FROM ORIGINS TO OUTCOMES: ESSAYS ON STATE FINANCIAL AID POLICY

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Dissertation

Submitted to the Faculty of the

Graduate School of Vanderbilt University

in partial fulfillment of the requirements

for the degree of

DOCTOR OF PHILOSOPHY

in

Leadership and Policy Studies

June 30, 2022

Nashville, TN

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ACKNOWLEDGEMENTS

Somewhere along the course of my doctoral studies, I became a houseplant enthusiast. As I have cared for these plants, supporting their growth and ensuring adequate sunshine, so many people in my life were doing the same for me. When I reflect on the personal and professional growth that I have experienced over the past five years, I am incredulous. I owe tremendous gratitude to:

- Will Doyle for continuous mentorship which has helped me find my voice and confidence as a scholar
- My dissertation committee for constructive feedback which improved this work
- LPO faculty and graduate students for providing a productive learning community
- My colleagues and fellow interns at the Tennessee Higher Education Commission for the opportunity to experience the practice of policy which continuously informs my research
- P20 Connect for access to data which was used for the fourth chapter of this dissertation
- The American Educational Research Association and the National Science Foundation for the financial support which allowed me to fully devote my time to this dissertation
- Nick Hillman and the SSTAR Lab for encouragement during the final stages of writing this dissertation and for supporting my transition into my role as a professional researcher
- The Central Michigan University Honors Program and faculty mentors for providing experiences which piqued my interest in higher education and research and for the financial support which I now strive to attain for every student
- My friends for listening and for proofreading all those emails
- My family for a strong foundation of intellectual curiosity and for being proud of me
- Currie for loving me through it all and for making sure the chocolate stash never runs out

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CHAPTER 1

Introduction

Financial aid is one of the most effective investments that state policymakers can make in higher education (Toutkoushian & Shafiq, 2010). Literature on financial aid programs frequently finds that financial aid is critical for supporting students' decisions to enroll, persist, and complete college (Cummings et al., 2021; AIR, 2022). One meta-analysis estimates that grant aid increases the probability of persistence and completion by 2-3 percentage points (Nguyen et al., 2019). Low-income students are especially price sensitive, and financial aid can have a larger effect of college access and attainment for this group (Herbaut & Geven, 2019; Hillman, 2011; Hossler et al., 1998; Perna & Jones, 2013).

States invest in financial aid to open access to new populations of students, retain high academic achievers, and promote economic development through educational attainment. In the 2019-2020 academic year, states awarded students about $14.8 billion in financial aid (NASSGAP 2020). However, there is substantial variation in financial aid investment across states – from an average of about $2500 annually per undergraduate[1] in Georgia and South Carolina to $12 and below in Montana and Wyoming (NASSGAP 2020).

States also vary in the types of financial aid offered. Most states offer a combination of need-aid, which is distributed on the basis of student's financial background, and merit-aid, which is distributed by student academic achievement criteria. Georgia offers exclusively merit-based financial aid whereas eleven states offer exclusively need-based financial aid (*Trends in Student Aid 2020*, 2020). Financial aid availability has also shifted overtime, from a focus on

[1] Full-time equivalent (FTE)

need-based financial aid in the mid-20th century, to merit-based aid in the 1990s, to contemporary discussions of universal aid. Financial aid literature is beginning to assess heterogeneity in student outcomes across different types of financial aid (*AIR, 2022)*.

These variations, which have developed across time and jurisdictions, mean that students in different states have different levels of access to an affordable college degree. The purpose of this dissertation is to understand how and why different financial aid policy designs have developed, with particular attention to external influences, and what effect those design choices have of student outcomes.

The origins of financial aid policy

The questions that emerge from this landscape relate to how and why state governments developed different types of financial aid policies – and why some clusters of states have implemented very similar policies. One theory is diffusion, which explains the way in which policy adoption in one state affects the likelihood that another state will adopt the same policy. Diffusion theory offers an explanation of the mechanisms by which policies spread as they relate to the relationships between states, such as competition and learning (Berry & Berry, 2014). Diffusion theory prompts additional questions about what types of information policymakers find relevant in policymaking.

In Chapter 1, I apply these questions and diffusion theory to the spread of statewide free-college programs. These programs, which cover the full cost of tuition and fees, have gained popularity very quickly over the past ten years. I have chosen to focus specifically on statewide free-college because the programs that have been implemented are fairly similar in design, and diffusion is a likely explanation (Perna & Leigh, 2018).

Ten states implemented free-college in the four years between 2014-2018 (Pingel 2018). My study identifies how state governments influence one another through policymaking. The main contribution of the study is a through description of the mechanisms by which free-college programs have spread from state to state. The mechanisms of diffusion are an understudied area of diffusion literature since they are difficult to operationalize, especially in quantitative research (Maggetti & Gilardi, 2016). This study also makes a practical contribution for policy actors and advocates. I describe how policymakers consider policies in other states and how this information is influential at different stages in the policymaking process.

The federal government is another external influence state on policy formation. One way the federal government can exert this influence is by offering intergovernmental grants, which compel states to implement a federal policy priority. The theory of fiscal federalism describes how the federal government decides to offer grants and how states decide to accept grants (Volden, 2007). The empirical literature in this area generally assesses the impact of new intergovernmental grants or of changes in grant funding over time. Less is known about how states respond when the financial incentive is eliminated, and if the initial federal incentive enough to create a lasting state policy.

In Chapter 2, I describe how states respond to a discontinued federal matching grant, the Leveraging Education Assistance Partnership (LEAP) program. LEAP was established in 1972 to incentivize states to develop need-based financial aid programs. The Obama administration's decision to discontinue LEAP was one of the most significant changes to fiscal federalism in higher education in recent years. Minimal research has been conducted about LEAP, but it does appear that the grant prompted state investment in need-based financial aid (Davis, 1994). The purpose of my study is to understand if state policymakers continued their commitment to need-

based financial aid without federal funding, or if the discontinuation of LEAP was a catalyst for states to shift priorities from need-based aid to other areas of higher education funding, such as merit-based aid.

Understanding the interplay between federal and state higher education policies is especially important within the current context of higher education. Amidst state divestment from higher education overall, there have been renewed calls for the federal government to partner with states and incentivize investment in higher education (Deming, 2017; Tandberg & Anderson, 2020). The descriptive findings from this study will provide important context for policymakers considering new federal-state partnerships.

The outcomes of state financial aid policy

The final chapter in this dissertation focuses on the effect of financial aid policies. At their essence, financial aid policies grant students money to pay for college. However, the different designs of the program reflect more specific intentions and outcomes. For example, aid may offer opportunity for students who otherwise are unable to pay for college; aid may serve as a reward for high achieving students or aim to stifle the brain drain; or aid may encourage students to attend specific institutions or programs of study that reflect state priorities.

In general, the financial aid literature has focused on the effect of need-based financial aid and merit-based financial aid separately. However, financial aid programs are increasingly designed with more complex eligibility criteria. In a comparison of the largest aid programs in each state operating in 2021, Education Commission of the States identifies 17 hybrid programs (of 100) in 16 states (Jamieson et al., 2021). These type of hybrid programs are appealing to policymakers as a way to balance increasing college access (as a strictly need-based program does) while also incentivizing student achievement (as a strictly merit-based program does).

This study identifies the effect of one hybrid program, Tennessee's HOPE Access grant. Policymakers developed HOPE Access for low-income students who were just below the academic eligibility requirements to receive the state's full merit-aid grant, HOPE. Prior literature has demonstrated the effects of HOPE (Carruthers & Özek, 2016; Cummings et al., 2022), but it remains unclear if HOPE Access has had the intended effect of offering college access to low-income students. This study will provide insight for policymakers in other states as they consider similar tiered or hybrid financial aid models.

These studies focus on three areas that are relevant to contemporary conversations about of state financial aid policy: free-college, federal and state partnerships, and hybrid need-and-merit-aid. The study of free-college diffusion aims to understand how states influence one another in the policymaking process. The study of LEAP describes how the discontinuation of a federal-state partnership may change state's financial aid priorities. The study of HOPE Access aims to understand how policy design choices impact students. Collectively, these three studies will contribute to the literature on how education policies are designed and the consequences of those policy design choices.

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CHAPTER 2

The Diffusion of Statewide Free-college Programs

Abstract:

Between 2014 and 2019, five states in the Southern Regional Education Board area enacted free-college programs. While existing literature describes how these statewide promise programs vary, researchers lack an understanding of how and why these similarities and differences developed. The purpose of this study is to investigate the extent to which diffusion as a policy process can explain why free-college programs are spreading across states. This study also describes the mechanisms by which the diffusion of free-college programs occurred, including: policy learning, imitation, normative pressure, competition, and coercion. I use qualitative methods to analyze free-college legislation, legislative records, and interviews with policymakers to identify how policy formation was influenced by policies adopted in other states. Understanding the adoption and spread of statewide free-college programs offers insight into how higher education policies are designed and how inter-state relationships influence adoption.

Background

Proposals for free-college have gained increasing attention at local, state, and national levels over the past decade. As defined by the Education Commission of the States, free-college programs are "a grant that provides tuition payments for a student" which covers "cost of tuition or unmet financial need" (Dachelet, 2019). Between 2014 and June 2018, 35 states and DC considered a total of 131 bills related to free-college; ten states enacted a free-college program (Pingel 2018).[2]

Statewide free-college programs are a type of college promise program. Promise programs include a wider set of aid programs which guarantee financial aid to eligible students in a particular jurisdiction for part or all of tuition and fees, but may not necessarily cover the full tuition cost (Millett et al., 2020).[3] Despite their common moniker, Perna and Leigh's (2018) typology demonstrates that promise programs can have vastly different policy designs on the basis of sponsorship, financial award structure, sector inclusion, and eligibility criteria.

Descriptive typologies provide a way to understand how statewide promise programs are similar and dissimilar. However, it remains unclear how and why these similarities and differences in free-college program design developed. This study uses the theory of diffusion to describe if and how policymakers were influenced by free-college policies in other states as they developed their own free-college policy. The next section provides an overview of innovation and diffusion as the theoretical framework for this study. I then review literature related to how promise programs are designed and evidence of diffusion in higher education policy. Following

[2] This count includes legislatively enacted programs using the ECS definition of free-college programs. Other scholars, using expanded definitions, have identified up to 23 statewide promise programs (Millett et al., 2020).
[3] In this proposal I use the term "promise program" when referring to this broader category of aid policies or to specific promise programs that do not fit the more narrow "free-college" definition. I refer to the statewide policies included in this study as "free-college" programs.

from the theory and literature, I define the research questions and describe the methodology I will use to answer those research questions. I present case studies of free-college in five states and discuss the themes in the policy formation process across these cases.

Theoretical Framework: Innovation and Diffusion

Policy innovation literature defines an innovation as "a program that is new to the government adopting it" (Berry & Berry, 2014; Walker, 1969). For example, a state is innovating if it enacts a policy which has never been implemented elsewhere, scales up a county-level program to statewide, or enacts a policy that has already been implemented different state. States have different propensities to innovate based on two factors: (1) internal determinants, which include social, economic, and political characteristics and (2) external influence from other jurisdictions (Berry & Berry, 1990).

Internally, states must have the capacity and motivation to innovate. Berry and Berry (2014) find that innovative states typically have more financial resources, since new programs are often expensive, have inherent financial risk, and require additional administrative capacity. Beyond means, the state policymakers need motivation to innovate. For example, legislators may be more likely to introduce a popular proposal to gain attention and support for an upcoming re-election campaign.

Early innovation literature found that states were much more likely to innovate when other states had previously adopted the policy, especially if adopters were peer states with whom policymakers had an established communication channel. This flow of ideas and spread of practices between states is the process of diffusion (Walker, 1969). The central tenant of diffusion is that multiple jurisdictions implement the same policy, not because they

independently identified the same solution, but that one jurisdiction got the idea for the policy from another. Stated another way by Simmons et al. (2006), "policy diffusion occurs when government policy decisions in a given [jurisdiction] are systematically conditioned by prior policy choices made in other [jurisdictions]." Studies of diffusion identify how policy spreads via this type of external and inter-jurisdictional influence.

Diffusion occurs for a variety of reasons and motivations. Berry and Berry (2014) review studies of policy adoption via diffusion and identify five mechanisms by which a state may be influenced by the policy choices of another. These mechanisms include:

- Learning: occurs when policymakers recognize positive outcomes from policies adopted by other states, assesses if that policy is likely to effective in their context, and subsequently adopts a similar policy. Policymakers may pay specific attention to neighboring states if they are perceived to have similar contexts or are perceived to be leaders in developing effective policies.
- Imitation/emulation: occurs when policymakers adopt a policy similar to another state's policy because they want to mimic that state, independent of the policy's effectiveness.
- Competition: occurs when policymakers adopt a policy after another state because it would be economically disadvantageous for them to be without the policy now that the other state has it.
- Normative Pressure: occurs when a policy becomes widespread and policymakers feels pressure to adopt the policy as a shared norm. The policy may be perceived as a best practice, regardless of tested effectiveness.
- Coercion: occurs when policymakers adopt a policy in response to an incentive or force from another government to implement the policy.

Other studies define different categorizations of diffusion mechanisms, but in general, the most commonly studied mechanisms are learning, imitation/emulation, and competition (Gilardi, 2016). In a meta-analysis of diffusion studies, Maggetti and Gilardi (2016) find little consensus on how these mechanisms are operationalized. For example, one study may use geographic proximity to indicate learning, while another argues proximity indicates competition. This limitation is frequently the result of using imperfect proxies of these mechanisms in quantitative studies.

Maggetti and Gilardi (2016) identify specific types of evidence that can be used to identify mechanisms. For diffusion via learning, there must be evidence of policy success in other jurisdictions, with success defined in relation to policy goals, implementation, or political support. For imitation/emulation, there must be evidence that policy became more desirable in a jurisdiction after it was implemented elsewhere, regardless of success. For competition, there must be an identifiable competitor and evidence that these jurisdictions have a competitive relationship.

The purpose of focusing on diffusion in this study is to understand inter-state relationships as external factors that influence states' decision to enact free-college policies. Internal factors, including capacity and motivation, are important for gaining a complete understanding of how and why states enact free-college policies, but are beyond the direct purpose of this study.

Literature Review

Prior studies have identified the internal factors associated with implementing a free-college aid program. I briefly review this body of work to provide context on how state

policymakers decide to adopt free-college, with specific attention to motivation, capacity, and diffusion. Beyond the area of free-college, this literature review identifies predictors of innovation and evidence of diffusion in other areas of state higher education policymaking.

Motivation for free-college policies

State policymakers have been motivated to implement free-college programs as a means of increasing educational attainment and promoting workforce development (Perna et al., 2017). Policy actors often invoke statistics citing the high proportion of jobs which will require postsecondary education in the near future (Carnevale et al., 2013). A case study of statewide free-college programs in New York, Oregon, and Tennessee, found that all three states had educational attainment goals prior to implementing a free-college aid program (Perna et al., 2017). Financial aid is a particularly effective way to increase college access since the cost of college is a significant factor in students' decision to attend college. Low-income and minority students are especially price sensitive, and financial aid policies are an important tool for promoting equity and access for students who have been systematically excluded from higher education (Kim et al., 2009; Pallais & Turner, 2006; L. W. Perna & Titus, 2005; St. John et al., 2005).

Through quasi-experimental methods on local and promise programs, researchers have found that this type of financial aid increases college enrollment (Carruthers & Fox, 2016; Daugherty & Gonzalez, 2016; Gurantz, 2020; H. Nguyen, 2020; Page et al., 2018). Across local promise programs, there are different enrollment outcomes across program design. Li and Gándara (2020) find that enrollment increases were greater at colleges where the promise program did not have an income eligibility requirement than where programs had an income requirement. However, they find no difference in enrollment effect based on if the program

covered full or partial tuition, was applied as first- or last-dollar, or had universal or targeted eligibility. When compared to similar colleges without promise programs, colleges with promise programs were more likely to see increases in enrollment, regardless of these design features (Li & Gandara, 2020). At the state level, enrollment at community colleges in Tennessee increased by 30% in the two years following Tennessee Promise's implementation (*TN Promise Year 2*, 2017).

Capacity to enact free-college programs

Beyond motivation, innovation and diffusion theory posits that state governments must also have the capacity to implement a new policy. In a case study of New York, Oregon, and Tennessee, authors Perna, Leigh, and Carroll (2017) found that all three states had similar educational attainment as national levels, slightly higher median family income, and slightly lower percentage of families living below the poverty level. The states generally had two pre-conditions in common that may have made free-college more palatable: (1) an existing aid infrastructure and (2) stated educational attainment goals. Additionally, all three of these free-college programs were designed as last dollar scholarships, meaning that the aid was applied after all other federal and state aid. This made the free-college program less expensive to implement because much of a student's aid is already covered by another source of financial aid.

To systematically assess which state characteristics make a jurisdiction more likely to implement a policy, researchers commonly conduct an event history analysis (EHA). This quantitative method has been used in innovation and diffusion studies since it can account for changes in both internal factors and external factors over time. These studies commonly operationalize diffusion as the number of neighboring jurisdictions that have implemented the policy. In a recent study, Delaney and Leigh (2020) predict the spread of local promise programs

using EHA. They find that state-level economic factors were related to the likelihood that a local area would implement a promise program: local areas in states with higher unemployment were more likely to implement a promise program, and areas in states with more income inequality were less likely to implement a promise program. They also find some evidence of regional diffusion and strong evidence that local areas were more likely to implement a promise program if there was already a local program in the state. While local-level agencies may have different motivations and capacities to implement a promise program, these factors may also be relevant considerations for statewide programs – especially since economic factors are consistent predictors of innovation in other types of state-level higher education policies.

At the state level, event history analyses are commonly conducted to predict what state characteristics – including educational attainment, population demographics, state economic factors, higher education governance, and political factors – are associated with adopting a new higher education policy. These studies usually also include diffusion as an external factor predicting policy adoption. Diffusion is typically operationalized as the policy having been adopted in a bordering state or a state within the same regional education compact. Of ten state-level higher education policy event history studies, three find a positive relationship between adoption by a neighbor or regional network and the likelihood that a state will implement the innovation: Baker (2019), with affirmative action; Doyle et al. (2010), in the case of prepaid tuition; and McLendon et al. (2005), for postsecondary financing or accountability policy. Li (2017) finds a relationship in the opposite direction; states were less likely to adopt performance funding in 2000-2013 if a neighboring state had performance funding. Li offers the learning mechanism as an explanation and hypothesizes that states were delaying adoption until they could see the political consequences for their neighboring policymakers.

While geographic proximity is thought to facilitate diffusion, a neighbor adopting a policy is a weak proxy for diffusion. Proximity does not offer evidence of a relationship that makes a state are more likely to adopt a policy because another state has adopted it—the central requirement to identify diffusion. Proximity could be an underlying factor in any (or none) of the mechanisms of diffusion, and these quantitative studies do not attempt to identify the mechanism of diffusion. However, qualitative studies have identified how the mechanisms of diffusion operate, which I review in the next section.

Evidence of diffusion in higher education policy

Qualitative methodologies are useful for identifying diffusion and the mechanisms of diffusion since they allow researchers to understand the nature of the relationships between states, and how those relationships make a state more or less likely to implement a policy. The literature reviewed in this section include qualitative studies focused of external factors influencing the adoption of other higher education policies. These studies offer insight into how to expect diffusion to operate for free-college policies.

The research most similar to the present study describes the diffusion of state merit-aid policies in the Southeastern US using interview data from policy actors who were involved in the adoption process. The three resulting studies find (1) that the diffusion mechanisms most prominent among adopting states were interstate competition and regional policy networks (Cohen-Vogel et al., 2008; Ingle et al., 2007) and (2) that policymakers were most likely to draw on the experience of neighboring states during the agenda setting and proposal formulation stages of the policymaking process (Cohen-Vogel & Ingle, 2007). Ingle et al. (2007) also analyzes the internal determinants that made innovation viable, including: motivation to increase education levels and decrease poverty, a lack of organized opposition to the policy, favorable

economic conditions, and revenue sources such as a state lottery to fund the program. Ingle et al. (2007) is one of few diffusion studies that include non-adopting states in the analysis. The authors aim to determine if diffusion mechanisms were also present in non-adopting states but that they did not have the internal capacity to innovate, as conventionally suggested in the literature. To the contrary, the authors find that non-adopting states did not reference other states in the same way, nor did they have the same economic or socio-political environment as adopting states.

In another study on merit-aid, Ness (2010) uses an inductive approach to determine which theoretical explanation of the policy process best described how policymakers determine the criteria for merit-aid eligibility in New Mexico, Tennessee, and West Virginia. Ness finds that states were looking to policy features and outcomes in Georgia, which was the first state to implement this type of lottery funded merit-based financial aid (Georgia HOPE). For example, Tennessee used Georgia HOPE's specifications as the baseline model for their own merit-aid program. In West Virginia, the Southern Regional Education Board (SREB) cautioned policymakers to look at evidence of grade inflation that occurred following the implementation of Georgia HOPE. Beyond the specific elements of the policy, policymakers in West Virginia were eager to pass merit-aid legislation to increase their likelihood of reelection after seeing the success of policymakers running on a financial aid platform in Georgia. Though Ness does not offer diffusion as a theoretical explanation, it is clear that policymakers were attuned to the criteria and success levels of other states' merit-aid programs when adopting their own policy.

The example above of the SREB's influence in the spread of merit-aid programs highlights how intermediary organizations can facilitate diffusion. Gándara, Rippner, and Ness (2017) find evidence of the influence of intermediary organizations in the diffusion of

performance funding policies. They find that in three states, one organization facilitated the diffusion via three mechanisms: coercion, normative pressure, and policy learning. The study builds on prior diffusion literature by demonstrating how diffusion happens specifically at the agenda setting stage, rather than just within policy adoption more generally.

Michelle Miller-Adams's (2021) analysis of the free-college movement briefly describes the diffusion of the promise program idea, beginning with Kalamazoo Promise in 2005. In particular, Miller-Adams describes the process as "bottom-up innovation," since the majority of free-college programs are community-based rather than state-wide. She argues that imitation has been the main mechanism of diffusion, as communities emulate the concept of free college, but tailor the structure to the community's need and funding source. Since programs are community-specific, she argues learning from other programs is difficult, but more data are becoming available over time and there are intermediary organizations dedicated to sharing information. Miller-Adams notes competition occurring at the state-level. The analyses conducted in this paper builds on Miller-Adams's insights by providing empirical evidence related to these mechanisms.

Research Questions

The literature outlined above provides valuable context for how states adopt higher policy innovations – including the motivations states have to innovate; which social, political, and economic characteristics make some states have a greater capacity to innovate; and that policies diffuse when policymakers take cues from actions in other states, which occurs for a variety of reasons. The free-college literature provides a fairly robust understanding of state's motivation and capacity, but has not explored the impact of external factors, including the inter-state

relationships, to the same extent. The present study seeks to build upon this knowledge by applying diffusion theory to understand the spread of free-college policies.

My first research question seeks to establish that diffusion of free statewide college programs is occurring between states:

1. To what extent did policy actors consider the experiences and characteristics of other state free-college policies as they designed and enacted their own free-college program?

Stated another way, this question asks for evidence that the likelihood that policymakers in one state will adopt free-college changes because free-college has been implemented in another state. The second research question explores why this likelihood changed by seeking evidence of the mechanisms of diffusion:

2. How do the various mechanism(s) of diffusion help to explain the spread of free-college programs?

I focus on the five mechanisms identified by Berry and Berry (2014): learning, emulation, competition, normative pressure, and coercion. I expect to find similar mechanisms for diffusion of free-college programs as Cohen-Vogel et al. (2007) and Ingle et al. (2007) identified in the case of merit-aid. While merit-aid and free-college programs are different in important ways, the narratives these authors describe related to workforce development and state economic conditions were also motivating factors for states that have adopted free-college programs, so competition is a likely mechanism.

Imitation is likely to be another mechanism, since the spread of free college programs for these early adopting states has occurred fairly quickly and all programs appear to have fairly similar designs (per Perna and Leigh, 2018). While Tennessee, the first adopter, was quick to

publish data on increases in the college going rate, the other states adopted before the effectiveness in terms of educational attainment goals could be proven. Therefore, I do not expect to find evidence of the learning mechanism on the policy goals, which are longer term. However, there may be evidence that free-college spread because policymakers learned about the implementation and political support for free-college in other states. States may have also learned from outcomes of local promise programs.

The third research question follows from Cohen-Vogel and Ingle (2007), which identifies when in the policy process states are influenced by policies in neighboring states:

3. At what point within the policymaking process does diffusion occur for free-college programs?

These stages include: problem identification, agenda setting, policy formation, and adoption. Cohen-Vogel and Ingle (2007) find that policymakers were most influenced by policies in neighboring states during the agenda setting and proposal formation stages for the adoption of merit-aid programs. Similarly, Gándara, Rippner, and Ness (2017) find diffusion in the agenda setting stage of performance funding policies. Based on this evidence, I expect states to be influenced by policies in other states during the agenda setting stage.

Methodology

Identifying statewide free-college programs

To be included in this study, the free-college program must: (1) be a legislatively-enacted[4] statewide initiative and (2) grant the amount of aid which brings the student's cost of tuition and fees to $0. I have identified these programs using the Education Commission of the

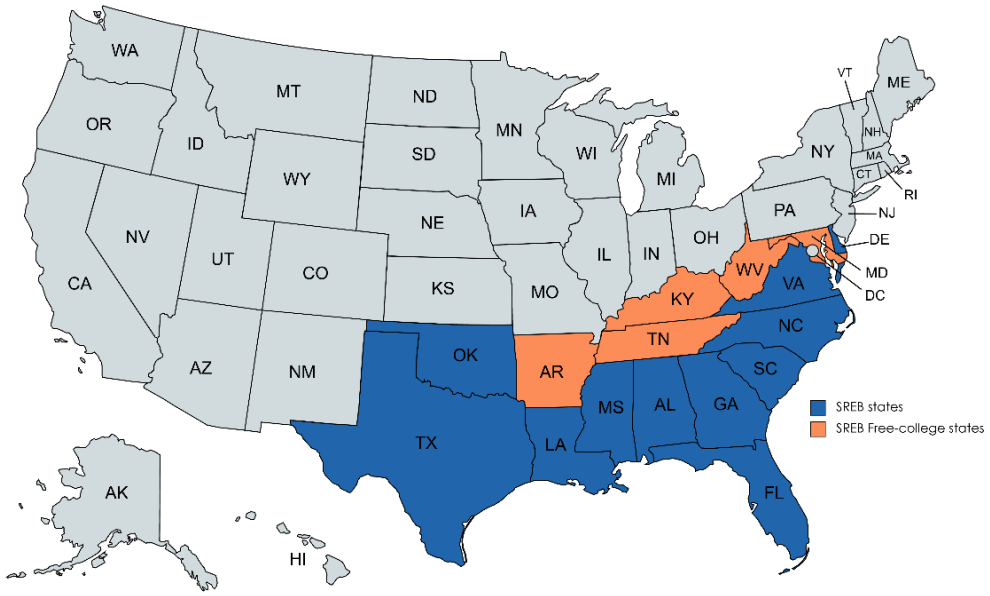
[4] Note that Kentucky is included because it passed the legislature, though the legislation was subsequently vetoed and enacted via executive order

States State Policy Database[5] tool, which uses this definition to tag legislation as "free-college." While there are many definitions of promise programs (Perna & Smith, 2020), and not all programs identified as promise programs bring a student's cost to $0, I narrow the set of programs to this definition for two main reasons: (1) the narrative of promise programs is often synonymous with free-college by popular conception and (2) Tennessee Promise, the first statewide promise program, fits this definition of free-college, which provides a clear starting point for diffusion.

I limit the study to states which are members of the Southern Regional Education Board (SREB). The SREB states with free-college programs, as defined using the Education Commission of the States definition, include: Tennessee, Kentucky, Arkansas, Maryland, and West Virginia. Diffusion theory suggests that geographic proximity is likely to facilitate diffusion. By focusing on one geographic region, this study will aid in identifying the mechanisms by which proximity facilitates policy spread. Using geography also eliminates the problem of selecting the states based on program characteristics, which risks selecting cases based on the dependent variable. Figure 1 depicts the SREB region and the location of states included in this study.

[5] https://www.ecs.org/state-education-policy-tracking/

Figure 1: SREB States that Enacted Free-College Legislation between 2014-2019



Notes: States were identified via the Education Commission of the States legislative tracking of free-college programs, using ECS's definition of free college (Pingel, 2018)

This is the same geographic region that the set of studies from Cohen-Vogel and Ingle use in their analysis for the spread of broad-based merit-aid programs. By focusing on the same set of states, I can compare the extent to which the process of diffusion is different for a different type of financial aid program and during a different time period. Since the Cohen-Vogel and Ingle studies were conducted, more research has identified the role of intermediary organizations in facilitating policy spread (e.g., Gandara et al., 2017). Additionally, some of the quantitative studies operationalize diffusion as the number of states within the regional compact which have the policy (e.g., Doyle, 2006). By focusing on states with a common membership in the SREB, I can expand my analysis to include the role of SREB for spreading information about free-college programs to these states.

The aim of this study is to gain knowledge of the breadth of diffusion as a phenomenon as it relates to free-college programs rather than gain depth of understanding nuances of how free-college diffused within a given state. Therefore, I include the cohort of states which enacted free-college programs within the five years after the first program was adopted (2014-2019). By identifying cases using a temporal and geographic cutoff, I am able to understand how free-college programs diffused, without selecting cases based on what I expect to find. States which introduced a free-college bill, but did not enact them are beyond the scope of this research. In non-adopting states, I would not be able to study the full policy process, so there may be fewer or different opportunities for inter-state influence.

Methodology for Stage 1: Document and Content Analysis

This study begins with a descriptive analysis of each statewide free-college program design to identify how the policy features are similar and dissimilar across states. The data source for this analysis is the text of the legislation which enacts the free-college program. These texts are publicly available via the state's legislative website. I focus on the legislation as initially enacted, though some have been amended since enaction. I identify the design features for each state to describe similarities and differences across eligibility requirements, institutional eligibility, aid retention requirements, and program structure. Whereas prior typologies of promise programs find state-level programs to be fairly similar, this descriptive analysis documents the variation within the typology. For example, two states may both be classified as having a need-based criteria for eligibility (per Perna and Leigh's (2018) typology), but it is also important to also understand if the specific income or EFC cutoffs are the same. I also note common language (such as repeated phrases) across policies and any references to other states.

The second part of the content analysis involves analyzing other legislative records including supplementary documentation for the legislation and transcripts/recordings of publicly available legislative hearings and testimonies. I use theory driven code to identify how programs in other states are referenced as they relate to the mechanisms of diffusion (Charmaz, 2006). I describe this coding process in the next section, as I use the same process for both the content analysis and interview analysis.

Methodology for Stage 2: Interviews with key policy actors

The second stage of this research involved conducting interviews to gain a more nuanced understanding of if and how policy actors considered the actions of other states when they developed their own free-college program. This section outlines how I identified these participants and describes my interview protocol and coding schema.

Identifying interview participants

I interviewed policy actors who were directly involved with the development and passage of the free-college legislation. Participants were members of the legislature, legislative staff, leadership and staff members of SHEEO agencies, staff of the governor's office, and members of outside advocacy groups which influenced the legislation in that state. I included participants from different positions and agencies within each state. This served (1) to triangulate the data within the state from different perspectives and (2) to allow comparisons across states within different types of agencies, since the types of knowledge a SHEEO member has may be very different from the knowledge of a legislative staff, for example.

I identified participants during the first stage of my research, through my analysis of legislative records. These records identified key actors who engaged in the legislative process

related to the free-college proposal, such as the legislators who sponsor the bill and outside agents who testify about the design. I supplemented these sources with media mentions and references on public webpages. I used a purposeful selection process to request an interview from those most involved with the development and adoption process. Then, I used snowball sampling to ask participants to identify other key actors. I identified 15-25 participants per state and ultimately interviewed 5-7 per state. I stopped conducting interviews in a given state when interviews began to confirm information from prior interviews rather than offer new insights. I also interviewed one individual from SREB, for a total of 33 participants (of 52 individuals contacted). Table 1 lists the participants by state and type of position.

Table 1: Number of Interviews by State and Position

	TN	KY	AR	MD	WV	SREB	Total
Legislature	1	1	1	2	3	-	8
Governor's office	2	2	1	0	0	-	5
Education nonprofit/interest group/association/local program	2	2	2	2	1	-	10
SHEEO/administrative agency/college system	2	2	2	3	1	-	9
Total	7	7	6	7	5	1	33

Interview protocol

The interview guide for this study focused on how and why states used policies from other states as they were developing their own free-college protocol. I used a semi-structured interview guide with (1) questions asked of everyone and (2) questions tailored to the individual based on the information I gathered during my document analysis. Cohen-Vogel et al. (2008) provide a sample interview guide from their merit-aid diffusion study which I used as a guide to develop my interview questions. Their questions focused mostly on identifying diffusion (e.g., "Can you tell me about the first time you heard about the idea of a broad-based merit-aid

program here or elsewhere?"). I also include questions which tease out the specific mechanisms by which diffusion occurred, identify when in the policy process other state policies were most influential, assess the role of intermediary organizations and local free-college programs, and identify how internal factors influenced the policy process.

Interviews lasted about 1 hour and were conducted using zoom, an online video conference software, between March and July 2021. With the participant's consent, I recorded these interviews and transcribed the audio. Appendix A lists the questions in the interview protocol.

Coding strategy and analyses

I used theory-driven coding to identify mechanisms of diffusions within the responses, appended with emerging themes (Charmaz, 2006). I identified *a priori* what types of data points are evidence of which mechanisms. Maggetti and Gilardi (2016) have noted that there is a lack of consensus in how the mechanisms of diffusion are operationalized. The authors suggest indicators of each mechanism that I used to guide my coding (these indicators are described in more detail in the theoretical framework section). For example, they note that there is evidence of learning if there is information about the success of a program in another jurisdiction, with success defined as relating to achievement of the policy goal, implementation, or political support.

To answer the third research question, I code the data for evidence of which stage of the policy process policymakers were most attune to policies in other states. I follow Cohen-Vogel and Ingle's (2007) identification of the types of evidence needed to attribute diffusion each policy stage. If diffusion is occurring at the problem identification stage, there would be evidence that "policy activities of border-states create demand for the redress of a new public problem."

For agenda setting, activity in another state would "force a latent problem into public view and onto the governmental agenda." For policy formation, another state's policy would "influence the design of the proposed solution." And for adoption, states would look to how another state's policymakers "build support or opposition for the policy."

I used a combination of manifest and latent coding. Text documents such as the legislation were used to identify program structure and were not coded for implied meaning. For interview and video data, I made note of non-text cues such as laughter and gestures which conveyed underlying meaning of the spoken text. In addition to coding the data for the themes I had identified from the theory, I coded emerging themes, most of which were related to internal factors influencing the policymaking process.

To analyze the legislative hearing and interview data, I first wrote a case narrative memo for each state. The purpose of these memos was to describe the process of ideating, designing, and enacting the free-college policy. These memos were organized around the stages of the policy process. The memos were attentive to specific actors and their motivations as well as specific design features and how/why they were developed.

The second set of memos described the evidence of diffusion for each state. These memos were organized around the research questions: first identifying evidence of diffusion, then describing evidence for each mechanism of diffusion, and finally describing diffusion at each stage in the policymaking process. Through this memo writing process, I weighed the evidence for each mechanism and identified the mechanism most relevant to each state.

Having drawn conclusions about diffusion within each state, I next developed memos to identify trends across states. These cross-case memos focused on the intersection of each

mechanism and each policy stage, resulting in a table identifying examples of how each mechanism manifest at each stage, and the frequency of that type of evidence. Finally, I produced memos on the themes from the data as it related to prior theory and literature on diffusion and on these programs. Limitations

Focusing on diffusion exclusively presents a limitation to gaining a complete understanding of the policy process of promise programs. Prior literature has demonstrated that political power and key policy actors are influential to policy adoption. Diffusion theory doesn't offer a framework to understand who is most influential in championing the spread of a policy, beyond special interest groups or intermediary organizations. This may limit the extent to which this study explains how free-college policies were designed. As Ness (2010) found, a single individual set the GPA threshold for merit-aid in New Mexico.

The information participants could provide is limited by their memories. In some cases, they were asked about events from as many as 8 years prior. I am also limited by the response rate. In some cases, I was unable to interview policymakers who were centrally involved in the policy development. Where available, I was able to supplement with secondary information gathered from other participants or contemporary media sources.

Results

Through my analysis of the program design features, I find notable similarities and differences in the design. The five free-college programs in this study are all last-dollar scholarships which cover the cost of tuition and fees for in-state high school graduates enrolled in two-year certificate or degree programs. Four are explicitly motivated by workforce development, and three are only available for students perusing high-demand fields. For eligibility, four require community service, two include mentorship, and only one is awarded on

the basis of financial or academic criteria. Notably, none of the program designs are an exact copy-paste of a previously enacted program, and there were no exact phrase matches in the legislation text. The table in Appendix B compares programs along additional eligibility requirements, institutional eligibility, aid retention requirements, and program structure.

The results from content and interview analysis are organized as case studies about how each state designed free college and why policymakers included certain design features. The case studies include both internal and external influences, with attention to the three research questions.

Tennessee: learning from local policy

Tennessee Promise was enacted in 2014, and is the first statewide free-college program, as defined using the parameters of this study. According to participants interviewed for this study, the governor's office primarily drove the policy initiative. Tennessee's Governor Haslam was motivated to enact a policy that would impact higher education, having focused on K-12 education policy during his first two years in office. The governor's staff surveyed policies in other states, but didn't perceive any policies to have as comprehensive of an approach to college completion as they wanted to pursue. The governor appointed Randy Boyd, a prominent business owner, as his senior advisor on education. In 2007, Haslam (then Mayor of Knoxville) and Boyd were part of a group of community leaders who developed Knox Achieves, a privately-funded last-dollar free-college program for Knox County graduates attending local community colleges. By 2011, when Haslam became governor, Knox Achieves had expanded to 27 counties and was renamed Tennessee Achieves.

There is evidence that Knox Achieves/Tennessee Achieves vertically diffused into Tennessee Promise. When the governor asked Boyd to develop a statewide college completion

plan, Tennessee was facing similar challenges related to workforce development and college access that had been facing Knox County in 2007. Boyd developed a proposal based on his experience, and aimed to take the Knox Achieves/Tennessee Achieves model statewide. One governor's staff members who worked on Tennessee Promise noted: "Randy [Boyd] had the vision to take Knox Achieves into Tennessee Achieves… And then, of course, when you ask him what he wants to do in higher ed and give him free rein to at least, like, conceptualize things, he's going to build off of what he already knows." The programmatic elements of Tennessee Promise were a direct replication of Knox Achieves/Tennessee Achieves as it was originally designed, rather than reimagining the idea of free-college as a new program. All three programs have nearly identical designs, though the state-wide version was modified to reflect the different funding source and administrative oversight.

Learning is the mechanism best describing why Tennessee Promise diffused from Tennessee Achieves. Boyd and Haslam saw the saw the impact Tennessee Achieves was making on their community in Knox County, and wanted to replicate that success statewide. During legislative hearings, the governor's staff and representatives from Tennessee Achieves (the nonprofit organization administering the local program) testified about the local program's mission, operation, and student outcomes. They frequently repeated "we have five or six years of data on this" to demonstrate that Tennessee Achieves was effective and justify that the same design elements should be included in the statewide program.

Diffusion via learning occurred mostly during the policy formation stage. The governor's office used evidence from Tennessee Achieves to convince the legislature that scaling up Tennessee Achieves as designed would be the most effective. For example, a participant from Tennessee Achieves recalled sharing student demographic information in order to demonstrate

that universal eligibility encouraged new populations of students to attend college and that these students could be successful, even if they didn't have the highest academic performance in high school:

> [Tennessee Achieves] provided statistics. I think it really important statistics to dispel some myths about students with certain GPA who couldn't find success or students with certain ACT scores. Right. We very much were trying to dispel all of these myths that you have to fit within a certain box in order to find success in college. And thankfully, we had six years of data behind us or I think Tennessee promise would look very different. I think there would be a GPA requirement for it or an ACT requirement, a HOPE [state merit-aid] 2.0. But the message from us was always, do you want to merely supplement kids that were going anyway or do you want to bring a new student into the pipeline?

This was an effective strategy. One state legislator introduced an amendment to add merit-based criteria for student eligibility. She withdrew the amendment after seeing retention data from Tennessee Achieves, explaining: "I've looked at the Tennessee Achieves program in twenty-seven counties and the retention rate in the Achieves program in those counties is much higher even than the retention rate for the HOPE Scholarship [state merit-aid]."

In addition to eligibility requirements, policymakers used information from Tennessee Achieves to justify including programmatic elements like mentoring in Tennessee Promise. Most of the information shared about mentoring was anecdotal, including student testimonies on how having a mentor contributed to their college success. Policymakers described the mentorship component as a "critical piece" and "key to success."

Most legislators agreed that Tennessee Achieves students were a relevant comparison group and used Tennessee Achieves data on enrollment and cost for Tennessee Promise financial projections. At least one legislator was skeptical and argued that the subset of students in Tennessee Achieves may not be representative of all Tennessee students and results could vary statewide. A representative from Tennessee Achieves responded that they felt Achieves students were representative because the program operated in 27 of 95 counties, including a mix of urban,

suburban, and rural communities. Internally, the governor's team also expressed concern that their projections could be incorrect because there was not another statewide program they could model after: "we had data from Tennessee Achieves, but… there wasn't another proof point out there somewhere there where somebody had done this and could say that it would be successful and we would get the ROI that we thought."

While Tennessee Promise was explicitly designed as a scaled-up version of Tennessee Achieves, this is not a case of diffusion via imitation. There was a desire to mimic the local policy, but it was not independent of the effectiveness of the policy. Multiple participants noted that Boyd and Haslam wanted to make Tennessee Achieves statewide because of the success it had produced in Knoxville. Still, some criticisms of the program design are attributed to the fact that this policy was a programmatic scale up without reassessment of the design. For example, one participant noted that the last-dollar design is inefficient because aid does not go to the students with the most financial need: "Those students that have no financial need are going to have benefit more financially from Tennessee Promise, and that's the way Knox Achieves was set up. So that was just kind of replicated." However, these critiques developed in reaction to early outcomes data from Tennessee Promise, and were not necessarily part of the conversation during design and enaction.

Internal factors were also critical to the enaction of Tennessee Promise. The governor was widely popular and motivated to enact a higher education policy. He dedicated specific actors to champion the policy and build support for it. The policy was fiscally responsible because of the last-dollar design and lottery funding, which increased the political viability. Tennessee Promise fit into the state's educational attainment goal, the Drive to 55, but it was also pitched as a tool for economic development. The legislation for Tennessee Promise describes the

intent was to make Tennessee "the number one location in the Southeast for high-quality jobs," and to do so the state would need to equip the workforce with "the knowledge and skills provided through postsecondary education." The policy received some opposition from legislators who didn't think college should be free, but some of the design elements like community service helped convince some legislators that students had "skin in the game." There was also opposition from some four-year colleges who were concerned about the impact this policy would have on their enrollment.

After Tennessee Promise was enacted, it received national attention. Media outlets, intermediary organizations, university researchers, and policymakers in other states reached out to policy actors in Tennessee to understand how they had enacted free college. In 2015, President Obama announced his proposal for national free-college at Pellissippi State Community College in Knox County. Policymakers in other states saw that free-college could be a palatable idea in their state, especially since it had passed in a very conservative state. Some were dismayed to learn Tennessee Promise was funded through a lottery surplus which not an option in most states. Others saw that the last-dollar model could be a more affordable design compared to other existing programs like Kalamazoo Promise (which is a first-dollar program and funds students at both two-year and four-year colleges).

Kentucky: external competition and internal tension

In 2016, when Work Ready Kentucky was introduced to the Kentucky House, the bill sponsor refenced Tennessee Promise directly:

> We actually borrowed the idea from our neighboring state of Tennessee. Mr. Speaker, you've heard me say many times that the only three things I ever saw good come out of Tennessee were the three interstates going north. [laughter] But we- but as we looked across the nation, we saw that our neighbors in Tennessee were doing something remarkably forward thinking in preparing their young people for the job market of this century. And they call it the Tennessee Promise. And what it really is, and it's contained

> in the bill that we call Work Ready Kentucky. It creates a scholarship program that fills the gap between all the scholarships and financial aid that is available to a student now and what the actual tuition costs are.

The quoted legislator makes light of the rivalry the Kentuckians feel towards Tennesseans, but the states do actively compete for economic development. One participant noted that Kentucky, Tennessee, and other bordering states "had similar geographic advantages that would be appealing" to employers in the logistics industries seeking a centrally located transportation hub. Policymakers in Kentucky were trying to attract industry to the state, especially in geographic areas which needed economic development, but had difficulty due to an under-educated population.

Diffusion via competition is evident in Kentucky, particular during the agenda setting stage. Leaders in Kentucky saw that Tennessee Promise had the potential to make Tennessee a more attractive destination for industry than Kentucky. Part of the motivation for enacting Work Ready Kentucky was to compete with Tennessee's workforce. Competition is referenced in the first line of the executive order enacting the Work Ready: "The Commonwealth of Kentucky is committed to increasing the currently low workforce participation rate by expanding the skilled, competitive workforce necessary to attract new businesses to the state." The vetoed legislation also referenced the need for a "competitive workforce." The governor's office had been researching which policies had contributed to Tennessee's economic growth and how they could be replicated in Kentucky:

> There was absolutely a feeling that we wanted to compete more with Tennessee than we had in previous years on the economic development front and on the education front. In terms of Nashville's growth in particular, I think leaders in Kentucky and leaders in Louisville looked at what Nashville has done over the last 10 to 20 years and we're looking at, I wouldn't say so much a model, but we're really kind of dissecting that progress and thinking of ways they might adopt some of the things that Nashville was doing to spur economic development. So on the education front, obviously, that that included ideas like Work Ready scholarship. On the economic development front and it

> included some of the more traditional Republican policies as well, like right to work and prevailing wage and doing something in those areas.

At the time, there were three existing statewide free-college programs (Tennessee Promise, Oregon Promise, and a pilot program in Minnesota called MnSCU Two-Year Occupational Grant). In conversations with both legislators and staff from the governor's office, participants shared that they got the idea to enact a free-college program from Tennessee and didn't look much at other state or local programs. One legislator noted that they didn't research other state policies as much as they normally would do because they wanted to move this legislation forward quickly, while the political conditions were conducive. Work Ready Kentucky was introduced mid-session, on March 1, 2016, and passed both chambers on April 16, 2016. The swift passage was just as much about gaining political ground, especially in an election year, as it was about enacting a good policy idea. The house Democrats and the Republican governor had an animus relationship due to partisan politics, so they did not include the governor's office in the design process. One legislator stated that house Democrats wanted to "assert their legislative independence and make it very clear that we are not a rubber stamp for the governor's office."

Governor Bevin vetoed the bill, but approved the appropriation to fund the program. In the veto message, the governor stated that he agrees with the goals of the legislation, but reasoned that it was "hastily written." Then in December, the governor issued an executive order enacting his own version of the Work Ready Kentucky scholarship. From the perspective of the legislature, free college wasn't on Governor Bevin's agenda until he saw how popular it was.

The legislation and the executive order have very similar designs. One key difference is that the legislation funded up to an Associate's degree whereas the executive order funded sub-Associate's certificates or diplomas. The governor's team was concerned that if they included

students who were pursuing an Associate's degree, all of the funding would go to students who were currently enrolled, whereas the policy aim was to add new students to the pipeline. In his veto message, Governor Bevin was critical that the legislation was not targeted by financial need, but he did not include a need-based requirement in the executive order.

The governor's team had more time to develop their proposal for free-college than the legislature, but still focused mostly in information from Tennessee, largely due to familiarity with Tennessee Promise. One of the governor's staff members had attended a conference where a representative from the Tennessee Higher Education Commission spoke about Tennessee Promise. For this participant, the meeting connected the dots between the state's problems of needing skilled workers, competition with Tennessee, and free-college as a policy solution. He recalled "there's probably not an aspect of the Tennessee Promise legislation we didn't discuss." Aspects of Work Ready Kentucky's design were influenced by information learned from Tennessee. For example, Tennessee had implemented mentoring and community service using a network of existing nonprofit organizations. Since Kentucky did not have the same infrastructure, the governor's team decided not to include those programmatic elements in Work Ready. The governor's team also used information about the cost and funding from Tennessee, and saw the last-dollar structure would make the policy financially feasible.

There are a number of important differences between Tennessee Promise and Work Ready Kentucky which developed as a result of contextual factors. Both Tennessee Promise and Work Ready Kentucky are motivated by workforce development, but policymakers in Kentucky designed every aspect of the policy to explicitly align with this goal. For example, students must enroll in one of the top five high-demand workforce sectors to be eligible for Work Ready Kentucky. Limiting field of study was a way to contain costs while maximizing the return on

investment and improving the workforce participation rate. Work Ready Kentucky was one of the first state-wide programs to make adult learners eligible. This aligned with the motivation of filling jobs and adding new students to the educational pipeline.

Arkansas: designing with lessons learned and the state context in mind

Political leaders in Arkansas, like Tennessee and Kentucky, were concerned about the state's economic development, particularly low wages. In 2017, Governor Hutchinson wanted to attract industry with high paying jobs to the state, but businesses were reluctant to relocate to Arkansas because of low educational attainment. Governor Hutchinson saw workforce training as a potential solution to these problems. He had seen other states, including Tennessee, implement tuition-free college programs, and perceived those programs to be successful, which elevated free-college to his policy agenda. The governor's team compiled a list of the designs of free-college programs in other states and then designed a policy specific to the Arkansas context. One participant noted, "I stole some ideas from Tennessee Promise. And then we, like I like to say, 'Arkansized' it to make it something a little more palatable for the members [of the legislature]." In addition to political palatability, some of the design features were modified to fit the state's demographic characteristics, financial feasibility, and higher education context:

> "He [Governor Hutchinson] knew, OK, these are what other states are doing and that's achievable in their states, but Arkansas is unique and… we don't have the same demographic. We don't have the same economy as other states, of course, were more similar to Mississippi and Alabama than we are to Tennessee, or Texas is very different. And so I think it definitely had an impact on his vision of what could happen in the state of Arkansas, and I think there were a lot of really good lessons learned from other states, but I think he recognized the fact that Arkansas is different than those states. So we need to craft something that's specific, that can be successful here academically and financially."

At the time, four other states had free-college programs and three more would also enact free-college in 2017. Four of the six participants I spoke to referenced Tennessee Promise as the

main external influence on the design of Arkansas Future (the other two participants were not directly involved in the design process and did not reference any other state as particularly influential). Diffusion from Tennessee to Arkansas occurred primarily through policy learning and primarily during policy design. One of the main policy developers interviewed said Tennessee Promise was especially influential because she had built a network with the Tennessee Higher Education Commission (THEC). She said a leader from THEC shared lessons learned from administering Tennessee Promise and offered feedback on Arkansas's ideas:

> I kind of pitched what we were planning to do. He mentioned a few things that he would have done differently if he'd been Monday morning quarterbacking the program. So we did have some conversation around that. Arkansas and Tennessee, proximity wise, we share a lot of students. We share a lot of ideas… Discussing the dynamics that we had going on in our states and our regions at the time politically for what we felt like we could get done were made up of very similar political groups that that influence that policy, and also, we have to be sure that we can we can get things passed. So we had kind of similar challenges and similar opportunities at that time.

Information from Tennessee was particularly influential because the contexts were perceived to be similar in terms of political feasibility. Another participant noted that this type of policy learning was fairly common in Arkansas: "that's the beauty of federalism. You get to watch Tennessee, you go, hey, you know, this is working for them. Let's do it. They're not that different than us. You know, you've got these little laboratories of, you know, a government in looking at your neighboring states especially."

However, Arkansas Future has some substantial differences from Tennessee Promise. Arkansas limited eligibility to students in STEM and high demand fields. This was a priority because the governor's team were focused on workforce development and wanted to ensure that the program set students up to fill good jobs. This requirement was popular in the Republican controlled legislature, many of whom didn't see a value in paying for students to pursue a career which was not in demand. Additionally, limiting the fields made the program more fiscally

feasible than a universal design. One participant recalled that these differences were received positively in Tennessee: “After [a THEC leader] and I talked he was like, ‘Man, I really wish we had done that. Like if we could have been a little more targeted in making sure that students were in degree programs that led to something that would have probably been a more efficient use of funds.’” Additionally, adult students were eligible for Arkansas Future, whereas Tennessee Promise was only for traditional students (however, at the same time Arkansas Future was developing, Tennessee was working on expanding Tennessee Promise to adult students through Tennessee Reconnect). Arkansas was one of the first states to enact a program which required students to reside and work in the state after they earn their degree. This requirement was included to ensure the future financial stability of the program.

In the legislature, the policy designed by the governor’s team did not receive much opposition or substantive changes. The legislature had a Republican supermajority, and the design was palatable for conservative legislators. Members of the legislature had already agreed that people need higher paying jobs. They were attuned to industry demands and had made efforts to support workforce training. Few legislators considered Arkansas Future an entitlement program since students were required to participate in community service and mentoring and had to stay in the state after graduating.

There were concerns about the design, particularly from the Black Caucus. The Black Caucus discussed whether Arkansas Future would funnel low-income students into two-year programs when they otherwise would have aimed for a four-year degree, which could have a detrimental effect on HBCUs. The governor’s office responded that (1) this financial aid was targeting students who would not have gone to college, rather than re-directing students from four-year colleges to two-years, and (2) with mentoring and community service supporting

students, Arkansas Future students may be more likely to succeed and even transfer to a four-year in the long run.

Part of the motivation for enacting Arkansas Future was to produce an educated workforce which would attract industry to the state. However, I find no evidence that policymakers in Arkansas felt that they were disadvantaged at attracting industry specifically because other states had free-college, including neighboring Tennessee. Policymakers in Arkansas perceived Tennessee to be a leader in higher education in the South, but not necessarily an economic competitor since Arkansas is so much smaller than Tennessee. Some participants described a friendly competition between Arkansas and Tennessee, particularly to improve upon Tennessee Promise with Arkansas Future. One participant noted that Tennessee and Arkansas do compete for students at their boarder region, but this was not listed as a motivating factor for enacting Arkansas Future. There wasn't a sense that Arkansas was losing students to Tennessee because of Tennessee Promise and therefore needed to enact their own free-college program (Tennessee and Arkansas have tuition reciprocity agreements through the SREB Academic Common Market, but Arkansas students aren't eligible for Tennessee Promise).

Maryland: normative pressure of a policy trend

By 2018, the idea of free-college had received national attention and had even proposed as federal policy. Various levels of the Maryland government – the legislature, the SHEEO, the community colleges – had internal conversations about free-college and researched how these programs operated in other states. Tennessee Promise emerged as a starting model because the program had been around the longest and THEC had released descriptive statistics on student outcomes.

The ultimate design of Maryland Promise is very different from Tennessee's model. Like in Arkansas, free-college was customized to the Maryland context. One legislator described the process of developing a chart to categorize different characteristics of other states' free-college programs (funding levels, eligibility criteria, funding source, structure) and then "try[ing] to pick what we could be the best and strongest for the state of Maryland." Maryland Promise was motivated by college access and opportunity, so aid was not limited to specific fields of study. Maryland is the only state-wide program in this study to include need- and merit-based eligibility criteria. Merit-based criteria were included largely for cost containment, but also to balance attracting students who were perceived to be serious about education while ensuring that students who didn't demonstrate exemplar achievement in high school would still have opportunity. The income cap was included to target students who likely otherwise would not have gone to college, but also appease middle-class constituents. A requirement to work in the state after graduating was added as a compromise with conservative legislatures who didn't want students to have free college without giving something back to the state.

The idea for free-college diffused to Maryland at the agenda setting stage via normative pressure. When the Maryland Community College Promise Scholarship was introduced to the House Ways and Means Committee, the bill sponsor listed all the states that had statewide free-college programs to build a narrative that Maryland was being left out of a very important policy trend:

> Now, there are 23 states and also 47 pieces of legislation which have been considered by the promise program. There are 200 promise programs in communities across forty-one states… [lists 8 states with free colleges and how much the programs cost] So all of these are just an indication of how fast they're moving and how well they're doing as far as bringing tuition into the community colleges. So we need to get on board. We need to be a player in this.

A representative from the community colleges who testified during the Ways and Means Committee underscored that Maryland wasn't moving fast enough on the idea: "This is the third year that we are talking about promise programs for the state of Maryland. And when you consider that we're one of the richest states in the United States, not to have a statewide program does give you pause." The bill sponsor expressed his intent for introducing the legislation was not as much about the specific design as it was to maintain the momentum behind the idea.

Pressure to enact free-college in Maryland had built because of the specific state context. One participant noted that Maryland sees itself as a fairly progressive state. Free-college was on the liberal/progressive agenda – especially after President Obama proposed a federal free-college program. This created a political pressure for the state to act. Maryland is also a wealthy state in terms of personal income and state budget. Legislators compared how much other states were spending on free college and saw that poorer states were able to enact free college. This made one participant feel further behind on the trend:

> I think it was helpful that other states had it. It gave the state of Maryland really no excuse not to do it, especially being one of the wealthiest states in the United States. Yeah. It's certainly. I mean, come on, Kentucky has it, you know, and I know no disrespect to Kentucky, great state, but our per capita income is much higher and you know, if they could put eight million dollars in it, we should be able to put twice as much.

Motivations for supporting free-college in Maryland varied, which also helped the policy gain traction – it would address multiple problems for different stakeholders. For some, the interest in free-college stemmed from a desire to increase access for students who would not otherwise go to college; removing financial barriers could help break intergenerational poverty. Free college would also help middle-class constituents, who were often more vocal and thought it unfair that some students could go to college for free based only on where they lived. The policy also aligned with workforce development aims. There was an unmet demand for workers, and Maryland was trying to become a technology hub. A free-college program could help

students re-train and stimulate the economy, especially if the state experienced an economic downturn.

While normative pressure was the primary catalyst for trying to adopt free-college in Maryland, policymakers also used evidence and information from other states to develop Maryland Promise. In particular, legislators expressed concerns after learning of potential negative consequences from free-college programs in other states. For example, one legislator expressed concern for HBCUs. She cited that HBCUs in Tennessee hadn't had the same enrollment growth that HBCUs had in other states. She had heard that Tennessee Promise directed students to two-year colleges instead. Another legislator cautioned against free-college because when California had free-college, students would drop in and out of school without completing. There was also criticism of Tennessee Promise's design as inefficient since aid wasn't going to the lowest income students and a perception that Tennessee wasn't seeing high rates of completion for how expensive their program was.

Policy learning was also evident during the adoption process. The free-college bill that passed in Maryland was designed with specific attention to what was likely to be adopted. In particular, one sponsor set the appropriation request after looking at what funding levels had been enacted in other states: "I put a ten-million-dollar limit on it, again, because I looked at other state and I looked to see how much they were funding and the bills that have not passed in the past are bills that had tremendously high fees."

Supporters of the legislation learned strategies for adoption from the existing local programs in Maryland. Conservative communities were persuaded by economic development framing, so supporters used that framing to gain political traction in the legislature:

> What was shocking to me is because some of our more rural counties in Maryland that would be more conservative Republican, they actually had local promise programs, the

> ones in Garrett and Allegheny… And it was such a popular thing, Garratt, that area of the state was hemorrhaging jobs and losing population. And I think they had to do something. So it was really a pragmatic step on the local government to say we need to actually sort of build human capital here and keep our, develop our workforce instead of continue to lose that once they graduate from high school to go elsewhere. So that was sort of the nexus too, and we were using that in our testimony.

Supporters also used information about the adoption process from Tennessee to anticipate potential opposition. One participant had seen pushback from the four-year colleges in Tennessee over enrollment concerns and prepared counterarguments:

> We looked at the feedback or potential criticism that some of these models had. And I know the Tennessee promise program seemed to- the four-year institutions seemed to really kind of complain about it, taking a hit in their enrollment… we were preparing for that argument more or less to see because we thought that the four-year institutions would come at us for trying to get the 16 million dollars of financial aid that would just be for us and not them. So we were trying to be prepared for that.

West Virginia: learning about free-college's economic advantages

In West Virginia, free-college was proposed as a solution to the state's social and economic conditions. With the job loss from the decline of coal and manufacturing industries – coupled with low wages, high teen pregnancy, poor health, and the opioid epidemic – policymakers perceived the citizens of the state growing hopeless. Policymakers had challenges attracting industry to the state due to low workforce participation and lack of training. State leaders were looking for a policy solution that had the potential to have a major impact on people's lives.

One West Virginia Senator saw free-college as a viable solution after learning about the success of Tennessee Promise. The senator recalled speaking to Tennessee's Governor Haslam at the National Republican Lieutenant Governor's Association:

> He [Governor Haslam] was just telling me some of the ways that it [Tennessee Promise] really does change people's lives. I mean, you're not just talking about an academic program, but you're talking about transforming what had previously been perhaps generational poverty and providing people with a skill set and a trade to take to the marketplace and learn a new way of life and a new opportunity to not only better your

> own self, but perpetuate a family, you know, moving forward and propagate the concept of work as good. Trade skills and so forth are incredibly valuable and needed in our economy. And four-year college degrees are not for everyone. And so we need to recognize that those skill sets have value, extreme value, and just talk more about it, you know, within our education community and within our school systems of how people can earn a great living. So I brought that back and began doing some more research.

Although the evidence from Tennessee was conceptual and anecdotal, West Virginia legislators who supported free-college perceived Tennessee Promise to be successful and thought free-college could also be successful in West Virginia. West Virginia had some cultural similarities, particularly with rural and Appalachian areas of Eastern Tennessee. There were concerns that West Virginia may not have the same increases in educational attainment as Tennessee had because West Virginia did not have population growth and experienced brain drain.

Learning from Tennessee also occurred during program design and enaction. During the legislative hearings, a representative from West Virginia Community and Technical Colleges (WVCTC) testified that she expected enrollment to increase by about 20% since that had occurred in Tennessee. Legislators spoke with policymakers from Tennessee to understand changes in the enrollment distribution between two-year and four-year colleges resulting from Tennessee Promise. Participants reflected that this information was useful to persuade legislators that enacting free community college wouldn't have a long-term negative enrollment effect on four-year colleges. One participant described on how information from Tennessee was persuasive in the legislature:

> You've got someone to fall back on, right? You can say, look, they did it in Tennessee it worked. And, you know, it's not it's not as much of a concern about four-year schools as you thought and all these things. We had someone to point to who had done it right and really had made an impression on a lot of the other states, as you've seen. So it just, they just made it easier.

The bill sponsor thought Tennessee Promise was an attractive model because the design had "some costs associated with it." These 'costs' included the last dollar structure, which required students to apply for federal financial aid, and community service. West Virginia also added a required drug test and required state residency after college. Drug testing was a non-negotiable provision in the legislature and critical to the bill's passage. Legislators had heard from employer that there weren't enough drug-free workers to fill available positions and that students would go to four-year colleges and become addicted to drugs. The requirement wasn't necessarily meant to be punitive, but was rationalized because the state needed a drug-free workforce and many of the jobs students would take after graduating would have a drug testing requirement.

While workforce development was a main motivator for adopting free-college, no participants stated explicitly that they enacted free-college because of competition with another state that had free college. Participants described wanting to attracting business rather than a perceived disadvantage from other states with free-college. As one participant noted:

> We need to give ourselves an advantage that will entice work, what do you call it, job makers, those who are, you know, wanting to move their companies. We need something to entice them here. And if they see that we are invested in the workforce and in getting folks with these two-year certificate programs that they need for their jobs, you know, this will this could help. So I think that was a contributing factor.

Policymakers in West Virginia felt that they were on the forefront of the free-college trend ("it's because there were so few states at the time doing it, it was hard to find a comparative other than Tennessee."), so enacting free-college was perceived as an advantage rather than overcoming a disadvantage to other free-college states. Some policymakers had limited knowledge of other states' free-college programs – even neighboring states they compete with – due to limited time and capacity to research other programs.

Policymakers in West Virginia also used information from Tennessee during the adoption stage. One legislator recalled asking policymakers in Tennessee about potential opposition to free-college:

> I just kind of asked in some general questions and try to get an idea of what their biggest concerns and hurdles had been so that I could be more prepared to defend the bill… Thoughts on what they had to go through to get it passed and what were the difficulties of the pitfalls so we could maybe avoid that.

Policymakers in West Virginia anticipated concerns that free community college would result in enrollment declines at four-year colleges, having heard this was challenge in Tennessee. Prepared for this pushback, a representative from WVCTC made a counter-argument during her legislative testimony:

> What happened in Tennessee was that there was an immediate drop for the first two years for four-year institutions in enrollment. And it wasn't a huge drop, but there was a drop. And then after two years, the enrollment and transfer kicked in. And so students started transferring from the two-year to the four-year system. And then anecdotally, in talking to the presidents in Tennessee, all the presidents in Tennessee, they talked about the quality of the student that they were getting and the transfer being a frankly, a higher quality student because they had been through two years of a community college program. They knew what it was supposed to look like. They knew what they had to do to go to college and they were transferring and succeeding.

She also suggested that West Virginia legislators could build elements to facilitate transfer into the program design, like articulation agreements, though these were not added to the bill.

Discussion

The aim of this study is to understand the extent to which policy diffusion could explain the rapid adoption of free-college programs, which mechanisms facilitated diffusion, and which stages of the policy process diffusion was occurring during. I focus specifically on five states in the SREB region that enacted free-college between 2014 and 2019. I find evidence of diffusion in each state – particularly via learning, competition, and normative pressure during the agenda setting stage, policy design process, and adoption.

Evidence of diffusion

To answer the first research question, I do find evidence of policy diffusion; states were influenced by free-college policy adoption in other jurisdictions. Policymakers in all four states outside of Tennessee emphasized the important role Tennessee played as a leader in the free-college movement. Tennessee was influential because it was the first state to adopt free college, which garnered national attention, so there was high awareness of Tennessee Promise. Policymakers from Tennessee were frequently invited to speak at conferences and share information about Tennessee Promise since. Tennessee Promise had been enacted for the longest time and the state had released data on student enrollment outcomes, which facilitated policy learning. Multiple participants noted that because other states had free-college, it was easier for them to build support for the policy since there was conceptual familiarity. Some states looked beyond Tennessee, compiling lists of programs across the country and charting out their design features.

Tennessee Promise diffused as a scaled-up version of a local free-college program, Tennessee Achieves. While other states did have local free-college programs, information about local programs were rarely shared in states outside of Tennessee. In Kentucky and Arkansas, policymakers perceived the local programs to be too dissimilar from what could be accomplished statewide. In Maryland, local programs were not considered as models to scale up statewide, but they were considered proof that a statewide program could be politically viable; conservative communities in Maryland had enacted free-college, increasing buy-in to the workforce development narrative.

Mechanisms of diffusion

Diffusion of free-college occurred via multiple of mechanisms. In Tennessee, learning was the main mechanism. Learning was facilitated by policy entrepreneurs who had developed the local free-college program on which Tennessee Promise is modeled. Learning is also the main mechanism by which policy diffused to Arkansas and West Virginia. In these states the main impetus for trying to enact free-college was the success free-college had in other states. They saw the potential for a similar policy to solve issues in their state. Policy learning also occurred in Kentucky and Maryland (for example, when data were shared about student outcomes in Tennessee), but the main catalyst for introducing free-college was not information about the policy's success elsewhere.

Competition was the main mechanism of diffusion in Kentucky. In particular, policymakers were actively trying to replicate some of Tennessee's policies in order to replicate some of the economic growth Tennessee was experiencing. Leaders in Kentucky felt they would be at an economic disadvantage after Tennessee enacted free-college, since an educated workforce was attractive to companies looking to relocate to the mid-South region. Other states, particularly Arkansas and West Virginia, were also motivated to enact free college in order to attract industry and promote economic development. However, policymakers in those states did not make the explicit connection that they needed to enact free college in order to compete with states that had free-college.

I find evidence that free-college diffused to Maryland primarily via normative pressure. Policymakers in Maryland referenced the number of other states which had considered or enacted free college and were concerned that they were falling behind an important policy trend—particularly because they were a progressive state and free-college was solidly on the

national progressive agenda by 2018. Normative pressure was not a prominent mechanism in other states.

I find minimal evidence of imitation. While some states were seeking to emulate policies in other states – such as policymakers Kentucky looking at what Tennessee was enacting for economic growth – the emulation was not independent of the policy's perceived success. At the design stage, certain elements of the free-college policies exist across multiple states, but policymakers rarely justified their inclusion as solely because another state had included that element. Typically, policymakers pursued the concept of free college because of the mechanisms described above, but then modified or kept specific design features to fit the specific needs of the state.

Diffusion and the policy process

Diffusion occurred primarily during the agenda setting stage, policy design process, and adoption. Free-college became part of policymakers' agendas when they connected the policy with particular problems they were trying to solve in their state. For example, policymakers who were looking to upskill their states' population learned that free-college increased college access, and decided to propose free-college. Some policymakers were actively seeking solutions, such as Kentucky looking for ways to compete with Tennessee. Other policymakers heard about successful free-college programs during conference presentations or professional networks facilitated by intermediary organizations. Where competition and normative pressure was the main mechanism of diffusion, diffusion occurred most prominently during agenda setting since the impetus for proposing the policy was related to actions in other states.

During the policy design stage, learning was particularly evident. Policymakers in multiple states describe the process of comparing free-college policies in other states and then

picking the policy elements that would be best for their state given contextual similarities or differences. Some participants recalled discussing particular features of other states' policies with the policy designers in those states to understand what motivated that feature and if it was effective in practice. Policymakers frequently used data from other states to make projections about the program costs and potential return on investment. These data informed other aspects of the program design, such as limiting eligibility for fiscal feasibility.

Policymakers also used information they learned from other states during the adoption process. For example, participants in Maryland and West Virginia recalled seeking information to prepare for potential opposition to adoption. The primary concern they heard was that four-year colleges in Tennessee had opposed the policy in anticipation of enrollment declines. Policymakers in Maryland and West Virginia prepared to address these concerns by providing data from Tennessee which found that four-year college enrollment declined at first, but then rebounded as students began to transfer.

The interaction of mechanisms and policy processes

Information from other states had different effects on policy design, even if the same mechanism was evident, due to when the information was shared and the type of information. For example, I find evidence of learning in every state. When policymakers – particularly legislators, governors, and other high-level officials – learned at the agenda setting stage, the information was largely conceptual: free-college could be a viable solution to workforce development issues in conservative states and could be enacted in a fiscally responsible manner. This type of conceptual learning is potentially less impactful on the actual program design than learning at the policy formation stage. At the formation stage, external information included more detail on specific design elements, including their effectiveness. This research process was

typically conducted by staff members who had more time and expertise in higher education policy. Where data were unavailable, these actors discussed practice with their counterparts in other states. This type of learning was more influential on policy design as these actors learned both what was effective and what elements could be improved upon. At this stage, policy designers also considered information comparing state contexts – including socio-demographic, economic, and administrative infrastructure – to assess if the design in another state would solve the specific problems their state was trying to address. As a result of this learning process, the design was modified, creating five unique free-college policies. Learning at the policy adoption stage included largely anecdotal information about what types of critiques and hurdles policymakers had faced in other states. In particular, policymakers learned that there might be pushback from four-year colleges concerned about enrollment declines if students were incentivized to attend two-year colleges. Anticipating these obstacles, policymakers prepared counterarguments which were informed by outcomes data from other states, such as that four-year enrollment recovered in Tennessee after a couple of years. Learning at the adoption stage did not necessarily affect the design features, but was important for building political support for the policy. This discussion highlights that the same mechanism can have different consequences on policy design based on the type of information and the state at which it is used. Considering the policy stage is critical to fully understanding the mechanisms of diffusion.

Emergent Themes

The process of diffusion was shaped by three factors, including internal context, geography, and policy leaders.

The interaction of external and internal factors

In each state, internal contexts interacted with external factors, resulting in different manifestations of the mechanisms of diffusion. In particular the policy actors' motivations, information sources, and networks shaped how they used external information and what type of information was influential. In Tennessee, the governor appointed an advisor to develop higher education policy who had already worked on a local free-college program and aimed to take the program statewide; the resulting statewide policy is nearly identical to the local program. In Kentucky, legislators were motivated to enact free-college quickly for political gain, so they expressed not having time to look at policy designs beyond Tennessee. In other states, like Maryland, research-oriented staff took time to map out policy designs across many states and consider academic research on the design effectiveness.

Networks with policymakers in other states facilitated information sharing. Networks were built through position-based intermediary organizations. For example, leadership in the Arkansas SHEEO had built relationships with leadership in the Tennessee SHEEO, through which Tennessee shared best practices which informed the design of Arkansas Future. Legislators built relationships with other legislators, financial aid administrators with other financial aid administrators, and executives with other executives. Additionally, ideas spread through partisan convenings. For example, a West Virginia legislator got the idea for free-college after hearing Tennessee's governor speak at the National Republican Lieutenant Governor's Association. Diffusion theorists are beginning to consider the role of intermediary organizations in facilitating policy spread, and future work should explore actor position and partisanship as well. Future work should also consider the role of individual actors in policy diffusion. One participant in an administrative role in Kentucky referenced a colleague who had

previously worked in Kentucky but now works in Tennessee. Their existing relationship facilitated information sharing. As individual policy actors change states for new jobs, they bring their expertise on policies and expand their networks. While beyond the scope of this study, future work should look at the migration of state policy workers as a potential facilitator of diffusion. The design of each program was modified to fit the state's specific needs – both practical and political – which is why imitation was not a prominent mechanism. The policies are ultimately very different in each state. This aligns with Miller-Adams's (2021) comments that free-college can easily diffuse because the concept is straightforward and can be easily adapted to fit community need. However, even where free-college may have been a desirable policy, fiscal capacity in each state was critical for viability and impacted the ultimate design of the policy. All five programs in this study are last-dollar designs, which costs less than a first-dollar design. This innovation began in Tennessee, and policymakers in other states noted they got the idea for a last-dollar model from Tennessee where they saw it required a relatively low fiscal investment. Despite this innovation, participants from Tennessee noted that Tennessee Promise was only viable because it was funded by a lottery surplus and didn't require appropriations. In other states, the policy design was modified as a direct reflection of available funding. For example, policymakers limited the fields of study or type of degree program to reduce the number of eligible students and make the programs less expensive. In many states, a fiscally responsible design was critical to gain the support of conservative legislators.

Though a full analysis of internal factors is beyond the scope of this paper, each state context-particularly political-was critical to the enaction of the free college program. For example, policy entrepreneurs were critical in most states. In West Virginia, the bill sponsor held a leadership role for setting the Senate, allowing him to drive the policy agenda. In Maryland, the

policy was enacted as a parting gesture to the sponsor, a long-serving legislator who was retiring. In Tennessee and Arkansas, free-college was a priority for popular governors. Future work should consider the adoption of free-college using different policy process theories. The Multiple Streams Approach, for example, could offer a theoretical lens for understanding how these policy entrepreneurs connected the state's social and economic problems to free-college policy and how the state's socio-political context created a policy window during which free-college became a viable solution.

The role of geography

I find that geography mattered for the spread of free-college in the Southern US, and geography mattered for multiple mechanisms. Policymakers were especially attentive to policies in neighboring or nearby states which had a similar political or demographic context. For example, policymakers in Arkansas saw free-college as politically viable because it had already been enacted in Tennessee, another conservative state. This is consistent with the regional diffusion theory, which suggests that it is easier for policymakers to compare proximate jurisdictions since they often have similar economic and social challenges.

Regional diffusion theory also suggests that geography may increase competition between jurisdictions. I find evidence of competition due to geography in Kentucky. Participants in Kentucky described competing with neighboring states to attract logistics industries because the region all had the same geographic advantages (e.g., centrally located for shipping and transit). Policymakers in Kentucky were closely watching policy innovations in Tennessee, including free-college, to ensure they wouldn't be disadvantaged at attracting industry relative to their neighboring states.

Geography may also facilitate diffusion through information networks. Some policymakers noted existing working relationships with policymakers in bordering states with whom they collaborated on regional issues. Most commonly, the networks that policymakers described as influential for developing free-college were position-based, not geography-based. I find that SREB as an organization did not produce influential reports or publications about free-college specifically, but some participants were attuned to SREB reports on state rankings to compare their educational attainment rates and other education indicators.

Participants in each state also referenced knowledge of their states' standings in national rankings for education, social, and economic conditions. For example, a legislator from Tennessee stated, "we're third in the nation in the amount of financial aid provided to our students. Yet we are forty third in the nation for the completion of degrees." Most commonly, policymaker's comments were noting concern about low rankings or slipping lower on positive indicators; however, policymakers rarely cited the sources of these statistics, so it is difficult to attribute to a specific information network. While knowledge of these rankings demonstrates an awareness of and attention to external conditions, this type of evidence cannot be attributed specifically to a singular mechanism of diffusion.

In prior literature, quantitative studies have claimed that close geographic proximity is indicative of diffusion. However, this operationalization misses the fundamental feature of diffusion; it does not provide evidence how or why adoption in one state made another state more likely to adopt the same policy. One finding from this analysis is that diffusion commonly occurred when policymakers perceived the adopting state to be contextually similar. When asked which states they considered to be peers, participants frequently named bordering or regional states, but they also described why some boarder states are not peers and named states in other

regions. For example, a legislator in Arkansas considered Missouri and Oklahoma to be fairly equivalent, but Texas to be "a league of their own." A different participant from Arkansas listed Utah because the states had about equal population levels. They described looking to different states for specific policy areas, such as Oklahoma and Arizona for supporting Native American communities. Since geography can influence multiple mechanisms of policy diffusion and since peer states are not necessarily proximate, scholars looking to operationalize diffusion in quantitative work should carefully consider what they are measuring by selecting neighboring states or regional membership.

Tennessee as a policy leader

The concept of free-college gained national attention after Tennessee Promise was enacted, and policymakers from Tennessee were frequently invited to speak at conferences and meetings about their work on Tennessee Promise, creating national awareness of the program. Participants in multiple states noted that they made free-college policy an agenda priority after speaking with someone from Tennessee about the success of Tennessee Promise. While there was limited empirical evidence of Tennessee Promise's success within the first couple of years after enaction, the information shared was perceived to be conceptually convincing.

In some states, policy actors conducted a broad survey of all state programs, comparing the designs. Tennessee Promise commonly emerged an exemplar model in states with this approach. Despite looking at Tennessee Promise as a model, policy designs in other state are different from Tennessee. In some cases, policymakers used lessons learned from policy actors in Tennessee to improve upon Tennessee Promise's design. Policy actors used the design of Tennessee Promise as a starting point and modified the design to fit their state specific context.

The important role of Tennessee aligns with the leader-laggard model of diffusion, which describes policy spreading in response to a leader jurisdiction adopting the policy. The leader-laggard model is difficult to incorporate into empirical research since most research occurs after policy enaction, at which point there is not necessarily a testable hypothesis about which states will be leaders since the innovator has already been identified. This study was not designed to test the leader-laggard theory specifically. However, I did ask policy actors which states they perceive to be leaders in higher education policy. This question yielded insights into how and why some states are perceived to be leaders, which can inform future work on leader-laggard diffusion. I find that policymakers considered states to be leaders if they if they made policy innovations, were perceived as effective, and had similar contexts.

Tennessee was referenced as making many innovations in higher education. Prior to free-college, Tennessee had received national attention for innovations to its performance-based funding formula. One participant joked about how innovative Tennessee has been in higher education: "we're sometimes a little tired of Tennessee being thrown in our face [laughs]… Tennessee has distinguished itself, at least among Southern states, as being a leader." A participant from a different state commented: "I sit down on things with Tennessee all the time, like, oh my god, what else are you doing? How are you getting all that good stuff done?"

When speaking more generally about leaders in higher education, policy actors referenced states which "produced good work." Participants often described the effectiveness of policy actors in leading states who held a similar role (SHEEOs looking to other SHEEOs, for example). Participants recognized that policies and practices from leading states would not always be feasible for their state due to contextual differences. Some looked to the leadership of states which were similar in terms of governance or region. Future work incorporating the

leader-laggard model should consider additional ways in which policy actors identify leaders and how leadership interacts with the mechanisms of diffusion.

Conclusion

I find that information from other jurisdictions is an important consideration to policymakers as they design and enact policies. Free-college was a high-profile higher education policy during the period the states in this study adopted the policy. Policymakers were paying close attention to Tennessee in particular because the state was the first adopter and many policymakers saw similarities between their state contexts and Tennessee. Beyond general awareness of free-college in other states, many policymakers had relationships with colleagues in other states or the opportunity to speak directly with someone from Tennessee about the policy. I find that these networks were largely position-based rather than geographic as traditionally diffusion suggests. While geographic proximity of adopting states was salient, it is not an exclusive indicator that diffusion is occurring.

These findings offer insight into what types of information policymakers find relevant as they design higher education policy, which has practical application for policymakers and advocates. The types of information about other free-college policies ranged, including: statistics on student outcomes, fiscal projections, anecdotes, state by state rankings, policy concepts, and descriptions of potential opposition. Different information resonated with different policy actors, depending on their position and interests. As researchers try to use rigorous empirical studies to inform policy design, they should carefully consider the way they frame this information to different policy audiences and during different stages in the policymaking process.

Scholars have criticized prior diffusion studies for lacking an appropriate operationalization of the mechanisms of diffusion (Maggetti & Gilardi, 2016). This study

contributes to our understanding of diffusion by providing clear examples of how the mechanisms operate. I find evidence of policy learning, competition, and normative pressure. However, the mechanisms of diffusion are not as clean cut as theoretical descriptions may imply. In each state, I found evidence of multiple mechanisms. I found the same mechanism could manifest differently in different states, or even within a state at different stages in the policymaking process. The exploration of how the mechanisms operate differently in different contexts is a promising area for future studies of diffusion to add nuance to the theory.

While external influences were important to enacting free-college, the internal contexts were critical for enacting free-college programs and interacted with external influences in ways which add nuance to our understanding of diffusion mechanisms. Some policymakers considered a menu of design options by looking at policies in a number of states, ultimately selecting the features which best aligned with the state's goals and were most feasible for the political, social, and fiscal context of the state. As a result of this policy tailoring to internal contexts, the policy designs are very different. Students across state lines have varying access to aid policies which are commonly termed "free-college" depending on what they study, their academic and financial backgrounds, and which schools they attend. Future studies should consider these data through theoretical lenses which identify internal factors related to policy design and adoption as well as assess student access to free-college.

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Appendix A: Interview questions

*Note: Interviews were semi-structured. Not every participant was asked every question. Questions were personalized and additional questions were added to this list for specific policy actors based on other information I gained during this study. * denotes question modified from Cohen-Vogel et al. (2008)*

Part 1: Participant's involvement in developing the free-college program

1. What was your role (if any) in the *development* of [program]? *

2. Who came up with the idea for [program]? *

3. Why do you believe that the idea for [program] emerged in your state when it did? *

4. Can you tell me about the first time you heard about the idea of free-college? *
    a. Was it here or elsewhere? *
    b. If program in another state: what about that program made policymakers in [state] think that it would be viable here?

Part 2: External influences

5. Are you familiar with other state-wide free-college programs? *
    a. If so, how did you learn about them? *
    b. In your opinion, did information about [other programs] influence thinking about free-college in your state? In what ways? *
    c. Can you characterize the relationship that your state has with [other program state]? [prompt: are there certain narratives that policy actors in your state have about policies in other state?]
    d. Are you aware of any relationships between policymakers in [state] and [other state] that may have influenced [state]? [prompt: for example, maybe someone who used to work in [other state], or common conference attendance]

6. [For states and programs that were influential]: If [other state] had not enacted a free-college program, do you think [state] still would have enacted [program]? Why?
    a. Alternatively: If [actor] had not received this information from [other state actor], do you think [state] would still have enacted [program]?

7. Was there a certain point during the policymaking process that information about free-college programs in other states was influential for policymakers in your state? [prompt if necessary: problem identification, agenda setting, policy formation, and adoption]

8. [If state has local free-college program] Did [local program] influence the development of [state program]? How?

9. Were there certain organizations, policy groups, or advocacy groups that policymakers looked to for information about free-college policies?
    a. What types of information were you looking for from these organizations?
    b. Prompt: What about SREB?

Part 3: Internal state resources, motivation, and capacity to innovate

1. Turning to program enactment now, explain your role in the *passage* of [program] in your state. *

2. Who do you believe was ultimately behind the bill's passage? *

3. What made the policy environment in [state] ripe for passage in [enactment year]? *
    a. Prompt: What about the political climate of the state? (may include specific references to state's political control at the time of enaction)
    b. Prompt: What about the state economy? (may include specific reference to state's unemployment levels, fiscal health)
    c. Prompt: What about the state's socio-demographic characteristics?
    d. Prompt: What about the state's higher education context? (may include specific reference to college enrollment, educational attainment, out-of-state college attendance, higher education governance, and/or funding for higher education)

2. What motivated policy actors in [state] to enact free college?

Part 4: Enaction and policy actors

1. Who were the proponents of [program] prior to and during its adoption? Why do you think they supported the program at the time? In what ways did they build support for the program's adoption? *

2. Who opposed the program and why? What strategies did they use to affect its passage? *

Part 5: Policy design

There are a variety of similarities and differences between [program's] design and free-college programs in other states. This next set of questions ask about how the features of [program] developed.

1. [Program] includes [feature (e.g., eligibility requirement/last dollar design/institution or program applicability)].
    a. How did this feature develop?
    b. Why was it important to include this feature?

c. [Prompt: Other states do not include this feature – why do you think [state] included it?]
d. [Prompt: Other states also include this feature – why do you think this is a common feature?]
e. [Prompt: How did the state's social, political, and economic context influence the development of this feature (if not answered above)]?

Part 6: Inter-state relationships

1. When you think about higher education policy in your state…
    a. Are there any states which you consider to be peers? Which? In what ways?
    b. Are there any states which you consider to be competitors? Which? In what ways?
    c. Are there any states which you consider to be leaders in higher education policy? Which? Why?
2. Since [state] enacted free college, how have policy actors in other states responded?
    a. Have policy actors in other states asked for information about [program]? What types of information?
    b. Do you think other states may be more likely to implement free-college now that [state] has free college? Why?

Part 7: Conclusion

1. If you were doing this project, what else would you want to know regarding the story behind [program's] development and enaction? *
2. Throughout this interview, you have mentioned a few other policy actors who were instrumental during the policy process for [program]. Do you think any of them, or perhaps others you haven't mentioned, would be interested in participating in this study? Would you be willing to refer them to me for an interview?

Appendix B: Program Characteristics

Table B1: Program Characteristics

Category	TN	KY	AR	MD	WV
Program Name	Tennessee Promise	Work Ready Kentucky Scholarship Program	Arkansas Future Grant	Maryland Community College Promise Scholarship	West Virginia Invests Grant Program
Year enacted	2014	2016	2017	2018	2019
Student eligibility:					
Financial requirements	None	None	None	Max AGI $100,000 (independent/single parent household); $150,000 (married/two-parent household)	None
Academic requirements	None	None	None	2.3 GPA	None
Citizenship	Unspecified	Citizen or permanent resident of the US	Unspecified	Unspecified	Citizen or legal resident of the US
Residence	TN resident; graduated from eligible high school (as defined in other state financial aid legislation)	KY resident as determined by the institution with criteria from the Council on Postsecondary Education	Graduated from AR high school or resided in AR for 3 years prior to applying	Must be eligible for in-state tuition; graduated high school/GED in state	Resident of WV at least 1 year prior to application
Graduation date	Must enroll the Fall term after high school graduation (or earing GED if under 19 years old)	Unspecified	Unspecified	Must enroll within 2yrs of graduating high school/ GED	Unspecified

Category	TN	KY	AR	MD	WV
Prior educational attainment	High school diploma/GED	High school diploma/GED, no Associate's degree or higher	High school diploma or equivalency	High school diploma /GED; no Bachelor's or Associate's degree	High school diploma
Other	Unspecified	Not in default for other KHEAA aid programs (may be waived)	Unspecified	Unspecified	Pass a drug test each semester (administered by institution)
Requirements to receive aid:					
File FAFSA	Required	Required	Required	Required (or state aid application if ineligible to complete FAFSA)	Required
Participate in mentorship	Required, as defined by TSAC	None	Monthly mentoring required	None	None
Complete community service	Required, as defined by TSAC	None	15 hours per term required	None	8 hours total during time of study
Complete application	Required	Required	Required	Required	Required
Attend meeting	Unspecified	Unspecified	Unspecified	Unspecified	Unspecified
Written agreement	Unspecified	Unspecified	Required	Required	Required
Institution eligibility:					

Category	TN	KY	AR	MD	WV
Program of study	Program or study leading to an Associate's degree or certificate or diploma	"Approved program of study that leads to an industry recognized certificate, credential, or diploma in one of KY's top 5 high-demand workforce sectors identified by the KY Workforce Innovation Board and the Education and Workforce Development Cabinet." AY 17-18 sectors: healthcare, advanced manufacturing, transportation or logistics, business services/IT, and construction	"Program of study that leads to an associate degree or certification in a science, technology, engineering, or mathematics field, including computer science; or regional high-demand field."	Vocational certificate, certificate, Associate's degree	"Curriculum of courses leading to a certificate or associate degree at an eligible institution which satisfies a course of study that has been deemed by the Department of Commerce to satisfy a workforce need [as determined in this code]"
Sector	Two-year colleges, technical colleges, and eligible two-year programs at four-year colleges	KY Community and Technical College System institutions; four-year publics; and four-year independent nonprofits licensed by the Council on Postsecondary Education	State-sponsored two-year or four-year colleges or universities; state-sponsored technical institutes; approved state-sponsored schools of nursing	Community colleges	Community and technical colleges; or public baccalaureate institutions that grants Associate's degrees that satisfy requirements to participate in Advanced Career Education program
Control	Public or private; institutions where students were already	Public or private nonprofit	Public	Unspecified	Public

Category	TN	KY	AR	MD	WV
	eligible to use state aid				
Aid retention:					
Financial requirements	None	None	None	Continues to meet income eligibility	None
Academic requirements	2.0 cumulative GPA; at TCATs: SAP as determined by the institution	2.0 GPA each term (student may regain aid eligibility for subsequent terms if they get a 2.0 in a term)	Maintain SAP as determined by the institution	2.5 GPA, maintain SAP	2.0 cumulative GPA, adequate progress towards completion
Residence during college	Unspecified	Unspecified	Unspecified	Continues to be eligible for in-state tuition	Unspecified
Aid termination	Diploma or Associate's degree earned; or 2.5yrs from initial enrollment; must have continuous enrollment (6-month exemption for medical leave of absence)	Whichever first: received aid for 4 academic terms, 32 credit hours, or earned first Associate's degree	5 academic semesters, obtain Associate's degree, failed to meet SAP, or failed to complete mentoring or community service requirements	3 years after first enrolling or associate's degree earned, whichever first (exceptions made for interruptions); failure to submit annual application	Can be renewed until course of study completed
Enrollment pattern	12 credits per semester	Part-time or full-time; aid prorated	Part-time or full-time	12 credits per semester (exceptions for interruptions)	6 credits per semester
Post-Grad residence requirement	None	None	Must reside in AR for 3 consecutive years and be employed within 6 months after receiving Associate's or certificate, else	Work full-time in the state within 1 year after completing certificate/degree; Work in-state 1 year for each year	Must reside in-state for two years following degree attainment; else required to repay

Category	TN	KY	AR	MD	WV
			grant converts to loan (requirement can be deferred if no employment/special circumstances)	awarded aid; else grant converts to loan	
Repayment	None	None		If retention criteria unmet, grant converts to loan (exceptions for extenuating circumstances)	If retention criteria unmet, grant must be repaid (some exceptions specified)
Program structure:					
Funding source	State endowment fund	General fund appropriations; sets up trust fund consisting of general fund appropriations, gifts and grants from public and private sources, and federal funds	Re-appropriate funding from two ineffective state financial aid programs	Annual appropriation	Created as a special revenue account, consisting of legislative appropriations, gifts/contributions, grants, and fund interest
Funding amount	$10 million	Year 1: $9.4 million Year 2: $15.9 million	$9 million	$15 million	$10,034,748
Sponsorship	State	State	State	State	State
Financial award structure	Last dollar	Last dollar	Last dollar	Last dollar	Last dollar

Category	TN	KY	AR	MD	WV
Funding applied to	Tuition and mandatory fees at public colleges; if attending private or 4-year public: average tuition and fees at public 2-year colleges	Tuition and mandatory fees	Tuition, fees and other charges; if attending a 4-year college, aid amount is average cost of tuition fees and charged at two-year institutions	Tuition and mandatory fees or up to $5000 (whichever less)	Tuition and mandatory fees
Program evaluation and data provisions	TSAC/THEC will report on student success and scholarship retention annually; effectiveness reviewed by comptroller of the treasurer every 4 years; advisory council with members from college access programs to help eliminate barriers to scholarship and oversee mentoring standards	KHEAA will report annually: amount distributed, number of students, number of credits, certificated and credentials earned	Unspecified	Commission required to report on implementation including number of applicants, number enrolled by type or program, amount of aid to each recipient, number on waiting list, number earned degrees, number transferred, impact on enrollment	Council produces annual report on student success and grant retention
Program administrative rulemaking agency	Tennessee Student Assistance Corporation (TSAC)	Kentucky Higher Education Assistance Authority (KHEAA) and the Education and Workforce Development Cabinet	Department of Higher Education	Maryland Higher Education Commission	Vice Chancellor for Administration; Virginia Council for Community and Technical College Education

Category	TN	KY	AR	MD	WV
Aid distribution	Unspecified	Aid awarded to everyone who meets criteria "to the extent funds are available for that purpose"	Distributed in the order that the department received applications	Aid awarded on greatest demonstrated financial need; priority in subsequent years to students who remain eligible; creates waiting list for eligible applicants who don't receive aid	Unspecified
Other provisions in the legislation	Makes changes to other lottery aid programs	None	Repeals AR Workforce Improvement Grant Program; declares emergency need for more skilled workforce	Creates a communication campaign and grant program to encourage "near completers" to re-enroll in college and earn a degree; limits extent to which community colleges can increase in-county tuition	Legislation related to high quality educational programs, connecting secondary education and college, increasing certificate program offerings and agreements

Category	TN	KY	AR	MD	WV
Stated justification	TN has goal of "making TN the number one location in the Southeast for high-quality jobs;" logic that jobs require an educated workforce and employers say demand for skilled workers exceeds supply; TN behind national average in educational attainment, and the state is not on track to meet its 2025 educational goal of 55% of residents with a postsecondary credential	KY has low workforce participation, and the economy needs a skilled workforce to draw businesses from outside KY; aims to give students and adults opportunity	Need for “a more educated and skilled workforce” to “drive the state economy forward”	Unspecified	State has a "human capital crisis" and low workforce participation. This program would support economic development. A more educated population would increase tax base. The drug epidemic might be curbed if more people have better employment opportunities, and this program would "provide citizens hope"

Notes: Program characteristics as stated in the legislation which originally created the program (or executive order in the case of Kentucky). Administrative rulemaking or subsequent legislative/executive action may have altered the subsequent implementation of these programs.

CHAPTER 3

State Financial-Aid Funding in Response to the Leveraging Education Assistance Partnership Discontinuation

Abstract:

The Leveraging Education Assistance Partnership (LEAP, formerly SSIG) program offered states a federal matching grant to develop need-based financial aid programs. Within the first four years LEAP was offered, all states began to offer some form of need-based aid. Following from theories of fiscal federalism, LEAP is an example of the federal government using intergovernmental grants to induce states to implement federal policy priorities. The purpose of this descriptive study is to assess how state policymakers responded to changes in LEAP funding over time and LEAP's discontinuation in 2011. I use fixed effects regression and interrupted time series models to describe the relationship between LEAP funding and state funding for need-based financial aid. I find that states were responsive to changes in LEAP and exhibited funding restraint on average in years LEAP declined. When LEAP was discontinued, states generally maintained funding for need-based financial aid even without the federal incentive.

Introduction

State investment in financial aid has generally grown over time, with more students participating and modestly more aid offered per student (College Board, 2020; NCES, 2002; NCES, 2019). However, the rising cost of college attendance has outpaced any growth in state financial aid, reducing its purchasing power. In the 1999-2000 academic year, the average state aid covered about 21% of the cost of attendance for students attending an averagely priced community college; by 2015, state aid only covered 14% (Author's calculation; College Board 2020; NCES 2002; NCES 2019).

Financial aid is one of the most efficient uses of state funding for higher education in terms of increasing access and return on the investment (Toutkoushian & Shafiq, 2010). Amidst state divestment from higher education overall, there have been renewed calls for the federal government to partner with states and incentivize investment in higher education (Deming, 2017; Tandberg & Anderson, 2020). One approach is to increase the availability of federal matching grants. For example, in 2021, President Biden proposed funding America's College Promise, a matching grant for states to establish free community college programs (Whitford, 2021). America's College Promise would have been 100% federally funded during the first year and then incorporate a state match up to 20% by over a five-year period.

To understand how states may respond to new federal matching grants for financial aid such as America's College Promise, this paper considers how states responded to a similar incentive in the past. Congress authorized the State Student Incentive Grant (SSIG) in the Higher Education Act of 1972. SSIG was renamed Leveraging Educational Assistance Partnership[6]

[6] For the purposes of this manuscript, I refer to the program as LEAP

(LEAP) in 1992. LEAP offered a dollar-for-dollar (50:50) match for state investment in need-based financial aid. While this program was discontinued in 2011, it is increasingly relevant to understand how states responded to this federal incentive, given the recent proposals for federal matching grants for higher education – including calls to reauthorize LEAP (Carey & Palmer, 2021).

The purpose of the proposed study is to describe how state policymakers responded to both changes in LEAP funding levels and to the discontinuation of LEAP. The next section provides additional context about LEAP. In the third section, I apply theories of fiscal federalism and intergovernmental grants to need-based financial aid. I describe the research questions about state's responses to LEAP funding and the methodologies I use to use to answer these questions. Finally, I present and discuss the results. I find that state need-aid was responsive to changes in LEAP and policymakers exhibited funding restraint on average in years LEAP declined. When LEAP was discontinued, states generally maintained funding for need-based financial aid even without the federal incentive.

Policy Context: LEAP

The Leveraging Educational Assistance Partnership (LEAP) was a federal matching grant to incentivize state governments to invest in need-based financial aid. States that received funding from LEAP were required to match federal funding dollar-for-dollar and subsequently make grants or work study funds[7] available to students. The state's aid programs were required to target students with "substantial financial need," as determined by the state and approved by

[7] Work studies generally provide part-time employment related to an enrolled student's program of study, so they can earn money to pay for educational expenses. Work studies were included in LEAP after a 1998 amendment. States were authorized to use up to 20% of their LEAP grant for work studies.

the federal commissioner of education (US House, n.d.). During the first decade of LEAP, students could receive a maximum of $1500 per academic year. Congress periodically raised this amount during the 1980s and 1990s. Following a 2008 amendment, state aid could cover the student's full cost of attendance or $12,500 per year, whichever was lower (US House, n.d.). In 2010, an estimated 161,556 students received a LEAP funded grant, with an average award amount of $1000 (U.S. Department of Education, 2010).

LEAP was originally allocated to states based on the proportion of students attending higher education in the state relative to the total national student enrollment in higher education. In 1998, allotment changed to be based on the number of students who are eligible for LEAP in the state relative to nationwide eligibility, but would be no less than a state received in 1979. If a state did not participate or used fewer dollars than allotted to them, the excess was distributed to other states (US House, n.d.).

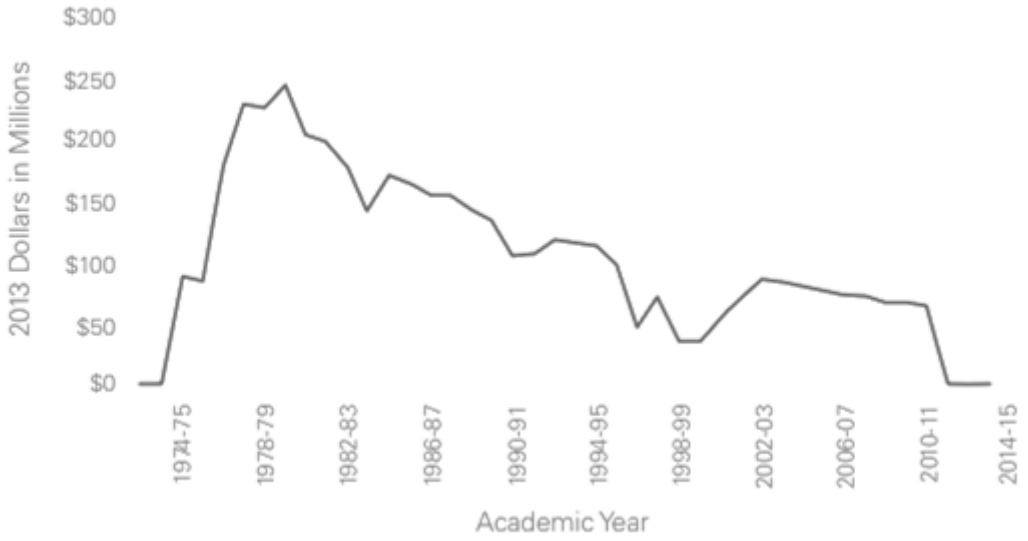
Beginning in 1998, if total LEAP appropriations exceeded $30 million, the excess were used for a program called the Special Leveraging Educational Assistance Partnership Program (SLEAP) (Special Leveraging Educational Assistance Partnership Program, n.d.). SLEAP was a 1:2 federal matching grant which could be used to increase the dollar amount students would receive from the state's LEAP funded financial aid program or increase the number of students receiving LEAP aid. SLEAP could also be used to fund (1) financial aid for low-income students pursuing STEM, teaching, or other high-demand fields, (2) merit-aid for low-income students, or (3) high school to postsecondary transition programs for low-income students. In 2009, SLEAP was discontinued and over the following two years, states could transition to receive Grants for Access and Persistence (GAP) instead (U.S. Department of Education 2010).

When LEAP was authorized in 1972[8], 28 states offered need-based financial aid programs (ExpectMore.Gov, n.d.). By 1978, all states and the District of Columbia had a need-based aid program and received LEAP funding (Davis, 1994). In the early years of the grant, most policymakers in states that developed new aid programs did not allocate more funding than they would receive from the federal government, for an equal 50/50 state/federal funding. As student demand increased and federal allocations decreased, states frequently increased their investment, often allocating more than their 50% share. For example, policymakers in Nebraska established a new aid program in 1974 which was funded using 50% federal LEAP dollars for the first 15 years. By the mid-1990s, just 19% of Nebraska's program was funded from federal LEAP (Davis, 1994).

Congress re-authorized LEAP funding every one to five years[9], so state policymakers had no guarantee that they would receive consistent federal funding from year to year. Figure 1 depicts total federal LEAP spending over time. During the first five years of the program, LEAP funding increased to a peak of about $250 million across all states. Federal allocations generally declined over the next thirty years.

[8] LEAP was first funded in 1974
[9] LEAP was generally re-authorized on the same schedule as the Higher Education Act

Figure 1: LEAP Funds from Federal Sources in Millions (2013 Dollars)



Reproduced from: Lumina Foundation and the Institute for Higher Education Policy (IHEP), "Where Financial Aid Began: Partnering with Campuses and States (Viewing Guide)" 2015

Since the initial purpose of the grant appeared to be fulfilled – all states had established need-based financial aid programs – the Reagan administration began conversations about eliminating the program (Miller, 1985). At this time, the federal priorities for higher education were beginning to shift from the mid-century initiatives meant to broaden access and opportunity for low-income students to a focus on affordability and choice for the middle-class through loans and tax credits (Keppel, 1987; Richardson & Hurley, 2005; Prisco et al., 2002; Heller, 2006).

Two decades after LEAP was established, state need-based aid programs were reliant on LEAP funding. A 1994 National Association of State Student Grant & Aid Programs (NASSGAP) survey found if LEAP were discontinued, 86% of state respondents said they would have to reduce award amounts or offer aid to fewer students, and 18% would discontinue their aid programs altogether. As a proponent of increasing LEAP funding, NASSGAP (Davis, 1994) advised:

> The SSIG program [LEAP] is an ideal federal/state partnership. Both the states and the federal government achieve a common goal with a mix of resources. The partnership not only leverages state monies, but allows states to fine tune the delivery so that awards are targeted to those students who most need the assistance.

LEAP was ultimately discontinued in 2011. The Obama administration argued that the funding was no longer necessary since most states had implemented need-based financial aid programs, and students could receive aid from other sources such as the federal Pell grant, work studies, and loans (ExpectMore.Gov, n.d.). In its final year, the program allocated nearly $64 million to states, with students receiving an average award of $1000 (US Department of Education, n.d.). *The Chronicle of Higher Education*'s news coverage of LEAP's defunding reported that LEAP-funded programs were the only or the primary need-based state aid in some states. The higher education commissioner in Arizona noted that, without LEAP funding, the fiscally conservative legislature would likely cut their need-based aid program (Quizon, 2011).[10]

State aid programs funded through LEAP

States took different approaches to using LEAP funding (a list of LEAP-funded state aid programs is included in Appendix A). Some states used LEAP to fund a LEAP-specific financial aid program, which were typically small programs, operating separately from the state's primary need-aid program (primary defined as the state's need-aid program with the largest funding and/or serving the most students). When LEAP was discontinued, some states using this approach opted to discontinue their LEAP funded need-aid program. For example, Colorado used LEAP funds for a need-aid program called the Colorado Leveraging Education Assistance Program. Colorado LEAP was a small program, costing about $1.5 million (with an additional $1 million from SLEAP) and serving fewer than 2000 students (and less than 1000 with

[10] Despite this concern, Arizona still funds AzLEAP (see Appendix A)

SLEAP). Colorado LEAP was discontinued in 2011 when federal funding was discontinued. By comparison, the state's primary need-aid program, the Colorado Student Grant, received $67 million in 2011 and served over 69,500 students ("NASSGAP Annual Survey," 2021). States with a similar pattern include Connecticut, Idaho, Louisiana, Nevada, North Carolina, and Virginia.

In other states where LEAP was not the primary need-based financial aid program, policymakers continued to offer the LEAP-funded program after LEAP was discontinued. These states include Arizona, Arkansas, Iowa, Montana, Texas, Vermont, Virginia[11], Washington, and Wisconsin. However, over half of these states have since eliminated their LEAP-funded aid programs ("NASSGAP Annual Survey," 2021).

Most states used LEAP to fund their primary need-based financial aid program, funding one large program instead of multiple, smaller source-based programs. For example, the New York Tuition Assistance Program (TAP), Tennessee's Student Assistance Award (TSAA), and Illinois's Monetary Award Program (MAP) were all funded through LEAP, often supplementing general funds or lottery funds ("NASSGAP Annual Survey," 2021). These large-scale programs generally persisted after LEAP was discontinued.

However, a small number of states discontinued their LEAP-funded need-aid program and did not have another need-aid program in operation. For example, Georgia is well-known for its broad-based merit-aid program, but Georgia did offer a LEAP-funded need-aid program called the "LEAP Grant Program." In the last year LEAP was funded Georgia's LEAP program allocated about $1.5 million and served about 3000 students ("NASSGAP Annual Survey,"

[11] Some states, including Virginia, used LEAP to fund multiple programs, so the states fit into multiple categories

2021). Georgia's LEAP was the only need-based financial aid in the state at the time, leaving low-income students who didn't meet merit-aid criteria without state financial aid. A similar situation occurred in Mississippi, New Hampshire, South Dakota, and Wyoming. Two states, Nebraska and Utah, discontinued their only need-aid programs when LEAP was discontinued, but appear to have established new need-aid programs the following year ("NASSGAP Annual Survey," 2021).

Theoretical Framework: Fiscal Federalism and Intergovernmental Grantmaking

The theory of fiscal federalism describes efforts in which different levels of government share the responsibility for the allocation of resources and administration of public services. Intergovernmental grantmaking is one way the federal government may distribute funding to state or local governments (for the purposes of this manuscript, I refer to subnational governments as states since LEAP was offered to state governments). The federal government uses grants as a financial incentive to induce states to adopt a federal policy priority. Volden (2007) developed a model of intergovernmental grantmaking, including the conditions under which a national government decides to offer a grant and state governments decide to accept a grant. This theory offers insight into why the federal government may have offered LEAP and how states may have responded to this intergovernmental matching grant.

Volden's (2007) model of intergovernmental grantmaking describes the federal government as the first actor, choosing to enact a public service directly, offer a grant for states to enact the service, or not take action. Given that the federal government decides to offer a grant, Congress decides how much funding will be available to state governments and what conditions will be required of grant recipients. Based on these conditions, the state government decides whether to accept the grant and develops policy around how to use the grant.

State policymakers have differing capacities and motivations to accept federal grants. Traditional models of fiscal federalism identify a cooperative relationship between the federal and state governments. States look to the federal government for policy solutions to joint problems and for funding to solve those problems. The federal government offers grants when the state can implement the policy more efficiently or effectively. Volden (2007) argues that intergovernmental grants can also reflect a competitive relationship between federal and state governments. For example, while states prefer unrestricted funding to apply where they see best fit, the federal government has incentive to attach obligations and restrictions to the grant to ensure states implement federal policy priories with fidelity. There is also tension as both governments may seek to claim credit for a successful policy while avoiding blame for additional taxation or an unsuccessful policy (Peterson, 2012; Volden, 2005).

Volden (2007) posits that states are more likely to accept when the grant has fewer restrictions, the grant is larger, the state can't efficiently raise taxes, the cost of the program is large, and when public demand is low. Few studies have tested these propositions across grant programs, but some have offered additional explanations for grant uptake, particularly related to political considerations. Nicholson-Crotty and Staley (2012) find that states were more likely to apply for federal Race to the Top grants if they expected to receive electoral credit for pursuing federal funds, more so than attention to need or capacity to improve education. Nicholson-Crotty (2004) finds that subnational jurisdictions are more likely to respond to the federal incentive with fidelity to the grant's purpose when there is ideological goal congruence between the national and state jurisdictions. In a political climate characterized by polarization, state governments are increasingly unresponsive to federal incentives that are initiated by the opposing political party (Conlan & Posner, 2016). For example, many Republican governors and legislators in southern

states opted against accepting federal funds to expand Medicaid, despite a 90% federal matching rate offered in the Affordable Care Act (Kaiser Family Foundation, 2020; Volden, 2017).

When state legislators do accept federal grants, they are generally highly responsive to the additional funding and increase their own allocations to that area, beyond what would be expected if the state were funding the program through their own revenue. This is known as the "flypaper effect" (Gramlich, 1977). The flypaper effect has been documented in both federal grants to states and state grants to local municipalities (see literature reviews from Hines & Thaler, 1995; Inman, 2008). The flypaper effect theory has been particularly useful for understanding how and why states respond to new grants and to increases in grant funding. A number of studies have expanded this area of literature to describe how state respond to a decline in grant funding – which was frequent with LEAP. In particular, researchers assess how states respond to declines relative to the flypaper effect (Volden, 2007). During years when the grant declines, states may reduce funding by the same magnitude they would have increased funding in a year the grant increased (assuming the grant increase and decrease were the same magnitude). This has been termed a "symmetric response" to the flypaper effect. An asymmetric response occurs when states respond differently to grant increases and decreases of the same magnitude. An asymmetric response can occur in two directions. First, funding restraint occurs when states reduce funding by more than would be expected under a symmetric response. Second, funding replacement occurs when states reduce funding by less than would be expected under a symmetric response (see Figure 2).

In the literature seeking to establish whether symmetry or asymmetry best describes how grantees respond to funding declines, more evidence supports asymmetric patterns than symmetric (Deller & Maher, 2006; Heyndels, 2001; Nguyen-Hoang & Hou, 2014). Volden

(1999), finding asymmetry with replacement, offers political pressure as one explanation for why states may not reduce funding to welfare programs when the grant declines.

These concepts are most commonly applied within the period that a grant is active. However, states may have similar responses when a grant is discontinued – either exhibiting restraint or replacing federal funds. There is some evidence replacement occurs when a federal grant is discontinued. Sobel and Crowley (2014) find that after federal grants are discontinued, states increase taxes by about as much as would be needed to maintain the program without federal support.

Applying fiscal federalism to financial aid

The federal government has taken multiple approaches to funding need-based financial aid, including offering aid directly to students through programs like the Pell grant and funding state programs through LEAP grants. While the federal government's direct investment in low-income students through the Pell grant have been substantial, the purchasing power of Pell has decreased as the cost of college has risen (College Board, 2020). Some have argued that doubling the Pell grant is a more efficient solution to college affordability than establishing a new federal-state partnership (such as the College For All Act) or matching grant. Others note that federal-state partnerships for need-aid can be used to protect the Pell investment (Chingos & Baum, 2017). For example, the shared responsibility for funding a financial aid program through a matching grant gives states an incentive to ensure their federal funding is used effectively and efficiently. Without state buy-in, states may be less sensitive to educational quality or to institutions inflating prices at pace with aid funding (Doyle, 2013; Kramer et al., 2018). Additionally, matching grants decrease the cost of the aid programs; the federal government pays the full amount of a Pell grant dollar, but only half of a LEAP grant dollar.

Following this logic, Congress authorized LEAP to promote state investment in need-based financial aid. State policymakers responded positively to this federal incentive, with all states accepting LEAP funding within four years of the grant's initial offering (Davis, 1994). When state policymakers considered ways to invest in higher education, need-based financial aid became more efficient than other types of financial aid or than channeling aid through institutions. With LEAP, $1 invested in need-based financial aid only costs the state $.50.

During the first decade of LEAP, the federal government generally increased appropriations to LEAP as more states established and expanded need-aid programs. The flypaper theory would suggest that when the federal government would invest more in LEAP, state governments would also invest more in need-aid. There is some initial evidence from a NASSGAP report on the first 20 years of LEAP that the flypaper effect may hold true. NASSGAP found that between 1974 and 1992, in years when LEAP increased, 70% of aid program expenditures increased (by at least 2% from the prior year) whereas 17% decreased (Davis, 1994).

The NASSGAP report did not identify the magnitude of funding changes, so preliminary evidence of a symmetric or asymmetric relationship cannot be assessed. For years between 1972 and 1992 when LEAP declined, 58% of aid program expenditures increased, whereas 24% decreased. Large states were substantially more likely to increase aid program funding (70%) than small states (45%). In small states, LEAP grants typically made up a larger portion of state aid funding (Davis, 1994). This variation by size highlights variation in state policymakers' ability and motivation to exceed the match.

The NASSGAP survey report provides insight into how states responded to increases and decreased in LEAP funding during the first 20 years of LEAP. It remains unclear if these

patterns held over the final 20 years of LEAP, during which LEAP generally declined. Additionally, NASSGAP's descriptive analysis does not take into account the full landscape of state need-aid. A state may have need-aid programs operating independently of LEAP-funded aid programs. While a LEAP funded program may have declined with federal funding, students in states with other need-aid options may not have experienced a decline in overall need-aid availability.

The flypaper effect and Volden's theory are typically applied during the period in which a grant is offered. However, these theories may also offer insight into how states respond when a grant is discontinued. When LEAP was discontinued, state policymakers had to decide whether they would replace lost federal funding or if they would reduce or eliminate the need-aid program altogether.

When LEAP was discontinued, the changes in the economic, political, and financial aid contexts may have influenced the way states responded. In 2011, the U.S. was beginning to emerge from the Great Recession, during which states had slashed appropriations to higher education. During this period, the federal government offered states aid for higher education through the American Recovery and Reinvestment Act which required states to maintain their 2008 level of funding to institutions. Delaney (2014) finds that states which received more aid from ARRA spent less on financial aid. Simultaneously, states with aging populations were facing rising costs for Medicare which cut into non-mandatory funding areas including higher education (Kane et al., 2005). State policymakers' abilities to respond to economic declines and offer additional public services were further hindered by decades of policies which limited the ability to grow taxes and expenditures (Archibald & Feldman, 2006). These factors may have reduced state financial capacity to replace lost federal LEAP funding.

LEAP was enacted during a period when bipartisanship was more common and supporting higher education was a less partisan issue. Losing LEAP in a partisan political climate may have prompted state policymakers to reassess their financial aid distribution and realign their policies along party lines. Public opinion data suggests that Democrats are more concerned about opportunity for higher education than Republicans (Doyle, 2007) and Democrats are more likely to think the government should be responsible for funding higher education (as opposed to students and families themselves) (*Varying Degrees 2019*, n.d.). This may prompt Democratic states to be more likely to continue funding need-based financial aid, even without federal incentive.

The context of financial aid also shifted in the decades after LEAP was founded. After Georgia HOPE was established in 1993, policymakers in many other states implemented state-wide merit-aid program. These types of merit-aid programs are commonly funded by lottery earmarks, which have been associated with a decrease in need-based financial aid (Bell et al., 2020). Whereas 100% of state financial aid was need-based in the 1970s when LEAP was established, by 2011, 71% of total state aid was need-based (*Trends in Student Aid 2012*, 2012). The LEAP grant no longer made investment in need-based aid more efficient, and states may have responded by re-allocating financial aid to popular merit-aid programs.

Research Questions

Despite having been in effect for nearly 40 years, little is known about how states responded to LEAP. The purpose of this study is to understand the relationship between state funding for need-based financial aid and changes in LEAP over time. This study is guided by four research questions:

1. How did state need-based financial aid change in response to increases and decreases in LEAP funding?
2. To what extent did state policymakers maintain funding for need-based financial aid after LEAP was discontinued?
3. To what extent did the distribution of state funding for financial aid to merit- and need-based financial aid change after LEAP was discontinued?
4. To what extent is the relationship between need-aid and LEAP's discontinuation related to the amount of LEAP funds a state received?

The first research question addresses states' responses to changes in LEAP funding during the period LEAP was offered. The analysis looks for evidence of symmetry and asymmetry by identifying if states responded differently in years when LEAP aid decreased relative to increased. If asymmetric, the analysis will also identify evidence of replacement or restraint in years LEAP declined.

When LEAP was discontinued, state policymakers who wanted to continue offering the same level of need-based financial aid had to allocate additional funds to replace lost federal LEAP funding. The second research question assesses if policymakers continued offering the same levels of need-based financial aid after LEAP. Without the federal incentive, state policymakers may have re-allocated the funding from their need-aid program to merit-aid programs or from their merit-based program to their need-based program to make up for the loss in federal funding. The third research question assesses if states changed the distribution of need and merit-aid after LEAP was discontinued. States may respond differently based on how much they relied on LEAP. The fourth research question identifies if states that received more or less funding from LEAP funded their need-aid programs differently after LEAP.

Methodology

I address the research questions using two descriptive methodologies. For the analyses, considering the period during with LEAP was offered, I use a fixed effects regression. To describe need-aid after LEAP, for the second through fourth research questions, I use an interrupted time series design. This section describes the model specifications and data sources.

Empirical models: symmetry and asymmetry to grant funding

The purpose of the first analysis is to understand the extent to which states respond differently in years when LEAP aid decreased relative to when LEAP aid increased. To do so, I follow a methodology developed by Stine (1994) and Gramkhar and Oates (1996). These authors were writing in response to studies of the flypaper effect, which solely focused on how grant recipients responded to grant increases. However, noting that the 1980s were a period of federal funding cuts, the authors sought to understand if sub-national governments were replacing lost federal aid with their own revenue. Specifically, they test for asymmetries to the flypaper effect by comparing the effect of grant increases and grant decreases. The method they developed has since been applied to a variety of settings, including the federal highway system and international municipalities (Gamkhar, 2000; Gennari & Messina, 2014; Mehiriz & Marceau, 2014).

I use a fixed-effects regression on panel data to identify the relationship between LEAP and state need-aid funding in years when LEAP increased and decreased:

$$NeedAid_{st} = \beta_0 + \beta_1 LEAP_{st} + \beta_2 LEAPdecrease_{st} * (LEAP_{st} - LEAP_{st-1}) + \boldsymbol{X}_{st}\boldsymbol{\gamma} + \rho_s + e_{st} \quad (1)$$

The outcome, *NeedAid*, is the log of need-aid in a given state *s* and year *t*. *LEAP* is the log of LEAP funding a state received in a given year. *LEAPdecrease* is a binary variable indicating that a state's LEAP allocations decreased from the prior year (*LEAPdecrease = 1 if* $LEAP_{st} < LEAP_{st-1}$). *LEAPdecrease* is interacted with the change in LEAP from the prior year.[12] These models also include a vector of covariates, $\boldsymbol{X}_{st}\boldsymbol{\gamma}$, that vary by state and year. ρ_s is a state-level fixed effect. To test the robustness of this specification, I run these models with and without covariates.

The coefficient β_1 describes the relationship between need-aid and LEAP funding for a given state-year in years when LEAP increased. If $\beta_1 > 0$, states increased funding for need-aid when the state received more LEAP funding. A positive relationship does not necessarily provide evidence of the flypaper effect, since it does not take into account if the increase is more than would be expected from a revenue increase that did not come from the LEAP grant.

The coefficient β_2 modifies β_1 for years in which LEAP funding decreased and indicates if the magnitude of change in state funding is different in years when the grant decreased than when the grant increased. The sum of β_1 and β_2 describes the relationship between LEAP and need-aid in years when LEAP funding decreased to that state. If $\beta_2 = 0$, the relationship between LEAP and need-aid is not different in years when LEAP increased or decreased. For example, in the case where $\beta_1 > 0$ and $\beta_2 = 0$, when LEAP funding increases, state need increases, and when LEAP decreases, state need-aid also decreases. This result is indicative of a symmetric response.

If $\beta_1 > 0$ and $\beta_2 \neq 0$, there is an asymmetric relationship between how state funding responds in years when the grant increases or decreases. The sign of β_2 indicates what type of

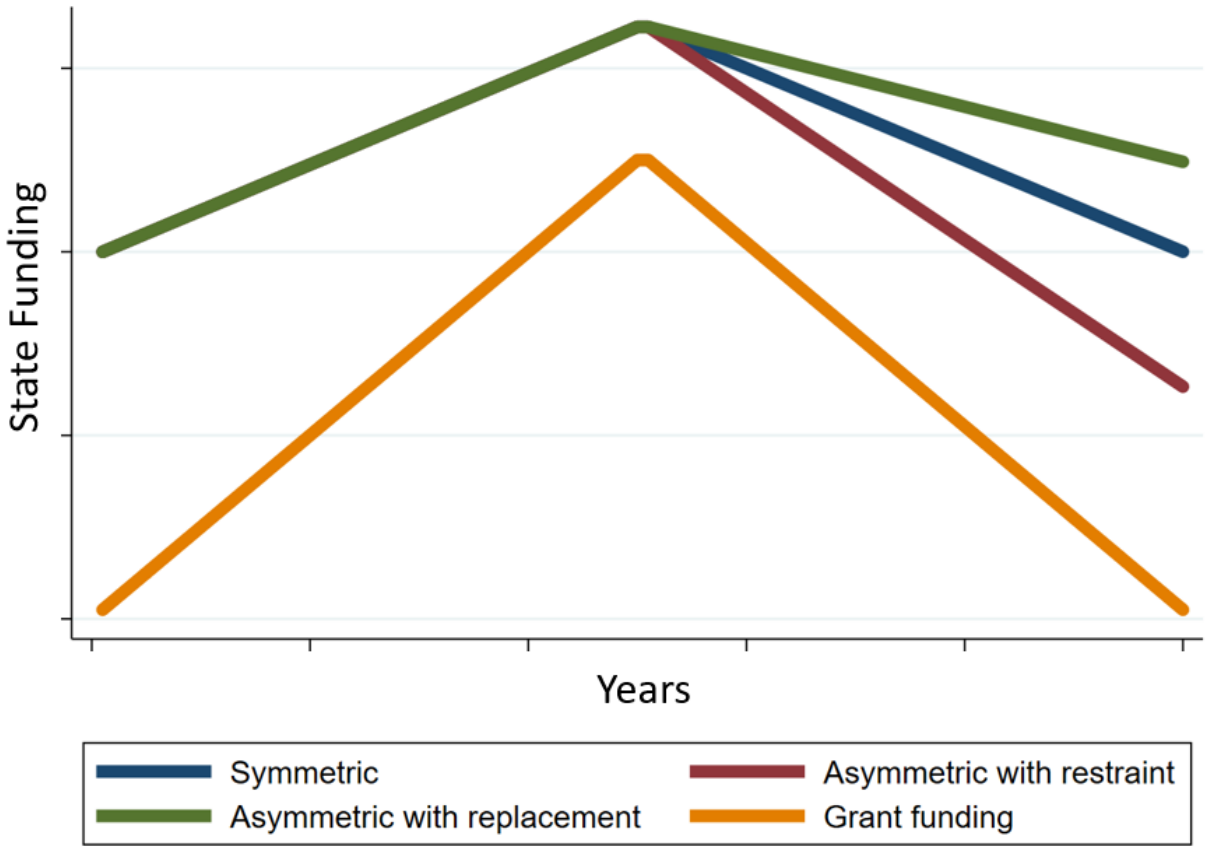
[12] The nominal change in LEAP logged

asymmetry is occurring. If $\beta_2 > 0$, there is asymmetry with restraint, meaning that in years when the grant decreases, state decrease funding more than would be expected if the relationship were symmetrical. Under restraint, the magnitude of change to state funding, in absolute terms, would be greater in years when LEAP declines than the magnitude of change to state funding in years when LEAP increases. If $\beta_2 < 0$, there asymmetry with replacement, meaning states would decrease funding less than expected in years when the grant decreases than they would if the relationship were the same as when the grant increases. Under replacement, states are trying to maintain funding levels or make up for lost grant aid.

For example, if states responded to a $1 grant increase by increasing state funding by $2, in a symmetric relationship, states would respond to a $1 grant decrease by decreasing state funding by $2 (B1=2, B2=0, B1+B2=2). If the relationship were asymmetric with restraint, state would decrease funding by more than $2 (B1=2, B2=.5, B1+B2=2.5). With replacement, states would decrease funding by less than $2 (B1=2, B2=-.5, B1+B2=1.5).

Figure 2 uses simulated data and relationships to depict funding symmetry and asymmetries. In this example, there is a positive relationship between grant funding and state funding. In all scenarios, the relationship is the same in years when the grant funding increases, asdepicted on the left side of the graph. In years when the grant funding decreases, state funding responses varies. The blue line depicts funding symmetry, in which the relationship between the grant and state funding is the same, still positive and of the same magnitude. The green line depicts asymmetry with replacement, in which the slope is not as steep as the symmetric relationship, meaning state funding decreased by a lesser magnitude in years the grant declined. The red line depicts asymmetry with restraint, which has a less-steep slope than the symmetric relationship, indicating greater decreases in state funding in years the grant declined.

Figure 2: Simulation of Funding Symmetries and Asymmetries



Empirical models: LEAP's discontinuation

I use an interrupted time series design to assess the extent to which state funding for need-aid after LEAP is different from what would be expected based on the trend while LEAP was in effect. This study does not aim to make a causal claim about the effect of discontinuing LEAP. LEAP funds were not randomly assigned, as would be ideal for a true experiment; since nearly all states used LEAP funds, there is not an untreated group to use as a comparison group for a difference-in-differences model. For an interrupted time series design to be considered causal, I would have to assume that in the absence of treatment (LEAP discontinued), the pre-treatment trend would continue in the post-period without a discontinuation at the point of treatment. This is nearly impossible to establish without a comparison group (Linden, 2017)—

especially given simultaneous interventions such as federal funding from the American Recovery and Reinvestment Act (ARRA) of 2009 (J. A. Delaney, 2014). However, these are strong descriptive models, because there are multiple treated groups (50 states, which I include fixed effects for) and multiple years pre-and post-treatment to establish a funding trend.

The empirical model for the second research question, assessing how state funding for need-based aid changed after LEAP was discontinued, is as follows:

$$NeedAid_{st} = \beta_0 + \beta_1 YEAR_t + \beta_2 POST_t + \beta_3 YEAR_t * POST_t + \boldsymbol{X}_{st}\boldsymbol{\gamma} + \rho_s + e_{st} \quad (2)$$

The outcome, *NeedAid*, is state funding for need-based financial aid (logged) in state *s* and year *t*. β_1 represents the liner time trend during LEAP. *POST* is an indicator for years after 2010, when LEAP was discontinued. β_2 is the intercept shift at the time when LEAP was discontinued. A significant result would indicate that states changed funding levels for need-aid when LEAP was discontinued in 2011, increasing need-aid if β_2 is positive, or decreasing need-aid if β_2 is negative. A state's response to LEAP's discontinuation may not have been immediate, so β_3, the coefficient on the interaction of year and the indicator for the post-period, represents the change in the slope after LEAP was eliminated. This model includes a vector of covariates, $\boldsymbol{X}_{st}\boldsymbol{\gamma}$, and state fixed effects, ρ_s. In the analysis, I run the model with and without covariates.

For the third research question, I identify changes to the relationship between need and merit-aid after LEAP using the following model:

$$NeedAid_{st} = \beta_0 + \beta_1 YEAR_t + \beta_2 POST_t + \beta_3 YEAR_t * POST_t + \beta_4 Merit_{st} + \beta_5 Merit_{st} * YEAR_t + \beta_6 Merit_{st} * POST_t + \beta_7 Merit_{st} * YEAR_t * POST_t + \boldsymbol{X}_{st}\boldsymbol{\gamma} + \rho_s + e_{st} \quad (3)$$

This model can be thought of as an interrupted time series with multiple groups, but instead of a binary indicator for the groups, it includes a continuous measure of merit-aid. By comparing the slope and intercept changes after LEAP in β_6 and β_7, this model demonstrates the extent to which merit-aid and need based aid increase/decrease at the same rate after LEAP is discontinued. If the relationship between need and merit-aid changed after LEAP, this may be evidence that state policymakers shifted their priorities for distributing financial aid across the two aid types.

Finally, I model heterogeneity in need-aid after LEAP, by LEAP reliance:

$$NeedAid_{st} = \beta_0 + \beta_1 YEAR_t + \beta_2 POST_t + \beta_3 YEAR_t * POST_t + \beta_4 LEAPr_{st} * YEAR_t + \beta_5 LEAPr_{st} * POST_t + \beta_6 LEAPr_{st} * YEAR_t * POST_t + \boldsymbol{X}_{st}\boldsymbol{\gamma} + \rho_s + e_{st} \quad (4)$$

LEAP reliance, *LEAPr*, is measured as the proportion of the total state appropriations to higher education in a given year from LEAP, averaged over the final five years which LEAP was offered (2006-2010). Using this measure, LEAP reliance is constructed as a stable characteristic of the state over time.[13] While LEAP as a portion of total higher education appropriations may change over the full period of LEAP, it is fairly stable in the five years prior to LEAP's discontinuation. I choose a five-year period because it is plausible that policymakers would look at a five-year average of LEAP funding to determine appropriations for the subsequent year.[14] Within a given state, there is minimal variation in the proportion of appropriations from LEAP over this five-year period. I use the proportion of total higher education appropriations from

[13] Since LEAP reliance does not vary within a state and the model includes state fixed effects, LEAP reliance is not included as an independent variable

[14] The results are robust to LEAP reliance averaged over the last 10, 5, 3, and 1 years of LEAP.

LEAP as opposed to the proportion of need-aid from LEAP in order to reduce collinearity with the dependent variable since need-aid includes LEAP funding.

The coefficients of interest in this model are β_5, the intercept change for need-aid after LEAP was discontinued for states with different levels of LEAP reliance, and β_6, the change in the slope by LEAP reliance after LEAP. If high (or low) LEAP reliant states are more likely to cut need-based financial aid after LEAP, there will be preliminary evidence that these types of states were unable or unwilling to make up for lost federal funding.

All models use covariates to control for state-level factors that are related the amount of financial aid that a state allocates in a given year. I include unemployment and average AGI as measures of state economic conditions. During better economic times, states generally have more revenue to invest more in social services like financial aid (Delaney & Doyle, 2011). More directly, I include state funding for higher education as a measure of the state's commitment to higher education. As a measure of demand for postsecondary education, I control for college enrollment using the number of full-time equivalent students. When more students are attending college, states may need to invest more in financial aid, particularly if aid programs are structured as entitlements. Finally, I include covariates for political control of the governor and the legislature. States that have Republican governors and more Republican legislators tend to invest less in higher education overall, but more on need-aid (McLendon et al., 2009, 2014).

Data sources and limitations

For this study, I draw data from multiple sources. Data are structured at the state by year level. Data for the dependent variable, state need-based financial aid offered to undergraduate students, are from the NASSGAP Annual Survey. NASSGAP data are collected annually and include data for each financial aid program the state offers, including who the program serves

(undergraduate or graduate) and the aid type (need or merit). Data are self-reported from the state, which may result in some data entry errors. Obvious errors were removed or corrected. An additional limitation is that NASSGAP changed their data reporting over time. Data prior to 1995 are reported as estimates whereas 1995 forward are actual spending, making early data less reliable.[15] All monetary variables are adjusted to reflect 2019 dollars and are on the log scale.

Data for the independent variable, LEAP funding, are from the U.S. Department of Education's Budget History.[16] The U.S. Department of Education does not report LEAP and SLEAP separately, so both are included in the measure of LEAP funding.[17] In 2009, states could shift from SLEAP to the new GAP program, but it is unclear if GAP funding is included in the federal funding data. Ideally, funding levels to LEAP would be the only program variation over time. However, SLEAP and GAP were significant changes to the LEAP policy, introduced in 1998 and 2009, respectively. After SLEAP, the match rate for a portion of LEAP appropriations was lower. SLEAP and GAP could be used for different types of financial aid programs. When these changes were introduced, states may have changed the way they funded need-aid.

Variables for the other covariates are sourced from a variety of government sources and organizations which are listed by variable in Table 1.

The panel data set includes years 1985 through 2019. While LEAP was in effect for ten years prior to the start to my data, I do not have complete data from all sources until 1985. The panel ends in 2019, the most recent year with full data. Different data sources calculate years differently, reporting either a fiscal, academic, or calendar year. LEAP allocations were made in

[15] The results are robust when data prior to 1995 are excluded
[16] NASSGAP also reported LEAP funding from 2003 forward, but NASSGAP's information does not match what the federal government reports exactly
[17] SLEAP was funded beginning in 1998 if total appropriations for LEAP exceeded $30million

the federal fiscal year prior to when they were used in the state, so I lag LEAP one year to align with the academic year in which it was used. Academic years typically span August to July, so data which were calculated on a calendar year beginning in January (such as economic and political variables) relay a period slightly behind the academic year. U.S. States, territories, and the District of Columbia were eligible to receive LEAP funding. However, due to incomplete data collection for U.S. territories and D.C., these areas are excluded from the analysis. Nebraska is excluded since its legislature in non-partisan.

Table 1: Variables by Source

Variable	Source
Dependent Variables	
Funding for all need-based financial aid programs (logged)	NASSGAP Annual Survey[18]
Independent Variables	
Funding from LEAP (logged)	US Department of Education[19]
Funding for non-need financial aid (logged)	NASSGAP Annual Survey
Covariates	
Unemployment (Seasonally adjusted)	FRED Economic Data[20]
Median AGI (logged)	U.S. Census Bureau, Current Population Survey[21]
State Funding for Higher Education (logged)	SHEEO/SHEF[22]
Full-Time Equivalent Enrollment	SHEEO/SHEF
Democratic party governor indicator	Carl Klarner Dataverse,[23] National Conference of State Legislatures[24]
Democratic party majority legislature indicator	Carl Klarner Dataverse, National Conference of State Legislatures

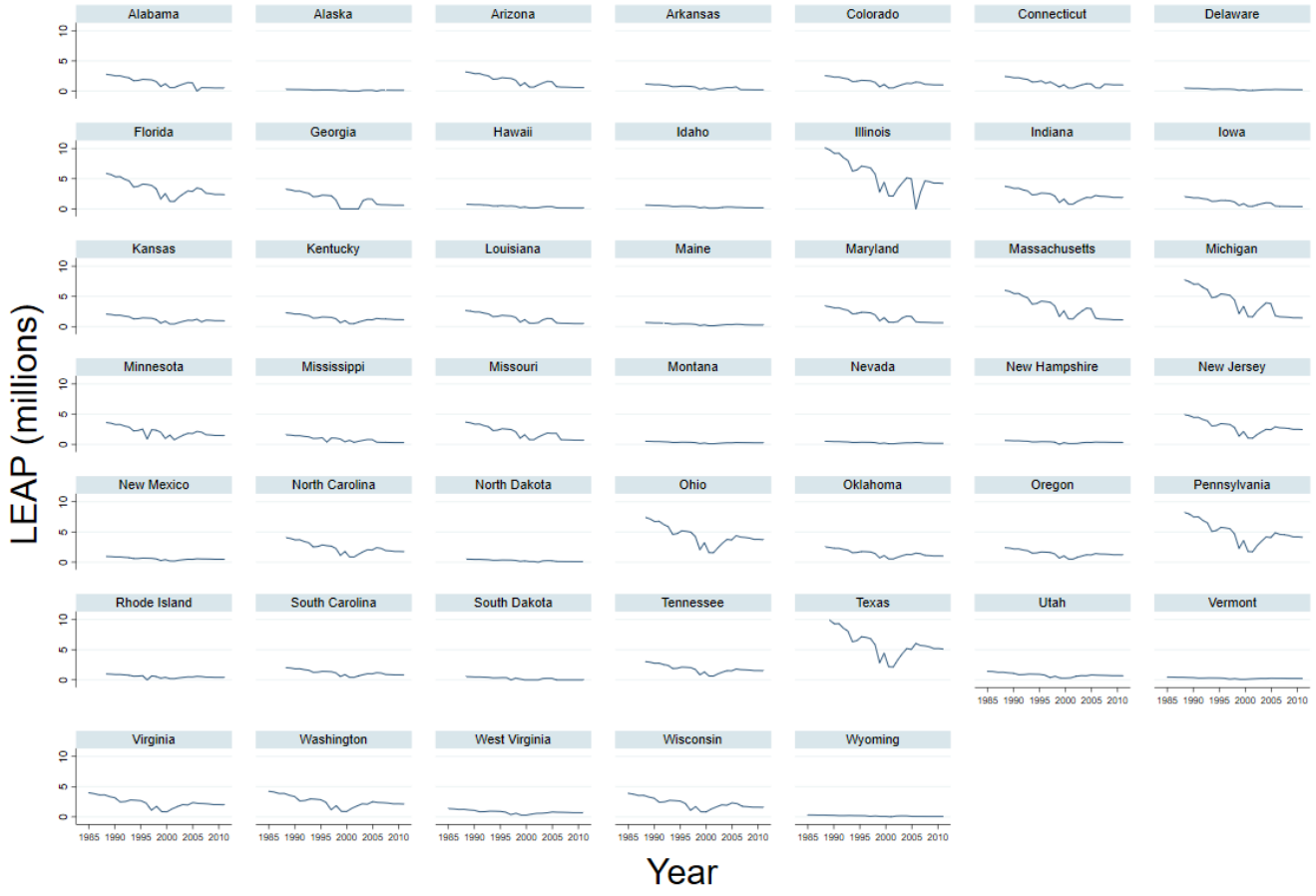
[18] https://www.nassgapsurvey.com/
[19] https://www2.ed.gov/about/overview/budget/history/index.html
[20] https://fred.stlouisfed.org/release?rid=112
[21] https://www.census.gov/data/tables/time-series/demo/income-poverty/historical-income-households.html
[22] https://shef.sheeo.org/past-shef-reports/
[23] https://dataverse.harvard.edu/file.xhtml?persistentId=doi:10.7910/DVN/LZHMG3/1BSFI3
[24] https://www.ncsl.org/research/about-state-legislatures/partisan-composition.aspx#Timelines

Results

Descriptive trends during and after LEAP

Total federal funding for LEAP peaked in the mid-1980s, at which point all states had enacted a need-based financial aid program (see Figure 1). From this high point, LEAP made a somewhat volatile decline until it was discontinued. Figure 3 depicts that the pattern in LEAP funds received at the state level generally follows the same trend as the total LEAP funding. States received more LEAP funds in years when the federal government allocated more and received less when fewer LEAP funds were offered. This is evident in states like Florida, Illinois, and Texas (California and New York also follow the trend of federal funding, but are not depicted because they received substantially more LEAP funding due to their large population, which obscures the trends in other states due to scaling). A number of states had fairly stable LEAP awards over time. In general, these states received lower LEAP funding to begin with – states like Arkansas, Maine, and Nevada. These states also typically offered lower total appropriations to need-aid over this period.

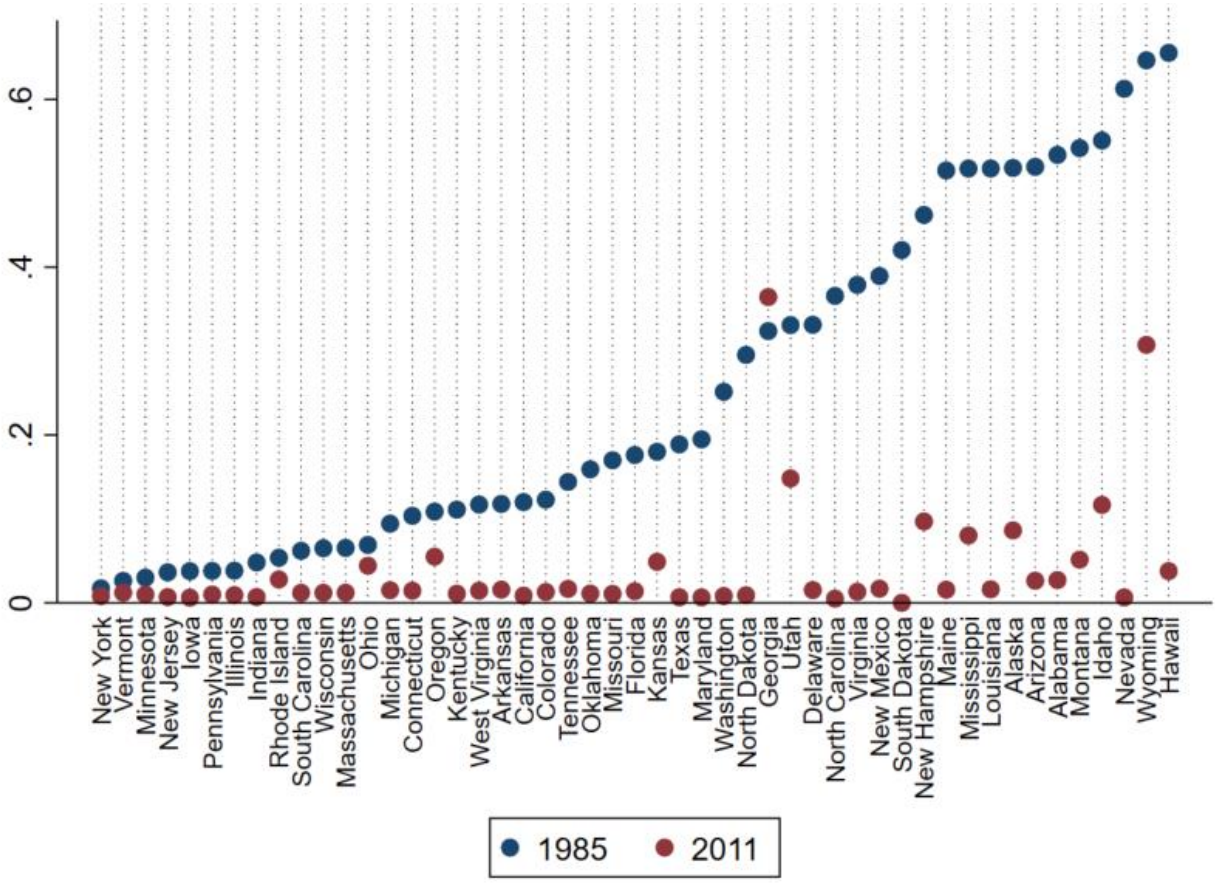
Figure 3: LEAP Appropriations over Time, by State (1985-2011)



During LEAP, total state investment in need-aid and merit-aid grew, on average (*Trends in Student Aid 2020*, 2020). Due to the inverse relationship between need-aid and LEAP funding, the proportion of total need-aid coming from LEAP declined substantially over time. Figure 4 depicts LEAP reliance by state for the years 1985 and 2010. In 1985, 12 states received more than 40% of their need-aid from LEAP. By 2011, the last year of LEAP funding, 35 states received less than 2% of their need-aid budgets from LEAP. Some of the states with the lowest LEAP reliance in 1985, like New York, New Jersey, and Minnesota, were allocating the most towards need-based financial aid. Similarly, states with the least need-aid were most reliant on LEAP. In early years of LEAP, there is a weak negative correlation between need-aid and LEAP

reliance (the correlation is -.39 in 1985), and the strength of this correlation declines over time (to -.23 in 2010). The states which relied most on LEAP at the point it was discontinued (Georgia, Wyoming, Utah) also had relatively low investment in need-aid, compared to other states.

Figure 4: Proportion of Need-Aid from LEAP by State, 1985 and 2011



Note: Due to data errors, two states do not have values for LEAP in 1985. In these states, LEAP was replaced with the most recent value available to calculate the proportion in this graph (but are considered missing in subsequent analyses). The 1985 value was replaced with 1988 for Nevada and 1986 for Texas.

Table 2 describes the dependent variable, independent variables, and covariates for both the pre- and post-LEAP discontinuation period. The "pre" period refers to years that LEAP was

offered, 1985-2011, with one observation per state for 26 years, totaling 1294 observations. The "post" period refers to years that LEAP was discontinued, 2012-2019. The post period includes 8 years of data for each state, totaling 369 observations.

Table 2: Average Value Pre- and Post-LEAP Discontinuation

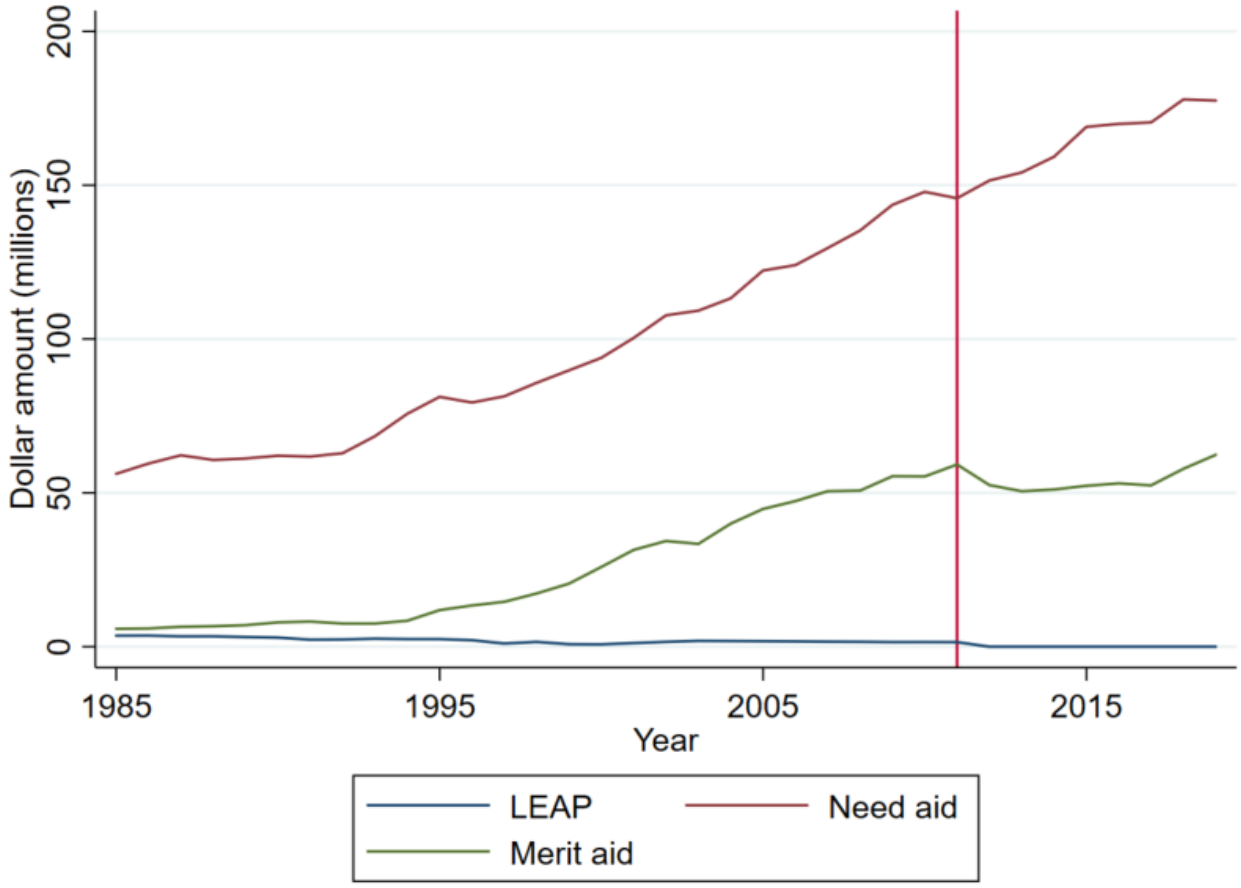
	Pre (1985-2011)	Post (2012-2019)
LEAP (2019 dollars, in millions)	2.13 (3.049)	0 (0)
Need-aid (2019 dollars, in millions)	97.21 (183.9)	179.8 (332.3)
Merit-aid (2019 dollars, in millions)	25.55 (77.14)	43.24 (129)
Average Annual Unemployment (percent)	5.735 (1.94)	5.147 (1.749)
Median Income (2019 dollars)	58138.2 (9609.6)	61951.7 (10507.8)
State appropriations to higher education (2019 dollars, in millions)	1637.5 (1872.7)	1781.6 (2222.1)
Net FTE enrollment	179601.7 (207519)	230694.7 (262864.5)
Democratic governor (average percent of states)	0.493 (0.5)	0.388 (0.485)
Democratic control of legislature (average percent of states)	0.486 (0.5)	0.325 (0.461)
Proportion of need-aid from LEAP	0.127 (0.194)	0 (0)

Proportion of total aid allocated for need	0.812 (0.294)	0.725 (0.359)
Proportion of total aid allocated for merit	0.188 (0.276)	0.265 (0.341)
LEAP per $1m state appropriation	1272.5 (944.3)	0 (0)
Observations	1294	369

Standard deviation in parentheses

In the period after LEAP was discontinued, states granted more need-based aid and more merit-based aid on average. Figure 5 depicts that both need-aid and merit-aid increased on average during the pre-period. Need-aid continued to grow during the post-period whereas merit-aid was generally stable. However, the distribution of aid shifted over this period. A larger proportion of total aid was allocated on the basis of need during LEAP than after LEAP was discontinued, declining from about 81% of total aid to 73%. Conversely, more aid was allocated on the basis of merit in the post period, increasing from about 19% to 27%.

Figure 5: Average Need-Aid, Merit-Aid, and LEAP over time, 1985-2019



Note: Vertical line indicates 2011

Economically, states were fairly similarly positioned in the pre-and post-period, on average, in terms of unemployment and income. The worst of the Great Recession occurred during the final two years of LEAP and the effects persisted into the post period. Politically, states were more likely to have Republican leadership in the Governor's office and the legislature during the post-period. In the higher education context, enrollment was higher in the post-period and states allocated more to higher education overall.

Need-aid during LEAP

First, I assessed the relationship between state allocations to need-aid and changes in LEAP receipt. The results are presented in Table 3. In the first column, the model is specified with state fixed effects and without covariates. The second column adds covariates.

Across both specifications, I find that there is a statistically significant and positive relationship between LEAP aid and need-aid: when states received more funding from LEAP, they allocated more funding to need-aid, on average. When modeled without covariates, the coefficient on the interaction between an indicator that LEAP decreased and the magnitude of change in LEAP from the prior year is insignificant. This is indicative of a symmetric relationship, meaning that states did not respond to LEAP declines differently than they responded to LEAP increased in terms of the magnitude of change to need-aid from the prior year.

In column 2, when modeled with covariates, the coefficient on the interaction of LEAP declining and the change in LEAP is positive and significant. This result provides evidence that states decreased funding to need-aid more in years when LEAP declined than would be expected if the relationship were symmetric. This is indicative of funding restraint. While this contradicts the results without covariates, the magnitude of this coefficient is very small, meaning the relationship is likely closer to symmetric than a dramatic decline in need-funding.

I did not expect to find a symmetric relationship nor fiscal restraint since, in aggregate, need-aid increased over this period by a magnitude much greater than LEAP, which generally declined (see Figure 5). To further explain the relationship between changes in need-aid and changes in LEAP, I provide additional descriptive tables which show substantial variation across states, which potentially explains why the analysis only find a marginal pattern.

Table 4 describes the frequencies of observations in which need-aid increased, decreased, or stayed the same within years when LEAP aid increased, decreased, or stayed the same between 1986 and 2011. This table follows the methodology from the NASSGAP survey (Davis 1994), which calculated an increase or decrease as a change of at least 2% from the prior year. I find that in years when LEAP increased, about 55% of states increased appropriations to need-aid and 28% decreased. In years when LEAP decreased, 47% of states increased appropriations to need-aid and 35% decreased. States increasing need-aid was the most frequent occurrence, regardless of the direction of change in LEAP. These patterns are consistent with NASSGAP's findings using data from 1974-1992, but even more observations included need-aid increasing during the earlier period. Table 4 also shows that a positive relationship between need-aid and LEAP (both increasing or decreasing) is just as common as an inverse relationship (one increasing, one decreasing).

Figure 6 depicts the average percent change (in absolute terms) of need-aid in years when LEAP increased or decreased by state (in this case, increase and decrease are any change greater than or less than zero). States like California, Illinois, and Wisconsin, depict a symmetric relationship: the change in need-aid was about the same in years when LEAP increased as in years when LEAP decreased. In states like Alabama, Kansas, and Massachusetts, the change in need-aid was less in years LEAP decreased than in years LEAP increased, which is indicative of funding replacement. Where the change in need-aid was greater in years LEAP decreased, there is evidence of funding restraint, as exhibited in Arizona, Georgia, and Nevada. This graph shows that funding restraint is the most common pattern. This graph does not account for the direction of change. As a result, the same pattern would appear for a state which increased need-aid in years LEAP declined and a state which decreased need-aid, if the average magnitude of change

were the same. However, access to need-based financial aid would be very different in these states, highlighting the limitation of this analysis.

Table 3: Fixed Effects Regression of State Need-Aid on LEAP Funding, 1986-2011

	(1) log need-aid (2019 dollars)	(2) log need-aid (2019 dollars)
Log LEAP (2019 dollars)	0.431***	0.471***
	(0.0286)	(0.0283)
LEAP declined # Log LEAP change	0.00883	0.0191*
	(0.00861)	(0.00835)
Average Annual Unemployment		0.0165
		(0.0334)
Log income (2019 dollars)		-0.495
		(0.865)
Log state appropriations (2019 dollars)		2.825***
		(0.382)
Net FTE enrollment		0.00000328**
		(0.00000125)
Democratic governor		-0.0477
		(0.103)
Democratic control of legislature		0.0169
		(0.138)
Constant	10.64***	-43.75***
	(0.397)	(9.615)
State Fixed Effects	Yes	Yes

N	1273	1273
r2	0.158	0.231

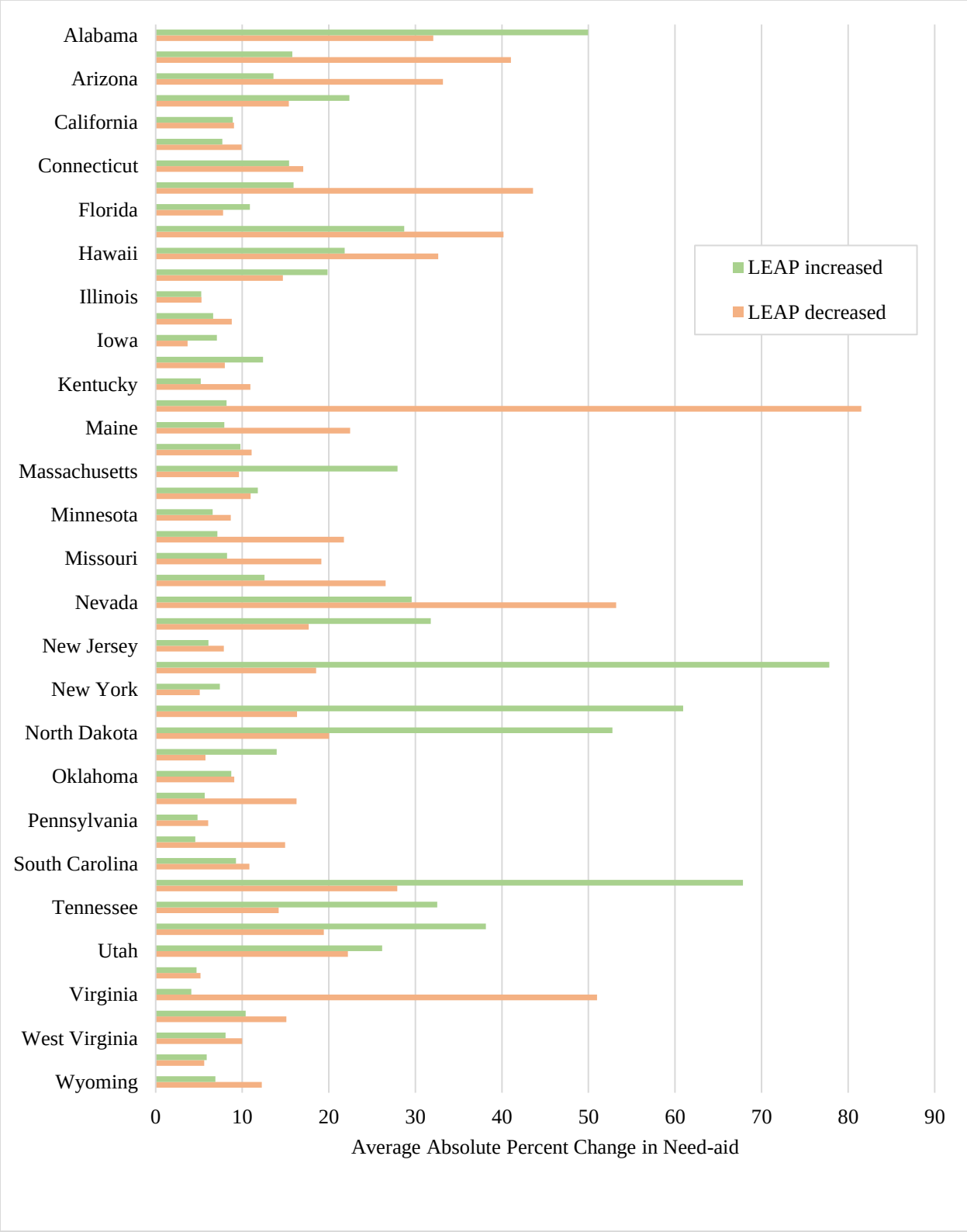
Standard errors in parentheses
* p < 0.05, ** p < 0.01, *** p < 0.001

Table 4: Frequency of Observations Increasing or Decreasing by Need-Aid and LEAP

	Need-aid			
LEAP	Increased	Decreased	Unchanged	Total
Increased	174	90	54	318
	54.72%	28.30%	16.98%	100%
Decreased	338	254	125	717
	47.14%	35.43%	17.43%	100%
Unchanged	90	87	28	205
	43.9%	42.44%	13.66%	100%
Total	602	431	207	1,240
	48.55%	34.76%	16.69%	100%

Note: Observations of increase and decrease are calculated as at least a 2% change from the prior year

Figure 6: Average Percent Change in Need-aid in Years LEAP Increased or Decreased (1986-2011)



Interrupted time series results

Table 5 displays the results for the second research question. In the first column, the interrupted time series was modeled without covariates and with state-level fixed effects. The results in the second column were modeled with covariates and state-level fixed effects. The positive coefficient on year indicates that need-aid increased by an average of 2.3% annually (3.7% without covariates) during LEAP. The coefficient on post-LEAP is interpreted as the average percent change in need-aid after LEAP was discontinued. The interaction of post-LEAP and year indicates if LEAP's discontinuation changed the allocation of state need-aid over time. Summing the coefficient on year and the coefficient on the interaction of post-LEAP and year produces the average difference in the slope of need-aid during the post-period. Across both specifications, the coefficients for post-LEAP and the interaction of year and post-LEAP are statistically insignificant. I find no difference in the amount of need-aid that states allocated after LEAP was discontinued. This is evidence that state policymakers maintained their total funding for need-based aid, even without federal incentives. Further, stability in need-aid after LEAP indicates that states were able to replace lost federal funding with their own appropriations, on average. Given that I did not find evidence of replacement occurring throughout LEAP (see Table 3), this is a somewhat unexpected result.

Table 6 reports the models for the third research question, which aims to identify if states invested more in merit-aid relative to need-aid after LEAP was discontinued. Table 6 follows the same structure as Table 5. The parameter of interest in this model is the triple interaction between the post-period, merit-aid, and year. This parameter is statistically insignificant across both specifications, indicating that the relationship between need and merit-aid did not change in

the post-LEAP period. On average, states did not shift their allocations from need-aid to merit-aid after they were no longer incentivized to invest in need-aid through LEAP.

Table 7 presents the results modeling the relationship between the discontinuation of LEAP and reliance on LEAP. This analysis aimed to identify if states that received more LEAP aid were more or less likely to decrease need-aid after LEAP was discontinued. Column 1 presents the results for models with state fixed effects. Column 2 includes covariates. Column 3 does not include state fixed effects since the measure of LEAP reliance is a constant, so the coefficient on LEAP reliance cannot be calculated with state fixed effects. I find that there is no difference in need-aid after LEAP was discontinued by LEAP reliance, as indicated by the insignificant interactions between (1) LEAP reliance and post-LEAP and (2) post-LEAP, LEAP reliance, and year. This means that states which were more reliant on LEAP were able to maintain pre-LEAP funding for need-aid on average, even though they had to make up for the most lost federal funding. There is significantly positive relationship between need-aid and LEAP reliance over time during the pre-period (meaning states which were more reliant on LEAP offered more need-aid on average), but the magnitude of this relationship is very small and not a meaningful difference.[25]

To test the sensitivity of these analyses, I ran the interrupted time series models using multiple alternative specifications. First, I excluded the year 2012 from the analyses to serve as a transition period where states may not have yet responded to the policy change. Second, I exclude the year 2011 from the analysis to account for a potential anticipatory reaction if states knew LEAP was to be discontinued. Third, instead of using full-time enrollment as a measure of

[25] While not the focus of this study, there are some statistically significant relationships between need-aid and some of the covariates. Across all three interrupted time series analyses, state need-aid has a negative relationship with income and positive relationship with state appropriations.

demand for higher education, I used the proportion of the state population between the ages of 15-19, and between 20-24.[26] Fourth, I exclude years prior to 1995 since NASSGAP changed its data reporting in that year. Fifth, I exclude years prior to 1998, when SLEAP was enacted. Sixth, I lag the covariates for unemployment, income, and political affiliations of the governor and legislature since some financial aid funding decisions occur in the prior year. The results are robust to all of these alternate specifications. The results of the third analyses were also robust to two alternate specifications of LEAP reliance: (1) the proportion of total appropriations to higher education from leap averaged over different number of years, including 1, 3, 5, and 10, and (2) quintile groupings of the continuous LEAP reliance measure used in the main results (five-year average proportion of total appropriations to higher education from LEAP).

Table 5: Interrupted Time Series Regression Results for Need-Aid Post-LEAP

	(1) log need-aid (2019 dollars)	(2) log need-aid (2019 dollars)
Year	0.0366***	0.0231*
	(0.00763)	(0.0110)
Post-LEAP	-39.57	-164.5
	(102.5)	(111.6)
Post-LEAP # Year	0.0194	0.0815
	(0.0509)	(0.0554)
Average annual unemployment		-0.0240
		(0.0416)
Log income (2019 dollars)		-3.129**

[26] Using data from the National Cancer Institute's Surveillance, Epidemiology, and End Results Program (SEER): https://seer.cancer.gov/popdata/popdic.html

		(1.031)
Log state appropriations (2019 dollars)		1.714***
		(0.420)
Net FTE enrollment		0.00000219
		(0.00000131)
Democratic governor		-0.00763
		(0.122)
Democratic control of legislature		0.157
		(0.155)
Constant	-56.56***	-31.04
	(15.24)	(17.23)
State Fixed Effects	Yes	Yes
N	1763	1763
r2	0.0146	0.0320

Standard errors in parentheses
** p < 0.05, ** p < 0.01, *** p < 0.001*

Table 6: Interrupted Time Series Regression Results for Need-Aid by Level of Merit-Aid

	(1) log need-aid (2019 dollars)	(2) log need-aid (2019 dollars)
Year	-0.00230	-0.00951
	(0.0139)	(0.0155)
Post-LEAP	-78.13	-131.1
	(224.3)	(227.1)
Post-LEAP # Year	0.0384	0.0648

	(0.111)	(0.113)
Log merit-aid (2019 dollars)	-4.167	-3.441
	(2.149)	(2.185)
Log merit-aid (2019 dollars) # Year	0.00213*	0.00176
	(0.00108)	(0.00109)
Post-LEAP # Log merit-aid (2019 dollars)	2.841	-0.721
	(15.37)	(15.35)
Post-LEAP # Log merit-aid (2019 dollars) # year	-0.00140	0.000366
	(0.00763)	(0.00762)
Average annual unemployment		-0.0328
		(0.0414)
Log income (2019 dollars)		-2.506*
		(1.024)
Log state appropriations (2019 dollars)		1.169**
		(0.424)
Net FTE enrollment		0.00000320*
		(0.00000130)
Democratic governor		-0.0247
		(0.120)
Democratic control of legislature		0.303*
		(0.154)
Constant	20.28	37.42
	(27.72)	(29.03)
State Fixed Effects	Yes	Yes

N	1763	1763
r2	0.0486	0.0626

Standard errors in parentheses
* p < 0.05, ** p < 0.01, *** p < 0.001

Table 7: Interrupted Time Series Regression Results for Need-Aid by LEAP Reliance

	(1) log need-aid (2019 dollars)	(2) log need-aid (2019 dollars)	(3) log need-aid (2019 dollars)
Year	0.0142	-0.0122	-0.00961
	(0.0142)	(0.0181)	(0.0157)
Post-LEAP	-58.79	-206.4	-191.1
	(191.0)	(195.1)	(194.1)
Post-LEAP # Year	0.0295	0.103	0.0953
	(0.0948)	(0.0968)	(0.0963)
LEAP reliance			-0.0800**
			(0.0299)
LEAP reliance # Year	0.0000273	0.0000418**	0.0000414**
	(0.0000146)	(0.0000154)	(0.0000150)
Post-LEAP # LEAP reliance	0.0234	0.0668	0.0709
	(0.197)	(0.196)	(0.196)
Post-LEAP # LEAP reliance	-0.0000124	-0.0000339	-0.0000359
	(0.0000977)	(0.0000974)	(0.0000974)
Average annual unemployment		-0.0288	-0.0177
		(0.0415)	(0.0402)
Log income (2019 dollars)		-2.933**	-2.567**
		(1.035)	(0.867)

Log state appropriations (2019 dollars)		1.718***	1.848***
		(0.451)	(0.249)
Net FTE enrollment		0.00000224	0.000000478
		(0.00000131)	(0.00000101)
Democratic governor		-0.00931	0.00726
		(0.123)	(0.122)
Democratic control of legislature		0.194	0.241
		(0.159)	(0.155)
Constant	-56.56***	-31.42	23.24
	(15.17)	(17.28)	(29.73)
State Fixed Effects	Yes	Yes	No
N	1763	1763	1763
r2	0.0253	0.0411	0.0398

Standard errors in parentheses
** p < 0.05, ** p < 0.01, *** p < 0.001*
Note: LEAP reliance is measured as the average LEAP dollars per $1 million in state appropriations to higher education for the final five years of LEAP, 2007-2011 (federal fiscal years 2006-2010)

Limitations

There are a number of limitations to using interrupted time series design which relate to the assumption that the trend in need-aid would continue in the absence of treatment. LEAP's discontinuation was not the only factor changing the landscape of state financial aid in 2011. State budgets were still being affected by the 2008 recession, during which many states made substantial cuts to funding for higher education. States may have been considering changing need-aid independently of LEAP. States could have used recession relief funding from policies

like the ARRA to supplant losses in LEAP funding. Additionally, changes were made to LEAP over the treatment period, including the addition of SLEAP and GAP. These policies may have changed how states used LEAP funds over time, which is especially concerning for the analysis of need-aid funding during LEAP. Some states may have anticipated LEAP's discontinuation and preemptively changed their funding for need-aid. Without a comparison group, this method cannot identify how states would have responded in the absence of LEAP.

The treatment period includes some years in which some states reported receiving $0 in LEAP funding. While all states are considered treated during the pre-period, a lack of LEAP funding would reflect either data errors or states temporarily eliminating their LEAP-funded programs prior to LEAP's discontinuation. Zero-dollar LEAP funding is rare, accounting for less than 2% of observations during LEAP. I have specified the models using a linear time trend since state need-aid over time is generally linear. If this specification does not reflect the trend in some states, the results could be over- or under-stated (Appendix B presents results from models relaxing this assumption by including year fixed effects). There were changes to data collection over the period in my panel. As described in the data section above, I have made reasonable adjustments to the data where necessary.

Discussion

In general, I find that as LEAP declined, states restrained their funding for need-aid, but there is variation across states. When LEAP was discontinued, I find that states maintained their need-based financial aid funding levels on average, even without federal incentive to do so. I do not find evidence that states shifted their allocation of financial aid to favor merit-aid, a plausible concern given the popularity of merit-aid at the time LEAP was discontinued. Additionally, I

find that the relationship between need-aid allocations and the discontinuation of LEAP is not moderated by the extent to which a state relied on LEAP.

LEAP's discontinuation was a major event, but it followed a long decline in federal appropriations to LEAP. LEAP funds had generally declined since the early 1980s (see Figure 1). Allocations to individual states follow this general trend. As state need-aid generally increased over this period, the proportion of state need-aid from LEAP decreased over time. In 2010, only four states' need-based financial aid budget included more than 10% LEAP funds, and the vast majority (80%) received lower than 5% of their need-aid budget from LEAP. States which were more reliant on LEAP tended to be states with lower investments in need-based aid. Given this trend, LEAP's discontinuation may not have been a shock to state need-based financial aid budgets in most states.

LEAP was successful at inducing states to invest in need-based financial aid (Davis, 1994). In the absence of the incentive, states maintained the total need-aid investment. These findings align with the stated justification for eliminating LEAP: the program had served its purpose of incentivizing states to develop need-based financial aid programs.

This study does not attempt to identify where states found the extra funding to replace LEAP. However, I find that states did not redistribute allocations between need-based and merit-based financial aid. This is evidence that states did not take funding from merit-aid to cover need-aid, nor did they move funds from need-aid to invest in merit-aid, despite the popularity of merit-aid programs.

Implications for theory and policy

Literature on grant declines and discontinuation is somewhat sparce. Prior studies have found funding asymmetries, meaning the changes states make to a funded area are different in years when the grant increases or decreases. I find evidence of funding asymmetries of a small magnitude during LEAP. States exhibited restraint on average, cutting need-aid by more in years LEAP declined than would be expected from a symmetric relationship. Prior work from Volden (1999) had found asymmetries with replacement in welfare programs. These differing results suggest that states may respond differently to different types of grant-funded programs.

Volden (1999) reasoned policymakers faced political pressure to maintain or increase funding for welfare programs even when federal grants declined. Financial aid may be an easier budget item for state policymakers to decrease funding for since these programs are often not guaranteed to students. The aid program may be structured as first-come, first-served or award amounts may be contingent on funding levels. This flexibility could allow policymakers to continue to receive credit for financial aid policies at a lower cost, without having to eliminate a financial aid program, which would be politically unpopular. Future work should consider the political pressures and role of credit-claiming in LEAP-funded financial aid programs.

While this study highlights that the federal government can drive lasting state funding patterns, these results may not be generalizable to other matching grant designs. The slow decline of LEAP may have allowed states time to build the fiscal capacity to self-fund need-aid and build a constituency of support for need-aid, which may have helped these programs persist without LEAP funding. If a new matching grant were designed with a set termination date, states may be warried to accept funding if they expect having to pay the full price of the program in the near future, which may present political or fiscal risks.

Fiscal federalism also theorizes that states are more likely to accept grants that have fewer restrictions (Volden, 2007). Under LEAP, states had the flexibility to design their aid program and identify student eligibility criteria. This may increase state participation, but it could also result in differing program designs which perpetuate inequalities in financial aid access across state lines.

Conclusion

The Obama administration's decision to discontinue LEAP was one of the most significant changes to fiscal federalism in higher education in recent years. Much of the fiscal federalism literature addresses the impact of new intergovernmental grants or of changes in grant funding over time. This study contributes to the literature on fiscal federalism by addressing how states respond when an intergovernmental grant in discontinued. Federal grants can be a powerful incentive for states to implement policies related to federal priorities – as was the case for LEAP and state need-based aid.

Recent policy briefs have called attention to the potential impact of new federal-state partnerships for higher education funding. However, the field's understanding of past federal-state partnerships is incomplete. LEAP existed for 40 years but has largely been overlooked in empirical research. This study and the fiscal federalism literature offers important context for policymakers and advocates who are considering federal partnerships for the funding of state financial aid – including LEAP-like programs. The flypaper literature had identified that federal grants can incentivize state spending beyond what a state would otherwise invest in a budget area (Gramlich, 1977; Inman, 2008). While the flypaper theory is not directly tested in this study, there is evidence that states did enact new need-aid programs after LEAP was enacted (Davis,

1994) and I do find a positive relationship between LEAP funding and state investment in need-aid.

Additionally, the fiscal federalism literature identifies certain design features that are more palatable to grantees and may produce a more successful federal-state partnerships. States are more likely to respond with fidelity to the grant's purpose when their goals and priorities align with the federal government (Nicholson-Crotty, 2004). This is a concern for new funding partnerships since higher education has become an increasingly partisan issue area. To improve the political palatability of a new matching grant for financial aid, policymakers should consider ways to ensure that both state and federal policymakers can claim political credit for the success of new spending in higher education. Co-credit claiming at a reduced cost is a substantial political benefit of matching grants (Nicholson-Crotty & Staley, 2012; Volden, 2007). A new grant should also include long-term funding. Some state policymakers have begun to reject federal funding partnerships, knowing these subsidies are temporary and the state taxpayers will have to foot the bill when it is discontinued. With more predictable funding, policymakers may be less concerned about needing to make politically unpopular decisions to raise taxes or eliminate an aid program when the federal grant expires.

The federal government may also gain state buy-in by allowing states to tailor the funded program to their state-specific needs. The fiscal federalism literature has shown that grantees are more responsive to grants with fewer restrictions (Volden, 2007). Under LEAP, states had few restrictions to the design their need-aid program, beyond a per-student award limit. However, the partnership should safeguard against creating a system where students have disparate access to financial aid across state lines. For example, a new grant could include a maintenance of effort clause to ensure states don't divest from other areas of higher education funding or increase

tuition in order to receive more grant funding. To bypass the complications of a funding an effective partnership, some policymakers have proposed that the federal government provide need-aid directly through increased investments in the federal Pell grant.

A concern with matching grants is the longevity of state-run programs if federal incentives are discontinued. This study provides initial evidence that federal incentives can create lasting state policy, even after federal dollars are removed. However, some states eliminated their LEAP funded need-aid programs after LEAP was discontinued which left some students without access to state need-aid. Above all, the designs of federal-state funding partnerships for financial aid must be student-centered and ensure students have consistent and predictable access to aid.

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Appendix A: LEAP funded programs

Table A1: LEAP Funded Programs in 2010-2011

State	Program	Expenditures (2010-2011)	Recipients (2010-2011)	Year Discontinued
Alabama	Alabama Student Assistance Program	5,617,208	7,913	
Alaska	AlaskAdvantage Education Grant	1,513,690	1,026	2013
Arizona	AZ LEAP/SLEAP Program	3,662,741	3,806	
Arkansas	Workforce Improvement Grant	3,704,683	3,437	2016
California	Cal Grant A	583,182,000	70,782	
California	Cal Grant B	675,746,000	156,736	
California	Cal Grant C	10,638,000	8,594	
Colorado	Colorado Leveraging Education Assistance Program	1,583,572	1,843	2011
Colorado	Supplemental Leveraging Education Assistance Program	1,009,082	700	2011
Connecticut	Capitol Scholarship Program	9,790,945	5,202	2013
Delaware	Scholarship Incentive Program	1,373,723	1,057	
Florida	Florida Student Assistance Grant Postsecondary	11,780,066	14,320	
Florida	Florida Student Assistance Grant Private	17,006,966	13,517	
Florida	Florida Student Assistance Grant Public	105,445,712	89,063	
Georgia	LEAP Grant Program	1,465,321	3,004	2011
Hawaii	Hawaii State Student Incentive Program	840,258	473	2017
Idaho	ID Leveraging Educational Assistance Partnership	719,049	1,832	2012
Idaho	SLEAP	150,000	475	2011
Illinois	Monetary Award Program	403,295,687	147,210	

Indiana	Indiana Higher Education Award & Freedom of Choice Grants (Frank OBannon Grant)	185,569,958	70,628	
Iowa	Iowa Grant	848,679	1,465	2015
Kansas	Kansas Comprehensive Grant	15,790,521	10,717	
Kentucky	College Access Program (CAP) Grant	59,569,352	37,836	
Louisiana	LA LEAP	1,987,995	5,141	2012
Maine	Maine State Grant Program	15,229,971	24,558	
Maryland	Howard P. Rawlings Educational Assistance Grant	55,224,174	25,734	
Massachusetts	MASSGrant	36,221,652	56,688	
Michigan	Michigan Competitive Scholarship	24,794,191	34,943	
Minnesota	Achieve Scholarship Program	1,164,725	1,838	
Minnesota	MN State Grant	119,893,607	88,823	
Mississippi	MS LEAP	950,600	1,339	2011
Missouri	Access Missouri Financial Assistance Program	56,574,757	53,888	
Montana	Montana Higher Education Grant	742,666	1,195	2015
Montana	Montana Tuition Assistance Program	2,176,298	2,457	2015
Nebraska	Nebraska State Grant	14,947,663	15,556	2011
Nevada	LEAP	347,448	307	2011
New Hampshire	New Hampshire Incentive Program	2,966,905	5,280	2011
New Jersey	Tuition Aid Grant	281,995,208	71,343	
New Mexico	NM State Student Incentive Grant	12,792,674	15,981	
New York	Tuition Assistance Program	855,470,000	374,449	
North Carolina	North Carolina Student Incentive Grant	5,635,362	9,398	2011
North Dakota	North Dakota State Student Incentive Grant Program	9,193,228	8,642	
Ohio	Ohio College Opportunity Grant Program	73,999,400	78,334	

Oklahoma	Oklahoma Tuition Aid Grant	19,996,904	24,176	
Pennsylvania	Pennsylvania State Grant Program	366,421,294	178,645	
Rhode Island	Rhode Island State Grant Program	13,169,812	16,767	
SC TGC	SC Tuition Grants Program	34,042,809	14,451	
South Dakota	South Dakota LEAP	407,397	561	2011
Tennessee	Tennessee Student Assistance Award	44,959,723	31,377	
Texas	TEXAS Grant with S/LEAP	343,159,278	76,738	
Texas	TX Tuition Equalization Grant with S/LEAP	102,439,014	27,784	
Utah	UT Leveraging Educational Assistance Partnership (LEAP)	1,989,886	3,571	2011
Vermont	Vermont Incentive Grant	15,719,789	9,457	
Vermont	VT Part-Time Grant	1,294,671	2,818	
Virginia	College Scholarship Assistance Program	5,134,169	6,549	2013
Virginia	Higher Education Teacher Assistance Program	963,159	680	2011
Washington	State Work Study	20,584,248	7,546	2011
Washington	Washington State Need Grant Program	205,226,122	72,338	
Washington, DC	DC LEAP	2,083,629	2,552	
West Virginia	West Virginia Higher Education Grant Program	37,136,887	20,573	
Wisconsin	Talent Incentive Program Grant	6,720,762	4,534	
Wyoming	Leveraging Educational Assistance Partnership (LEAP)	167,205	275	2011

Note: LEAP funded programs in existence in 2010-2011 may include programs which had previously been LEAP funded but not listed as LEAP funded during 2010-2011 due to data errors or being funded from a different source. LEAP-funded includes SLEAP-funded programs. Year discontinued is listed as the academic year, so 2011 would indicate 2011-2012. Data are self-reported from states to NASSGAP. Data were available through 2019, so programs discontinued since then are not listed as discontinued.
Source: https://www.nassgapsurvey.com/survey/program_finder/program_finder.asp

Appendix B: Year Fixed Effects

As an alternate specification of the interrupted time series models, I include year fixed effects in order to relax the assumption that need-aid is linear over time. Graphically, need-aid and year appear to have a mostly linear relationship for some states. Other states are better fit with a quadratic function, as funding for need-aid at an increasingly higher rate in the 2000s. Year fixed effects is not my preferred specification because the key independent variable in the interrupted time series designs do not vary within a given year. In particular, the interaction of post and year are omitted in the year fixed effects model, so I cannot discern a slope change in need-aid after LEAP was discontinued. The interrupted time series results with year fixed effects are presented in Table B1. As with the main results, I find no significant relationships.

Table B1: Interrupted Time Series with Year Fixed Effects

	Need-aid post-LEAP	Need-aid and merit-aid post-LEAP	LEAP Reliance
	log need-aid (2019 dollars)	log need-aid (2019 dollars)	log need-aid (2019 dollars)
Year	0.378	0.199	0.357
	(0.462)	(0.465)	(0.463)
Post-LEAP=1	-12.43	-7.727	-11.88
	(15.9)	(15.95)	(15.94)
Log merit-aid (2019 dollars)		-3.772	
		(2.325)	
Log merit-aid (2019 dollars) # year		0.00193	
		(0.00116)	
Post-LEAP=1 # log merit-aid (2019 dollars)		-9.772	
		(13.04)	
Post-LEAP=1 # log merit-aid (2019 dollars) # year		0.00485	
		(0.00647)	
Average LEAP per $1m state appropriations, 2006-2010 # year			0.0000590***
			(1.6E-05)
Post-LEAP=1 # Average LEAP per $1m state appropriations, 2006-2010			0.105
			(0.165)
Post-LEAP=1 # Average LEAP per $1m state appropriations, 2006-2010 # year			-5.3E-05
			(8.2E-05)
Average annual unemployment	-0.0933	-0.09	-0.117*

	(0.0594)	(0.0586)	(0.0594)
Log income (2019 dollars)	-2.345*	-1.809	-2.213*
	(1.076)	(1.068)	(1.076)
Log state appropriations (2019 dollars)	1.831***	1.331**	1.887***
	(0.433)	(0.437)	(0.464)
Net FTE enrollment	2.1E-06	0.00000310*	2.17E-06
	(1.3E-06)	(1.3E-06)	(1.3E-06)
Democratic governor	-0.0237	-0.0341	-0.0306
	(0.124)	(0.122)	(0.125)
Democratic control of legislature	0.123	0.272	0.157
	(0.157)	(0.157)	(0.161)
Constant	-745.8	-387.7	-801.8
	(914.4)	(920.9)	(918.3)
N	1763	1763	1763
r2	0.0517	0.0807	0.0649

Standard errors in parentheses
* *p < 0.05*, ** *p < 0.01*, *** *p < 0.001*

CHAPTER 4

Tennessee HOPE Access: A Regression Discontinuity of Student Enrollment, Persistence, and Completion

Abstract:

The distinction between need and merit based financial aid is becoming increasingly blurred as states implement financial aid programs that use both to determine eligibility. While researchers have studied the effects of need-aid and merit-aid separately, few studies look at combination programs. This study evaluates outcomes of Tennessee's HOPE Access grant, which has both income and academic eligibility criteria. HOPE Access is offered to low-income students who are just below the threshold to receive the merit-based HOPE grant; both of which are part of the state's lottery-funded financial aid program. The purpose of this project is to understand the effect of HOPE Access on student academic achievement (including college enrollment, persistence, and completion). This study uses a regression discontinuity design to compare outcomes for low-income students who met the criteria for HOPE Access with low-income students who met the criteria for HOPE and students who did not meet criteria for any state lottery aid. Overall, I find that HOPE Access eligible students did not have observably different outcomes from either group, at the eligibility thresholds. In addition to gaining a better understanding of this specific program, the results provide useful context for policymakers in other states consider including both income and merit criteria in their financial aid programs.

Note: This research was supported by a grant from the American Educational Research Association which receives funds for its "AERA-NSF Grants Program" from the National Science Foundation under NSF award NSF-DRL #1749275. Opinions reflect those of the author and do not necessarily reflect those AERA or NSF.

Introduction

The distinction between need and merit-based financial aid is becoming increasingly blurred as states implement financial aid programs that use both to determine eligibility. While researchers have studied the effects of need-aid and merit-aid separately, few studies look at combination programs. This study evaluates outcomes of Tennessee's HOPE Access grant, which has both income and academic eligibility criteria. HOPE Access is offered to low-income students who are just below the threshold to receive the merit-based HOPE grant; both of which are part of the state's lottery-funded financial aid program. The purpose of this study is to understand the effect of HOPE Access on student academic achievement (including college enrollment, persistence, and completion). This study uses a regression discontinuity design to compare outcomes for low-income students who met the criteria for HOPE Access with low-income students who met the criteria for HOPE and students who did not meet criteria for any state lottery aid. In addition to gaining a better understanding of this specific program, the results provide useful context for policymakers in other states consider including both income and merit criteria in their financial aid programs.

In the next section, I describe the factors which influence a student's decision to attend college using Perna's (2006) college choice model, with attention to the influence of the policy context. Then, I describe the theory of action of state financial aid policies and the way policymakers design eligibility criteria on the basis of need, merit, or a hybrid of the two. This study focuses specifically on one hybrid program, HOPE Access, and the third section describes the financial aid policy context in Tennessee. Then, I describe the regression discontinuity models I use to assess how HOPE Access impacts student academic outcomes and present the

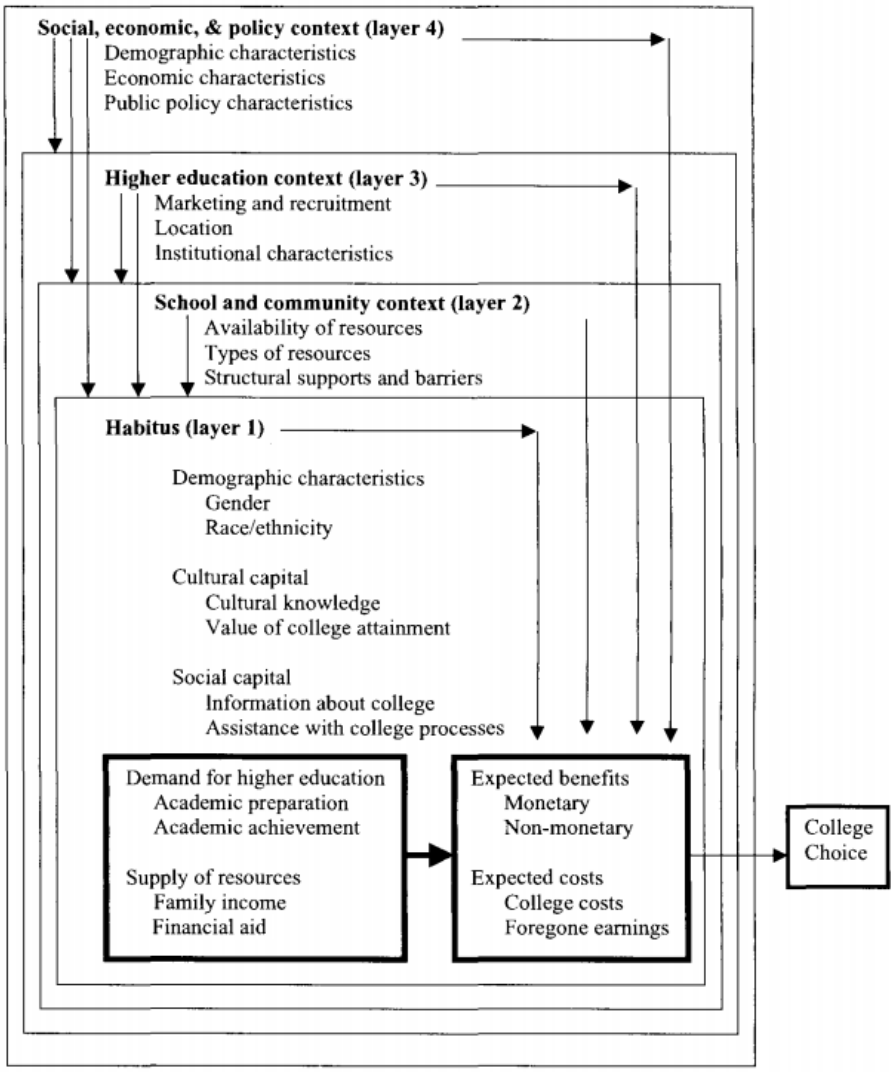
results, including tests for the identification assumptions and alternate model specifications. I conclude with description of the contribution of this work.

Conceptual Framework: College Choice

This study draws on Perna's (2006) conceptual model for college access and choice. Perna's model bridges economic and sociological theories of college choice by accounting for the way that a student's background and context shape the way they calculate the costs and benefits of attending college. For reference, the visual conceptual framework map is reproduced in Figure 1. At the center of the model is the student's calculation of the cost of higher education, including available resources from income and financial aid. These costs are weighed against the potential benefits of earning a college degree, including future earnings and quality of life. Surrounding this calculation are layers for factors which influence this cost/benefit analysis including (1) habitus, (2) school and community context, (3) higher education context, and (4) social, economic, and policy context.

The present study focuses specifically on the impact of the policy context (layer 4) on students' supply of resources. State policymakers frequently use financial aid to reduce the cost of college for students to induce them to attend college – be it to keep high achieving students in the state via a merit-based aid program or to reduce achievement gaps for low-income students through need-based aid. Financial aid is an effective strategy to for encouraging low-income students to enroll in college since they have a lower supply of financial resources to weigh against the high cost of college and are especially price sensitive (Pallais & Turner, 2006; Perna & Titus, 2005). The purpose of this study is to assess the extent to which one particular financial aid program was successful at increasing the likelihood that low-income students enrolled, persisted, and completed college.

Figure 1: Perna's Proposed Conceptual Model of Student College Choice



Reproduced from: Perna (2006), Figure 3.1

This model is useful for framing the present study for a variety of reasons. First, it grounds this study at the level of the individual student. Under ideal conditions, policymakers who aim to increase college access would craft policies that acknowledge how each of these layers impact a student's decision-making. For example, they may implement a robust college counseling policy to reduce the information asymmetries within the school context. In practice,

policymakers operate under resource and political constraints that reduce their capacity to make robust and effective policies.

Second, the framework accounts for both the sociological and economic factors that influence a student's decision. Literature on financial aid often comes from the field of economics and relies on the expectation that students act in an economically rational way: weighing the cost of investing in their human capital against the returns to this investment. However, it is also important to understand how information asymmetries result from systemic barriers to the types of knowledge and social connections that are essential for making an economically rational calculation about college choice. In her review of this literature, Perna (2006) accounts how students who face systemic racism, low-income students, and first-generation college students are less likely to have accurate perceptions of how much college graduates earn. This model accounts for different ways that students inform their cost/benefit analysis based on the types of social and cultural capital they have access to. By incorporating human, social, and cultural capital, this model offers a more holistic and *realistic* understanding of student choice.

Third, this framework was developed with applicability to research in mind. Perna (2006) offers suggestions on how to design studies which account for these layers as independent variables. A study which intends to understand the effect of one of these characteristics on college choice must account each layer of context. This framework offers a guide for ensuring the appropriate covariates are included in quantitative research which will isolate the desired effect.

Perna defines college choice as the predisposition to attend college (including the aspirations, expectations, and plans to attend), the college search process, and the ultimate choice

of which college to attend, if any. I extend this framework by applying it to a broader definition of college choice which includes the decision to persist and ultimately complete a degree. During their college experience, students are continually gaining information and re-negotiating their identity in a way that may shift their cost/benefit analysis. For example, students may encounter mentors who validate their sense of belonging on campus; or students may face an unexpected financial hardship that makes the cost of forgone earnings outweigh the long-term benefits. The policy context may also shift while the student is enrolled in college in a way that changes the choice calculation. Aid programs typically require students meet "satisfactory academic progress" criteria in order to continue receiving the financial aid. A student who was induced to attend college due to an aid offer may reconsider if they become ineligible for aid and can no longer afford to attend that college.

Literature Review: Merit, Need, and Hybrid Aid for Low-Income Students

Low-income students are especially price sensitive, and financial aid can have a larger effect on college enrollment and completion for low-income students than for higher-income students (Herbaut & Geven, 2019; Hillman, 2011; Hossler et al., 1998; L. W. Perna & Jones, 2013). Low-income students benefit from both need- and merit-based financial aid, but that the effect of need-based aid on enrollment is greater than the effect of merit-aid (Lowry, 2019). By targeting financial aid to low-income students through need-based financial aid, state governments can receive a larger return on their investment in terms of maximizing long-term tax revenue and reducing income inequality (Hadavand, 2018; Sachs et al., 2018).

While the majority of state aid has historically been awarded on the basis of financial need, a shift began to occur in the mid-1990s, with the rise in popularity of lottery-funded merit-based programs. In the 2017-2018 academic year, about 25% of state financial aid dollars were

awarded through merit-based aid (*Trends in Student Aid 2019*, 2019). However, there is considerable variation between states. Tennessee, for example, had the fourth highest average aid per full-time equivalent (FTE) student in 2017, but ranked nineth lowest in terms of the percent of aid that was allocated on the basis of need, at around 30% (*Trends in Student Aid 2019*, 2019). While merit-aid programs may also benefit low-income students, merit-aid has been critiqued for "being awarded disproportionately to populations of students who historically, and today, have the highest college participation rates," including higher-income students and white students (Heller & Marin, 2002). However, there is tremendous variation in aid access across groups depending on the academic eligibility requirements for the program (Dynarski, 2002). Merit-aid programs are often motivated as a means of keeping high achieving students in the state and have been successful at achieving this goal (Harrington et al., 2016; Zhang & Ness, 2010).

For policymakers attuned to the balance between increasing access and rewarding achievement, hybrid[27] need and merit-aid programs are emerging as an increasingly popular solution. These programs offer aid to students by both financial need and demonstrated academic achievement. Domina (2014) identifies that 8 of the 24 state-wide merit-aid programs implemented between 1991 and 2005 are actually hybrid programs.[28] In a comparison of the largest aid programs in each state operating in 2021, Education Commission of the States identifies 17 hybrid programs (of 100) in 16 states (Jamieson et al., 2021). Hybrid programs reward academic achievement while targeting students who both have the highest need and the highest return on the investment for the state. In acknowledgement of the barriers low-income students face to academic achievement, some of these programs include lower academic

[27] Aid programs which have both need and merit eligibility criteria have been referred to as hybrid, need-within-merit, and targeted merit-aid.
[28] Domina (2014) only identifies Tennessee's aid program as HOPE, so the study classifies Tennessee as a merit-only program, rather than taking into account the hybrid HOPE Access.

eligibility requirements. This allows more students to participate so the program can have broad distribution like traditional need-based aid programs (Creech & Davis, 1999; Ness & Noland, 2007). One concern of hybrid programs is that programs with more complex structure don't have as high of positive effects as programs with a simple structure (Domina, 2014; Dynarski & Scott-Clayton, 2013; Hadavand, 2018).

The design choices policymakers make when crafting financial aid programs have consequences for student college choice behavior as well as long term economic effects for the state. However, despite the growing popularity of using hybrid aid programs to overcome concerns about equitable and efficient distribution of funding, little is known about the effectiveness these programs. Most of the literature on state financial aid focuses on need-aid or merit-aid programs – including studies of hybrid programs that only analyze one of the eligibility criteria. The purpose of this study is to identify how one specific hybrid program, HOPE Access, affects student academic outcomes in college. The next section describes how HOPE Access was designed with access for low-income students in mind.

Designing Merit and Hybrid Aid in Tennessee

In 2004, Tennessee implemented a suite of merit-aid programs known as the Tennessee Education Lottery Scholarships (TELS). Ness (2010) describes a series of compromises Tennessee legislators made when setting the eligibility criteria for HOPE, the TELS base-level merit-aid program. Legislators reviewed projections of aid receipt by income and race for varying eligibility criteria and award amounts. Upon demonstrating that a disproportionately low number of Black students would not meet the proposed ACT and GPA eligibility requirements, legislators compromised by requiring students to meet either ACT or GPA criteria – which increased the projected proportion of Black recipients from 6.5% to 12%. Expanding the

eligibility criteria in this way also increased low-income students' access to HOPE (Ness & Noland, 2007).

While the task force designing the program recognized that merit-aid is disproportionally allocated to higher-income students, legislators ultimately decided against including an income cap (Ness, 2010). Instead, legislators developed two programs targeted to low-income students: (1) Aspire, a supplemental award for students who met HOPE criteria, and (2) HOPE Access, an award with lower academic eligibility criteria than HOPE. HOPE Access seemingly acknowledges that low-income students may face barriers to academic achievement, which is reflected in lower GPA and ACT scores. HOPE Access offers these students an opportunity to demonstrate that they can be successful in college and rewards students with additional financial aid if they reach certain academic thresholds in college.

Programs like HOPE Access appear to acknowledge that the college choice equation is different for low-income students and financial aid can reduce the cost, inducing them to attend. However, HOPE Access has a contradictory theory of action. The design recognizes that even if low-income students were motivated to achieve an ACT or GPA that would make them eligible for merit-aid, they may not have the same opportunities which support academic achievement in high school as higher income students. HOPE Access is framed as an opportunity for these students to demonstrate that they can be successful in college and deserve merit-aid. When HOPE Access students arrive on campus, they receive less financial aid than HOPE students—but the disproportionate challenges that low-income students faced have not disappeared. Nevertheless, the program design assumes that motivation to receive additional aid in their second year will be enough to help students achieve during their first year. It remains unclear if the financial aid offered in this hybrid program is enough to encourage enrollment, persistence,

and completion for low-income students. Before I begin to address this question, I further describe the financial aid landscape in Tennessee.

State financial aid programs in Tennessee

The HOPE Access aid program was established as part of the 2004 Tennessee Education Lottery Scholarship (TELS) program, which designated state lottery funds for financial aid. The TELS program is a merit-based financial aid initiative that includes four financial aid programs:

1. HOPE: base aid award for students who meet academic criteria
2. GAMS: awarded to students with higher academic achievement as a supplement to HOPE
3. Aspire: awarded to low-income students as a supplement to HOPE
4. HOPE Access: awarded to low-income students who are just below the academic criteria for HOPE

The intent of the TELS program was to incentivize high academic achievement in high school, promote college access by reducing the cost, and retain students at Tennessee institutions. In the 2018-2019 academic year, over 74,000 students received financial aid from one of these four TELS programs (THEC, 2020). In addition to these programs, Tennessee offers other financial aid programs for specialized groups such as students from foster care and students who attend technical colleges. In 2015, Tennessee implemented the Tennessee Promise scholarship, a last-dollar scholarship covering tuition and fees for students enrolling in two-year programs.[29]

[29] For more information on the higher education policy context in Tennessee, I recommend: Finney, Joni, Elaine Leigh, Roman Ruiz, Wendy Castillo, Edward Smith, and Daniel Kent. "Driven to Perform: Tennessee's Higher Education Policies & Outcomes: A Case Study." *Institute for Research on Higher Education - Graduate School of Education, University of Pennsylvania*, April 1, 2017. https://repository.upenn.edu/gse_pubs/466.

The four TELS aid programs are allocated based on some combination of the student's ACT score, high school GPA, and income. Table 1 describes aid eligibility by ACT score and high school GPA for low-income students (AGI<$36,000). Panel A demonstrates that students who score between 18-20 on the ACT have three possible aid outcomes that depend on their GPA: (1) receive no aid if their GPA is below 2.75, (2) receive HOPE Access if their GPA is between 2.75 and 2.99, or receive HOPE with the Aspire supplement if their GPA is above 3.0. Similarly, students with a GPA between 2.75 and 2.99 have different aid outcomes based on their ACT. Panel B lists the award amounts by sector and award.

Table 1: TELS Financial Aid Eligibility and Award Amount

Panel A: Award eligibility by ACT and GPA for students with AGI<$36,000

	GPA			
ACT	2.74 and below	2.75-2.99	3.0-3.74	3.75 and above
29 and above	HOPE + Aspire	HOPE + Aspire	HOPE + Aspire	HOPE + GAMS
21-28	HOPE + Aspire	HOPE + Aspire	HOPE + Aspire	HOPE + Aspire
18-20	None	HOPE Access	HOPE + Aspire	HOPE + Aspire
17 and below	None	None	HOPE + Aspire	HOPE + Aspire

Panel B: Annual Award Amount, by Sector (2009-2015)

	Sector	
Award	4yr	2yr
HOPE + GAMS	$7,500	$4,500
HOPE + Aspire	$8,250	$5,250
HOPE Access	$4,125	$2,625

Note: Sourced from the Tennessee Education Lottery Scholarship Program Annual Report

HOPE Access

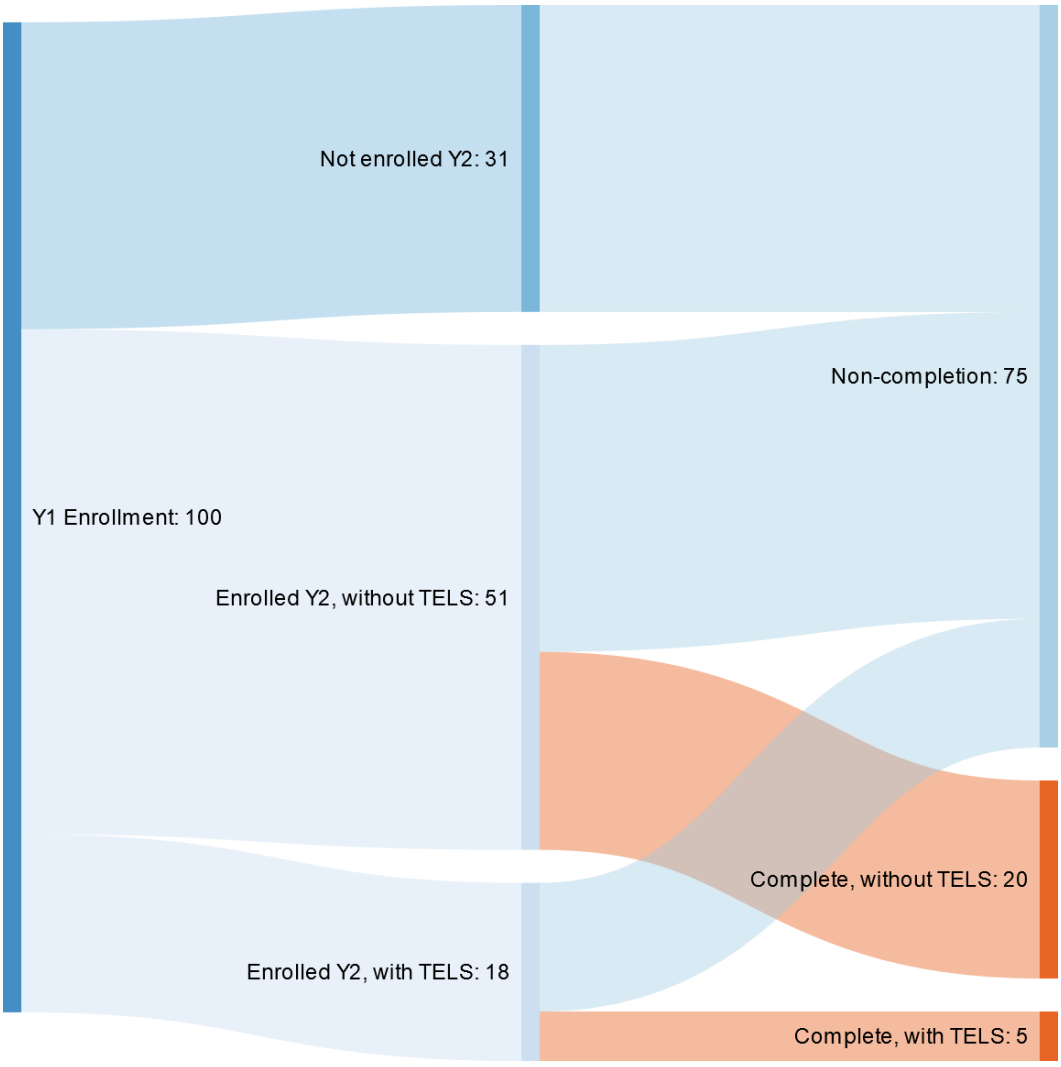
This study focuses on HOPE Access, which intended to provide a pathway for low-income students to receive HOPE aid. HOPE Access is the smallest of these four TELS programs, with 325 recipients in the 2018-2019 academic year (THEC, 2019). To receive HOPE Access, students must meet all three of the following eligibility criteria:

1. High school GPA: 2.75-2.99
2. ACT: 18-20
3. AGI: Less than $36,000

These eligibility criteria are just below the HOPE eligibility criteria of a 3.0 GPA or 21 ACT (HOPE does not have income requirements). HOPE Access is only awarded for the first 24 credits that a student is enrolled. If HOPE Access student earns at least a 2.75 GPA in college by the time they reach 24 credits, they qualify to receive the full HOPE award in subsequent academic terms. HOPE Access students receive $4,125 annually at four-year colleges and $2,625 at two-year colleges, which is about half the amount they would receive with full HOPE with the Aspire supplement (award amounts for 2009-2015; see Table 1, panel B).

According to the annual TELS report (THEC, 2015; THEC, 2019), about 18% of the 2013 HOPE Access cohort qualified to receive HOPE at 24 credits. Fifty-one percent did not qualify, but maintained enrollment without TELS aid. Twenty-six percent of initial HOPE Access recipients ultimately earned a degree within six years. Five percent of initial recipients were still receiving TELS aid when they graduated. Figure 2 depicts the flow of students from enrollment with HOPE Access aid to completion.

Figure 2: Outcomes for HOPE Access Students, 2013 Cohort (in percent)



Note: Statistics sourced from the 2015 and 2019 Tennessee Education Lottery Scholarship Program Annual Report

TELS aid outcomes

While research has not directly studied the impact of HOPE Access, prior studies have analyzed outcomes of other TELS aid programs, specifically HOPE. HOPE students are one of

the comparison groups in this study, so prior work in this area provides context for how we may expect HOPE and non-HOPE recipients to behave.

Bruce and Carruthers (2014) analyze matriculation outcomes for HOPE recipients between 2006-2009. The authors model a regression discontinuity, using the ACT eligibility cutoff for HOPE receipt as the threshold. Overall, they find that students around this eligibility threshold are more likely to enroll in a four-year college and more likely to enroll in a college with better graduation rates. They find that the impact is larger for low-income students and Pell recipients. These findings are supported by evidence from a survey of Tennessee high school seniors, which found that TELS aid impacted their decision on whether to attend college, especially for Black students and low-income students (Ness & Tucker, 2008).

TELS aid impacts student outcomes beyond enrollment. Carruthers and Ozek (2016) also use a regression discontinuity design to identify differences in college and work behaviors for students who lose HOPE eligibility after earning 24 college credits. The study finds that students who lose HOPE are more likely to enroll in fewer courses and work more during the subsequent term. Students who lose HOPE were less likely to persist into their 4^{th} term, but did not have different likelihood of on-time completion. Descriptive studies have found that students who are Black, low-income, and score lower on the ACT are more likely to lose their HOPE scholarship eligibility (Menifield, 2012).

In another study using a regression discontinuity design, Cummings et al. (2022) compare HOPE recipients across the GPA threshold for maintaining HOPE eligibility after their first year in college. They find higher-income white students are more likely to stop-out if they lose HOPE and Black students are more likely to transfer to a two-year college. They do not find an effect on Bachelor's degree attainment within four years, but Black students were less likely to

graduate with a Bachelor's degree within six years if they lost HOPE eligibility (Cummings et al., 2022).

These prior studies of TELS have focused exclusively on the HOPE program. This study expands our knowledge of the TELS program adding HOPE Access as a comparison group for the effect of HOPE or no-TELS. This study also differs from prior studies of HOPE by using all three eligibility thresholds to triangulate the findings.

Research Questions

This study is guided by the following research question: *To what extent do students who receive HOPE Access have different academic outcomes than (a) students who receive full HOPE aid and (b) students who receive no TELS aid?*

I compare students along two aid eligibility thresholds: the cutoff between HOPE Access receipt and full HOPE receipt, and the cutoff between HOPE Access receipt and ineligibility for TELS aid. These eligibility criteria are defined using a combination of three characteristics: ACT, GPA, and income. The academic outcomes included in this study include initial enrollment in college, persistence, and degree attainment. When identifying the effect of enrollment outcomes, students are identified by aid eligibility rather than actual aid receipt.

This question first asks if, in the absence of treatment, students who received HOPE Access would have the same academic outcomes as students who received the full HOPE award. For this comparison, treatment should be thought of as the receipt of a lower award amount than the comparison group. The "absence of treatment" does not refer to $0 TELS aid, but instead refers to the full HOPE amount. Part *b* of the research question compares HOPE Access students to students who receive no TELS aid. The comparison groups follow the more traditional model

in financial aid studies in which treatment is the HOPE Access award and the absence of treatment is $0 in TELS aid.

Hypothesis

HOPE Access is allocated on the basis of both financial need and demonstrated academic achievement. Prior research on need and merit financial aid finds that low-income students are especially price sensitive, and additional financial aid increases the likelihood that they will enroll, persist, and graduate from college (Castleman & Long, 2016; D. Deming & Dynarski, 2009; Hossler et al., 2009). I hypothesize that among students in this study, all of whom are low-income, those who receive more aid will have better academic outcomes in college. I anticipate HOPE students will have better outcomes than HOPE Access students, who have better outcomes than students who receive no TELS aid.

Students who have higher demonstrated academic achievement in high school also have better outcomes in college (Allensworth & Clark, 2020). While students receive different aid amounts based on their ACT and GPA, this study is not comparing students on the basis of these academic outputs. Using a regression discontinuity, this study compares students within a very narrow bandwidth, where assignment to treatment—which is based on these academic cutoff scores—is as good as random. Thus, the differences in student outcomes can be attributed to different levels of aid receipt, not prior academic achievement. The next section further explains the assumptions of my study design which justify this attribution of causality.

Methodology

The purpose of this study is to understand the effect of HOPE Access on student academic achievement. In an ideal study, students would be randomly assigned to receive HOPE, HOPE Access, or no TELS aid. This would eliminate the selection bias that makes some students

more or less likely to receive aid based on personal and structural characteristics. Randomly administering a state program is not feasible in this case as it would raise ethical and legal questions about access to public funding.

The next best approach is to use quasi-experimental methods to identify how the experimental condition, state aid, was administered in a way that mimics random assignment and control for other factors related to selection. Students are selected to receive HOPE Access based on their income, GPA, and ACT scores. Given that income, GPA, and ACT operate independently of aid receipt, students on the immediate either side of these award cutoffs are essentially randomly assigned to treatment. Using these three selection cutoffs as forcing variables, it is plausible to conduct a study using regression discontinuity design.

Identification Assumptions

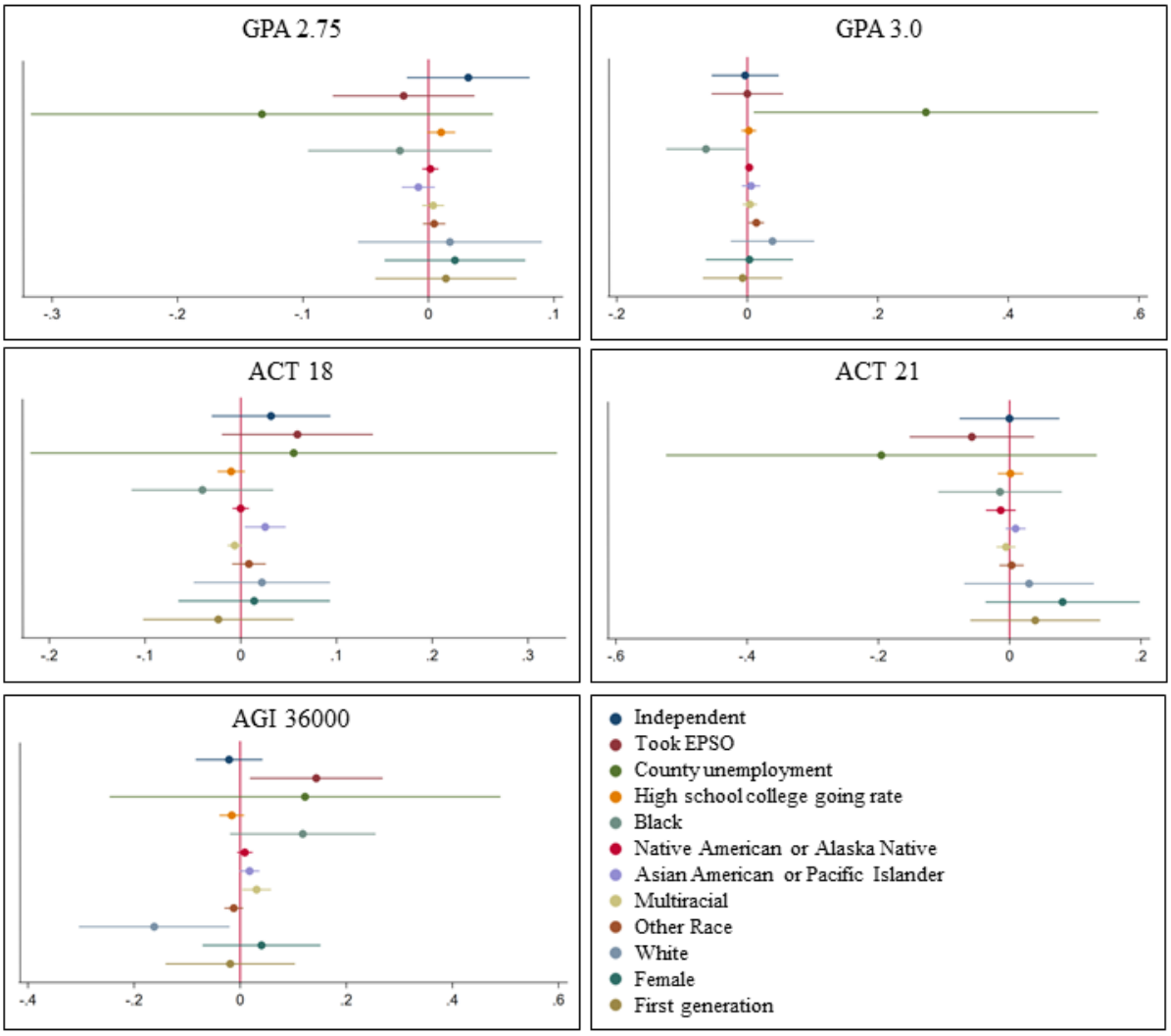
A key identification assumption for a plausibly causal regression discontinuity design is that the forcing variable is exogenous to treatment, meaning that students were unable to manipulate their ACT, GPA, or income to ensure they would receive aid. It is plausible that students would seek to earn a GPA or ACT score above the threshold in order to receive aid. The GPA threshold uses the cumulative average GPA for a student's high school career. To aim for this threshold, students would either have to know about it early in their high school career or be relatively close to the threshold later in their career to feasibly increase their average with few courses remaining. Similarly, some students may have the opportunity to re-take the ACT until they reach the score needed to receive aid. There may be personal characteristics and structural supports that are endogenous to the outcome that make some students more likely to be reach the ACT or GPA threshold. For example, students who are motivated, have mentors at home, or do not face systemic barriers to academic achievement may be more likely to reach the threshold

and have higher academic achievement in college because of these same characteristics. If some students are systematically more likely to reach the threshold in ways that cannot be controlled for, the model will overestimate the effect of aid. In other words, the effect will be a combination of aid and these omitted variables. Manipulation would be evident if the distribution of scores is not smooth at the cutoff for aid receipt.

To test that this assumption is met, I follow Carruthers and Ozek's (2016) example and check for balance and discontinuity by student demographic characteristics above and below the GPA, ACT, and income thresholds. This identifies if different types of students are more or less likely to respond to the threshold incentive. Figure 3 depicts the estimated discontinuities of pre-college student characteristics at each treatment threshold. Overall, this sample does appear to be fairly balanced demographically at both ACT and GPA thresholds. At the AGI threshold, students with higher incomes are more likely to have taken an early postsecondary opportunity (EPSO), more likely to be multi-racial, and less likely to be Black.

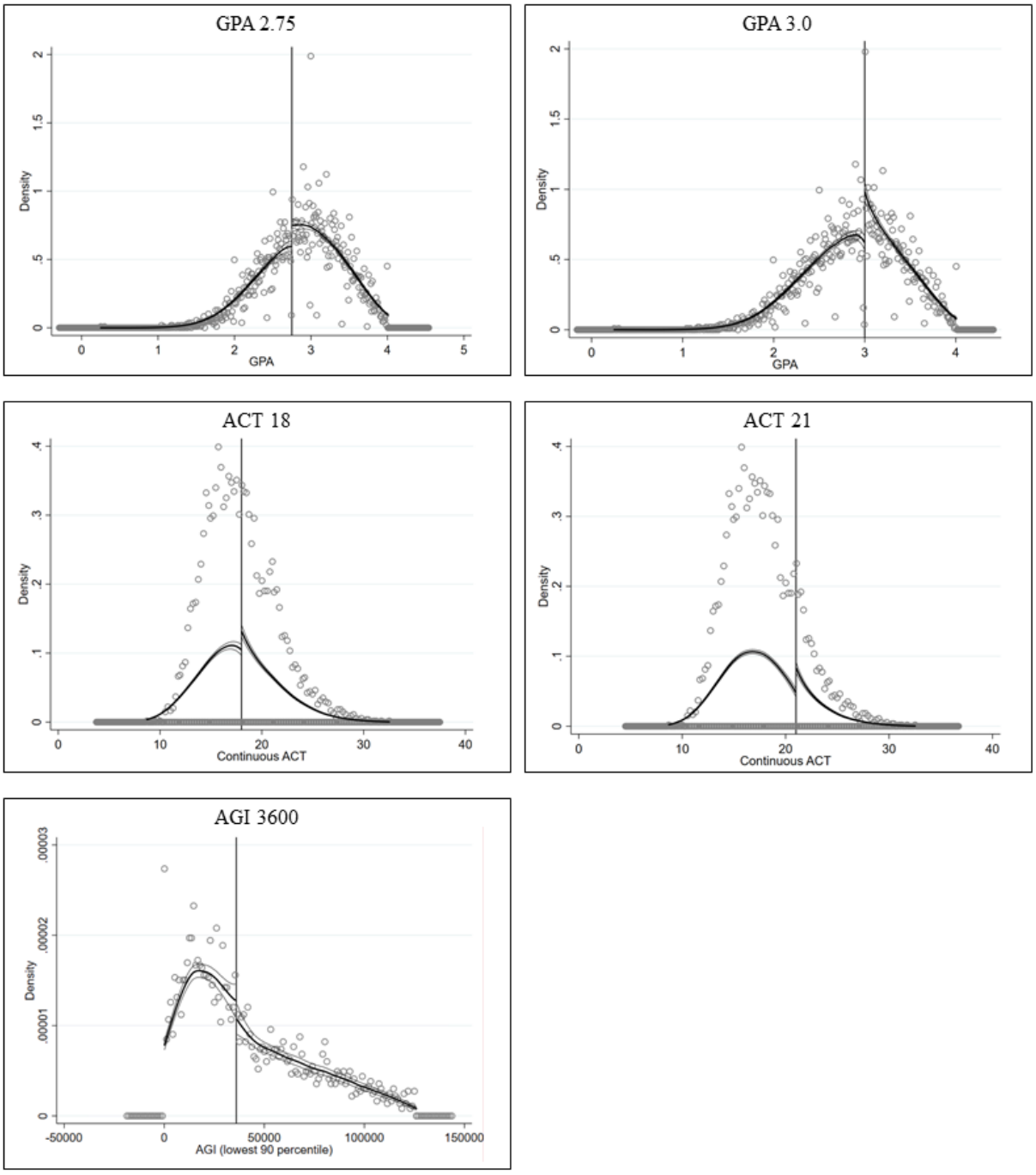
I also conduct McCrary (2008) tests to identify manipulation at the cutoff. The McCrary test identifies discontinuities in the density of the running variable at the cutoff. Figure 4 depicts the McCrary density plots at each threshold. I find evidence of significant discontinuities at both ACT and GPA thresholds for HOPE Access eligibility. The income density depicted excludes the top 10 percentile, since income is positively skewed, and the analyses will not include students from high income families. However, a McCrary test of the full income sample does indicate a discontinuity at the $36,000 threshold.

Figure 3: Estimated Discontinuities of Pre-College Student Characteristics at Each Threshold



Note: Additional characteristics that are not depicted due to scaling, but are insignificant at all thresholds include: tuition at closest four-year college, TCAP reading, TCAP math, and distance to closest four-year college. The vertical lines depict the 95% confidence intervals around the coefficient.

Figure 4: McCrary Density Plots at Each Threshold



Note: Samples restricted by the other HOPE Access eligibility criteria (for example, GPA threshold density plots include students with ACT scores between 18 and 20 and incomes less than or equal to $36000).

Bruce and Carruthers (2014) also find a discontinuity at the ACT cutoff for HOPE eligibility using McCrary test. To overcome this limitation, their study used the student's first ACT score instead, which did not have a discontinuity at the threshold. With my sample limitations, I do find evidence of discontinuities using three different ways to measure ACT: continuous ACT (the non-rounded average of the four subject ACT subject test), first ACT, and highest ACT score. Since the magnitude of the discontinuity is least using continuous ACT, I use continuous ACT in the main analyses.

The treatment variables have discontinuities which occur due to the underlying structure of these data. GPA scores, as the average of ordinal letter grades, are more likely to fall on rounded numbers. McCrary tests find significant discontinuities at each increment of .25 between GPA scores of 2 to 3.75, even though students do not have an incentive to manipulate their GPAs to non-treatment scores. Similarly, I find evidence of discontinuities in ACT scores and incomes at non-treatment increments. While some of the discontinuities at the thresholds may be manipulation, it would be extremely difficult for a student to intentionally manipulate all three criteria for HOPE Access receipt.

Another regression discontinuity identification assumption is that there are no other treatments at the threshold. If this assumption is not satisfied, the effect measured will be the effect of HOPE Access plus whatever other treatment is offered for students based on the same threshold. There are no other state financial aid programs that use the same GPA, ACT, or income thresholds. Institutions, however, may have their own aid programs that are available to students based on these same thresholds. Further, certain institutions may admit students generally based on these same academic criteria. If students are more likely to be admitted and attend certain institutions because of their GPA or ACT score and these institutions also have

student supports which make students more likely to enroll, persist, and earn a degree, the treatment effect would be receipt of HOPE Access plus attending a certain institution. I control for some institutional characteristics, including sector, control, tuition costs, and college graduation rate.

Regression discontinuity model

The analyses include combinations of three student outcomes, three thresholds for treatment, and two comparison groups. The combinations are listed in Table 2. Table 2 also lists the group of students included in each model. I use two base regression discontinuity models: one when the outcome is enrollment and another for the persistence and completion outcomes.

In the first set of models, the outcome is enrollment in college. I do not have information on treatment (aid receipt) noncompliance for students who do not enroll in college. There is no way of knowing if they would have accepted the aid if they had enrolled, whereas I can calculate noncompliance for students did enroll. Therefore, I use a sharp regression discontinuity, where the effect can be interpreted as the intent to treat students:

$$Y_i = \beta_0 + \beta_1 T_i + \beta_2 (Si - Sc) + \beta_3 ((Si - Sc) * T_i) + \gamma_k \boldsymbol{G} + e_i \quad (1)$$

Y is the likelihood that individual *i* enrolls in college; *Ti* is an indicator that the individual met the criteria for treatment by way of either GPA, ACT, or income, which are modeled separately; *Si – Sc* is the difference between the individual's value for the forcing variable (GPA, ACT, or income) and the cutoff score which determined HOPE Access eligibility. The interaction of *(Si -Sc)* and the treatment indicator *Ti* allows the linear function to vary on either side of the cutoff. ***G*** is a vector of covariates (explained below), and *e* is the error term.

B1 represents the parameter of interest, the difference in probability of enrollment for students who were eligible to receive HOPE Access and those who were not eligible for HOPE Access (in one set of models these students were eligible for HOPE and in another, for no TELS aid). Specifically, this is the local average treatment effect and should only be interpreted as applicable to students near the threshold for treatment.

I use a second set of models for the persistence and completion outcomes. These models only include students who enrolled in college, so I can calculate noncompliance for both the treated and untreated groups. While the state automatically distributes the financial aid to students who file the FAFSA and enroll at an eligible institution, there is noncompliance since the state does not automatically receive GPA scores for all students (described in further detail in the following section). Therefore, I model a fuzzy regression discontinuity using two-stage-least-squares. In the first stage, I predict the likelihood that a student is treated (receives HOPE Access) from the eligibility criteria:

$$T_i = \beta_0 + \beta_1 Elig_i + \beta_2(Si - Sc) + \beta_3((Si - Sc) * Elig_i) + \gamma_k \boldsymbol{G} + e_i \quad (2)$$

The outcome, *T*, is an indicator that student *i* received treatment, financial aid through HOPE Access. *Elig* is an indicator that the student was eligible for treatment via GPA, ACT, or income, depending on the model. *B1* is interpreted as the first-stage effect of meeting the eligibility criteria. As with model 1, *Si – Sc* is the difference between the individual's value for the forcing variable and the cutoff score which determined HOPE Access eligibility. $\boldsymbol{G}$ is a vector of covariates, and *e* is the error term.

In the second stage of the fuzzy regression discontinuity, I use the expected value of treatment from the first stage as the independent variable, $\widehat{T}$:

$$Y_i = \beta_0 + \beta_1 \widehat{T}_i + \beta_2(Si - Sc) + \beta_3((Si - Sc) * \widehat{T}_i) + \gamma_k \boldsymbol{G} + e_i \quad (3)$$

This two-stage least squares (2SLS) approach uses the probability of treatment receipt estimated in Model 2 (the first stage) as an instrument for actual aid receipt in Model 3 (the second stage). The probability of aid receipt is a good instrument for aid receipt since it is a strong predictor of aid receipt and it is unlikely that the probability of treatment affects the outcomes except through aid receipt. This approach also assumes that there are some students on either side who comply to treatment assignment, some who would always receive treatment regardless of assignment, and some who would never receive treatment. The group of students who always or never receive treatment are not affected by the cutoff, and it is assumed that the proportion of students in these groups on either side of the cutoff is equal. Therefore, the IV effect estimates the behavior of the compliant group (Murnane & Willett, 2011).

I check for model sensitivity by running these models with and without covariates, with a quadratic functional form, and varying bandwidths (described below).

In each model, I limit the sample to students who are otherwise eligible for HOPE Access based on the other two eligibility criteria (see Table 2, column 4). This strategy of modeling each threshold separately using subsamples has been termed a "frontier RD," estimating the "frontier average treatment effect" (Reardon & Robinson, 2012; Wong et al., 2013). Reardon and Robinson (2012) describe multiple strategies, including the frontier method, for conducting regression discontinuities for multi-treatment and multi-score eligibility criteria. Other strategies have advantages such as maximizing power by using all available data to estimate all treatment effects in a single model (as is the case in the response surface design) or estimating the effect of two treatments directly against each other (in the distance-based design). I have chosen the frontier method because my research questions focus exclusively on identifying the effect of HOPE Access, rather than the effect of each treatment (non-TELS, HOPE Access, and

HOPE/Aspire). The frontier approach also has the advantage following the methodology employed by studies which have a single cutoff which eases interpretation. A disadvantage to the frontier method is that the effects cannot necessarily be compared directly to other thresholds when different sub-samples are used. Generalizability of the treatment effect is limited to students at the threshold who fit in the other subsample criteria. Additionally, limiting the sample may reduce statistical power. Prior studies of financial aid programs with both income and merit criteria have also used the frontier method (Kane, 2003).

Table 2: List of Models

<table>
<tr><th>Model number</th><th>Comparison group (relative to HOPE Access)</th><th>Forcing variable</th><th>Sample</th><th>Outcome</th></tr>
<tr><td colspan="5">RQ1a</td></tr>
<tr><td>1</td><td rowspan="6">HOPE</td><td rowspan="3">GPA (3.0 cutoff)</td><td rowspan="3">Income <36k, ACT 18-20</td><td>Initial enrollment</td></tr>
<tr><td>2</td><td>Persistence into second year (accumulates > 24 credits)</td></tr>
<tr><td>3</td><td>Earns a degree</td></tr>
<tr><td>4</td><td rowspan="3">ACT (21 cutoff)</td><td rowspan="3">Income <36k, GPA 2.75-2.99</td><td>Initial enrollment</td></tr>
<tr><td>5</td><td>Persistence into second year (accumulates > 24 credits)</td></tr>
<tr><td>6</td><td>Earns a degree</td></tr>
<tr><td colspan="5">RQ1b</td></tr>
</table>

7	No TELS Aid	GPA (2.75 cutoff)	Income <36k, ACT 18-20	Initial enrollment
8				Persistence into second year (accumulates > 24 credits)
9				Earns a degree
10		ACT (18 cutoff)	Income <36k, GPA 2.75-2.99	Initial enrollment
11				Persistence into second year (accumulates > 24 credits)
12				Earns a degree
13		Income (36k cutoff)	ACT 18-20, GPA 2.75-2.99	Initial enrollment
14				Persistence into second year (accumulates > 24 credits)
15				Earns a degree

Dependent variables

The three main outcomes in this study include are enrollment, persistence, and completion. Enrollment is an indicator that the student enrolled in any college where students can apply TELS aid within two years of high school graduation. This includes public four-year and community colleges, as well as 32 private colleges. Students are eligible for TELS up to sixteen months after they graduate from high school. The two-year window allows me to include students who did not enroll directly into college the fall after spring high school graduation, but were still eligible for TELS. The limit also sets an equal time for each cohort so results are not more favorable for students in earlier cohorts who have had more time to enroll. Persistence is an indicator that the student earned more than 24 credit hours within one year of enrolling in

college, the point at what students become ineligible for HOPE Access. Completion is an indicator that the student earned a degree or certificate within six years of initial college enrollment. Due to data limitations, I do not have data for students who transfer or complete a degree at an institution that does not report to the state. These students may, in fact, persist or complete, but they would appear as unenrolled in my data.

Treatment variable

Treatment is HOPE Access eligibility in the enrollment models and initial HOPE Access receipt in the persistence and completion models. Students receive HOPE Access for their first 24 credits. For both HOPE Access and HOPE students, eligibility is re-calculated based on college GPA at 24 credits. This study does not take into account dosage in terms of number of terms that the student receives TELS aid.

Covariates

The covariates in these models include student-level information which serve as control variables to isolate the effect of financial aid. These variables follow from the conceptual framework and include indicators which prior literature have demonstrated are related the student's choice to enroll, persist, and complete college. Perna's (2006) conceptual framework includes abstract concepts such as social and cultural capital, which are difficult to measure directly. Perna offers suggestions for appropriate proxies and operationalizations that have been used in prior research, which I also use in this study.

The most concrete features of the cost/benefit analysis include the supply of resources, which I measure using family income, dependency status, and state aid eligibility (the treatment). A second element is the student's "demand for higher education" which can be measured through academic preparation and achievement. I include measures of the student's high school

performance on state standardized tests and an indicator that the students took any early postsecondary opportunities (EPSO) including AP, IB, or dual enrollment. The expected costs of going to college include college prices and foregone earnings, which I measure as the cost of attendance at the college which is closest to their high school and unemployment rate in the student's high school county.

Perna notes that the expected benefits to college are influenced by a student's background and habitus. For example, low-income students are more likely to underestimate earnings for college graduates and female students have more to gain from degree attainment due to the gender wage gap. Student identities are important to account for because of the way that the educational system has been designed to exclude groups of people on the basis of these identities. Therefore, I include race and gender. Additionally, the K-12 and higher education system are designed for students who have a particular social and cultural capital—often associated with white, middle- and upper- socioeconomic statuses—which offer the unspoken knowledge for successfully navigating the college admissions process. In addition to the aforementioned race and financial variables to serve as imperfect proxies for these measures, I include an indicator that the student's parents do not have a college degree, since these students are less likely to have the inter-generational knowledge which eases navigating the college choice process. Another aspect of social capital includes the peer effects, which I will capture as the average college going rate at the student's high school.

The next layer in Perna's model is the student's school and community context. Sample size does not permit me to include a fixed effect for high school, and I do not have measures related to the types of college counseling or availability of college prep courses at the student's high school. However, I have already mentioned a few school and community level variables

that are also related to this layer including: county unemployment rate and high school college going rate.

The higher education context is the third layer. This context is similar for all students since they are all in the same state. However, most students attend college close to their hometown, so in the enrollment models, I include variables related to the county that a student is from including distance to the closest college from the student's high school and the cost of that college. College context matters much more when considering the post-enrollment outcomes in this study. I include college-level covariates including college graduation rate, sector, control, and cost of attendance in the persistence and completion models. I am unable to include institution fixed effects due to sample size.

Finally, the fourth layer of college choice includes the broader social, economic, and policy context. The social and economic characteristics have been captured in other variables. The policy context is generally the same for all students since they are operating within the same state, though there may be county level policies which influence college choice. For example, Knox Achieves began to offer free-community college to high school graduates from Knox county in 2008 (Carruthers 2019). To account for this county-specific aid policy, I conduct a robustness check where I exclude students who graduated from Knox, Decatur, and Henderson counties, all of which had a free-college program prior to 2014.[30] Students may also be subject to different contextual factors over time, though I am unaware of any major higher education or K-12 reforms during this period.

Table 3 lists these covariates along with dependent and independent variables in this study.

[30] Results are robust to this specification

Table 3: List of Variables

Variable	Construct
Dependent Variables	
Enrollment in college	
Persistence after 24 credits	
College completion	
Independent Variables	
TELS aid receipt	Supply of resources
ACT score	Demand for higher education
High school GPA	Demand for higher education
Adjusted Gross Income	Supply of resources
Covariates	
Dependency status	Supply of resources
High school standardized test scores (TCAP reading and math)	Demand for higher education
Participated in at least one EPSO	Demand for higher education
Cost of attendance at closest college	Expected cost of college
County unemployment	Expected cost of college (forgone earnings)/community context
High school college going rate	Community context/Habitus
Race	Habitus
Gender	Habitus
First generation status	Habitus
Distance from high school to nearest college	Higher education context
College sector (TCAT/2yr/4yr)	Higher education context*
College graduation rate	Higher education context*
College control (public/private)	Higher education context*
College cost of attendance	Higher education context*

*Note: ACT, GPA, and AGI are included as covariates in models where the other eligibility criteria are used as the treatment threshold. *Covariates for persistence and completion models only.*

Appendix A includes an extended methodology describing additional information on how these variables were calculated.

Bandwidth specifications

One of the most important considerations for a regression discontinuity design is specifying the bandwidth, or how far away from the cutoff a student can be to be included. While a smaller bandwidth results in more precise estimates, a larger bandwidth may be necessary to maintain enough statistical power. The further away from the cutoff a student is, the more likely it is that they become dissimilar on factors other than treatment that are related to the outcomes.

I run each model with different bandwidth specifications to test the robustness of the results to the bandwidth. In the primary models, I use the mean squared error-optimal bandwidth and a triangular kernel (Calonico et al., 2017). To test for model sensitivity to the bandwidth, I also model bandwidths at increments of .01 for GPA, 1 for ACT, and $1000 for income.

Data

This analysis uses Tennessee's longitudinal data system, which includes K-12, postsecondary, and workforce data. The data used for this project is primarily administrative data from the Tennessee Higher Education Commission and Tennessee Student Assistance Corporation (THEC/TSAC), the state's higher education coordinating agency. THEC/TSAC collects an array of enrollment and completion data from public colleges and select private colleges at various points throughout the year for the purpose of administering the state's financial aid programs. These data include student-level measures for demographic, financial, and academic characteristics, as well as measures related to the college experience including enrollment, financial aid records, and credit attainment. Postsecondary data is supplemented with data from K12, including high school characteristics, student demographic information, and test scores.

The postsecondary data are the same sources used to report descriptive statistics in the annual legislative reports on the TELS program. However, due to data updates over time and different specifications used in this study, descriptive results presented in this study may be slightly different results than the reports.

I supplement these data with publicly available data about institutional characteristics from IPEDS and county information from the Bureau of Labor Statistics.

Sample

For this analysis, the full sample includes students who graduated from high school between Spring 2010 through Spring 2013 and filed the FAFSA. If students enroll in college the Fall after graduating, they would be considered first-time freshmen (FTF) between Fall 2010 though Fall 2013. Pooling data from four cohorts (FTF 2010, 2011, 2012, and 2013), increases the sample size and improves statistical power. I exclude students who do not file the FAFSA because I do not have income data for these students and AGI is one of the eligibility thresholds for TELS aid. I also exclude students who are missing an ACT or GPA score.

I focus on high school graduates because non-completers would not be eligible for financial aid. Cohorts after FTF 2014 would have been eligible for Tennessee Promise, making them recipients of two treatments, so they are excluded from this analysis. Additionally, six-year outcomes data are unavailable for students in cohorts after FTF 2013. My sample starts at 2010 which is the first year all of the covariate information is available. The complete P20 dataset includes data for cohorts graduating between 2006-2021, and I test my model's robustness to different sets of cohorts. While the results are robust to alternate cohort specification, but I report on the 2010-2013 cohorts since it is the most conservative.

Compliance with Treatment

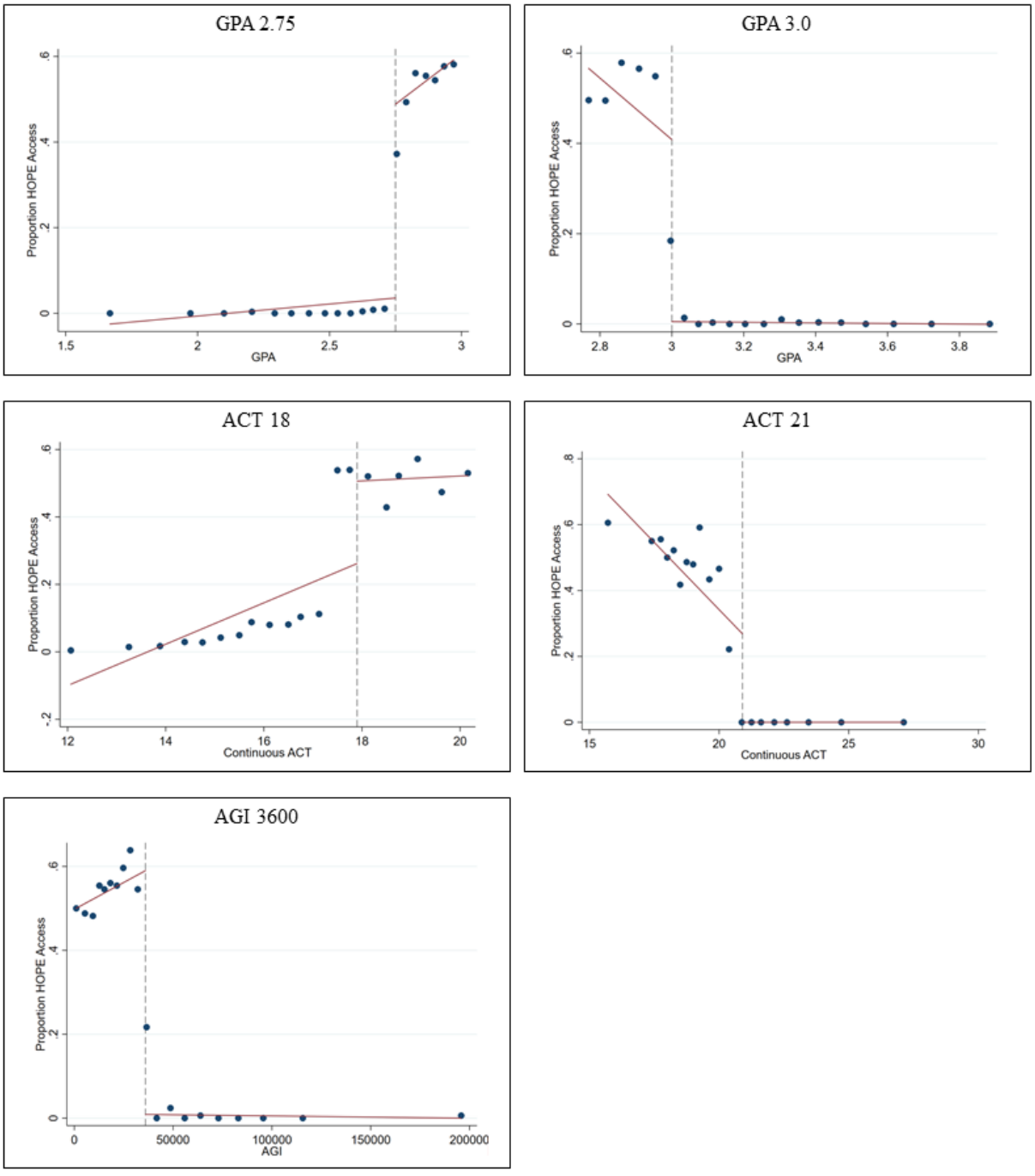
State financial aid is automatically awarded to students who file the FAFSA, however, this does not necessarily mean that all eligible students receive an award. Students may meet the eligibility criteria for treatment but not receive aid for a few reasons. First, a student may enroll in an institution which is not eligible to receive state TELS aid, thus meeting the criteria but not receiving aid. These students would not be included in the analysis because the institutions they attend do not report data to the state. Second, students with loan defaults are not eligible to receive state aid. Third, students may refuse to accept the aid, typically for religious objection to lottery. Fourth, the state may not receive information about the student's GPA, which sometimes must be submitted separately if the student does not have a HOPE eligible ACT score (since HOPE is awarded on either ACT or GPA). Since I have built a dataset which has both K12 and postsecondary data sources for ACT and GPA, I may have data which is different from what was actually submitted to the state for aid eligibility – particularly in cases where I supplemented postsecondary data with K12 data.

I find that 54% of students who enroll in college and meet the eligibility criteria for HOPE Access actually receive the award. About 79% for HOPE or Aspire eligible students receive an award. Very few students, .1%, who are not eligible for TELS receive an award.

Figure 5 depicts the proportion of students on either side of each threshold who receive HOPE Access. Samples for each graph are limited to students who meet the other eligibility criteria for HOPE Access. The top two graphs depict compliance at the GPA thresholds. The middle two graphs depict compliance using a measure of continuous ACT. There is more non-compliance using my derived continuous ACT measure than actual ACT because actual ACT

scores are rounded. For example, students just below the threshold for HOPE Access at the 18 cutoff are just as likely to receive HOPE because their actual ACT scores would have been 18.

Figure 5: Compliance to Treatment at Each Threshold



Descriptive Statistics

Student characteristics across aid eligibility and receipt

Table 4 reports characteristics of HOPE Access students, compared to students who were eligible for/received a TELS grant and to students who were not eligible for/did not receive a TELS grant. The comparison groups are limited to students with an income less than or equal to $36,000, the income threshold for HOPE Access receipt. The sample is limited to students who graduated from a TN high school between 2010 and 2013. Descriptively, HOPE Access students had lower enrollment rates than TELS eligible students, but higher enrollment rates than non-TELS eligible students. For students who enroll in college, HOPE Access students are less likely to earn 24 credits and to earn a college degree within 6 years than TELS students, but more likely to achieve those outcomes than non-TELS students.

As expected given the academic eligibility criteria for the financial aid programs, HOPE Access students' average ACT and GPA scores fall between TELS and non-TELS students. The average income is similar across the three groups, though slightly lower for non-TELS students. HOPE Access students and non-TELS students are substantially more likely to be Black than TELS students. Access recipients and TELS recipients are both more likely to enroll in four-year colleges than non-TELS recipients, the majority of whom enroll in two-year colleges.

Table 4: Descriptive Characteristics by Aid Group (2010-2013 Cohorts)

Panel A: Enrollment outcomes

	Access eligible	TELS eligible (Aspire)	Non-TELS eligible, low income
Enrolled in college	82%	87%	68%
Observations	1954	22761	23037

Panel B: Persistence and completion outcomes

	Access	TELS (non-Access), low-income	Non-TELS, low-income
Earned 24 credits	72%	83%	62%
Earned college degree or certificate	32%	51%	19%
Observations	971	17540	21864

Panel C: Student Characteristics

	Access	TELS (non-Access), low-income	Non-TELS, low-income
ACT	18.85	21.64	16.36
	(0.796)	(3.720)	(3.326)
GPA	2.874	3.336	2.473
	(0.0863)	(0.433)	(0.532)
AGI	18755.2	18708.0	17067.3
	(10832.2)	(10220.6)	(9820.7)
Black	55%	32%	55%
American Indian or Alaska Native	0%	0%	0%
Asian or Pacific Islander	1%	2%	1%
Multiracial	0%	0%	0%
Other race	0%	1%	1%
White	43%	64%	43%
Female	61%	62%	56%
First generation	59%	57%	63%
TCAP Reading	552.1	566.2	536.5
	(25.47)	(30.06)	(35.55)
TCAP Math	553.9	574.1	534.8
	(30.83)	(36.10)	(42.73)
Participated in at least 1 EPSO	31%	47%	17%
Independent	9%	9%	19%

College enrollment rate for high school graduating class	71%	71%	68%
In-state tuition at closest four-year college	6085.8	6074.3	6065.8
	(917.4)	(986.7)	(924.0)
County unemployment	9%	9%	9%
	(1.590)	(1.802)	(1.629)
Distance to closest four-year college (miles)	11.12	15.86	13.24
	(14.38)	(16.28)	(15.31)
Two-year institution	27%	26%	69%
Four-year institution	73%	74%	25%
TCAT	0%	0%	6%
Private institution	11%	14%	7%
In-state tuition at first college	6360.0	7230.1	4198.2
	(4838.5)	(5949.0)	(2838.8)
Observations	867	15515	18955

Note: Standard deviation for non-binary variables in parentheses

Descriptively, cohorts of Access students have similar outcomes and demographic characteristics, so variation from pooling data across cohorts should not be a major concern.

Student characteristics across thresholds

Table 5 describes pre-treatment characteristics of students above and below each threshold. Panel A draws from the full sample of students, as does the enrollment model. Panel B includes only students who enrolled in college within two years of graduating high school, which is the sample for the persistence and completion models. For each threshold, the sample is limited to students who would be eligible for HOPE Access based on the other criteria. For example, Columns 1 describes students who earned an ACT score below 21, but had a GPA between 2.75 and 3.0 and income below $36,000. These descriptive statistics do not include any bandwidth limitation around each threshold, so students are included who would not be in the analyses.

Descriptively, fewer students who were below each threshold enrolled in college, earned 24 credits, and earned a degree, suggesting that students with higher scores and higher incomes

had better outcomes. For persistence and completion, the difference is larger for the GPA groupings than the ACT groups. About 64% of students with a GPA below 3.0 earned 24 credits, compared to 81% for those above, a difference of 17 percentage points. For students scoring below or above 21 on the ACT, the difference is only about 3.5 percentage points. The difference is fairly consistent comparing each group for college enrollment, at about 8 to 11 percentage points, but lower for income groups.

Table 5 also compares student demographic characteristics. Students are fairly similar across groups in terms of ACT, GPA, and AGI (aside from when grouped using that factor). Students in the different groups faced similar community and school contexts, evidenced by similar county unemployment rates, and tuition at and distance to nearby institutions. When grouped by the ACT thresholds, students with higher ACT scores were slightly more likely to attend schools with a higher college enrollment rate. Concerning student's demonstrated high school academic achievement, students with higher ACT scores and GPAs were substantially more likely to have participated in an EPSO by about 14 to18 percentage points. Similarly, students with higher ACT scores and GPAs scored higher on TCAP tests on average.

The racial composition is fairly similar across GPA score groups but substantially different across the ACT and AGI groups. In panel A, about 60% of students scoring below 18 on the ACT are Black compared to 32% of those above (results within one percentage point for the students in Panel B). Below the 21 ACT score, about 53% are Black compared to 23% above. For AGI, about 44% students with incomes below $36,000 are Black compared to 24% for higher income students. By gender, there are a higher percentage of female students in the higher GPA scoring groups, but a lower percentage in the higher ACT scoring groups.

Panel B also includes characteristics of the institution the student attended. Students with lower ACT scores and GPAs were substantially more likely at attend community college. Those students also attended colleges with lower tuition rates and lower graduation rates, on average.

Table 5: Descriptive Means for Student Characteristics by Threshold Sample (2010-2013 Cohorts)

Panel A: Enrollment Samples

	ACT<21	ACT>21	GPA<2.75	GPA>2.75	ACT<18	ACT>18	GPA<3.0	GPA>3.0	AGI<36000	AGI>36000
Enrolled college within 2 years of high school graduation	78%	89%	78%	86%	76%	86%	76%	85%	82%	86%
ACT	17.03	22.77	18.79	19.03	15.87	20.89	18.77	18.98	18.84	18.97
	(2.34)	(3.00)	(0.79)	(0.80)	(1.79)	(2.69)	(0.78)	(0.80)	(0.79)	(0.81)
AGI	17,676.50	17,388.40	17,533.20	18,544.00	17,691.40	17,534.70	17,421.60	18,328.90	17,763.20	81,934.70
	(10,051.80)	(10,363.70)	(9,949.60)	(9,970.60)	(9,979.90)	(10,274.10)	(9,862.90)	(10,019.00)	(10,128.20)	(59,845.10)
GPA	2.86	2.87	2.53	3.35	2.86	2.87	2.36	3.22	2.87	2.87
	(0.07)	(0.07)	(0.35)	(0.25)	(0.07)	(0.07)	(0.30)	(0.31)	(0.07)	(0.07)
Independent	16%	15%	18%	13%	17%	16%	18%	14%	16%	1%
Participated in at least 1 EPSO	24%	41%	20%	39%	20%	35%	17%	35%	27%	22%
In-state tuition at closest 4yr college	6,092.20	6,056.10	6,090.90	6,117.90	6,092.90	6,075.80	6,082.10	6,115.50	6,109.10	6,190.40
	(919.90)	(1,014.50)	(973.50)	(974.10)	(884.00)	(1,001.70)	(977.40)	(971.60)	(965.30)	(1,091.70)
County unemployment	8.84	8.70	8.75	8.90	8.90	8.71	8.78	8.85	8.71	8.53

	(1.71)	(1.80)	(1.67)	(1.78)	(1.68)	(1.79)	(1.64)	(1.76)	(1.71)	(1.74)
College enrollment rate for high school graduating class	0.68	0.72	0.70	0.69	0.67	0.71	0.71	0.70	0.70	0.72
	(0.10)	(0.09)	(0.10)	(0.09)	(0.10)	(0.09)	(0.10)	(0.09)	(0.09)	(0.08)
Black	53%	23%	43%	43%	60%	32%	42%	43%	44%	24%
American Indian or Alaska Native	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Asian or Pacific Islander	1%	1%	1%	2%	1%	1%	1%	1%	1%	1%
Multiracial	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
Other race	1%	1%	1%	1%	1%	1%	1%	1%	1%	0%
Female	63%	45%	51%	70%	67%	51%	47%	67%	58%	54%
First Generation	64%	56%	59%	60%	66%	58%	59%	61%	61%	38%
Distance to closest four-year college (miles)	13.15	15.24	13.12	15.68	12.53	14.80	12.93	15.09	13.52	14.70
	(15.64)	(15.84)	(15.23)	(16.59)	(15.36)	(15.99)	(15.13)	(16.30)	(15.41)	(14.86)
TCAP score for reading	542.60	570.90	552.20	556.40	535.50	563.30	551.40	555.70	553.80	553.50
	(30.96)	(28.88)	(27.89)	(26.95)	(29.74)	(29.17)	(27.81)	(27.26)	(27.98)	(29.57)

TCAP score for math	543.00	577.20	552.90	561.90	534.60	567.80	551.30	560.30	556.20	555.60
	(36.32)	(33.88)	(32.18)	(30.51)	(34.88)	(34.26)	(32.04)	(31.10)	(32.23)	(33.89)
Observations	4,655	1,130	5,402	4,639	3,159	2,626	3,638	6,403	1,764	1,600
Panel B: Persistence and Completion Samples (College Enrollees)										
	ACT<21	ACT>21	GPA<2.75	GPA>2.75	ACT<18	ACT>18	GPA<3.0	GPA>3.0	AGI<36000	AGI>36000
Earned 24 credits within 1 year of enrolling college	67%	71%	64%	81%	66%	70%	61%	78%	69%	74%
Earned degree within 6 years graduating high school	28%	31%	24%	48%	27%	31%	21%	43%	30%	37%
ACT	17.19	22.88	18.79	19.04	16.00	21.02	18.78	18.98	18.83	18.98
	(2.32)	(2.85)	(0.79)	(0.80)	(1.78)	(2.66)	(0.79)	(0.80)	(0.79)	(0.81)
AGI	17,828.10	17,347.80	17,535.80	18,659.80	17,892.40	17,543.80	17,374.80	18,443.50	17,845.00	81,444.00
	(10,122.20)	(10,403.90)	(9,981.70)	(10,004.20)	(10,081.40)	(10,292.10)	(9,899.70)	(10,046.10)	(10,139.10)	(56,453.20)
GPA	2.86	2.87	2.54	3.35	2.86	2.87	2.37	3.22	2.87	2.87
	(0.07)	(0.07)	(0.34)	(0.25)	(0.07)	(0.07)	(0.30)	(0.31)	(0.07)	(0.07)
Independent	13%	13%	14%	11%	13%	13%	14%	11%	13%	1%
Participated in at least 1 EPSO	25%	41%	22%	39%	21%	36%	19%	36%	27%	23%

In-state tuition at closest four-year college	6,062.30	6,054.20	6,078.70	6,106.10	6,063.10	6,057.90	6,074.90	6,100.80	6,086.00	6,184.20
	(920.40)	(1,027.00)	(961.60)	(969.30)	(885.60)	(1,003.70)	(965.90)	(965.00)	(953.40)	(1,095.40)
County unemployment	8.83	8.71	8.73	8.89	8.90	8.70	8.76	8.83	8.67	8.51
	(1.73)	(1.84)	(1.66)	(1.79)	(1.70)	(1.81)	(1.65)	(1.77)	(1.69)	(1.73)
College enrollment rate for high school graduating class	0.69	0.73	0.71	0.70	0.68	0.72	0.71	0.70	0.71	0.73
	(0.10)	(0.09)	(0.10)	(0.09)	(0.10)	(0.09)	(0.10)	(0.09)	(0.09)	(0.08)
Black	54%	23%	44%	44%	62%	32%	43%	45%	46%	25%
American Indian or Alaska Native	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Asian or Pacific Islander	1%	1%	1%	2%	1%	1%	1%	2%	1%	1%
Multiracial	0%	0%	0%	1%	0%	0%	0%	1%	0%	1%
Other race	1%	1%	1%	1%	1%	1%	1%	1%	1%	0%
Female	63%	46%	52%	71%	67%	51%	48%	68%	59%	53%
First Generation	63%	55%	58%	61%	65%	57%	57%	60%	60%	36%
Distance to closest four-year college (miles)	13.06	15.44	12.85	15.24	12.58	14.64	12.84	14.61	12.85	14.48

	(15.32)	(15.86)	(14.76)	(16.36)	(15.18)	(15.70)	(14.83)	(15.95)	(14.64)	(14.68)
TCAP score for reading	542.90	571.50	551.10	555.60	535.90	563.30	550.20	554.90	552.70	553.00
	(29.89)	(29.04)	(25.82)	(25.26)	(29.17)	(28.53)	(25.83)	(25.42)	(25.73)	(28.94)
TCAP score for math	543.10	578.10	552.00	561.20	534.50	568.00	550.40	559.60	554.90	555.30
	(35.84)	(33.54)	(30.74)	(29.24)	(34.81)	(33.83)	(30.43)	(29.89)	(31.13)	(33.04)
In-state tuition at first college	5,031.40	6,389.40	4,983.50	6,503.30	4,705.30	5,989.70	4,663.70	6,263.00	5,597.80	5,172.10
	(3,660.00)	(5,074.30)	(3,809.40)	(5,368.40)	(3,091.30)	(4,772.70)	(3,497.80)	(5,117.50)	(4,277.90)	(4,081.90)
Two-year institution	50%	31%	55%	31%	55%	37%	62%	34%	41%	49%
TCAT	3%	1%	2%	2%	4%	1%	2%	2%	2%	2%
Graduation rate at college attended	25.91	34.68	24.91	33.95	23.77	32.13	22.43	32.82	29.67	27.92
	(17.57)	(16.87)	(16.99)	(16.57)	(17.54)	(16.98)	(16.64)	(16.67)	(16.55)	(16.66)
Observations	3,639	1,009	4,209	3,988	2,401	2,247	2,768	5,429	1,441	1,372

Note: Standard deviation in parentheses; grey columns are eligible for or received HOPE Access

Regression Discontinuity Results

The main results for this study are reported in Table 6. Estimates for models with enrollment as the outcome are reported in Panel A. Panel B reports estimates for persistence outcomes, and Panel C estimates degree completion. In the first two columns, the comparison groups compare HOPE Access students with students who are eligible for TELS aid. The third through fifth columns use non-TELS eligible students as the comparison group. To visualize the uncertainty of the results, the confidence intervals around each coefficient is plotted in Figure 6.

All analyses were conducted using the mean squared error-optimal bandwidth and a triangular kernel (Calonico et al., 2017). The results indicate the local average treatment effect for students within the listed bandwidth of the threshold who also met the other HOPE Access eligibility criteria. Significant effects can be interpreted as the percentage point change in likelihood that a student enrolls, persists, or completes in college. The sample includes students who graduated high school between 2010 and 2013. Each model is limited to students who would otherwise be eligible for HOPE Access, except for the forcing variable. Overall, I do not observe that HOPE Access had an effect on student outcomes.

Additional results using alternate specifications and bandwidths are reported in Appendix B. Appendix C reports the persistence and completion models as intent to treat, which increases the sample size and statistical power.

Enrollment

The first student outcome in this study is enrollment patterns. Enrollment is measured as an indicator that the student enrolled in a postsecondary institution within two years of their high school graduation year.

The first two columns in Table 6, Panel A reports the sharp regression discontinuity estimates where the comparison groups are students who are eligible for HOPE Access and eligible for HOPE + Aspire students (model 1). Column 1 reports the local average treatment effect for students using the ACT threshold (21). The sample for this analysis includes students who would otherwise be eligible for HOPE Access on the basis of their GPA (between 2.75 and 3.0) and income (maximum of $36,000). The resulting effect is insignificant; there is no statistically significant difference in student enrollment behavior for students who are eligible for HOPE Access and students who are eligible for HOPE + Aspire at the ACT eligibility threshold.

The second column in Table 6, panel A reports the results for students at the eligibility threshold on the basis of GPA (3.0). This analysis was conducted using the same methodology as described for the ACT analysis, but the sample is limited by ACT (18-20) and income (<=36000). I do not find a statistically significant difference in the likelihood of enrollment for students who are eligible for HOPE + Aspire or HOPE Access at the GPA threshold.

The remining columns of Table 6, panel A use the lower thresholds for HOPE Access eligibility. The comparison group is students who are not eligible to receive any TELS aid. Column 3 reports the results the effect at the ACT threshold (18); Column 4 reports the effect at the GPA threshold (2.75); Column 5 reports the effect at the income threshold ($36,000).[31] I find that students who are eligible for HOPE Access are no more likely to enroll in college than students who are not eligible for TELS aid at the threshold for none of the three eligibility criteria.

Table 6 also reports the statistical power of each model, which indicates the probability of detecting an effect, should one exist, given the sample size and sample mean for groups on

[31] Income is not included in Part A because HOPE Access and HOPE + Aspire have the same income criteria.

either side of each threshold. The enrollment models for ACT and GPA have sufficient power to detect an effect, but the income model does not.

The results presented in Table 6 are generally robust to alternate specifications including: with covariates, quadratic functional form, and varying bandwidths. Appendix B, Figure B1 depicts the coefficients for each of the five models with these alternate specifications.

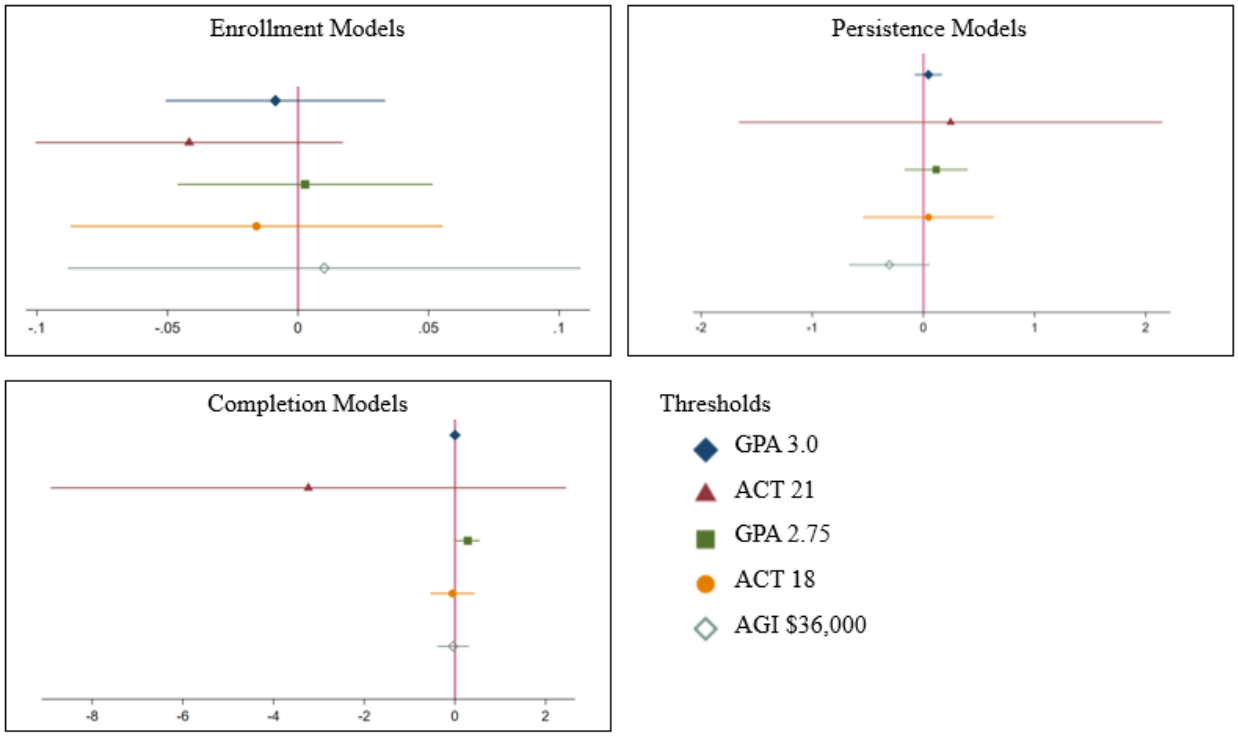
In the models where the comparison group is eligible for HOPE +Aspire at the 21 ACT threshold, there is a statistically significant effect of HOPE Access when the model includes covariates, quadratic form, and at smaller-than-optimal bandwidths. The coefficient is negative, meaning that HOPE Access eligible students within the bandwidth around the ACT threshold were less likely to enroll in college than otherwise similar students who were eligible for HOPE + Aspire.

Table 6: Estimated Effect of HOPE Access

	(1) ACT	(2) GPA	(3) ACT	(4) GPA	(5) Income
Panel A: Enrollment	HOPE + Aspire eligible		Non-TELS eligible		
Effect	-0.042	-0.009	-0.016	0.003	0.010
	(0.030)	(0.021)	(0.036)	(0.025)	(0.050)
Bandwidth	2.351	0.361	1.726	0.348	13479.054
n	6320	11185	6320	11185	3714
Statistical power	*.92*	*.99*	*.97*	*.99*	*.23*
Panel B: Persistence					
Effect	0.245	0.045	0.045	0.115	-0.306
	(0.972)	(0.062)	(0.300)	(0.145)	(0.184)
Bandwidth	2.837	0.194	0.994	0.078	11002.445
n	5057	9104	5057	9104	3109
Statistical power	*.06*	*.73*	*.22*	*.82*	*.06*
Panel C: Completion					
Effect	-3.233	0.003	-0.054	0.284	-0.041
	(2.898)	(0.065)	(0.249)	(0.134)	(0.177)
Bandwidth	2.395	0.189	1.106	0.075	9881.323
n	5057	9104	5057	9104	3109
Statistical power	*.05*	*.99*	*.19*	*.77*	*.25*

Note: Robust standard error in parenthesis. Statistical power refers to the probability of detecting an existing effect. Power was calculated using the sample means of the outcomes and sample sizes on each side of the threshold.

Figure 6: Estimated Effect of HOPE Access



Note: The vertical lines depict the 95% confidence intervals around the coefficient

Persistence

Panel B of Table 6 reports the results for student persistence. Persistence is measured as an indicator that the student earned 24 credits within one year of enrolling in college. The sample is limited to students who enrolled in college. Panel B follows the same structure as Panel A. When compared to HOPE + Aspire eligible students, I find HOPE Access does not have an observable effect on student persistence across the ACT or GPA thresholds. Similarly, HOPE Access students were no more or less likely to persist than students who were not eligible for TELS across the ACT, GPA, or income threshold. HOPE Access does not have an observable impact student persistence behavior. Appendix B, FigureB-2 depicts that these results are robust to alternate specifications and bandwidths.

Degree completion

Panel C of Table 6 report results for degree completion, measured as the student earning any type of degree within six years of high school graduation. I find no observable effect comparing HOPE Access eligible students with HOPE +Aspire eligible students at the ACT or GPA thresholds. Using alternate specifications, reported in Appendix B, Figure B3 these insignificant results hold.

For the models comparing HOPE Access and non-TELs eligible students, there is no observable effect at the ACT and income thresholds, but there is a positive effect at the GPA threshold. Students who were eligible for HOPE Access at the GPA threshold were more likely to earn a degree than otherwise similar students who earned a GPA just below the HOPE Access eligibility criteria. While this coefficient can be interpreted as an average change in the likelihood of graduating by 28 percentage points, there is a high degree of uncertainty around this effect. The uncertainty is evidenced by the wide range of the 95% confidence interval, which is bound between 2.1 and 54.5 percentage points. The addition of covariates can improve precision in this model. When the model includes covariates, there is no observable effect of HOPE Access (see Appendix B, Figure B3). Running this model as an intent to treat, using a sharp regression discontinuity can also increase precision by increasing the sample size, improving statistical power. The intent to treat model identifies a statistically significant negative effect of -6.5 percentage points, bound by a 95% confidence interval of -12.2 to -.8 percentage points. However, this model includes a substantially larger bandwidth (.40 compared to .08), which may introduce bias. The 2SLS regression discontinuity models with larger-than-optimal bandwidths, identify a significant but negative effect of HOPE Access compared to non-TELS students (see Appendix B, Figure B3). While larger bandwidths may have greater power to

detect smaller effect sizes, these models may also introduce bias by including students who are further from the cutoff and more likely to be different on observable and non-observable characteristics.

Discussion

Overall, I do not find that HOPE Access had an observable effect on student enrollment, persistence, or completion in college. Following the conceptual framework and prior studies on the impact of financial aid, I had hypothesized that the more TELS financial aid students were eligible for, the more likely they would be to reach these academic milestones. The study was set up to test two counterfactuals to identify what students would have done in the absence of HOPE Access. In the first, the comparison group is students who receive (or were eligible for) the full HOPE award, so the counterfactual is that students would have received a higher award amount. Most of the models comparing HOPE Access and full HOPE students do not identify a difference in outcomes. So, in the absence of treatment, had HOPE Access students received a higher aid award, I do not identify that they would have performed significantly differently. The second comparison group is students who received no (or were ineligible for) TELS aid. Across the models using this comparison, I again find that in the absence of treatment—had Access students received no TELS aid—I do not observe that they would not have had significantly different outcomes. There is modest evidence for the enrollment outcomes that HOPE + Aspire eligible students are more likely to enroll in college than HOPE Access students when the threshold is student ACT. Stated another way, in the absence of treatment, if HOPE Access students scoring just below the 21 ACT had received the higher financial aid award from HOPE + Aspire, they would have been more likely to enroll in college. However, there is evidence of manipulation at the 21 ACT threshold, so student motivation is a plausible explanation for this

finding. Seeking a higher ACT score by re-taking the test likely signifies the student intends to go to college, connecting the independent and dependent variables exogenous to the treatment. Bruce and Carruthers (2014) estimate the effect of HOPE across the ACT threshold and find no effect on enrollment for low-GPA, low-income students when using first ACT as an instrument for ACT since it is not subject to manipulation like the measure of the highest ACT score. However, their study does not account for the tiers of TELS aid beyond HOPE and their comparison group may include both HOPE Access and non-TELS-eligible students.

GPA and income are less easily manipulated, and I do not find any observable effect of HOPE Access on enrollment across these thresholds. The sample only includes students who graduated from high school and filed the FAFSA. Filing the FAFSA is not a required activity – particularly prior to 2014 when the state bolstered efforts to get more students to file the FAFSA with the implementation of Tennessee Promise. Students who filed the FAFSA likely have some intent to go to college.

In the persistence models, I find no observable effect of HOPE Access on the likelihood of earning 24 college credits within one year of enrolling in college at any of the thresholds separating HOPE Access eligibility from HOPE + Aspire or non-TELS. These results do not support the hypothesis that students at each higher tier of financial aid would be more likely to persist in college.

I find HOPE Access generally had no observable effect on degree attainment either. There is modest evidence that students who were eligible for HOPE Access on the basis of GPA were more likely to earn a degree than similar non-TELS eligible students. This result is in the expected direction, but is not robust to alternate specifications. Persistence is, of course, a stepping stone to degree completion, so these results are less surprising given the insignificant

findings for persistence. The present study only accounts for initial TELS eligibility, not continued aid eligibility, which could have consequence for the students' behavior. Prior studies of HOPE have found that losing HOPE eligibility had no effect on degree completion (Carruthers & Özek, 2016; Cummings et al., 2022).

These results are not necessarily generalizable to HOPE Access students further from the threshold. The results are robust to larger bandwidths which include all HOPE Access students, but students further from the threshold cannot be considered to be only unequal from the non-treated groups except for the eligibility criteria tested in the model. However, by using three different thresholds for eligibility, I have three different samples of HOPE Access students, and the consistent findings across these groups strengthens the generalizability.

While the results in this study overall did not detect a difference in outcomes, a number of the models did not have sufficient statistical power (reported in Table 6). The enrollment models were sufficiently powered, except for the income threshold model. For the persistence and completion models, only the GPA threshold models had sufficient power to detect an effect size. These models had a larger sample size and descriptively, the differences in sample means were greater for the GPA outcomes (see Table 5). Future work should attempt to improve power by including wider bandwidths and increasing the sample size by adding additional cohorts of students.

To further complicate the narrative about these effect of HOPE Access, the models which could and did detect an effect are imprecise. Figure 6 depicts the confidence intervals around the main coefficient estimates. Some models, most notably the model comparing students at the 21 ACT threshold, have extremely large confidence intervals. The magnitude of the insufficient

estimates appears very large in some models, but should not be interpreted as a precise difference.

Limitations

The data only include students who enroll in Tennessee institutions which report to THEC. This means I am undercounting student enrollment rates as well as persistence and completion rates for students who transfer. I limit the sample to high school graduates and FAFSA filers, which likely biases my results towards students who were motivated to go to college. The design of this study does not explore heterogeneity in student outcomes across student identities. Cummings et al. (2022) find heterogeneous effects of losing HOPE eligibility across income and race. By pooling students, I am unable to identify nuances in the student experience.

While the regression discontinuity design assumes that students within a narrow bandwidth on either side of the eligibility threshold should be equal except for treatment, there is reason to suggest students might have differences related to the cutoff. In particular, there is some imbalance in student characteristics for the income threshold and there is evidence of manipulation at the cutoff, particularly for the 21 ACT. I attempt to control for student characteristics, but some may be immeasurable, like motivation. Other covariates may be measured imprecisely. For example, gender was collected as a binary variable and race was collected in standardized categories which may miss nuances of student identity. Further, my covariates focus on student characteristics which are associated with college enrollment. For the persistence and completion models, there are important factors that are associated with positive student outcomes at the institution level that I do not control for, such as educational spending and other financial aid that the student may receive. However, since all of the students in my

analyses are low-income, they likely receive similar amounts of state need-aid and federal Pell, particularly in the models at the income threshold.

Conclusion

In this study, I assessed the effect of HOPE Access, a hybrid need-and-merit financial aid program. Overall, I do not find evidence that students who were eligible for HOPE Access had observably different enrollment, persistence, and completion outcomes from students who were eligible for a higher dollar merit-aid or no merit-aid. Future studies of HOPE Access could add nuance to the results in this study by considering different outcomes such as enrollment by sector, scholarship loss, or graduation by type of degree. Future work should also explore heterogeneity by student demographic characteristics. Methodologically, future studies could try other strategies for handling multiple assignment variables. These results cannot be generalized all hybrid or tiered financial aid program. HOPE Access served a specific set of students who were low-income and had middle-levels of demonstrated academic achievement. Future research should consider other mechanisms by which hybrid financial aid programs operate to help compare across hybrid financial aid program designs.

The connection between policy design and student outcomes has been well established for need- and merit-based programs. This study aims to contribute to the financial aid literature by assessing the effectiveness of a hybrid need-and-merit-aid program on student academic achievement. Hybrid models are an increasingly popular design for balancing program efficiency and equity, so it is important to understand the extent to which these types of programs attain these goals. This study focuses specifically on the effectiveness goal by assessing the relationship between the policy and the student's decision to enroll, persist, and complete

college. By applying Perna's (2006) model of college choice, this study takes into account both sociological and economic factors that influence student behavior.

Prior literature on financial aid programs with complex eligibility requirements has found that these programs do not produce as positive of student outcomes as is commonly found in the financial aid literature. In addition to a complex eligibility requirement, the potential effectiveness of HOPE Access may have been reduced due to logistical and informational challenges. A large portion of students who were eligible for HOPE Access did not receive the aid. This is likely because students needed to complete the extra step of submitting their GPA scores to the state, whereas ACT scores and income were automatically sent to the state. Since the period in this study, the state has improved outreach efforts to identify students who were eligible for financial aid and to encourage schools to participate in transcript exchanges so the state automatically receives GPAs. Financial aid policies which do have complex eligibility criteria should ensure that the application process is as automated as possible to reduce informational and logistical barriers for eligible students.

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Appendix A: Extended Methodology

Analytic sample

I began by keeping students who have a high school graduation record between 2006 (the start of P20 data) and 2020 (the most recent year), for a sample of 944,261. I remove students who appear in the postsecondary enrollment data but do not have a record in the K12 student characteristics file, who I assume graduated from high schools outside of the state and are ineligible for TELS aid. I also remove students who do not have both K12 and postsecondary identification numbers. This results in a sample of 833,950 students.

I remove any students who are missing either an AGI, GPA, or ACT score since these variables are the eligibility criteria on which a define the samples for specific models and I wanted consistency in the possible sample across these indicators. This resulted in a sample of 737,864 students.

Missing data

The vast majority of the missing data for other covariates were removed through this process of defining my analytic sample. A small portion of students attended institutions which do not report to IPEDs, so I do not have college graduation rate for .06% of the sample and cost of attendance for .02%. About 30% are missing TCAP scores, but this is concentrated in early cohorts, since this measure is taken five years prior to high school graduation. About 17% of students are missing a measure of continuous ACT score, which is one of my running variables, because this measure was calculated from K12 data, not supplemented by postsecondary data, like the main measure of ACT score. For the same reason, 17% are missing first ACT, which I do not use in my main analysis, but do use in robustness checks. I do not impute for missing data.

Data cleaning and variable definitions

For FAFSA information, I keep the student's first FAFSA on file, which I assume to be the FAFSA for their first year in college, which would have been used to identify initial TELS eligibility. If the student was missing AGI or the first-generation indicator, I replaced it with information from the next available FAFSA (about 3% of students). About 93% of the sample had a FAFSA record, and students without a FAFSA end up dropping from my sample when I remove students without an AGI.

I removed dual enrollment records. To identify the student's first enrollment institution, I used the first institution where the student was listed as a first-time-freshman. Some students have no such indicator, so I used their earliest listed institution. To identify enrollment within two years, I subtracted the student's high school graduation year from the student's FTF (or first) college enrollment record year. Persistence and completion timeframe measures were calculated using similar methods.

For standardized test scores, I used the most recent math and reading TCAP scores, which should be from the student's eighth grade year. However, some students may have moved out of state prior to their eighth-grade year, so this measure could plausibly be from a prior grade. Since scores are measured five years prior to the student graduating high school, I do not have test scores for students prior to the graduating class of 2010. There also seems to be changes to the test scale beginning with cohorts who graduate in 2014, with the average score increasing by 200 points, so models run with the 2010-2013 cohorts are the most conservative estimates.

P20 data includes GPA and ACT score information for students from both K12 and postsecondary sources. Since postsecondary data includes the scores reported to THEC for the

purposes of administering TELS aid, I began with these measures and supplemented using K12 data. ACT is missing for about 14% of students in the postsecondary data. GPA is missing for about 47% (when GPAs of 0 are removed) because GPA is typically only reported if the student does not meet the ACT requirement for HOPE but does meet the GPA, since HOPE is awarded on either/or criteria. Missingness is reduced considerably through this process. K12 data has all of the ACT scores a student took, as well as individual scores, so it can be used to identify the first score, highest score, and continuous score.

To indicate if a student took EPSOs, I used secondary enrollment data indicators if a course was AP, IB, or dual credit. There may be other courses which would be considered EPSOs, like industry certifications, which are not captured in this definition. I decided not to use the number of EPSOs since some courses are reported multiple times over different semesters, so the count may not be consistent across schools which use semesters, quarters, and trimesters.

I calculated the college enrollment rate by high school using the P20 data counts of students in each high school's graduating class and the number who enrolled in college.

External data

I supplement these P20 data with publicly available data about institutional characteristics from IPEDS and county information from the Bureau of Labor Statistics. Since zip codes and county FIPS codes so not overlap perfectly, I identified the population centroid of the county and of the zip code and used a geospatial program to match a zip code to a county code. Data for the population weighted centroid of the zip code was from the US Department of Housing and Urban Development.[32] County population centroids were from the US Census Bureau.[33] I used the 2021 population centroids since that was what was available in HUD data.

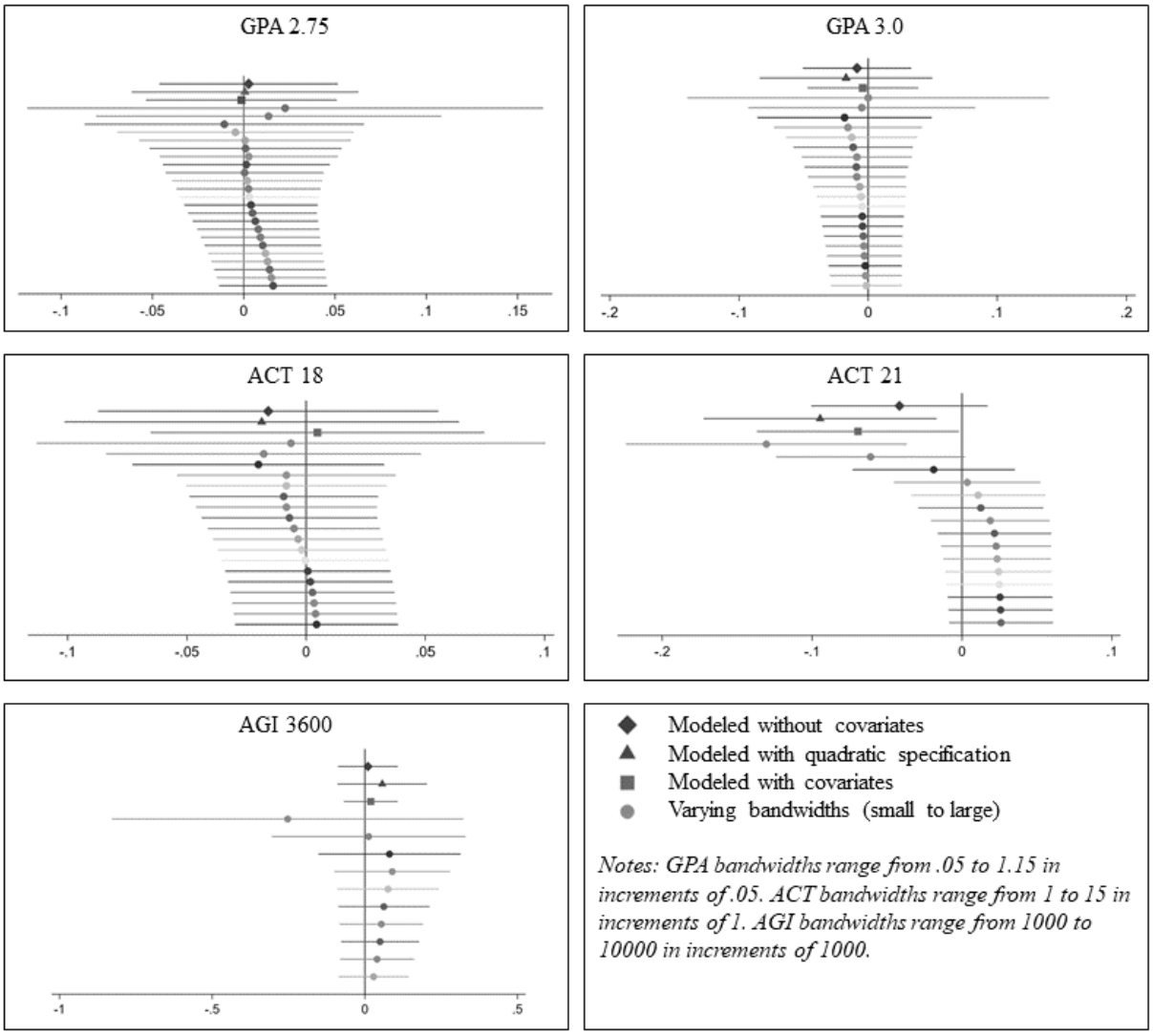
[32] https://hudgis-hud.opendata.arcgis.com/
[33] https://www.census.gov/geographies/reference-files/time-series/geo/centers-population.html

While population centroids – as well as boarders of zip codes and counties – could change over the span of this study, it is unlikely to significantly impact on my results. These measures are only intended to establish the social conditions of the students' community, not attributed to any policy affecting treatment. I used data from Ben Skinner to identify the closest institution of higher education to each county population centroid, and the distance to that institution.[34] TCATs do not report tuition to IPEDS, so I used data from the THEC Factbook 2010-2011 and 2020-2021.

[34] https://github.com/btskinner/spatial

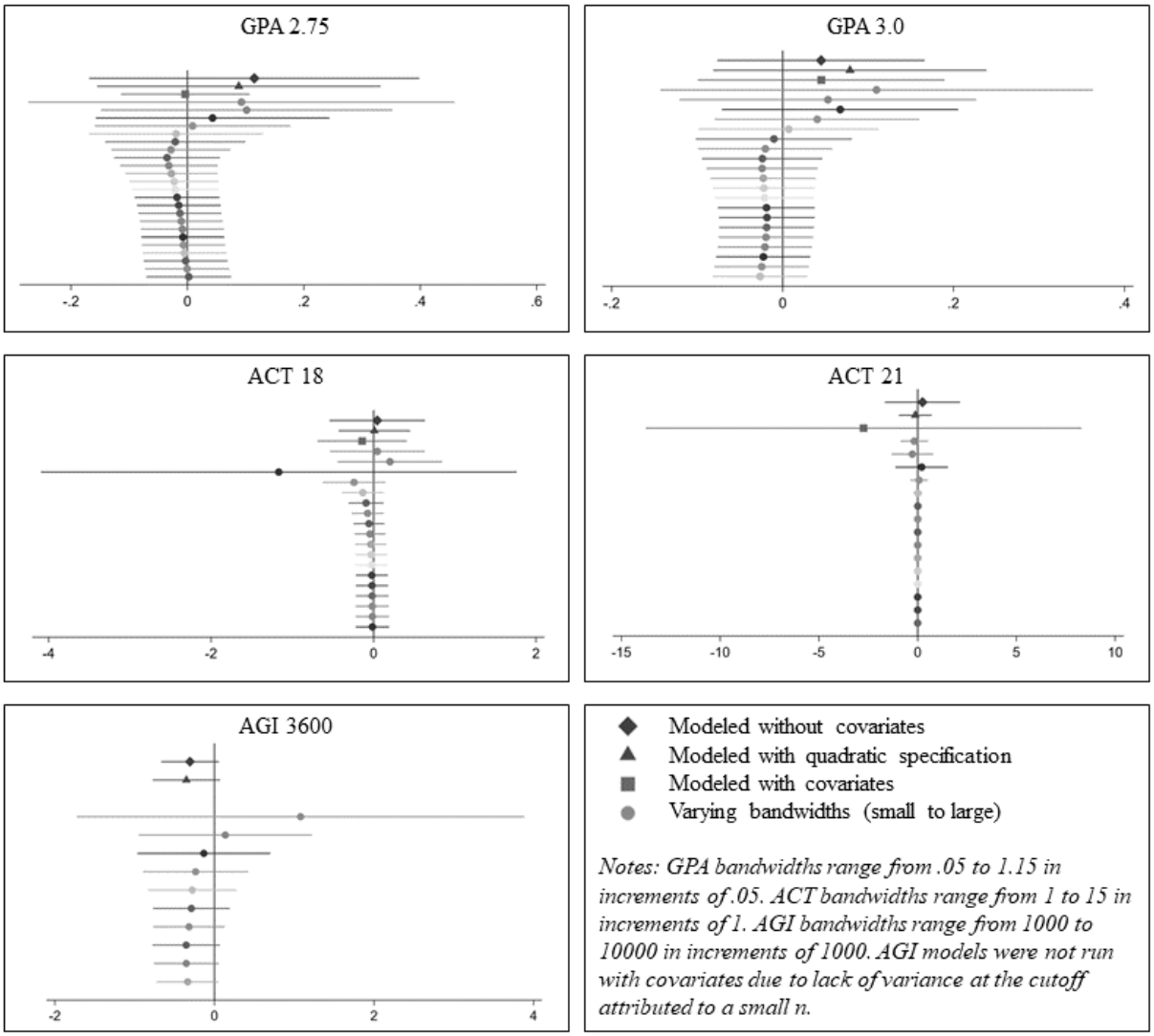
Appendix B: Additional Model Specifications

Figure B1: Enrollment Models



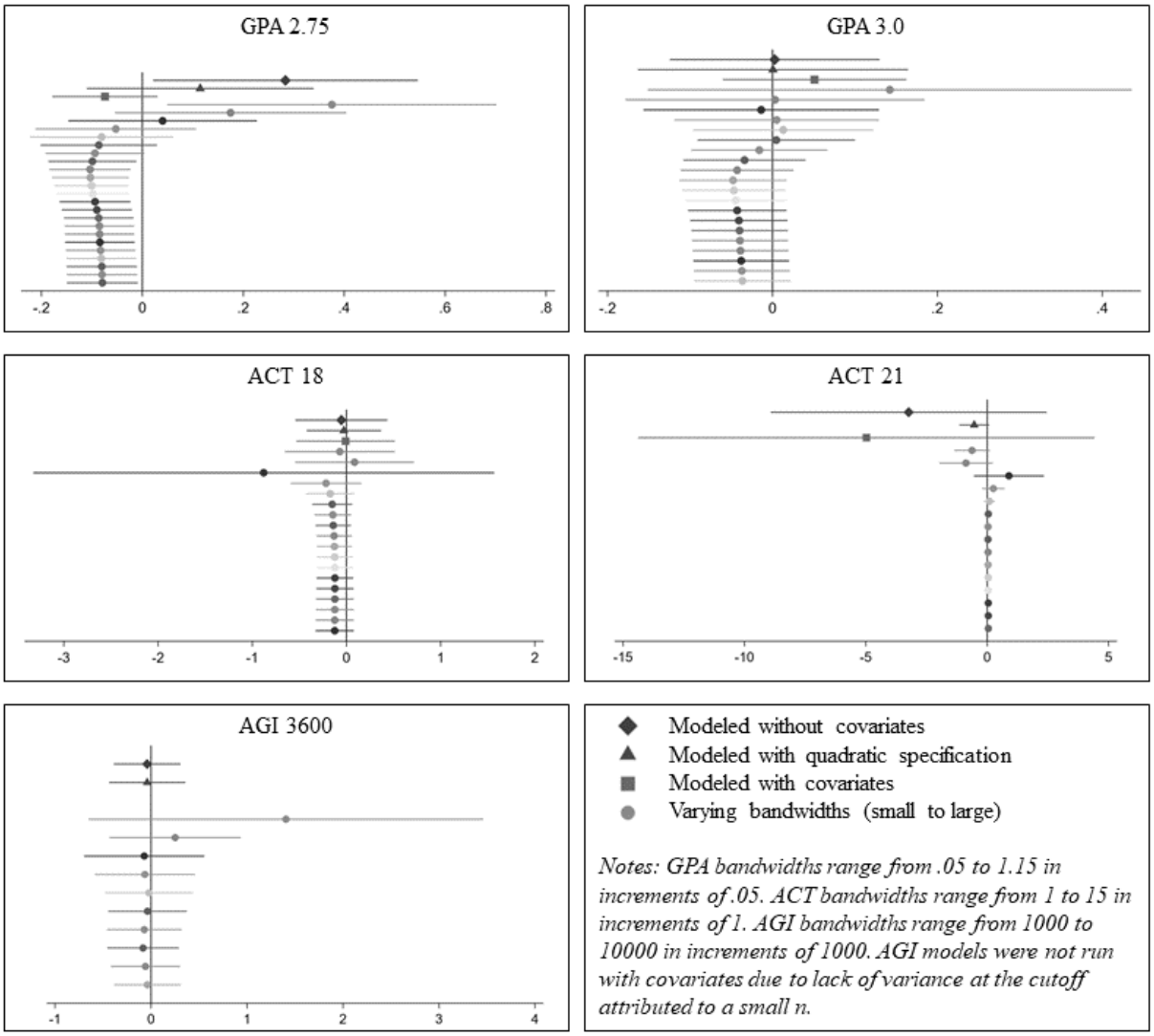
Note: The vertical lines depict the 95% confidence intervals around the coefficient

Figure B2: Persistence Models



Note: The vertical lines depict the 95% confidence intervals around the coefficient

Figure B3: Completion Models



Note: The vertical lines depict the 95% confidence intervals around the coefficient

Appendix C: Intent to Treat

To improve statistical power, I model the persistence and completion models using a sharp regression discontinuity design. These results can be interpreted as the effect of being eligible for HOPE Access, regardless of actual aid receipt.

Table D1: Intent to Treat Effects of HOPE Access

	(1) ACT	(2) GPA	(3) ACT	(4) GPA	(5) Income
	HOPE + Aspire eligible		Non-TELS eligible		
Panel A: Persistence					
Effect	-0.011	0.013	-0.040	-0.023	0.134
	0.043	0.029	0.041	0.030	0.074
Bandwidth	2.837	0.337	2.314	0.423	10654.156
n	5057	9104	5057	9104	3109
Panel B: Completion					
Effect	-0.072	-0.003	-0.023	-0.065	0.015
	0.048	0.040	0.039	0.029	0.066
Bandwidth	2.395	0.196	2.421	0.400	13077.220
n	5057	9104	5057	9104	3109

CHAPTER 5

Conclusion

The purpose of this dissertation was to understand the factors that influence state financial aid policy design and the effect of those design decisions on students. Overall, I find external factors do influence state policymaking in both process and design. The federal government can create lasting state policy change through matching grants, as was the case with LEAP. For free-college programs, adoption in one state can prompt other states to adopt similar policies for different reasons which interact with the internal context. I also find that one hybrid need-and-merit financial aid program in Tennessee was not an effective policy design for improving student academic outcomes in college. This chapter summarizes the content and contribution of each study in greater detail.

Policy origins: diffusion of free-college

In Chapter 1, I conducted a qualitative case study of Southern states which enacted free-college financial aid programs between 2014-2019. Using the theoretical lens of diffusion, I describe how external factors influenced the design and enaction of these policies. I find that state policymakers are attentive to policy adoption in other states, particularly if they perceive those states to be contextually similar or economic competitors. I find that diffusion occurred by different mechanisms in different state contexts and during different stages in the policymaking process.

Geographic proximity has long been theorized to facilitate diffusion due to common information sharing networks. I find some evidence of information sharing through regional intermediaries, particularly for ranking comparison data. Participants were more likely to gain

information about free-college from national position-based and partisan organizations. Future studies of diffusion should continue to consider the role of intermediary organizations—particularly partisan organizations, which are understudied—in facilitating diffusion.

Geography is often used as a proxy for diffusion in quantitative studies. In some cases, I find proximity to an adopter did facilitate diffusion, but state policymakers are not equally attentive to all nearby states. State policymakers were most interested in states which they perceived to be contextually similar or were in competition with. There are regional differences in political, sociodemographic, and economic conditions which make proximate states similar, but policymakers also looked to distant states which faced similar problems, had similar populations, or were perceived to be policy leaders. To fully understand diffusion, researchers must understand the relationships between states. Proximity alone is not always indicative that diffusion is occurring. Future quantitative studies of diffusion should consider alternate ways to operationalize diffusion that accounts for these inter-state relationships.

While all the policies in my study can be termed "free-college," I find that their designs varied substantially. I find that policymakers frequently started with the design of another state, or a menu of designs across multiple states, and modified that template to fit their own needs and budget. For example, in Tennessee, students can enroll in any program of study. Across the border in Kentucky, students must enroll in a high-demand workforce sector. As a result, students still face different access to the financial aid. This may cause confusion to students for whom the messaging of "free" can be a very powerful catalyst for pursuing a college degree. Financial aid scholarship has begun to assess how different free-college program designs affect students (e.g., Li & Gandara, 2020), and research in this area should continue to help inform the design of future free-college programs.

Policy origins: LEAP federal matching grants

In an effort to create more consistency across state lines, the federal government may use grants to incentivize states to invest in particular types of financial aid policies. For example, the federal-free college policies which have been proposed, such as America's College Promise, are designed as federal-state funding partnerships. As federal policymakers continue to refine the structure of a federal free-college policy, it is important to understand how states have responded to prior federal cost-sharing policies for financial aid.

For forty years the federal government offered LEAP grants to incentivize states to invest in need-based financial aid. In Chapter 2, I use an interrupted time series design to understand how states responded as federal funding for LEAP changed and was ultimately discontinued. I find that states were responsive to this funding and continued to fund need-aid even after LEAP was discontinued. While state spending on need-aid overall was not descriptively different after LEAP, some states did discontinue their LEAP-funded financial aid program, particularly if LEAP was used to fund an aid program separate from a larger need-based financial aid program. Future work on LEAP should consider the different policy designs of LEAP-funded programs and the impact of program elimination on student aid access across states.

This study provides initial evidence that federal incentives can create lasting state policy. However, this finding may not be applicable to contemporary matching grants due to contextual differences from when LEAP was enacted in the 1970s. Recent federal funding partnerships in other areas, such as Medicaid expansion, have been rejected by some state policymakers due to political polarization politics and the recognition that if federal subsidies are temporary, state taxpayers will have to pay more for the service when it is discontinued.

As policymakers consider matching grants for financial aid, they should consider what features will encourage states to participate in the program and to continue funding the program after federal funding is eliminated. One feature evident in LEAP is that federal funding tapered off over a long period of time. This may have allowed states time to build their fiscal capacity to fund need-aid without federal funding and to build political support for need-aid programs. States may be reluctant to accept new federal matching funds if they anticipate being unable to afford to self-fund the program without federal funding, since eliminating financial aid is generally politically unpopular. This logic aligns with prior literature on fiscal federalism which has identified political pressure and reelection as a motivation for policymakers to continue funding programs after funding declines (Volden, 1999, 2007). Future scholarship should consider how these influenced the effectiveness of LEAP and other federal grants.

Literature also suggests that states are more likely to accept grants that have fewer restrictions (Volden, 2007). Under LEAP, states had the flexibility to design their aid program and identify student eligibility criteria. This may increase state participation, but it could also result in differing program designs which perpetuate inequalities in financial aid access across state lines.

Policy outcomes: Tennessee HOPE Access

Policymakers aim to design financial aid policies which will be effective and efficient for both the student and the state. In chapter 3, I assess the effectiveness of a financial aid policy in Tennessee, HOPE Access, which was targeted toward low-income students with academic achievement levels just below the requirements for the state's merit-aid grant. Overall, I find that the program had no observable effect on students' enrollment, persistence, or completion for

students at the thresholds for eligibility compared to students who were not eligible for state merit-aid nor full merit-aid.

In general, financial aid literature finds aid is effective, but studies have found hybrid aid and aid programs with more complex eligibility criteria aren't as effective as simple programs (Domina, 2014; Dynarski & Scott-Clayton, 2013; Hadavand, 2018). Policymakers who want to support low-income, middle-achieving students may consider alternate financial aid policy designs which are less complex or administratively burdensome. Financial aid alone may not be enough support for this population, and policymakers should consider designing policies with additional highly-effective student supports.

This effect was assessed for cohorts of students prior to the adoption of Tennessee's state-wide free-college program. Future work on HOPE Access should assess the interaction of this type of program with Tennessee Promise which included additional supports such as mentoring. Future work should also consider other impactful outcomes, such as debt accumulation and job placement.

Conclusion

In combination, these studies offer insights into the design and enaction of state financial aid policies and the effect that certain designs have on student outcomes. Policymakers and advocates should consider the emergent themes about the role of federalism and external influence on state financial aid. Under federalism, state aid policies often serve as pilot programs. The most effective policies can be adopted by other states or scaled up to the federal level. State policies which are not found to be effective may be more easily discontinued or modified at the state level.

Policies in other jurisdictions—particularly at the state and federal level—do influence state policymakers. However, this external influence can only go so far as states face internal limitations. State policymakers are especially conscientious of the fiscal and political constraints on the policymaking environment. The federal government may be able to improve states' fiscal capacity through matching grants. However, these matching grants should be carefully designed to encourage state participation. In the case of LEAP, federal incentives created lasting state policy. Federal matching grants may be most effective when they are long lasting, offer states' flexibility, and are politically appealing to state policymakers. Federal policymakers can learn from this historical example and apply the principles which made LEAP successful to current policy proposals.

Federalism offers states autonomy to tailor policies to the specific needs of their student populations and state goals, as occurred with the design of state free-college policies. However, policymakers should be mindful that this customization can result in a disjointed financial aid system. Variation in financial aid access across state lines may produce confusion and inequitable student outcomes.

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