

# THE UNEQUAL IMPACTS OF PERFORMANCE-BASED FUNDING ON INSTITUTIONAL RESOURCES IN HIGHER EDUCATION

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## Introduction

For numerous decades, state policymakers have sought ways to foster improved performance from public colleges and universities due in part to the growing importance of higher education to socioeconomic mobility and economic development (Dougherty & Natow, 2015). The notion of enhancing accountability in higher education represents an increasingly popular public policy goal designed to increase efficiency and improve degree attainment among postsecondary institutions (Kelchen, 2018). Public colleges and universities have traditionally received state funding based solely on their number of enrolled students and appropriations in the previous year (Layzell, 1999), but performance-based funding (PBF) policies that link at least a portion of state appropriations to institutional outcomes have become a staple of higher education finance in recent years.

Although 41 states have implemented PBF at some point as of Fiscal Year 2020, the design of PBF policies looks very different across PBF-adopting states (Rosinger et al., 2021). As one example, the percentage of state funding tied to institutional outcomes or the “dosage” of PBF policies varies considerably across PBF-adopting states. In Fiscal Year 2020, four states (Kentucky, Ohio, North Dakota, and Tennessee) allocated a majority of funds to both two- and four-year colleges based on institutional performance, while the median state with PBF tied fewer than 10% to performance. For example, Arkansas (3%), Nevada (4%), Louisiana (20%), Kentucky (70%), and Ohio (100%) allocate varying proportions of state appropriations to institutional performance. Among the 32 states with a PBF system in place in Fiscal Year 2020, roughly 60%

incentivize completion outcomes among racially minoritized students in their PBF formula. A higher percentage (80%) of PBF-adopting states include financial incentives for graduating low-income students in their PBF formula (Rosinger et al., 2021), which suggests that some policymakers may avoid including race/ethnicity metrics in their PBF policy design (Gándara, 2020).

A substantial body of literature has examined the effects of PBF on college access and student success metrics, but less is known about the financial implications of PBF adoption (Ortagus et al., 2020). In one of the only studies of the financial impact of PBF policies, Hagood (2019) found that PBF was associated with increases in state funding for highly selective universities and research universities but decreases in state funding for rural universities. This offers important insights for the financial implications of PBF for specific types of four-year institutions but does not consider the wide variations in PBF policy design that could influence institutional responses. Prior work does not analyze financial impacts of PBF policies for institutions that enroll the largest shares of underserved students, such as community colleges, lesser-resourced four-year institutions, and different types of minority-serving institutions (MSIs).

For both PBF and non-PBF states, historically Black colleges and universities (HBCUs) and other MSIs receive far less per-student state funding than predominantly white institutions (Boland & Gasman, 2014; Cunningham et al., 2014). Similarly, institutions with higher percentages of Pell Grant recipients receive less state support than those colleges and universities with fewer lower-income students (Goldrick-Rab & Kolbe, 2015). A serious concern pertaining to PBF in higher education is the potential for an inequitable funding system in which already under-resourced institution types, such as community colleges and minority-serving institutions, receive even fewer resources (Hillman & Corral, 2018). In Fiscal Year 2019, Florida State University was allocated \$51.6 million in new performance funds, the University of Florida received \$57.6 million in new performance funds, yet Florida A&M University (an HBCU) was allocated \$0 in new performance funds (Dobson, 2018).

In Fiscal Year 2020, states used performance metrics to budget nearly 10% of total state appropriations for public colleges and universities (Rosinger et al., 2021), highlighting the critical importance of better understanding how PBF alters the distribution of state funds across institution types. The financial implications of PBF policy design represent a critical yet understudied area of higher education research, leaving policymakers with little guidance pertaining to the effects of discrepancies in PBF dosage or the inclusion of equity-oriented bonuses or premiums. If a given PBF system shifts appropriations from under-resourced institutions serving large shares of low-income and racially minoritized students to higher-performing institutions serving large shares of higher-income and white students, the challenges facing under-resourced institutions and their underserved students will become exacerbated. The inclusion of PBF bonuses or premiums for racially minoritized or low-income students' academic success has the potential to offer financial solace for those institutions enrolling disproportionate shares of historically underserved

students (Gandara & Rutherford, 2020; Kelchen, 2018; Rosinger et al., 2021). Yet we know little about how the inclusion of equity-oriented metrics influences the distribution of state funding.

To explore these issues, we leverage the most detailed dataset to date on PBF policy design features to address the following research questions:

1. To what extent do PBF policies impact institutions' revenue from state appropriations and state appropriations per full-time equivalent (FTE) student?
2. Do results vary according to the design of the PBF policy?
3. Do results vary according to institution type?

In this study, we show that the adoption of *any* PBF policy is unrelated to various measures of state funding received by PBF-adopting four-year institutions. However, we find evidence of concentrated impacts of PBF adoption on four-year institutions' state funding, depending on the design of the PBF policy and institution type. In particular, we show that high-dosage PBF policies had a negative impact on state funding for four-year HBCUs and four-year institutions serving an above-average share of racially minoritized students.

For community colleges, we report sporadic evidence of positive impacts of PBF policies on several measures of state funding, but the positive effects of the adoption of *any* PBF policy appear to be concentrated among non-MSIs and community colleges serving below-average shares of racially minoritized students or below-average shares of low-income students. Additional specifications reveal that low-dosage PBF policies, in particular, had positive effects on state funding per FTE student and revenue obtained from state funding, especially among non-MSIs. Similar to the findings focused specifically on four-year institutions, we show that high-dosage PBF policies had a negative impact on state funding per FTE student for various types of community colleges, including MSIs, HBCUs, and institutions serving an above-average share of racially minoritized students. The inclusion of equity-oriented metrics in the PBF formula, such as bonuses or premiums for graduating racially minoritized students, appears to mitigate the unequal impacts of various PBF policies, representing a critical policy consideration in future years.

## Literature Review

### [Disadvantages in State Appropriations for MSIs and Community Colleges](#)

A significant component of funding for public colleges and universities originates from yearly allocations from states' budgets. Funding formulas for public colleges and universities vary across states, with numerous states implementing different funding methods for their two- and four-year systems. Even so, there are general approaches to how states fund public institutions (Severson et al., 2020; Layzell, 2007). States typically fund public higher education with either one or a combination of an enrollment model (state bases funding on student enrollment levels), a base-plus model (state increases or decreases funding for all

institutions by a similar percentage from year to year), or a PBF system (state bases funding on student outcomes, such as credit hour completion, persistence, and completion) (Lingo et al., 2021). Some states pair their PBF and enrollment formulas with hold-harmless or stop-loss protections, which allows public institutions in a given state to have some stability (and avoid extreme funding cuts) via a baseline level of protected funding from year to year.

For already-underfunded institution types, such as MSIs and community colleges, base-plus models would avoid extreme fluctuations in funding; however, such funding models ignore historical inequities that created the (unequal) baseline level of funding. Enrollment-based funding models also disadvantage MSIs and community colleges in structural ways. With over two-thirds of MSIs enrolling under 5,000 students and many rural community colleges facing shrinking populations, any dramatic decreases in enrollment could threaten these institutions' financial solvency (Mercer & Stedman, 2008; Rush-Marlowe, 2021). Using full-time equivalent (FTE) enrollment instead of headcount to determine funding levels also disadvantages many already-underfunded institution types, including community colleges and MSIs, that serve a disproportionate share of part-time students (Romano & D'Amico, 2021). State appropriations and the design of funding models are critical considerations but are not the only way MSIs and community colleges face disadvantages in funding.

#### [Underfunding of MSIs and Community Colleges through Other Supports](#)

Outside of support from their state's general fund, public institutions rely on several other funding mechanisms. Students provide funding through tuition and fee payments paid for by a combination of out-of-pocket payments, loans, grants, or scholarships. Institutions or systems can increase tuition and fees, but a growing number of states are placing limits on tuition price increases (Kelchen & Pingel, 2018). As open-access institutions with a mission-centered commitment to affordability, community colleges are limited in their ability to increase tuition to meet revenue disparities given that tuition increases may close the door to higher education for many lower-income or price-conscious students (Hendrick et al., 2006). Some public institutions respond to decreases in state funding by increasing their reliance on out-of-state and international students, but this revenue-enhancing strategy only appears to work at research universities and selective and primarily white institutions serving low proportions of racially minoritized students (Bound et al., 2020; Jaquette et al., 2016; Jaquette & Curs, 2015).

All public institutions have endowments, funded primarily by private donations, that vary greatly in size across institution types. MSIs and community college endowments are considerably lower relative to their non-MSI and four-year counterparts. For example, the average public non-HBCU has a per-FTE endowment 3.5 times the size of a public HBCU (Smith, 2021), while the median four-year endowment is nearly 12 times the size of the median community college endowment (NACUBO-TIAA, 2019). Similar disparities exist when looking at institutional revenue obtained from research and private grants (Cunningham et al., 2014).

In almost every facet of institutional revenue, four-year non-MSIs receive more revenue per student than four-year MSIs (Cunningham et al., 2014). Both MSI and non-MSI community colleges receive less per-student revenue than their four-year counterparts. MSIs are more reliant on public funding than non-MSIs, but federal funding for all MSIs has not kept pace with the increases in racially minoritized students or the total number of MSIs in higher education (Williams & Davis, 2019; Vargas, 2018; Nellum & Valle, 2015; Cunningham et al., 2014). Local appropriations can help to narrow the funding gap between community colleges and four-year institutions, but local tax revenue received by community colleges does not cover the gap in state appropriations when comparing the public funds received by community colleges and four-year institutions (Dowd et al., 2020; Yeun, 2020). The considerable discrepancies in revenue across institution types leave questions as to whether PBF will improve or exacerbate the funding disparities among community colleges and MSIs relative to four-year institutions and non-MSIs.

### Performance-Based Funding Across Institution Types

Prior work has suggested that PBF systems may cause some colleges and universities to be diverted from their equity-based missions by becoming more selective in the admissions process, reducing academic standards, or pushing students into certificate-granting programs (Dougherty et al., 2016; Wayt & LaCost, 2016; Zerquera & Ziskin, 2020). Many smaller institutions and MSIs lack the administrative and institutional capacity to generate competitive advantages in a PBF system due to low levels of funding and prior enrollment numbers (Jones et al., 2017; Thornton & Friedel, 2016; Zerquera & Ziskin, 2020). In addition, smaller institutions and MSIs do not have the same resources as larger institutions and non-MSIs to be able to lobby state authorities to develop metrics within a PBF formula that would benefit their institutions, leading to a funding climate that favors already-advantaged four-year universities with political influence (Gándara, 2020; Favero & Rutherford, 2020).

Numerous studies have explored the effects of PBF adoption on college access and student success. In the four-year sector, PBF-adopting institutions have been found to lower admissions rates, enroll students with higher standardized test scores, and enroll fewer first-generation students (Gándara & Rutherford, 2020; Umbricht et al., 2017). However, equity-oriented bonuses or premiums in PBF formulas to incentivize completion outcomes among low-income and racially minoritized students may alleviate some of the unintended consequences of PBF in higher education (e.g., restricting access to PBF-adopting institutions) (Gándara & Rutherford, 2018, 2020; Kelchen, 2018). For the community college sector, PBF policies appear to incentivize community colleges in PBF states to push students in the direction of short-term certificates at the expense of longer-term associate degrees that bring a greater labor market return (Li & Kennedy, 2018; Li & Ortagus, 2019).

A particular concern regarding PBF in higher education is whether these policies will financially reward institutions already positioned to do well. Although Hagood (2019) has explored the financial implications of

PBF policies, the author focuses solely on four-year institutions, finding that PBF adoption leads to increases in per-student appropriations at research and highly selective institutions while lowering per-student appropriations at rural, less-selective, and non-research institutions (Hagood, 2019). Hillman and Corral (2018) also focus solely on public four-year institutions and report that four-year MSIs are financially disadvantaged in PBF systems. Additional research suggests that part-time and historically underserved students generate less funding in a PBF system in the state of Texas (McKinney & Hagedorn, 2017). Despite the wide variation in the design and dosage of PBF policies, prior research has yet to consider the role and influence of PBF policy design on the financial consequences of PBF adoption (Ortagus et al., 2021). In addition, we know little about the extent to which PBF policies and their design features serve to widen (or narrow) funding disparities facing community colleges, four-year institutions serving disproportionate shares of racially minoritized or low-income students, and different types of MSIs.

## Conceptual Framework

The logical rationale of this study is guided by Schneider and Ingram's (1993) theory of social construction of target populations, which helps to explain why specific subgroups of the population receive greater advantages than others and how policy design often reinforces or exacerbates those built-in social advantages. The social construction of target populations influences legislators' decision-making and thereby affects the policy agenda as well as the design of a given policy. For PBF policies, the theory of social construction of target populations can help explain why PBF-adopting states may design PBF policies as a way to allocate state appropriations to institutions serving larger shares of already-advantaged students, such as white students and individuals from higher-income families, and restrict state appropriations to institutions serving larger shares of traditionally disadvantaged students, such as racially minoritized students and individuals from low-income families.

Schneider and Ingram's (1993) theory of social construction of target populations centers the role of political power to explain why public officials may prioritize specific subgroups of society in policy design and implementation. More specifically, public officials may seek to optimize their likelihood of reelection by developing or supporting policies that prioritize powerful or advantaged target populations. Due to variations in how public policies distribute resources to different target populations, the theory of social construction of target populations suggests that public officials' pursuit of power mediates their decisions and explains why benefits will be oversubscribed to advantaged populations and burdens will be oversubscribed to disadvantaged populations.

In the case of PBF, public officials leverage PBF policies as a way to hold public colleges and universities accountable for their outcomes. As higher education faces questions regarding the value of postsecondary credentials, rising costs of a college education, and rising student loan debt, legislators respond to public

pressures by seeking out state-level accountability systems intended to increase college completion (Kelchen, 2018). Similar to many public-sector accountability policies, PBF is guided by the principal-agent relationship in which the principal (e.g., state government) pays the agent (e.g., public college or university) to perform a given task, such as increasing the number of college graduates (Jensen & Meckling, 1976; Spence & Zeckhauser, 1971). Under a principal-agent framework, the agent depends upon the principal for necessary funds in order to change their priorities and adhere to the principal's priorities—as long as the funds being allocated by the principal represent a critical funding source for the agent (Harnisch, 2011). This general framework is also rooted in a resource dependence perspective (Aldrich & Pfeffer, 1976), which posits that principals have more power over agents when the agent is more reliant on a single funding source being controlled or allocated by the principal. MSIs, in particular, tend to rely more heavily on state funding to support their operations when compared to non-MSIs, suggesting that the amount or dosage of funds at stake should be considered alongside institution type to better understand why and how PBF adoption may affect institutional resources.

Previous research has shown that the implementation of any accountability system in the public sector can lead to a host of unintended consequences (Kelchen, 2018; McDonnell & Elmore, 1987; Thompson, 1999), such as restricting access to selective institutions and exacerbating funding disparities across institution types (Ortagus et al., 2020). However, Schneider and Ingram's (1993) theory of social construction of target populations contends that any outcome described in higher education literature as an unintended consequence of PBF adoption (e.g., exacerbating funding inequities between advantaged and disadvantaged institution types) may be an embedded feature of PBF policies rather than an unintended outcome. Prior work has suggested that state policymakers may seek to funnel funds to institutions enrolling students they deem as more likely to graduate on time (e.g., white and higher-income students) while restricting funds to institutions enrolling students they deem as less likely to graduate on time (e.g., racially minoritized and low-income students) (Kelchen, 2017; Ortagus et al., 2020).

Taken together, the logic of Schneider and Ingram's (1993) theory of social construction of target populations suggests that the specific design elements of PBF policies will be influenced by political power such that state appropriations will be distributed unequally in ways that prioritize institutions serving larger shares of white and higher-income students and penalize institutions serving larger shares of racially minoritized and low-income students. As such, we hypothesize that public officials used PBF policies, particularly high-dosage PBF policies, to increase institutional revenue from state appropriations for non-MSI four-year institutions and institutions enrolling a larger share of white or higher-income students while decreasing institutional revenue from state appropriations for MSIs, community colleges, and institutions enrolling a larger share of racially minoritized or low-income students.

## Data and Methods

To analyze the impact of various types of PBF policies on institutions' revenue from state appropriations and state appropriations per FTE student, we created the first comprehensive longitudinal dataset of PBF policy details (Authors, 2021) and merged publicly available Integrated Postsecondary Education Data System (IPEDS) data on institutional characteristics, state characteristics, and our outcomes of interest. The analytic sample covers over two decades of data (1997-2019) and includes the population of degree-granting public community colleges and four-year institutions in the U.S. during that period. Because over 100 community colleges now offer a small number of bachelor's degrees in addition to their primary offerings of certificate or associate degree programs (e.g., Floyd & Skolnik, 2019; Ortagus & Hu, 2020), we classify all institutions in our sample according to their 2018 Carnegie classification rather than their highest degree awarded.

In addition, we created an MSI indicator and a non-MSI indicator to better understand the heterogeneous effects of various PBF policies across institution types. The MSI indicator includes HBCUs (drawn from IPEDS) or institutions eligible to be Primarily Black Institutions (PBIs), Hispanic-serving institutions (HSIs) (obtained from *Excelencia in Education's* HSI Database), institutions eligible to be Asian American and Native American Pacific Islander-Serving Institutions or Alaska Native and Native Hawaiian Serving Institutions, and Native American-Serving Nontribal Institutions. We excluded Tribal Colleges and Universities (TCUs) from our analytic sample because states are not obligated to fund TCUs, which receive only 4% of their revenue from the state on average (IPEDS, 2021). We also exclude any special-focus institutions or military academies, allowing our final sample to include 1,091 public community colleges and 552 public four-year institutions.

To create the PBF dataset, our research team collected detailed data on features of PBF policies from a variety of state policy documents, such as budget provisos, legislation, and higher education agency documents, covering a period between 1997 and 2019. Our research team's data collection effort took place over a period of four years and involved careful reviews of more than 2,000 state policy documents and regular meetings to confirm accurate and consistent interpretation of policy documents and data coding decisions. In addition, we used the Internet Archive: Wayback Machine to capture historical versions of websites with relevant PBF policy details or corresponded directly with state higher education agency officials when information was unclear or not readily available. For a detailed overview of our data collection protocol, see Authors (2019).

Detailed PBF policy information collected for the purpose of our study include (1) whether *any* PBF policy was adopted in a state in a given year, (2) whether the PBF policy was actually funded in a state in a given year, (3) the specific metrics used within the PBF policy, and (4) the percent or "dosage" of state general funds tied to performance-based outcomes. Given that several states only have PBF for either community college or four-year institutions, we carried out separate analyses for community colleges and four-year



institutions, respectively. Figure 1 shows maps of the United States indicating the percentage or dosage of state appropriations tied to performance-based outcomes across PBF-adopting states in Fiscal Year 2019. In addition, Figure 1 displays which PBF-adopting states include equity-oriented metrics focused on racially minoritized students or low-income students in Fiscal Year 2019.

***See Figure 1. Presence of any PBF, PBF dosage levels, and PBF equity metrics across states (FY 2019)***

### Variables

The outcome variables of interest for this study are the total amount of institutional revenue derived from state appropriations (logged) and state funding per FTE student. The first treatment variable of interest is a binary indicator to capture whether a state funded *any* PBF policy. The second treatment variable considers the percentage or dosage of state appropriations tied to institutional performance, which is measured by a categorical indicator distinguishing between high-dosage PBF policies (greater than 10% of funds tied to performance) and low-dosage PBF policies (fewer than 10%). In addition to ease of interpretation, we use a threshold of 10% to distinguish between low- and high-dosage PBF policies because both the mean and median values of funded PBF policies were fewer than 10% of state funds.

The third treatment variable is a binary measure capturing whether a PBF-adopting state included an equity-oriented premium to incentivize performance-based outcomes among racially minoritized students (e.g., Black, Hispanic, and Native American students). The fourth and final treatment variable is a binary indicator to show whether a PBF-adopting state had an equity-oriented premium to incentivize performance-based outcomes among low-income students. The comparison group across specifications includes only institutions that were not subject to the specific PBF policy in a given year.

We controlled for a host of institution- and state-level characteristics that may influence our outcomes of interest. Specifically, our control variables at the institution level include FTE undergraduate enrollment (logged), percent of part-time students, in-state tuition and fees (logged), instructional expenditures per student (logged), local appropriations per student (logged). Control variables at the state level include per-capita income (logged), unemployment rate, percent of adults with a bachelor's degree or higher, size of the state's college-aged population (logged), and share of college-aged population by race.

We adjusted all financial variables using the Consumer Price Index and ran separate models for public community colleges, public four-year institutions, institutions serving an above-average share of racially minoritized students (by sector), institutions serving a below-average share of racially minoritized students (by sector), institutions serving an above-average share of low-income students (by sector), institutions serving a below-average share of low-income students (by sector), MSIs (by sector), HBCUs (by sector), HSIs (by sector), and non-MSIs (by sector). Tables 1 and 2 present descriptive statistics for all outcome variables

and covariates included in our models, including separate columns for institutions not subject to PBF and each type of treated institutions (low-dosage, high-dosage, minority metric, low-income metric).

***See Table 1. Descriptive statistics for variables of interest by PBF policy features (four-year institutions) and Table 2. Descriptive statistics for variables of interest by PBF policy features (community colleges)***

### Analytic Strategy

To examine the impact of various PBF policies on institutional resources, we employed a generalized difference-in-differences design (GDiD) with two-way fixed effects, which allows for treatment adoption across different states in different years. We used the GDiD estimator ( $\delta_1$ ) to compare the difference in outcomes between treated and untreated observations following the adoption of the PBF policy type of interest before subtracting the difference in outcomes prior to the adoption of the PBF policy. Formally, the regression model is represented by the following equation:

$$y_{ij} = \beta_0 + \delta_1 PBF_{ij} + c_i + h_j + Z_{ij} + \varepsilon_{sj}$$

where  $y_{it}$  represents the outcome variables described above at institution  $i$  in year  $j$ .  $\beta_0$  is an institution-specific intercept.  $PBF$  is an indicator of the adoption of PBF policy type of interest for institution  $i$  in year  $j$ .  $\delta_1$  is the coefficient of interest.  $c_i$  represents the time-invariant institution-level fixed effect, and  $h_j$  represents the year fixed effect (Allison, 2009).  $Z_{ij}$  is a vector of state- and institution-level covariates described in the previous section. We followed the recommendations of Cameron and Miller (2015) by estimating robust standard errors and clustering standard errors at the state level for each regression model.

Our first specification for all models is a naïve model including only the treatment variable of interest and fixed effects (Column 1 or 3 in Tables 3-10). Our second specification for all models includes the treatment variable of interest, fixed effects, and institution- and state-level covariates (Column 2 or 4 in Tables 3-10). In response to recent developments in econometrics literature outlining issues with time-varying treatment adoption and potential bias in the GDiD approach (e.g., Goodman-Bacon, 2021; Sun & Abraham, 2021), we include a series of event studies to account for both staggered PBF adoption and heterogeneous treatment effects. Two additional issues complicate the traditional GDiD approach when examining complicated state policy issues over a long period of time. First, several states, such as Tennessee, implemented PBF prior to the beginning of our panel period. Second, our four-year data collection initiative has revealed that PBF-adopting states may adopt, abandon, and re-adopt PBF policies during the panel period, which may bias the estimates and weights in the GDiD models in ways that may not capture the accurate treatment effect of various PBF policies.

To directly address these issues associated with potentially biased GDiD estimates and differential treatment timing, we focus on Sun and Abraham's (2021) event study approach identified within recent econometrics literature (*eventstudyinteract* package in Stata). For each outcome variable of interest, we used Sun and Abraham's event study approach for the following sample restrictions: the sample excluding all institutions that adopted PBF prior to the start of the analytic period, and the sample excluding all institutions that adopted PBF prior to the start of the analytic period as well as any institutions that abandoned PBF for any period of time (after initial adoption) between 1997 and 2019. In the event study models, we examined the impact of adopting any PBF policy and ran separate models for public community colleges, public four-year institutions, institutions serving an above-average share of racially minoritized students (by sector), institutions serving a below-average share of racially minoritized students (by sector), institutions serving an above-average share of low-income students (by sector), institutions serving a below-average share of low-income students (by sector), MSIs (by sector), HBCUs (by sector), HSIs (by sector), and non-MSIs (by sector).

### Limitations

This study advances our understanding of the financial implications of PBF policies, but it is subject to several limitations. First, we measure low-income student enrollment by using the number of federal grant recipients enrolled at a public community college or four-year institutions due to IPEDS data limitations. The vast majority of federal grant recipients received the Pell Grant, which targets lower-income students and represents the largest federal grant aid program for college students. However, not every federal grant recipient is a low-income student, as the count of federal grant recipients includes individuals who received smaller federal education assistance programs and training funds. Despite this limitation, federal grant receipt remains the most appropriate measure of low-income student enrollment during our study period given that the number of federal grant recipients and the number of Pell recipients are correlated at 0.99 (authors' calculations using IPEDS data).

Second, we focus specifically on Black, Hispanic, and Native American students when capturing racially minoritized status because PBF policies designed to close completion gaps by race/ethnicity typically focus on Black, Hispanic, and Native American students at PBF-adopting institutions. We acknowledge the complexity of measuring race/ethnicity using IPEDS data, which has nine race/ethnicity categories, and made the decision to align our operationalization of racially minoritized status with the specific language used in many PBF policies with incentives for graduating racially minoritized students.

Finally, our analyses exploring the financial impact of PBF policies on community colleges may not perfectly capture the financial realities of this sector of higher education. In many states, community colleges receive a substantial portion of their public funds from local appropriations, which would not be an appropriate outcome of interest in a PBF study. However, community colleges serving disproportionate shares of racially

minoritized and low-income students may face compounding decreases in local funding not captured in our models. To account for the financial complexities of community colleges, we control for local appropriations in all models focused on the community college sector.

## Results

In this section, we first provide the results from our GDiD analyses specifying the impact of various types of PBF policies on community colleges and four-year institutions, respectively. Each table will examine the pooled sample of institutions (within the community college or four-year sector), various types of MSIs (by sector), and the institutions serving a below- or above-average share of racially minoritized or low-income students (by sector). After doing so, we present our event study results incorporating Sun and Abraham's (2021) estimation strategy outlined in recent econometrics literature to directly address challenges associated with GDiD designs when the treatment of interest (e.g., PBF) is adopted at varying time periods and has heterogeneous treatment effects.

### GDiD Results

Table 3 reports the impact of adopting *any* type of PBF policy on institutional revenue from state appropriations and state appropriations per FTE student among four-year institutions. Across all four-year specifications, the presence of *any* type of PBF policy did not have a statistically significant impact on institutional revenue from state appropriations or state appropriations per FTE student. Table 4 shows the effects of adopting *any* type of PBF policy on the same measures of state appropriations for community colleges, revealing different patterns within the community college sector. Specifically, the presence of *any* type of PBF policy had a positive impact on institutional revenue for community colleges that were non-MSIs (between 10.2 and 11.5 percent), serving a below-average share of racially minoritized students (between 11.8 and 12.1 percent), or serving a below-average share of low-income students (between 10.4 and 11.4 percent). Similar results emerged when examining the outcome of state appropriations per FTE student among PBF-adopting community colleges, as the adoption of *any* type of PBF policy led to increases in state appropriations per FTE student in the naive models for non-MSIs (\$509.88) and institutions serving a below-average share of racially minoritized students (\$604.35).

***See Table 3. Effects of any PBF policy on state appropriations among four-year institutions and Table 4. Effects of any PBF policy on state appropriations among community colleges***

Table 5 considers the dosage of PBF policies and presents the impact of low-dosage or high-dosage PBF systems on four-year institutions' revenue from state appropriations and state appropriations per FTE student. The adoption of a high-dosage PBF system had large negative effects on total revenue from state appropriations among four-year HBCUs (23.5 percent) and state appropriations per FTE student among

four-year institutions serving an above-average share of racially minoritized students (\$905.37) and four-year HBCUs (\$2,215.14).

***See Table 5. Effects of PBF dosage on state appropriations among four-year institutions***

Table 6 shows the effects of low-dosage or high-dosage PBF systems on institutional revenue from state appropriations and state appropriations per FTE student for community colleges. The presence of a low-dosage PBF policy increased institutional revenue from state appropriations by 8.9 percent and state appropriations per FTE students by \$385.16, with stronger effects for community colleges serving a below-average share of racially minoritized or low-income students. In addition, the effects of low-dosage PBF adoption on state appropriations were consistently positive and statistically significant for community colleges classified as non-MSIs, indicating that institutional revenue from state appropriations increased between 9.5 and 10.4 percent and state appropriations per FTE student increased between \$348.60 and \$467.27. Similar to the four-year sector, high-dosage PBF systems had a negative impact on state appropriations for community colleges. Specifically, the adoption of a high-dosage PBF system decreased state appropriations per FTE student for HBCUs (\$1,288.04), MSIs (\$486.57), and institutions serving an above-average share of racially minoritized students (\$568.48).

***See Table 6. Effects of PBF dosage on state appropriations among community colleges***

Tables 7 and 8 present the impact of including a PBF bonus or premium for low-income students' performance on state appropriations for four-year institutions and community colleges, respectively. Regardless of the level of institution, the inclusion of metrics for low-income students in the PBF formula does not have a statistically significant impact on either measure of state appropriation for the pooled sample or subsample of institutions serving an above-average share of low-income students.

***See Table 7. Effects of PBF policies including metrics for low-income students on state appropriations among four-year institutions and Table 8. Effects of PBF policies including metrics for low-income students on state appropriations among community colleges***

Table 9 shows the effects of the presence of a PBF bonus or premium for racially minoritized students on four-year institutions' revenue from state appropriations and state appropriations per FTE student, revealing that a PBF system with metrics for racially minoritized students' performance did not have a statistically significant impact on state appropriations for the pooled sample of four-year institutions, HBCUs, HSIs, MSIs, or institutions serving an above-average share of racially minoritized students.

***See Table 9. Effects of PBF policies including metrics for racially minoritized students on state appropriations among four-year institutions***

Table 10 presents the impact of adopting a PBF system with a bonus or premium for racially minoritized students on community colleges' revenue from state appropriations and state appropriations per FTE student. Specifically, the inclusion of a PBF metric for racially minoritized students' performance had a positive impact on the institutional revenue from state appropriations for MSIs (16.5 percent) and institutions serving an above-average share of racially minoritized students (between 9.9 and 11.0 percent) as well as the state appropriations per FTE student for MSIs (\$399.31), HSIs (\$481.36), and institutions serving an above-average share of racially minoritized students (\$368.53).

***See Table 10. Effects of PBF policies including metrics for racially minoritized students on state appropriations among community colleges***

### Event Study Results

In this subsection, we report results from Sun and Abraham's (2021) event study approach that directly addresses the issues of time-varying adoption and heterogeneous treatment effects that have been highlighted in recent econometrics literature (e.g., Goodman-Bacon, 2021; Sun & Abraham, 2021). Each corresponding figure presents the results from Sun & Abraham's event study approach and generally aligns with the GDiD results outlined above. Similar to the GDiD results pertaining to the impact of the presence of any PBF policy, the event study results for four-year institutions were generally not statistically significant. However, the event study results for four-year institutions reveal some lagged effects after one or two years. Specifically, the models excluding early adopters of PBF (prior to 1997) showed targeted positive effects for four-year institutions that were statistically significant among non-MSIs and four-year institutions serving below-average shares of racially minoritized or low-income students.

***See Figure 2. Event studies dropping four-year institutions subject to PBF in 1997***  
(outcome: changes in state appropriations per FTE student)

***Figure 3. Event studies dropping four-year institutions subject to PBF in 1997 and treated four-year institutions that stopped adopting PBF prior to 2019***

(outcome: changes in state appropriations per FTE student);

***Figure 4. Event studies dropping four-year institutions subject to PBF in 1997***

(outcome: logged revenue from state appropriations);

***and Figure 5. Event studies dropping four-year institutions subject to PBF in 1997 and treated four-year institutions that stopped adopting PBF prior to 2019***

(outcome: logged revenue from state appropriations)

The event study results for community colleges show generally similar findings to the GDiD results regarding the financial implications of adopting any PBF policy, with some noteworthy lagged effects after one or two years. Nearly all specifications were not statistically significant, but the adoption of any PBF policy had a

negative and statistically significant impact on the revenue from state appropriations for community colleges designated as HSIs. While the presence of any funded PBF policy had positive effects on state funding for community colleges that were non-MSIs or serving a below-average share of racially minoritized or low-income students, event study results only revealed positive and statistically significant effects for state appropriations per FTE among community colleges serving a below-average share of racially minoritized students.

*See Figure 6. Event studies dropping community colleges subject to PBF in 1997* (outcome: changes in state appropriations per FTE student)

*Figure 7. Event studies dropping community colleges subject to PBF in 1997 and treated community colleges that stopped adopting PBF prior to 2019* (outcome: changes in state appropriations per FTE student);

*Figure 8. Event studies dropping community colleges subject to PBF in 1997* (outcome: logged revenue from state appropriations)

*and Figure 9. Event studies dropping community colleges subject to PBF in 1997 and treated community colleges that stopped adopting PBF prior to 2019* (outcome: logged revenue from state appropriations)

## Discussion

A large body of literature examining the effects of PBF policies on college completion has generally failed to find consistent evidence that PBF improves degree completion for students, while other research on PBF policies highlights the negative effects of PBF on access to selective public institutions among historically underserved student populations (see Ortagus et al. (2020) for a review). When it comes to understanding the impact of PBF on how state policymakers allocate funds across institution types, however, we know relatively little despite states allocating around 10% of general fund revenue based on performance in 2020 (Rosinger et al., 2021). This study leverages a new comprehensive PBF dataset to better understand the extent to which PBF policies and their design features serve to widen (or narrow) funding disparities across institution types.

We found that the presence of *any* funded PBF policy had no effect on state appropriations among PBF-adopting four-year institutions; however, high-dosage PBF policies had a negative effect on state appropriations for four-year HBCUs and four-year institutions serving an above-average share of racially minoritized students. This suggests that PBF systems in the four-year sector widen existing funding disparities and further disadvantage under-resourced institutions. There is some evidence of a more complicated picture when examining the effects of PBF policies on state appropriations among community colleges. Although the presence of *any* funded PBF policy only had positive effects on state appropriations

for community colleges that were non-MSIs or serving a below-average share of racially minoritized or low-income students, we found that low-dosage PBF policies had more consistent positive effects on some measures of state appropriations, with stronger impacts among non-MSIs. For high-dosage PBF policies affecting community colleges, we found that high-dosage PBF policies had negative impacts on some measures of state appropriations among MSIs, HBCUs, and institutions serving an above-average share of racially minoritized students. PBF policies with incentives for graduating racially minoritized students appear to mitigate the unequal impacts of PBF adoption on state appropriations.

Our findings align with prior research showing that less-advantaged public four-year universities face funding disadvantages under PBF policies (Hagood, 2019; Hillman & Corral). While prior research has focused on binary measures of PBF and only considered broad categorizations of four-year universities, we extend the consideration of the impact of PBF policies on institutional resources by accounting for PBF policy design and including community colleges, different types of minority-serving institutions, and both two- and four-year institutions serving disproportionate shares of racially minoritized or low-income students. These institutions are paramount when examining the equity implications of PBF policies in higher education. Despite the role they play in promoting upward mobility, community colleges and MSIs have faced historically embedded funding disadvantages (Boland & Gasman, 2014; Cunningham et al., 2014; Harris, 2021). State higher education funding formulas can serve to reinforce and potentially exacerbate these financial disadvantages (see Lingo et al. (2021) for a review of state higher education funding formulas). Our study confirms that PBF, which was used by 32 states to allocate funds to public colleges and universities in Fiscal Year 2020, plays a role in reinforcing and exacerbating disparities in institutional resources across multiple institution types.

Results from this study also align with the theory of the social construction of target populations (Schneider & Ingram, 1993) in demonstrating that policymakers can design and implement policies in ways that ensure advantages for socially privileged groups who wield greater political power. Our findings make it clear that public four-year HBCUs and universities that serve larger shares of racially minoritized students receive less funding under high-dosage PBF policies. Meanwhile, gains in institutional resources under low-dosage PBF policies at community colleges are stronger at non-MSIs and losses under high-dosage PBF policies are larger at less-advantaged and already-underfunded institutions. Under a resource dependence perspective, these wins and losses are even more pronounced given that community colleges and MSIs are more reliant on state funding, making any state-level budget cuts more severe for these under-resourced institutions and the communities they serve.

### [Implications for Policy and Practice](#)

Our study raises the question of whether policymakers intentionally design policies to guarantee the outcomes they wish to see, leading to a system in which well-resourced and already-advantaged institutions



accrue a disproportionate share of state resources. For instance, if state policymakers seek to secure advantages for socially privileged groups (and disadvantages for disadvantaged groups), PBF serves as a mechanism to secure funding advantages and disadvantages in future competitions for state dollars. If state policymakers, intentionally or not, use PBF to justify further retractions of state support for historically under-funded institution types, these institutions will face compounding financial barriers to serving their students, which can lead to worse outcomes and justifications of prior and subsequent reductions in state support.

When it comes to policy design, our study highlights the need for state policymakers to explicitly prioritize college access and student success for racially minoritized students in their funding formulas. The presence of PBF metrics that considered the enrollment and completion outcomes of racially minoritized students offset declines in state funding that occurred at institutions in PBF-adopting states. Although state policymakers have demonstrated some reluctance to explicitly build race/ethnicity into PBF metrics (Gándara, 2020) and PBF policies more often incentivize the outcomes of low-income students than racially minoritized students (Rosinger et al., 2021), this study demonstrates that race-neutral approaches are simply not enough to remedy historical inequities built into higher education funding formulas. Absent sufficient attention and remediation of historical funding inequities, policymakers may further enshrine funding disparities into higher education funding formulas through PBF systems.

## References

- Allison, P. (2009). *Fixed effects regression models. Quantitative applications in the social sciences*. Thousand Oaks, CA: SAGE.
- Authors. (2019).
- Authors. (2021).
- Aldrich, H. E., & Pfeffer, J. (1976). Environments of organizations. *Annual Review of Sociology*, 2, 79-105.
- Boland, W. C., Gasman, M. (2014). *America's public HBCUs: A four state comparison of institutional capacity and state funding profiles*. Penn Graduate School of Education.
- Bound, J., Braga, B., Khanna, G., & Turner, S. (2020). A passage to America: University funding and international students. *American Economic Journal: Economic Policy*, 12(1), 97-126.
- Cameron, A. C., & Miller, D. L. (2015). A practitioner's guide to cluster-robust inference. *Journal of Human Resources*, 50(2), 317-372.
- Cunningham, A., Park, E., Engle, J. (2014). *Minority-serving institutions: Doing more with less*. Institute for Higher Education Policy.
- Dobson, B. (2018). *Florida State scores third in performance rankings, FAMU still in bottom three*. Tallahassee Democrat. Retrieved from <https://www.tallahassee.com/story/news/2018/06/27/florida-state-florida-m-learn-how-they-rank-performance-ratings/738876002/>
- Dougherty, K. J., & Natow, R. S. (2015). *The politics of performance funding for higher education: Origins, discontinuations, and transformations*. Johns Hopkins University Press.
- Dougherty, K. J., Jones, S. M., Lahr, H., Natow, R. S., Pheatt, L., & Reddy, V. (2016). Looking inside the black box of performance funding for higher education: Policy instruments, organizational obstacles, and intended and unintended impacts. *RSF: The Russell Sage Foundation Journal of the Social Sciences*, 2(1), 147. doi:10.7758/RSF.2016.2.1.07
- Dowd, A., Rosinger, K., & Fernandez Castro, M. (2020). Trends and perspectives on finance equity and the promise of community colleges. In L. Perna (Ed.), *Higher education: Handbook of theory and research* (pp. 517-588). Dordrecht, The Netherlands: Springer Publishing.
- Favero, N., & Rutherford, A. (2020). Will the tide lift all boats? Examining the equity effects of performance funding policies in US higher education. *Research in Higher Education*, 61(1), 1-25.
- Floyd, D. L., Skolnik, M. L. (2019). *The community college baccalaureate movement: Evolutionary and revolutionary*. In O'Banion, T. U. (Ed.), 13 ideas that are transforming the community college world (pp. 103-126). Lanham, MD: Rowman & Littlefield.
- Gándara, D. (2020). How the sausage is made: An examination of a state funding model design process. *The Journal of Higher Education*, 91(2), 192-221.
- Gándara, D., & Rutherford, A. (2018). Mitigating unintended impacts? The effects of premiums for underserved populations in performance-funding policies for higher education. *Research in Higher Education*, 59(6), 681-703.
- Gándara, D., & Rutherford, A. (2020). Completion at the expense of access? The relationship between performance-funding policies and access to public 4-Year universities. *Educational Researcher*, 49(5), 321-334.

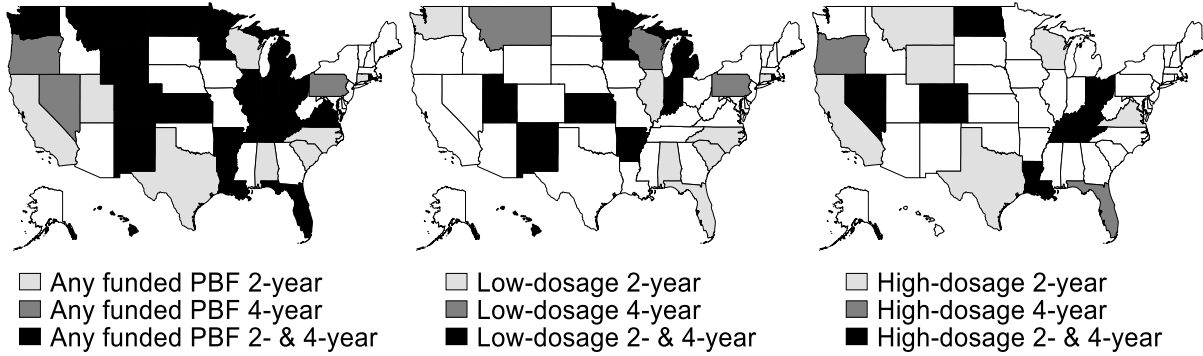
- Goldrick-Rab, S., Kolbe, T. (2015, September 28). *Rethinking state support for higher ed*. Inside Higher Ed. Retrieved from <https://www.insidehighered.com/views/2015/09/28/essay-need-consider-which-institutions-should-bear-brunt-state-cuts-public-higher>
- Goodman-Bacon, A. (2021). Difference-in-differences with variation in treatment timing. *Journal of Econometrics*.
- Hagood, L. P. (2019). The financial benefits and burdens of performance funding in higher education. *Educational Evaluation and Policy Analysis*, 41(2), 189-213.
- Harnisch, Sebastian (2011) Role theory: Operationalization of key concepts. In S. Harnisch, C. Frank & H. Maull (Eds), *Role theory in international relations: Approaches and analyses* (pp. 7–15). Routledge.
- Harris, A. (2021). *The state must provide: Why America's colleges have always been unequal—and what to do about it*. Harper Collins Publishers.
- Hendrick, R. Z., Hightower, W. H., & Gregory, D. E. (2006). State funding limitations and community college open-door policy: Conflicting priorities? *Community College Journal of Research and Practice*, 30(8), 627-640.
- Hillman, N. W., Corral, D. (2018). The equity implications of paying for performance in higher education. *American Behavioral Scientist*, 61(14), 1557–1572.
- Jaquette, O., & Curs, B. R. (2015). Creating the out-of-state university: Do public universities increase nonresident freshman enrollment in response to declining state appropriations? *Research in Higher Education*, 56(6), 535-565.
- Jaquette, O., Curs, B. R., & Posselt, J. R. (2016). Tuition rich, mission poor: Nonresident enrollment growth and the socioeconomic and racial composition of public research universities. *The Journal of Higher Education*, 87(5), 635-673.
- Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4), 305-360.
- Jones, T., Jones, S., Elliott, K., Owens, L., Assalone, A., Gándara, D. (2017). *Outcomes based funding and race in higher education*. Palgrave Macmillan.
- Keeler, E., Spence, M., & Zeckhauser, R. (1971). The optimal control of pollution. *Economics of Natural and Environmental Resources*, Routledge Revivals.
- Kelchen, R. (2017). A review of College Promise programs: Evidence from the midwest. MHEC Policy Brief. *Midwestern Higher Education Compact*.
- Kelchen, R. (2018). Do performance-based funding policies affect underrepresented student enrollment? *The Journal of Higher Education*, 89(5), 702-727.
- Kelchen, R., & Pingel, S. (2018). *Postsecondary tuition capping and freezing*. Denver, CO: Education Commission of the States.
- Layzell, D. T. (1999). Linking performance to funding outcomes at the state level for public institutions of higher education: Past, present, and future. *Research in Higher Education*, 40(2), 233–246.
- Layzell, D. T. (2007). State higher education funding models: An assessment of current and emerging approaches. *Journal of Education Finance*, 1-19.

- Li, A. Y., & Kennedy, A. I. (2018). Performance funding policy effects on community college outcomes: Are short-term certificates on the rise? *Community College Review*, 46(1), 3-39.
- Li, A. Y., Ortagus, J. C. (2019). Raising the stakes: Impacts of the Complete College Tennessee Act on underserved student enrollment and sub-baccalaureate credentials. *Review of Higher Education*, 43(1), 295-333.
- Lingo, M., Kelchen, R., Baker, D., Rosinger, K., Ortagus, J., & Wu, J. (2021). *The landscape of state funding formulas for public colleges and universities*. InformEd States.
- McDonnell, L. M., & Elmore, R. F. (1987). Getting the job done: Alternative policy instruments. *Educational Evaluation and Policy Analysis*, 9(2), 133-152.
- McKinney, L., Hagedorn, L. S. (2017). Performance-based funding for community colleges in Texas: Are colleges disadvantaged by serving the most disadvantaged students? *The Journal of Higher Education*, 88, 159-182.
- Mercer, C. J., & Stedman, J. B. (2008). *Minority serving institutions: Selected institutional and student characteristics*. In M. Gasman, B. Baez, & C. S. Turner (Eds.), *Understanding minority-serving institutions*. Albany, NY: State University of New York Press.
- National Association of College and University Business Officers-Teachers Insurance and Annuity Association (NACUBO-TIAA) (2019). *2018 NACUBO-TIAA Study of Endowments*. Washington, DC: National Association of College and University Business Officers.
- Nellum, C. J., & Valle, K. (2015). Government investment in public Hispanic-serving institutions. *American Council on Education Issue Brief*.
- Ortagus, J. C., & Hu, X. (2020). A national study of the financial implications of community college baccalaureate adoption. *The Journal of Higher Education*, 91(7), 1053-1086.
- Ortagus, J. C., Kelchen, R., Rosinger, K., & Voorhees, N. (2020). Performance-based funding in American higher education: A systematic synthesis of the intended and unintended consequences. *Educational Evaluation and Policy Analysis*, 42(4), 520-550.
- Ortagus, J., Rosinger, K., & Kelchen, R. (2021). *InformEd States performance-based funding policies dataset*. InformEd States. Retrieved from [informedstates.org/data](https://informedstates.org/data).
- Romano, R. M., & D'Amico, M. M. (2021). How federal data shortchange the community college. *Change: The Magazine of Higher Learning*, 53(4), 22-28.
- Rosinger, K. O., Ortagus, J. C., Kelchen, R., Cassell, A., Voorhees, N. (2021). *The evolution and landscape of performance-based funding for higher education*. InformEd States.
- Rush-Marlowe, R. (2021). *Strengthening rural community colleges: Innovations and opportunities*. Washington, DC: Association of Community College Trustees.
- Schneider, A., & Ingram, H. (1993). Social construction of target populations: Implications for politics and policy. *American Political Science Review*, 87(2), 334-347.
- Smith, D. (2021). Achieving financial equity and justice for HBCUs. The Century Foundation. Retrieved from <https://tcf.org/content/report/achieving-financial-equity-justice-hbcus/>
- Sun, L., & Abraham, S. (2021). Estimating dynamic treatment effects in event studies with heterogeneous treatment effects. *Journal of Econometrics*, 225(2), 175-199.

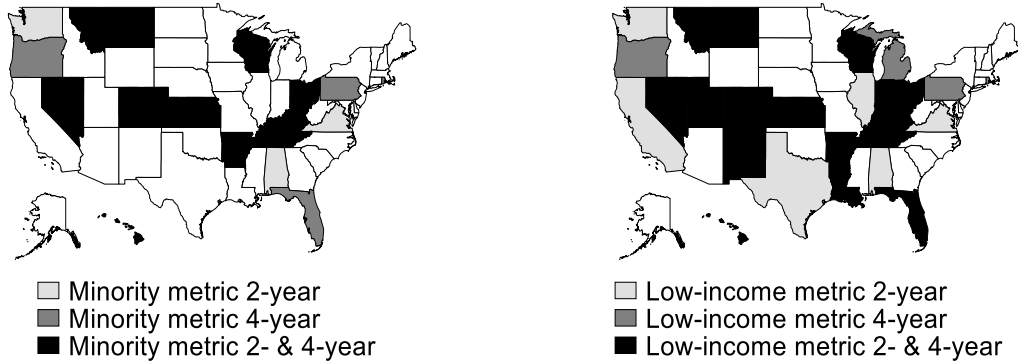
- Syverson, E., Whinnery, E., & Pingel, S. (2020, April). 50-state comparison: Postsecondary education funding. *Education Commission of the States*. Retrieved from <https://www.ecs.org/50-state-comparison-postsecondary-education-funding/>
- Thompson. (1999). Cultural capital and accounting. *Accounting, Auditing, & Accountability*, 12(4), 394–412.
- Thornton, Z. M., & Friedel, J. N. (2016). Performance-based funding: State policy influences on small rural community colleges. *Community College Journal of Research and Practice*, 40(3), 188-203.
- Umbrecht, M. R., Fernandez, F., & Ortagus, J. C. (2017). An examination of the (un)intended consequences of performance funding in higher education. *Educational Policy*, 31(5), 643-673.
- Vargas. (2018). Racial expropriation in higher education: Are whiter Hispanic serving institutions more likely to receive minority serving institution funds? *Socius: Sociological Research for a Dynamic World*, 4, 237802311879407–.
- Wayt, L. K., & LaCost, B. (2016). Transitioning to performance-based state funding: Concerns, commitment, and cautious optimism. *Educational Considerations*, 43(2), 1-6.
- Williams, K. L., & Davis, B. L. (2019). *Public and private investments and divestments in historically Black colleges and universities*. Washington, DC: American Council on Education.
- Yuen, V. (2020). *The \$78 billion community college funding shortfall*. Washington, D.C.: Center for American Progress. Retrieved from <https://www.americanprogress.org/article/78-billion-community-college-funding-shortfall>
- Zerquera, D., & Ziskin, M. (2020). Implications of performance-based funding on equity-based missions in US higher education. *Higher Education*, 80, 1153-1174.

**Figure 1. Presence of any PBF, PBF dosage levels, and PBF equity metrics across states (FY 2019)**

**PBF Policies and Dosage (FY 2019)**



**PBF Equity Metrics (FY 2019)**



**Table 1. Descriptive statistics for variables of interest by PBF policy features (four-year institutions)**

	PBF Dosage			PBF Race Equity		PBF Low-Income Equity	
	No PBF	Low-dosage PBF	High-dosage PBF	PBF without metric	PBF with metric	PBF without metric	PBF with metric
<b>Outcomes</b>							
State Appropriations per FTE	8267.73 (4663.24)	7104.12 (3241.70)	6519.29 (5245.37)	7232.51 (3285.80)	6594.48 (4367.74)	7302.63 (3128.35)	6745.72 (4150.00)
Revenue from State Appropriation (in \$1,000)	79443.76 (98635.70)	70790.40 (88497.11)	85631.58 (116818.74)	77894.55 (94700.80)	67899.93 (96143.12)	63664.22 (84641.21)	81402.57 (101857.90)
<b>Institution-level covariates</b>							
Logged FTE undergraduate enrollment	8.72 (0.95)	8.79 (0.89)	8.86 (1.08)	8.81 (0.97)	8.81 (0.88)	8.68 (0.90)	8.89 (0.96)
Percentage of part-time undergraduates	20.75 (14.12)	21.99 (14.19)	23.65 (13.03)	24.44 (13.84)	19.04 (13.53)	22.24 (14.04)	22.40 (13.93)
Percentage receiving Federal grant aid	36.77 (17.28)	36.14 (14.92)	41.27 (16.33)	37.03 (15.62)	37.49 (14.97)	34.75 (14.85)	39.02 (15.49)
Logged in-state tuition	8.76 (0.44)	8.84 (0.37)	9.00 (0.26)	8.82 (0.37)	8.95 (0.33)	8.73 (0.38)	8.98 (0.30)
<b>State-level covariates</b>							
Logged per-capita income	10.70 (0.17)	10.67 (0.12)	10.74 (0.10)	10.65 (0.11)	10.75 (0.10)	10.66 (0.13)	10.71 (0.10)
Unemployment rate	5.65 (1.90)	5.49 (1.72)	5.46 (2.03)	5.59 (1.82)	5.34 (1.72)	5.19 (1.64)	5.70 (1.86)
Percent of adults with bachelor's degree	19.56 (4.58)	18.74 (3.69)	21.11 (4.11)	17.89 (3.25)	21.33 (3.92)	18.32 (3.66)	19.91 (3.94)
College-aged population	13.06 (1.02)	13.04 (0.73)	13.06 (0.91)	12.94 (0.80)	13.21 (0.70)	12.75 (0.78)	13.26 (0.69)
Share of Black college-aged adults	8.42 (4.42)	8.49 (2.87)	7.97 (2.87)	8.37 (2.76)	8.40 (3.04)	8.38 (3.01)	8.38 (2.77)

Share of Hispanic college-aged adults	7.99 (3.23)	7.95 (2.97)	8.26 (2.96)	7.77 (3.14)	8.39 (2.64)	7.84 (3.50)	8.14 (2.50)
Share of American Indian or Alaska Native college-aged adults	7.27 (9.39)	6.67 (7.57)	9.39 (12.41)	7.21 (7.58)	7.29 (10.59)	6.95 (7.09)	7.45 (9.98)



**Table 2. Descriptive statistics for variables of interest by PBF policy features (community colleges)**

	PBF Dosage			PBF Race Equity		PBF Low-Income Equity	
	No PBF	Low-dosage PBF	High-dosage PBF	PBF without metric	PBF with metric	PBF without metric	PBF with metric
<b>Outcomes</b>							
State Appropriations per FTE	4637.90 (3774.14)	5182.59 (3502.28)	4398.94 (2686.98)	5108.11 (3434.97)	4691.10 (3062.34)	5588.33 (3713.61)	4209.59 (2579.94)
Revenue from State Appropriation (in \$1,000)	13095.21 (13870.87)	15670.97 (17799.53)	17946.98 (21585.22)	16565.25 (19759.19)	14860.02 (14685.00)	14973.17 (14650.54)	17832.92 (23118.28)
<b>Institution-level covariates</b>							
Logged FTE undergraduate enrollment	7.91 (1.04)	7.94 (0.92)	8.01 (1.00)	7.98 (0.96)	7.87 (0.85)	7.88 (0.92)	8.06 (0.96)
Percentage of part-time undergraduates	57.10 (15.65)	57.16 (11.79)	62.25 (14.74)	58.75 (12.04)	56.74 (14.44)	57.18 (11.60)	59.80 (13.89)
Percentage receiving Federal grant aid	46.04 (18.73)	49.41 (17.00)	52.95 (13.68)	48.95 (17.05)	54.19 (13.32)	47.34 (17.37)	54.13 (14.01)
Logged in-state tuition	7.86 (0.76)	8.04 (0.55)	8.19 (0.43)	7.99 (0.57)	8.35 (0.26)	7.92 (0.54)	8.28 (0.45)
Logged local appropriations per FTE	2.02 (7.12)	1.06 (7.17)	1.40 (7.34)	1.83 (7.08)	-1.14 (7.14)	0.89 (7.08)	1.47 (7.36)
<b>State-level covariates</b>							
Logged per-capita income	10.69 (0.17)	10.71 (0.16)	10.79 (0.12)	10.70 (0.15)	10.81 (0.15)	10.67 (0.14)	10.80 (0.14)
Unemployment rate	5.89 (1.98)	5.61 (1.93)	4.88 (1.27)	5.56 (1.89)	5.09 (1.55)	5.55 (1.90)	5.31 (1.72)
Percent of adults with bachelor's degree	19.03 (4.14)	20.25 (4.53)	21.28 (3.64)	19.72 (3.94)	22.93 (4.79)	19.18 (3.95)	22.28 (4.29)
College-aged population	13.18 (1.01)	13.19 (0.59)	13.57 (1.10)	13.33 (0.75)	13.12 (0.72)	13.15 (0.59)	13.46 (0.89)

Share of Black college-aged adults	8.38 (3.59)	8.30 (2.24)	8.24 (2.46)	8.34 (1.98)	8.12 (3.08)	8.27 (1.89)	8.32 (2.76)
Share of Hispanic college-aged adults	7.92 (3.02)	7.52 (2.64)	8.93 (2.02)	7.64 (2.66)	8.41 (2.22)	7.22 (2.77)	8.67 (2.01)
Share of American Indian or Alaska Native college-aged adults	6.86 (8.54)	7.96 (7.48)	9.62 (10.77)	8.08 (7.26)	9.13 (11.10)	7.62 (6.55)	9.30 (10.24)

**Table 3. Effects of any PBF policy on state appropriations among four-year institutions**

	Revenue from State Appropriations (logged)		State Appropriations per FTE Student	
	(1)	(2)	(3)	(4)
<i>Panel A: All four-year institutions</i>				
Any PBF Policy	0.013 (0.037)	0.019 (0.027)	234.956 (210.683)	82.082 (148.522)
Number of observations	11,623	11,512	11,822	11,716
<i>Panel B: Historically Black Colleges and Universities (HBCUs)</i>				
Any PBF Policy	-0.079 (0.104)	-0.065 (0.074)	-321.692 (856.532)	-563.761 (584.589)
Number of observations	835	823	837	827
<i>Panel C: Institutions serving an above-average share of low-income students</i>				
Any PBF Policy	-0.010 (0.046)	-0.004 (0.030)	60.951 (258.607)	-20.619 (192.756)
Number of observations	5,186	5,151	5,263	5,231
<i>Panel D: Institutions serving a below-average share of low-income students</i>				
Any PBF Policy	0.031 (0.036)	0.033 (0.027)	395.576 (216.160)	200.689 (162.182)
Number of observations	6,407	6,329	6,528	6,452
<i>Panel E: Institutions serving an above-average share of racially minoritized students</i>				
Any PBF Policy	-0.020 (0.060)	-0.005 (0.043)	-91.317 (250.875)	-216.076 (201.026)
Number of observations	5,393	5,328	5,460	5,399
<i>Panel F: Institutions serving a below-average share of racially minoritized students</i>				
Any PBF Policy	0.058 (0.043)	0.065 (0.033)	371.041 (224.335)	266.117 (158.823)
Number of observations	6,206	6,161	6,339	6,294

<i>Panel G: Hispanic-serving institutions (HSIs)</i>				
Any PBF Policy	-0.018 (0.071)	0.077 (0.038)	-128.053 (433.358)	165.059 (232.143)
Number of observations	936	936	958	958
<i>Panel H: Minority-serving institutions (MSIs)</i>				
Any PBF Policy	-0.035 (0.049)	-0.019 (0.043)	-359.587 (473.944)	-311.599 (314.181)
Number of observations	2,429	2,411	2,453	2,439
<i>Panel I: Non-Minority-serving institutions (non-MSIs)</i>				
Any PBF Policy	0.021 (0.038)	0.022 (0.028)	256.864 (219.726)	122.429 (148.699)
Number of observations	8,792	8,707	8,959	8,876
Two-way fixed effects	X	X	X	X
Covariates		X		X

**Note:** \*\*\* p<0.001, \*\* p<0.01, \* p<0.05

**Table 4. Effects of any PBF policy on state appropriations among community colleges**

	Revenue from State Appropriations (logged)		State Appropriations per FTE Student	
	(1)	(2)	(3)	(4)
<i>Panel A: All community colleges</i>				
Any PBF Policy	0.094*	0.085	354.598	229.074
	(0.044)	(0.043)	(207.719)	(184.884)
Number of observations	21,713	21,184	22,146	21,713
<i>Panel B: Historically Black Colleges and Universities (HBCUs)</i>				
Any PBF Policy	-0.069	-0.056	-108.165	-45.674
	(0.209)	(0.060)	(773.838)	(188.716)
Number of observations	219	217	218	217
<i>Panel C: Institutions serving an above-average share of low-income students</i>				
Any PBF Policy	0.086	0.075	316.457	247.219
	(0.044)	(0.043)	(231.767)	(195.140)
Number of observations	10,750	10,576	10,992	10,854
<i>Panel D: Institutions serving a below-average share of low-income students</i>				
Any PBF Policy	0.114*	0.104*	202.002	169.071
	(0.048)	(0.049)	(183.013)	(154.356)
Number of observations	10,858	10,496	11,058	10,760
<i>Panel E: Institutions serving an above-average share of racially minoritized students</i>				
Any PBF Policy	0.049	0.041	-5.364	42.386
	(0.044)	(0.041)	(194.266)	(124.857)
Number of observations	11,219	10,868	11,414	11,150
<i>Panel F: Institutions serving a below-average share of racially minoritized students</i>				
Any PBF Policy	0.121*	0.118*	604.351*	397.470
	(0.060)	(0.054)	(264.475)	(241.735)
Number of observations	10,449	10,270	10,688	10,523

<i>Panel G: Hispanic-serving institutions (HSIs)</i>				
Any PBF Policy	0.071 (0.083)	0.119 (0.069)	85.614 (244.745)	247.822 (188.355)
Number of observations	3,186	3,142	3,290	3,252
<i>Panel H: Minority-serving institutions (MSIs)</i>				
Any PBF Policy	0.073 (0.059)	0.084 (0.062)	-169.086 (242.811)	78.080 (177.857)
Number of observations	5,396	5,249	5,503	5,386
<i>Panel I: Non-Minority-serving institutions (non-MSIs)</i>				
Any PBF Policy	0.115* (0.048)	0.102* (0.046)	509.882* (230.021)	385.728 (206.012)
Number of observations	14,837	14,683	15,193	15,034
Two-way fixed effects	X	X	X	X
Covariates		X		X

**Note:** \*\*\* p<0.001, \*\* p<0.01, \* p<0.05

**Table 5. Effects of PBF dosage on state appropriations among four-year institutions**

	Revenue from State Appropriations (logged)		State Appropriations per FTE Student	
	(1)	(2)	(3)	(4)
<i>Panel A: All four-year institutions</i>				
Low-Dosage PBF	0.024 (0.036)	0.027 (0.027)	244.832 (202.714)	110.332 (153.259)
High-Dosage PBF	-0.064 (0.095)	-0.040 (0.074)	176.746 (448.365)	-94.312 (314.323)
Number of observations	11,623	11,512	11,822	11,716
<i>Panel B: Historically Black Colleges and Universities (HBCUs)</i>				
Low-Dosage PBF	-0.000 (0.076)	0.003 (0.068)	340.653 (845.471)	92.443 (548.133)
High-Dosage PBF	-0.278 (0.134)	-0.235* (0.086)	-2,012.489 (985.410)	-2,215.140** (758.643)
Number of observations	835	823	837	827
<i>Panel C: Institutions serving an above-average share of low-income students</i>				
Low-Dosage PBF	0.016 (0.035)	0.012 (0.026)	168.379 (226.870)	80.260 (188.710)
High-Dosage PBF	-0.135 (0.106)	-0.087 (0.070)	-409.832 (468.266)	-479.575 (330.112)
Number of observations	5,186	5,151	5,263	5,231
<i>Panel D: Institutions serving a below-average share of low-income students</i>				
Low-Dosage PBF	0.032 (0.038)	0.035 (0.029)	357.051 (211.035)	191.188 (166.402)
High-Dosage PBF	0.023 (0.101)	0.012 (0.089)	695.968 (537.185)	279.785 (428.799)
Number of observations	6,407	6,329	6,528	6,452
<i>Panel E: Institutions serving an above-average share of racially minoritized students</i>				
Low-Dosage PBF	0.019	0.023	106.034	-53.306

	(0.044)	(0.036)	(223.782)	(201.248)
High-Dosage PBF	-0.202	-0.142	-905.374*	-919.104
	(0.156)	(0.116)	(415.637)	(468.843)
Number of observations	5,393	5,328	5,460	5,399
<i>Panel F: Institutions serving a below-average share of racially minoritized students</i>				
Low-Dosage PBF	0.059	0.068	325.340	253.899
	(0.044)	(0.036)	(210.834)	(158.103)
High-Dosage PBF	0.050	0.040	678.001	353.362
	(0.072)	(0.050)	(474.148)	(268.996)
Number of observations	6,206	6,161	6,339	6,294
<i>Panel G: Hispanic-serving institutions (HSIs)</i>				
Low-Dosage PBF	0.019	0.101*	-75.745	178.763
	(0.080)	(0.035)	(504.533)	(282.117)
High-Dosage PBF	-0.210	-0.061	-332.021	112.036
	(0.282)	(0.224)	(449.732)	(512.226)
Number of observations	936	936	958	958
<i>Panel H: Minority-serving institutions (MSIs)</i>				
Low-Dosage PBF	0.010	0.015	-169.540	-67.676
	(0.035)	(0.038)	(481.933)	(353.023)
High-Dosage PBF	-0.238	-0.177	-1,112.012	-1,290.870
	(0.151)	(0.126)	(627.481)	(641.091)
Number of observations	2,429	2,411	2,453	2,439
<i>Panel I: Non-Minority-serving institutions (non-MSIs)</i>				
Low-Dosage PBF	0.026	0.025	244.154	122.051
	(0.037)	(0.028)	(208.595)	(149.210)
High-Dosage PBF	-0.022	-0.002	344.022	125.141
	(0.090)	(0.063)	(480.174)	(290.717)



Number of observations	8,792	8,707	8,959	8,876
Two-way fixed effects	X	X	X	X
Covariates		X		X

**Note:** \*\*\* p<0.001, \*\* p<0.01, \* p<0.05

**Table 6. Effects of PBF dosage on state appropriations among community colleges**

	Revenue from State Appropriations (logged)		State Appropriations per FTE Student	
	(1)	(2)	(3)	(4)
<i>Panel A: All community colleges</i>				
Low-Dosage PBF	0.094* (0.039)	0.089* (0.039)	385.164* (177.404)	222.489 (173.516)
High-Dosage PBF	0.095 (0.085)	0.071 (0.086)	257.298 (449.454)	251.307 (371.903)
Number of observations	21,713	21,184	22,146	21,713
<i>Panel B: Historically Black Colleges and Universities (HBCUs)</i>				
Low-Dosage PBF	0.095 (0.101)	0.118 (0.056)	856.683* (213.030)	341.289 (246.682)
High-Dosage PBF	-0.267 (0.144)	-0.336 (0.151)	-1,288.038** (151.819)	-670.873 (332.841)
Number of observations	219	217	218	217
<i>Panel C: Institutions serving an above-average share of low-income students</i>				
Low-Dosage PBF	0.085* (0.036)	0.078* (0.036)	305.557 (199.523)	244.981 (174.223)
High-Dosage PBF	0.087 (0.087)	0.067 (0.087)	346.612 (447.340)	253.762 (365.698)
Number of observations	10,750	10,576	10,992	10,854
<i>Panel D: Institutions serving a below-average share of low-income students</i>				
Low-Dosage PBF	0.107* (0.046)	0.102* (0.048)	242.363 (146.469)	144.797 (136.906)
High-Dosage PBF	0.138 (0.093)	0.114 (0.088)	55.890 (490.425)	262.408 (410.340)
Number of observations	10,858	10,496	11,058	10,760
<i>Panel E: Institutions serving an above-average share of racially minoritized students</i>				
Low-Dosage PBF	0.079*	0.081*	244.086	159.322

	(0.039)	(0.038)	(185.612)	(147.412)
High-Dosage PBF	-0.020	-0.054	-568.478*	-233.023
	(0.056)	(0.055)	(245.009)	(188.748)
Number of observations	11,219	10,868	11,414	11,150
<i>Panel F: Institutions serving a below-average share of racially minoritized students</i>				
Low-Dosage PBF	0.101*	0.101*	520.403**	325.594
	(0.045)	(0.043)	(192.207)	(182.037)
High-Dosage PBF	0.196	0.190	917.971	686.044
	(0.137)	(0.125)	(632.380)	(620.295)
Number of observations	10,449	10,270	10,688	10,523
<i>Panel G: Hispanic-serving institutions (HSIs)</i>				
Low-Dosage PBF	0.148	0.239**	457.900	548.029
	(0.073)	(0.069)	(294.818)	(309.730)
High-Dosage PBF	-0.006	-0.002	-276.596	-52.610
	(0.085)	(0.051)	(210.642)	(158.982)
Number of observations	3,186	3,142	3,290	3,252
<i>Panel H: Minority-serving institutions (MSIs)</i>				
Low-Dosage PBF	0.118	0.136	13.066	243.047
	(0.059)	(0.074)	(323.830)	(233.901)
High-Dosage PBF	-0.009	-0.013	-486.574*	-221.631
	(0.069)	(0.052)	(206.957)	(168.122)
Number of observations	5,396	5,249	5,503	5,386
<i>Panel I: Non-Minority-serving institutions (non-MSIs)</i>				
Low-Dosage PBF	0.104*	0.095*	467.268*	348.602*
	(0.039)	(0.038)	(178.551)	(163.308)
High-Dosage PBF	0.161	0.136	691.893	554.039
	(0.111)	(0.104)	(567.796)	(515.060)

Number of observations	14,837	14,683	15,193	15,034
Two-way fixed effects	X	X	X	X
Covariates		X		X

**Note:** \*\*\*  $p < 0.001$ , \*\*  $p < 0.01$ , \*  $p < 0.05$

**Table 7. Effects of PBF policies including metrics for low-income students on state appropriations among four-year institutions**

	Revenue from State Appropriations (logged)		State Appropriations per FTE Student	
	(1)	(2)	(3)	(4)
<i>Panel A: All four-year institutions</i>				
PBF Low-income Metric	-0.017 (0.048)	-0.002 (0.037)	190.788 (261.783)	63.894 (222.253)
Number of observations	11,623	11,512	11,822	11,716
<i>Panel B: Institutions serving an above-average share of low-income students</i>				
PBF Low-income Metric	-0.035 (0.060)	-0.015 (0.042)	92.667 (323.501)	-44.637 (254.780)
Number of observations	5,186	5,151	5,263	5,231
Two-way fixed effects	X	X	X	X
Covariates		X		X

**Note:** \*\*\* p<0.001, \*\* p<0.01, \* p<0.05

**Table 8. Effects of PBF policies including metrics for low-income students on state appropriations among community colleges**

	Revenue from State Appropriations (logged)		State Appropriations per FTE Student	
	(1)	(2)	(3)	(4)
<i>Panel A: All community colleges</i>				
PBF Low-income Metric	0.118 (0.060)	0.105 (0.062)	308.966 (289.601)	241.584 (257.425)
Number of observations	21,713	21,184	22,146	21,713
<i>Panel B: Institutions serving an above-average share of low-income students</i>				
PBF Low-income Metric	0.098 (0.055)	0.084 (0.056)	301.500 (280.647)	268.768 (239.641)
Number of observations	10,750	10,576	10,992	10,854
Two-way fixed effects	X	X	X	X
Covariates		X		X

**Note:** \*\*\* p<0.001, \*\* p<0.01, \* p<0.05

**Table 9. Effects of PBF policies including metrics for racially minoritized students on state appropriations among four-year institutions**

	Revenue from State Appropriations (logged)		State Appropriations per FTE Student	
	(1)	(2)	(3)	(4)
<i>Panel A: All four-year institutions</i>				
PBF Minority Metric	0.011 (0.046)	0.005 (0.040)	308.494 (290.089)	90.619 (281.755)
Number of observations	11,623	11,512	11,822	11,716
<i>Panel B: Historically Black Colleges and Universities (HBCUs)</i>				
PBF Minority Metric	-0.121 (0.084)	-0.142 (0.071)	-1,635.663 (834.477)	-1,383.706 (875.919)
Number of observations	835	823	837	827
<i>Panel C: Institutions serving an above-average share of racially minoritized students</i>				
PBF Minority Metric	-0.038 (0.088)	-0.050 (0.081)	-339.692 (391.784)	-361.051 (428.298)
Number of observations	5,393	5,328	5,460	5,399
<i>Panel D: Hispanic-serving institutions (HSIs)</i>				
PBF Minority Metric	-0.180 (0.238)	-0.063 (0.179)	1.092 (392.732)	131.956 (474.703)
Number of observations	936	936	958	958
<i>Panel E: Minority-serving institutions (MSIs)</i>				
PBF Minority Metric	-0.108 (0.074)	-0.116 (0.071)	-799.421 (622.055)	-891.930 (499.424)
Number of observations	2,429	2,411	2,453	2,439
<i>Panel F: Non-Minority-serving institutions (non-MSIs)</i>				
PBF Minority Metric	0.024 (0.045)	0.017 (0.041)	343.485 (296.909)	147.698 (287.813)
Number of observations	8,792	8,707	8,959	8,876
Two-way fixed effects	X	X	X	X
Covariates		X		X

**Note:** \*\*\* p<0.001, \*\* p<0.01, \* p<0.05

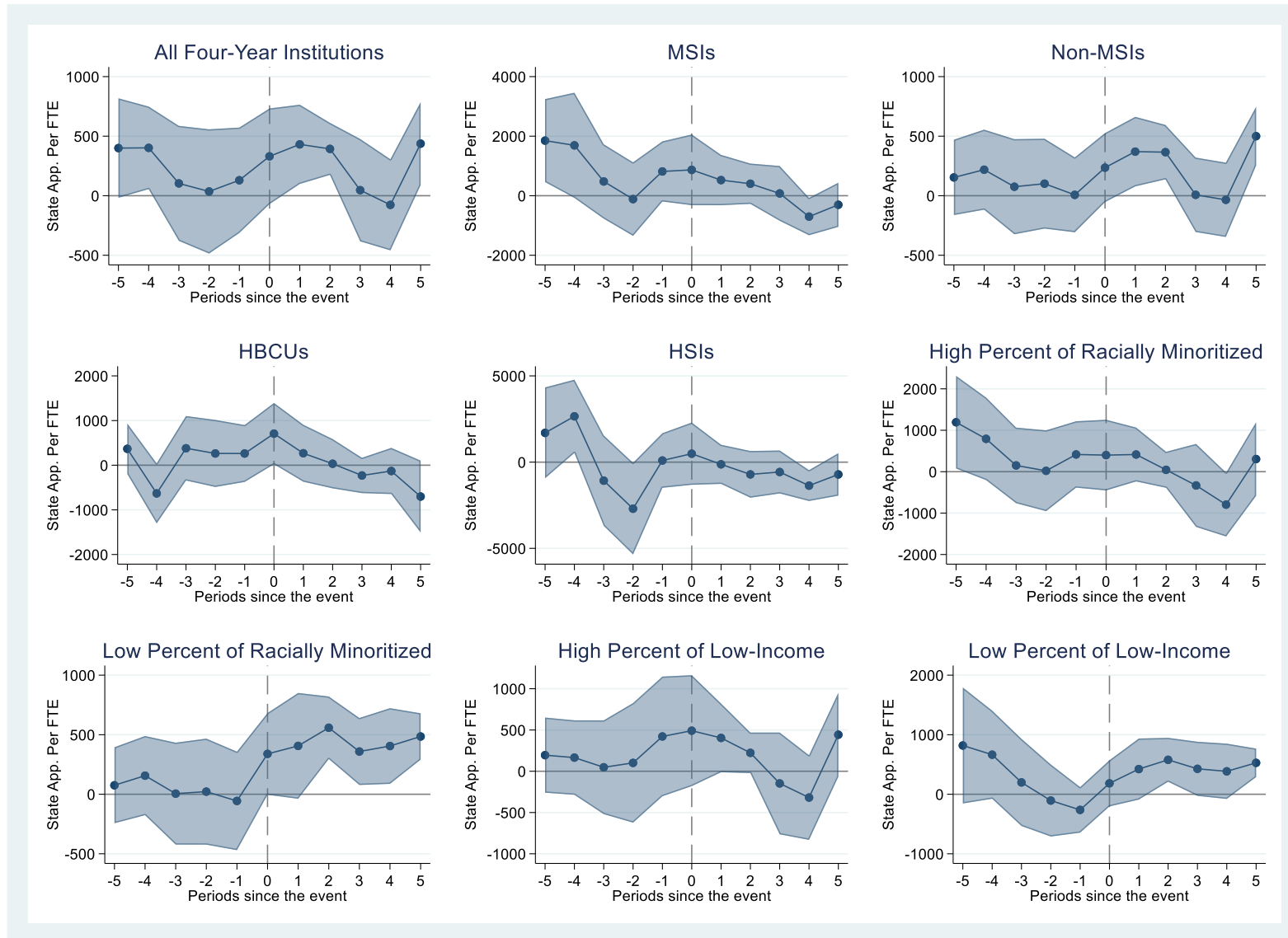
**Table 10. Effects of PBF policies including metrics for racially minoritized students on state appropriations among community colleges**

	Revenue from State Appropriations (logged)		State Appropriations per FTE Student	
	(1)	(2)	(3)	(4)
<i>Panel A: All community colleges</i>				
PBF Minority Metric	0.153 (0.084)	0.153 (0.085)	743.270 (433.185)	464.907 (416.068)
Number of observations	21,713	21,184	22,146	21,713
<i>Panel B: Historically Black Colleges and Universities (HBCUs)</i>				
PBF Minority Metric	0.117 (0.256)	0.199 (0.116)	379.380 (189.015)	797.431 (596.597)
Number of observations	219	217	218	217
<i>Panel C: Institutions serving an above-average share of racially minoritized students</i>				
PBF Minority Metric	0.099* (0.048)	0.110* (0.045)	528.839 (306.725)	368.533* (180.855)
Number of observations	11,219	10,868	11,414	11,150
<i>Panel D: Hispanic-serving institutions (HSIs)</i>				
PBF Minority Metric	0.158 (0.092)	0.108 (0.054)	403.692 (314.679)	481.361* (176.018)
Number of observations	3,186	3,142	3,290	3,252
<i>Panel E: Minority-serving institutions (MSIs)</i>				
PBF Minority Metric	0.149 (0.080)	0.165* (0.073)	171.884 (283.633)	399.310** (145.676)
Number of observations	5,396	5,249	5,503	5,386
<i>Panel F: Non-Minority-serving institutions (non-MSIs)</i>				
PBF Minority Metric	0.154 (0.096)	0.142 (0.092)	827.965 (487.492)	532.277 (472.276)
Number of observations	14,837	14,683	15,193	15,034
Two-way fixed effects	X	X	X	X
Covariates		X		X

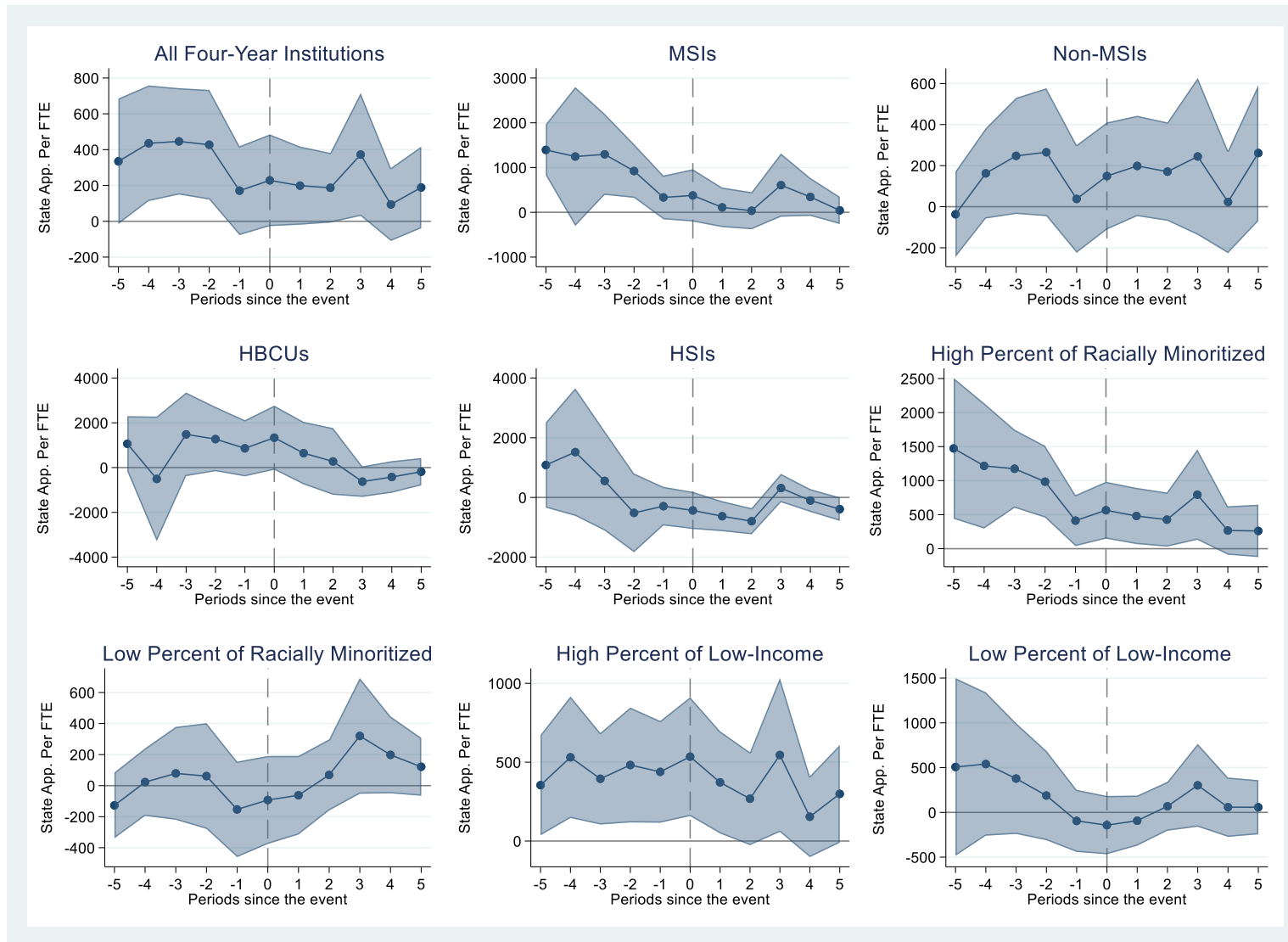
**Note:** \*\*\* p<0.001, \*\* p<0.01, \* p<0.05



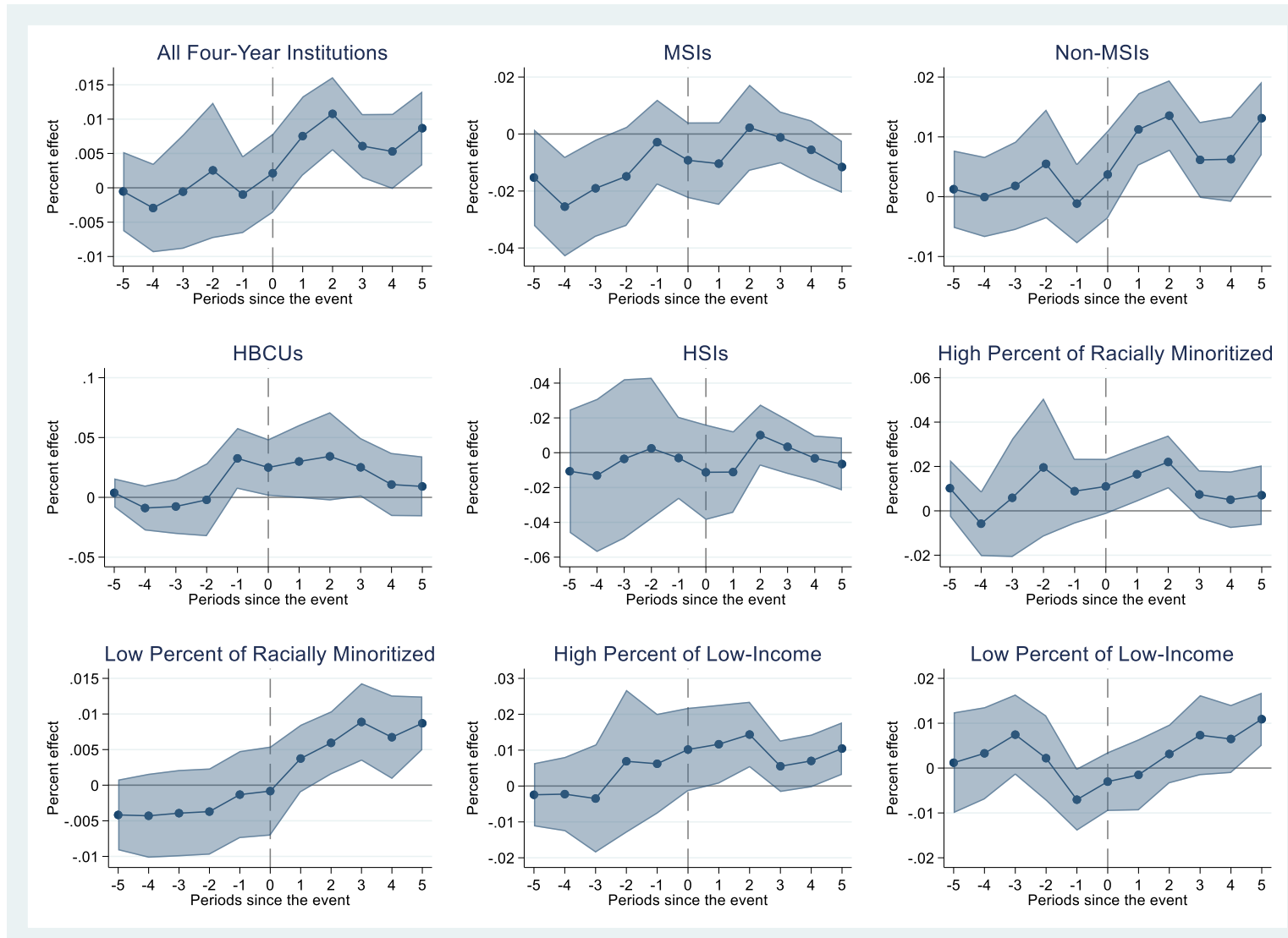
**Figure 2. Event studies dropping four-year institutions subject to PBF in 1997  
(outcome: changes in state appropriations per FTE student)**



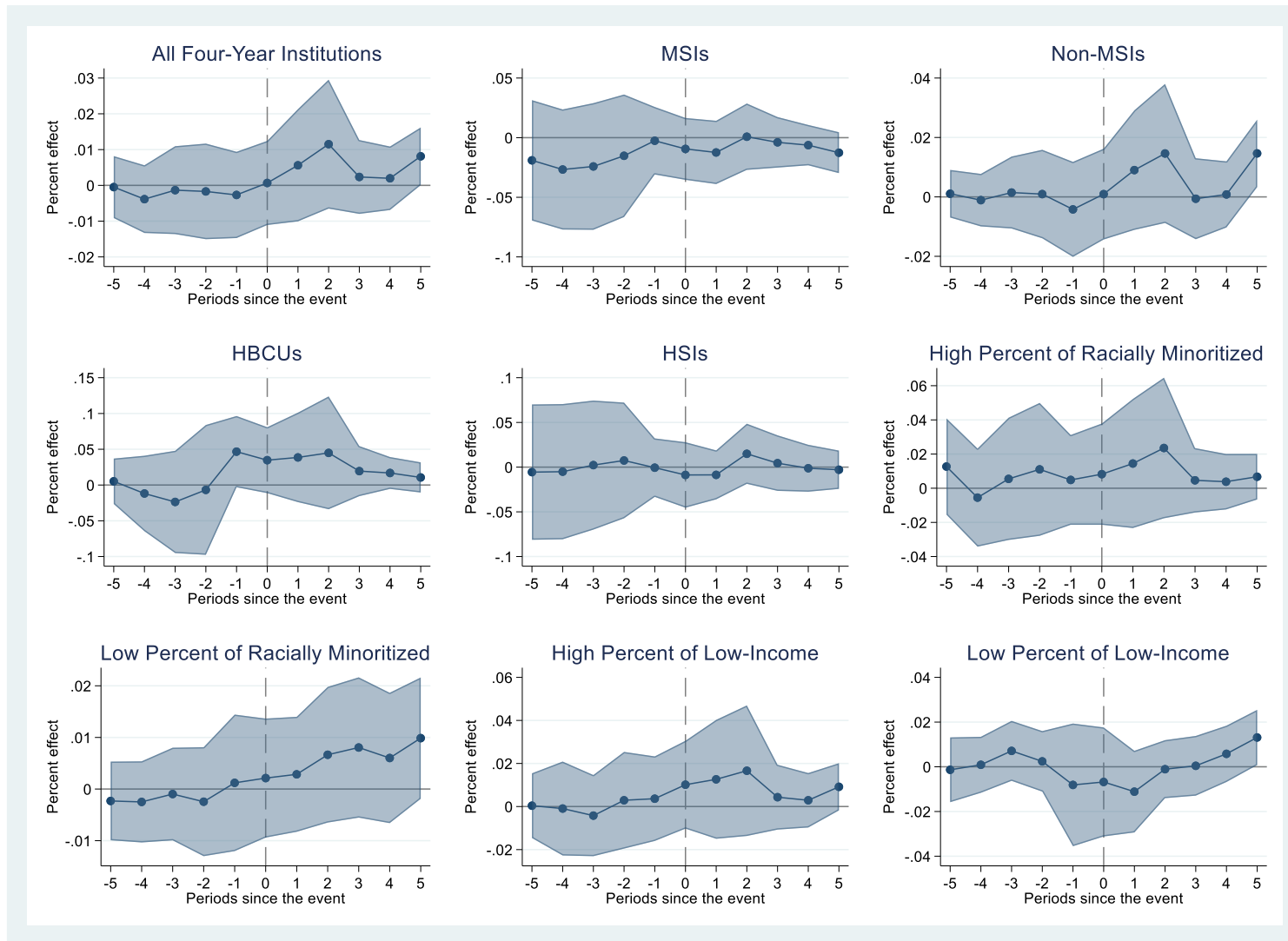
**Figure 3. Event studies dropping four-year institutions subject to PBF in 1997 and treated four-year institutions that stopped adopting PBF prior to 2019 (outcome: changes in state appropriations per FTE student)**



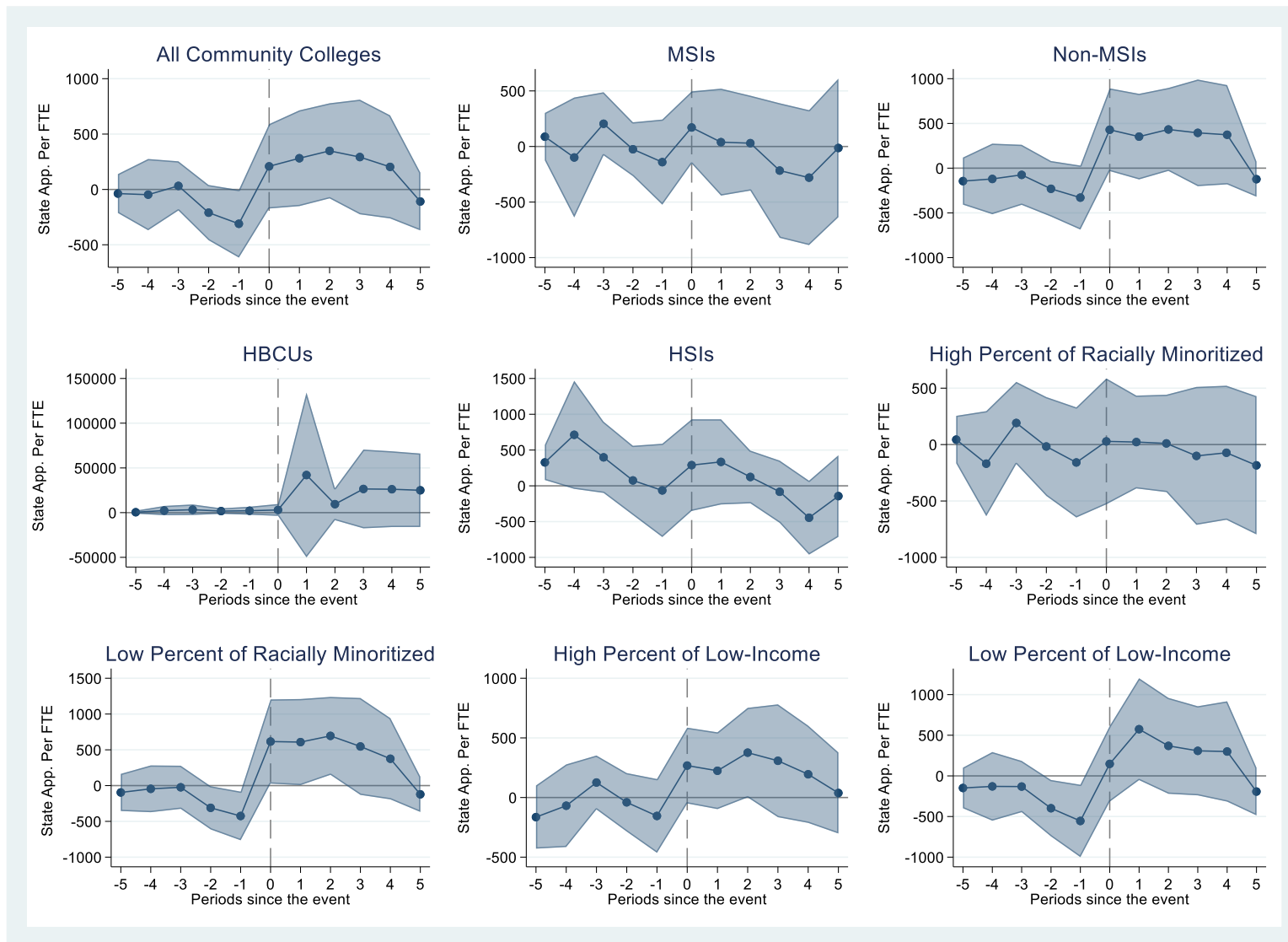
**Figure 4. Event studies dropping four-year institutions subject to PBF in 1997  
(outcome: logged revenue from state appropriations)**



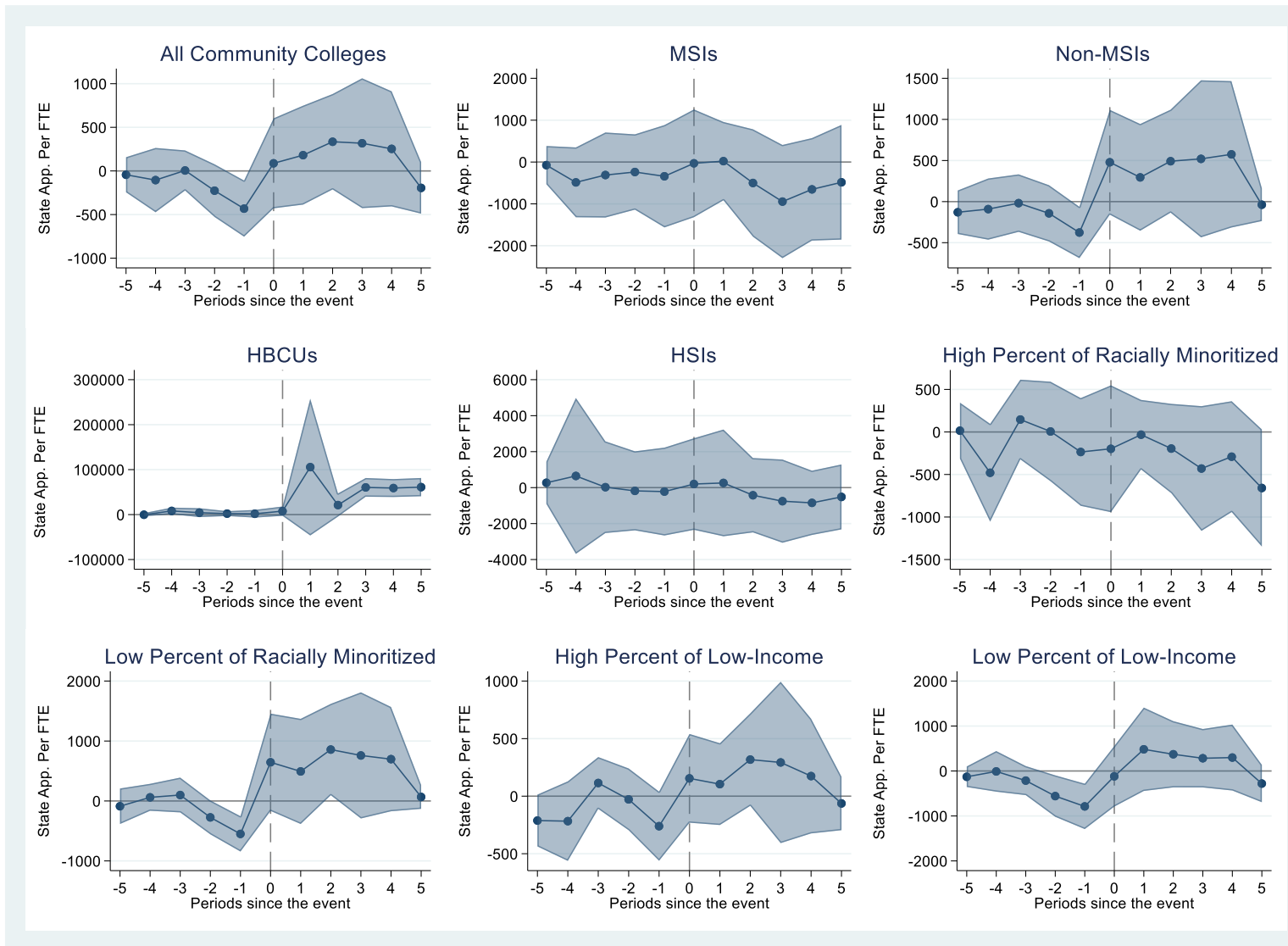
**Figure 5. Event studies dropping four-year institutions subject to PBF in 1997 and treated four-year institutions that stopped adopting PBF prior to 2019 (outcome: logged revenue from state appropriations)**



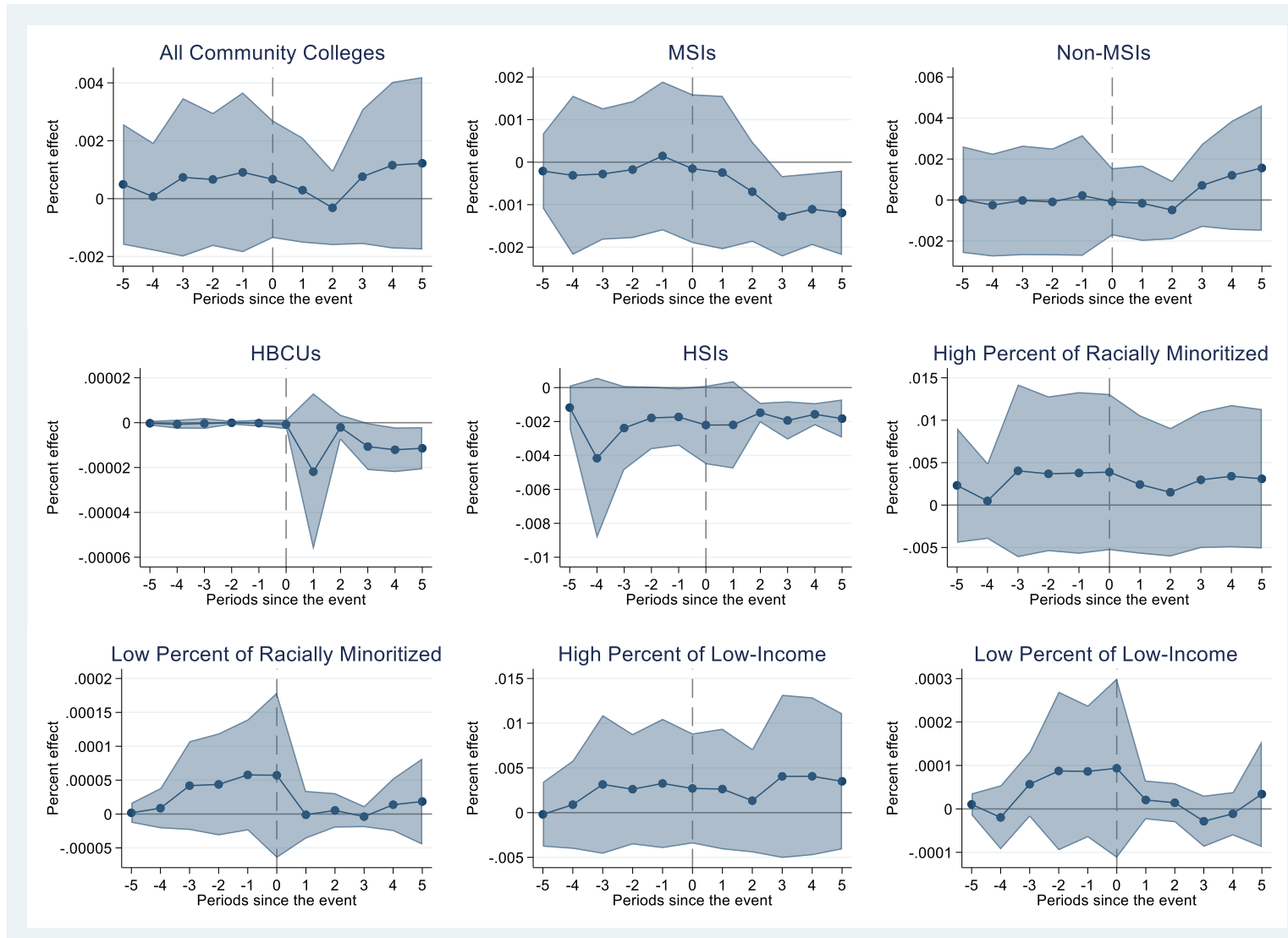
**Figure 6. Event studies dropping community colleges subject to PBF in 1997 (outcome: changes in state appropriations per FTE student)**



**Figure 7. Event studies dropping community colleges subject to PBF in 1997 and treated community colleges that stopped adopting PBF prior to 2019 (outcome: changes in state appropriations per FTE student)**



**Figure 8. Event studies dropping community colleges subject to PBF in 1997  
(outcome: logged revenue from state appropriations)**



**Figure 9. Event studies dropping community colleges subject to PBF in 1997 and treated community colleges that stopped adopting PBF prior to 2019 (outcome: logged revenue from state appropriations)**

