Examining the Effects of Tuition Controls on Student Enrollment

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Abstract: A growing number of states are placing restrictions on whether public universities can increase tuition, and this trend is likely to continue in the future. Yet no research has examined whether tuition caps or freezes have induced more students—particularly from historically underrepresented groups—to enroll in public higher education. In this paper, we constructed an institution-level dataset of tuition controls mandated by state legislatures or higher education agencies to answer these important questions. We found that tuition freezes were associated with increased enrollment of both in-state and out-of-state students, but primarily at less-selective universities that were willing to expand capacity. There is also some evidence that Hispanic enrollment may have increased following tuition freezes.

Many public colleges and universities are facing difficult financial situations as their budgets have been squeezed on both the expenditure and revenue sides since the Great Recession. Rising costs for maintaining aging facilities, providing health insurance, and supporting historically underfunded pension systems have contributed to the typical costs of running a higher education institution increasing faster than the rate of inflation over time (Commonfund Institute, 2020). At the same time, inflation-adjusted state appropriations—once the largest revenue source for most public colleges—have been unable to keep up with increases in enrollment and costs in most states over the last several decades (Laderman & Weeden, 2022).

These recurring challenges are only felt more acutely as states and postsecondary institutions confront the aftermath of funding and public health crises associated with the COVID-19 pandemic. Although state higher education funding as a whole increased slightly in Fiscal Year 2021 after an influx of federal support, 21 states reported funding cuts in Fiscal Year after numerous states made midyear budget cuts in Fiscal Year 2020 (Applegate, 2021; Open Campus, 2020). At the same time, colleges absorbed massive losses in tuition and housing revenues while facing increased costs in the form of protective equipment, cleaning, increasing support for distance learning, and offering additional sections of courses to reduce class sizes in order to meet social distancing requirements. By some estimates, higher education lost between $120 billion and $183 billion as a result of the pandemic, and federal relief packages only filled a portion of that chasm (Friga, 2021; Mitchell, 2020).

Before the COVID-19 pandemic, public colleges and universities responded to budget gaps by sharply increasing tuition and fee charges, particularly following reductions in state funding (Delaney & Doyle, 2011; Delaney & Doyle, 2018; Webber, 2017). Listed tuition and fee prices increased far faster than median household income for decades prior to the pandemic (Ma

et al., 2020). Per-student state appropriations have remained at 1980 levels after adjusting for inflation, while net tuition revenue per student has nearly doubled (Laderman & Weeden, 2022). In sum, colleges are more reliant on student tuition than ever.

A growing movement to cap or limit tuition and fees at public colleges existed prior to the pandemic. When tuition is capped or frozen, postsecondary institutions are prohibited from increasing tuition beyond a set amount for a set period of time. When tuition is guaranteed, a student is guaranteed the same tuition rate for a set number of years, while new students would be enrolled each year under a presumably new rate. State legislatures and higher education governing boards routinely use their authority to restrict whether and how much colleges could increase tuition and fees. Thirteen states placed legislative restrictions on tuition or fees as of 2020, with additional states allowing system governing boards to enact further limits (Pingel & Broom, 2020). System governing boards in states such as Colorado, Pennsylvania, and Vermont froze tuition in the aftermath of the pandemic (Bakuli, 2020; Schackner, 2020; Scott, 2020), and college tuition prices as a whole saw their largest decline in more than four decades in August 2020 (Bauer-Wolf, 2020).

The decision to implement tuition controls both before and during the pandemic seemingly made immediate sense to policy leaders and the public. However, given that universities in a majority of states now rely more on tuition revenue than state appropriations to fund their operations (Laderman & Weeden, 2022), public institutions face steep challenges when their ability to increase tuition and fees on in-state students is constrained. In this paper, we are interested to uncover whether institutions respond to capped resident tuition by augmenting revenue from other sources. Specifically, we are interested to find if institutions pursued changes to their resident and nonresident enrollment mix to make up for new limitations on tuition

revenue from resident students. We are also interested in impacts on students that have been historically underrepresented in higher education, such as Hispanic students, Black students, and students receiving federal Pell Grants, given previous literature suggesting price sensitivity in these student groups (e.g., Chen & DesJardins, 2010; Flores & Shepherd, 2014). Studying the impact of tuition freezes on enrollment, specifically resident versus nonresident enrollment and enrollment of students that have been historically underrepresented, adds to the collective knowledge about how policies intended to support access and success for one student population may hold unintended and adverse consequences for other student populations.

Previous research has indicated that increased numbers of nonresident students crowd out low-income and minoritized students from selective public universities (Jaquette et al, 2016), while Kelchen (2019) found that the additional tuition revenue is not used to subsidize lower-income in-state students. We are therefore concerned that institutional incentives to recruit more students from other states or countries may impact enrollment of resident students, specifically resident students from historically underrepresented backgrounds. On the other hand, research by Allen and Wolniak (2019) showed that tuition increases disproportionately depresses minoritized student enrollment, meaning that limiting tuition increases may increase enrollment.

We are concerned that policy leaders may be trading short-term, limited affordability in the present through the form of limits on tuition increases for longer-term damage to accessible in-state, public postsecondary education options for historically underrepresented students. In this paper, we use a new dataset that we constructed of tuition controls between the 2003-04 and 2017-18 academic years to explore the potential implications of state policies to cap or freeze tuition prices on access to higher education.

Our research questions are the following:

(1) What is the effect of a state-imposed tuition cap on new student enrollment, both overall and by student subgroup?

(2) What is the effect of a state-imposed tuition freeze on new student enrollment, both overall and by student subgroup?

(3) Do these effects differ by institutional selectivity?

Conceptual Framework and Literature Review

Our study is motivated by principal-agent theory and resource dependence theory. Under principal-agent theory (e.g., Jensen & Meckling, 1976; Spence & Zeckhauser, 1971), the state (the principal) seeks to control the actions of public universities (the agents) through setting conditions on how institutions can operate. Under resource dependence theory (e.g., Aldrich & Pfeffer, 1976), organizations are looking to diversify their revenue sources in order to remain financially strong and to become less dependent on a single funder, such as the state. Both of these theories focus on the relationship between the state and public postsecondary institutions, and are notably limited in their ability to account for the ways in which student decisionmaking can impact the extent to which the state influences student enrollment decisions, or whether institutions can diversify their revenue streams in practice.

State and system leaders often cite college affordability as a driving factor behind establishing the tuition cap or freeze that limits individual institutions' ability to increase tuition, and research shows that tuition increases reduce student enrollment (e.g., Hemelt & Marcotte, 2011). For example, Kansas Governor Laura Kelly signaled support for freezing tuition at

institutions under the state Board of Regents, stating: "...regents institutions will be able to continue to hold tuition flat, making college more affordable for Kansans of all backgrounds" (Carpenter, 2022). Statements like these serve a key political function for state and postsecondary leaders that are seeking to signal awareness and support of the college affordability challenges that many students face. At the same time, limiting tuition increases generally does not require a budget outlay on the part of the state. This leaves colleges facing a choice on how to manage their operations with limited or no ability to raise tuition.

Therefore, in this paper, we interrogate whether a tuition cap or freeze policy actually delivers access to an affordable college education for all. When a state restricts a university's ability to raise funds from a key revenue source (in-state tuition), universities must rebalance their budgets. Potential options include increasing revenue by enrolling more students overall, enrolling more students that will require less institutionally-funded financial aid (and therefore have a higher ability to pay). Enrolling more students overall likely increases access for students from historically underrepresented groups, but attempting to enroll more full-pay students likely results in decreased access for low-income and minoritized students. They may also attempt to reduce expenses, which has potential consequences for quality (Chakrabarti et al., 2020; Deming & Walters, 2017; Webber & Ehrenberg, 2010).

Another potential option is for colleges to attempt to circumvent these targeted caps by reframing student charges, and this may be tacitly encouraged by a state that is seeking to improve the perception of college affordability while not actually affecting the levels of resources that institutions end up receiving. One common method that colleges have used to circumvent tuition caps is by increasing mandatory student fees. Missouri's tuition cap, for example, was effective in keeping universities' tuition increases among the lowest in the country

over the last decade. However, supplemental fees increased by 112% per FTE student in just seven years as colleges substituted fees for tuition (Office of Missouri State Auditor, 2016). In a case like this, any effects of a tuition cap on enrollment would be due to a perceived improvement in college affordability rather than from actually making college more affordable.

There is relatively little empirical research that directly examines the implications of tuition and fee controls on public universities. Two prior efforts used surveys conducted every 3-5 years by the State Higher Education Executive Officers Association (SHEEO) to examine the relationship between the presence of any tuition or fee control and college pricing. Kim and Ko (2015) found that the presence of tuition controls was associated with larger increases in tuition prices, while Kelchen (2016) concluded that the presence of tuition controls was associated with higher fee levels while fee controls were associated with higher tuition charges. Both of these studies were limited by the underlying dataset, which did not include the levels of tuition and/or fee controls or annual observations.

More recently, Miller and Park (2022) did use annual observations in an event study approach to understanding tuition capping policies. They found that while institutions subject to tuition caps and freezes saw lower tuition prices, they often lowered institutionally-funded financial aid to protect against losses from decreased tuition revenue. Tuition tended to increase more dramatically once the tuition cap ended, which is congruent with prior work by Kim and Ko (2015). If institutions decrease financial aid spending, this further substantiates the idea that postsecondary institutions subject to tuition caps will take other actions to balance their budget. Given the political popularity of tuition capping, uncovering and elevating these tradeoffs is key.

Deming and Walters (2017) collected data on legislatively-imposed tuition controls between 1990 and 2013 to examine the implications of tuition controls on educational attainment. This dataset included the percentage by which colleges were allowed to raise tuition on an annual basis, representing an improvement over the SHEEO data in several ways. While they did not find a relationship between the presence or strength of tuition controls and the number of degrees earned, they did show that the presence of a tuition cap lowered tuition in the year of the cap and in the successive two years. Universities in states with a higher percentage cap saw higher tuition levels for each of the five following years. However, this dataset did not include controls on student fees or caps imposed by state higher education agencies and also omitted some caps that were legislatively approved. Finally, Worsham (2023) found that guaranteed tuition rates (a form of tuition controls) for in-state undergraduate students in North Carolina led to increases in out-of-state undergraduate tuition as well as tuition for graduate students.

These findings generally align with examinations of other state higher education policies that are framed as methods to improve college affordability not obtaining the desired result. A number of states require colleges to offer frozen tuition rates to students for up to four years at a time. Yet research has shown that these plans backfire, as institutions respond to the prospect of future tuition freezes by increasing tuition by far more than students would have paid in the absence of a guaranteed tuition plan (Delaney & Kearney, 2015; Delaney & Kearney, 2016). Other states, such as Georgia and Massachusetts, have historically structured their grant aid programs to cover only tuition charges, leaving fees out and encouraging institutions to increase fees as much as they wish while moderating tuition increases (Cohodes & Goodman, 2014; Sielke, 2011).

Sample, Data, and Methods

To answer our research questions, we used data on tuition control policies, institutional enrollment, and institutional and state-level characteristics from the 2003-04 through 2018-19 academic years and two different research methods to examine the relationship between the presence of a tuition cap or freeze and the enrollment outcomes of interest. Details on our sample, data, and methods are below.

Sample

Our analytic sample consisted of 515 public four-year universities in 49 states, excluding service academies, community colleges, graduate institutions, and 18 universities for missing data on our covariates of interest. We also excluded Massachusetts public universities because of the state's unusual higher education finance structure. Since tuition dollars go directly to the state instead of colleges, tuition did not increase between the 1990s and 2016 and all increases were in the form of mandatory student fees (University of Massachusetts, 2016). As a result, the state's tuition freeze was not an effort to improve college affordability and we omitted the state due to how the state's pricing policies have affected students' college choice decisions (Cohodes & Goodman, 2014).

Data

The policy of interest in this study is whether a public university operated under a tuition cap or freeze in a given year. We constructed an institution-level dataset of tuition and fee controls between the 2003-04 and 2018-19 academic year by doing a systematic search of state policies using the guidance specified by Kelchen, Rosinger, and Ortagus (2019). We used state

policy documents as our primary data source and supplemented this with Google and Lexis-Nexis searches for each academic year and state. We defined a university as operating under a tuition or fee control if it was specified by legislation or higher education governing boards, and did not count a state board rejecting a larger proposed tuition or fee increase as having a control in place. In a small number of cases, tuition controls applied to some institutions within a state but not others. For example, there were several years of tuition caps at University System of Maryland institutions, while the independently-governed St. Mary's College and Morgan State University were free to increase tuition as desired. In those cases, we classified universities based on whether they were subject to a cap or freeze regardless of how other universities in the state were classified.

Table 1 shows the number of states (excluding Massachusetts) that had tuition or fee controls in place for at least some public universities over a 16-year period. Between 12 and 22 states had a cap on tuition in each year between 2003-04 and 2018-19, with two to eight states capping fees. As shown in Appendix 1, many caps (especially in the 2000s) were set well above the Consumer Price Index. This means that some states with caps had larger tuition increases than states without caps. For example, Connecticut and Idaho had tuition caps set at 15% and 10% increases, respectively, during much of the 2000s. These rates were well above the typical tuition increase nationwide.

[Insert Table 1 here]

Tuition freezes were most common between the 2013-14 and 2016-17 academic years, with eight to 14 states implementing freezes in each year. Tuition and fee controls frequently were implemented simultaneously, as about 90% of observations with fee caps also had tuition

caps and nearly two-thirds of fee freezes also had tuition freezes. For this reason and because fees tend to be much lower than tuition, we focus the remainder of this paper on tuition controls. Because the vast majority of caps at or below the Consumer Price Index were tuition freezes, we chose not to create a separate group of institutions that were allowed to have very small tuition increases.

Appendix 2 shows trends in inflation-adjusted in-state tuition and fees by the type of cap or freeze policy that was in place during the panel. Between the 2003-04 and 2018-19 academic years, the largest increase in tuition and fees (75%) occurred among universities that were subject to a tuition cap but not a freeze at some point during that time period. Increases were smaller (58%) at universities that faced a tuition freeze, and were the smallest (50%) at universities that never faced a cap or freeze. This suggests that states may have chosen to implement caps or freezes at their public institutions because large tuition increases had already occurred or were likely to occur.

Outcomes

Our outcomes of interest were the number of first-time students enrolled at public universities across a number of characteristics. These data are available through the Integrated Postsecondary Education Data System (IPEDS). We first examined overall first-time student enrollment before looking at enrollment by race/ethnicity. We created categories for underrepresented minority enrollment (Black, Hispanic, Native American, Native Hawaiian/Pacific Islander, and multiracial) and separate categories for white and Asian enrollment. This matches how most states typically classify students as being underrepresented or racially minoritized in their higher education funding systems (e.g., Rosinger et al., 2023).

Due to a lack of racial/ethnic diversity at many public universities, we combined all minoritized students into one category.

Our next set of outcomes was the number of in-state and out-of-state students. These data came from the IPEDS residence and migration survey, which colleges are only required to complete in odd-numbered fall semesters. About 20% of colleges did not report in even years, so we interpolated data in those cases. Both international and domestic nonresident students are included in the out-of-state student category. The final set of outcomes is the number of first-time, full-time students receiving federal grant aid (as a proxy for the number of students with financial need since nearly all federal grant aid is need-based) and the number of students in that cohort who did not receive federal grants. This is a strong proxy for the number of Pell Grant recipients, as the two measures are correlated above 0.99. We used the number of federal grant recipients instead of Pell recipients because federal grant recipients were first available in 2004-05 and Pell Grant recipients were first available in 2007-08.

Controls

We included a number of other variables that could potentially affect student enrollment decisions and were driven by our conceptual framework. Many of these variables have been found in the higher education finance literature (e.g., Allen & Wolniak, 2019; Doyle, 2012; Jaquette & Curs, 2015; Kelchen, 2016; Kim & Ko, 2015; Toutkoushian & Hillman, 2012) to affect tuition prices or student enrollment. Institution-level variables (all from IPEDS) included FTE enrollment, the percentage of students who are undergraduates, the percentage of applicants who are admitted, in-state tuition and fees, the share of total revenue coming from tuition (tuition reliance), and state appropriations.

We included state economic characteristics in our models. Because state financial aid programs can influence college enrollment rates and colleges' pricing strategies (Kim, 2012; Kramer II et al., 2018; Nguyen et al., 2019, Sjoquist & Winters, 2015), we controlled for the generosity and characteristics of state grants. We used data from the National Association of State Student Grant and Aid Programs (NASSGAP) on the percentage of undergraduate aid based on financial need. We also constructed a measure of the amount of state aid per 18-24 year old by combining state population data from the Census Bureau with NASSGAP data. We included state-level economic indicators such as per-capita personal income (from the Bureau of Economic Analysis) and the poverty rate (from the Census Bureau). Since the number of underrepresented minority students is a key outcome in our analysis, we also examined the percentage of 18-24 year olds in the state who were underrepresented minorities (from the Census Bureau).

Finally, we included state-level political characteristics as they have been shown to affect tuition prices and state appropriations (e.g., Doyle, 2012; Weerts & Ronca, 2012). We included unified control of the state legislature (by Democrats or Republicans) and whether the state's governor was a Republican. While many studies in the higher education finance literature exclude Nebraska on account of its officially nonpartisan unicameral legislature, there is convincing evidence that the legislature has been controlled by Republicans throughout the period of our study. Based on research by Masket and Shor (2015) and our Lexis-Nexis searches of Nebraska newspapers over time, we decided to keep Nebraska in our analysis and code it as having a Republican legislature.

Table 2 contains the summary statistics of our dataset, broken down by whether an institution was ever subject to a cap or freeze on tuition during the panel (n=242) or whether they

never faced a tuition control (n=173). The two groups of universities looked broadly similar on most student characteristics, but institutional characteristics showed that universities subject to tuition controls were more likely to be highly selective. Institutions subject to tuition controls were also disproportionately located in wealthier states with lower likelihoods of having Republican political control. This data element highlights the bipartisan popularity of limiting tuition increases, even if other differences regarding funding and governance differ between Republican and Democratic-led states.

[Insert Table 2 here]

Methods

To answer our research questions, we used two different research methods that allow for tuition controls (caps or freezes) to be adopted at different times across states. The first method is a generalized difference-in-differences (DiD) model with two-way fixed effects (TWFE). This approach, which has been commonplace in education research over the last decade (Furquim et al., 2020), compiles weighted average treatment effects across each fixed effect. This approach has been critiqued recently for the treatment of staggered adoptions and allowing for the possibility of negative weights on certain observations (e.g., de Chaisemartin & D'Haultfoeuille, 2020; Goodman-Bacon, 2021; Imai & Kim, 2021).

While we still used traditional TWFE, we also employed a new two-stage estimation technique that first identifies state and year fixed effects and then estimates coefficients after excluding these fixed effects in the second stage (Gardner, 2021). To implement the Gardner DiD technique, we used the *did2s* command from Butts (2022). All financial variables were adjusted for inflation using the Consumer Price Index, and all enrollment and financial variables

were logged so outcomes can be interpreted in percent terms. Finally, standard errors were clustered at the state level.

We used a one-year lag as our preferred estimate, as that allows students and colleges to make application, admissions, and enrollment decisions with full knowledge that tuition increases would be limited. State legislatures typically end their legislative sessions in the late spring, which is when governing boards often set tuition for the following year. This is after the typical college application deadline, but could potentially affect whether students enroll. We also used two-year and three-year lags to see if the policy had longer-term effects, as well as no lag to capture the possibility of an immediate response if a tuition policy was announced earlier than normal.

We also conducted these analyses by institutional selectivity using Barron's (2009) admissions competitiveness index as our measure of selectivity. It is possible that more selective colleges could respond to limits on in-state tuition increases by recruiting more out-of-state and higher-income students, while less selective colleges could see an increase in overall and underrepresented student enrollment due to improved college affordability. Institutions in the very competitive, highly competitive, and most competitive categories (121 universities) were categorized as more selective, while the other 394 universities were categorized as less selective.

Our second method consists of event study analyses that attempt to more fully account for pre-treatment trends than do traditional DiD approaches. Because there is not yet a single preferred event study technique, we used two different techniques that treat pre-treatment observations differently (Marcus & Sant'Anna, 2021; Roth et al., 2022). We used the *did_imputation* technique in Stata (Borusyak et al., 2021) that imputes pre-treatment

observations and the *eventstudyinteract* technique (Sun & Abraham, 2020) that estimates a weighted average treatment effect. We then plotted the two results on the game graph using the *eventplot* command (Borusyak, 2021). We used the same covariates and clustered standard errors in the same way as in the DiD models, but we did not run event study models by selectivity due to sample size concerns.

Event studies require pre-treatment observations for every unit, so we excluded institutions subject to tuition caps or freezes in 2003-04 (the first year of our dataset). Twelve states had tuition caps in 2003-04, while freezes were limited to all Mississippi public universities and one Louisiana university. As a robustness test, we also conducted DiD models using the same sample. Finally, event studies do not allow treatments to be turned off and back on. Therefore, our estimates are the effects of ever having had a tuition cap or freeze and are not limited to states that maintained controls after having initially adopted them.

Limitations

Formal controls on tuition prices are just one of the methods that states use to shape the operation of public universities. Since governing board members are either appointed by elected officials or elected directly by voters, colleges can be pressured to keep tuition increases modest without having to enact formal limits or in exchange for additional autonomy on other measures (Kelchen, 2018). For example, the Pennsylvania governor pressured colleges to freeze tuition prices for the 2015-16 academic year in exchange for the promise of additional state funding. The Pennsylvania State University system agreed to freeze tuition with the hope of receiving additional state funding (Bunn, 2015), while the Pennsylvania State System of Higher Education eventually reversed a vote to freeze tuition after the state failed to pass its budget on time (Esack,

2015; Palochko, 2015). Because neither of these was a mandatory cap on tuition, we excluded both in our analyses.

We also excluded other institutional or state-level efforts to limit tuition increases. We did not consider guaranteed or prepaid tuition plans, especially as those have been shown to be ineffective in reducing student prices (Delaney & Kearney, 2015; 2016). We also omitted tuition caps and freezes that institutions or systems voluntarily implemented because of the difficulty tracking all of these changes and our interest in examining state-imposed policies. For example, Purdue University and the University of Wisconsin System have both operated under tuition freezes since 2013. However, since Purdue's is voluntary and Wisconsin's is legislatively mandated, we count Wisconsin as having a tuition freeze but do not count Purdue.

Some of our student enrollment categories do not include all students due to data reporting concerns and limitations of IPEDS data definitions. For example, we excluded a small percentage of students who were classified as having an unknown race/ethnicity in our analyses of white/Asian and underrepresented students. This affected a higher percentage of students before 2009 (Ford et al., 2020), but is less of a concern in more recent years. Our proxy for being from a lower to middle income family (receiving a federal grant) is only for first-time, full-time students who filed the Free Application for Federal Student Aid. Students from lower-income families are less likely to attend college full-time (authors' calculation using data from the National Postsecondary Student Aid Study). Additionally, a sizable share of students with financial need do not file the FAFSA (Kofoed, 2017). As a result, we are potentially understating the effects of tuition controls on the most vulnerable students.

Results

We begin by presenting DiD results using both traditional TWFE and Gardner techniques examining the effects of tuition caps on new student enrollment in the following year. As shown in Table 3, there are no consistent overall effects on enrollment across either specification or by institutional selectivity. The Gardner estimate for overall enrollment is negative and significant for more selective institutions, and is just short of significance for less selective institutions. There is some evidence of increases in Hispanic and Asian student enrollment at less selective institutions across both the TWFE and Gardner estimations.

[Insert Table 3 here]

We would expect to see larger effects when only considering tuition freezes, as quite a few tuition caps were set at well above the rate of inflation and may not influence behaviors. Table 4 shows TWFE and Gardner results by institutional selectivity when considering tuition freezes instead of all tuition caps. The models partially backed up our hypothesis. We found positive effects on overall enrollment of approximately three percent across both the TWFE and Gardner models in the year following the adoption of a tuition freeze for all students, and this was driven by students from under-represented backgrounds generally (approximately seven percent), Hispanic students (approximately seven percent), and in-state students (three percent). Again, these effects are driven by less selective universities that may be more willing to expand their capacity in response to student demands. Taken together, we view the results for tuition freezes as showing suggestive evidence of their effectiveness for certain groups of students, particularly among those attending less selective colleges.

[Insert Table 4 here]

We then move to the event study sample, dropping colleges that were subject to tuition caps or freezes (depending on the analysis) in the 2003-04 academic year. The Gardner analyses for this sample (found in Appendix 3) again show no consistent pattern of coefficients when using tuition caps as the outcome of interest. For tuition freezes, the same pattern of results generally holds with the event study sample. However, the standard errors are somewhat larger on account of the reduced sample size.

The event study results can be found in the three panels of Figure 1 for tuition caps and the three panels of Figure 2 for tuition freezes. In general, the results of the DiD and event study estimations align with each other. The positive and statistically significant estimates for Asian and Hispanic student enrollment shortly following the adoption of tuition caps generally hold in the event study models, although the coefficients were somewhat smaller. The event student results also show increases in Black enrollment following the implementation of a cap, but the existence of positive and significant pre-treatment coefficients leads us to not have confidence in this finding.

[Insert Figure 1 here]

Turning to tuition freezes (Figure 2), the most compelling finding in the event study models is a sharp increase in Hispanic student enrollment in the two to three years following a freeze. The large increase in URM enrollment from the DiD models seems to be primarily driven by pre-treatment trends, and there are no statistically significant differences in in-state student enrollment in the event study model. Finally, while overall enrollment increased modestly in the DiD estimates, we generally cannot rule out null effects in the event study models.

[Insert Figure 2 here]

Discussion

College affordability has become an increasing concern for state policymakers, students, and their families over the past several decades. In response to rising tuition and fee charges, a growing number of states have implemented limits on how much public colleges can increase student charges. Yet there is a dearth of research examining whether these policies are actually effective in increasing the enrollment of state residents and diversifying student bodies, even though the topic is even more important in the wake of the coronavirus pandemic and a growing number of universities operating under tuition controls.

We use principal-agent theory and resource dependency theory to frame our inquiry into the impact of tuition freezes on the mix of students enrolled in public postsecondary institutions. These frameworks offer us a way to understand the relationship between the state and the postsecondary institution. Specifically, they allow us to ask whether state tuition control policy has influences beyond just setting tuition rates. Given that public institutions are resource-dependent, are state-imposed tuition controls lead public universities to consider other ways to increase revenue?

To explore this, we compiled a 16-year dataset of tuition and fee control policies and found at most modest effects of tuition controls on student enrollments. Across both differences-in-differences and event study models, the most consistent finding is that tuition freezes lead to increases in Hispanic student enrollment in the years initially following the imposition of controls. This was entirely driven by less-selective institutions, with precise null estimates for more-selective institutions. Research has shown that Hispanic students tend to be particularly loan averse relative to other students (Boatman et al., 2017), so the message sent by a tuition

freeze at institutions with smaller financial aid budgets may be sufficient to get Hispanic students to consider attending.

Other findings tended to be much smaller in magnitude or showed concerns with pre-treatment trends in the event study models. These results suggest that while institutional enrollment decisions were associated with the presence of tuition controls, the association is relatively weak, and is not consistent across institutional types. This suggests that public universities were generally unable or unwilling to make major changes to their enrollment management strategies in response to limits on in-state tuition increases. Less selective universities may have been able to only modestly broaden their pool of potential students, especially when other universities in the same state faced the same constraint on tuition. More selective universities, on the other hand, may not have had the capacity to expand enrollment to meet any increases in demand or sought to enhance their prestige instead of increasing the size of their student body.

Our findings raise a number of topics for future research. One important question is whether tuition control policies improve longer-term student outcomes such as graduation, debt burdens, and earnings. This is of particular interest because our findings are concentrated at less-resourced universities. The strong relationship between available resources and these student success metrics (Chakrabarti et al., 2020; Deming & Walters, 2017; Webber & Ehrenberg, 2010) raises concerns about how much students will benefit when they attend universities with fewer resources available to support instructional and support services. It also raises questions about whether the effects of tuition freezes differ based on the length of the freeze, as universities subject to longstanding freezes (such as University of Wisconsin System campuses, which have had tuition frozen since 2013) may have to reduce spending on educational activities more than

universities subject to one-year freezes. Exploring whether effects vary based on the length of the freeze has important policy implications, as many freezes are for just one or two years.

Discovering whether colleges seek out revenue from additional sources beyond out-of-state undergraduates would also add to our understanding of the impact of tuition capping and freezing. Under resource dependence theory, colleges operating under tuition controls for in-state undergraduates would seek revenue from other sources. We did not find evidence of large increases in undergraduate enrollment, but universities could seek to enroll more graduate students, increase room and board charges, or pursue sponsorship and research funding opportunities in an effort to diversify their revenue sources and gain additional flexibility. Some of these revenue generating options, such as increasing room and board rates, would have adverse effects on undergraduate students, while other options may represent a broadening of institutional missions.

It is also possible that institutions may increase their interest in revenue sources such as government grants or philanthropic support. However, these sources are a small part of overall revenue at most public universities. For example, the median public university had an endowment of just $5,400 per full-time equivalent student in Fiscal Year 2016. This equates to approximately $250 per student in returns assuming a 4.5% spending rate (Baum et al., 2018), but endowment funds are often restricted for particular purposes. These are useful areas for potential future study, but are outside the scope of this paper.

Finally, it is crucial to talk with stakeholders on university campuses, in state legislatures, and at state higher education agencies to understand the process by which tuition controls get implemented and how they affect students. One item to consider is whether other policies were

also put in place at the same time as tuition controls. The most straightforward way to support a tuition cap or freeze is for the state to increase funding to help maintain educational resources, but legislators and governing board members may hesitate to increase funding without imposing additional accountability provisions. This would force public universities to juggle additional demands and make operating choices, consistent with principal-agent theory. And if tuition freezes continue to generate the modest enrollment increases that we found in our analysis, university leaders will have to figure out how to best educate students with limited resources. It is also important to talk with current and prospective students about affordability. If tuition is frozen but remains at a level that is unaffordable for many students, null findings of tuition controls are to be expected.

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Table 1: Number of states with tuition and fee controls for public universities, 2003-04 to 2018-19.

	Tuition			Fees		
Academic year	Any cap	Cap at/below CPI	Freeze	Any cap	Cap at/below CPI	Freeze
2003-04	12	2	2	6	1	1
2004-05	13	3	2	6	2	1
2005-06	13	4	3	6	2	1
2006-07	14	5	3	7	3	2
2007-08	16	7	5	7	3	2
2008-09	17	7	7	7	2	2
2009-10	17	6	5	8	3	3
2010-11	17	3	3	8	1	1
2011-12	13	4	2	5	0	0
2012-13	16	4	4	5	0	0
2013-14	21	10	10	6	1	1
2014-15	22	15	15	6	1	1
2015-16	15	8	8	4	0	0
2016-17	18	15	14	3	2	1
2017-18	12	6	3	3	1	1
2018-19	12	6	5	2	0	0

Source: Authors' review of state policies.

Notes:

(1) We coded a policy as being at or below the CPI if it was within 0.1% of the final CPI for a given fiscal year (July-June).

(2) Not all policies cover all public universities in a given state.

(3) For states that have different caps across universities, the most stringent cap was coded here.

(4) This excludes Massachusetts on account of its unusual tuition and fee structure.

Table 2: Summary statistics of the dataset, 2003-04 through 2018-19.

	Ever had cap/freeze		Never had cap/freeze		
Characteristic	Mean	(SD)	Mean	(SD)	Source
Tuition cap (pct)	54.3	(49.8)	0.0	--	Authors' data collection
Tuition freeze (pct)	20.0	(40.0)	0.0	--	Authors' data collection
Total new student enrollment	1,975	(1,623)	1,839	(1,734)	IPEDS
Pct underrepresented minority students	28.8	(24.2)	31.3	(24.5)	IPEDS
Pct Black students	14.8	(22.7)	16.2	(21.1)	IPEDS
Pct Hispanic students	10.4	(12.8)	11.9	(17.0)	IPEDS
Pct white students	62.3	(26.7)	62.4	(25.5)	IPEDS
Pct Asian students	6.4	(9.2)	4.3	(7.8)	IPEDS
Pct receiving federal grant	37.4	(16.7)	39.2	(15.7)	IPEDS
Pct out-of-state students	17.4	(14.0)	17.2	(15.9)	IPEDS
More selective institution (pct)	29.8	(45.8)	16.2	(36.9)	Barron's
FTE enrollment	12,294	(10,495)	11,100	(10,512)	IPEDS
Pct undergraduate	88.3	(8.0)	87.0	(9.2)	IPEDS
Admit rate (pct)	67.4	(18.3)	72.5	(14.8)	IPEDS
Tuition reliance (pct)	26.3	(10.1)	29.3	(10.8)	IPEDS
State appropriations ($mil)	108.5	(132.5)	86.2	(102.4)	IPEDS
State aid per 18-24 year old ($)	352.4	(207.7)	352.3	(211.7)	NASSGAP, Census
State aid based on need (pct)	74.6	(32.5)	81.4	(31.0)	NASSGAP
State per-capita personal income ($)	50,777	(8,319)	47,134	(5,456)	BEA
State poverty rate (pct)	13.2	(3.3)	13.8	(2.8)	Census
State age 18-24 URM (pct)	33.7	(13.9)	35.8	(15.2)	Census
Democratic unified legislative control (pct)	37.9	(48.5)	22.8	(42.0)	NCSL, authors' data collection
Republican unified legislative control (pct)	41.1	(49.2)	64.7	(47.8)	NCSL, authors' data collection
Republican governor (pct)	47.3	(49.9)	62.7	(48.4)	NCSL
Number of colleges	342		173		

Abbreviations:

IPEDS: Integrated Postsecondary Education Data System

NASSGAP: National Association of State Student Grant and Aid Programs

BEA: Bureau of Economic Analysis

NCSL: National Conference of State Legislatures

Note: All financial values are adjusted into 2020 dollars using the Consumer Price Index.

Table 3: Difference-in-differences regressions examining the effects of a tuition cap on new student enrollment.

	Overall		Less selective		More selective	
Student group (log)	TWFE	Gardner	TWFE	Gardner	TWFE	Gardner
All	0.004	-0.062	0.004	-0.078	-0.006	-0.065*
	(0.014)	(0.034)	(0.016)	(0.044)	(0.012)	(0.032)
Underrepresented minority	0.032	-0.262	0.042	-0.252	-0.006	-0.010
	(0.021)	(0.154)	(0.024)	(0.161)	(0.027)	(0.076)
Black	0.007	-0.303	0.014	-0.271*	-0.008	-0.053
	(0.019)	(0.170)	(0.026)	(0.138)	(0.017)	(0.088)
Hispanic	0.045*	0.295	0.064*	0.238	-0.009	0.165
	(0.022)	(0.229)	(0.028)	(0.153)	(0.016)	(0.281)
White	0.006	0.528	0.008	0.478	-0.004	-0.136
	(0.010)	(0.338)	(0.015)	(0.314)	(0.009)	(0.080)
Asian	0.032	0.370	0.058*	0.321*	-0.037	0.038
	(0.021)	(0.221)	(0.022)	(0.161)	(0.022)	(0.113)
Received federal grant	0.019	-0.180	0.019	-0.168	0.015	0.045
	(0.022)	(0.098)	(0.029)	(0.102)	(0.018)	(0.124)
No federal grant	-0.023	0.008	-0.029	-0.034	-0.019	-0.125
	(0.017)	(0.029)	(0.022)	(0.023)	(0.023)	(0.094)
In-state students	0.002	-0.047	0.004	-0.060*	-0.007	-0.050
	(0.014)	(0.025)	(0.016)	(0.030)	(0.011)	(0.027)
Out-of-state students	0.066	-0.106	0.044	-0.156	0.120	-0.095
	(0.043)	(0.101)	(0.038)	(0.103)	(0.075)	(0.233)

Notes:

(1) Each entry is the result of a separate regression, with control variables as listed in Table 2, two-way fixed effects, and state-clustered standard errors (in parentheses).

(2) * represents p<.05, ** represents p<.01, and *** represents p<.001.

(3) Enrollment is reported for the year following the implementation of a tuition cap.

Table 4: Difference-in-differences regressions examining the effects of a tuition freeze on new student enrollment.

	Overall		Less selective		More selective	
Student group (log)	TWFE	Gardner	TWFE	Gardner	TWFE	Gardner
All	0.028*	0.031*	0.031*	0.033	0.019	0.021
	(0.013)	(0.016)	(0.014)	(0.018)	(0.011)	(0.014)
Underrepresented minority	0.083**	0.062	0.103***	0.074	0.036	0.032
	(0.029)	(0.042)	(0.029)	(0.045)	(0.036)	(0.043)
Black	0.035	-0.007	0.052	-0.002	-0.005	-0.010
	(0.021)	(0.044)	(0.028)	(0.057)	(0.027)	(0.029)
Hispanic	0.061**	0.088***	0.088***	0.126**	0.005	0.001
	(0.021)	(0.023)	(0.022)	(0.040)	(0.021)	(0.030)
White	0.008	0.044	0.009	0.059	-0.004	-0.004
	(0.010)	(0.041)	(0.014)	(0.057)	(0.009)	(0.012)
Asian	0.002	0.027	0.004	0.039	-0.017	-0.020
	(0.029)	(0.047)	(0.037)	(0.058)	(0.024)	(0.026)
Received federal grant	0.042	0.028	0.053	0.032	0.023	0.026
	(0.026)	(0.044)	(0.030)	(0.054)	(0.023)	(0.025)
No federal grant	0.010	0.017	0.003	0.009	0.026	0.026
	(0.017)	(0.019)	(0.022)	(0.024)	(0.014)	(0.018)
In-state students	0.026*	0.031*	0.032*	0.037*	0.009	0.011
	(0.012)	(0.015)	(0.014)	(0.016)	(0.009)	(0.012)
Out-of-state students	0.071	0.065	0.064	0.050	0.092	0.114
	(0.050)	(0.068)	(0.042)	(0.059)	(0.084)	(0.120)

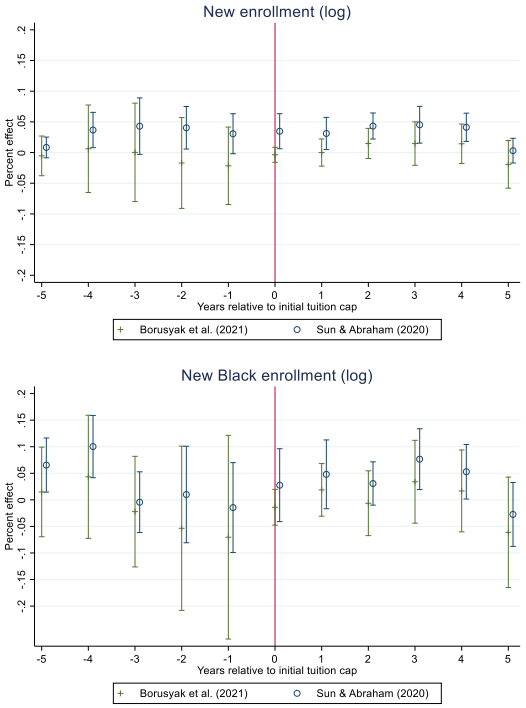
Notes:

(1) Each entry is the result of a separate regression, with control variables as listed in Table 2, two-way fixed effects, and state-clustered standard errors (in parentheses).

(2) * represents p<.05, ** represents p<.01, and *** represents p<.001.

(3) Enrollment is reported for the year following the implementation of a tuition freeze.

Figure 1a: Event studies, tuition caps



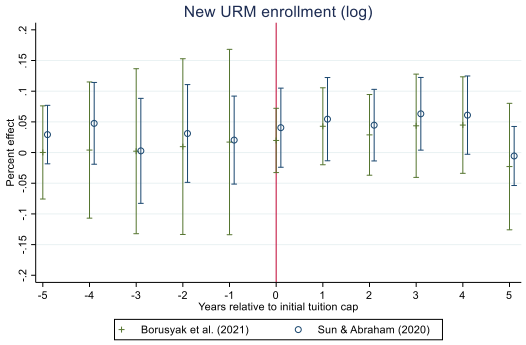
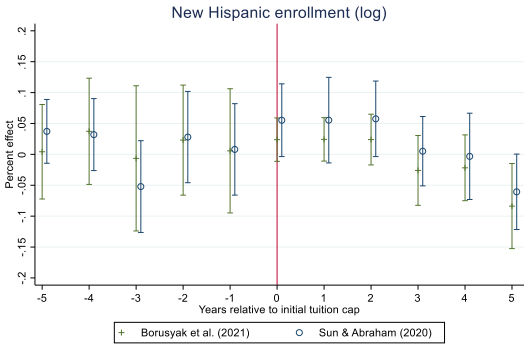
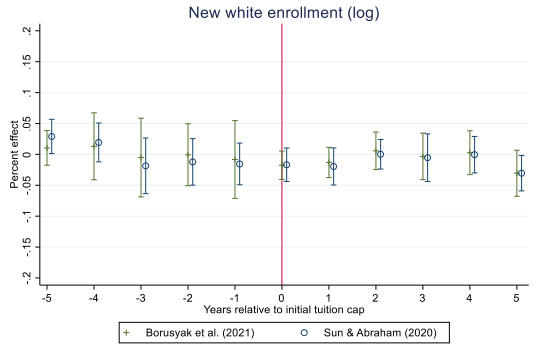


Figure 1b: Event studies, tuition caps





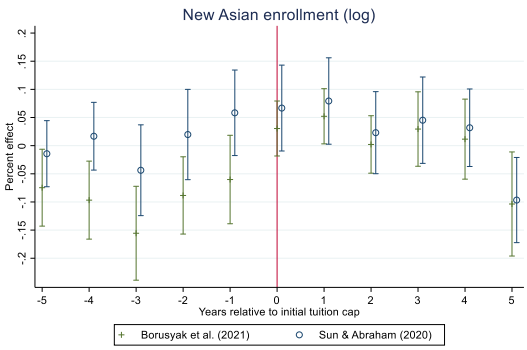


Figure 1c: Event studies, tuition caps

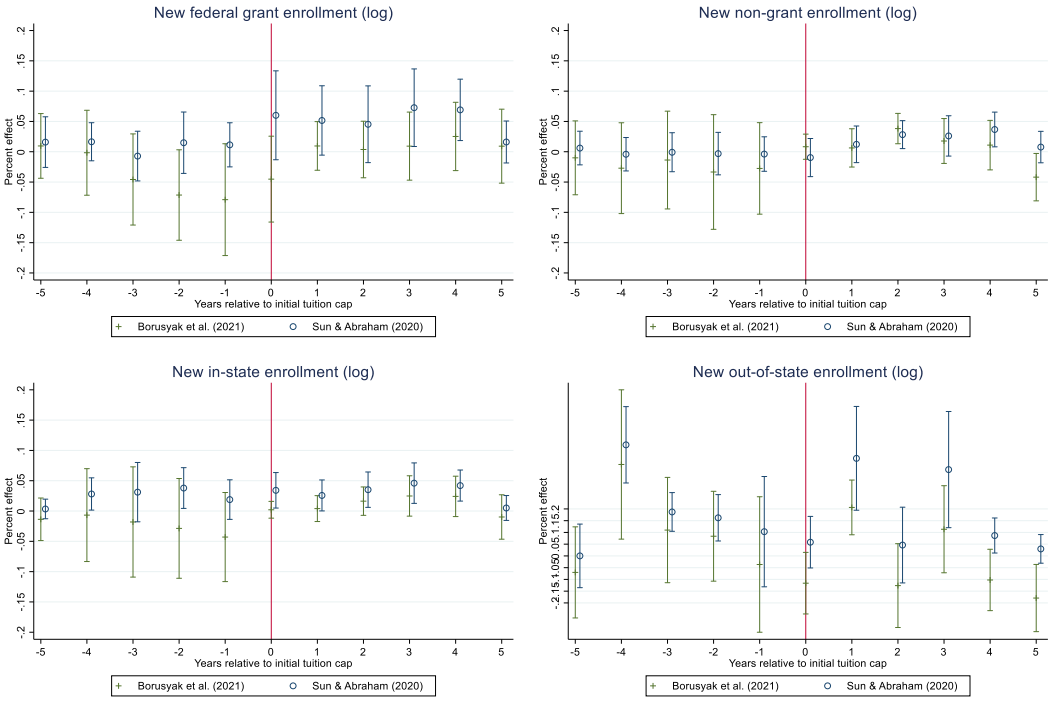


Figure 2a: Event studies, tuition freezes

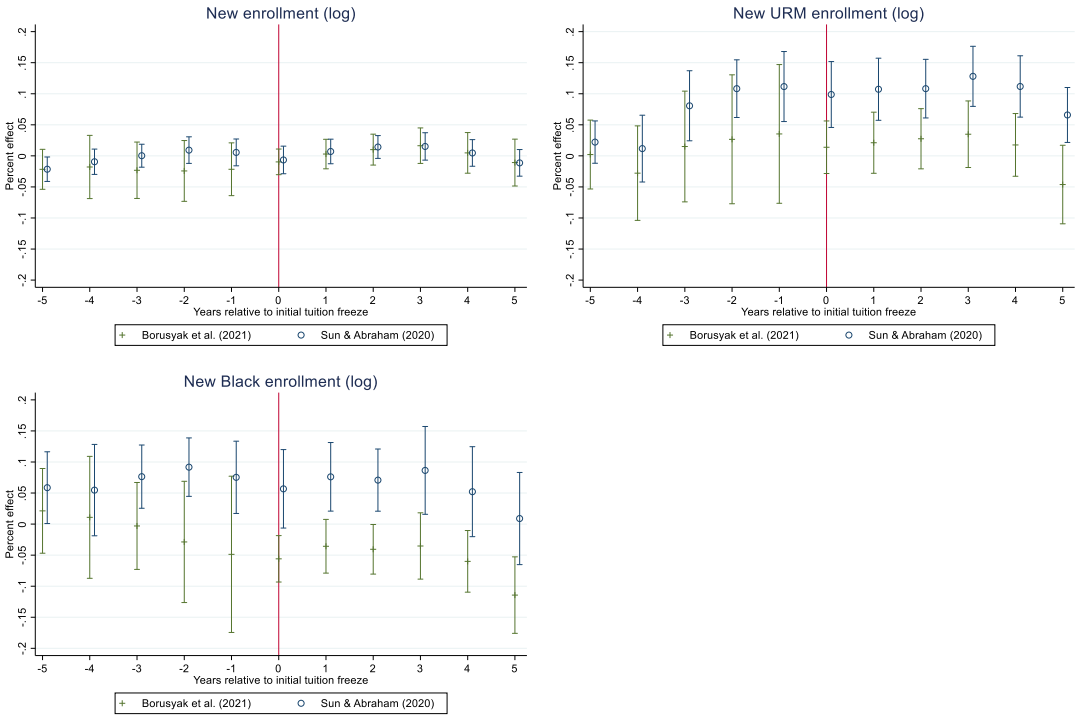


Figure 2b: Event studies, tuition freezes

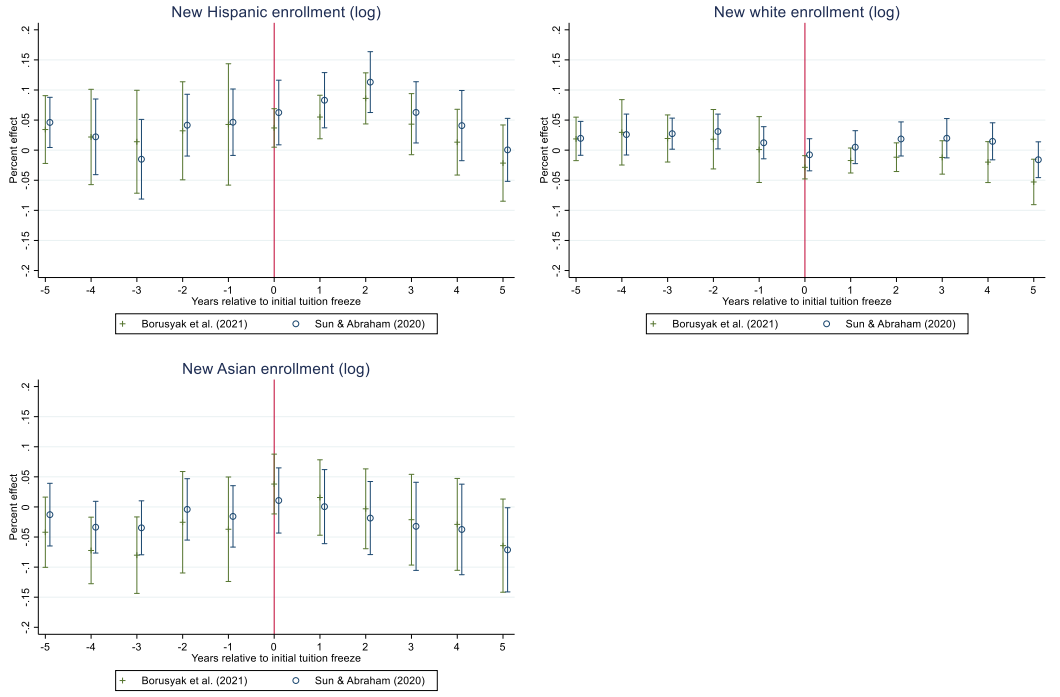
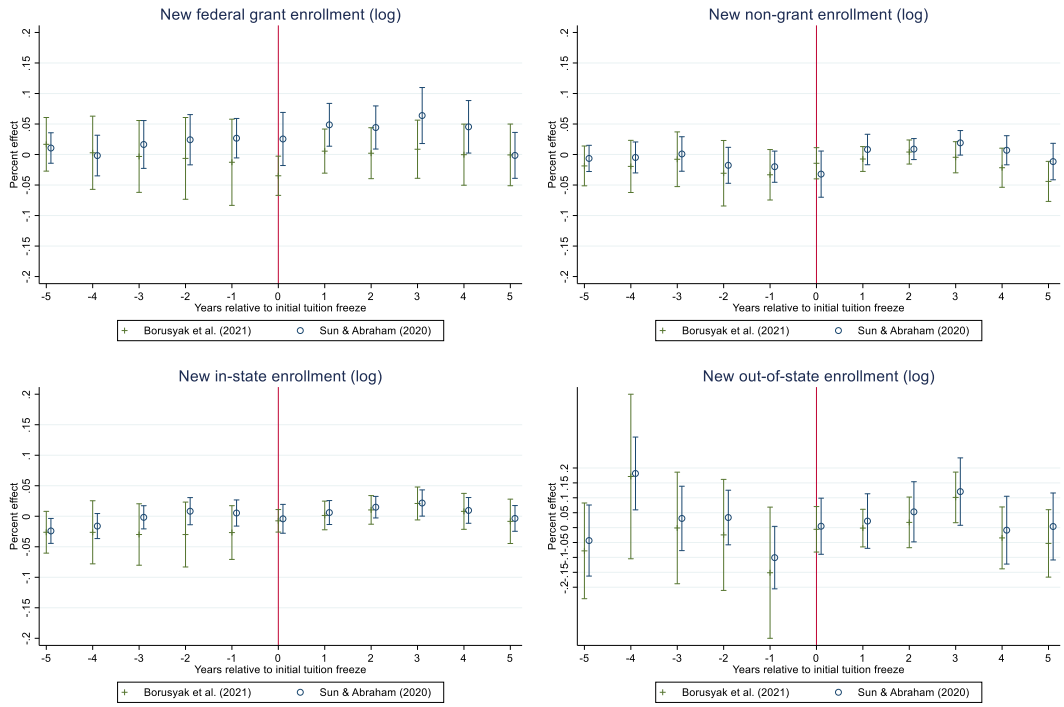


Figure 2c: Event studies, tuition freezes



Appendix 1: Tuition limits by state and year.

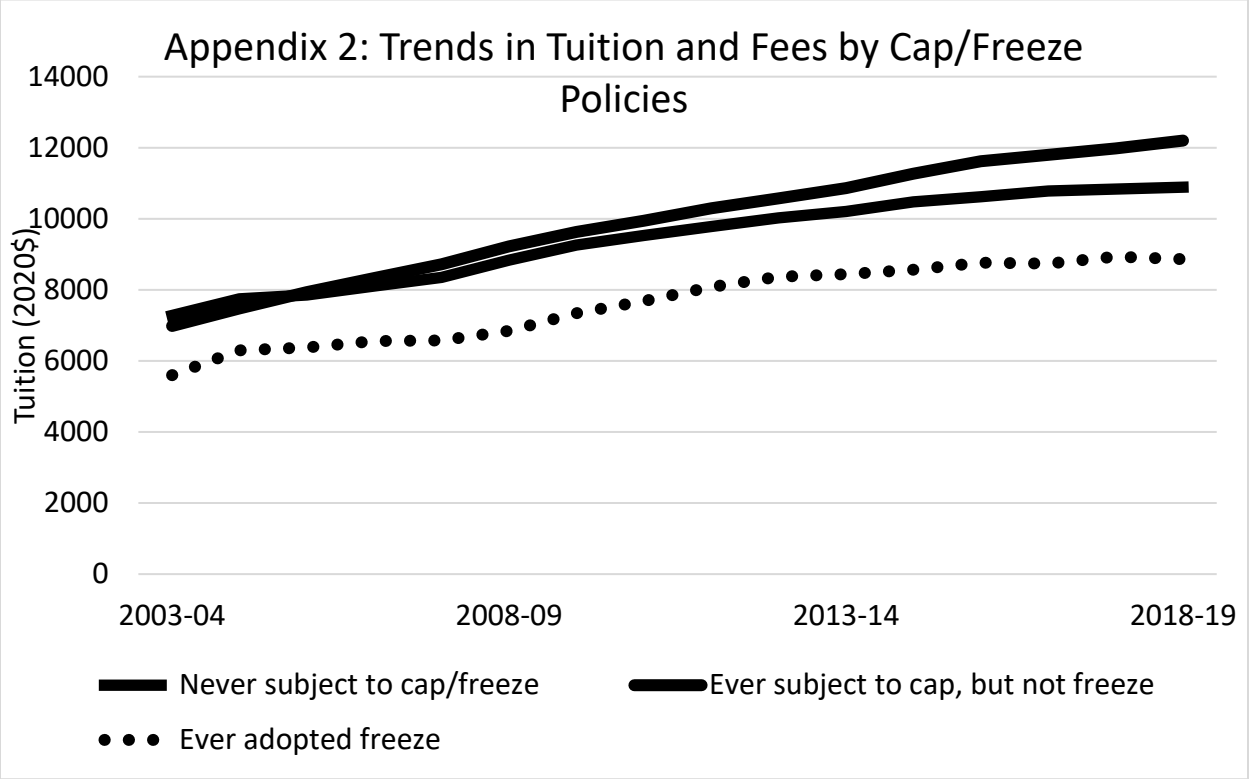
Academic year	Limit (percent)
2003-04	CT (15%), FL (8.5%), ID (10%), LA (7.5%*), MS (0%), NC (5%), NJ (9%), OH (9.2%*), VA (5%), WA (7%), WI (16.8%*), WV (9.5%)
2004-05	CT (15%), FL (7.5%), ID (10%), LA (3.3%*), MI (2.4%), ND (18.5%*), NJ (8%), NY (0%), OH (9.2%*), UT (10.9%*), WA (7%), WI (14.0%*), WV (11%)
2005-06	CT (15%), FL (5%), ID (10%), LA (-1.4%*), MN (7%), NC (0%), ND (10%), NJ (8%), NY (0%), OH (6%), OR (3%), WA (6.25%*), WV (9.5%)
2006-07	CO (2.5%), CT (15%), FL (3%), ID (10%), KY (9.4%*), LA (0.3%*), MD (0%), ND (10%), NJ (8%), NY (0%), OH (6%), OR (3%), WA (6.25%*), WV (9.5%)
2007-08	CO (6%*), CT (15%), FL (5%), ID (10%), KY (9.4%*), LA (0.3%*), MD (0%), MT (0%), NC (6.5%), ND (5%), NY (0%), OH (0%), OR (3.4%), VA (6%), WA (5.5%*), WV (9.5%)
2008-09	CO (8.5%*), CT (15%), FL (6%), ID (10%), KY (7.75%*), LA (6.4%*), MD (0%), MO (4.1%), MS (0%), MT (0%), NC (6.5%), ND (5%), NY (0%), OH (0%), OR (3.4%), VA (4%), WY (0%)
2009-10	CO (9%), CT (15%), FL (15%), ID (10%), KY (4.25%*), LA (6.7%*), MD (0%), MO (1%), MT (1%*), NC (6.5%), ND (3.5%), NJ (3%), NY (9.5%*), OH (0%), OK (0%), OR (7.6%*), WA (14%)
2010-11	CO (9%), CT (15%), FL (15%), ID (10%), KY (5.25%*), LA (5%), MD (3%), MO (2.7%), MT (1%*), NC (6.5%), ND (3.5%), NJ (4%), NY (0%), OH (3.5%), OR (7.6%*), WA (14%), WV (0%)
2011-12	CA (0%), CO (9%), FL (15%), KY (5.25%*), LA (5%), MD (3%), MI (7.1%), NC (6.5%), ND (2.5%), NY (6.2%*), OH (3.5%), OR (3.4%*), WI (5.5%)
2012-13	AZ (0%), CA (0%), CO (9%), FL (15%), KY (5.25%*), LA (10%), MD (3%), ME (0%), MI (4%), MO (3%), NC (6.5%), ND (2.4%*), NY (5.8%*), OH (3.5%), OR (3.4%*), WI (5.5%)
2013-14	CA (0%), CO (9%), FL (1.7%), KY (3%), LA (10.3%*), MD (2.8%*), ME (0%), MI (3.75%), MN (0%), MO (1.7%), MT (0%), NC (6.5%), ND (4.5%*), NE (0%), NH (0%), NY (5.5%*), OH (2%), OR (3.5%), RI (0%), WA (0%), WI (0%)
2014-15	CA (0%), CO (6%), FL (0%), KY (4%), LA (10%), MD (2.8%*), ME (0%), MI (3.2%), MN (0%), MO (0%), MT (0%), NC (0%), ND (4.5%*), NE (0%), NH (0%), NY (5.2%*), OH (2%), OR (0%), RI (0%), SD (0%), WA (0%), WI (0%)
2015-16	CA (0%), CO (6%), FL (0%), KY (3.3%*), LA (7.5%*), ME (0%), MI (3.2%), MO (0.8%), MT (0%), NC (6.5%), ND (2.5%), NY (4.9%), OH (0%), WA (-5%), WI (0%)
2016-17	CA (0%), FL (0%), GA (0%), KY (4.7%*), LA (1.3%*), MD (2%), ME (0%), MI (4.2%), MN (0%), MO (0%), MT (0%), ND (2.5%), NY (0%), OH (0%), RI (0%), SD (0%), WA (-12.5%*), WI (0%)
2017-18	FL (0%), KY (4.4%*), LA (-0.9%), MD (2%), MI (3.8%), MO (2.1%), ND (4%), NH (2.5%), NY (3.1%), OR (6.5%*), WA (2.2%), WI (0%)
2018-19	FL (0%), GA (0%), KY (4%), LA (0%), MI (3.8%), MN (0%), MO (2.1%), ND (4%), NY (3%), OR (5%), WA (2.2%), WI (0%)

Source: Authors' review of state policies.

Notes:

(1) Not all policies cover all colleges in a given state.

(2) Some states allow colleges to increase tuition by different amounts in a given year. Those are indicated with *, and the average is shown here.



Appendix 3: Gardner estimates examining the effects of tuition caps and freezes using event study sample.

	Overall		Less selective		More selective	
Student group (log)	Cap	Freeze	Cap	Freeze	Cap	Freeze
All	-0.010	0.031	-0.012	0.035*	-0.029	0.017
	(0.020)	(0.016)	(0.023)	(0.018)	(0.021)	(0.015)
Underrepresented minority	-0.067	0.058	-0.062	0.072	-0.123	0.029
	(0.050)	(0.041)	(0.059)	(0.045)	(0.052)	(0.043)
Black	-0.083	-0.010	-0.125	-0.004	0.020	-0.013
	(0.056)	(0.044)	(0.090)	(0.057)	(0.046)	(0.029)
Hispanic	-0.034	0.090***	0.018	0.126**	-0.186*	0.007
	(0.082)	(0.024)	(0.087)	(0.042)	(0.094)	(0.029)
White	0.016	0.045	0.023	0.062	-0.022	-0.007
	(0.025)	(0.042)	(0.032)	(0.059)	(0.031)	(0.012)
Asian	0.055	0.024	0.094*	0.037	-0.056	-0.022
	(0.034)	(0.048)	(0.045)	(0.059)	(0.043)	(0.026)
Received federal grant	-0.041	0.029	-0.015	0.035	-0.133	0.025
	(0.054)	(0.044)	(0.050)	(0.054)	(0.091)	(0.025)
No federal grant	0.011	0.015	-0.013	0.011	0.026	0.017
	(0.027)	(0.020)	(0.028)	(0.025)	(0.044)	(0.023)
In-state students	-0.017	0.030*	-0.024	0.037*	-0.016	0.009
	(0.026)	(0.015)	(0.031)	(0.017)	(0.021)	(0.013)
Out-of-state students	0.029	0.064	-0.019	0.048	0.164	0.112
	(0.087)	(0.070)	(0.079)	(0.061)	(0.220)	(0.122)

Notes:

(1) Each entry is the result of a separate regression, with control variables as listed in Table 2, two-way fixed effects, and state-clustered standard errors (in parentheses).

(2) * represents p<.05, ** represents p<.01, and *** represents p<.001.

(3) Enrollment is reported for the year following the implementation of a tuition cap or freeze.