Abstract: State and local government decisions about how school funding is raised and allocated have profound impacts on American public education, and in recent years, some experts have warned of increases in one type of spending in particular: public pensions. Until this point, however, it has been difficult to assess how school districts’ pension costs have changed over time or how local and state governments have been responding. In this paper, I analyze a new dataset of the annual pension expenditures of approximately 200 unified school districts across the United States from 2005 to 2016. I find that pension expenditures rose in real terms in most of them, but also that there has been significant variation in that growth. Moreover, larger within-district pension expenditure growth is associated with 1) greater revenue growth in the subsequent year and 2) reductions in school district employment, mainly through reductions in the number of non-teaching staff. Finally, there is evidence that districts’ responses to rising pension costs depend on state political institutions, in particular whether the states have mandatory collective bargaining for teachers.

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In the last two years, debates about mask requirements, critical race theory, and remote instruction have put America’s local school boards in the national spotlight, but well before 2020 there was another challenge mounting for U.S. school districts: the cost of public employee pensions. The governing dilemmas generated by rising pension costs arise more gradually than those created by the Covid-19 crisis, and the politics of the issue tend to be less partisan, but the implications for public education nonetheless stand to be profound. Decisions about how school funding is raised and allocated are central to the goals of increasing student achievement and closing learning gaps. And as school districts struggle with the health, behavioral, and learning challenges of providing education during a pandemic—challenges that many argue need to be met with more resources and school staff—districts’ ability to address those needs is shaped by their financial capacity. School districts’ pension costs and financial health are therefore critically important issues even if they are not often covered in national news media. Examining the extent to which school districts’ pension costs are increasing and how districts have adjusted to any such changes is essential for understanding trends in American public education.

Until this point, it has been difficult to carry out a broad assessment of what pension costs look like in school districts across the country. There have been studies of school pensions, most of which paint a dire picture, but almost all of them examine a single district, a single point in time, or state-level data. For example, a Pew study of the School District of Philadelphia concludes that “the district is now paying more than it ever has into the retirement system” and that “the district now faces some tough budget decisions as a result” (Pew Charitable Trusts 2019, p. 1). Other research has examined trends in state spending on public education: for example, a report by Equable finds that “on a national level, the share of state education spending going to pay pension costs has nearly doubled from 7.5% in 2001 to 14.4% in 2018”
Kim, Koedel, and Xiang (2020) find that recent increases in state pension costs are associated with reduced spending on teacher salaries (see also McGee 2016). Still other studies examine multiple districts in a state at a point in time, such as one analysis of Maryland’s school districts in 2018, which concludes that district spending on teacher pensions exacerbates cross-district disparities in school funding (Marchitello 2019).¹

Yet studies of single districts cannot speak to how widespread any retirement cost increases have been. Studies of state spending cannot directly be used to assess what is happening in local school districts. And studies of a single year do not show how retirement costs have changed over time. Thus, while researchers and policy analysts have devoted attention to this issue in recent years, the resulting studies are not sufficient for evaluating whether there is a widespread pattern of rising school district retirement costs and, if there is, whether there are patterns to how school districts have adjusted.

The main reason for this is the absence of easily-accessible data on school districts’ pension contributions. While there are some excellent existing datasets on public pensions, they track features of state and large local pension plans (most notably, the Public Plans Database maintained by the Center for Retirement Research at Boston University). They therefore contain information about plan-level quantities such as funding ratios, actuarial assumptions, and investments, but not information about what local governments spend on pensions. To collect pension data at the level of school districts—most of which contribute to more than one pension plan on behalf of their employees—one has to collect data from the districts’ annual financial statements.

¹ In addition, a study of Connecticut (where the state pays all pension costs for teachers) finds that the state model of pension funding is highly inequitable across districts (Randazzo, Dowell, and Golos 2021). Another approach is to analyze trends in school districts’ total spending and spending on benefits. Using this approach, Marchitello (2018) finds that benefits spending nationwide has increased much more than total spending.
statements. Moreover, to evaluate how pension costs have changed within districts over time, one has to do that for multiple years. The difficulty and tediousness of this work is likely the reason analysts have so far focused on pension plans, state funding, single districts, or single points in time.

A 2019 Pivot Learning report is an exception in that it examines the finances of 98 school districts in California over a period of ten years and analyzes survey and interview data from school board presidents across the state. From their data on actual and projected pension expenditures, they find that district spending on CalSTRS (the state’s teacher pension plan) more than doubled through 2018 and grew as a share of total district budgets, from 3.8% to 6.4%. District spending on CalPERS (for non-teacher employees) grew as well. They also find that the share of district spending going to teacher salaries declined over the same time period. And their survey data show that some of the most commonly cited ways that California districts have responded to rising pension costs are deferring maintenance, increasing class sizes, and offering fewer enrichment classes like music and art. The authors’ conclusion is bleak. They write, “Today’s students are the ones who will experience fewer support services, fewer enrichment opportunities, and less individualized instruction—even as California’s students are more diverse in terms of background and need than ever before” (Pivot Learning 2019, p. 3).

That report stands out for its coverage of a large number of school districts and years as well as its direct investigation of the local-level consequences of rising pension costs, but more research on these questions is needed. Are school districts in states other than California having similar experiences? Is there a way to move the analysis beyond what district administrators say is happening to a more objective assessment of which budget categories are being most affected
by changes in pension costs? Moreover, can one be confident that concurrent trends in school finances are due to rising pension expenditures and not something else?

To answer these questions and to examine trends in school districts’ pension spending over time, I assembled a new dataset. I first collected the annual financial reports of more than 200 school districts across the United States for a period of twelve years, from 2005 to 2016. Then, using information in the reports, I built a dataset that tracks how much each district spent on each of its pension plans in each year. This dataset allows me to analyze trends in the pension spending of a large, diverse, national sample of school districts.

I also connect this pension dataset with annual data on school district staffing, enrollment, revenue, and expenditures from 2005 to 2017, available through the National Center for Education Statistics (NCES). By connecting these datasets, I am able to evaluate whether there are any patterns to how school districts (and states) have responded to any changes in their pension expenditures—specifically whether they have increased revenue, decreased staffing, or decreased spending in areas unrelated to employee compensation.

I find that in most of the school districts in my sample, inflation-adjusted pension expenditures did increase from 2005 to 2016—in some cases by large amounts. Moreover, in the vast majority of the districts, pension expenditures grew both as a share of general revenue and per full-time equivalent employee, demonstrating that the overall growth in pension expenditures is not simply a consequence of growing district budgets or district expansion. I also find that on average, rising pension expenditures are being met with both increases in revenue and staffing reductions. The dominant pattern, moreover, is that pension-induced staffing reductions are coming from non-teaching staff such as support staff rather than teachers. While I do not find a national trend of districts responding to pension cost increases by reducing spending on capital
projects, larger pension cost increases are associated with lower district spending on textbooks. Finally, there is evidence that districts’ responses to rising pension costs depend on state political institutions, in particular whether the states have mandatory collective bargaining for teachers.

**Background on pensions**

Nearly all of the 14 million people who work full-time for U.S. state and local government are eligible for a traditional pension, and school district employees are no different. In retirement, teachers and other K-12 public school employees who have vested in the system receive a defined benefit for as long as they live, equal to a fraction of their final average salary times the number of years they worked for the government. Most are enrolled in large, state-operated pension plans, typically one plan for teachers and another for other school employees, but the arrangement varies by state and district. Some school districts also participate in locally-administered plans, although this is less common for school districts than for cities and counties.

In principle, the model for funding pensions is straightforward: they are supposed to be prefunded, with government employers (here, school districts and the state) and employees (teachers and other school employees) setting aside funds to pay for the retirement benefits earned each year. However, well before 2020, most state and local pension funds did not have sufficient assets to cover the retirement benefits that had been promised. Two broad categories of state and local government decisions contributed to this shortfall. First, over the years officials have made pension benefits more generous (Koedel, Ni, and Podgursky 2014; DiSalvo 2015), such as by increasing the benefit formula’s multiplier or reducing the retirement age. Between 1999 and 2001 alone, 34 different states enacted a total of 97 new laws expanding pension benefits for public employees (Anzia and Moe 2017). These changes have had long-lasting
effects, because in many states, pension benefits can only be reduced for future hires—not for future years of work by current employees.

Second, state and local governments have consistently underfunded their pensions, setting aside too little money to pay for the benefits they have promised. The decline in asset values brought by the Great Recession played a large role in decreasing pension funding ratios (Munnell, Aubry, and Cafarelli 2015), but so did many different kinds of decisions by policymakers, including adopting unrealistic actuarial assumptions that make pension liabilities look smaller and keep contributions low (see, e.g., Novy-Marx and Rauh 2011; Aldeman 2020), failure to pay the amounts required for full funding (Anzia and Moe 2019), and politically-motivated investment decisions (Andonov, Hochberg, and Rauh 2018).

School district pension expenditures data

School districts may be feeling the consequences of these past decisions in the form of rising pension expenditures—both to pay for the larger benefits enacted in the past, and to make up for the growing funding shortfalls (Doherty, Jacobs, and Lueken 2017). But how extensive and widespread are any such changes? To better understand how pension costs have changed in school districts across the United States, I set out to collect the annual financial reports of a large, diverse set of school districts—reports that detail what the governments contributed to each of their employee retirement plans in each year.

Even collecting and acquiring information from school district financial reports is difficult, however. The reports can be hard to locate, especially for smaller districts and for years in the more distant past. Once the reports are in hand, moreover, it takes time to find the relevant information and interpret it. Most of these documents are long, and local governments are not always clear and consistent in the way they report their pension contributions. Thus, collecting
and reading the annual financial reports of thousands of school districts for several decades would have been prohibitively costly.

To balance these priorities—the need to include a large, diverse set of districts over time while still having a feasible data collection project—I selected a sample of 215 unified school districts for pension expenditure data collection. I drew these districts from those available in the U.S. Census’s Survey of Governments (SOG) Finance and Employment files for years between 2005 and 2016.² The SOG Finance files include annual data for all public school systems that provide elementary or secondary education. The SOG Employment files, however, include only a sample of districts, so I drew a sample from the 325 unified school districts that are in the SOG Employment files for most years from 2005 to 2016.

Because the goal was to have a sample of districts varying in size, I divided the 325 districts into eight bins by student enrollment: the largest districts are those with more than 100,000 students enrolled, and the smallest districts have fewer than 5,000 students enrolled. I included in the sample all of the school districts from the smallest two enrollment bins (less than 10,000 in enrollment) as well as the largest two enrollment bins (greater than or equal to 50,000 in enrollment). I then used random sampling with replacement, weighted by population, to select 40 school districts within each of the remaining enrollment bins (school districts with enrollment between 10,000 and 49,999). In order to have the sample span most states that have independent school districts, I added two districts from Massachusetts (which have 9 years of data in the SOG Employment files), three from New Hampshire (one with 11 years of data and two with 9 years),

² This was part of a larger project in which I selected samples of counties, cities, school districts, and special districts from the SOG data files. See the online appendix for details.
and 3 from Tennessee (with 9 years of data). A table in the online appendix presents the number of school districts in the sample broken down by size.

For each of these school districts, I attempted to collect twelve years of annual financial reports, from 2005 to 2016. Some school districts had at least some reports available on their websites, typically for the two or three most recent years, but some school districts’ websites did not provide any reports at all. For district-years for which the reports were not available online, research assistants contacted the districts to request the documents, filing public information requests where necessary. Many districts provided their reports at no charge; others provided them for a fee; and still others did not respond to the requests. I was able to obtain the complete set (twelve years) of reports with retirement contribution amounts from 164 school districts, or 76% of those in the sample. For an additional 45 districts, I collected reports from some years but not all. There were six districts for which I was unable to collect any reports and one more for which I was only able to acquire the report for 2016.

I attempted to draw several pieces of information from each report, most importantly the amount the district contributed to each of its employee retirement plans in that year. I included contributions to defined contribution (DC) plans as well as defined benefit (DB) plans, although DC plans are rare and typically make up a small share of total contributions. A small number of districts also fund other post-employment benefits (OPEB) from their pension fund contributions. I subtracted out funds going to OPEB whenever possible, but for a very small number of plans, the pension contribution amounts include some OPEB expenditures.

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3 Alaska, Hawaii, Maryland, and North Carolina do not have independent school districts, and Virginia only has one. Those states are not included.

4 School districts use different names for their reports. Most are called comprehensive annual financial reports, but as long as the format and content of the documents were similar—and if they included information on the government’s retirement plans—I included them.
While this is not a representative sample of school districts, the goal of this study is to document changes in pension spending in school districts of varying sizes and in many states, and to evaluate whether changes in local pension spending within those school districts are associated with changes in school district finance and staffing outcomes. Because this dataset tracks the over-time pension contributions of a diverse set of school districts and links them to finance and employment data, it is uniquely suited to the task.

A few other features of the data collection are worth highlighting. First, my goal was to collect school districts’ total retirement plan contributions, including any amount of the districts’ employee contributions paid by the local government, which can be substantial (typically called Employer-Paid Member Contributions, EPMC, or “pickup”). Unfortunately, however, in most financial reports, it is difficult to discern whether the district is picking up any of the employees’ share of contributions, and even when a report does indicate EPMC, the dollar value is typically not reported clearly and consistently. Therefore, I collected information about EPMC from the reports whenever possible, but I only include EPMC in the contribution amounts analyzed below when they are reported by the district every year. For any other districts that pay EPMC, the amounts I analyze are less than the districts’ total pension contributions.

Second, pension obligation bonds (POBs) are less common for school districts than for cities, counties, and states, but there are a few school districts in this dataset (mainly in Oregon) that either had outstanding POBs or issued POBs during the study period. Ideally, my tracking of districts’ total pension contributions would include any interest paid on those bonds, but the documents do not always report those interest payments clearly, so POB interest is only included when it could be done consistently within a district for all years in the dataset. In addition, because governments usually make a very large contribution to the pension fund in the year they
issue POBs (using revenue from the bonds), I subtract the POB bond value from districts’ total pension contributions in the year that they issued the POB.

Third, the dataset tracks what the school districts actually paid toward retirement benefits, not what they should be paying. The actual expenditure figures are less debatable—they are just the numbers provided in the reports—and they are also the figures most appropriate for this study. The questions at hand here are whether districts’ pension expenditures have risen over time and how that is affecting school districts. The quantity of interest is therefore what the districts actually spent on pensions, because those are the numbers affecting their budgets.

Fourth, the raw pension expenditure data I collected are at the level of the plan, district, and year, but for the analysis, I sum the pension expenditures to the district-year level. I exclude three districts (covering five unique plans) entirely because the district did not report having made pension contributions in most or all of the years covered. I also exclude certain years of contributions from three other districts because of limited or inconsistent reporting from year to year.\(^5\) Importantly, because I am focused on the over-time changes within districts, I had to ensure that the annual contribution amounts within districts are comparable to each other and include the same plans (unless a district phased out or introduced a new plan in a particular year). I therefore exclude the contributions of an additional 45 plans (out of 435 plans total)—most of them very small—for which the districts’ financial documents did not consistently report contributions to the plan in every year that the plan existed.\(^6\) In total, the district-year dataset has

\(^5\) See the online appendix for details.
\(^6\) I define a “plan” here as specific to a school district. For example, if more than one district contributes to the same state-level plan, it is counted as a separate plan for each district in my accounting. See the online appendix for a list of the excluded plans.
2,335 annual pension expenditure observations from 205 unique school districts, spanning 43 states and 385 plans.

Finally, the dataset only includes the contributions made by the school district—not any expenditures made by the state government on behalf of the district. This is important to note because in some states, the state government—not the local district—makes the contributions to the teacher pension fund, such as in Kentucky, Massachusetts, and New Jersey. For districts in these states, the district itself usually does still make contributions to one or more other funds, so there are still district-level contributions included in this dataset. In these cases, however, the district contributions are a small share of the overall pension costs of the district. For the analysis to follow, therefore, I exclude the districts for which the state government makes a large share of the districts’ pension contributions, but I also test the robustness of the results to the inclusion of these districts and report those results in the online appendix.

**Trends in school district pension expenditures**

I begin with a descriptive analysis of whether and how school districts’ pension expenditures have changed over time. Studies of particular districts and states like California have shown that school districts’ pension contributions have increased in the last several years (e.g., Pivot Learning 2019). Also, in my analysis of a large sample of cities and counties across the United States, I found that 88% of those local governments saw their pension contributions increase in real terms from 2005 to 2016 (Anzia 2022). Do these trends extend beyond California and beyond cities and counties? If so, how widespread and extensive are any such increases?

As a first glance at the data, Figure 1 summarizes how pension expenditures changed within these districts from 2005 to 2016. There, I plot the distribution of the percentage change in pension expenditures from 2005 to 2016 for all districts that have comparable data for both of
those years. The first finding of note is that the percentage change is positive for 79% of the school districts: pension expenditures grew in real terms between 2005 and 2016 in over three quarters of the school districts in the sample. Moreover, of the districts in the sample where 2016 contributions were lower than those of 2005, over half were in Florida, where local districts’ pension contributions to the Florida Retirement System decreased following a 2011 state pension reform. In general, then, the trend has been one of over-time growth in district pension expenditures. In the median district of those included in Figure 1, inflation-adjusted pension expenditures grew by 46% over this twelve-year period.

A second notable feature of Figure 1 is the long right tail of the distribution. In a relatively small number of school districts, the growth in pension expenditures from 2005 to 2016 was very large. In 23% of the districts, inflation-adjusted pension expenditures more than doubled during those twelve years. In the top 10% of districts, which includes the school systems in Philadelphia and Chicago, pension spending grew by over 200% from 2005 to 2016. And in three districts, pension expenditure growth exceeded 500% over twelve years.\(^7\)

Examining the overall percentage change in pension expenditures only reveals so much about what is happening in school districts, however, because pension expenditures can increase for a variety of reasons, some of which are not a signal of possible fiscal stress. For example, if a district grows and employs more people, its pension expenditures should go up because it is contributing on behalf of more employees. In Figure 2, therefore, I present the distribution of the within-district change in pension expenditures per full-time equivalent employee from 2005 to 2016.

\(^7\) They are: La Joya Independent School District and Pasadena Independent School District in Texas, and North Kitsap School District in Washington.
This is arguably the best measure of the fiscal pressure school districts are feeling from pensions because it is calibrated to the number of employees in the district. If this number increases, that indicates that for a given level of employment, the district is paying more toward pensions, either because the benefits are more expensive, because the district and state are making up for funding shortfalls, or both.

Figure 2 paints a clear picture of the trend in per-employee pension expenditures: 72% of the districts experienced increases. The median increase in per-employee pension expenditures from 2005 to 2016 was $1,076. (As a benchmark, the median district in this sample spent $3,692 per FTE staff member in 2005.) Moreover, in 25% of the districts, the increase was more than $2,244, and in the top 10%, it was over $4,306. Again, while there are a non-negligible number of districts where pension costs per employee decreased over this twelve-year period, many of those were in Florida. Viewed as a whole, then, this sample shows that per-employee pension costs have increased in most of these districts, but the within-district changes are quite variable.

In Figure 3, I show the distribution of the change in pension expenditures as a proportion of district general revenue between 2005 and 2016. This, too, is a useful metric because it can indicate whether pension spending is growing faster than revenue. Even if that is the case, however, it is not necessarily a sign of pension-induced fiscal pressure, because it could simply reflect that the district is hiring more employees and thus contributing on behalf of more people. Regardless, what Figure 3 shows is that in most of the districts in this sample—75% of them—pension expenditures grew faster than general revenue between 2005 and 2016. In 2005, pension contributions amounted to 3.9% of general revenue in the median district in the sample, with the

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8 For a small number of district-years, the NCES FTE staff numbers appear to have errors, so I exclude them for this analysis. See the online appendix for details.
9 Figure 2 excludes Chicago Public Schools for presentation purposes; it is a distant outlier.
top 10% of districts spending more than 7.5% of general revenue on pension contributions (not shown). From 2005 to 2016, in the median district, pension expenditures consumed an additional 1% of general revenue. In some districts, moreover, the growth was substantial. In the top 10% of school districts, for example, pension expenditures increased by more than 3.5% of general revenue from 2005 to 2016.

The general pattern of pension expenditures in these school districts is therefore one of increases over time. Pension expenditures in some districts have decreased—many of them in Florida after the state-level reform—and in others, the increases have been modest. But in a large number of districts, inflation-adjusted pension expenditures have risen overall, per employee, and as a share of general revenue.

**How are rising pension costs affecting school districts?**

Next I explore how school districts have responded to changes in their retirement costs. If a district is spending more on pensions—particularly more on pensions for each of its employees—then something has to shift in response. Very few school districts have issued POBs, so either they must be finding additional revenue or reducing spending in other areas (or both). Naturally, different districts and states can respond in different ways, applying varying mixes of cuts and funding increases, but the question I ask here is whether there are discernible trends in how school districts have responded.

This has been a difficult question for researchers to answer, especially without local-level data on pension expenditures. And while it seems straightforward that as one spending category grows, something else has to shift, how can one attribute any particular shift to pension expenditure increases? One approach is to ask school administrators how they have responded, as Pivot Learning (2019) does. Another approach is to analyze quantitatively whether pension
cost increases in a district are linked to increases in revenue or decreases in staffing or other
categories of spending.

I use the latter approach here, examining an array of dependent variables, including
school district revenue, staff numbers, and two categories of non-personnel expenditures. For the
main dependent variables, I start by describing over-time trends for these districts and evaluating
whether they vary concurrently with changes in pension costs. Then, to assess whether larger
within-district pension cost increases are associated with larger changes in these school district
outcomes, I use OLS to model the district funding, staffing, and non-personnel spending
variables, with the main explanatory variable being pension expenditures per employee. I log this
main independent variable to reduce the pronounced right skew in its distribution, and I also lag
it by one year because that is a reasonable model of government decision-making: pension costs
in year $t - 1$ are likely factored into the policy and budget decisions of year $t$. Lagging the pension
cost variable by one year also helps to address the mechanical endogeneity of pension
expenditures per employee and staffing levels in the same year, as I discuss below when I turn to
models of school district staffing.

Also key to the modeling approach is the inclusion of both school district and year fixed
effects. Different districts spend widely varying amounts on pensions for their employees for a
variety of reasons, including different benefit levels, different state funding assumptions and
practices, and because districts are held responsible for different proportions of overall pension
contributions. The school district fixed effects partial out the effect of any time-invariant district
characteristics associated with their pension expenditure levels and their revenue, staffing, and
non-personnel expenditures (the dependent variables). Moreover, there are likely secular trends
in pension expenditures and these outcomes. For instance, during the Great Recession, state and
local revenue decreased at the same time that many local governments were called on to make larger pension contributions (to make up for funding shortfalls, and because of pension reforms). The year fixed effects account for any such annual trends that are constant across districts.

While there are also time-varying characteristics of districts that could plausibly be correlated with both pension expenditures per employee as well as staffing, revenue, and other spending outcomes, it is theoretically unclear what they would be or how they would be correlated with the other variables in the models. One variable that is important to consider is the size of the district: as enrollment in a district grows, one would expect to see revenue and staffing increases, and possibly changes in per-employee pension expenditures as well. In all models, then, I include as a predictor the log of total district enrollment. While it is less clear how they would affect the estimates, I also run separate models including a set of additional district variables, including the share eligible for free and reduced price lunch, the share with a written Individualized Education Program (IEP), and the share of students who are Black, Hispanic, Asian, and American Indian or Alaskan Native.\(^\text{10}\) Data for all of these independent variables come from the NCES. Throughout, I cluster the standard errors by state, expecting the error term to be correlated among districts within the same state.

### Revenue

I start with an analysis of school district general revenue. For school districts, inflation-adjusted general revenue per student tended to rise from 2005 to 2009, decrease from 2010 to 2013, and then rise again after 2014. In this sample, median general revenue per student was $11,604 as of 2009 (in 2016 dollars). The median then fell to $10,658 by 2013 and exceeded the

\(^{10}\) I have also run these models including the percentage of students who are English language learners (see online appendix), but that variable has a large number of missing observations, so it is excluded from the main models presented here.
pre-recession high by 2016, reaching $11,956. There is variation across districts, however. From 2005 to 2017, general revenue per student increased in 74% of the districts and decreased in the remaining 26%. Moreover, of those districts that saw increased revenue over these years, the extent of revenue growth varied dramatically. The question, then, is whether there is any detectable link to rising pension costs: Are districts and their states responding to rising local-level pension expenditures with increases in revenue?

Because of the political difficulty of raising revenue, it is possible that school districts with greater pension cost increases will not see corresponding revenue increases. In my analysis of city and county governments, I found no relationship between growth in pension expenditures and growth in general revenue (Anzia 2022). But school districts are different from cities and counties in important ways, perhaps making it more likely that some pension cost growth would be offset by more revenue. First, it may be easier for local school districts to pass revenue increases than cities and counties. Second, school districts rely much more on intergovernmental revenue than cities and counties—particularly from the states. For the median district-year in my sample, about half of general revenue comes from state government, with most of the remaining amount coming from local sources and typically about 10% coming from the federal government. Thus, because of the different nature of school district funding and local school district politics, it is possible that pension cost increases have been met with revenue increases, unlike in most cities and counties.

As an initial indicator of a possible link between pension cost increases and revenue increases, when I plot the percent change in district general revenue from the previous year against the percent change in pension expenditures per employee from the previous year, the bivariate relationship is slight but positive, with a correlation of 0.106 (see the online appendix).
Table 1 presents the estimates from the OLS models. Column 1 shows results of a model of logged general revenue regressed on logged pension expenditures (lagged by one year), logged enrollment, and district and year fixed effects. The model in column 2 adds the other controls. In both of these first two models, the estimated coefficients on lagged pension expenditures per employee are positive and statistically significant at the 10% level. In column 1, it is 0.056, suggesting that on average, a 10% increase in pension expenditures per employee is associated with a 0.56% increase in district general revenue. In column 2, when I add the other controls, the coefficient on lagged pension expenditures per employee changes only modestly.

In columns 3 through 5 of Table 1, I analyze major components of school district revenue separately: total revenue from local sources, local property tax revenue specifically (which makes up a large majority of local revenue in most districts), and total revenue from the state government. Throughout, I present only the results of the simpler model, but the results do not change in any substantive way when I add the full set of controls. The results in column 3 show that a 10% increase in pension expenditures per employee is associated with an average 0.73% increase in total local revenue. Moreover, when I focus on property tax revenue in column 4, the estimates suggest that a 10% increase in pension expenditures per employee is associated with roughly a 1.04% increase in property tax revenue the following year. The results in column 5, however, do not show a relationship between pension contribution changes and changes in revenue from the state. The same is true for federal government revenue (see online appendix).

To some extent, then, there is an overall trend of increases in per-employee pension costs being met with revenue growth—in particular revenue growth from local sources, including

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11 This includes local property taxes, local non-property taxes, any investments, and revenue from food service, student activities, sales of textbooks, and any transportation and tuition fees.
property taxes. Importantly, however, the earlier descriptive analysis showed that pension costs have been rising faster than general revenue in most districts. That suggests that even with some revenue increases, districts might still be under pressure to limit costs in other ways. I turn next to analysis of trends in district-level staffing and non-personnel spending.

**Staffing and non-personnel spending**

Similar to the general pattern of school district revenue, school district staffing per student in the typical district decreased during and after the Great Recession but then rebounded, recovering to pre-recession levels by 2017. In the median district in this sample, the staff-to-student ratio was actually larger in 2017 than in 2005. However, in 39% of the districts, the ratio shrank from 2005 to 2017. Moreover, the LOWESS plot in Figure 4 shows that there is a negative relationship between districts’ changes in pension expenditures per employee from 2005 to 2016 and their changes in staff per student from 2005 to 2017. This, then, is a preliminary sign of a contraction in staffing levels connected to pension cost growth.

In Table 2, I first model the log of the total number of FTE staff in the district. I use the same modeling approach as in Table 1, including district and year fixed effects, logged pension expenditures per employee in the previous year, and time-varying district-level controls. Column 1 presents the estimates of the model that only includes logged enrollment as a control, and column 2 presents the results of the model with the full set of time-varying controls. Both sets of estimates show that larger pension cost increases per employee are associated with larger staffing reductions the following year. On average, a 10% increase in pension expenditures per employee is associated with a 0.71% to 0.72% decrease in FTE employment the following year.

While pension costs per employee is the preferred measure of whether districts’ pension costs are rising—again, because a districts’ total pension costs should be higher when it employs
and contributes on behalf of more people—one might be concerned that lagging the pension costs per employee variable does not fully address the mechanical endogeneity of these models of district staffing. Another approach is to examine the relationship between total pension contributions and staffing levels. In such a model, however, it is important to account for the possibility that a district is expanding and hiring more people (hence any increase in its pension costs). In column 3, therefore, I add logged general revenue as a control and use logged total pension costs as the main independent variable. As expected, enrollment and general revenue growth are associated with employment of more staff. Also, pension expenditures are negatively associated with staffing levels: on average, when a district’s total pension expenditures double, the number of FTE staff decreases by 3.6%.

Are certain categories of school district employees being disproportionately affected by changes in pension costs? To illustrate the typical composition of a school district’s staff, Figure 5 presents the median FTE staff per student in a number of categories reported in the NCES database. Teachers are by far the largest category of school district employee, making up roughly half of all staff in the typical school district. Figure 5 is also useful as an illustration of the composition of school districts’ non-teaching staff, including student support staff, administrative staff, and other support staff. The largest category of student support staff is instructional aides, and the typical district also has smaller numbers of student support services staff (which includes attendance officers and providers of health, psychology, speech pathology, audiology, or social services and their supervisors), guidance counselors, librarians and media specialists and their support staff, and school and district instructional coordinators. The typical district also has administrators and administrative support staff at the district and school level,
and the NCES reports a large category called “other support services staff,” which includes support staff not included in other categories, including cafeteria workers and bus drivers.

In columns 4-8 of Table 2, I analyze whether changes in pension costs are associated with changes in staffing levels in different categories, beginning with models of the log of the number of teachers. The estimates in column 4 show that there is no discernible relationship between the size of pension cost changes and reductions in teaching staff; the coefficient on logged pension expenditures per employee is statistically insignificant. While this does not rule out the possibility that certain districts are addressing rising pension costs by increasing class sizes and decreasing the number of teachers, it does suggest that reducing teaching staff is not a dominant response of the school districts in this sample. Instead, it appears that pension-induced staff reductions are concentrated among non-teaching staff. In column 5, I model the log of total non-teaching staff and estimate a significant, negative coefficient on districts’ pension expenditures. On average, in this sample, a 10% increase in pension expenditures per employee is associated with a 1.37% decrease in non-teaching staff in the district.

Finally, in columns 6 through 8, I estimate separate models for all student support staff (such as instructional aides and guidance counselors), administrative staff, and other support staff (the large category that includes cafeteria workers and bus drivers). In all three columns, the coefficient on log pension expenditures is negatively signed, but it is only significant in column 8—for other support staff. Thus, while it seems clear that the dominant pattern of staff reductions is that those reductions are occurring mainly for non-teaching staff, there is little pattern in terms of which types of non-teaching employees are most affected, perhaps because different districts

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12 In the online appendix, I present data from a few districts in different states where there are patterns of rising pension expenditures and decreasing teaching staff per student.
employ different mixes of support staff to operate public school systems—and also make reductions in different categories depending on local circumstances and strategy.13

One final area to explore is whether pension expenditure increases are prompting reductions in district spending on non-personnel budget items. In Table 3, I model two dependent variables: the log of total capital outlays in the district, which includes spending on construction and public buildings, and the log of expenditures for textbooks used for classroom instruction. The models of capital outlays, shown in columns 1 and 2, do not show that larger increases are leading to reductions in capital expenditures. In column 1, the coefficient on pension expenditures per employee is actually positive, but in column 2, where I add logged general revenue as a predictor, the magnitude of the coefficient decreases. In contrast, the results in columns 3 and 4 show that that larger pension contribution increases are associated with lower spending on textbooks the following year. Thus, there is also sign that rising pension expenditures are affecting non-personnel spending in some areas.

**State variation in the response to rising pension costs**

Because this dataset covers almost all states with independent school districts—and thus states and school districts with a diverse set of political conditions—it is worth exploring whether the responses to rising pension expenditures depend on those conditions. A number of state and district-level characteristics could be important, but here I look at three variables that are especially relevant to the topic at hand: whether local governments in the state are

---

13 The results in columns 4-8 of Table 2 do not change in a substantive way when I add the full set of controls, add logged general revenue as a control, or model the staffing variables with logged total pension expenditures and include logged general revenue. With logged general revenue as a control, the negative coefficient on logged student support staff is statistically significant.
constrained by TELs, whether they are in more conservative or liberal counties, and whether the state mandates collective bargaining for teachers.

State TELs are important to consider because they could potentially limit local officials’ options for responding to rising pension costs. Research on the effects of TELs find that they make it more difficult for officials to raise revenue and may work to limit local spending (e.g., Porterba and Rueben 1995; Dye et al. 2005). It could be, then, that school districts more constrained by TELs would be less likely to respond to rising pension costs by increasing revenue and possibly more likely to respond by reducing staffing or other spending.

In research on local politics, moreover, the partisan and ideological leanings of local residents have been shown to be correlated with local government revenue and spending. Cities whose residents lean Democratic in presidential elections and have more liberal positions on national policy issues tend to raise and spend more overall (Tausanovitch and Warshaw 2014; Einstein and Kogan 2016). One possibility is thus that school districts in more Democratic, liberal areas are more likely to respond to rising pension costs with revenue increases and are less likely to cut back on staffing or other spending.

Finally, districts’ collective bargaining status is an important factor to consider for two reasons. The first is because of its importance to how matters of school policy are decided, including employee compensation and staffing (e.g., Strunk and Grissom 2010). In states like California and Illinois, school district officials must come to agreement with teacher and other school employee unions on district policies regarding the salary schedule, many fringe benefits, and staffing levels. Compared to school districts without mandated collective bargaining, these district officials might have less flexibility in how they reduce costs to respond to rising pension expenditures, such as by lowering salaries or giving smaller salary increases. Second, state
collective bargaining laws are highly correlated with teacher union membership rates (Moe 2011). It may be that in states with mandatory collective bargaining and well organized teacher unions, there is greater political pressure to increase funding to public schools and stave off employment reductions. At the local level, stronger teacher unions might be able to help push through revenue increases. At the state level, teacher unions with more political clout might be more successful in advocating for increased state funding to local school districts. It is therefore worth exploring whether the response to rising pension costs is different for school districts in places with collective bargaining than in places without.

It is notoriously difficult to collect data on the political and institutional environments in local school districts, and there are currently no available data on the tax environment, partisanship, or collective bargaining status of each school district. Instead, for the strength of TELs, I use a state-level dataset developed by Amiel et al. (2009), which incorporates information on the type of TEL a state has, its scope and restrictions, and the provisions and established methods for exemptions and overrides. The resulting index ranges from 0 (e.g., New Hampshire) to 38 (Colorado), with higher values indicating more restrictive TELs. As a measure of local partisanship and ideology, I use the vote share received by Barack Obama in the school district’s county in 2012.14 For collective bargaining status, state laws on teacher collective bargaining are a good proxy: in states where there is a duty-to-bargain law for teachers, virtually all school districts in the state have collective bargaining (see Moe 2011). I therefore use data on state collective bargaining laws as of 2012 from Anzia and Moe (2016): a binary indicator of whether the state requires collective bargaining for teachers. Fifteen of the states in this dataset

14 The data come from Tausanovitch and Warshaw (2014). I also use their measure of county-level citizen ideology; see the online appendix.
do not require collective bargaining, including many states in the South and Mountain West. The remaining 28 states have duty-to-bargain laws for teachers.

In Table 4, I focus on two main dependent variables—general revenue and total FTE staff—and interact the lagged pension expenditures variable with each of the three political variables: first TEL strength (columns 1 and 2), then partisanship (columns 3 and 4), and finally collective bargaining status (columns 5 and 6). The estimates in column 1 show that the association between pension contribution increases and revenue increases does not vary significantly with the strength of state TELs. For a school district in a state with an average-strength TEL, the coefficient on logged pension expenditures is 0.056 and significant at the 10% level, and the interaction between TEL strength and the pension expenditures variable is small and insignificant. Nor does the staff reduction response vary by TEL strength, as shown in column 2. In column 3, moreover, I examine whether districts in Democratic counties are more likely to respond to rising pension expenditures by increasing revenue, but I find no such relationship. It also does not appear that districts in more Democratic counties are significantly less likely to respond by reducing staff (column 4).

The one model in which the interaction term is significant is column 5: the model of general revenue with pension costs interacted with the indicator for mandatory collective bargaining for teachers. In districts in non-mandatory bargaining states, increasing pension costs are not associated with significantly larger revenue increases: the coefficient on pension expenditures per employee is statistically insignificant. However, the interaction of collective bargaining and pension expenditures is 0.086 and significant at the 1% level, indicating that the revenue response to rising pension expenditures is more pronounced in states with collective bargaining. Finally, in column 6, I return to the model of total FTE staff to evaluate whether
districts in states with collective bargaining were more or less likely to reduce employment in
order to accommodate rising pension costs. I find that in states with and without collective
bargaining, larger pension cost increases are linked to larger staff reductions the following year.
In states without mandatory bargaining, a 10% increase in pension costs per employee is
associated with a 0.54% drop in employment the following year (p=0.108). In districts with
mandatory bargaining, it is associated with a 0.81% decrease (p=0.017). However, the
coefficient on the interaction term is statistically insignificant, and so those pension-induced staff
reductions are not significantly more pronounced in states with collective bargaining.

In sum, regardless of whether the state has mandatory bargaining for teachers, a strong
TEL, or a more Democratic-leaning constituency, rising pension costs are associated with larger
staff reductions. However, districts in states with collective bargaining are also seeing a greater
influx of revenue to at least partially accommodate their growing pension contributions. Thus,
there is some sign that political conditions shape how districts respond to pension cost changes.

Conclusion

Researchers and practitioners in recent years have been warning about rising retirement
costs in school districts and the consequences for public education. Detailed analyses of single
districts—usually large, urban districts like Philadelphia and Chicago—have pointed to the
dramatic increases in district pension expenditures and the other changes in staffing and
spending that have happened concurrently. Some experts have expressed concern about state
teacher pension funding ratios as well as the rising proportion of state funding that is being put
toward shoring up teacher and other state pension funds. And a detailed report of California
school districts lays out how school administrators are feeling pressure from these changes—and
what they report their school districts are doing to make room for the required increases in pension contributions (Pivot Learning 2019).

Up to this point, however, the research on school district pension costs has been limited to subsets of districts, usually in a single state. It has also been difficult for researchers to attribute various changes in staffing and resources to pension costs themselves. In any given year, revenue and staffing policies are shaped by numerous political and economic forces, and in any given district, there is some tug-of-war over how resources will be allocated. Thus, while some have expressed concern over how retirement costs in general and pensions in particular are reshaping public education across the United States, it has been difficult to make broad and definitive statements about what is happening and how districts and states are responding.

The first contribution of this paper is the new data on the over-time pension expenditures of more than 200 school districts across the United States, spanning a period of twelve years both before, during, and after the Great Recession. In the first part of my analysis, I summarized the 2005-to-2016 changes in those expenditures—overall, per employee, and as a share of general revenue. Not all school districts have experienced real growth in their pension expenditures, but the vast majority have. And while the growth has been modest in some districts, in others it has been substantial. Thus, even before delving into the other data on school district finances and staffing, it is clear that pension expenditure growth is putting much more pressure on some districts than on others.

The second contribution of this paper is its analysis of whether larger within-district growth in pension contributions is associated with larger changes in several key district outcomes: general revenue, employment levels, and two non-personnel spending areas. This is one way of evaluating whether certain trends in district finances and staffing are empirically
linked to the magnitude of changes in their pension costs. And I find that they are. School
districts with greater pension cost increases have seen greater growth in their revenue—but only
in states where there is mandatory collective bargaining for teachers. But pension cost growth is
also associated with staffing reductions. On the one hand, there is little to no trend of reductions
in teaching positions associated with pension cost growth. On the other hand, there is a clear
trend of reduction in non-teaching staff, such as support staff. Larger pension cost increases are
also linked to decreases in expenditures on textbooks. Thus, pension expenditures are leading to
reductions in certain resources available to students.

Importantly, this should not be viewed as an assessment of what should be happening or
what should be done going forward but rather an evaluation of what *is* and *has been* happening,
based on analysis of data presented in the districts’ own financial reports. It provides a more
complete picture of how pension costs are affecting public education than has been possible in
the past. And it illustrates the tradeoffs of pension cost growth for states, school districts,
teachers, other school employees, and of course the students themselves. What can and should be
done going forward will continue to be debated. But because of this analysis, we can see more
clearly what is at stake, not just in the future—as is so often the case in debates about pensions—
but in the present and past. For school districts, school employees, and students, it appears that
changes to public education due to retirement costs have already begun.
References

https://www.brookings.edu/blog/brown-center-chalkboard/2020/02/25/teacher-pension-plans-are-getting-riskier-and-it-could-backfire-on-american-schools/


https://www.nctq.org/dmsView/Lifting_the_Pension_Fog


https://www.teacherpensions.org/blog/maryland-teacher-pension-spending-compounds-school-finance-inequities


Moe, Terry M. 2011. *Special Interest: Teachers Unions and America’s Public Schools.*


Munnell, Alicia H., Jean-Pierre Aubry and Mark Cafarelli. 2015. How Did State/Local Plans Become Underfunded? State and Local Pension Plans 42.


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<td>(0.031)</td>
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<td>2,162</td>
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Notes: Standard errors clustered by state in parentheses. All models include district and year fixed effects. *p<0.10, **p<0.05, ***p<0.01 (two-tailed).
## Table 2: Staffing

<table>
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<tr>
<th></th>
<th>Ln(Total FTE Staff)</th>
<th>Ln(Non-Teaching Staff)</th>
<th>Ln(Student Support Staff)</th>
<th>Ln(Admin. Staff)</th>
<th>Ln(Other Support Staff)</th>
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</thead>
<tbody>
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<td>Ln(Pension exp. per employee)</td>
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<td>-0.014 (0.016)</td>
<td>-0.137** (0.064)</td>
<td>-0.08 (0.062)</td>
<td>-0.042 (0.078)</td>
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<tr>
<td>Ln(Total pension exp.)</td>
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<td>Ln(Enrollment)</td>
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<td>0.97*** (0.048)</td>
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<td>0.813*** (0.166)</td>
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<td>% Free/Reduced Lunch</td>
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<td>0.191 (0.348)</td>
<td>0.191 (0.348)</td>
<td>0.191 (0.348)</td>
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</tr>
<tr>
<td>% IEP</td>
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<td>0.191 (0.348)</td>
<td>0.191 (0.348)</td>
<td>0.191 (0.348)</td>
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<tr>
<td>% Black</td>
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<td>-0.057 (0.359)</td>
<td>-0.057 (0.359)</td>
<td>-0.057 (0.359)</td>
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</tr>
<tr>
<td>% Latino</td>
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<td>1.627 (0.857)</td>
<td>1.627 (0.857)</td>
<td>1.627 (0.857)</td>
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<td>0.308** (0.119)</td>
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Notes: Standard errors clustered by state in parentheses. Models include district and year fixed effects. *p<0.10, **p<0.05, ***p<0.01 (two-tailed).
Table 3: Non-Personnel Expenditures

<table>
<thead>
<tr>
<th>Ln(Pension exp. per employee)</th>
<th>Ln(Capital Outlays)</th>
<th>Ln(Instructional Textbook Expenditures)</th>
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<td></td>
<td>(1)</td>
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<td>0.054</td>
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<td>(0.150)</td>
<td>(0.127)</td>
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<td>Ln(Enrollment)</td>
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<td>(0.562)</td>
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<td>Ln(General Revenue)</td>
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Notes: Standard errors clustered by state in parentheses. Models include district and year fixed effects. *p<0.10, **p<0.05, ***p<0.01 (two-tailed).
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<tr>
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<td>0.96***</td>
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Notes: Standard errors clustered by state in parentheses. Models include district and year fixed effects. *p<0.10, **p<0.05, ***p<0.01 (two-tailed).
Figure 1: Percent change in real pension expenditures, 2005-2016
Figure 2: Change in per-employee pension expenditures, 2005-2016
Figure 3: Change in pension expenditures as proportion of general revenue, 2005-2016
Figure 4: Changes in pension expenditures and staff per student
Figure 5: Composition of school district staff

- Teachers
- Instructional aides
- Student support services
- Guidance counselors
- Library and media specialists and support
- Instructional coordinators
- District administration
- School administration
- Other support services

FTE per student (median)