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Who pays for public employee health costs?

Jeffrey Clemens[a,*], David M. Cutler[b]

[a] University of California, San Diego and NBER, United States
[b] Harvard University and NBER, United States

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ABSTRACT

We analyze the incidence of public-employee health benefits. Because these benefits are negotiated through the political process, relevant labor market institutions deviate significantly from the competitive, private-sector benchmark. Empirically, we find that roughly 15 percent of the cost of recent benefit growth was passed onto school district employees through reductions in wages and salaries. Strong teachers' unions were associated with relatively strong linkages between benefit growth and growth in total compensation. Our analysis is consistent with the view that the costs of public workers' benefits are difficult to monitor, contributing to benefit oriented, and often under-funded, compensation schemes.

The cost of health care for state and local government employees is increasing rapidly, as it is for workers across the economy. Since state and local governments are large employers – one in seven people work in state and local government – these cost increases are materially important. Estimates suggest that state and local governments spent $70 billion on their employees' health insurance in 2001, and $117 billion in 2010 (both in 2012 dollars).[1] The real increase was roughly $2400 per state and local government employee or $150 per U.S. resident.

Adjusting to these cost increases is more difficult for state and local governments than for private businesses. One strategy that businesses use to address rising costs is to pass those costs back to workers, in the form of increased cost sharing for health insurance, less generous coverage, lower contributions to employee benefits, or smaller wage increases (Summers, 1989; Gruber, 1994; Kolstad and Kowalski, 2012). However, in a setting where wages and benefits are covered by union contracts – as is the case with 35 percent of state and local employees (Bureau of Labor Statistics, 2014) – the ability to effect these adjustments may be limited.

To the extent that wage and benefit adjustments are limited, increases in health care spending are equivalent to an increase in input costs, much like a price increase for electricity would be. In private businesses, some of this cost increase would show up in higher prices. Prices are not as flexible in the public sector, however, since the price for state and local services is the tax rate. Tax increases may be directly constrained by institutions, as with property tax limits in California, or may be politically difficult. Debt issuance by state and local governments similarly faces institutional and political constraints. Limits to adjustment along these margins leave reductions in inputs, and with them the quality or amount of public service provision, as a residual response to increased benefit costs.

The incidence of rising benefit costs depends on which aspects of public budgets are constrained and which are relatively flexible. When compensation schemes, revenue, and debt issuance are fixed, cost increases may reduce the quality of public services (e.g., worse schools and more crime) or crowd out spending on infrastructure. Loose deficit-financing restrictions may allow burdens to be shifted onto future taxpayers. Cross-government transfer arrangements (e.g., revenue sharing across school districts) may

* Corresponding author. Tel.: +1 5095702690.
E-mail address: clemens.jeffrey@gmail.com (J. Clemens).

[1] There are no official estimates of these amounts. We form them using reported health insurance takeup and premiums from the Medical Expenditure Panel Study.

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0167-6296/

similarly loosen the revenue-raising constraints faced by local governments. Finally, the strength of public sector unions may drive the extent to which benefit costs can be shifted back onto government employees. The question of which margins will yield is ultimately empirical. After characterizing the potentially relevant forces in Section 1, we thus turn to the data.

We empirically analyze rising benefit costs in the context of school districts, where health benefits for both retirees and current workers have taken center stage in recent budget debates (Costrell and Dean, 2013; Nash and Pettersson, 2014). School district finance data are sufficiently rich to allow us to assess the effects of benefits on total compensation costs, total spending, revenue-raising, and a proxy, albeit a limited one, for student outcomes – the dropout rate. The biggest drawback of the data is that they report health and pension benefits as a single aggregate.

The analysis uses a simulated instrument constructed using districts' baseline benefit levels and regional growth in health expenditures. The instrument isolates the benefit growth that would be predicted absent endogenous changes to the generosity of benefits. Our initial finding, namely that this instrument strongly predicts actual benefit growth with a coefficient near 1, suggests that, at least on average, school districts did little to counteract benefit growth within the benefit package itself.

Looking both across districts and across employee groups within districts (e.g., across teachers, administrators, maintenance, and food service workers), we find that only a small fraction of increases in benefit costs are offset through reductions in wages. Each dollar in benefit growth is associated with an 85 cent increase in total compensation. The results thus provide evidence that the market for public sector workers deviates from the competitive, private-sector benchmark analyzed by Summers (1989), Gruber (1994), and Kolstad and Kowalski (2012).

We next analyze how school districts finance these increases in benefits. To our initial surprise, we find that benefit-driven increases in employee compensation were financed by transfers from higher levels of government. A detailed inspection of these revenues reveals them to come from sources subject to significant discretionary reporting (Cullen, 2003). For example, one third of the relevant dollars are associated with "categorical aid" for students classified as having special needs or requiring remedial education. Recent work documenting fraud in school lunch programs (Bass, 2010) emphasizes the flexibility of school reporting and the limitations of the systems through which eligibility claims are validated.

Consistent with the conceptual analysis in Section 1, we find that the strength of teachers' unions mediates school districts' responses to benefit growth. The relationship between simulated benefit growth and actual benefit growth is strongest in school districts with strong teachers' unions. Districts with weak unions appear to have largely offset increases in health care costs through reductions in the generosity of benefits. Inflows of categorical aid also appear to be mediated by union strength. The same is true of inflows of general formula assistance, though this result is imprecisely estimated.

Finally, we find that benefit growth was associated with declines in student performance as measured by dropout rates. The reorganization of students required to increase flows of categorical aid may thus have worked to students' detriment, though we do not have proof that this is the case. As we estimate this final result with moderate precision on a sample severely constrained by data limitations, it should be treated with caution.

The remainder of the paper is structured as follows. The first section characterizes the avenues through which increases in government health costs can be absorbed by public budgets. The second section empirically assesses the impact of increased health insurance costs on school budgets. The last section concludes.

1. The incidence of public sector health benefits

In private labor markets, analysis of the incidence of employee benefits is facilitated by assumptions related to competition, profit maximizing firms, and market clearing (Summers, 1989). In this paper's public sector context, a variety of standard assumptions may fail to hold. We first characterize the channels through which benefit incidence can be borne using an accounting framework, which does not require taking stands regarding the operation of the markets for government services and public sector labor. We then sketch an intuitively appealing theory that is consistent with our subsequent empirical analysis as well as related recent research.

1.1. An accounting framework for tracking the incidence of public employee benefits

Public goods and services are produced according to a production function that takes labor, L, and non-labor input, X:

$$G = f(L, X). \tag{1}$$

The budget constraint is described by:

$$T + D = L \cdot [w + p_b b] + X, \tag{2}$$

where T is tax revenue, D is the deficit (or surplus when negative), w is the wage, b is the quantity of a non-wage benefit (e.g., health insurance or pension obligations), and p_b is the unit cost of that benefit. The non-labor input has been normalized to have a price of 1. Differentiating and rearranging, we write the budget's response to a change in the cost of non-wage benefits as follows[2]:

$$dp_b Lb = -dL \cdot [w + p_b b] - dwL - dbLp_b - dX + dT + dD. \tag{3}$$

Faced with an increase in the price of benefits, there are 6 possibilities. The government can reduce employment (dL), reduce wages (dw), reduce the generosity of the benefit package (db), reduce spending on non-labor inputs (dX), increase taxes (dT), or add to the deficit (dD). Each of these will affect finances, with changes in prices mediated by the relevant quantities, and vice versa.

The incidence of rising benefit costs depends on which of the above margins adjust the most. Reductions in either wages or the generosity of benefits shift these costs back onto workers. The division of such reductions across wages, retiree benefits, and the benefits offered to current workers has significant implications for the burden's division across public worker cohorts. Tax increases are borne by current taxpayers, while deficit increases may either be borne by future taxpayers or shifted onto future public workers.[3] Reductions in inputs and infrastructure spending, and by extension in public production, will be borne in part by the beneficiaries of the relevant public goods and services.[4]

The flexibility of the first three terms of Eq. (3) depends on the valuation of health insurance by workers, the nature of employment contracts, and the relevance of unions. When firms are

[2] Allocating a change in health care costs across prices and quantities is not as conceptually straightforward as implied above. For current purposes, we intend only to allow for the possibility that an increase in cost driven by one dimension of the health benefit might be offset through a decrease in its generosity. We do not mean to imply that increases in health care costs can be described entirely as valueless price inflation.

[3] House price capitalization of local debt obligations may also be an important channel through which the incidence of deficit increases is allocated.

[4] The welfare implications of these alternatives depend on where levels of public service provision fall relative to their optimum, the excess burdens associated with revenue raising and other deficit financing possibilities, and on the welfare weights society places on public workers, current taxpayers, future taxpayers, and the beneficiaries of public services and infrastructure.

profit maximizing, workers fully value health benefit increases, and wages are flexible, the sole margin to respond will be other forms of compensation – wages, or perhaps pension benefits (Summers, 1989; Gruber, 1994; Kolstad and Kowalski, 2012). If valuation is less than dollar-for-dollar, the cost above the value is functionally equivalent to a tax, and will have effects on other factor returns and output. As in standard applications of the flypaper effect (Hines and Thaler, 1995), a portion of the associated growth in compensation costs "sticks."

In the incomplete-valuation framework, past work has shown public sector unions to be adept at steering resources toward their preferred expenditures (Hoxby, 1996; Feiveson, 2012), as well as deflecting budget cuts (Clemens, 2012). Union contracts may be particularly inflexible along the wage margin. Employment may also exhibit rigidities, as layoffs of teachers, police, and fire fighters can be politically unpopular.

The generosity of non-cash benefits can vary significantly in terms of its flexibility. Initial bankruptcy proceedings for the city of Detroit illustrate the potential difficulties associated with reducing the generosity of pensions. The generosity of health benefits tends to be more flexible. In recent decades, private firms have significantly reduced the comprehensiveness of their plan offerings while simultaneously increasing the share of premiums paid directly by workers (Kaiser Family Foundation and Health Research and Education Trust, various years).[5]

The flexibility of the last three terms of Eq. (3) depends on the nature of budgeting and legislative processes. Adjustment of non-labor inputs depends on how they are financed. Recent evidence (Leduc and Wilson, 2013) suggests, for example, that highway funds associated with the American Recovery and Reinvestment Act resulted, nearly dollar for dollar, in additional highway spending. In our setting, school districts may be unable to adjust expenditures covered by earmarked funds from the state (e.g., through capital or building funds).

Deficit financing faces relatively explicit, though potentially evadable, institutional constraints. Balanced budget requirements force most state governments to enact budgets that foresee no need to issue short-term, general obligation debt. Many states are explicitly prevented from carrying such debt into subsequent years when unexpected needs arise (ACIR, 1987). These legal constraints have significant practical importance. They have been found to influence the manner in which states respond to fiscal shocks (Poterba, 1995; Clemens and Miran, 2012) as well as bond market reactions toward states in distress (Lowry, 2001; Poterba and Rueben, 2001). At the same time, such rules appear evadable by, for example, accumulating pension obligations as an alternative to paying workers through current wages and salaries (Novy-Marx and Rauh, 2011; Rauh, 2010).

Finally, constraints on revenue-raising can be both political and institutional. California's Proposition 13, for example, significantly constrains property taxation. Tax increases, and in particular those associated with property, have proven to be quite politically unpopular (Cabral and Hoxby, 2012).

1.2. *Incidence implications of "shrouded benefits"*

A growing body of evidence, including that presented below, supports what Glaeser and Ponzetto (2013) dub the "shrouded" view of public employee benefits.[6] The key premise of this view is that, relative to wages, employees value benefits more than voters perceive their costs. We summarize existing evidence for this view and discuss its implications for our empirical setting.

An examination of the budgetary landscape suggests several reasons why benefit costs may be less salient to voters than public-workers' wages. Historically, comprehensive data on benefit costs have simply not existed. Assembling the relevant information has required significant undertakings by Novy-Marx and Rauh (2011) in the context of pensions and by Lutz and Sheiner (2013) in the context of health benefits. Second, state and local governments face lax obligations for the pre-funding of pensions and retiree health obligations. A given current budget can thus be stretched into a higher present value of worker compensation by shifting compensation toward unfunded benefits. In our accounting framework, this aspect of benefit funding effectively loosens constraints on deficit financing. Third, while current health benefits can be restructured, they share an important characteristic with "mandatory" federal expenditures; absent an active decision to restructure the benefit, spending occurs without need for appropriation. Health benefits may thus attract less attention than wages during standard appropriations processes. A resulting failure to perceive health benefits as a source of budgetary pressure may help these benefits avoid pushback. This seems particularly plausible during good economic times, when revenue growth is sufficient to cover all planned expenditures.

Empirically, the "shrouded benefits" view has several implications. First, public workers would be expected to take a relatively large share of their compensation through benefits. Glaeser and Ponzetto (2013) observe this to be the case. Second, retiree benefits – both pensions and health – will tend to be underfunded, as documented by Novy-Marx and Rauh (2011) and Lutz and Sheiner (2013). Third, excess benefits imply that, on the margin, public workers will value benefits less than wages. On the latter point, Fitzpatrick (2012) finds that teachers are willing to pay far less than dollar-per-dollar in exchange for incremental increases in the present value of their pensions.

We emphasize two incidence implications of the "shrouded benefits" view. First, if both voters and public workers perceive the value of marginal benefit increases to be less than their full dollar cost, workers will bear less than the full cost of benefit growth through wage reductions. Our empirical analysis, which takes place in the context of school district finances, presents evidence consistent with this point.

Second, budgets attract increased attention from voters during times of fiscal stress. Recessions may thus result in a reconsideration of public workers' compensation packages. During such times, public workers may face a wage-benefit tradeoff closer to one-for-one. If compensation is inefficiently loaded onto benefits, then public workers will more readily acquiesce to reductions in benefits than in wages. An earlier version of this paper (Clemens and Cutler, 2013) provided evidence for this phenomenon in the context of state employee benefits during the budgetary realignment of the recent financial crisis.

The welfare consequences of benefit shrouding depend on the ultimate resolution of the financial problem. Equity considerations will clearly be influenced by incidence considerations, which determine who pays. Efficiency considerations will be affected to the extent that real resources are misallocated either in the shrouded equilibrium or by the adjustment process.

[5] In an earlier version of this paper, we showed that state governments have taken many similar actions – introducing high deductible insurance plans and increasing the share of the premiums that workers pay.

[6] Glaeser and Ponzetto adopt the concept of "shrouded attributes" from Gabaix and Laibson (2006).

Table 1
Summary statistics for school finance variables: 1998 and 2007.

	(1) 1998	(2) 2007
Total spending per pupil	6971.5	11,132.0
	(1822.3)	(3029.5)
Benefit costs per pupil	1030.9	1901.4
	(339.3)	(767.0)
Salary costs per pupil	3894.0	5676.6
	(967.5)	(1385.3)
Compensation costs per pupil	4924.9	7578.0
	(1215.7)	(2010.0)
Non-comp. spending per pupil	2046.6	3554.0
	(1083.8)	(1827.1)
Revenues per pupil	6916.0	11,051.7
	(1640.0)	(2977.4)
Local revenues per pupil	3020.6	4792.5
	(1905.5)	(2927.3)
Non local revenues per pupil	3895.4	6259.2
	(1338.7)	(2627.0)
Property taxes per pupil	2329.2	3557.1
	(1779.7)	(2740.3)
Non-medicare health spending per cap.	3386.0	5641.5
	(368.2)	(688.3)
Simulated benefit growth	.	412.1
	(.)	(168.6)
Observations	6429	6429

Note: The table reports summary statistics constructed by the authors using data collected by the National Center for Education Statistics. The data are associated with the Common Core of Data, collected through the annual editions of School District Finance Survey F-33. Compensation Costs are the sum of Benefit Costs and Salary Costs. Total Spending is the sum of Compensation Costs and Non-Compensation Costs. Revenues are the sum of Local and Non Local Revenues. Non-Medicare health spending per capita was calculated as statewide health care spending through all sources other than Medicare divided by the state population net of its Medicare beneficiaries. These series come from the National Health Expenditure Accounts. Simulated benefit growth is constructed as the 1998 level of benefit spending per pupil (at the school district level) times the state level growth of per capita health expenditures among the non-elderly population.

2. Benefit growth and school district finances

In this section we assess the effect of benefit growth on school district finances and education outcomes. School districts provide a relatively data rich environment for assessing the economic incidence of benefit cost growth. In addition to providing a large sample of relatively localized government entities, school districts provide a setting in which employee compensation accounts for the bulk of total cost. Nearly 70 percent of school district costs are for employee compensation (see Table 1). Benefit costs may thus more plausibly exert an appreciable impact on the finances of school districts than on other government entities. Indeed, the health benefits of teachers played important roles in recent disputes over public-worker benefits in Wisconsin, Ohio, and Massachusetts (Costrell and Dean, 2013).

Our analysis is in terms of benefit and compensation growth, as opposed to levels. School employees may be paid more or less than their private sector alternative wage. Since this has no bearing on our results, we take no stand on whether their baseline compensation is too high or too low. Rather, our focus is on the changes in compensation and financing associated with the growth of health costs.

2.1. Data on school district finances

We assemble a panel of data on school district finances using files made available through the National Center for Education Statistics (NCES). The data are collected as part of the Common Core of Data (CCD), specifically through the annual editions of School District Finance Survey F-33.

We are interested in the trend growth in spending more than year-to-year variation. Year-to-year variation in spending can be absorbed by temporary changes in other inputs (for example, deferring maintenance of buildings), while longer-term trends cannot. Thus, we analyze data from 1998 and 2007, years roughly a decade apart. Among non-elderly individuals, real per capita national health expenditures grew by 5.8 percent annually in this time period, or $2250 in (2007) dollar terms. We note, however, that these data do not encompass the Great Recession. The incidence of benefit increases in an expansion may differ from that which might occur in a time of recession.

The NCES reports data on a universe of roughly 16,000 school districts. Our analysis sample excludes districts that did not report a complete accounting of the relevant financial variables in both 1998 and 2007, as well as those whose data exhibited statistical irregularities.[7] Our final analysis sample contains 6429 districts, with total 2007 enrollment of 27 million students.[8] The districts in our sample account for 56 percent of the total school enrollment reported in the NCES.

Table 1 presents summary statistics describing the primary fiscal characteristics of the school districts used in our analysis. The table, like our entire analysis, expresses all costs and revenues in constant 2007 dollars on a per pupil basis. Spending variables of interest include total spending, benefit costs, salary costs, total compensation (the sum of salaries and benefits) costs, and all other non-compensation costs. In constant 2007 dollars, average school district spending rose from just under $7000 to just over $11,000 per pupil from 1998 to 2007. While total costs thus rose by just over 50 percent, benefit costs rose by 80 percent, from approximately $1000 per pupil to nearly $1900 per pupil.

Fig. 1 shows the resulting rise in benefits as a share of total school district spending. After exhibiting stability during the mid-1990s, a period characterized by relatively slow growth in health care spending and a robust economic expansion, benefit costs rose from 14 to 17 percent of total costs over the subsequent decade. Over the same period, these costs rose from 20 to 25 percent of worker compensation. For our purposes, a notable shortcoming of the benefit data is that NCES reports benefit spending as an aggregate inclusive of both pensions and health benefits. We discuss the potential relevance of this shortcoming in greater detail below.

Table 1 also presents data describing the primary sources of school district revenue. Just over half of school district spending is financed by transfers of revenue from the state and federal governments, as was over half of the growth that occurred between 1998 and 2007. Roughly 70 percent of school districts' own-source revenues came through property taxation.

2.2. Approach to estimating the incidence of benefit growth

We implement two strategies to produce unbiased estimates of the incidence of school district employees' health benefits.

[7] Relevant irregularities include cases in which total spending per pupil grew by more than 300 percent or declined by more than 50 percent, or when benefits were reported as exceeding 50 percent of a group of workers' total compensation. Our results change little when we adjust the thresholds associated with these sample inclusion criteria. Returning the excluded districts to the sample tends primarily to reduce the precision of our estimates.

[8] While lost districts are disproportionately small, large districts are also prone to incomplete or inconsistent reporting. New York City School District and its 1 million students are lost, for example, due to missing 2007 data on major financial aggregates.

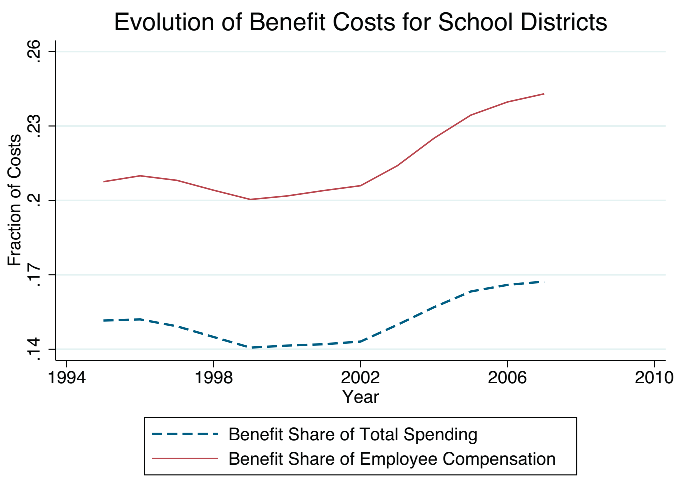

Fig. 1. Evolution of benefit costs. *Note*: The series in the figure were constructed by the authors using data collected by the National Center for Education Statistics. The data are associated with the Common Core of Data, collected through the annual editions of School District Finance Survey F-33. The Benefit Share of Total Spending is equal to the total employee benefit aggregate divided by the total spending aggregate. The Benefit Share of Employee Compensation is equal to the total employee benefit aggregate divided by the sum of the benefit aggregate and the aggregate of total employee wages and salaries. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of the article.)

Both approaches use baseline benefit generosity and local growth in health expenditures to construct a simulated-benefit-growth instrument. In our first approach, we estimate the effect of instrumented benefits on district-level budgetary aggregates. Our second approach isolates variation in simulated benefit growth *across* groups of workers (e.g., bus drivers, maintenance staff, food service workers, and administration) *within* each district. This second approach, described in greater detail below, addresses identification concerns associated with omitted correlates of local health spending growth.

Our initial, district-level, approach is described by the following two stage estimation framework:

$$\textbf{1 st Stage}: \Delta \widehat{Benefits}_{j,1998-2007} = \gamma_0 + \gamma_1 Simulated\,Benefit\,Growth_j \quad (4)$$

$$\textbf{2 nd Stage}: \Delta Outcome_{j,1998-2007} = \delta_0 + \delta_1 \Delta \widehat{Benefits}_{j,1998-2007} + \varepsilon_{j,1998-2007} \quad (5)$$

The variable *Simulated Benefit Growth*$_j$ is the product of two components: district *j*'s baseline level of per-pupil benefit spending ($Benefits_{j,1998}$) and the average growth, in real per capita terms, of non-Medicare health spending in the state.[9] *Simulated Benefit Growth*$_j$ is thus the growth that would be predicted were the cost of benefits to grow at the same rate as the growth of health spending on the statewide non-elderly population. On average across the sample, non-elderly health spending grew from $3400 per capita to $5600 per capita from 1998 to 2007 (in 2007 dollars), or by roughly 65 percent. *Simulated Benefit Growth*$_j$ averages roughly $400 per student across districts, as shown in Table 1. The difference between simulated benefit growth and average benefit

[9] The latter variable is constructed as [$Non\ Medicare\ Health\ Per\ Cap_{s(j),2007}/Non\ Medicare\ Health\ Per\ Cap_{s(j),1998} - 1$]. Data on non-Medicare health spending is from the National Health Expenditure Accounts maintained by the Center for Medicare and Medicaid Services.

Table 2
Summary statistics for school finance variables: 1998 and 2007.

	(1) 1998	(2) 2007
Teachers	3314.1	5027.8
	(859.8)	(1427.3)
Pupil support workers	258.1	419.8
	(127.1)	(223.6)
Inst. support workers	197.5	362.7
	(88.18)	(175.1)
Gen. Admin. workers	64.52	102.6
	(55.24)	(88.18)
School Admin. workers	328.8	497.8
	(85.07)	(128.4)
Maintenance workers	306.3	464.9
	(125.7)	(189.6)
Transport workers	149.0	236.3
	(99.32)	(165.5)
Food service workers	122.5	182.3
	(39.67)	(59.08)
Observations	6429	6429

Note: The table reports summary statistics constructed by the authors using data collected by the National Center for Education Statistics. The data are associated with the Common Core of Data, collected through the annual editions of School District Finance Survey F-33. Compensation Costs are the sum of Benefit Costs and Salary Costs. Total Spending is the sum of Compensation Costs and Non-Compensation Costs. Revenues are the sum of Local and Non Local Revenues. Non-Medicare health spending per capita was calculated as statewide health care spending through all sources other than Medicare divided by the state population net of its Medicare beneficiaries. These series come from the National Health Expenditure Accounts. Simulated benefit growth is constructed as the 1998 level of benefit spending per pupil (at the school district level) times the state level growth of per capita health expenditures among the non-elderly population.

growth suggests that the pension portion of the benefit aggregate grew at an even faster rate than health benefits over this time period. If pension and health cost growth are correlated across districts, our estimates will characterize the effects of growth in benefits broadly construed rather than health benefits per se.

We use Eq. (5) to study a variety of outcomes. Our first outcomes involve spending: how much, in total, does spending change with increases in simulated benefit costs? When we turn to wages, the important question is how close δ_1 is to 0 and −1. A coefficient of 0 would indicate no shifting of benefit costs to wages, while a coefficient of −1 would indicate full shifting. We also look at other outcomes such as revenue and student achievement.

For δ_1 in Eq. (5) to produce consistent estimates of the impact of benefit growth on spending, a standard exclusion restriction must hold, namely that simulated spending growth is uncorrelated with the error term. This condition may not hold. For example, growth in statewide health expenditures could be driven in part by income growth, which might also drive up the wages paid to school district employees and spending on other parts of schools. Although we find that controlling directly for income growth has little impact on our results, we take further efforts to alleviate concerns of this sort.

In addition to providing data on the wage bill and cost of benefits for teachers, the school district finance data include the cost of benefits and wages for an additional 7 categories of school district employees: bus drivers, maintenance staff, food service workers, pupil support staff (e.g., guidance counselors), instructional support staff (e.g., teachers' aids), school level administrators, and district level administrators. Table 2 shows that teachers themselves, at $5000 per pupil in 2007, account for around two thirds of school districts' total compensation costs. Remaining compensation costs are relatively evenly distributed across the remaining worker categories, the largest being school administration, at nearly $500 per pupil, and the smallest being district administration, at $100 per pupil. Fig. 2 illustrates that the growth in

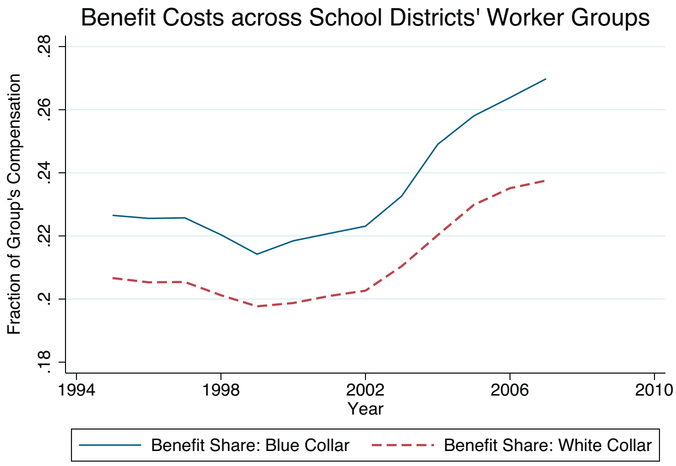

Fig. 2. Evolution of Benefit Costs across worker groups. *Note*: The series in the figure were constructed by the authors using data collected by the National Center for Education Statistics. The data are associated with the Common Core of Data, collected through the annual editions of School District Finance Survey F-33. Both series involve sums of the group-specific employee benefit aggregate divided by the sums of the benefit aggregate and the aggregates of total employee wages and salaries. "Blue Collar" workers include transportation, food service, and maintenance staff. "White Collar" workers include teachers, instructional aids, student support staff, school administration, and district administration. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of the article.)

benefits as a share of total compensation was broadly similar across groups.[10]

There is substantial variation both across and within districts in the baseline benefit costs associated with these groups of workers. Using the resulting variation in group-level simulated benefit growth, *Simulated Benefit Growth*$_{g,j}$, we can estimate the relationship between benefit growth and wages on a within-district basis:

$$\Delta Outcome_{g,j,1998-2007} = \gamma_j + \gamma_g + \beta_1 Simulated\ Benefit\ Growth_{g,j} + \varepsilon_{g,j,1998-2007} \quad (6)$$

Crucially, we are able to control for the components of wage growth that are common both across groups within each district, γ_j, and across districts within each group, γ_g. Any growth in benefits associated with broader increases in incomes or changes in preferences for school district spending will thus be accounted for by the district fixed effect.

2.3. Incidence results

Table 3 reports estimates of Eqs. (4) and (5). The first stage is reported in column 1. Each dollar in simulated benefit growth is associated, on average, with \$1.30 in additional spending on benefits. The point estimate is within a standard deviation of 1 and is strongly statistically differentiable from 0. The first stage yields an F-statistic of 14.7, implying that *Simulated Benefit Growth*$_j$ is a reasonably strong instrument for growth in benefit costs. We illustrate the fit of this first stage relationship in Panel A of Fig. 3.

The remaining columns of Table 3 report estimates of Eq. (5). Each dollar of benefit growth is associated with a roughly \$1 increase in total spending (i.e., it neither crowds out nor is supplemented by other spending). Wages fall on average by an estimated \$0.15. This estimated wage incidence is statistically indistinguishable from 0 but is statistically differentiable from −1. The estimate thus suggests that the compensation of school district employees deviates from the benchmark case of competitive labor markets in which employees fully value health benefits. This contrasts with the results of Gruber (1994), raising interesting questions about why.[11]

We find that increases in benefit costs were, to our initial surprise, financed by increased flows of funds from the state and federal government. Local revenues appear, if anything, to decline modestly in response to increases in benefit costs. The same pattern of results holds when we control for growth in income per capita, as shown in Table 4. While income growth is a strong predictor of growth in school districts' wage and salary costs, the inclusion of this control has essentially no effect on the coefficients of primary interest. Increases in benefit costs continue to appear to be financed by inflows of revenue from outside the locality.

We next investigate the sources of the revenue inflows associated with simulated benefit growth. Tables 5 and 6 present the results. Table 5 shows that these revenues are not associated with Federal Title I grants, Federal Nutritional Assistance, or other direct federal transfers to school districts. While the revenues thus pass directly to the school districts from state governments, it should be kept in mind that the federal government transfers significant resources to state governments for precisely this purpose.

Table 6 presents the breakdown of revenues passed directly to the school districts by state governments. In total, each dollar in instrumented benefit growth is associated with \$1.54 in such transfers. The primary sources of these revenues are quite illuminating. Nearly half of this money (a total of \$0.76) comes from two categories of revenue that previous research suggests are subject to manipulation by the school districts (Cullen, 2003).[12] These include revenues linked to students classified as special needs, remedial, and bilingual (\$0.46),[13] and revenues associated with "Other Programs" tied to state transfers (\$0.30). An additional, but imprecisely estimated, \$0.45 is associated with state general formula assistance. Finally, a precisely estimated \$0.28 comes from moderately sized categories with uninformative descriptions (e.g., "Unspecified"); we categorize these state revenue sources as "Mystery" funds.

We next turn to the group-level analysis described in Eq. (6). We relate simulated spending growth for each worker group to spending on benefits, total compensation, and salaries. Table 7 reports the results. Columns 1 and 2 show the first stage results without and with the inclusion of district fixed effects. We do this to examine the potential importance of omitted, district-level factors. A similar coefficient across the two columns would indicate that district level changes are not particularly important in the results. In both columns, the coefficient on Simulated Benefit Growth is again indistinguishable from 1. Precision in both instances is significantly improved from that observed in Tables 4 and 5, with the associated first stage F-statistics in excess of 30.

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[10] While the figure shows groups aggregated into "white" and "blue" collar groups, the pattern is quite similar across the individual groups.

[11] Possibilities include differences between public and private sector labor markets, as emphasized in Section 1, and differences in the periods studied.

[12] Cullen finds that the disability-claiming rates of Texas school districts responded significantly to changes in the value of the state aid associated with serving such students. Cullen and Reback (2006) find evidence of moderate manipulation of "the composition of students in the test-taking pool" for tests associated with publicized school accolades. Anecdotally, a broad range of school district activities linked to state transfers and assessment are subject to manipulation. Systematic fraud in the reporting associated with school lunch programs (Bass, 2010) provides an additional example.

[13] The school district finance data only report the financial flows associated with categorical aid. We thus do not directly observe the counts of students reported in these groups.

Table 3
IV Relationship between changes in per-student benefit costs and changes in school district spending and revenue aggregates.

	(1) Benefits	(2) Spending	(3) Salaries	(4) Non Comp.	(5) Revenue	(6) Non Local	(7) Local	(8) Property
Δ Benefit Costs		1.296** (0.626)	−0.153 (0.332)	0.449 (0.473)	1.366** (0.674)	1.607*** (0.467)	−0.242 (0.459)	−0.080 (0.498)
Sim. Ben. Growth	1.257*** (0.326)							
N	6429	6429	6429	6429	6429	6429	6429	6429
Number of clusters	45	45	45	45	45	45	45	45
Weighted	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Estimator	OLS	IV	IV	IV	IV	IV	IV	IV
Instrument	NA	Sim CG	Sim CG	Sim CG	Sim CG	Sim CG	Sim CG	Sim CG
Specification	Changes	Changes	Changes	Changes	Changes	Changes	Changes	Changes
Period	98 to 07	98 to 07	98 to 07	98 to 07	98 to 07	98 to 07	98 to 07	98 to 07

Note: Standard errors are calculated allowing for correlation at the state level. The table reports estimates of γ_1 (column 1) in Eq. (6) and δ_1 (the remaining columns) in Eq. (7), both from the main text. The outcome variables are described in greater detail in the note to Table 2. "Sim. Ben. Growth" is equal to the base year (1998) value of benefit costs per pupil times the growth (in percent terms) of state level per capita health spending on the non-Medicare population. Observations describe changes from 1998 to 2007 at the school district level.
* Statistical significance at 0.10 level.
** Statistical significance at 0.05 level.
*** Statistical significance at 0.01 level.

Columns 3 through 6 report estimates of the effect of simulated benefit growth on total compensation and cash income. The results are quantitatively similar and statistically indistinguishable from those reported in the district-level analysis. An additional dollar of simulated benefit growth is associated with just under one dollar in total compensation, and with a $0.19 reduction in cash income. The coefficients associated with reductions in cash income are, in both cases, distinguishable from 1. Once

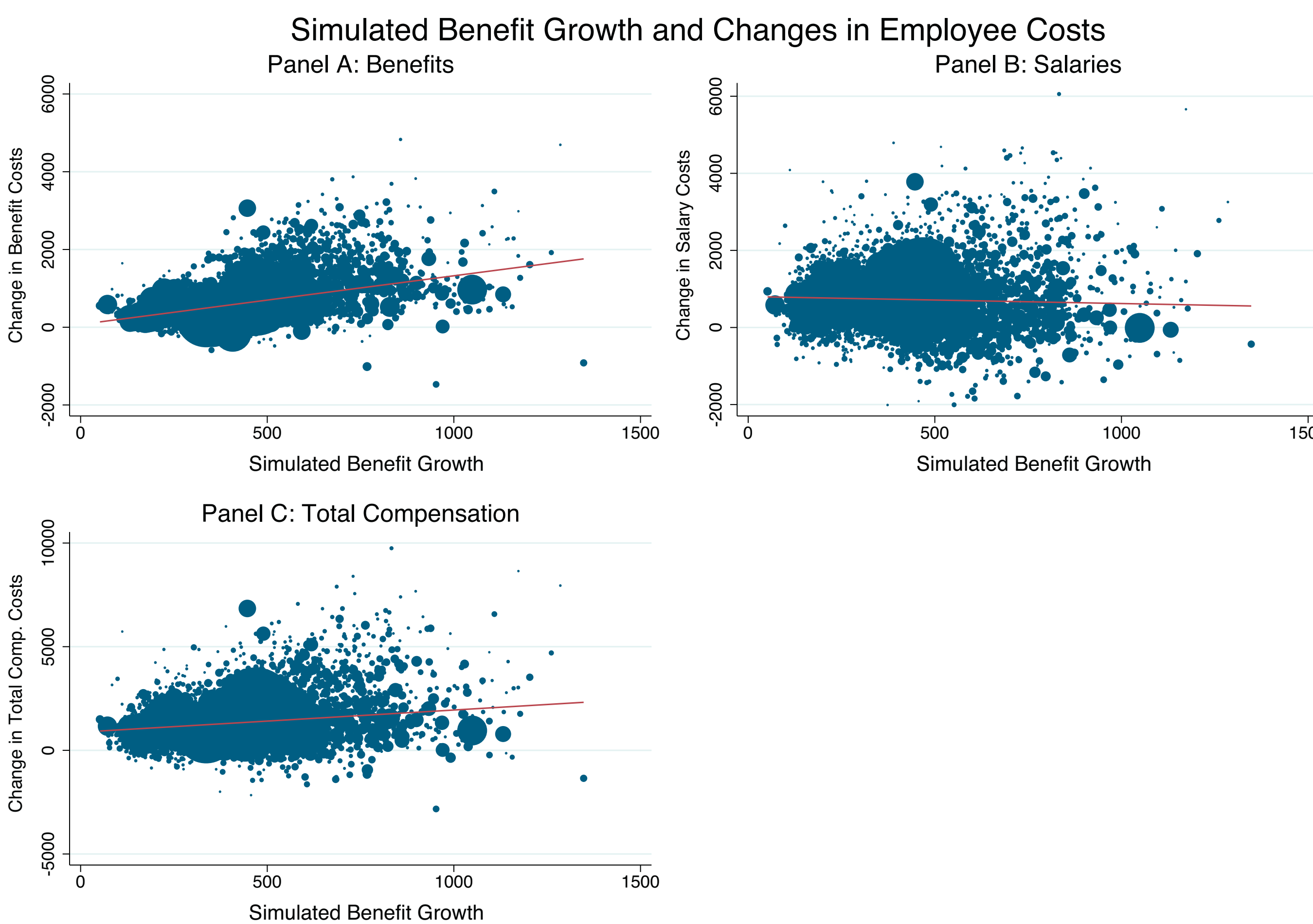

Fig. 3. Simulated Benefit Growth and Employee Costs. *Note*: The series in the figure were constructed by the authors using data collected by the National Center for Education Statistics. The data are associated with the Common Core of Data, collected through the annual editions of School District Finance Survey F-33. Both series involve sums of the group-specific employee benefit aggregate divided by the sums of the benefit aggregate and the aggregates of total employee wages and salaries. "Blue Collar" workers include transportation, food service, and maintenance staff. "White Collar" workers include teachers, instructional aids, student support staff, school administration, and district administration. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of the article.)

Table 4
IV Relationship between changes in per-student benefit costs and changes in school district spending and revenue aggregates.

	(1) Benefits	(2) Spending	(3) Salaries	(4) Non Comp.	(5) Revenue	(6) Non Local	(7) Local	(8) Property
Δ Benefit Costs		1.323**	−0.137	0.460	1.396**	1.631***	−0.236	−0.074
		(0.596)	(0.255)	(0.491)	(0.586)	(0.466)	(0.432)	(0.471)
Sim. Ben. Growth	1.263***							
	(0.296)							
Income Growth	0.031	0.190*	0.111***	0.078	0.210*	0.168*	0.042	0.036
	(0.037)	(0.104)	(0.036)	(0.078)	(0.109)	(0.092)	(0.057)	(0.054)
N	6429	6429	6429	6429	6429	6429	6429	6429
Number of clusters	45	45	45	45	45	45	45	45
Weighted	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Estimator	OLS	IV	IV	IV	IV	IV	IV	IV
Instrument	NA	Sim CG	Sim CG	Sim CG	Sim CG	Sim CG	Sim CG	Sim CG
Specification	Changes	Changes	Changes	Changes	Changes	Changes	Changes	Changes
Period	98 to 07	98 to 07	98 to 07	98 to 07	98 to 07	98 to 07	98 to 07	98 to 07

Note: Standard errors are calculated allowing for correlation at the state level. The table reports estimates of γ_1 (column 1) in Eq. (6) and δ_1 (the remaining columns) in Eq. (7), both from the main text. The outcome variables are described in greater detail in the note to Table 2. "Sim. Ben. Growth" is equal to the base year (1998) value of benefit costs per pupil times the growth (in percent terms) of state level per capita health spending on the non-Medicare population. Observations describe changes from 1998 to 2007 at the school district level.
* Statistical significance at 0.10 level.
** Statistical significance at 0.05 level.
*** Statistical significance at 0.01 level.

Table 5
IV Relationship between changes in per-student benefit costs and changes in sources of non-local revenues.

	(1) Non Local	(2) Fed Title I	(3) Fed Nutrit.	(4) Other Fed	(5) State Rev
Δ Benefit Costs	1.607***	0.050	−0.008	0.024	1.541***
	(0.467)	(0.071)	(0.014)	(0.084)	(0.450)
N	6429	6429	6429	6429	6429
Number of clusters	45	45	45	45	45
Weighted	Yes	Yes	Yes	Yes	Yes
Estimator	IV	IV	IV	IV	IV
Instrument	Sim CG	Sim CG	Sim CG	Sim CG	Sim CG
Specification	Changes	Changes	Changes	Changes	Changes
Period	98 to 07	98 to 07	98 to 07	98 to 07	98 to 07

Note: Standard errors are calculated allowing for correlation at the state level. The table reports estimates of δ_1 in Eq. (7) from the main text. The outcome variables in columns 2 through 7 sum to total Non Local Revenue from column 1. Observations describe changes from 1998 to 2007 at the school district level.
* Statistical significance at 0.10 level.
** Statistical significance at 0.05 level.
*** Statistical significance at 0.01 level.

again, the estimates provide evidence that the compensation of school district employees deviates from the benchmark case of competitive labor markets in which employees fully value health benefits.

We take the additional step of splitting the sample of worker groups into those traditionally classified as "blue collar" and "white collar." Our estimates of δ_1 could be biased if cross-district variation in baseline benefit levels for a given class of workers is correlated

Table 6
IV Relationship between changes in per-student benefit costs and a further breakdown of state revenues.

	(1) State Tot	(2) Gen. Formula	(3) Capital	(4) Classification Kids	(5) Other Prog.	(6) Mystery	(7) Minor
Δ Benefit Costs	1.541***	0.451	0.035	0.459**	0.306*	0.282**	0.042
	(0.450)	(0.401)	(0.088)	(0.181)	(0.181)	(0.134)	(0.127)
N	6429	6429	6429	6429	6429	6429	6429
Number of clusters	45	45	45	45	45	45	45
Weighted	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Estimator	IV	IV	IV	IV	IV	IV	IV
Instrument	Sim CG	Sim CG	Sim CG	Sim CG	Sim CG	Sim CG	Sim CG
Specification	Changes	Changes	Changes	Changes	Changes	Changes	Changes
Period	98 to 07	98 to 07	98 to 07	98 to 07	98 to 07	98 to 07	98 to 07

Note: Standard errors are calculated allowing for correlation at the state level. The table reports estimates of δ_1 in Eq. (7) from the main text. The outcome variables in columns 2 through 7 sum to total State Other Revenue from column 1. Categorical refers to funding associated with special, remedial, bilingual and other students to whom funding is directly linked. Mystery includes moderately large revenue categories labeled as "Unspecified" and "State Revenue on Behalf – Not Employee Benefits." Other Prog. is an independent category of general, program-specific funding. Observations describe changes from 1998 to 2007 at the school district level.
* Statistical significance at 0.10 level.
** Statistical significance at 0.05 level.
*** Statistical significance at 0.01 level.

Table 7
Estimates of the effect of simulated benefit cost growth on total compensation and salaries across the worker groups within Districts.

	(1) Benefits	(2) Benefits	(3) Salaries	(4) Salaries	(5) Total Comp.	(6) Total Comp.
Δ Benefit Costs			−0.176	−0.186	0.824**	0.814**
			(0.378)	(0.390)	(0.378)	(0.390)
Sim. Benefit Growth	1.350***	1.354***				
	(0.183)	(0.190)				
N	51,432	51,432	51,432	51,432	51,432	51,432
Number of clusters	45	45	45	45	45	45
Weighted	Yes	Yes	Yes	Yes	Yes	Yes
Estimator	OLS	OLS	IV	IV	IV	IV
Specification	Changes	Changes	Changes	Changes	Changes	Changes
Period	98 to 07	98 to 07	98 to 07	98 to 07	98 to 07	98 to 07
Observation level	Group × Dist	Group × Dist	Group × Dist	Group × Dist	Group × Dist	Group × Dist
District fixed effects	No	Yes	No	Yes	No	Yes
Group fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Note: Standard errors are calculated allowing for correlation at the state level. Columns 1 and 2 report estimates of β_1 in Eq. (8) from the main text. District fixed effects are excluded in column 1 and included in column 2. Columns 3 and 4 report IV estimates of the relationship between benefit growth and salaries in which columns 1 and 2 serve as the underlying first stage. Columns 5 and 6 similarly report IV estimates of the relationship between benefit growth and total compensation. The outcome variables are described in greater detail in the note to Tables 2 and 3. "Simulated Benefit Growth" is equal to the base year (1998) value of benefit costs per pupil times the growth (in percent terms) of state level per capita health spending on the non-Medicare population. Observations describe changes from 1998 to 2007 at the level of worker groups within each district. The worker-group data are summarized in Table 3.
* Statistical significance at 0.10 level.
** Statistical significance at 0.05 level.
*** Statistical significance at 0.01 level.

with subsequent, cross district variation in changes in that class of workers' economic prospects. If relevant, such forces would almost certainly play out in terms of cross-district differentials in the trajectories of the compensation for administrators and instructional staff relative to bus drivers, food service workers, and maintenance staff. Table 8 thus reports results separately for "blue collar" and "white collar" worker groups. The results are broadly similar to the pooled results reported in Table 7.

Table 9 provides suggestive evidence that the relationship between simulated benefit growth and increases in school district costs is driven primarily by states with relatively strong teachers' unions. The union variable is adapted from a 5 category characterization of union strength generated by Winkler et al. (2013). It runs from 0 to 1, with 1 indicating the strongest unions. The estimates in column 1 suggest that where teachers' unions are weak, benefit cost growth tended to be shifted back onto workers. Total compensation growth is, similarly, only positively associated with simulated benefit growth where strong unions prevail. Neither of these union-interaction results is estimated with a substantial precision.

Building on the analyses in Tables 6 and 9, Table 10 shows that strong-union states drive the linkage between benefit growth and the acquisition of funds from higher levels of government. Most notably, the linkage between benefit growth and aid associated with students classified as requiring special or remedial education is driven entirely by states with relatively strong teachers'

Table 8
Estimates of the effect of simulated benefit cost growth on total compensation and salaries across the worker groups within districts: Blue Collar vs. White Collar Worker Groups.

	(1) Blue Benefits	(2) Blue Salary	(3) Blue Comp	(4) White Benefits	(5) White Salary	(6) White Comp
Δ Benefit Costs		0.183	1.183***		−0.202	0.798**
		(0.273)	(0.273)		(0.404)	(0.404)
Sim. Benefit Growth	1.137***			1.346***		
	(0.152)			(0.185)		
N	19,287	19,287	19,287	32,145	32,145	32,145
Number of clusters	45	45	45	45	45	45
Weighted	Yes	Yes	Yes	Yes	Yes	Yes
Estimator	OLS	IV	IV	OLS	IV	IV
Specification	Changes	Changes	Changes	Changes	Changes	Changes
Period	98 to 07	98 to 07	98 to 07	98 to 07	98 to 07	98 to 07
Observation level	Group × Dist	Group × Dist	Group × Dist	Group × Dist	Group × Dist	Group × Dist
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Group fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Note: Standard errors are calculated allowing for correlation at the state level. The specifications are equivalent to those reported in columns 2, 4, and 6 of the previous table, with the samples restricted to sub-groups of workers. The worker-groups categorized as "Blue" and "White" collar are listed in the note to Fig. 5. Blue Collar includes transportation, food service, and maintenance staff, while White Collar includes all other workers. The outcome variables are described in greater detail in the notes to Tables 2 and 3. "Simulated Benefit Growth" is equal to the base year (1998) value of benefit costs per pupil times the growth (in percent terms) of state level per capita health spending on the non-Medicare population. Observations describe changes from 1998 to 2007 at the level of worker groups within each district. The worker-group data are summarized in Table 2.
* Statistical significance at 0.10 level.
** Statistical significance at 0.05 level.
*** Statistical significance at 0.01 level.

Table 9
Union strength interactions.

	(1) Benefits	(2) Salaries	(3) Tot Comp	(4) Non Comp	(5) Tot Spend	(6) Revenue	(7) Non Loc Rev
Sim. Benefit Growth	0.308	−0.606	−0.298	0.744	0.447	0.008	−0.491
	(0.453)	(0.536)	(0.649)	(1.435)	(1.672)	(1.670)	(1.051)
Sim. Ben. Gr. × Union	1.057*	0.461	1.518*	−0.201	1.318	1.904	2.800**
	(0.623)	(0.478)	(0.786)	(1.565)	(1.640)	(1.450)	(1.058)
N	6429	6429	6429	6429	6429	6429	6429
Number of clusters	45	45	45	45	45	45	45
Weighted	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Estimator	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Specification	Changes	Changes	Changes	Changes	Changes	Changes	Changes
Period	98 to 07	98 to 07	98 to 07	98 to 07	98 to 07	98 to 07	98 to 07

Note: Standard errors are calculated allowing for correlation at the state level. Specifications take the form of Eq. (6) from the main text, augmented to include an interaction between Simulated Benefit Growth and an index of union strength. The index runs from 0 to 1 (in 5 evenly distributed categories) and was taken from a report published by the Thomas Fordham Institute (Winkler et al., 2013). Higher values of the index indicate relatively strong teachers' unions. The outcome variables are described in greater detail in the note to Table 2. Observations describe changes from 1998 to 2007 at the school district level.
* Statistical significance at 0.10 level.
** Statistical significance at 0.05 level.
*** Statistical significance at 0.01 level.

Table 10
Simulated benefit growth and state revenues: the mediating role of strong teacher's unions.

	(1) State Tot	(2) Gen. Formula	(3) Capital	(4) Classification Kids	(5) Other Prog.	(6) Mystery	(7) Minor
Sim. Benefit Growth	−0.984	−0.849	−0.203	−0.451	0.363	0.253	−0.300
	(0.911)	(0.898)	(0.190)	(0.352)	(0.699)	(0.187)	(0.244)
Sim. Ben. Gr. × Union	3.255***	1.579	0.276	1.146**	0.025	0.113	0.393
	(0.905)	(1.015)	(0.174)	(0.500)	(0.825)	(0.119)	(0.307)
N	6429	6429	6429	6429	6429	6429	6429
Number of clusters	45	45	45	45	45	45	45
Weighted	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Estimator	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Specification	Changes	Changes	Changes	Changes	Changes	Changes	Changes
Period	98 to 07	98 to 07	98 to 07	98 to 07	98 to 07	98 to 07	98 to 07

Note: Standard errors are calculated allowing for correlation at the state level. Specifications take the form of Eq. (6) from the main text, augmented to include an interaction between Simulated Benefit Growth and an index of union strength. The outcome variables in columns 2 through 7 sum to total State Other Revenue from column 1. Categorical refers to funding associated with special, remedial, bilingual and other students to whom funding is directly linked. Mystery includes moderately large revenue categories labeled as "Nonspecified" and "State Revenue on Behalf – Not Employee Benefits." Other Prog. is an independent category of general program-specific funding. Observations describe changes from 1998 to 2007 at the school district level.
* Statistical significance at 0.10 level.
** Statistical significance at 0.05 level.
*** Statistical significance at 0.01 level.

unions. This is also true to an economically, although not statistically, significant degree of transfers through state general formula assistance.

In results not shown, we find that the correlation between simulated benefit growth and growth in funds associated with special and remedial education is relatively strong in states with histories of revenue gaming. The relevant states are those in which local intergovernmental transfer (IGT) arrangements were used as sources of funding for states' Disproportionate Share Hospital (DSH) contributions (Coughlin et al., 2000). Baicker and Staiger (2005) emphasize that such arrangements enabled state governments to appropriate federal DSH contributions for other state purposes. On average, districts in these states obtained $0.50 more than districts elsewhere in special and remedial education funds per dollar in simulated benefit growth (p-value of 0.095).[14]

To understand the quantitative implication of these results, we use the estimates of wage impacts. Our baseline estimates, both across districts and across the worker groups within each district, suggest that salaries declined by around 20 cents for each additional dollar in benefit costs. Our simulated growth in benefit costs, which mapped roughly dollar for dollar into growth in actual benefits, averages $410 across the districts in our sample. We therefore estimate that total district costs rose, on average, by roughly $330 per student due to the rising cost of health benefits. This accounts for 10 percent of the total increase in per student spending over the course of the sample period. The variation in this number is also large. Moving from the 5th percentile to the 95th percentile, the rise in compensation costs associated with the rise in health benefits ranges from $60 to $600 dollars per student.

2.4. *Effect on school quality*

We next turn to available proxies for school outputs and inputs. NCES reports data on dropout rates of 9–12th graders in a manner directly comparable between the first and last years of our sample. Dropout data are more sparsely available than finance data, however, resulting in a substantial reduction in the size of the analysis sample (from 6429 districts to 3388). The reduction of sample size

[14] The sample for this analysis is further reduced, to 34 states, by the survey from which information about the IGT funding mechanism was obtained. Notably, the union strength and IGT mechanism variables are slightly negatively correlated. When interactions between simulated benefit growth and each of these variables are included in a single specification, the coefficients on both interactions are positive and statistically significant at the 0.10 level. They thus appear to proxy for distinct dimensions of states' revenue-gaming tendencies.

Table 11
Benefit growth, spending, and student outcomes.

	(1) Benefits	(2) Salaries	(3) Spending	(4) Dropout percent × 100
Sim. Ben. Growth	1.276**	−0.151	2.240**	0.296**
	(0.471)	(0.421)	(0.910)	(0.144)
N	3388	3388	3388	3388
Number of clusters	32	32	32	32
Weighted	Yes	Yes	Yes	Yes
Estimator	OLS	OLS	OLS	OLS
Specification	Changes	Changes	Changes	Changes
Period	98 to 07	98 to 07	98 to 07	98 to 07

Note: Standard errors are calculated allowing for correlation at the state level. Specifications take the form of Eq. (6) from the main text. Drop Out Percent × 100 is the district dropout rate of 9th through 12th graders as reported in the Common Core of Data's "Nonfiscal Data Files" for "Local Education Agency (School District) Universe Survey Dropout and Completion Data." In 1998, Drop Out Percent × 100 had a mean of 395 in the analysis sample. Observations describe changes from 1998 to 2007 at the school district level. The sample is smaller than that in previous tables due to the need to merge the dropout data with the school district finance data.
* Statistical significance at 0.10 level.
** Statistical significance at 0.05 level.
*** Statistical significance at 0.01 level.

Table 12
Benefit growth, compensation per teacher, and teacher employment.

	(1) Benefits	(2) Salaries	(3) Total Comp.	(4) Comp. Per Teacher	(5) Num. Teachers (per 10,000)
Sim. Benefit Growth	0.812***	−0.144	0.668	1.998	0.004
	(0.275)	(0.282)	(0.520)	(6.012)	(0.044)
N	6215	6215	6215	6215	6215
Number of clusters	42	42	42	42	42
Weighted	Yes	Yes	Yes	Yes	Yes
Estimator	OLS	OLS	OLS	OLS	OLS
Specification	Changes	Changes	Changes	Changes	Changes
Period	98 to 07	98 to 07	98 to 07	98 to 07	98 to 07

Note: Standard errors are calculated allowing for correlation at the state level. Specifications take the form of Eq. (6) from the main text. Number of Teachers is the per pupil number of full time equivalent instructional staff as reported in the Common Core of Data's "Nonfiscal Data Files" for "Public Elementary/Secondary School Universe Survey Data." Compensation Per Teacher is equal to Total Comp. divided by Number of Teachers. The sample is smaller than in earlier tables due to the need to merge the full time instructional employment data with the school district finance data.
* Statistical significance at 0.10 level.
** Statistical significance at 0.05 level.
*** Statistical significance at 0.01 level.

significantly reduces the power of our first stage, as illustrated in column 1 of Table 11. To sidestep the problem of understated two-stage-least-squares standard errors, we thus estimate the effect of benefit cost growth on the dropout rate using a reduced form approach.

We estimate that benefit cost growth is associated with increases in school districts' dropout rates. A $200 increase in simulated benefit growth (just over one standard deviation) is associated with a 0.6 percentage point increase in the dropout rate.[15] This corresponds to one-sixth of a standard deviation in the dropout rate at baseline.

Finally, we investigate the effect of benefit growth on the margins of total compensation per teacher and the number of teachers. Teachers are the only worker group for whom the CCD reports employment; fortunately, they are probably the most important. We estimate a version of Eq. (4) using spending per teacher and the number of teachers as the dependent variables.

The results of this exercise are reported in Table 12. The relationships between simulated benefit growth and both compensation per teacher and the number of teachers are positive, but statistically indistinguishable from 0. While the precision of this exercise is low, the point estimates suggest that benefit-induced increases in compensation costs were driven by changes in total compensation per teacher. These increases appear to have been neither mitigated nor augmented by changes in employment. In the standard incidence framework (Summers, 1989), one expects increases in total compensation per worker to be associated with decreases in employment as firms adjust to equate cost with labor's marginal revenue product. These results thus provide a final, suggestive bit of evidence regarding differences between benefit incidence in the public and private sectors.

3. Conclusion

Our analysis assesses the incidence of rising benefit costs for public sector workers. In the public sector, the institutions associated with labor supply and demand, as well as price determination (here the setting of tax rates), deviate significantly from those in the competitive-market benchmark. We find empirically that these institutions significantly shape the incidence of benefit cost growth in the context of school district finances.

We estimate that the compensation of school district employees tended to rise by 85 cents for each dollar increase in benefit costs; reductions in wages and salaries offset roughly 15 cents of the increase. Labor market, budgetary, and legislative institutions play important roles in determining how the resulting increases in public employee costs are distributed. We find that public worker organizations play an important, mediating role; the

[15] Note that the coefficient in the table is reported in percent × 100 so that several significant digits are visible. The point estimate implies that an additional dollar in simulated benefit growth is associated with a 0.003 percentage point increase in the dropout rate, hence an additional $200 in simulated benefit growth is associated with a 0.6 percentage point increase.

linkage between cost growth and compensation growth was driven largely by areas with strong teachers' unions. We find further that high cost growth areas financed differential increases in employee benefits by generating higher transfers from state governments. Here it is important to emphasize that our methodology tracks only the incidence of differential cost growth across areas. If state governments respond to school districts' revenue gaming by reducing aid across the board, for example, our estimates would not detect this effect. A fuller understanding of the incidence of higher health costs will thus require additional research.

Finally, we emphasize that our results were generated in the context of health costs. Public pension costs have also grown substantially over this time period, and their incidence may or may not follow similar patterns. This too is a subject for future research. Looking forward, the outcomes of future bargaining over benefits will significantly influence the finances of service-intensive governments like school districts, where employee compensation accounts for the bulk of total cost.

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References

Advisory Commission on Intergovernmental Relations (ACIR), 1987. Fiscal Discipline in the Federal System: National Reform and the Experience of the States. Report number A-107.
Baicker, K., Staiger, D., 2005. Fiscal Shenanigans, targeted federal health care funds, and patient mortality. The Quarterly Journal of Economics 120 (1), 345–389.
Bass, D.N., 2010. Fraud in the Lunchroom? Education Next.
Bureau of Labor Statistics "Union Members–2013." January 2014.
Cabral, M., Hoxby, C., 2012. The Hated Property Tax: Salience, Tax Rates, and Tax Revolts," No. w18514. National Bureau of Economic Research.
Clemens, J., 2012. State Fiscal Adjustment During Times of Stress: Possible Causes of the Severity and Composition of Budget Cuts, Available at SSRN 2170557.
Clemens, J., Cutler, D.M., 2013. Who Pays for Public Employee Health Costs?" No. w19574. National Bureau of Economic Research.
Clemens, J., Miran, S., 2012. Fiscal policy multipliers on subnational government spending. American Economic Journal: Economic Policy 42, 46–68.
Costrell, R.M., Dean, J., 2013. The rising cost of teachers' health care. Education Next Spring, 66–72.
Coughlin, T., Ku, L., Kim, J., 2000. Reforming the medicaid disproportionate share hospital program. Health Care Financing Review XXII, 137–157.
Cullen, J.B., 2003. The impact of fiscal incentives on student disability rates. Journal of Public Economics 87 (August (7–8)), 1557–1589.
Cullen, J.B., Reback, R., 2006. Tinkering Toward Accolades: School Gaming under a Performance Accountability System, vol. 14. Emerald Group Publishing Limited, Amsterdam.
Feiveson, L., 2012. General Revenue Sharing and Public Sector Unions (Unpublished manuscript).
Fitzpatrick, M.D., 2012. How Much Do Public School Teachers Value Their Retirement Benefits? Stanford Institute for Economic Research Working Paper.
Gabaix, X., Laibson, D., 2006. Shrouded attributes, consumer myopia, and information suppression in competitive markets. The Quarterly Journal of Economics 121 (2), 505–540.
Glaeser, E.L., Ponzetto, G.A.M., 2013. Shrouded costs of government: the political economy of state and local public pensions. No. w18976. National Bureau of Economic Research.
Gruber, J., 1994. The incidence of mandated maternity benefits. The American Economic Review, 622–641.
Hines, J.R., Thaler, R.H., 1995. Anomalies: the flypaper effect. The Journal of Economic Perspectives, 217–226.
Hoxby, Caroline M., 1996. How teachers' unions affect education production. The Quarterly Journal of Economics 111 (3), 671–718.
Kaiser Family Foundation and Health Research and Education Trust, 2001–2012. Employer Health Benefits, Annual Survey. Kaiser Family Foundation, Washington, DC.
Kolstad, J.T., Kowalski, A.E., 2012. Mandate-based health reform and the labor market: Evidence from the Massachusetts reform. No. w17933. National Bureau of Economic Research.
Leduc, S., Wilson, D., 2013. Are state governments roadblocks to federal stimulus? Evidence from highway grants in the 2009 Recovery Act. No. 2013-16.
Lowry, R.C., 2001. A visible hand? Bond markets, political parties, balanced budget laws, and state government debt. Economics & Politics 13 (1), 49–72.
Lutz, B., Sheiner, L., 2013. Examining the Whole Picture: Retiree Health Obligations and the Long-Term Budget Outlook for the State and Local Government Sector. Unpublished Manuscript.
Nash, J., Pettersson, E., 2014. California Cities Strained by Retiree Health: Muni Credit. Bloomberg. February 18, 2004. (Accessed 03.03.14: http://www.bloomberg.com/news/2014-02-19/california-cities-strained-by-retiree-health-muni-credit.html).
Novy-Marx, R., Rauh, J., 2011. Public pension promises: how big are they and what are they worth? The Journal of Finance 66 (4), 1211–1249.
Poterba, J.M., 1995. State Responses to Fiscal Crisis: The Effects of Budgetary Institutions and Politics. No. w4375. National Bureau of Economic Research.
Poterba, J., Rueben, K., 2001. Fiscal news, state budget rules, and tax-exempt bond yields. Journal of Urban Economics, 50.
Rauh, J., 2010. Are state public pensions sustainable? Why the federal government should worry about state pension liabilities. National Tax Journal (Forum) 63 (10).
Summers, L.H., 1989. Some simple economics of mandated benefits. The American Economic Review 79 (2), 177–183.
Winkler, A.M., Scull, J., Zeehandelaar, D., 2012. How Strong Are U.S. Teacher Unions? A State-By-State Comparison. Thomas Fordham Institute, http://www.edexcellence.net/publications/how-strong-are-us-teacher-unions.html, October 2012 (accessed 01.08.13).