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THE LANDSCAPE OF STATE FUNDING FORMULAS FOR PUBLIC COLLEGES AND UNIVERSITIES

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Introduction

With more than 25% growth in enrollment over the past two decades, public colleges and universities enroll nearly three in four students in American higher education (de Brey et al., 2021). As public institutions continue to serve a majority of students, per-student funding for public higher education has declined over time and was only partially protected during the COVID-19 pandemic by a large influx in federal support (Laderman & Heckert, 2021; Laderman & Tandberg, 2021).

Higher education has traditionally acted as a balance wheel for state budgets by taking disproportionate budget cuts during recessions (Delaney & Doyle, 2011; 2018). This pattern is of particular concern because a sizable body of research shows positive relationships between state funding for higher education and student outcomes (Bound et al., 2019; Chakrabarti et al., 2020; Deming & Walters, 2017; Monarrez et al., 2021). As a result, decreases in higher education funding have direct negative consequences for longstanding attainment gaps by race, family income, and parental education.

Ninety percent of all state support for public higher education is through direct appropriations to colleges (Laderman & Heckert, 2021). Prior research provides snapshots of state funding mechanisms but examines one year or sector (e.g., Layzell, 2007; Mullin & Honeyman, 2007; Syverson et al., 2020; Toutkoushian & Shafiq, 2010). To our knowledge, there has not been a systematic longitudinal analysis of state funding

mechanisms and how they have changed over time.¹ Given the lack of comprehensive longitudinal information about how states fund public higher education, state policy actors and institutional leaders are left without critical information to close attainment gaps. A large body of literature focuses on performance-based funding (PBF) (Ortagus et al., 2020), but PBF comprises less than 10% of all state funding for public higher education (Rosinger et al., 2021). Aside from PBF, there is little systematic documentation of the mechanisms through which states fund public colleges and universities or how elements of state higher education funding formulas have changed over time.

To address this gap in the literature, we draw on a comprehensive longitudinal dataset compiled from a review of more than 2,000 state policy documents and direct correspondence with state higher education agency officials to answer the following research questions:

- 1. How do states currently allocate funds to public two-year and four-year institutions?***
- 2. How have these funding mechanisms changed from Fiscal Years 2004 to 2021?***

Our findings demonstrate that nearly 40% of four-year systems and over 70% of two-year systems have enrollment components in their formulas. Between 25% to 30% of systems had a performance element to their formula in an average year. Of states with either an enrollment or performance provision, nearly 60% and 70% of two- and four-year systems, respectively, have some kind of protected base-level of funding. Yet, these other funding strategies receive little exploration when compared to PBF. This article offers the first full picture of how states and higher education systems have allocated funding to public colleges and universities over time, covering a period before the Great Recession through the beginning of the COVID-19.²

Literature Review

There is a large body of research showing positive relationships between increased resources for public higher education and a host of student outcomes, such as graduation rates, post-college earnings, and student loan repayment (Bound et al., 2019; Chakrabarti et al., 2020; Deming & Walters, 2017; Monarrez et al., 2021). For example, Webber (2012) found a positive relationship between per-student expenditures and graduation rates among public university students in Ohio. In addition, reductions in state funding may lead

¹ The only known current landscape of higher education formulas is from the Education Commission of the States (Syverson et al., 2020). The dataset includes information for one year (2019) and does not account for how funding formulas changed over time. While the State Higher Education Executive Officers' (SHEEO) State Higher Education Finance (SHEF) data tracks various funding trends across time, the dataset does not include information on the how or the why state-funded higher education institutions (HEIs) received their allocations. Earlier attempts to document state funding formulas have focused on community colleges (e.g., Mullin & Honeyman, 2007) or are more than a decade old (e.g., Layzell, 2007; Mullin & Honeyman, 2007).

² For the sake of brevity, we refer to the Great Recession as “the recession” and the “COVID-19 pandemic” as COVID-19.

public universities to prioritize enrolling out-of-state students, crowding out low-income and racially minoritized state residents (Jaquette & Curs, 2015; Jaquette et al., 2016).

Due to court-mandated adequacy and equity reforms and legislative actions since the 1970s, there is a clearer sense of how states fund public K-12 education (Jackson et al., 2014). The vast majority of states rely on foundation programs in which the state guarantees a base-minimum of funding per student or teacher and adjusts based upon the cost of living, size, and free and reduced lunch status (Dachelet, 2019; Jackson et al., 2014). Research has shown that schools with greater financial resources have higher fourth- and eighth-grade math and reading scores, and K-12 funding formulas with an emphasis on equity significantly improve these outcomes among low-income students (Baker & Weber, 2016), but we know less about higher education funding models over time.

Most research on state funding models in higher education has focused on PBF models that tie state support to student outcomes, which represented less than 10% of state funding in Fiscal Year 2020 (Rosinger et al., 2021). This research has generally found null or modest positive effects of PBF on access and completion metrics. Prior studies on the effects of PBF adoption have also revealed several unintended consequences that disproportionately harm racially minoritized and low-income students (Ortagus et al., 2020). Other portions of state funding formulas, such as funding based on enrollment or fixed percentage point increases or decreases across institutions' base-level of funding, have received less attention due to the lack of available data. There are concerns about formulas that reward enrollment using full-time enrollment (FTE) instead of headcount, harming community colleges and public universities serving large numbers of part-time students (Romano & D'Amico, 2021). Other issues surround the long history of states underfunding minority-serving institutions (MSIs) relative to predominantly white institutions and how formulas may exacerbate such inequities (Boland & Gasman, 2014; Cunningham et al., 2014; Harris, 2021).

States allocate nearly \$100 billion toward higher education, and allocations appear to have links to increases in students' academic and labor market outcomes (Kelchen et al., 2020). However, certain institution types are underfunded, and some design elements of state funding formulas are not equitable or effective (e.g., performance funding). The only way to truly understand which funding strategies are efficient, equitable, and effective in promoting college access and student success is first to examine how states fund their public higher education institutions (HEIs), which this study aims to do.

Data Collection and Methods

Our research team compiled the first longitudinal dataset on the mechanisms through which states or higher education agencies or systems allocated funds to public colleges and universities. We followed the guidelines of Kelchen et al. (2019) and collected data by examining state policy documents, including budgets, legislation, and audit reports, as well as higher education board reports, financial statements, and other

documents. Our research team reviewed more than 2,000 documents related to state funding for higher education from fiscal years 2004 to 2021 (academic years 2003-04 to 2020-21). We used the Internet Archive: Wayback Machine to find historical documentation that was no longer available on active websites. To ensure accuracy and consistency in data reporting and coding, we met weekly as a research team to discuss data collection procedures, interpretations of documents, and complex data decisions until we reached a consensus. Finally, we reached out to higher education agencies within states to ask specific questions about data elements that remained unresolved after our data collection efforts.

Our unit of analysis was the state-by-sector level for each year, with sectors defined as two-year and four-year institutions based on Carnegie classifications.³ Ten states have multiple systems within a sector.⁴ For example, California has two four-year systems (the University of California and the California State University) and the two-year California Community Colleges. Among the 48 states captured, there were 55 four-year systems and 51 two-year systems.^{5,6} Due to our inability to obtain critical information through policy documentation despite repeated attempts to contact the state systems, we did not include Connecticut and New Hampshire in our analysis. In total, there were 1,902 total observations among the 106 systems in 48 states across 18 years in our dataset.

Throughout the coding process, we used a series of binary indicators to record different funding models. The first item we coded captures whether the state allocates funding directly to HEIs or allows a coordinating commission or board to allocate the money. We then coded a series of binary variables to indicate whether the sectors had a base-plus, enrollment, or performance provision. We defined base+ as any system that either increased or decreased funding across institutions in a sector by a similar amount (e.g., +/- one-percentage point) or incorporated a protective mechanism that guaranteed HEIs a set portion of the previous year's allocation.⁷ Enrollment provisions included any funding mechanism for increases or decreases in the number of students. Within enrollment, we include binary variables to understand whether

³ We consider institutions with Carnegie classification Baccalaureate/Associate's Colleges as two-year institutions because these colleges primarily grant sub-baccalaureate degrees.

⁴ Six states had multiple systems at the four-year level, three states had multiple systems at the two-year level, and New York had two systems at the four- and two-year level.

⁵ For the purposes of this analysis, we consider groups of institutions that are funded using the same model as a "system," even if they are not treated as a system for governance purposes. For example, we consider all four-year universities in Tennessee outside of the University of Tennessee system as a "system," even though they have independent governing boards.

⁶ Institutions in the Texas State Technical College System (TSTCS) were classified in 2010 as two-year institutions by the Carnegie classification system, so we included the system from 2010 onward. Prior to 2010, the TSTCS was unclassified.

⁷ An example of a system with a protected base is the Minnesota State two- and four-year system. Under the funding model, all institutions retain 50% of the previous year's allocation. The other 50% of funding and any new funding from the state to the institution is allocated using an enrollment-based formula. There is the possibility that some states provide an informal base+ to their HEIs for *Enrollment Only*, *Performance Only*, or *Enrollment+Performance* systems. In the event that a state or its coordinating board did not explicitly mention a protected base or hold-harmless provision, we did not code it as having a *Base+*.

a state determined allocations based on FTE enrollment, headcount, field, or level of study (e.g., developmental, associate, bachelor's, or advanced degree coursework). We marked states as having performance funding if the sector received funding based on student outcome metrics, such as accumulated credit hours, retention rates, or graduation rates. In coding, we documented mechanisms states actually used to allocate funds, which sometimes differed from funding formulas that were on the books but were not actually used in practice.⁸ For instance, if a higher education agency had a funding model but the legislature did not use it to appropriate funds, we captured the mechanism the legislature used (e.g., *Base+ Only* or *No Funding Formula*).

Many states had a hybrid system with at least two of the three funding mechanisms. Using the three primary funding types, base+, enrollment, and performance, we recoded each sector within a state according to their specific mix of funding formulas. Some sectors within multiple states had no discernable enrollment or performance funding formula and did not increase or decrease the base-level funding across institutions at a similar rate. We coded these states as *No Funding Formula*.

In addition to the above funding mechanisms, some states also allocated funding based on equity and research provisions. We created a binary variable indicating whether the state offered equity-oriented funding. Common equity provisions based on institutional characteristics included Historically Black Colleges and Universities, low enrollment, rural, or traditionally under-resourced. Common equity provisions based on characteristics of enrolled students included the number/percentage of racially minoritized students, low-income status⁹, or students with disabilities. Other equity measures come from performance formulas that tie funding to student outcomes among targeted subgroups of historically underserved students. Finally, we created a binary variable for whether the state offered a competitive research program or weights based on research activity for four-year institutions. If the research funding was part of a PBF system, we did not include it as research funding.¹⁰

Results

To understand recent funding trends, we begin by providing a snapshot of how states allocate funding to public colleges and universities in fiscal year 2021 (see Table 1). Over 70% of two-year systems engaged in a

⁸ For example, the Alabama Commission on Higher Education (ACHE) uses an enrollment formula to make yearly funding recommendations to the state legislature. Through direct correspondence ACHE, we were told that the legislature does not use the funding recommendations based upon the formula. When looking at the relative increases/decreases between the institutions, the state does not apply a *Base+ Only* formula. Therefore, we determined the state to operate under a *No Funding Formula* model.

⁹ The most common form of states defining low-income is whether the student is Pell-eligible or a Pell recipient. For the sake of brevity and because it is the most inclusive measure, we refer to the low-income designation as Pell-eligible.

¹⁰ See [Appendix A](#) for a detailed description of each funding mechanism in our dataset.

hybrid funding formula that combined base+, enrollment, and performance elements, while nearly half of four-year systems used a hybrid funding formula. In the four-year sector, 12 systems have *No Funding Formula*, 11 participate in a *Base+ Only* formula, and 5 have an *Enrollment Only* formula. Of two-year systems engaging in non-hybrid formulas, six use *Enrollment Only*, three use *Base+ Only*, three use *No Funding Formula*, and two use *Performance Only*. Nearly 50% of two- and four-year systems engaged in some kind of equity funding, while 20% of four-year systems had a research provision in their formula.

See Table 1: Fiscal Year 2021 Funding Formulas and Provisions

We next describe several trends in funding formulas over time that emerged from our analysis.

Funding Formulas Over Time

Across sectors, approximately nine four-year and seven two-year systems changed formulas in a given year (see Figure 1).^{11,12} Though two-year systems had fewer pre-recession changes, both two- and four-year systems changed formulas more frequently during and immediately following the recession. Both systems had post-recession highs of 13 of two-year and 17 of four-year systems changing formulas in 2014. Except for a spike in 2021 of two-year systems changing their funding formulas around COVID-19, both sectors experienced decreases in the total number of formula changes per year since 2014.

See Figure 1: Number of Systems Changing Funding Formula in a Year

The average four-year and two-year system had its formula changed nearly three and two times, respectively, during the period.¹³ Ten four-year systems and eight two-year systems experienced no changes in the funding formula throughout the 18 years.¹⁴ Nine four-year and ten two-year systems experienced formula changes at least one standard deviation above the mean.¹⁵ For example, the Massachusetts two-year system and the non-University of Massachusetts four-year system had the most shifts, changing seven and nine

¹¹ These figures do not include the nuanced changes in enrollment weighting or performance standards. With the exclusion of changes to enrollment weights or performance standards, these figures possibly undercount the total number of changes HEIs experienced in regards to their funding formulas.

¹² See [Appendix B](#) for the number of formula changes for each sector by year.

¹³ See [Appendix C](#) for the number of formula changes by each system for the period.

¹⁴ The four-year systems include: the University System of Georgia, Maryland, Nebraska, City University of New York, State University of New York, the University of Vermont, Virginia, Washington, and Wyoming. The two-year systems include: the University System of Georgia, the Technical College System of Georgia, Maine, Maryland, Mississippi, Nebraska, New Jersey, and North Carolina.

¹⁵ A one standard deviation increase above the mean among four-year systems is five or more changes and two-year systems is roughly four or more changes in the funding formula.

times, respectively. Both systems switched among *Base+ Only*, *Base+Performance*, and *No Funding Formula*.

Another way of examining variation in funding formulas is to look at how funding formulas change (see Figure 2). Hybrid formulas using base+, enrollment, and performance mechanisms emerged as the preeminent strategy for allocating funds in both sectors. In 2004, 14 systems in each sector had a hybrid funding model. By 2021, 27 four-year and 37 two-year systems used hybrid models. While two-year systems experienced steady growth in hybrid funding, the use of hybrid formulas experienced pre-recession expansion followed by a decline during the recession with a post-recession expansion. As hybrid formulas increased, the relative percentage of performance and enrollment formulas implementing protected base measures increased from 58% to the mid- to high-70% in the four-year sector and from 41% to 71% in the two-year sector.

See Figure 2: Changes in Funding Formulas from 2003-04 to 2020-21

There appear to be two reasons for the switch to a hybrid formula. First, the shift coincides with a widespread decrease *Base+ Only* and *Enrollment Only* funding models in both sectors. While the number of four-year systems implementing either *Base+ Only* and *Enrollment Only* formulas decreased from 30 to 16, the number of two-year systems with these models decreased from 32 to 9. For example, in 2021, both New York two-year systems switched from an *Enrollment Only* to a *Base+Enrollment* formula when the state created a base-minimum of financial assistance for the sector.

A second driver of hybrid formulas resulted from PBF becoming a central component of higher education funding formulas. States frequently suspended or abandoned PBF during recessions (Dougherty et al., 2012). Nevertheless, after the recession, many states turned to PBF to allocate new funds. In 2008, seven two-year and thirteen four-year systems had performance metrics in the funding formula. In 2010, the number dropped to nine and four, respectively, but by 2014, 23 two-year and 19 four-year systems included PBF. By 2020, 30 two-year systems and 23 four-year systems had a performance component in their funding formula. The results are even more striking given that in 2004 only five four-year systems and four two-year systems had a funding model with PBF. Some systems, such as the Arizona and Mississippi four-year systems, participated in performance funding for only a few years after the recession. Other PBF systems, such as Ohio and North Dakota's two- and four-year systems, continued through 2021. Similar to the recession, some states suspended PBF in 2021 due to economic turmoil.

Sector Variation

Within states, differentiation in funding formulas across sectors became a normal facet of higher education funding. In 2004, 30 of the 48 states had similar funding models for their four- and two-year sectors.¹⁶ By 2021, the number dropped to 17 states. As an example, the three California systems have operated under different funding formulas since 2019.¹⁷ Only nine states, Colorado, Georgia, Louisiana, Nevada, New Mexico, North Dakota, Oklahoma, Tennessee, and Utah, applied the same style of funding formula across both sectors for all years. Even though some of these states changed formulas during the panel (often to include performance components), they used the same formula structure across both sectors.

No Funding Formula was one of the top two funding mechanisms in the four-year sector. In an average year, thirteen four-year systems engaged in *No Funding Formula* and nearly four two-year systems engaged in *No Funding Formula*. Four-year systems in Alaska, Alabama, Maryland, Mississippi, Nebraska, and Washington consistently used *No Funding Formula* in their allocations. Some states, such as Kansas and Illinois, employed this funding system when not allocating money based upon their traditional *Base+Performance* or *Base+ Only* formulas. South Carolina and Iowa are examples of states that once used either *Base+* or *Enrollment Only* formulas but switched to *No Funding Formula* after the recession. Similarly, *Base+ Only* funding has consistently been a top-three funding model for the four-year sector but decreased from a high of 20 systems in 2011 to 11 systems in 2021. Compared to an average of nearly 12 two-year systems operating under either *No Funding Formula* or *Base+ Only*, many states chose enrollment components in funding their two-year sector.

While enrollment is a central tenet of two-year system funding, how states chose to include enrollment in their formula continually evolved. Approximately 34 two-year systems had an enrollment component in an average year, but the number of systems funded by *Enrollment Only* decreased over time. In 2004, 20 two-year systems had *Enrollment Only* funding formulas. By 2021, only Arizona, Kansas, Maryland, New Jersey, and South Carolina Technical College systems remained *Enrollment Only*. The remaining systems were hybrid by 2021.

Enrollment formulas are also an essential funding component for many four-year systems. Within the four-year sector, the number of systems with an enrollment component decreased from a high of 27 in 2006 and 2007 to a low of 17 in 2015. Since 2016, around 20 four-year systems include an enrollment component. Of the seven four-year systems subject to separate funding models within a state, largely made up of regional

¹⁶ Because it does not have a two-year system, Alaska is not considered a part of the calculation.

¹⁷ Since 2019, the University of California System currently uses an *Enrollment Only* formula, the California Community College System uses an *Enrollment+Performance* formula, and the California State University system uses a *Base+Performance* formula.

comprehensive universities (RCUs) and MSIs, four were under some form of enrollment formula model in 2021.

Facets of Funding Formulas

FTE enrollment has been the primary determinant of enrollment-based funding in both sectors instead of headcount enrollment. The distinction is vital because FTE-driven formulas disadvantage two- and four-year institutions that serve large shares of nontraditional students, such as adults or parents, who are less likely to enroll full-time (Romano & D'Amico, 2021). Figure 3 shows the overall number of four-year systems (first panel) and two-year systems (second panel) with enrollment components and the number that use FTE versus headcount enrollment. The use of headcount among four-year systems engaging in enrollment formulas grew from 17% in 2004 to 25% in 2010 but has remained around 15% since 2019. In the two-year sector, the percentage of systems using headcount in their enrollment formulas has decreased from a high of 20% in 2006 to a low of 6% in 2014 and has not risen above 10% since. When formulas include headcount, it works in tandem with FTE in determining funding. While FTE determines the state revenue received for academic units, headcount typically directs funding to student services and support.

See Figure 3: Enrollment Funding Formulas

Frequently, FTE enrollment is weighted based on a student's field or level of study (shown in Figure 3). In the two-year sector, just over half of formulas with an enrollment component included weights for field, while one-third included weights for level. In the four-year sector, field and level weights were more common due to wider variations in courses offered and students' academic level. Within the four-year sector, 68% and 77% of systems with enrollment funding had weights for field and level in an average year, respectively. For example, Louisiana assigns base credit hour funding for lower-division liberal arts programs, while STEM courses and graduate-level programs receive larger credit hour weights. Over time, there have been slight declines in the number of four-year systems with field or level weights, while the number of two-year systems with weights remained consistent.

Weighting based upon level and field of enrollment is not the only facet that affects an institution's funding level. Some institutions receive money based upon metrics relating to institutional and student equity. Equity provisions grew in the periods leading up to the recession and COVID-19, where they declined (see Figure 4 to see changes in equity and research funding). For both sectors, the number of systems receiving institutional-based equity decreased in recent years from highs of 15 for the four-year sector in 2013 and 13 for the two-year sector in 2018. In 2021, 10 four-year and 11 two-year systems had institutional equity measures. The majority of institutional-based equity revolved around small and rural HEIs. Some equity provisions, such as Mississippi and North Carolina's funding for two-year institutions hit hard by hurricanes or Missouri's line-item funding to address the University of Missouri-St. Louis' historical underfunding,

make brief forays into the dataset. Arkansas once funded its HBCUs with a racial equity provision, only to switch to a racially minoritized student equity provision in its PBF system. For other states, such as Alabama and Mississippi, court case settlements require institutionally focused race-based equity funding to HBCUs. The Geier settlement directed funding to Tennessee State University until 2007. In 2008, the state dispersed funds for diversity initiatives across all HEIs with special consideration for Tennessee State University (State of Tennessee, 2007).

See Figure 4: Equity and Research Provisions

Student equity measures focused on enrollment or academic performance goals of specific student subpopulations provided the primary growth in equity funding. These student groups include students from racially minoritized or low-income backgrounds, first-generation status, adult learners, students with disabilities, and English language learners. For example, the Minnesota State Systems' two- and four-year institutions receive additional weighted headcounts in student service funding for students of color, first-generation status, and Pell eligibility. In Ohio's PBF model, institutions receive more funding for course completions of Pell-eligible, adult, academically underprepared, and racially minoritized students. For the four-year sector, student equity grew from five to 11 systems before the recession. In the years following, the number of systems dropped to nine only to reach 24 systems in 2020. Though the two-year sector did not see the initial pre-recession growth in student-based equity measures, the number grew steadily from seven in 2009 to twenty-four in 2020. Both sectors experienced small drops in 2021.

In both sectors, PBF with equity measures drove the growth in student equity.¹⁸ Two of the five four-year systems with equity provisions had PBF equity metrics in 2004, but by 2020, 21 of 24 systems with equity provisions had PBF-based equity. Similarly, the two-year sector grew from 0 of 5 systems with equity provisions in PBF in 2004 to 22 of 24 in 2020. Both two-year and four-year non-PBF student equity metrics hovered in the low single digits throughout the panel.¹⁹ PBF equity provisions experienced growth post-recession, only to shrink in number during the first year of COVID-19. During the panel, the number of PBF equity provisions for racially minoritized students grew from one to sixteen systems in the four-year sector and zero to fourteen systems in the two-year sector but dropped to fifteen and twelve, respectively. The number of adult equity provisions in the two-year sector grew from zero to twelve systems in 2020 to but dropped to nine in 2021. Performance-based Pell-eligible equity measures in the two-year sector grew from

¹⁸ See [Appendix D](#) for a comparison of non-PBF and PBF equity provisions by year.

¹⁹ Non-PBF racially minoritized student funding in the four-year sector ranged between five to seven systems, while the two-year sector grew from one to three systems. Non-PBF Pell-eligible equity measures ranged from two to four systems in the four-year sector and rotated between one to three institutions in the two-year sector. Neither the two- nor four-year sectors had non-PBF adult equity provisions.

zero systems in 2004 to twenty-two systems in 2020 but dropped to seventeen in 2021. Finally, in the four-year sector, PBF Pell-eligible equity metric grew from one system in 2004 to twenty-one systems in 2020 but dropped to fourteen systems in 2021. Even with the increase in equity across all states and systems, the number of four-year systems with equity components never surpassed 50% and reached just over 50% for two-year systems.

Besides funding through enrollment and equity, 21 four-year systems received funding to support competitive research initiatives between 2004 and 2021. Arizona, Maine, Minnesota State, the State University of New York system, Oklahoma, Oregon, and Texas were the only systems with consistent research funding across all years. Research funding grew from 11 to a high of 16 in 2008 and 2009. From 2009 to 2018, research provisions fluctuated between 13 and 15 systems but decreased to 11 systems by 2021.

Discussion and Conclusion

States invest nearly \$100 billion toward higher education, but those investments may not be distributed in ways that are both equitable and effective across institution types or subgroups of students. Without first understanding the various mechanisms through which states fund higher education and how these have changed over time, researchers and policy analysts cannot fully comprehend how funding formulas shape college access and student success. The lack of information creates inefficiencies in policymakers and institutional leaders' abilities to create policy that can meet attainment goals and critical workforce shortage areas. We provide the first detailed longitudinal examination of state higher education funding strategies to advance our understanding of the specific funding strategies that can promote college access, student success, and the closing of attainment gaps.

In this study, we find growth in the number of “hybrid” funding models that incorporate enrollment, performance, and/or prior year allocation (base+) considerations in the two- and four-year sectors. At the same time, funding formulas with a student enrollment component remained the predominant funding mechanism in the two-year sector. Though funding public four-year institutions by *Base+ Only* or *No Funding Formula* waned over the two decades, over 40% of four-year systems use one of the two funding formulas. We see a steady number of two- and four-year systems that include provisions that seek to provide more equitable funding based on an institution’s characteristics. Equity provisions based on the characteristics of students at institutions proliferated during pre-and post-recessionary periods but dropped during and immediately after the recession and the first year of the COVID-19 pandemic. The changes were due, in large part, to states adding or dropping PBF equity metrics in non-recessionary or recessionary periods, respectively. We find a decreasing number of four-year systems with funding provisions to improve the research capacity of institutions since the recession.

Our analyses lead us to recommend several areas where more research is needed. The first set of questions focus on understanding why states and systems use their current funding model and why these models have changed over time. There is a considerable amount of qualitative research examining PBF adoption (Dougherty et al., 2016, Gándara, 2019), but little to no research considering why states include weighting for field or level of study or use FTE or headcount in their enrollment models. Similar questions arise for states engaging in *No Funding Formula* or *Base+ Only* models. This research could help answer what socio-political mechanisms are at play in states that either create or abandon enrollment-driven formulas or continue other forms of funding. Given the frequent changes to funding formulas that our study documents, this type of work will help institutions better understand and anticipate whether and what types of changes in formulas may occur. The second set of questions concern how institutions navigate constant changes in funding formulas. Though there is research on how administrators navigate the implementation of PBF (e.g., Rosinger et al., 2021), there are questions about the effects of weathering frequent changes in other formulas.

In addition to these broad sets of questions, there is a need for more research on the implications of enrollment-based funding formulas on state educational attainment goals. Enrollment formulas that consider high-cost fields and levels of study may allow institutions greater flexibility to increase enrollment in those areas (Altonji & Zimmerman, 2019; Davis et al., 2021). Formulas based on the level of coursework provide more money for upper-division undergraduate and graduate courses or courses in high-cost (and often high-demand) fields, but there is little research on whether these funding disparities improve student labor market outcomes.

The implications of funding formulas on non-flagship public universities also deserve additional consideration. There is a long history of funding equity lawsuits in K-12 education, and some of those principles may also be applicable in higher education (Kolbe & Baker, 2019). Every funding model risks widening attainment gaps by race and family income. Base+ funding models lock in historical funding disparities, states without funding formulas run the risk of advantaging flagship universities in the legislative process, and both enrollment-based and performance-based mechanisms can result in less funding going to RCUs, community colleges, or MSIs (Hagood, 2019; Romano & D’Amico, 2021). Another area that deserves more research is funding provisions that hold institutions harmless or limit funding losses when formulas change. While these provisions are important for stability in funding for colleges, they may also prevent funds from being reallocated from more politically powerful and predominantly white institutions to MSIs with less lobbying power.

The final set of implications focuses on the relationship between different funding models and student outcomes, especially for students from historically underrepresented groups. Again, research on performance funding models provides a potential path forward for considering other funding provisions. As

it currently stands, there is a significant gap in the scholarly literature regarding how various funding mechanisms aid or hinder college access and student success among traditionally underserved students in higher education. As research delves deeper into understanding funding formulas, there is a need to investigate these funding mechanisms' adequacy, equity, and efficacy. It is crucial to consider as many funding provisions as possible to determine the optimal funding model for college access and student success, especially as we show that many states operate funding models simultaneously with multiple components.

As our data shows, many PBF components have only been instituted since the recession. Many formulas featuring PBF offer some protected measure of previous funding levels and funding based on enrollment measures. PBF formulas ignore the long-term implications of underfunding HEIs that served and continue to serve students of racially minoritized and first-generation backgrounds (Hamilton & Nielsen, 2021). These institutions may be further disadvantaged by issues not fully recognized by formulas, such as the lack of name-brand recognition for student recruitment or the research and philanthropic infrastructure to access external revenue. In any case, there is a need for further research as to how these formulas and provisions may or may not provide enough revenue to entice public HEIs to create greater access to students from marginalized backgrounds and enough services to help students succeed once they are in college.

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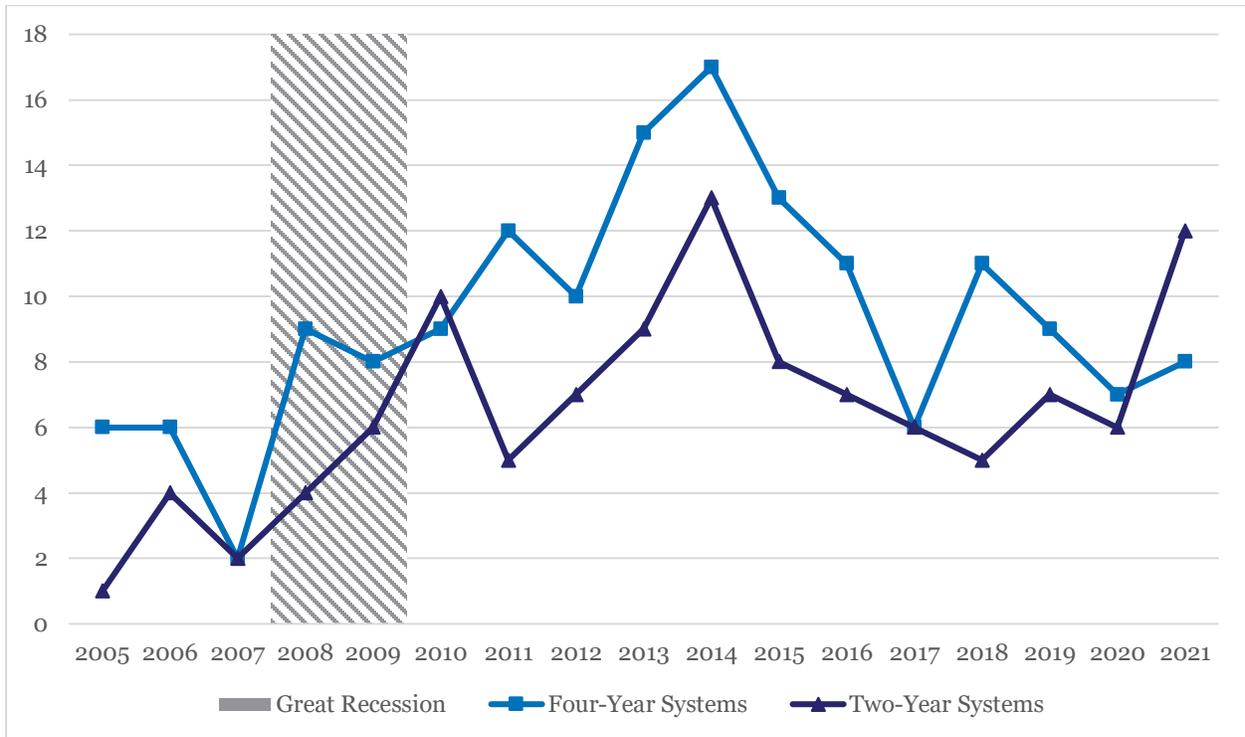
Table 1: Fiscal Year 2021 Funding Formulas and Provisions

State	Four-Year Institutions											Two-Year Institutions										
	Direct HEI Funding	Base+ Only	Enrollment Only	Performance Only	Base+Enrollment	Base+Performance	Enrollment+Performance	Base+Enrollment+Performance	No Formula	Equity	Research	Direct HEI Funding	Base+ Only	Enrollment Only	Performance Only	Base+Enrollment	Base+Performance	Enrollment+Performance	Base+Enrollment+Performance	No Formula	Equity	
AL									✓	✓											✓	
AK	✓								✓													
AZ	✓								✓		✓			✓								✓
AR	✓					✓					✓					✓						✓
CA			✓								✓							✓				✓
CA - CSU					✓						✓											
CO	✓		✓								✓			✓								✓
DE	✓	✓										✓									✓	
FL	✓							✓			✓									✓		
GA - USG					✓										✓							
GA - TCSG															✓							
HI	✓					✓					✓									✓		✓
ID	✓				✓							✓			✓							✓
IL	✓	✓										✓						✓				✓
IN	✓					✓					✓					✓						✓
IA	✓								✓			✓				✓						✓
KS	✓								✓					✓								
KY	✓							✓			✓									✓		✓
LA	✓				✓							✓			✓							✓
ME			✓									✓										
MD	✓								✓			✓		✓								✓
MA									✓			✓				✓						✓
MA - Non-UMass	✓					✓					✓											
MI	✓	✓										✓			✓							
MN		✓																				
MN - Minn State					✓						✓				✓							✓
MS									✓		✓				✓							✓
MO	✓	✓													✓							
MT							✓				✓									✓		✓

State	Four-Year Institutions										Two-Year Institutions												
	Direct HEI Funding	Base+ Only	Enrollment Only	Performance Only	Base+Enrollment	Base+Performance	Enrollment+Performance	Base+Enrollment+Performance	No Formula	Equity	Research	Direct HEI Funding	Base+ Only	Enrollment Only	Performance Only	Base+Enrollment	Base+Performance	Enrollment+Performance	Base+Enrollment+Performance	No Formula	Equity		
NE									✓														
NV							✓			✓									✓				✓
NJ	✓					✓				✓				✓									
NM	✓					✓				✓		✓					✓						✓
NY- CUNY	✓	✓														✓							
NY- SUNY	✓		✓							✓	✓					✓							
NC	✓				✓						✓									✓			✓
ND	✓					✓					✓	✓					✓						✓
OH	✓						✓			✓		✓			✓								✓
OK		✓									✓		✓										✓
OR	✓					✓				✓	✓								✓				✓
PA	✓	✓										✓				✓							
PA - PASSHE	✓				✓					✓													
RI	✓					✓				✓		✓					✓						
SC	✓								✓					✓									✓
SC - USC CCs												✓										✓	
SD	✓								✓							✓							
TN	✓					✓				✓	✓												
TN - SUCCS	✓					✓				✓	✓						✓						✓
TX	✓				✓					✓	✓										✓		✓
TX-TSTC																✓							✓
UT	✓								✓		✓		✓									✓	
VT	✓	✓																					
VT - VSCS									✓													✓	
VA	✓		✓																		✓		✓
WA	✓								✓												✓		✓
WV		✓											✓										
WI						✓				✓											✓		✓
WY	✓	✓																			✓		

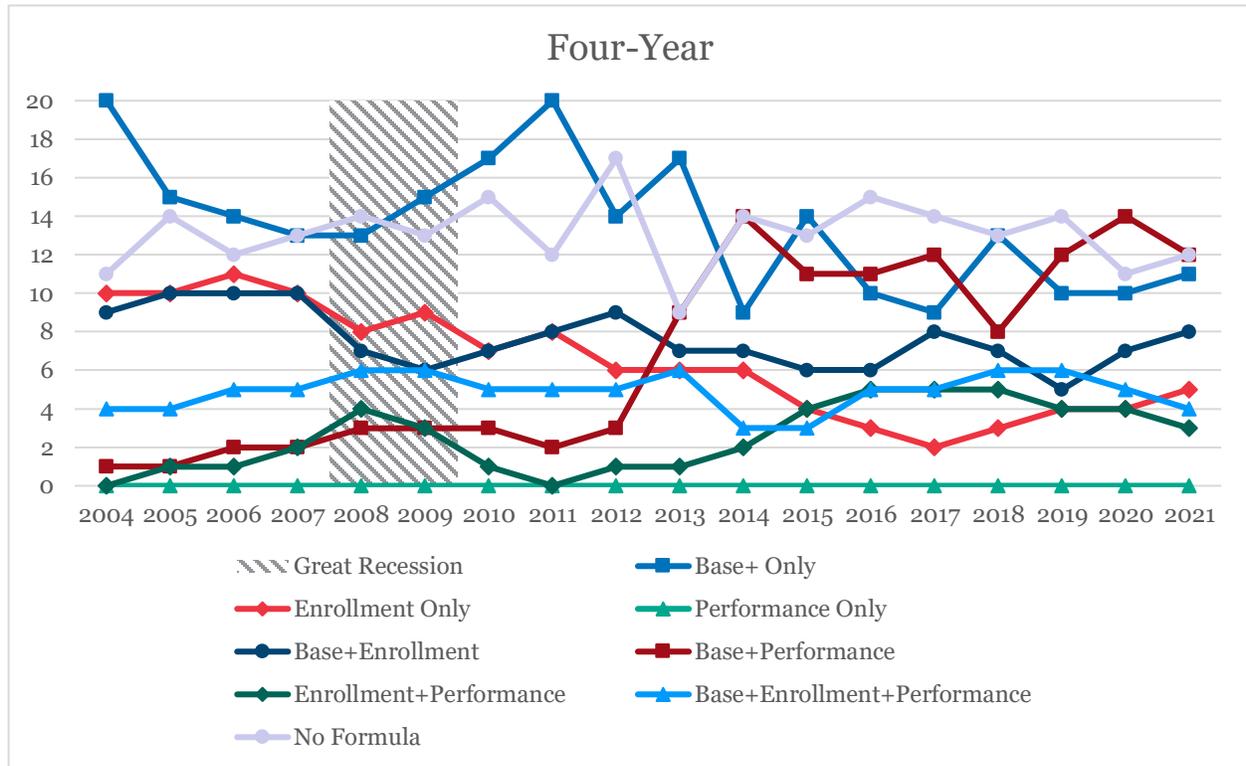
Direct funding refers to the state having direct appropriations to the HEIs themselves as opposed to a system coordinating or governing board. Due to the lack of data, Connecticut and New Hampshire are not included in the chart. In states with multiple systems, we consider the flagship system as the main four-year or two-year system. The following state-system dyads represent the secondary system: California-California State Universities, Georgia-University System of Georgia, Massachusetts-Non-University of Massachusetts, Minnesota-Minnesota State Universities and Colleges, Pennsylvania-Pennsylvania State System of Higher Education, South Carolina-University of South Carolina Community Colleges, Tennessee-Non-University of Tennessee, Texas-Texas State Technical College, and Vermont-Vermont State College System.

Figure 1: Number of Systems Changing Funding Formula in a Year



Note. The Four-Year Systems has a mean of 9.294, a standard deviation of 3.567, a median of 9, and a mode of 6. The Two-Year Systems has a mean of 6.588, a standard deviation of 3.183, a median of 6 and a mode of 6.

Figure 2: Changes in Funding Formulas from 2003-04 to 2020-21



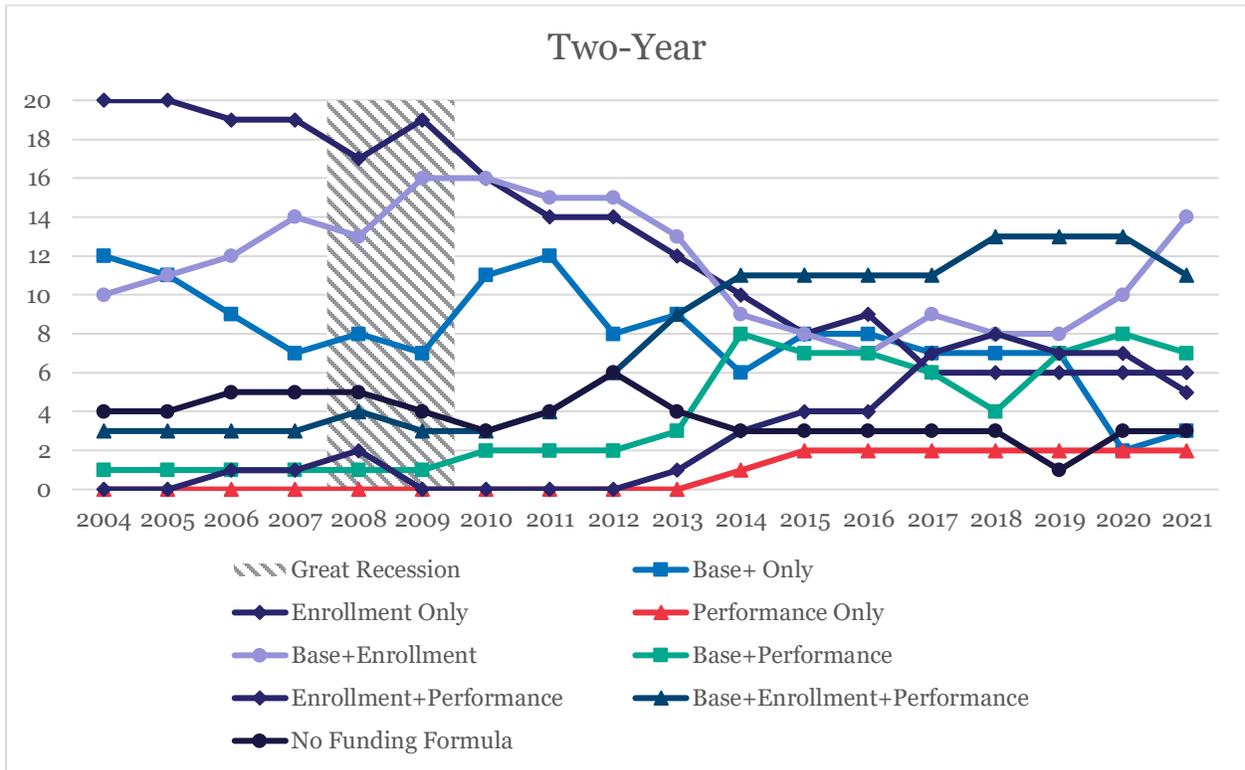
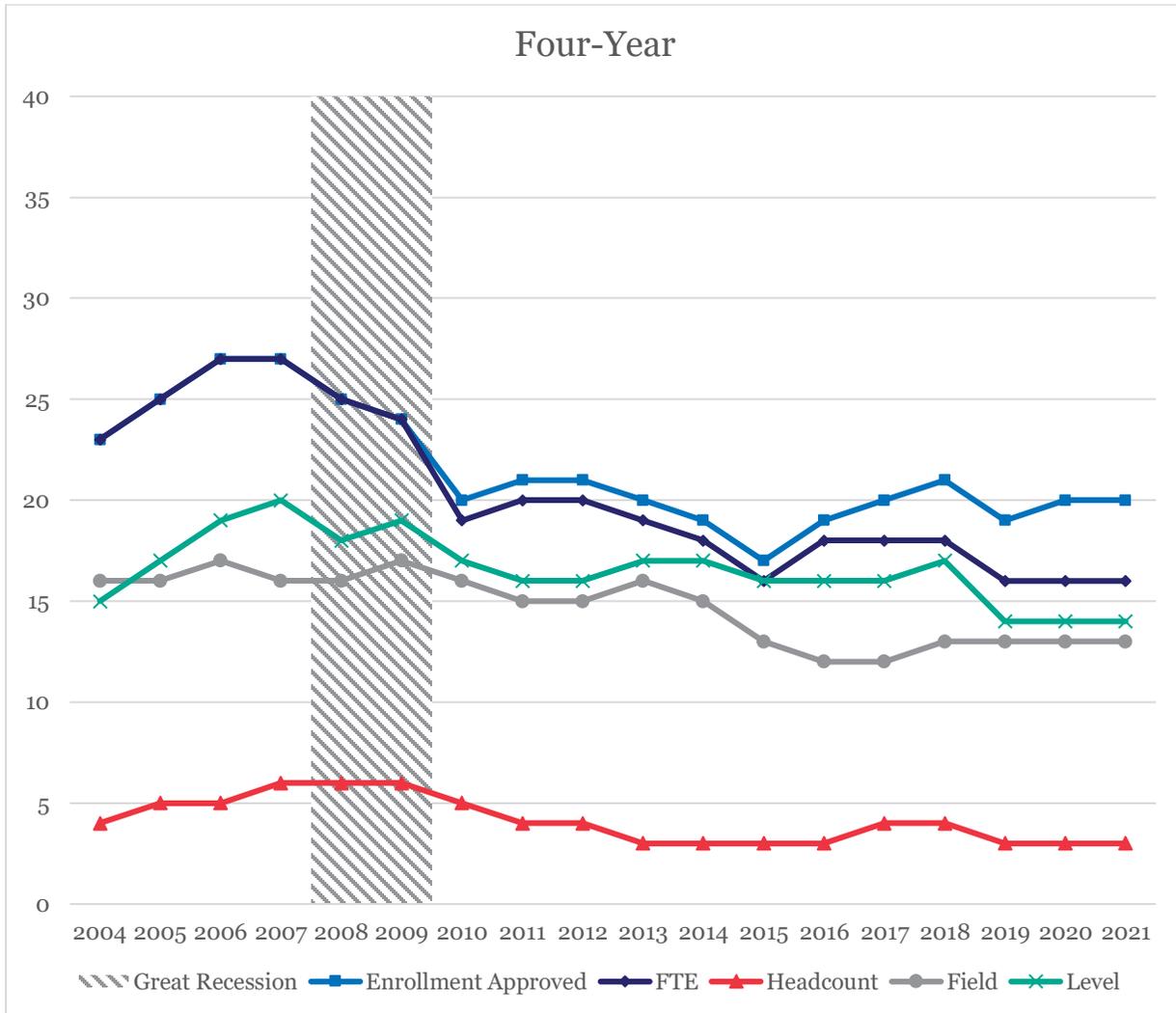


Figure 3: Enrollment Funding Formulas



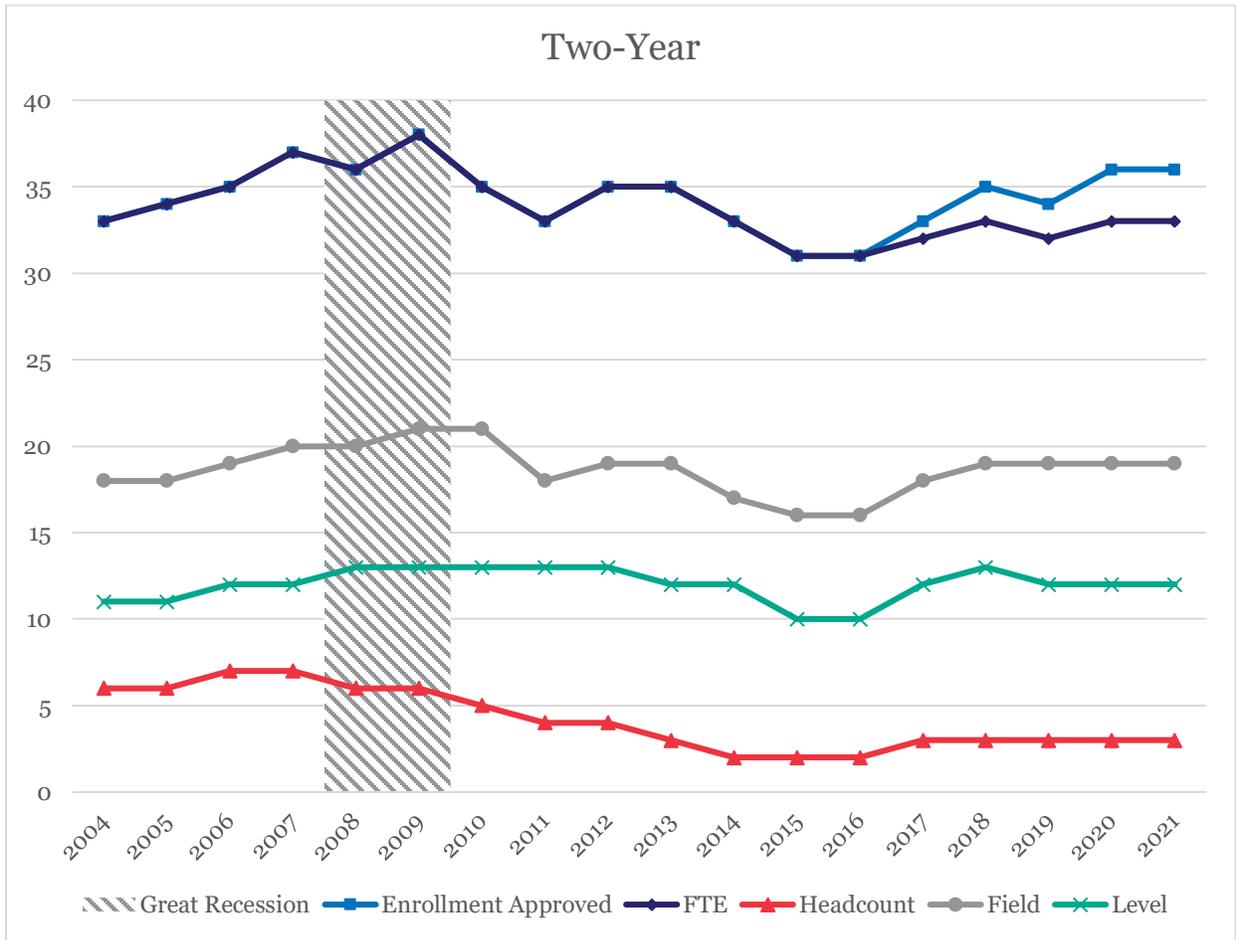
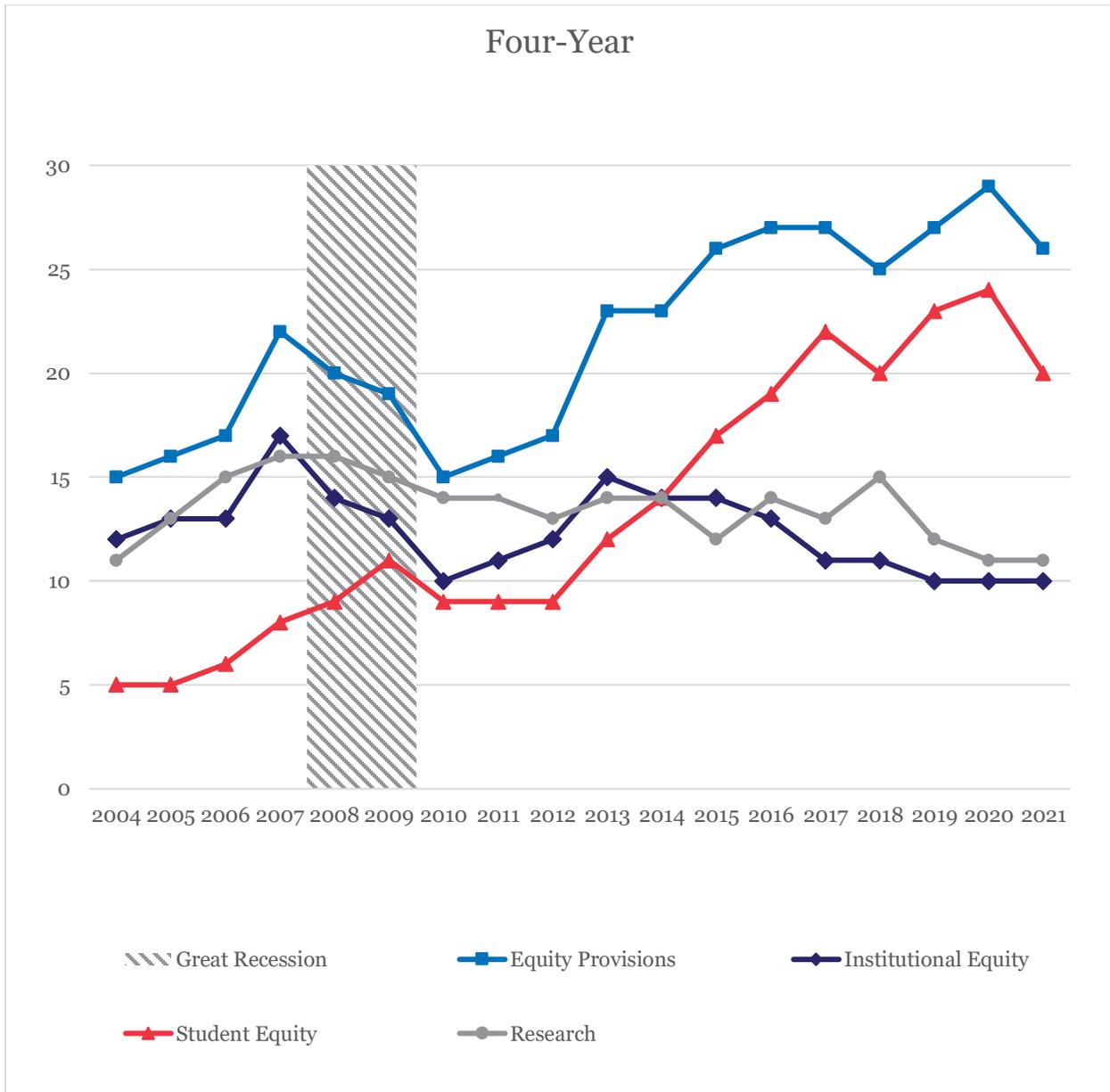
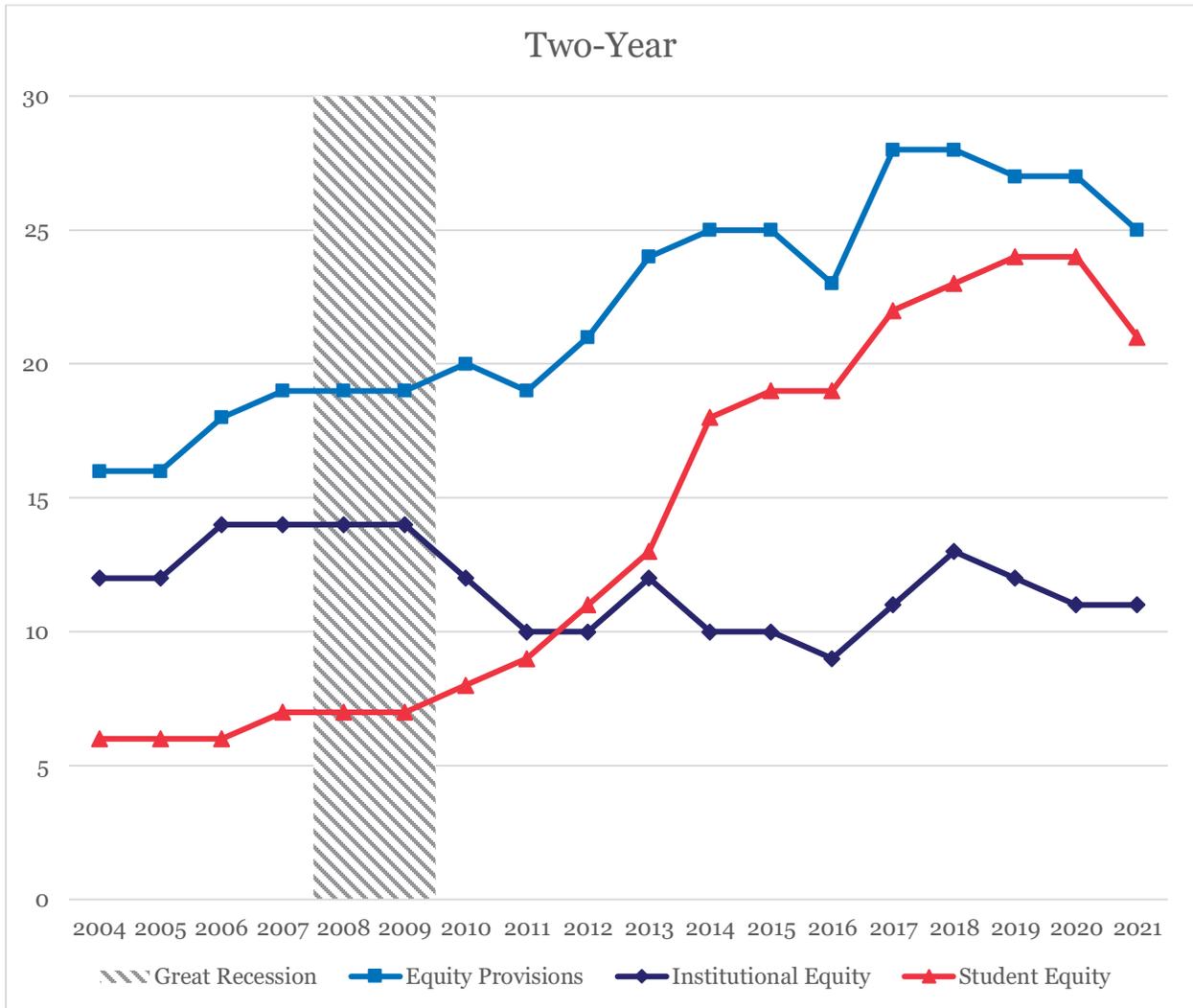


Figure 4: Equity and Research Provisions





Appendix A

Funding Models

Direct Appropriations to HEIs - With the exception of New York switching from awarding funding to the City University of New York as a system to awarding funds to individual institutions in 2010 and the inclusion of the Texas State Technical College System in 2012, 69% of four-year systems and 53% of two-year systems had line-item funding measures from the states directly to the HEIs throughout the panel. The trend is an indication that two-year HEIs were more reliant on governing or coordinating boards to determine their funding outcomes and that states that had direct appropriations systems largely maintained those systems.

Base+ Only - A pure *Base+* system implies that institutions across a system received a similar across-the-board percentage point increase/decrease in funding from the prior year's allocation. Eleven four-year systems and three two-year systems used a *Base+ Only* model.

Enrollment Only - An *Enrollment Only* model indicates funding depends on student enrollment levels at an institution and includes no protection of base funding levels. Often the funding differs by field and/or level of coursework and may use one or a combination of headcount or full-time equivalent (FTE) student enrollment. Five four-year systems and six two-year systems used an *Enrollment Only* funding model.

Performance Only - A *Performance Only* model allocates all state general funds for an institution based on performance metrics as outlined by the state or board. Only two two-year systems (the Ohio Association of Community Colleges and the Texas State Technical Colleges) used a *Performance Only* funding model.

Base+Enrollment - This model is based on enrollment and involves a protected base or stop-loss provision that ensures institutions do not lose more than a certain amount of funds from the prior year's allocation. Under this model, HEIs primarily receive new monies through raising FTE/headcount enrollment or raising FTE/headcount enrollment relative to other institutions in that sector in the state. Sometimes this occurs with weighting for field or level of study. Eight four-year systems and fourteen two-year systems used a *Base+Enrollment* funding model.

Base+Performance - The state has a performance funding model for a portion of state funding, but there are stop-loss provisions that protect the vast majority of current funding. This means that money at stake under performance funding is primarily restricted to new state appropriations. Twelve four-year and seven two-year systems used a *Base+Performance* funding model.

Enrollment+Performance - This funding model is based on a combination of enrollment and a HEI's performance on metrics outlined by the state and/or system. Similar to the other enrollment models, some

combination of FTE, headcount and weighting for field and level of study typically affect monies received through enrollment. The institutions have no protected base or stop-loss provision. Three four-year systems **and five two-year systems used an Enrollment+Performance funding model.**

Base+Enrollment+Performance - This funding model is based on a combination of enrollment and a HEI's performance on metrics outlined by the state and/or system and includes a protected base or a stop-loss provision. The HEIs have a protected base or a stop-loss provision. Four four-year systems and eleven two-year systems used a *Base+Performance+Enrollment* funding model.

No Funding Formula - While states provide funding to HEIs, these systems do not have a stated funding model that is used to allocate funds to HEIs. These states fall into one of two sets. The first set are states that allocate across-the-board increases to systems to meet inflation, salary, and insurance increases along with line-item funding of certain educational programs, research projects, and strategic initiatives. This includes states such as Alaska and Washington. The second set of states provide no indication of any kind of base+, enrollment, or performance funding measures in either a state's budget or coordinating board minutes. Examples include Alabama and Nebraska. To determine that these systems were *not* subject to *Base+ Only* funding (a common approach to higher education funding when no formula exists), we calculated year-to-year changes in funding levels. When finding funding levels from the state's general fund to differ by greater than one percentage point across HEIs in a system, we determined a *Base+ Only* model was not used. Twelve four-year systems and three two-year systems had no discernable funding model in 2021.

Equity and Research Provisions

Equity Provisions - Equity provisions provide funding to HEIs outside of the above funding models, typically based on institutional or student characteristics that require additional resources. Twenty-six four-year and twenty-five two-year systems engaged in some kind of equity funding in the fiscal year 2021.

Research Provisions - Research provisions refer to whether the state offered a competitive research program through a state general fund or had research weights in their formula for the four-year sector. We did not include direct specific line-item research funding in this category because this funding tended to support specific research centers rather than focusing on increasing research capacity overall. In the fiscal year 2021, 20% four-year systems had some kind of research provision.

Appendix B

Yearly Changes in Funding Formula

	Four-Year		Two-Year	
	Number	Percentage	Number	Percentage
2005	6	10.9	1	2.0
2006	6	10.9	4	8
2007	2	3.6	2	4
2008	9	16.4	4	8
2009	8	14.5	6	12
2010	9	16.4	10	20
2011	12	21.8	5	9.8
2012	10	18.2	7	13.7
2013	15	25.5	9	17.6
2014	17	30.9	13	25.5
2015	13	23.6	8	15.7
2016	11	20.0	7	13.7
2017	6	10.9	6	11.8
2018	11	20.0	5	9.8
2019	9	16.4	7	13.7
2020	7	12.7	6	11.8
2021	8	14.5	12	23.5
<i>Mean</i>	9.294	16.8	6.588	13
<i>SD</i>	3.567	6.2	3.183	6.4
<i>Median</i>	9	16.4	6	11.8
<i>Mode</i>	6	10.9	6	13.7

Appendix C

Number of Changes in Funding Formula by State-System

State	Four-Year	Two-Year	State	Four-Year	Two-Year
AL	2	2	NE	0	0
AK	4		NV	1	1
AZ	8	2	NJ	1	0
AR	5	5	NM	1	1
CA	5	1	NY-CUNY	0	3
CA-CSU	4		NY-SUNY	0	3
CO	3	3	NC	0	0
DE	6	6	ND	1	1
FL	3	2	OH	1	2
GA	0	0	OK	3	3
GA-TCSG		0	OR	4	1
HI	1	1	PA	4	3
ID	4	3	PA2	1	
IL	6	4	RI	6	1
IN	2	1	SC	6	4
IA	1	5	SC-USC CCs		2
KS	8	6	SD	5	1
KY	6	2	TN	1	
LA	4	4	TN-SUCCS	1	1
MA	6	7	TX	2	1
MA-Non-UMass	9		TX-TSTC		1
ME	3	0	UT	2	2
MD	0	0	VT	0	
MI	4	5	VT-VVSCS	1	1
MN	4		VA	0	1
MN-MinnState	4	4	WA	0	1
MS	2	0	WV	5	7
MO	5	3	WI	1	1
MT	1	2	WY	0	2
<i>Mean</i>	<i>2.545</i>	<i>2.196</i>	<i>Median</i>	<i>2</i>	<i>2</i>
<i>SD</i>	<i>2.415</i>	<i>1.887</i>	<i>Mode</i>	<i>1</i>	<i>1</i>

Due to the lack of data, Connecticut and New Hampshire are not included in the chart. or the sake of clarity, if the secondary four-year system and primary two-year systems are served

under the auspices of the same coordinating board, we include the systems on the same line. The following state-system dyads represent the secondary system: California-California State Universities, Georgia-University System of Georgia, Georgia-Technical College System of Georgia, Massachusetts-Non-University of Massachusetts, Minnesota-Minnesota State, Pennsylvania-Pennsylvania State System of Higher Education, South Carolina-University of South Carolina Community Colleges, Tennessee-State University and Community College System, Texas-Texas State Technical College, and Vermont-Vermont State College System.

Appendix D

Changes in Equity Provisions Across Time

Year	Four-Year Systems									
	Equity Provisions	PBF Equity Provision	Small/Rural Equity Provision	Racially Minoritized Equity Provision	Non-PBF Racially Minoritized Equity Provision	PBF Racially Minoritized Equity Provision	Non-PBF Pell Grant/Low Income Equity	PBF Pell Grant/Low Income Equity	Non-PBF Adult Learner Equity	PBF Adult Learner Equity
2004	15	2	7	6	6	1	2	1	0	0
2005	16	2	7	6	6	1	2	1	0	0
2006	17	3	8	7	6	2	2	1	0	1
2007	22	3	11	8	7	2	2	1	0	1
2008	20	5	9	8	7	2	2	3	0	1
2009	19	7	8	8	7	2	2	5	0	1
2010	15	4	6	7	7	1	2	3	0	0
2011	16	6	7	7	7	3	2	6	0	2
2012	17	7	8	8	6	5	2	6	0	3
2013	23	10	10	10	6	7	2	9	0	5
2014	23	13	9	9	6	6	2	11	0	6
2015	26	16	7	11	5	9	2	14	0	7
2016	27	18	7	15	5	13	3	15	0	6
2017	27	20	5	17	6	14	4	17	0	8
2018	25	17	6	15	7	11	4	16	0	8
2019	27	20	5	18	6	15	4	20	0	9
2020	29	21	5	21	7	16	4	21	0	9
2021	26	17	5	19	6	15	3		0	8

Year	Two-Year Systems									
	Equity Provisions	PBF Equity Provision	Small/Rural Equity Provision	Racially Minoritized Equity Provision	Non-PBF Racially Minoritized Equity Provision	PBF Racially Minoritized Equity Provision	Non-PBF Pell Grant/Low Income Equity	PBF Pell Grant/Low Income	Non-PBF Adult Learner Equity	PBF Adult Learner Equity
2004	16	0	7	1	1	0	2	0	0	0
2005	16	0	7	1	1	0	2	0	0	0
2006	18	0	7	1	1	0	2	0	0	0
2007	19	0	8	2	2	0	2	0	0	0
2008	19	0	9	2	2	0	2	0	0	0
2009	19	0	9	2	2	0	2	0	0	0
2010	20	1	8	2	2	0	2	1	0	0
2011	19	3	7	2	2	1	2	3	0	1
2012	21	6	7	5	2	4	2	5	0	2
2013	24	9	8	6	2	5	1	8	0	4
2014	25	13	7	8	2	7	1	13	0	6
2015	25	15	6	11	2	10	1	15	0	8
2016	23	16	5	11	2	10	2	16	0	7
2017	28	19	8	12	2	11	2	19	0	9
2018	28	21	12	14	3	13	2	21	0	10
2019	27	22	10	14	3	13	3	22	0	12
2020	27	22	10	15	3	14	3	22	0	12
2021	25	19	9	13	3	12	3	17	0	9

Note. There was a total of 55 four-year systems, 50 two-year systems until 2009, and 51 two-year systems after 2009.