4383	2816	1556	1331
	R-sq within	0.58	0.66	0.62	0.54	0.67	0.65	0.53	0.62	0.57
	R-sq overall	0.04	0.01	0.42	0.52	0.01	0.09	0.14	0.09	0.33

Notes: * p<0.05, ** p<0.01, *** p<0.001; PF GENERAL = 1 in the states and years in which performance funding policies targeting four-year institutions are funded; financial data in 2014 constant dollars. Original Models can be found in Table 4.10; Implementation Years Only models exclude post-treatment years in which performance funding policies targeting four-year institutions were not funded; Without Select States models exclude AR, MN, and TN due to odd implementation characteristics. This abbreviated table displays the coefficient and t-statistics for the independent variables of interest as well as the number of observations and R-squared statistics for each full model; all models include state-level controls and state and year fixed effects.

Table E4. Estimates of PF GENERAL Impact on Institution-level State Appropriations per Student, for Individual State Models

State Models	All institutions	Research	Master's	Bachelor's	Highly Selective	Selective	Non-selective	Rural	MSI
AZ PF	380.6	785.6	0	0	-871.9	-253.6	2293.9	0	0
T-statistic	(0.38)	(0.86)	(.)	(.)	(-1.35)	(-0.61)	(1.84)	(.)	(.)
N	4878	1704	2829	927	1112	2473	1293	778	719
R-sq within	0.56	0.64	0.63	0.48	0.72	0.61	0.54	0.60	0.68
R-sq overall	0.02	0.00	0.20	0.41	0.00	0.12	0.05	0.05	0.06
CO PF	-233.5*	-85.93	-444.8*	-158.4	-473.7	-245.5	-23.84	-718.4*	0
T-statistic	(-2.36)	(-0.47)	(-2.48)	(-1.31)	(-1.57)	(-1.80)	(-0.23)	(-2.16)	(.)
N	4975	1712	2859	1000	1136	2540	1299	789	719
R-sq within	0.56	0.63	0.63	0.48	0.70	0.59	0.55	0.60	0.68
R-sq overall	0.02	0.01	0.20	0.51	0.03	0.15	0.06	0.05	0.06
IN PF	-3.899	159.3	-59.09	-485.6	120.6	-799.5*	-156.9	-652.7	
T-statistic	(-0.02)	(0.41)	(-0.25)	(-1.57)	(0.29)	(-2.16)	(-0.57)	(-1.83)	
N	5136	1751	2993	997	1135	2521	1480	848	
R-sq within	0.57	0.64	0.63	0.50	0.72	0.60	0.56	0.61	
R-sq overall	0.01	0.01	0.21	0.44	0.01	0.08	0.07	0.06	
KS PF	33.80	570.6	-494.7	0	2478.8***	-470.7*	9.334		
T-statistic	(0.08)	(0.96)	(-1.93)	(.)	(8.77)	(-2.11)	(0.04)		
N	4949	1704	2900	927	1112	2544	1293		
R-sq within	0.56	0.63	0.64	0.48	0.68	0.61	0.56		
R-sq overall	0.02	0.00	0.21	0.41	0.01	0.12	0.04		
KY PF	147.6	708.4***	268.4*	436.9*	308.2	100.3	217.0	-205.4	-65.61
T-statistic	(0.71)	(3.65)	(2.07)	(2.54)	(0.68)	(0.37)	(0.58)	(-1.14)	(-0.25)
N	4997	1680	2972	951	1136	2544	1317	826	743
R-sq within	0.56	0.65	0.63	0.49	0.72	0.60	0.55	0.61	0.67
R-sq overall	0.01	0.00	0.19	0.40	0.00	0.06	0.07	0.04	0.09

Table E4. Continued

State Models	All institutions	Research	Master's	Bachelor's	Highly Selective	Selective	Non-selective	Rural	MSI
LA PF	-162.3	269.5	-366.5	671.5	33.29	-307.4	-94.85	-27.77	-456.4
T-statistic	(-0.56)	(0.45)	(-1.26)	(1.71)	(0.05)	(-0.78)	(-0.21)	(-0.05)	(-0.86)
N	5118	1727	3036	937	1111	2613	1394	857	788
R-sq within	0.57	0.64	0.64	0.49	0.71	0.61	0.56	0.61	0.68
R-sq overall	0.02	0.00	0.26	0.42	0.01	0.14	0.06	0.01	0.11
MI PF	-420.1	33.31	-406.9*	546.3	-970.3*	8.556	222.2	-268.4	
T-statistic	(-1.61)	(0.07)	(-2.20)	(1.41)	(-2.18)	(0.03)	(0.66)	(-0.70)	
N	5159	1800	3062	949	1206	2662	1291	895	
R-sq within	0.57	0.65	0.64	0.48	0.72	0.61	0.55	0.62	
R-sq overall	0.02	0.00	0.23	0.42	0.00	0.16	0.05	0.05	
MN PF	147.0	954.6***	511.3***	-253.8	-60.57	448.2*	354.5	-0.848	
T-statistic	(0.52)	(4.84)	(3.54)	(-0.55)	(-0.10)	(2.18)	(1.83)	(-0.00)	
N	5036	1656	2992	1013	1159	2560	1317	797	
R-sq within	0.56	0.65	0.63	0.51	0.68	0.61	0.56	0.62	
R-sq overall	0.01	0.00	0.21	0.46	0.01	0.13	0.06	0.05	
MO PF	633.7**	1236.2**	489.9**	-313.9	891.7**	261.7	340.7	371.2	-115.3
T-statistic	(3.20)	(3.28)	(3.20)	(-0.92)	(3.03)	(1.50)	(1.37)	(1.32)	(-0.26)
N	5114	1728	2973	995	1232	2521	1361	826	763
R-sq within	0.57	0.65	0.64	0.48	0.71	0.61	0.55	0.62	0.67
R-sq overall	0.01	0.01	0.20	0.46	0.01	0.12	0.05	0.05	0.05
NJ PF	-260.9**	206.1	-137.2	-272.9	-260.9	-378.3**	267.3	-392.9	-1043.9*
T-statistic	(-2.62)	(1.03)	(-1.22)	(-1.09)	(-1.41)	(-2.97)	(1.47)	(-1.82)	(-2.19)
N	5039	1680	3014	970	1202	2544	1293	802	733
R-sq within	0.56	0.65	0.63	0.48	0.70	0.60	0.56	0.60	0.68
R-sq overall	0.01	0.00	0.20	0.44	0.02	0.12	0.01	0.05	0.06

Table E4. Continued

State Models	All institutions	Research	Master's	Bachelor's	Highly Selective	Selective	Non-selective	Rural	MSI
NM PF	-851.7**	-1196.2***	-1327.0***	0	0	-1000.0***	-764.6*	224.0	-50.77
T-statistic	(-3.01)	(-4.14)	(-6.31)	(.)	(.)	(-3.49)	(-2.07)	(0.81)	(-0.15)
N	4932	1680	2897	927	1088	2496	1348	788	829
R-sq within	0.56	0.64	0.63	0.48	0.72	0.61	0.55	0.60	0.67
R-sq overall	0.02	0.00	0.17	0.41	0.01	0.09	0.05	0.05	0.06
OH PF	8.036	358.3	-415.0***	-1029.3**	1637.3*	-408.2	-417.1*	370.7	
T-statistic	(0.04)	(1.30)	(-3.39)	(-3.37)	(2.50)	(-0.89)	(-2.20)	(0.88)	
N	5100	1864	2853	953	1112	2539	1449	813	
R-sq within	0.56	0.63	0.64	0.49	0.69	0.61	0.57	0.61	
R-sq overall	0.02	0.01	0.20	0.41	0.01	0.10	0.03	0.05	
OK PF	-14.99	3.077	314.1	128.8	-263.7	290.3	-211.0	-57.59	819.8
T-statistic	(-0.08)	(0.01)	(1.49)	(0.40)	(-0.59)	(0.88)	(-0.76)	(-0.15)	(1.56)
N	5099	1680	3016	1043	1136	2567	1396	824	742
R-sq within	0.56	0.64	0.63	0.49	0.72	0.60	0.55	0.60	0.68
R-sq overall	0.01	0.00	0.28	0.47	0.01	0.12	0.07	0.04	0.14
OR PF	-268.0	-256.9	-360.8	-626.9	0	-369.0	-1182.3**	-1195.7*	0
T-statistic	(-1.08)	(-0.57)	(-1.76)	(-1.86)	(.)	(-1.43)	(-3.37)	(-2.56)	(.)
N	1304	1704	2898	204	1088	2593	1290	823	719
R-sq within	0.77	0.65	0.64	0.86	0.72	0.61	0.56	0.61	0.68
R-sq overall	0.12	0.01	0.20	0.78	0.01	0.16	0.06	0.09	0.06
PA PF	-1369.2***	-1306.3***	-1352.5***	-1404.2***	0	-1125.3***	-1455.6***	-1242.5***	-2997.4***
T-statistic	(-11.13)	(-5.89)	(-9.87)	(-5.81)	(.)	(-6.52)	(-6.02)	(-5.17)	(-4.53)
N	5137	1656	3136	950	1088	2662	1387	849	742
R-sq within	0.57	0.64	0.65	0.49	0.72	0.62	0.56	0.61	0.67
R-sq overall	0.03	0.00	0.20	0.41	0.01	0.14	0.08	0.08	0.07

Table E4. Continued

State Models	All institutions	Research	Master's	Bachelor's	Highly Selective	Selective	Non-selective	Rural	MSI
SC PF	66.39	520.2*	-35.53	35.27	709.5	-225.1	514.2	-184.9	-38.45
T-statistic	(0.33)	(2.39)	(-0.22)	(0.15)	(1.42)	(-1.28)	(1.82)	(-0.85)	(-0.20)
N	5032	1701	2968	989	1159	2562	1311	822	741
R-sq within	0.58	0.67	0.64	0.51	0.73	0.61	0.56	0.61	0.68
R-sq overall	0.02	0.00	0.20	0.43	0.00	0.14	0.06	0.04	0.06
SD PF	-180.4	-87.63	-377.1*	-157.7	0	-109.0	-157.5		
T-statistic	(-1.49)	(-0.51)	(-2.59)	(-0.86)	(.)	(-0.79)	(-1.00)		
N	4922	1679	2921	996	1088	2542	1292		
R-sq within	0.56	0.64	0.63	0.49	0.72	0.60	0.55		
R-sq overall	0.02	0.00	0.22	0.44	0.01	0.12	0.05		
TN PF	-63.12	573.6	-417.5	0	845.5*	-340.8	-1010.7*	0	-507.9
T-statistic	(-0.26)	(1.54)	(-1.52)	(.)	(2.30)	(-1.35)	(-2.64)	(.)	(-2.01)
N	5020	1750	2972	927	1135	2592	1293	778	743
R-sq within	0.55	0.61	0.64	0.48	0.67	0.61	0.55	0.60	0.67
R-sq overall	0.01	0.00	0.21	0.41	0.01	0.12	0.05	0.05	0.06
TX PF	595.7***	819.6***	186.9	2.594	732.2**	361.1*	468.8	539.2	369.4
T-statistic	(3.68)	(3.98)	(0.93)	(0.01)	(3.07)	(2.50)	(1.63)	(1.48)	(1.37)
N	5551	2012	3336	950	1160	2735	1656	919	1002
R-sq within	0.55	0.63	0.60	0.48	0.72	0.61	0.51	0.60	0.56
R-sq overall	0.03	0.00	0.28	0.42	0.01	0.15	0.12	0.02	0.13

Notes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; Each STATE PF policy variable = 1 in the years in which that state's performance funding policies targeting four-year institutions was funded; control group includes all non-PF states; financial data in 2014 constant dollars. This abbreviated table displays the coefficient and t-statistics for the independent variables of interest as well as the number of observations and R-squared statistics for each full model; all models include state-level controls and state and year fixed effects.

Table E5. Sensitivity of CO and SD Policy Implementation Periods

Alternative State Models	All institutions	Research	Master's	Bachelor's	Highly Selective	Selective	Non-selective	Rural	MSI
CO PF (1995-1998)	7.532	214.2	-354.9	81.02	-319.3	56.37	158.1	0	0
T-statistic	(0.05)	(0.89)	(-1.30)	(0.52)	(-0.74)	(0.36)	(0.67)	(.)	(.)
N	4975	1712	2859	1000	1136	2540	1299	789	719
R-squared within	0.56	0.63	0.63	0.48	0.69	0.59	0.55	0.60	0.68
R-squared overall	0.02	0.01	0.21	0.51	0.02	0.15	0.06	0.05	0.06
CO PF (2001-2003)	-404.8***	-399.1*	-328.9*	-359.7	-472.8*	-459.6**	-261.7	-718.4*	0
T-statistic	(-3.64)	(-2.30)	(-2.39)	(-1.55)	(-2.38)	(-3.33)	(-0.72)	(-2.16)	(.)
N	4975	1712	2859	1000	1136	2540	1299	789	719
R-squared within	0.56	0.63	0.63	0.48	0.69	0.59	0.55	0.60	0.68
R-squared overall	0.02	0.01	0.20	0.51	0.03	0.15	0.06	0.05	0.06
CO PF (1995-2003)	-395.8**	-373.6	108.2	-346.0	-849.5**	-444.0*	41.04	-789.7*	0
T-statistic	(-3.08)	(-1.75)	(0.60)	(-1.38)	(-3.05)	(-2.39)	(0.16)	(-2.39)	(.)
N	4975	1712	2859	1000	1136	2540	1299	789	719
R-squared within	0.56	0.63	0.63	0.48	0.70	0.59	0.55	0.60	0.68
R-squared overall	0.02	0.01	0.20	0.50	0.03	0.15	0.06	0.05	0.06
SD PF (1998-2003)	-231.6	-281.7	-355.2	-242.5	0	-59.94	-130.5	0	0
T-statistic	(-1.49)	(-1.15)	(-1.90)	(-1.20)	(.)	(-0.32)	(-0.73)	(.)	(.)
N	5131	1754	3046	1028	1128	2635	1368	817	753
R-squared within	0.56	0.64	0.63	0.49	0.72	0.60	0.55	0.60	0.68
R-squared overall	0.02	0.01	0.23	0.45	0.01	0.14	0.05	0.05	0.06

Notes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; Each PF policy variable = 1 in the state and years specified; control group includes all non-PF states; financial data in 2014 constant dollars. This abbreviated table displays the coefficient and t-statistics for the independent variables of interest as well as the number of observations and R-squared statistics for each full model; all models include state-level controls and state and year fixed effects.