Annenberg Institute
BROWN UNIVERSITY

EdWorkingPaper No. 24-1114

How are Institutions Positioned on the Brink of the Enrollment Cliff?: Evidence from Ohio

Casey Boyd-Swan
Kent State University

C. Lockwood Reynolds
Kent State University

Since 2018, institutions of higher education have been aware of the "enrollment cliff" which refers to expected declines in future enrollment. This paper attempts to describe how prepared institutions in Ohio are for this future by looking at trends leading up to the anticipated decline. Using IPEDS data from 2012-2022, we analyze trends in enrollment, revenues, debt and staffing across Ohio's nine largest public universities. We find significant variation in how institutions have evolved over this period. Our analysis suggests Ohio serves as an illustrative case study for examining institutional preparedness, as it represents a "worst-case scenario" across multiple dimensions - from projected enrollment declines to state funding constraints. The paper concludes by considering implications for higher education nationally and suggesting directions for future research on institutional responses to demographic shifts

VERSION: December 2024

Suggested citation: Boyd-Swan, Casey, and C. Lockwood Reynolds. (2024). How are Institutions Positioned on the Brink of the Enrollment Cliff?: Evidence from Ohio. (EdWorkingPaper: 24 -1114). Retrieved from Annenberg Institute at Brown University: https://doi.org/10.26300/hkw3-0n45

How are Institutions Positioned on the Brink of the Enrollment Cliff?: Evidence from Ohio*

Casey Boyd-Swan†

C. Lockwood Reynolds‡

December 20, 2024

Abstract

Since 2018, institutions of higher education have been aware of the "enrollment cliff" which refers to expected declines in future enrollment. This paper attempts to describe how prepared institutions in Ohio are for this future by looking at trends leading up to the anticipated decline. Using IPEDS data from 2012-2022, we analyze trends in enrollment, revenues, debt and staffing across Ohio's nine largest public universities. We find significant variation in how institutions have evolved over this period. Our analysis suggests Ohio serves as an illustrative case study for examining institutional preparedness, as it represents a "worst-case scenario" across multiple dimensions - from projected enrollment declines to state funding constraints. The paper concludes by considering implications for higher education nationally and suggesting directions for future research on institutional responses to demographic shifts.

Keywords: higher education, enrollment cliff, university finances

*

†Department of Economics, Kent State University, Kent, OH. cboydswa@kent.edu

‡Corresponding Author. Department of Economics, Kent State University, Kent, OH. creynol9@kent.edu

1 Introduction

Grawe (2018) documented a future decline in total enrollments in higher education in the United States. This "enrollment cliff" - which is predicted to begin in 2025/2026 - is the result of several factors, but the culminating effect is that there will likely be fewer students attending higher education because there are fewer current students in the K-12 system. Rising college costs over time and changes in attitudes about higher education could exacerbate this problem (Nayga Jr et al., 2024). While Grawe (2021) outlined potential institutional responses, it remains unclear how seriously universities have begun addressing this challenge. Moreover, the COVID-19 pandemic was a great disruption to higher education and may have distracted institutions from the future demographic problem (or delayed their preparation for it). Recent research predicts a significant number of institution closures resulting from the enrollment cliff (Kelchen et al., 2024).

Fewer students in the K-12 system does not necessarily lead to proportional declines in higher education enrollment (and, correspondingly, revenues). It is possible that the matriculation rate among high school students could increase, and higher retention or graduation rates in college would increase revenues to institutions. Research has shown that smaller cohorts have higher graduation rates, likely due to higher resources per student (Bound and Turner, 2007). It may be possible to focus state efforts into increasing the percent of high school graduates that attend college, however the effects of the COVID-19 pandemic on students in the K-12 system suggest that the upcoming cohort may be less prepared for college than previous ones and thus would need even more resources (e.g., Storey and Zhang (2024); Dee (2024)).

This paper investigates how Ohio universities are positioned to face this enrollment cliff. Ohio makes an interesting case study for several reasons. First, it is a large state with populations across rural, suburban and urban locations. Second, there are a relatively large number of public institutions of various sizes, so comparisons across institution types can be made. And lastly, the higher education "system" in Ohio is decentralized without a strong

governing board. This means that institutions are often acting on their own and not in a coordinated effort. These characteristics make Ohio representative of broader U.S. higher education trends.

The primary focus will be on the 9 highest enrollment main campuses in the state. That includes Ohio State University (OSU, state flagship) and the four corner institutions (Bowling Green State University (BGSU), Kent State University (KSU), Miami University (MU) and Ohio University (OU)). We also include the University of Cincinnati (UC), the University of Toledo (UT), the University of Akron (UA), and Cleveland State University (CSU). Obviously, there are implications for other institutions in the state as well as the regional campus systems of these institutions. While that will be fruitful areas for future research, the institutions selected comprise a substantial proportion of total enrollment in public four-year institutions in Ohio (82% in 2022).[1]

When evaluating how prepared institutions are, we are primarily looking at their revenue sources, overall costs and the structure of those costs. The focus here will be on the costs associated with staffing at these institutions. Further research into other areas of expenditure could be interesting for future research but may be less easily changed by the institutions. For example, fewer students may need fewer buildings (e.g., academic buildings, residence halls), but such a change takes more time. Alternatively, institutions may make other changes quickly to match declining enrollment - for example, cutting programs and/or faculty. Indeed, institutions nationwide have begun making such changes (Friedman, 2024). Therefore, it is particularly useful to investigate the extent to which Ohio institutions have increased faculty staffing (or salaries) over the course of the period examined.

The remainder of this paper is as follows: first we begin by presenting a review of the literature around strategies to deal with the "enrollment cliff". Next, we present our methods section in two parts: first a brief description of the data used and second by discussing the

[1]Other than the regional campuses of these institutions, there are 4 other smaller-enrollment universities in the state. In 2022, full-time equivalent enrollment across all of the public four-year institutions was 265,926. 219,249 (82%) was in the universities studied, 21,095 were in regional campuses of those institutions (8%) and the remaining 25,582 (9.6%) were at the other institutions. We later demonstrate that patterns are similar when including the regional campuses.

state context, including the magnitude of the enrollment cliff in Ohio and recent trends in enrollments, revenues and costs across the state. Notably, state support of higher education per student and net tuition and fee revenues per student were higher on average in 2022 than 2012. This increase in per student support is partly due to a decline in enrollment that began after 2016, meaning that the state is already dealing with enrollment declines and the enrollment cliff is yet looming. In the fourth section, we present our analysis across five dimensions: enrollments, net revenues, revenue sources, debt and salary outlays. We find significant institutional variation within the state. Enrollment is climbing at OSU and UC but has been steady or falling at other institutions. Partly due to the details of the state funding model, there are large differences in state support per student across institutions as well as net tuition and fees. Moreover, some institutions carry significant per-student debt that may become harder to service with falling enrollments. Investigating differences in salary outlays for different categories of employees, we find that both levels and trends across these categories have varied by institution. Some institutions have already been forced to decrease staffing due to earlier budget problems and in response to the pandemic. Few institutions show growth in instructional staff outlays, and those with growth show small increases. In the fifth section, we offer a discussion of our findings and consider the relative preparedness of each institution for the impending enrollment cliff. Finally, our conclusion considers how representative Ohio's universities are nationally and suggests directions for future research.

2 Literature Review

Grawe (2018) outlined a stark reality facing the future of higher education: demographic effects (e.g., lower birth rates and long-term trends away from higher education attendance) will result in a significant drop-off in the number of students attending and graduating from college. Grawe finds that while the probability of attending college varies markedly by demographic characteristics, it is also the case that institutional characteristics can serve to

mediate the effects felt from the "enrollment cliff". However, these characteristics will only blunt impacts in specific regions, particularly the Northeast and eastern Midwest, where birth rates and migration patterns suggest the largest declines.

Institutions might respond by intensifying recruitment efforts. Chief marketing officers at regional public institutions believe that careful marketing can help institutions through the enrollment cliff (Phillips and Jones, 2024). On the one hand, marketing research suggests increased expenditures can benefit private firms during recessions (O'Malley et al., 2011). On the other hand, universal adoption of such strategies will likely diminish their effectiveness. Large universities already recruit heavily outside their states, focusing on privileged populations in higher-income, predominantly white, and private schools (Salazar et al., 2021). Such outreach attempts in the future are likely to have large diminishing returns (and therefore large marginal costs) because the pool of students will be shrinking precipitously over a sustained period.

Grawe (2021) points to institutions' belief that they could recruit international students to overcome the enrollment cliff. In 2000, there were 547,873 international students in the United States which increased to 1,043,839 by fall 2015. However, international enrollments declined after 2015 and was not helped by COVID. Numbers have climbed back up to 1,057,188 by fall 2022 but both potential changes in federal immigration policy and/or political rhetoric around immigration may again deter students.[2]

Universities might invest in student amenities to attract students (Jacob et al., 2018) and enhance the in-person experience (Aucejo et al., 2023), but that would be costly and have diminishing returns. Pavlov and Katsamakas (2020) apply a system dynamics computational model - where feedback loops between students, faculty and costs borne by institutions and students are modeled under variable conditions - to understand which strategies may prove the most fruitful in helping universities weather the storm. Evaluating an "invest in facilities" strategy, they find a short-term surge in enrollment (and revenue), but the expansion of facilities requires a substantial debt to be incurred. The evidence suggests that this solution

[2]Data on international students was collected from the NCES Digest of Education Statistics: https://nces.ed.gov/programs/digest/d23/tables/dt23_310.20.asp.

is not sustainable in the long-run due to the resulting operational deficits.

Online program expansion and recruitment of non-traditional students are other strategies which face significant challenges. The online market is fairly saturated in response to prior declines in state support (Ortagus and Yang, 2018), students have shown a high willingness to pay for in-person education (Aucejo et al., 2023) and increasingly evidence shows that online learning is less successful than in-person learning Altindag et al. (2021). It is not clear why older workers would want to return to college especially since they do not receive the same economic benefits from future wages as young attendees (Aliprantis et al., 2024). Cost-sensitive, marginally-qualified students choose two-year colleges (e.g., Delaney and Marcotte (2024)) and this market could become even more competitive as community colleges begin offering bachelor's degrees (Wright-Kim, 2023).

One option is for institutions to recruit existing students at other institutions. The National Association for College Admission Counseling (NACAC) historically disallowed recruiting of students already attending other institutions; that rule was dropped in 2019. Whether or not strategies of student poaching are good for students is unclear, but it is unlikely to be good for the sector as a whole. Somewhat relatedly, changes to NCAA rules around profiting from names, images, and likeness (NIL) may increase expenditures to recruit student athletes - whether that will pay off with higher sports revenue is unclear.

Tuition strategies like "tuition resets" or increased tuition discounts and institutional aid require highly elastic demand, and evidence suggests these approaches don't boost long-term enrollment (e.g., Ward and Corral (2023); Behaunek and Gansemer-Topf (2019)). Furthermore, there are strong pressures for institutions to compete over resources - partly to build reputations and improve university rankings - which leads to higher tuition (Pavlov and Katsamakas, 2023). Finally, institutions have already engaged in price cutting to attract out-of-state students to combat declining state support (Jaquette and Curs, 2015) so there are likely to be diminishing returns to these efforts.

Improving retention and graduation rates could increase revenue, particularly in states with performance-based funding systems (Rosinger et al., 2022). Deming and Walters (2017)

present evidence that changes in tuition have little effect on enrollment and degree completion, but spending has large impacts. The immediate problem, of course, is that institutions have long attempted to increase retention and graduation rates - it is not clear why we should expect this to improve in the near future, especially given the evidence of learning losses from the pandemic.

It may be worth marketing existing facilities to current students if there were meaningful impacts on retention. Indeed, Zegre et al. (2022) find that students who use on-campus recreational facilities are between 7 and 8 percentage points more likely to stay enrolled relative to their non-user counterparts. A large amount of research has investigated how to increase retention but it is unclear the degree to which institutions follow that guidance. For example, research has shown that living on campus increases student outcomes, but the estimated magnitude varies (e.g., Schudde (2011); Reynolds (2020)).[3]

Most strategies for tackling retention and completion require resources which will be in short supply. Resource constraints might incentivize problematic solutions like grade inflation and lowering standards. This would increase the number of students continuing at the institution but at the cost of education quality. In fact, there is evidence that grade inflation has increased over time (Denning et al., 2022), that students are spending less time engaging with their education (Babcock and Marks, 2011), and grade inflation appeared to jump during the pandemic as institutions attempted to help students (e.g., Harris and Reynolds (2024)).

Finally, institutions could attempt to reduce expenditures by reducing administration, capital expenditures, instructional staff or other employees. There are tradeoffs with these approaches. Reducing capital expenditures would run contrary to the idea above that investing in amenities may help students. Reducing other university staff is frequently done - but at the bottom of the payroll so the cost savings are small (and the opportunity costs of not having these employees could be large). Administrative costs can be reduced by iden-

[3]Relatedly, a literature has demonstrated that peer effects through on-campus roommates can increase student outcomes in some contexts (e.g., Sacerdote (2001); Zimmerman (2003); Griffith and Rask (2014)). This may present a pathway for institutions to improve student outcomes if strategic pairing occurs at the university-level.

tifying efficiencies and eliminating redundancies in organizational structure. This often has large cost savings because these are highly paid positions - but the same administrators may be the ones deciding on cuts and may not have an unbiased view of the tradeoffs. While statewide consolidation efforts can reduce costs (Russell, 2019), they require coordinated state action.

Program elimination and faculty reduction present complex tradeoffs. Targeting low-enrollment programs may overlook other measures of "value", such as employment outcomes, program quality or institutional importance. Unfortunately, "data-driven" decisions move the conversation from normative questions about educational purpose to more narrowly-defined criteria where weight is placed on specific metrics (Michael Brown and Steigleder, 2023). Additionally, program eliminations may increase conflict between faculty and administrators about institutional goals (Vican et al., 2020) as well as competition among various subgroups at the institution (Gumport, 1993). These eliminations often lack transparency and thus increase uncertainty (Donoff and Rosser, 2016). Pavlov and Katsamakas (2020) evaluate the feasibility of cost-cutting through the reduction of faculty in their model, finding that institutions still run operational deficits, thereby making it impractical as a long-term solution. This is consistent with other evidence that institutions are already cost-efficient (Titus et al., 2017), and undergraduate education appears to have economies of scale so reductions in students will tend to make average costs increase.

Conzelmann (2024) documents the increased diversity of undergraduate majors over time and the results reveal another tradeoff with program elimination. Increases in the number of majors has increased instructional costs without increasing enrollment. Instead, this diversity has primarily reallocated existing students into different programs within institutions - "new" programs do not seem to help as a recruitment strategy. This would suggest that eliminating programs - or consolidating related programs - could reduce costs. However, the paper also demonstrates that diversity of majors has increased graduation rates so program elimination may lower student success, negatively impacting both students and university revenues.

In short, institutions face limited viable options for addressing the enrollment cliff. Some strategies above may apply to specific schools and therefore decision-makers can attempt to minimize the coming problems by adjusting specific margins. However, the sector-wide response may ultimately devolve into a war of attrition, where institutions benefit primarily from competitors' cutbacks or closures.

3 Methods

3.1 Data

Most of this analysis uses data collected from the Integrated Postsecondary Education Data System (IPEDS) which gathers data on all institutions of higher education in the United States that receive federal aid. While IPEDS data goes back to the 1980's, not all variables have been collected consistently over time. For example, expenditures on salaries for instructors has been collected since the 1980s but salary expenditures on non-instructional staff has only been collected since 2012. The most current data available is 2022. We will focus on the data from 2012 -2022 allowing us to document changes both before and after the enrollment cliff had been identified. Throughout the paper, nominal dollar values are converted into real 2023 dollars using the consumer price index (CPI).

We make use of the Urban Institute's Education Data Portal (Urban Institute, 2024) API which allows us to download data using the *educationdata* package in R. Some newer years of data are not available yet in that system so we downloaded individual files from IPEDS (U.S. Department of Education, National Center for Education Statistics, 2024b). There are data missing for some variables in the 2022 file, as well as missing data from 2021 which schools did not report.

We will also use two additional data sources. First, to get information about the enrollment cliff in Ohio, we use data from the Common Core of Data (U.S. Department of Education, National Center for Education Statistics, 2024a). This allows us to measure the size of the K-12 public school population in Ohio. Like IPEDS, we access this data using

the Urban Institute's Education Data Portal. For some specific analyses, we will rely on public data on university employees and salaries. We access that data from the database maintained by the Buckeye Institute (Buckeye Institute, 2024).

3.2 State Higher Education Context and Patterns

Before looking at individual institutional data, we first describe the trends in higher education in Ohio from 2012 to 2022 (based on the institutions in our analysis).

The public higher education system in Ohio was essentially founded by 5 public institutions who, in 1938, created the Inter-University Council (IUC) of Ohio to advocate for and coordinate resources. One institution was OSU, which is the state flagship located in the middle of the state. It is by far the largest institution in Ohio. The other institutions were the "four corners" institutions, which are located in each corner of the state: Kent State in the northeast, OU in the southeast, MU in the southwest, and BGSU in the northwest. Over time, other institutions joined the council, but in 1963 coordinating authority was switched to the newly created Board of Regents with different goals. The current structure has diverged from this original setup. For example, while UC was not part of the original IUC it is now the second or third largest institution in the state (depending on whether regional campuses are included) and one of the most well-known outside the state of Ohio. Kent State has enrollments similar to UC while BGSU has smaller enrollments more similar to UT. Miami has historically attracted more out-of-state students compared to the other institutions.

Beyond those variations, the funding of public higher education in Ohio introduces other differences. On the simplest level, state appropriations are allocated per student (called State Support for Instruction (SSI)). The amounts are based on estimated costs of instruction, which vary by course type and broad categories of academic discipline. On top of that simple idea, however, is a complex set of additional considerations, many of which are performance-based. For example, in theory more money is allocated to an institution that has higher performance measures such as graduation rates. In practice, however, those

performance calculations are largely relative measures comparing institutions. For instance, an institution could see an increase in their graduation rate but lose appropriations if their increase is smaller than the rest of the institutions in the state. More significantly, this model adds a level of uncertainty about future funding that makes long-run planning difficult even if the state legislature makes no changes to the funding model and level in their biennial budgets.

Additionally, the state has introduced various limitations on the ability of institutions to increase revenue through tuition. Institutions are capped each year in how much they can increase tuition - usually 2 to 3% - and in recent years a tuition guarantee model was introduced where tuition can only be increased on new students; students are guaranteed the same rate of tuition during their time at the institutions. While in theory good for students, evidence suggests that tuition limits are less effective at raising graduation rates compared to increased spending on higher education Deming and Walters (2017). These variations in funding and limits on tuition mean that institutions may be positioned differently for the enrollment cliff.

The demographic problem in Ohio can be seen in Figure 1. The figure shows 2022 levels of enrollment across grades in the public K-12 system in Ohio from the Common Core of Data. The largest cohort is the 9th grade cohort, who are expected to graduate high school in spring of 2026. The 8th grade cohort is approximately 8% smaller and the cohorts remain smaller through the 1st grade. Even if these students graduate high school and attend college at the same rate as previous cohorts, this will represent a significant decline in college enrollment. This decline will begin in the fall of 2026 and continue to be lower than current levels until at least the fall of 2033. The 2026 entering cohort will likely be around 8% smaller than the previous year, but the first-year cohort is only a fraction of the total students. In all likelihood, total enrollment will fall around 2-3% in Fall 2026, and then an additional 2-3% for the next 5 to 6 years.

[Figure 1 here]

Given this projected drop in enrollment, it is useful to examine how enrollment in

higher education has trended over time in Ohio. We will measure enrollment based on full-time equivalent (FTE) students. This measure includes all full-time students and then a fraction of part-time students (to reflect their lower course load). Since we are interested in the overall situation on these campuses, which includes the revenues and expenditures for all activities, we include both undergraduate and graduate students in the FTE measure. Panel A of Figure 2 shows that FTE across the institutions in the sample has fallen since 2012. Setting aside the enrollment cliff on the horizon, Ohio institutions are already seeing a downward trend in enrollment. Across these institutions there has been a slight increase in domestic out-of-state students; following an increase from 2012 to 2016 the number of international students shrank (see Appendix Figure A-1).[4]

Panel B shows the net revenue per FTE across institutions (total revenues per FTE [blue] - total expenditures per FTE [red]). Both real revenues and expenditures per FTE have increased over time and - so far at least - revenues have generally exceeded expenditures. Looking at Figure 3, the reason for that appears partly due to some growth in state support (Panel A: appropriations, grants, and contracts) per FTE over time (which may not hold in the future). However, net tuition and fees revenue [Panel B], a much larger source of revenue per FTE, began to decline in 2017 and was about 2.9% lower in 2022 compared to 2012. Appendix Figures A-2 and A-3 present longer time horizons of both charts. Most notably, FTE is currently higher than it was prior to 2012 while state support is significantly lower corresponding with an increase in tuition and fee revenue.

[Figure 2 here]

[Figure 3 here]

Lastly, we present IPEDS data about the distribution of employment and salary outlays for different categories of staff in Figure 4. The staff categories are presented in decreasing order of average salary and the chart shows the share of that category across institutions in terms of employment and salary outlays. Instructional staff are the largest category in

[4]Data on students by location of residence in IPEDS is only calculated for first-year undergraduate students and is only available until 2020. CSU and UT are excluded because they did not consistently report.

terms of both share of employees and total salary outlays, around 27% of employees and 36% of salary outlays.[5] These shares have decreased slightly (just over 1 percentage point) from 2012 to 2022. The next largest category of staff is management which are approximately 14% of employment and 20% of salary outlays.[6] Both of these shares appear to have increased slightly (just over 1 percentage point). Most of the remaining categories have seen either little change in their share (e.g., health care professionals) or declines (e.g., office and administrative support). The only category with a significant increase is "business and financial operations" which increased both the employment and salary share by approximately 3 percentage points.[7] Later, we will investigate variations across institutions for instruction (largest share), management (highest salary, second highest outlays) and "business and financial operations" (most significant increase in shares).

[Figure 4 here]

4 Results

4.1 Full-time equivalent enrollment

We first look at enrollment trends during the time period. With this, we can understand differences in size across institutions and see where enrollment is trending leading into the enrollment cliff.

[Figure 5 here]

Figure 5 presents two versions of the FTE trends. The top panel (A) presents the overall levels of FTE. The bottom panel (B) presents the index value which is calculated as $\frac{FTE_{jt}}{FTE_{j2012}} \times 100$ which is the number of FTE students at institution j at time t ($FTE_{,t}$) divided

[5]IPEDS definition: "Instructional Staff- An occupational category that consists of the following two functions: 1) "Instruction" only and 2) "Instruction combined with research and/or public service." Does not include medical staff.

[6]In IPEDS reports: "Management function should include those staff whose job it is to plan, direct, or coordinate policies, programs, and may include some supervision of other workers. In addition, Postsecondary Deans should be classified in this category as well, even though they perform similar activities to the workers that they supervise."

[7]In IPEDS "An occupational category based on the major group in the 2010 Standard Occupational Classification (SOC) Manual called "Business and Financial Operations Occupations." The SOC data can be found here: https://www.bls.gov/soc/2010/2010_major_groups.htm#13-0000.

by the number of FTE students at the same institution j in 2012 and then multiplied by 100. So the value in 2012 is 100 for all institutions and then future values can be interpreted as percentage changes relative to that starting point.

Ohio State is a clear outlier with the highest enrollment, but that enrollment is the same in 2022 as 2012. Cincinnati had the second largest enrollment in 2012, but they have also experienced the largest percentage growth, with 2022 FTE about 20% higher on their main campus compared to 2012. Maimi has also experienced growth, with FTE about 9% higher in 2022 than 2012 (although they started from the second lowest position). The other institutions all have lower enrollment in 2022 than 2012. Bowling Green's enrollment has been more stable than that of KSU and OU, both of which closely mirror each other in terms of both levels and changes. Both institutions experienced an increase in FTE until 2016/2017, after which FTE decreased with KSU's FTE in 2022 about 10% less than 2012 and OU's FTE in 2022 about 15% less.

4.2 Net revenue

Next, we plot the trends in net revenue per FTE in Figure 6. There is also variation here across institutions and across time. Overall, OSU had the largest net revenue in most years, and the gap to the next school could be quite large. Several schools have seen negative net revenue (e.g., KSU and OU in 2018 and 2019) but UT has had the most number of years at a negative. However, starting in 2019 their net revenue per FTE became positive and generally larger than other institutions. Most institutions in 2022 finished at relatively low levels of net revenues.

[Figure 6 here]

4.3 Revenue sources

The two largest sources of revenues for these institutions are tuition and fees and state appropriations. When considering tuition and fees, it is important to not just look at published tuition and fees as students often receive institutional aid in the form of grants or

discounts. Institutions can lower the cost of attendance using that institutional aid, which may increase attendance but at a lower average net revenue. Thus, we focus on the net tuition and fee enrollment per FTE. We similarly measure state appropriations, grants and contracts per FTE.

[Figure 7 here]

The top panel shows a wide range of state appropriations, grants and contracts per FTE across these campuses. OSU has the highest while MU has the lowest. Since MU educates a smaller proportion of in-state students compared to other institutions, this lowers their state support under the funding model. Unsurprisingly, MU has relied more on tuition and fee revenue (bottom panel). Miami followed by OSU earn the most revenue per FTE from this source, and the difference in levels between MU (the highest) and BGSU (the lowest) is about $8,000 per FTE. However, that gap begins to shrink starting around 2017; by 2022, MU is earning about $5,000 more than BGSU. This is mostly due to declines for MU which has been increasing the discounts on tuition - particularly after 2018 (Appendix Figure A-4). Essentially, their revenue model looks more like private institutions and many of those have had to increase discounts to maintain enrollments (Behaunek and Gansemer-Topf, 2019). Bowling Green stayed stable, and OSU is in a slightly better position in 2022 than 2012, but all other institutions have seen declines.

4.4 Long term debt

Beyond net revenues, the fiscal health of an institution also depends on the debt it holds. While debt itself is not a bad thing, institutions need to be able to pay it off and so high debt burdens could add financial challenges to institutions when demographics shift. Figure 8 shows a wide range of debt per FTE over time. OSU has the highest debt per FTE and it has grown in percentage terms since 2012. UC and MU started with similar debt levels per FTE, but they have decreased since 2012. Among the remaining largest institutions, KSU has seen a decline in debt per FTE while OU has increased debt by almost 200%. BSU increased debt by an even larger percent by 2017 but has reduced that back down to around

200% higher than 2012. UA saw a small increase in debt but has since returned to 2012 levels, while CSU and UT both experienced declines in debt.

[Figure 8 here]

4.5 Salary outlays by staff category

We now switch to thinking about the evolution of salary outlays across the institutions. We focus on the highest two categories in Figure 4 - instructional and management - as well as "financial and business operations" which is the only category at the state level that saw increased shares of employment. While in theory institutions are instructed on how to assign numbers to different categories, in practice there can be variation across institutions in how staff are categorized. Strict comparisons across institutions must be interpreted cautiously. However, as long as institutions maintain the *same* categorization over time, the comparisons can still be useful. This appears to be the case for most institutions, except OU which in 2014 went through a process to reclassify staff (named Compensation 2014). This results in a very large change in management - particularly in percentage terms - beginning in 2015. However, the data following that change still provides short-term trends.

We begin with outlays (expenditures) for instructional salaries. Figure 9 shows the level of spending per FTE-student in the top panel and the index value over time per institution in the bottom panel. Several things are apparent. First, there has generally been an increase in instructional spending per FTE-student during the earlier part of the sample which is then followed by a decline in the later part of the sample. Second, there is large variation in instructional spending per FTE-student across the institutions.

Percentage-wise, the increase was largest at OU until 2019 at which point it returned to 2012 levels (index value close to 100). Expenditures per FTE changed the least over time at UC. Expenditures per FTE at KSU and BGSU State University have not seen the same decline in recent years as other institutions - although there is a hint of decrease beginning - so their instructional spending per FTE is about 10% higher in 2022 than 2012. However, while both institutions have seen similar percentage changes over time, the actual level of

spending per FTE-student is lower at KSU by about $1,000. In fact, KSU and OU have the lowest level of instructional spending at baseline and thus while the percentage increases may be large, the change in actual dollars is relatively small.

[Figure 9 here]

Next, we investigate salary outlays for management per FTE-student and present the trends in Figure 10. In terms of level of spending on management, OSU is the outlier spending almost twice as much as the next two institutions (KSU and UC). Ohio University is a clear outlier in terms of the percentage increase in this category, but that is primarily mechanical. Partly the percent increase is because they started at the lowest level of spending (a smaller denominator for the index) but mostly because of a reclassification of positions in 2014. However, while that means more jobs were classified as management it is not clear what the actual change in positions was – as such most years of the index are excluded from the chart because it dramatically affects the y-axis scale. Most of the institutions have seen relatively little percent change in management spending per FTE-student, except for KSU which has experienced about a 34% increase, or approximately an increase of $600 per FTE-student.

[Figure 10 here]

Finally, we compare two other categories of staff at the institutions. First, the outlays for business and financial operations staff (Figure 11) and those for "all other" staff (Figure 12). Most institutions have seen an increase in staff in business and financial operations, although the large percentage increase at BGSU and UC is - again - due to their low initial spending. Ohio State spends the most in this category (and experiences a large increase) followed by KSU, although the level dropped in 2020 such that spending is similar to MU and UC by 2022.

“All other” staff is a very broad category, but clear patterns are observed. Again, OSU spends much more per FTE-student than other institutions with KSU and BGSU the lowest. Most institutions show a sharp percentage decrease in this category in 2020, while MU and UC have experienced an overall decrease in spending in this aggregated staff category since

2012.

[Figure 11 here]

[Figure 12 here]

5 Discussion

The figures presented here show that institutions in Ohio are in very different financial, enrollment and staffing positions leading into the enrollment cliff. What should we expect in terms of how well each institution will weather the demographic changes?

Information about what Ohio universities are currently doing has begun to emerge and it follows a pattern seen across the country: suspending programs, merging programs and sunsetting programs (Gottsacker, 2024). UT is cutting/merging 48 programs, MU is considering cutting 18 programs, UA has announced workforce reductions (Unglesbee, 2024) and other schools in the state not in this study - public and private - have also announced cuts. These cuts tend to focus on low enrollment programs across the universities but are particularly felt in the humanities as is common across the country (Gottsacker (2024), Friedman (2024)). KSU has announced an initiative to merge academic colleges as a way of reducing costs instead of taking action on programs (Wiggins, 2024). What is true of all institutions, however, is that these actions appear to be addressing the current budget situations that have occurred partly due to *already* falling enrollment (Figure 5). While it is positive that institutions are addressing current budget shortfalls, it is not clear how well that prepares institutions for the larger demographic changes fast approaching.

Looking at outliers in the current data can serve as a useful starting point for conversation. On the one hand, OSU is the largest, most prominent institution in the state with a high level of net revenues over the time period and the strongest revenue streams (the highest state appropriations/grants/contracts and the second highest net tuition revenue). More than likely, OSU will experience a smaller percentage decrease in enrollment compared to other institutions as they may attract students away from the other institutions. Alter-

natively, the same percent decline in enrollment would be the largest *number* of students at OSU. A drop in enrollment at OSU is compounded by the high revenue per student from tuition and the state that the institution currently receives; a large decrease in students will have a large impact on institutional revenues.

This challenge of replacing students may matter because OSU also has the highest debt per FTE that needs to be serviced at some point. Lower revenues could make that challenging. Another possibility is that the state changes the funding model to help OSU - the flagship - but likely would not increase total state support. Instead, it would likely shift money at a cost to the other institutions. Furthermore, if higher education in Ohio has increasing returns-to-scale then a reduction of size will tend to make average costs rise. That would put further pressure on the institution. OSU has the highest salary outlays in all categories considered, but particularly management, "financial and business operations", and "all other staff". This could mean they have the ability to decrease labor costs in some categories, although there has already been a slight decrease in management.

Part of the reason that the staffing costs are so high at OSU is because of athletics (e.g., coaching salaries) and medicine (there is a hospital and a medical school). The IPEDS data does not provide a more complete of job subcategories or titles, but salaries are public information. We collected data on employees, job titles and salaries from the database maintained by the Buckeye Institute for 2022 for OSU. Of the 100 highest paid employees, 72 are associated with medicine and 12 are associated with athletics. Those activities may generate auxiliary revenues that cover the cost of staffing. Then again, UC also has a hospital and medical school and high-level sports but their salary outlays per student are not nearly as high. In fact, of the 500 highest-paid staff at any institution in our sample, 467 (93%) are associated with OSU.

In terms of management, the main campus of KSU is another outlier as it has seen the largest - and relatively steady - increase in management per student across institutions (ignoring the reclassification efforts of OU). While management per FTE is over 30% higher in 2022 compared to 2012, most other institutions have seen reductions in salary outlays in

this category. Furthermore, while all categories of staff have increased at KSU, the increase in management per FTE is larger than each of the other categories, and is the only category which has increased from pre-pandemic peaks.

Where did this growth come from? We again collected data on employees, job titles and salaries from the database maintained by the Buckeye Institute for 2012 and 2022. Unlike other staff categories, there are common positions in management with similar - but not identical - job titles across institutions. One challenge with this data is that job titles are imprecise. Some titles may have changed over time without a corresponding change in responsibilities or salary. Additionally, interim positions could be hard to identify. To reduce these problems, we combined categories of job titles to capture "similar" types of jobs.

We investigated the following categories: Sr VP/VP, Sr Assoc VP/Assoc VP, Assoc Provost, Asst VP, Dean, Sr Assoc Dean/Assoc Dean, Asst Dean, Exec Dir/Sr Dir/Dir, Assoc Dir, Asst Dir, and department chairs/school directors/academic program directors. To match the analysis above, we removed individuals classified as being on one of Kent's regional campuses. According to the data (see Figure A-5), the total number of employees across these categories increased from 244 to 294 from 2012 to 2022 while FTE actually decreased. Much of this increase in counts is due to Asst VP (1 to 8), Sr Assoc Dean/Assoc Dean (10 to 23), Asst Dean (11 to 16) and especially Exec Dir/Sr Dir/Dir (86 to 117). Other categories saw little change or small decreases (for example, department chairs/school directors/academic program directors which decreased by 4).

The corresponding total salaries across these positions increased from $36.9 million to $40.0 million, approximately a $3.13 million increase. Like the IPEDS data, the nominal dollars values in each year were converted to real 2023 dollars. The biggest increases in total salaries were $2 million for Sr Assoc Dean/Assoc Dean, $1.9 million for Exec Dir/Sr Dir/Dir, $0.9 million for Asst VP and $0.56 million for Dean. These totaled an increase of $5.1 million over this period which was then offset by decreases in some categories (e.g., -$0.78 million for Asst/Assoc Provost, -$0.77 million for department chairs/school direc-

tors/academic program directors).[8]

On the one hand, the data suggests that moving management levels back to the 2012 level would save a large amount of salary outlays. This may be feasible since FTE is lower in 2022 than it was in 2012, so even moving the management *numbers* back to 2012 levels will still be a higher ratio of employees to students than in 2012. Of course, doing this would affect some workings of the institution. For example, reducing the number of associate deans would likely shift workload to the deans and department chairs. On the other hand, unlike some directors, associate deans are often tenured faculty so eliminating these positions moves them back to faculty and does not, therefore, threaten their employment - nor does it remove their salaries entirely from university expenditures. It is also possible that the higher levels of management positions successfully improved important metrics for the university (e.g., retention, external funding). We do not have data to evaluate that possibility but - if true - then reducing management would potentially negatively affect these areas of performance.

Miami is also in a unique position within the state. As discussed, it has relied more on out-state students and high tuition and fee revenues (and relatively low state support). However, while enrollment is higher in 2022 than in 2012, there has been little growth since before the pandemic. This higher enrollment appears to be maintained by increasing tuition discounts (Appendix Figure A-4) which has led to falling net tuition and fees. This has not been offset by higher state support. Attracting more in-state students would likely increase state support but the high tuition levels relative to other institutions in the state may make that challenging.

6 Conclusion and Future Research

What can an examination of Ohio institutions of higher education tell us about the broader population of universities? During budgetary crises, institutions typically respond by in-

[8]Most of these positions are common and likely have not changed duties over time but some of the changes are due to changes in titles. We also calculated these changes for salary ranges - ignoring titles - and found some increase in total salaries at the top and bottom of the salary range (Appendix Figure A-6). This likely represents a combination of promotions (perhaps needed to retain talent) but also creation of new initiatives.

creasing revenue and/or decreasing spending. Previous literature points to two main approaches: revenue-based solutions (attracting new students, improving retention, and raising tuition) and spending reductions (cutting capital expenditures, staff, administration, faculty, and programs). Ohio's situation provides insight into conditions facing other states.

While the "enrollment cliff" is a nationwide problem, not every state will feel the effects equally. Grawe (2018) forecasts high school graduate numbers through 2032, with Ohio projected to decrease by at least 15% - placing it among the worst-affected states along with 11 others. Fifteen states show positive growth of at least 2.5%. Regarding college-going students specifically, Ohio again falls into the worst category, with 25 states expecting decreases of 15% or more. Only seven states project growth above 2.5%.[9]

If bringing in new residents cannot feasibly make up for the enrollment cliff, then institutions could attract students in from out-of-state, from competitors by showcasing their distinctive nature, appealing to adult learners or online preferences, or through "tuition resets". Evidence as to the effectiveness or long-term viability of these approaches is scant. There is also little to suggest that institutions can move the needle on retentions enough to improve revenues that way. While institutional collaboration might improve survival chances, Ohio's board of education governance structure provides little support for such strategies.

Raising tuition presents another challenge, as more than half of states, including Ohio, have implemented tuition freezes or limits. Increasing state support requires legislative action, making it dependent on political feasibility. State Higher Education Executive Officers Association data (2023) reveals wide variation in per-student appropriations, from Nevada's $3,134 to New Mexico's $24,222. Ohio ($7,406) falls well below the national average ($10,236), suggesting most states have more flexibility in this area.[10] However, like Ohio, the state funding model in any given state may not be designed to allocate funds equally across all FTE-students, but instead weighted by relative institutional characteristics. If

[9]Variability in enrollment drop-off levels and timing by state and metropolitan areas can be calculated using Grawe's HEDI projections datafile. That data can be found here: https://ngrawe.sites.carleton.edu/wp-content/uploads/2020/09/StatusQuo.xlsx.

[10]State Higher Education Finance: FY 2023: https://shef.sheeo.org/data-downloads/.

that is the case, state support becomes an unreliable factor in budgetary planning.

With limited revenue options, institutions increasingly turn to spending reductions. Nationwide, there is evidence that institutions are cutting/merging programs as a cost-saving approach. From small private universities to large public state flagships, institutions are eliminating undergraduate majors and graduate degrees that do not attract enough students in an effort to "right-size" their program offerings. This may be a way to effectively cut costs, since previous research has shown that increased majors lead to increased operating costs; unfortunately, cutting majors may also lead to lower graduation rates. In states where funding models reward better student outcomes, such cuts could trigger losses in state support. Ohio exemplifies this challenge, as its institutions compete against each other for state resources.

Accompanying program cuts are faculty layoffs and hiring freezes. While faculty are not alone in layoffs aimed at spending reduction, they are a focus of layoff plans taken across the US. Like programmatic cuts, many of those laid off are in humanities, fine arts and language programs. Staff layoffs have also been prevalent in the announced plans. As far as administrative management positions, some universities targeted by state legislation to reduce state support for "diversity, equity and inclusion" have cut offices and management positions that would have put them at risk. The University of Missouri in Columbia is a recent example, but institutions in many states - including Ohio - are in a similar position. While calls to reduce "administrative bloat" come from across the political spectrum, universities rarely evaluate administrative positions based on their impact on student experience and outcomes before making cuts. These reductions offer immediate financial relief but may not address long-term challenges.

The enrollment cliff is not a single-year problem; rather, it is a sudden shift into a new normal. Institutions will need to consider innovative ways to adapt, and they will need to act quickly. While some states' institutions have time to consider options, Ohio universities face worst-case scenarios across multiple dimensions: severe enrollment drops, lack of collaborative structures, tuition constraints, and limited state funding models that

favor certain public institutions over others. Ohio serves as both a warning sign and baseline for tracking enrollment cliff effects.

Future research should examine the diversity of university characteristics and responses to enrollment declines. Key areas include the net impact of program elimination, the role of local competition in institutional adaptation, and the influence of state-level funding schemes on universities' capacity to weather these challenges. Public universities in states with generous, evenly distributed support may fare better, though flagship institutions with limited local competition and preferential funding might prove most resilient. In the wake of these changes that take place, future work should certainly examine the extent to which already marginalized populations of students - and faculty - are differentially affected.

References

Aliprantis, D., Carroll, D. R., and Reynolds, C. L. (2024). The nonequivalence of college equivalents. *working paper*.

Altindag, D. T., Filiz, E. S., and Tekin, E. (2021). Is online education working? Working Paper 29113.

Aucejo, E. M., French, J., and Zafar, B. (2023). Estimating students' valuation for college experiences. *Journal of Public Economics*, 224:104926.

Babcock, P. and Marks, M. (2011). The Falling Time Cost of College: Evidence from Half a Century of Time Use Data. *The Review of Economics and Statistics*, 93(2):468–478.

Behaunek, L. and Gansemer-Topf, A. M. (2019). Tuition discounting at small, private, baccalaureate institutions: Reaching a point of no return?. *Journal of Student Financial Aid*, 48(3):3.

Bound, J. and Turner, S. (2007). Cohort crowding: How resources affect collegiate attainment. *Journal of Public Economics*, 91(5):877–899.

Buckeye Institute (2024). Higher ed salary database. Retrieved from the Buckeye Institute website.

Conzelmann, J. (2024). The diversification of baccalaureate education. *manuscript*.

Dee, T. S. (2024). Higher chronic absenteeism threatens academic recovery from the covid-19 pandemic. *Proceedings of the National Academy of Sciences*, 121(3):e2312249121.

Delaney, T. and Marcotte, D. E. (2024). The cost of public higher education and college enrollment. *The Journal of Higher Education*, 95(4):496–525.

Deming, D. J. and Walters, C. R. (2017). The impact of price caps and spending cuts on u.s. postsecondary attainment. Working Paper 23736, National Bureau of Economic Research.

Denning, J. T., Eide, E. R., Mumford, K. J., Patterson, R. W., and Warnick, M. (2022). Why have college completion rates increased? *American Economic Journal: Applied Economics*, 14(3):1–29.

Donoff, S. B. and Rosser, V. J. (2016). Closing up shop: Perspectives on the departmental/programmatic elimination experience. *The Journal of Higher Education*, 87(2):272–299.

Friedman, A. (2024). Another public flagship may cut dozens of majors. *The Chronicle of Higher Education*. Accessed on 11/8/2024.

Gottsacker, E. (2024). Ohio universities keep cutting programs — what's the deal? *Statehouse News Bureau*. Accessed on 10/25/2024.

Grawe, N. D. (2018). *Demographics and the demand for higher education*. JHU Press.

Grawe, N. D. (2021). *The agile college: How institutions successfully navigate demographic changes*. JHU Press.

Griffith, A. L. and Rask, K. N. (2014). Peer effects in higher education: A look at heterogeneous impacts. *Economics of Education Review*, 39:65–77.

Gumport, P. J. (1993). The contested terrain of academic program reduction. *The Journal of Higher Education*, 64(3):283–311.

Harris, T. F. and Reynolds, C. L. (2024). Covid-19 diagnoses and university student performance: evidence from linked administrative health and education data. *Empirical Economics*.

Jacob, B., McCall, B., and Stange, K. (2018). College as country club: Do colleges cater to students' preferences for consumption? *Journal of Labor Economics*, 36(2):309–348.

Jaquette, O. and 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.

Kelchen, R. J., Ritter, D., and Webber, D. A. (2024). Predicting college closures and financial distress. Working Paper 33216, National Bureau of Economic Research.

Michael Brown, S. S. and Steigleder, K. (2023). "may i contribute some data to the discussion?": Negotiating data politics through general education reform. *The Journal of Higher Education*, 94(7):851–895.

Nayga Jr, R. M., Liu, J., and Kassas, B. (2024). The looming demographic cliff: A wake-up call for the agricultural and applied economics profession. *American Journal of Agricultural Economics*, 106(2):468–484.

O'Malley, L., Story, V., and O'Sullivan, V. (2011). Marketing in a recession: retrench or invest? *Journal of Strategic Marketing*, 19(3):285–310.

Ortagus, J. C. and Yang, L. (2018). An examination of the influence of decreases in state appropriations on online enrollment at public universities. *Research in Higher Education*, 59(7):847–865.

Pavlov, O. V. and Katsamakas, E. (2020). Will colleges survive the storm of declining enrollments? a computational model. *PLOS ONE*, 15(8):1–29.

Pavlov, O. V. and Katsamakas, E. (2023). Tuition too high? blame competition. *Journal of Economic Behavior & Organization*, 213:409–431.

Phillips, C. H. and Jones, S. J. (2024). Strategic and tactical marketing strategies for regional public universities to address the enrollment cliff. *The Journal of Higher Education*, 0(0):1–25.

Reynolds, C. L. (2020). The effect of dormitory residence during college on student outcomes. *Journal of Human Capital*, 14(2):249–289.

Rosinger, K. O., Ortagus, J., Kelchen, R., Cassell, A., and Brown, L. C. (2022). New evidence on the evolution and landscape of performance funding for higher education. *The Journal of Higher Education*, 93(5):735–768.

Russell, L. (2019). Better outcomes without increased costs? effects of georgia's university system consolidations. *Economics of Education Review*, 68:122–135.

Sacerdote, B. (2001). Peer Effects with Random Assignment: Results for Dartmouth Roommates*. *The Quarterly Journal of Economics*, 116(2):681–704.

Salazar, K. G., Jaquette, O., and Han, C. (2021). Coming soon to a neighborhood near you? off-campus recruiting by public research universities. *American Educational Research Journal*, 58(6):1270–1314.

Schudde, L. T. (2011). The causal effect of campus residency on college student retention. *The Review of Higher Education*, 34(4):581–610.

Storey, N. and Zhang, Q. (2024). A meta-analysis of the impact of covid-19 on student achievement. *Educational Research Review*, 44:100624.

Titus, M. A., Vamosiu, A., and McClure, K. R. (2017). Are public master's institutions cost efficient? a stochastic frontier and spatial analysis. *Research in Higher Education*, 58(5):469–496.

Unglesbee, B. (2024). University of akron braces for workforce cuts. *Higher Ed Dive*. Accessed on 11/13/2024.

Urban Institute (2024). Education data portal (version 0.22.0). under ODC Attribution License. Accessed on [date accessed].

U.S. Department of Education, National Center for Education Statistics (2024a). Common core of data. Retrieved from the National Center for Education Statistics website.

U.S. Department of Education, National Center for Education Statistics (2024b). Integrated postsecondary education data system (ipeds). Retrieved from the National Center for Education Statistics website. Accessed on [date accessed].

Vican, S., Friedman, A., and Andreasen, R. (2020). Metrics, money, and managerialism: Faculty experiences of competing logics in higher education. *The Journal of Higher Education*, 91(1):139–164.

Ward, J. D. and Corral, D. (2023). Resetting prices: Estimating the effect of tuition reset policies on institutional finances and enrollment. *Research in Higher Education*, 64(6):862–892.

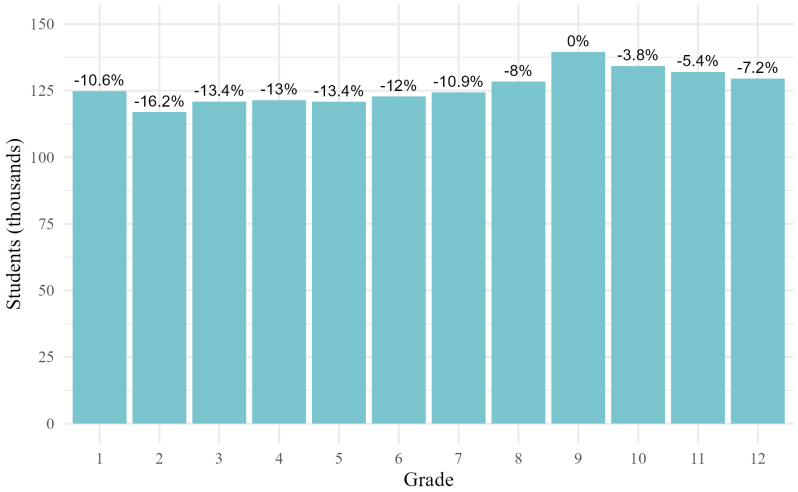
Wiggins, D. (2024). 'transformation 2028': Kent state considering 5 restructuring plans to cut costs, align academic programs for future. *WKYC*. Accessed on 10/24/2024.

Wright-Kim, J. (2023). The impact of offering baccalaureate degrees on institutional enrollment in community colleges. *Community College Review*, 51(1):3–29.

Zegre, S. J., Hughes, R. P., Darling, A. M., and Decker, C. R. (2022). The relationship between campus recreation facility use and retention for first-time undergraduate students. *Journal of College Student Retention: Research, Theory & Practice*, 24(2):421–447.

Zimmerman, D. J. (2003). Peer Effects in Academic Outcomes: Evidence from a Natural Experiment. *The Review of Economics and Statistics*, 85(1):9–23.

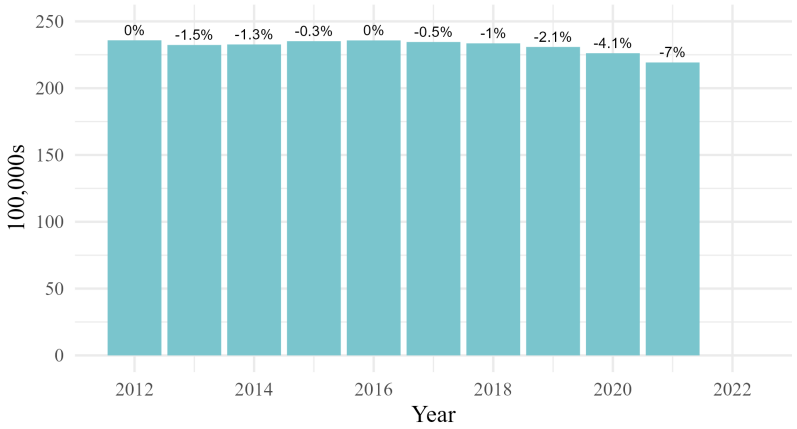
Figure 1: Total Enrollment by Grade in Public K-12 in Ohio in Fall 2022



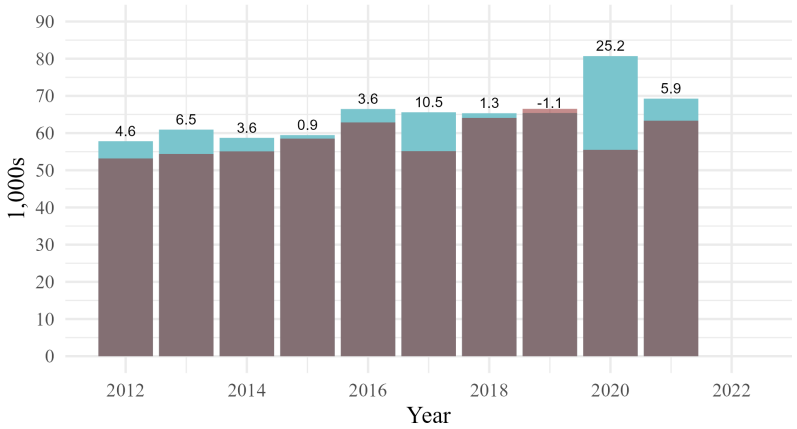
Note: Data is collected from the Common Core of Data.

Figure 2: Full-time equivalent enrollment and net revenues across institutions in Ohio

A. FTE



B. Net revenue per FTE

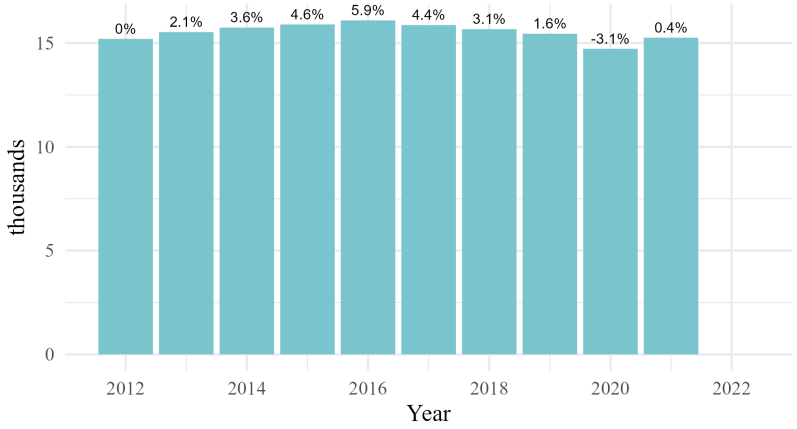


Note: Data is from IPEDS for the main campuses of the 9 universities in the study. Full-time equivalent (FTE) enrollment is measured for all students at these institutions. Panel B shows both total revenue [in blue] and total expenditures [in brown], with the resulting difference of net revenue per FTE. Revenues and expenditures are for the same institutions and are measured in real 2023$.

Figure 3: State support and net tuition and fees revenues across institutions in Ohio, per FTE

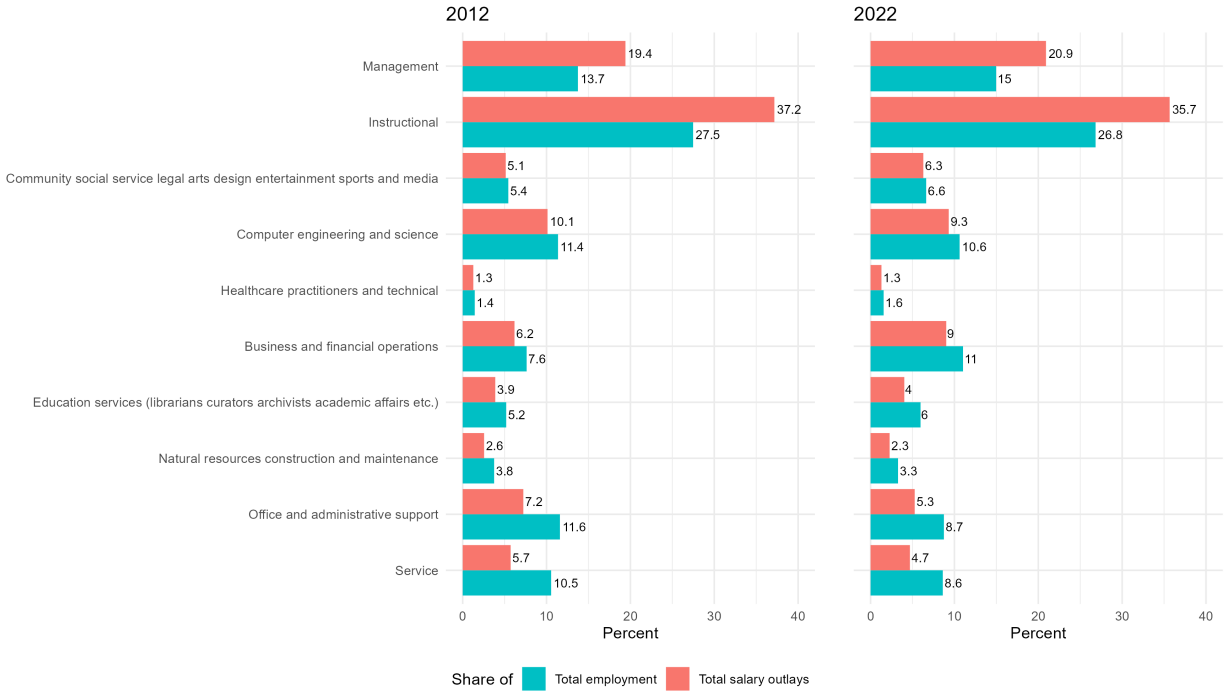
A. State appropriations, grants and contracts

B. Net tuition and fees



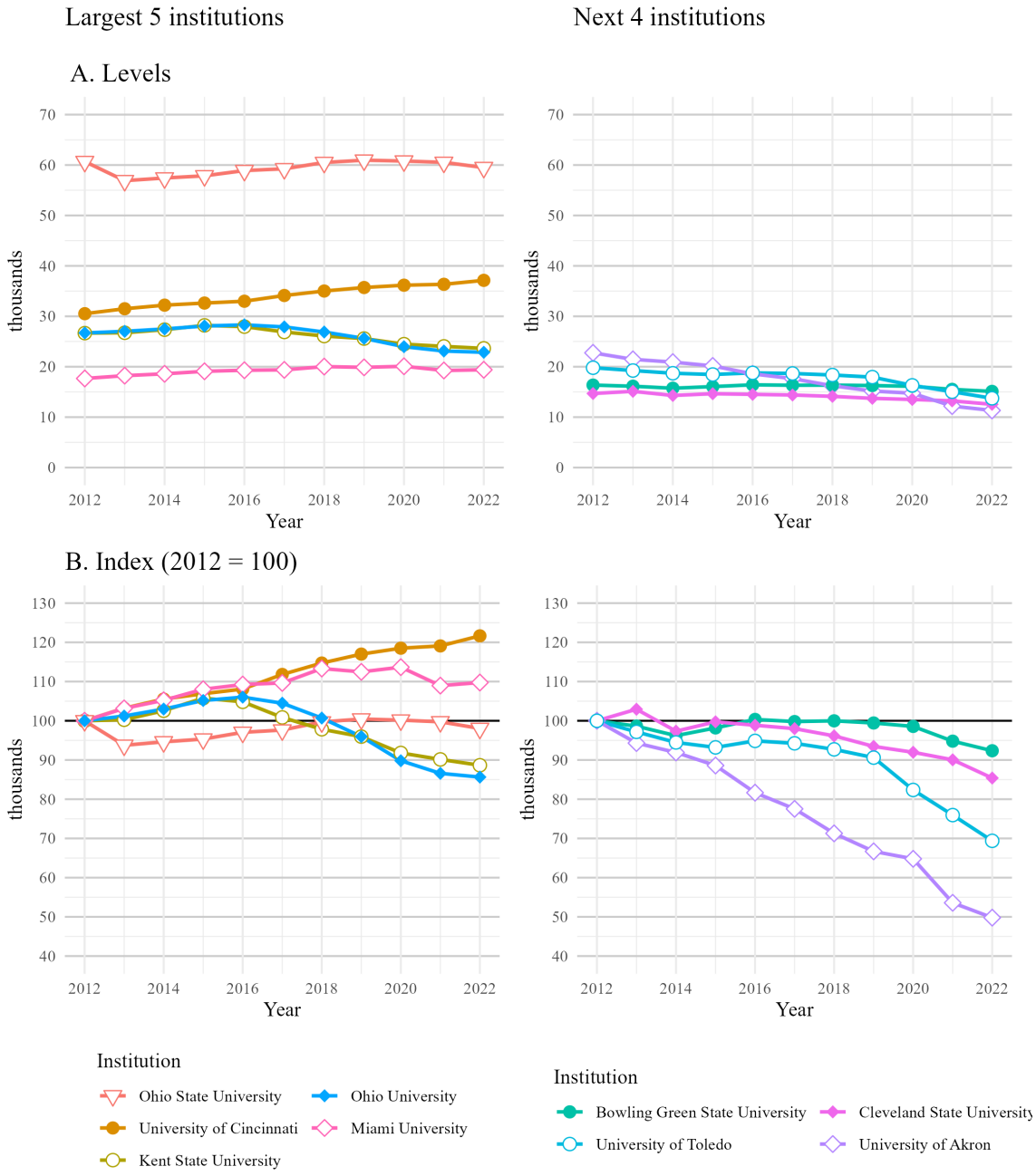
Note: Data is from IPEDS for the main campuses of the 9 universities in the study. Both revenue sources are presented per full-time equivalent (FTE) enrollment or all students at these institutions. Revenues and expenditures are for the same institutions and are measured in real 2023$. Net tuition and fees is the tuition and fee revenues minus any discounts or allowances.

Figure 4: Share of employment and salary outlays by staff category across institutions



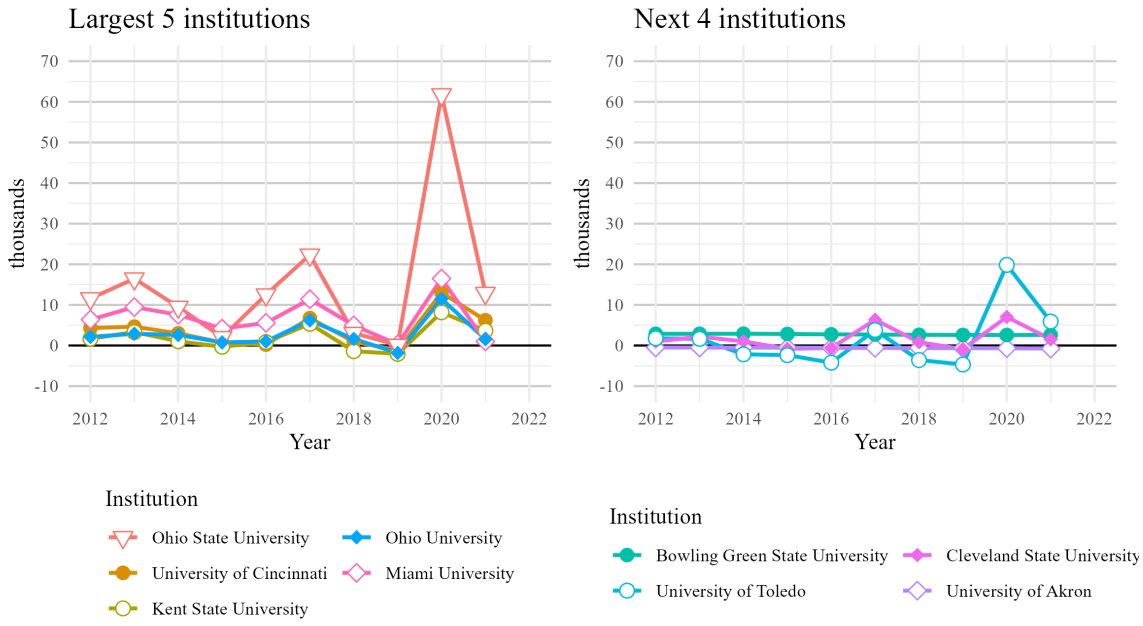
Note: Data is from IPEDS for the main campuses of the 9 universities in the study. Categories are presented in decreasing order of average salary. Categories with less than 1 percent of the employment or salary share are included in the calculated shares but excluded from the chart. Outlays are measured in real 2023%.

Figure 5: Index and Levels of Full-time Equivalent Students (FTE) Across Institutions



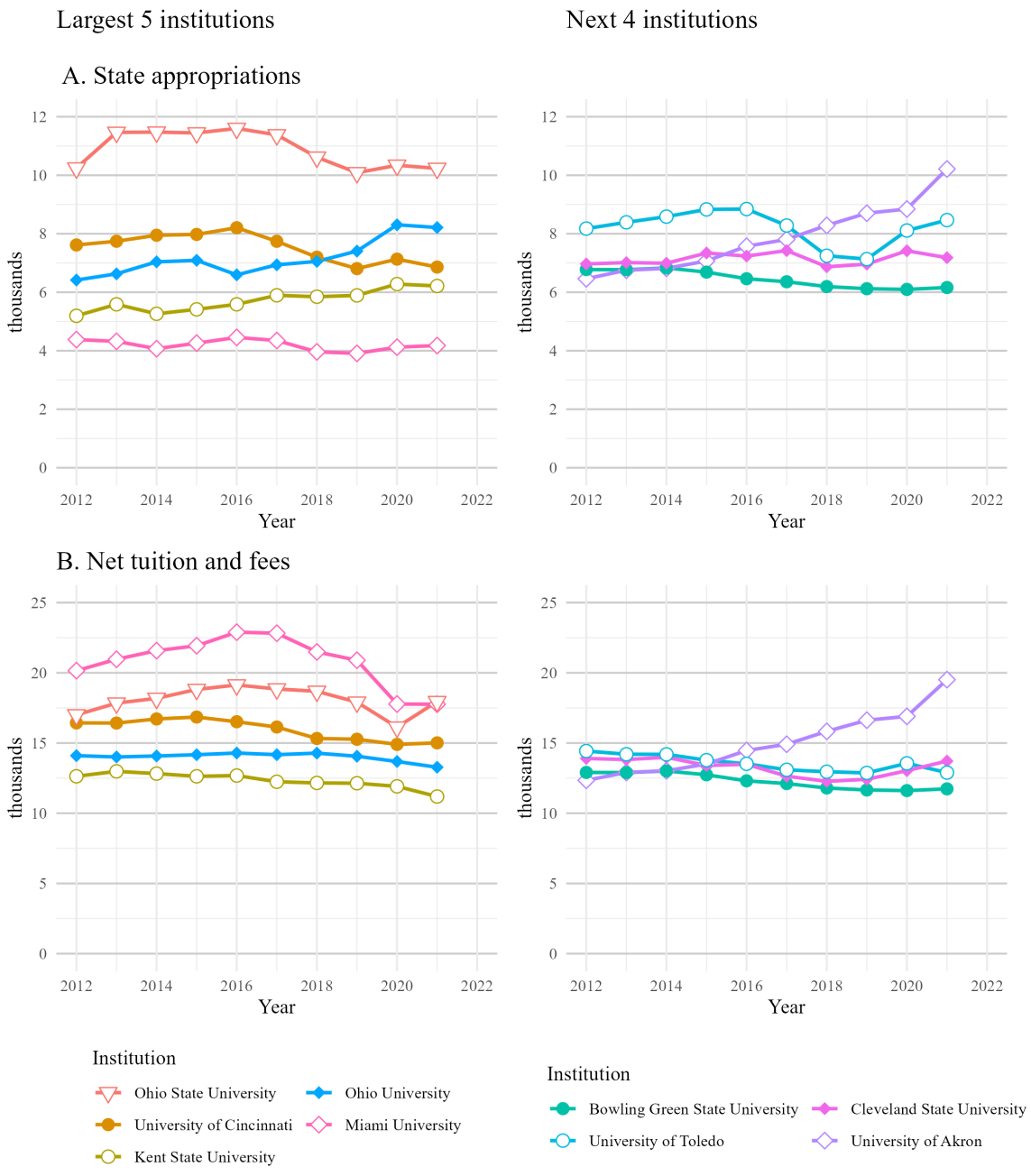
Note: Data is from IPEDS for the main campuses of the 9 universities in the study. FTE enrollment is calculated for all students at the university. The index values can be interpreted as percentage changes from 2012.

Figure 6: Net Revenue per FTE Across Institutions



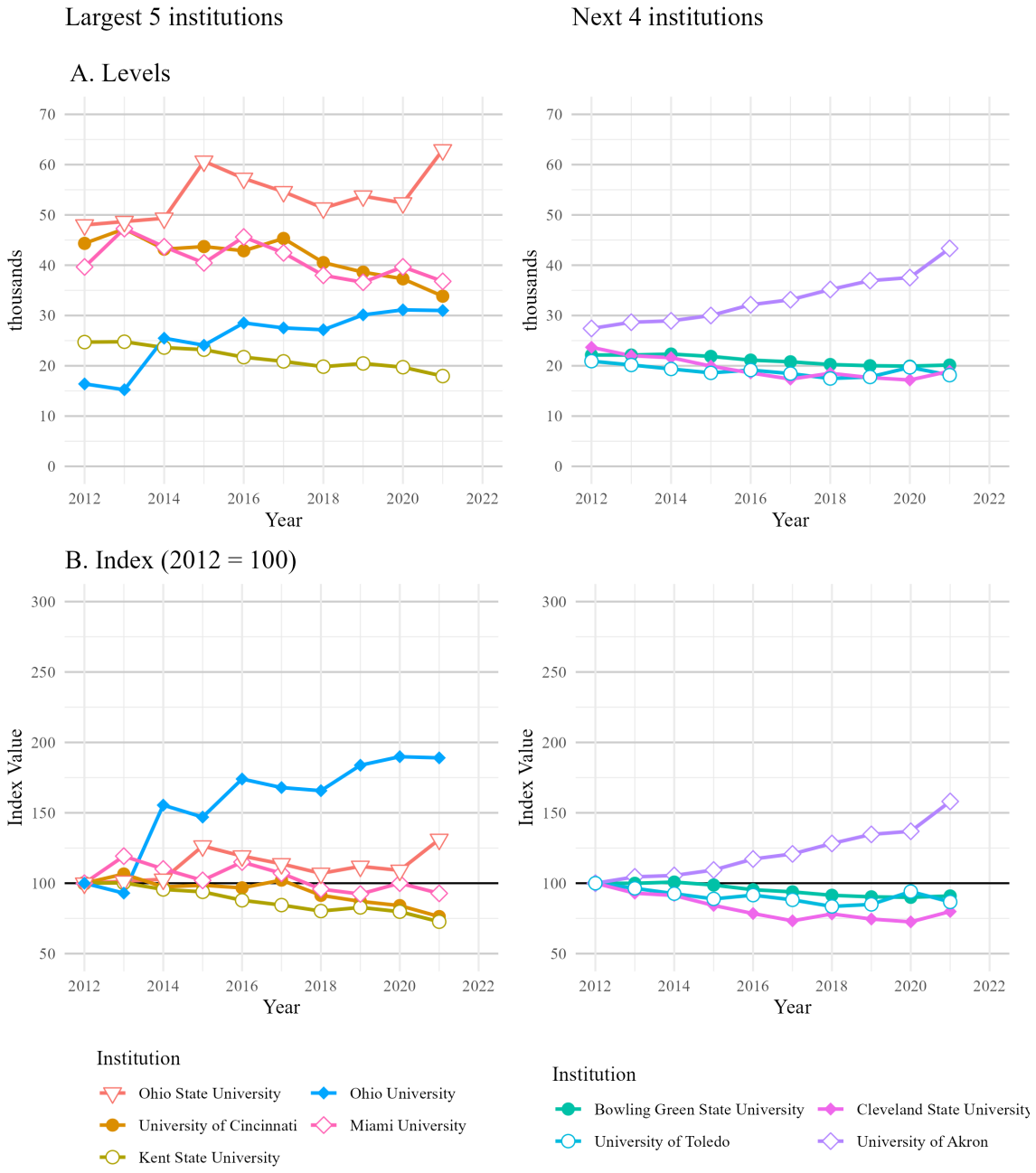
Note: Data is from IPEDS for the main campuses of the 9 universities in the study. FTE enrollment is calculated for all students at the university. Revenues are measured in real 2023$.

Figure 7: Net tuition and fee revenue and state appropriations, grants and contracts, per FTE



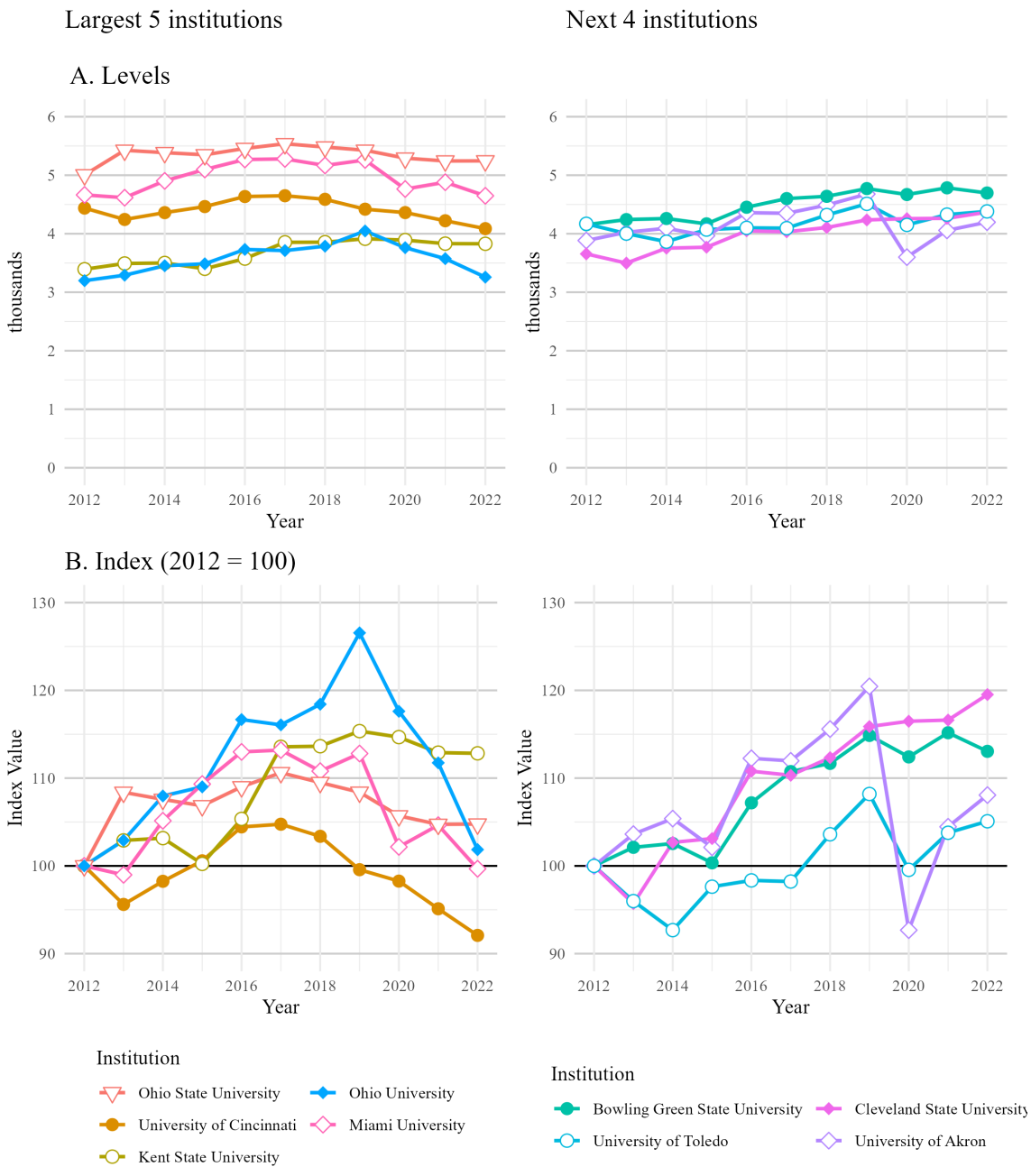
Note: Data is from IPEDS for the main campuses of the 9 universities in the study. FTE enrollment is calculated for all students at the university. State appropriations and tuition/fees are for the same institutions and are measured in real 2023$.

Figure 8: Long-term debt, per FTE



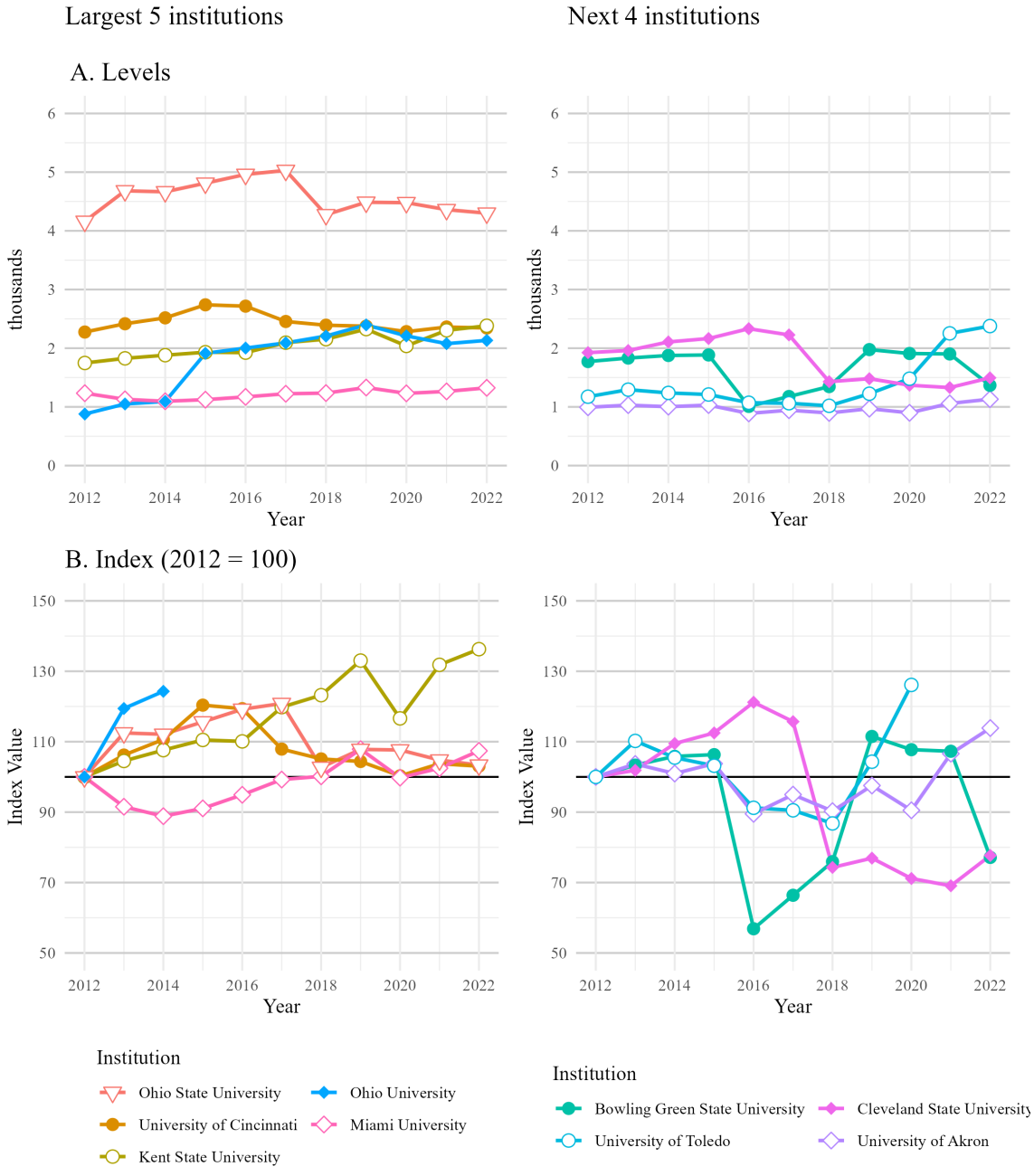
Note: Data is from IPEDS for the main campuses of the 9 universities in the study. FTE enrollment is calculated for all students at the university. Debt is measured in real 2023$.

Figure 9: Index and Levels of Instructional Outlays per Full-time Equivalent Students Across Institutions



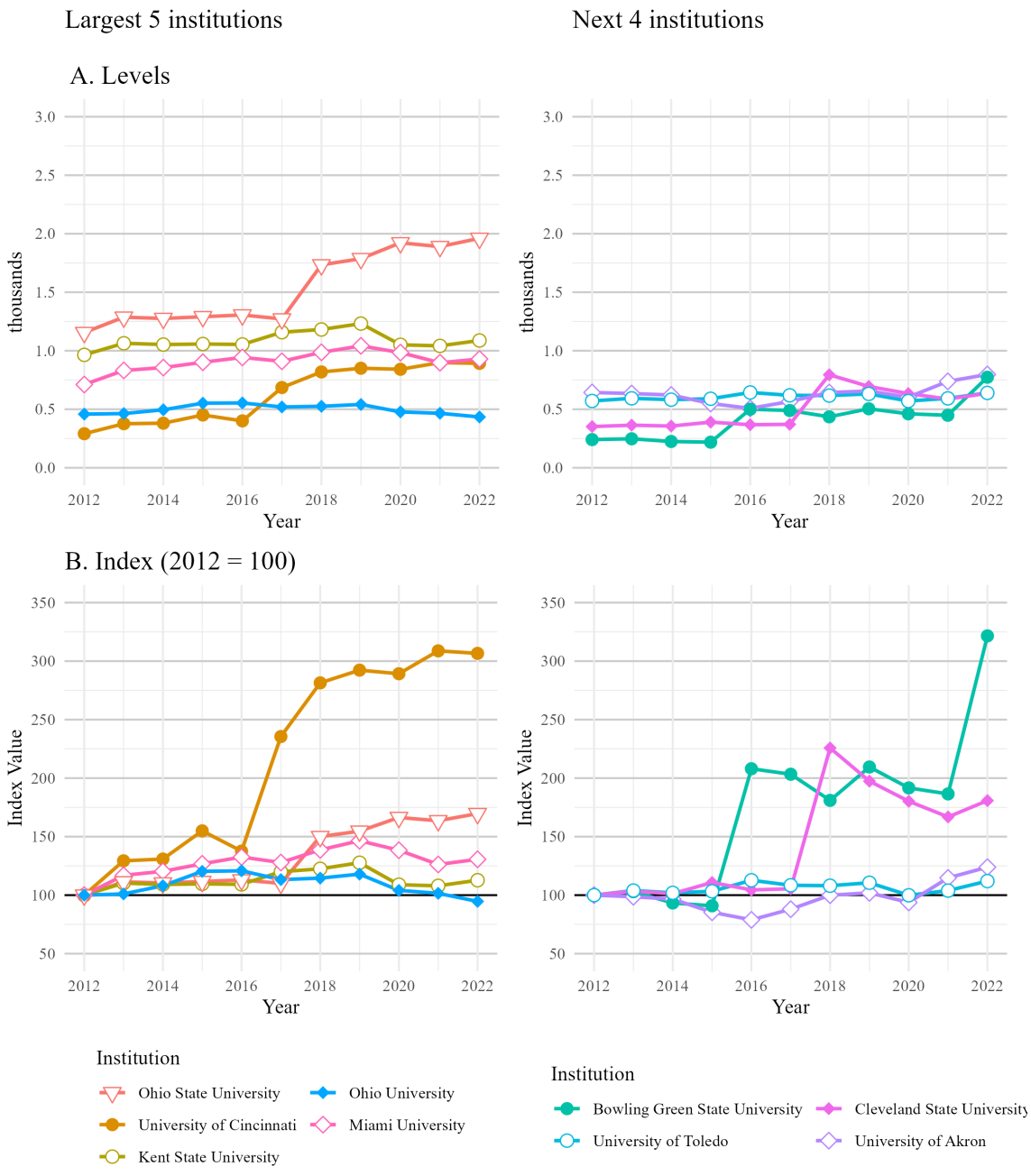
Note: Data is from IPEDS for the main campuses of the 9 universities in the study. FTE enrollment is calculated for all students at the university. Outlays are measured in real 2023$.

Figure 10: Index and Levels of Management Outlays per Full-time Equivalent Students Across Institutions



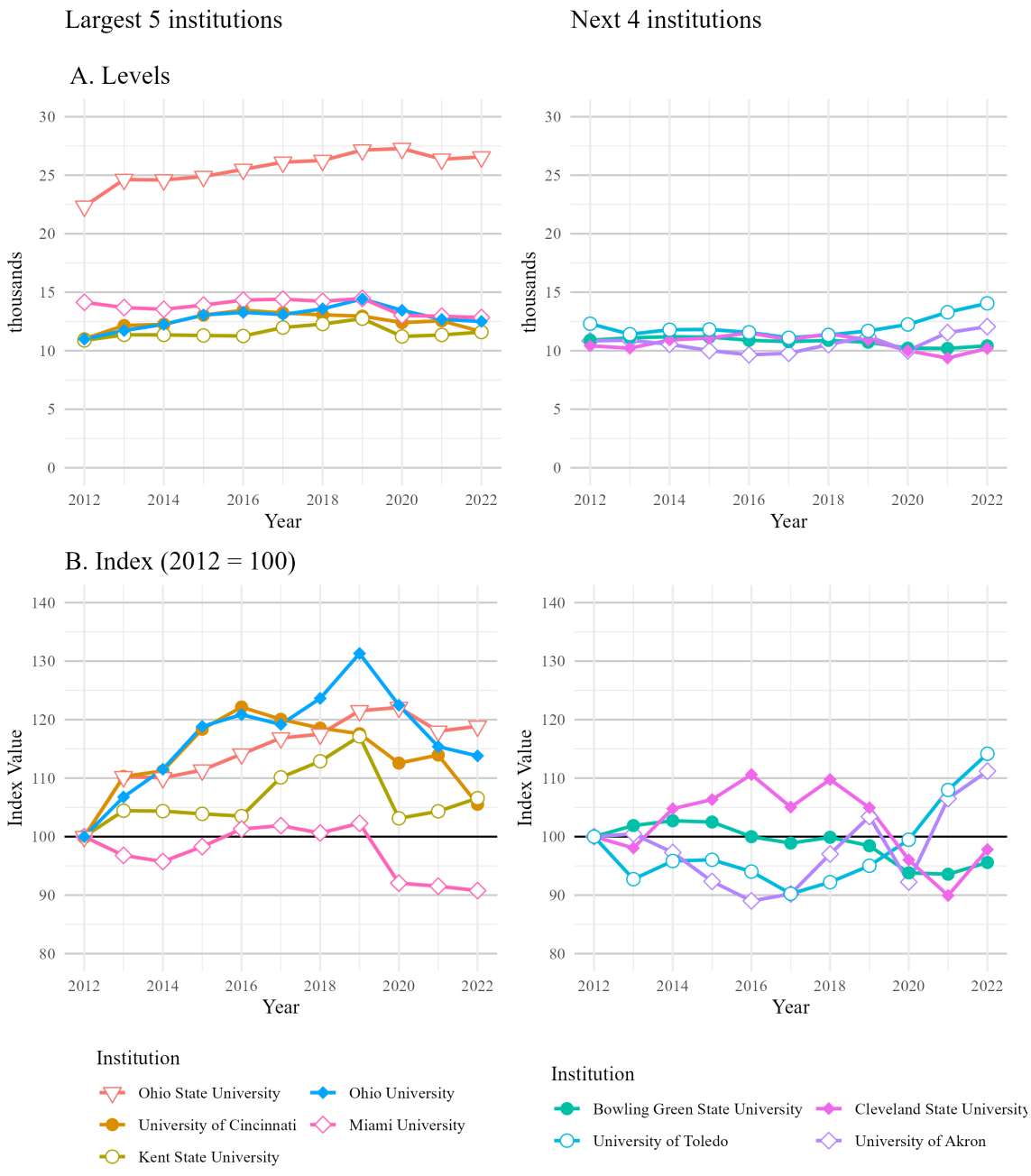
Note: Data is from IPEDS for the main campuses of the 9 universities in the study. FTE enrollment is calculated for all students at the university. Outlays are measured in real 2023$. Ohio University after 2014 is excluded from the index chart because the percentage increase dramatically extends the range of the y-axis but is due to a reclassification of positions and therefore a change in reporting (which can be seen in the level chart).

Figure 11: Index and Levels of Financial and Business Operation Outlays per Full-time Equivalent Students Across Institutions



Note: Data is from IPEDS for the main campuses of the 9 universities in the study. FTE enrollment is calculated for all students at the university. Outlays are measured in real 2023$.

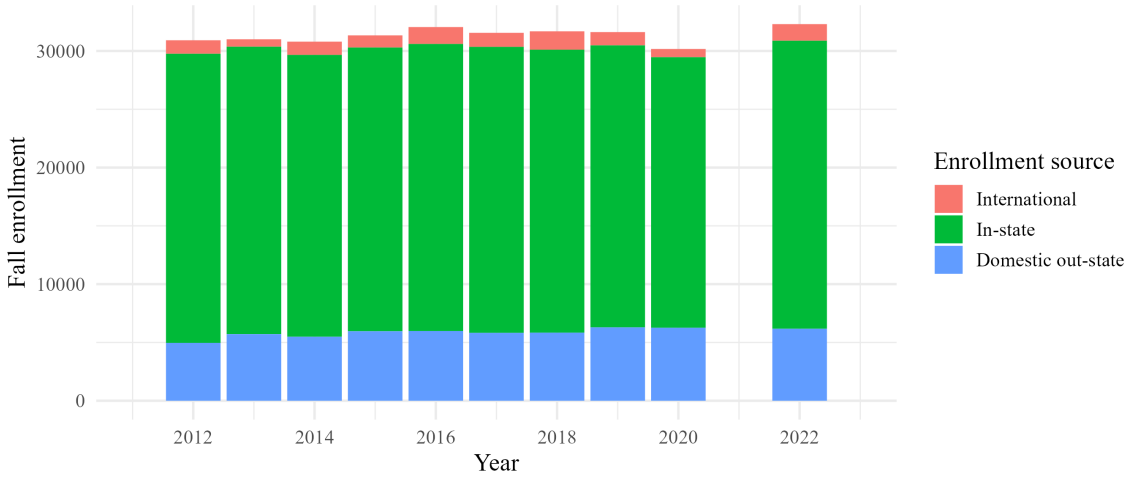
Figure 12: Index and Levels of Outlays per Full-time Equivalent Students for All Other Staff Across Institutions



Note: Data is from IPEDS for the main campuses of the 9 universities in the study. FTE enrollment is calculated for all students at the university. Outlays are measured in real 2023$.

A Additional Results not for Publication

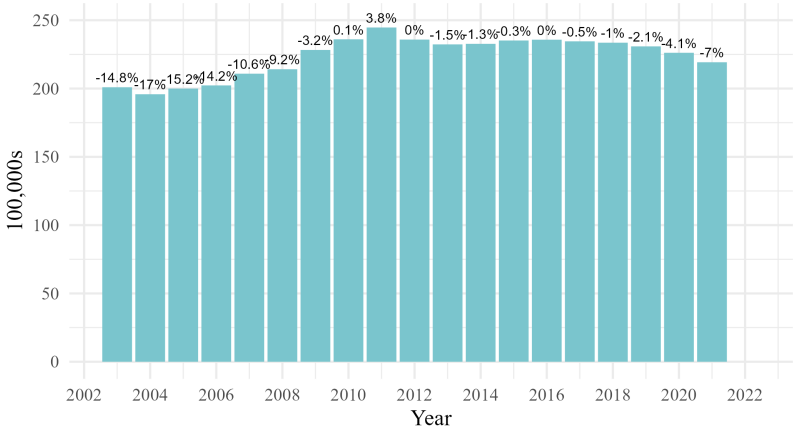
Figure A-1: First-year Fall Enrollment by Student Location



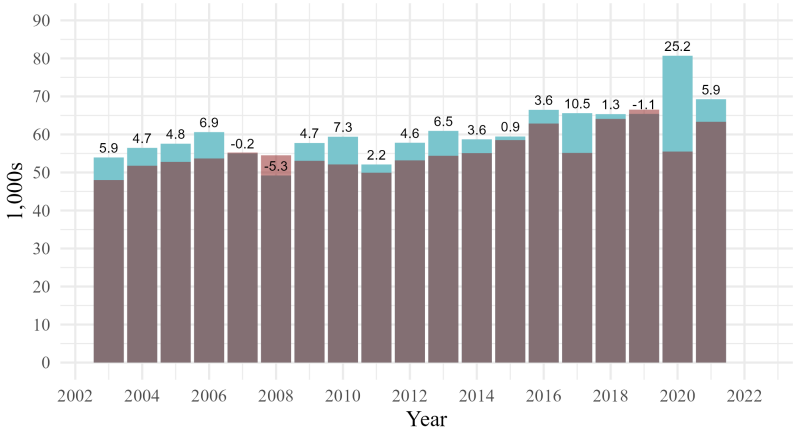
Note: Data is from IPEDS for the main campuses of the 7 universities in the study. UT and CSU are excluded because they did not consistently report data during the sample period. 2021 is removed as a number of institutions did not report.

Figure A-2: Full-time equivalent enrollment and net revenues across institutions in Ohio, 2003-2012

A. FTE



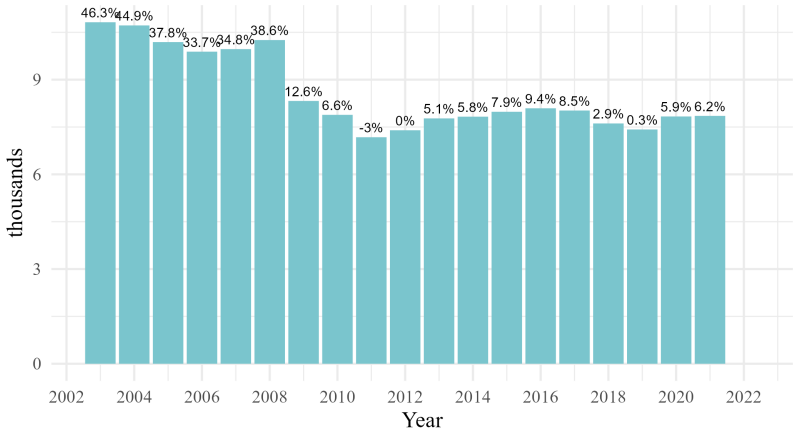
B. Net revenue per FTE



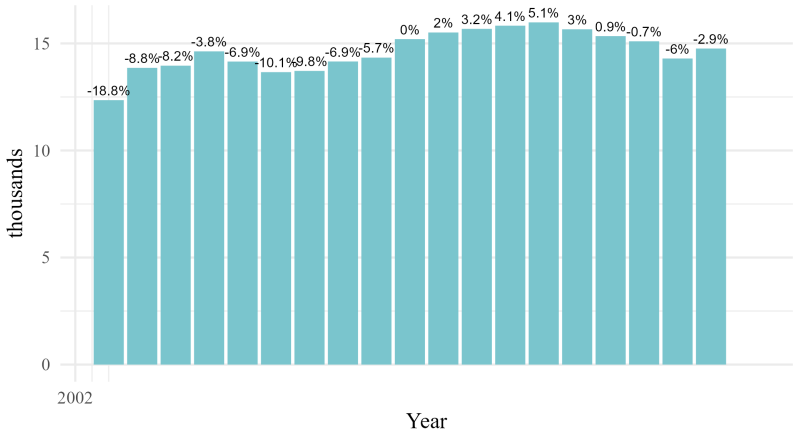
Note: Data is from IPEDS for the main campuses of the 9 universities in the study. Full-time equivalent (FTE) enrollment is measured for all students at these institutions. Panel B shows both total revenue [in blue] and total expenditures [in brown], with the resulting difference of net revenue per FTE. Revenues and expenditures are for the same institutions and are measured in real 2023$.

Figure A-3: State support and net tuition and fees revenues across institutions in Ohio, per FTE, 2003-2012

A. State appropriations, grants and contracts



B. Net tuition and fees



Note: Data is from IPEDS for the main campuses of the 9 universities in the study. Both revenue sources are presented per full-time equivalent (FTE) enrollment or all students at these institutions. Revenues and expenditures are for the same institutions and are measured in real 2023$. Net tuition and fees is the tuition and fee revenues minus any discounts or allowances.

Figure A-4: Tuition discount level per FTE and discount rate by institutions over time

Note: Data is from IPEDS for the main campuses of the 9 universities in the study. FTE enrollment is calculated for all students at the university. Tuition discounts are measured in real 2023$.

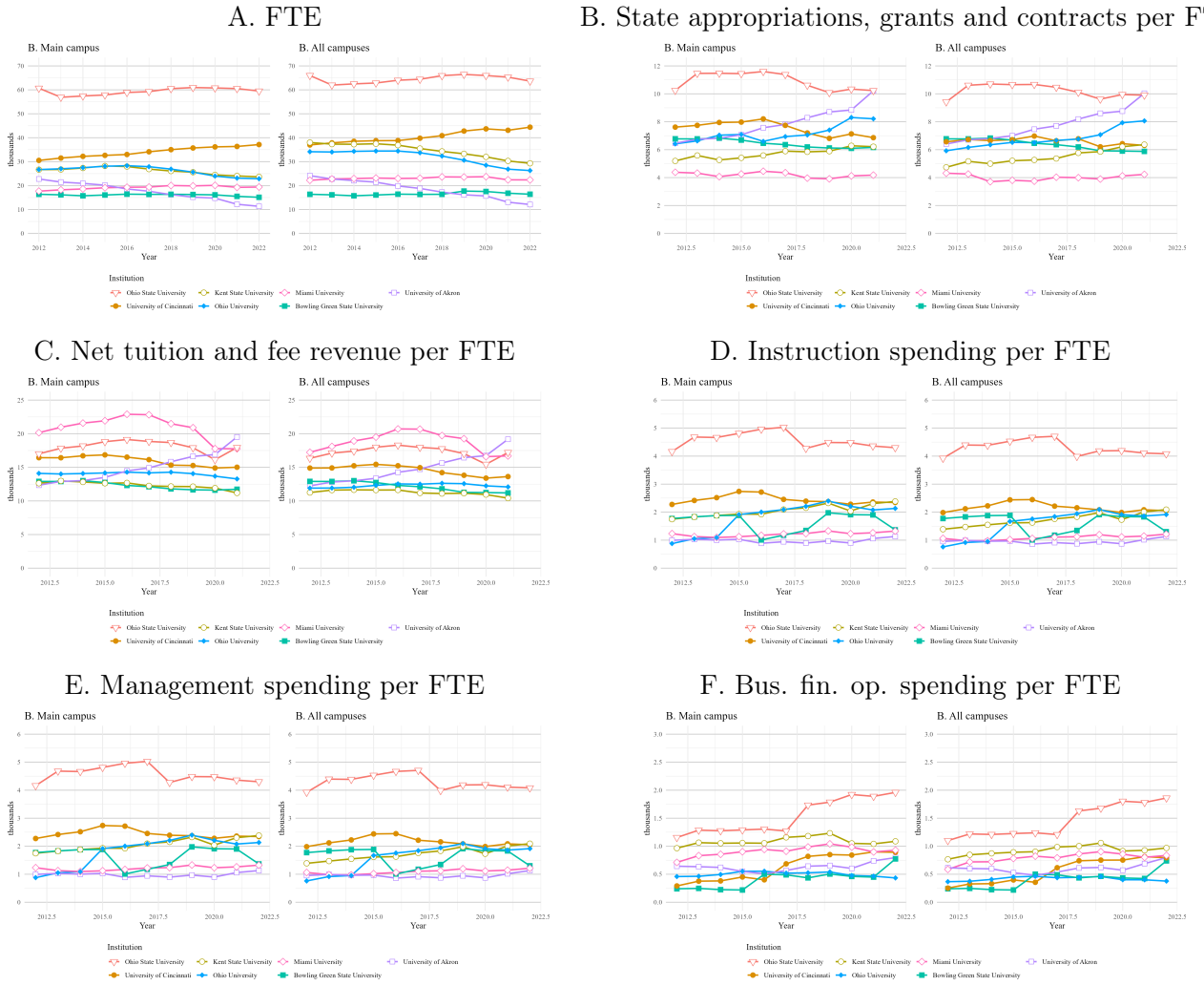
Figure A-5: Counts and Total Earnings of Selected Management Positions at Kent State (main campus)

Note: Data is collected from a database maintained by the Buckeye Institute. Parentheticals indicate combined categories. For example, (Sr) VP includes both Sr VP and VP while (Exec) Dir includes both Exec Dir and Dir. Earnings are measured in real 2023$.

Figure A-6: Counts and Total Earnings of Selected Management Positions at Kent State (main campus) by Salary Range

Note: Data is collected from a database maintained by the Buckeye Institute. Earnings are measured in real 2023$.

Figure A-7: Comparison of trends between the main campus and all campuses for the 6 institutions with multiple campuses



Note: Data is from IPEDS for the main campuses then all campuses of the 6 universities in the study with multiple campuses. Full-time equivalent (FTE) enrollment is measured for all students at these institutions. Revenues and expenditures are for the same institutions and are measured in real 2023$.