Growing Liability

How Connecticut teacher pensions put teachers, taxpayers and students at risk

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Across Connecticut, the teacher pension system is not working for teachers, taxpayers or children. And it has the potential to fail current and future retirees if it is not equitably and carefully reformed – soon.

Many of us are aware of how the system already strains taxpayer resources; what's less well known is that the system doesn't work for the majority of teachers, either. And worst of all, the system is diverting important resources away from the children who desperately need them.

Consider:

- The pension system is underfunded by $31,300 for each K-12 student.
- The state has only 52 cents for every dollar needed to fund the retirement system.
- The pension debt has grown by five times since 2000, after netting out the effects of inflation.
- Pension liabilities keep teacher salaries lower than they otherwise might be.
- In 2000, the state contributed about $369 per student into the pension system; by 2018 that number had ballooned to $2,400 per student. This represents 12% of the total resources directed to public school classrooms.
- Teachers who leave the profession before their 10th year receive no benefit whatsoever from the pension system – nor have they earned any Social Security benefits from those years of work.
- The lack of portability of teacher retirement benefits penalizes mobility and partial careers. Only 30% of teachers stay in the system long enough to receive benefits that are close to peak pension wealth accrual.

It is time to enact true pension reform for teachers. Policymakers should consider the skewed incentives in the current system that penalize both taxpayers and teachers. This paper provides common-sense solutions that would produce a pension system that is fair, sustainable, and secure, and works for teachers, taxpayers and children.

Introduction

According to some measures, average annual salaries for teachers in Connecticut ranks 15th highest in the nation, after adjusting for differences in cost of living across states.[1] Average teacher salaries, however, have been flat for many years. The estimated average annual salary of teachers in public K-12 schools in Connecticut, after adjusting for inflation, declined by about 2% between fiscal years 2000 and 2017.[2] Given that salaries are set at the district level and depend on factors such as years of experience, credentials and workload, we are limited in what we can infer from averages. One glaring reason can at least partly explain this flatlining: pension costs.

Connecticut is among a handful of states facing severe and perpetual challenges with its public finances. These challenges stem largely from pensions and retiree health care for public workers.

One assessment of the fiscal stress across states due to unfunded pension and retiree health care obligations shines a light on Connecticut.[3] The analysis uses a measure, called the "IPOD" ratio, an acronym for Interest, Pension, Other post-employment benefits and Defined contribution payments. It depicts the percent of a state's revenue that is devoted to retirement-related payments for public workers. The report considers IPOD ratios below 15% as "manageable."

Connecticut's current IPOD ratio is 22%, meaning that 22 cents of each dollar of state revenue now pays for costs related to public worker retirement benefits.[4] Only Illinois has a higher IPOD ratio. This estimate of 22% does not mean the observed level is enough to fully pay for obligations over time.

After revising the ratio to reflect a more realistic assumption about investment returns, 35 cents for every dollar of revenue for Connecticut would need to go towards retirement-related payments in order to fully pay for obligations over time. If this burden were shifted solely to taxpayers, then tax revenue would need to increase by 12%. If the burden shifted completely to public workers, then their contributions for retirement benefits would need to increase by 400%. Consistent investment returns of 10.5% is yet another way for the state's public worker retirement systems to fund the gap between current payments and payments needed to fully meet retirement obligations.

Public school teachers provide an important public service and did not individually create the funding problems that Connecticut faces. Nonetheless, none of these situations is tenable. Managing these fiscal problems will be exceedingly challenging. Rather than point blame, the state must confront its reality.

While much focus has been placed on the funding side of Connecticut's retirement systems for public workers, there is another dimension: how these plans work for teachers and the incentives underlying these plans that can affect retirement behavior. This paper analyzes Connecticut's pension plan for teachers from a labor market perspective, how pension benefits accrue for Connecticut teachers and how their underlying incentives are structured.

This paper is organized as follows: the next section discusses how defined benefit plans work, costs associated with the teachers' pension plan and the distribution of the plan's costs. Then the paper shows how pension benefits accrue under the current plan for a representative teacher. It finishes with a discussion about policy options and offers concluding remarks.

How defined benefit plans work

Pension formula

All public-school teachers in Connecticut, including public charter-school teachers, enroll in the Connecticut Teachers' Retirement System (CTRS). This plan is a final-salary defined benefit plan, also known as a "traditional" defined benefit plan. Under such plans, one's pension benefit is defined by the following formula:

$$Annuity_t = m * YOS * FAS * (1 + COLA_t)$$

where Annuity is the annual benefit amount received in year t, m is an accrual factor (or percentage), YOS stands for years of service credited to one's pension benefit, FAS denotes "final average salary" and COLA is the cost-of-living adjustment applied to benefits in year t. Final average salary is typically the average of three to five years of one's highest annual earnings. The term (m*YOS), known as the replacement rate, depicts the percentage of a worker's earnings replaced by retirement income. The annuity is the pension benefit paid each year over the worker's entire life starting from the retirement date.

Let's consider a hypothetical example. Consider a teacher who works for 30 years, her final average salary is $80,000 (the average of the last five years of her wages), and the accrual factor under the plan is 2%.[5] Her annuity would equal 60% of her final average salary, or $48,000. Typically, pension payments are distributed on a monthly basis. In this example, the retired teacher's monthly pension check would be $4,000 for the first year plus a cost-of-living adjustment for the remainder of her life.

Funding pension benefits

In theory at least, benefits under defined benefit plans are pre-funded. Under these plans, both workers and employers make periodic contributions to the plan over time.

$$Required\ contributions = employee\ contributions + employer\ contributions$$

These funds are then invested and accrue interest. By the time a worker retires, total funds (contributions plus investment earnings) should be sufficient to cover the costs of the stream of payments for a retiree's post-employment life. This is also referred to as normal cost – the amount of contributions plus expected investment earnings necessary to pay for future benefits accrued by today's workers.

Contributions are determined by independent actuaries, typically on an annual or biannual basis. Employee contributions of CTRS members are relatively stable, and the employer contribution is set at the difference between the overall required contribution rate and member rate. If contributions and investment earnings are not enough to pay for future benefits, then a shortfall occurs, and the deficit between assets on hand and promised benefits will need to be made up somehow. This deficit, also referred to as unfunded actuarial liabilities (UAL) or pension debt, will increase future costs.

Total Required Contribution Rate = normal cost rate + unfunded actuarial liabilities rate

Pension debt can be reduced in at least four ways:
- By increasing employee and employer contributions (typically only employer)
- By reducing benefits for workers (typically, this applies to future hires only)
- Changing investment strategies (pension funds taking on greater financial risk)
- Issuing pension obligation bonds

Issuing bonds is a gamble. Borrowers, such as Connecticut's retirement systems, issue bonds because officials believe that the proceeds from these bonds can be invested and earn a return that exceeds the interest cost of the bonds. If it plays out as officials hope, then the proceeds can be used to help shore up pension debt. If it doesn't, as would be likely in the event of an economic downturn, then the system would find itself in a deeper hole. Unfunded liabilities would increase, and managing this debt would become more difficult.

For the fiscal year ending June 30, 2008, bond proceeds worth $2 billion were deposited into Connecticut's teachers' pension fund, in addition to the state's contribution. This had the effect of artificially raising the funding status publicly reported, though only temporarily (Figure 1). The funded ratio increased from 63% from the 2006 valuation to 70% in the 2008 valuation.

The state legislature recently passed House Bill 7427, the state budget for the biennium ending June 30, 2021. Of particular interest, the assumed rate of return on investments will decrease from 8% to 6.9%. A decrease in the assumed rate of return usually implies an increase in contribution requirements to fund the system, however contribution requirements will actually decrease during the coming biennium because the state re-amortized its unfunded pension liabilities over 30 years.[6] Notably, this will have the effect of adding years in the future that the state's taxpayers will be paying down this debt. HB 7427 impacts valuation results for fiscal years ending 2020 and 2021, including the system's estimated unfunded liabilities.

Prior to the pension obligation bond issuance, the system's funded ratio was 63%. As of the fiscal year 2018 actuarial valuation, the system's funded ratio has fallen to 52%, meaning that the system has 52 cents on hand for each dollar it owes for future benefits. The system currently has $16.8 billion in unfunded liabilities, worth $31,300 for each student in K-12 public schools in Connecticut. After netting out the effects of inflation, this debt today is worth five times the debt level in fiscal year 2000.

Figure 1: Connecticut Teachers' Retirement System funding

CTRS system funded ratios as percent and unfunded liabilities per student, fiscal years 2000-2018 ($ adjusted for inflation)
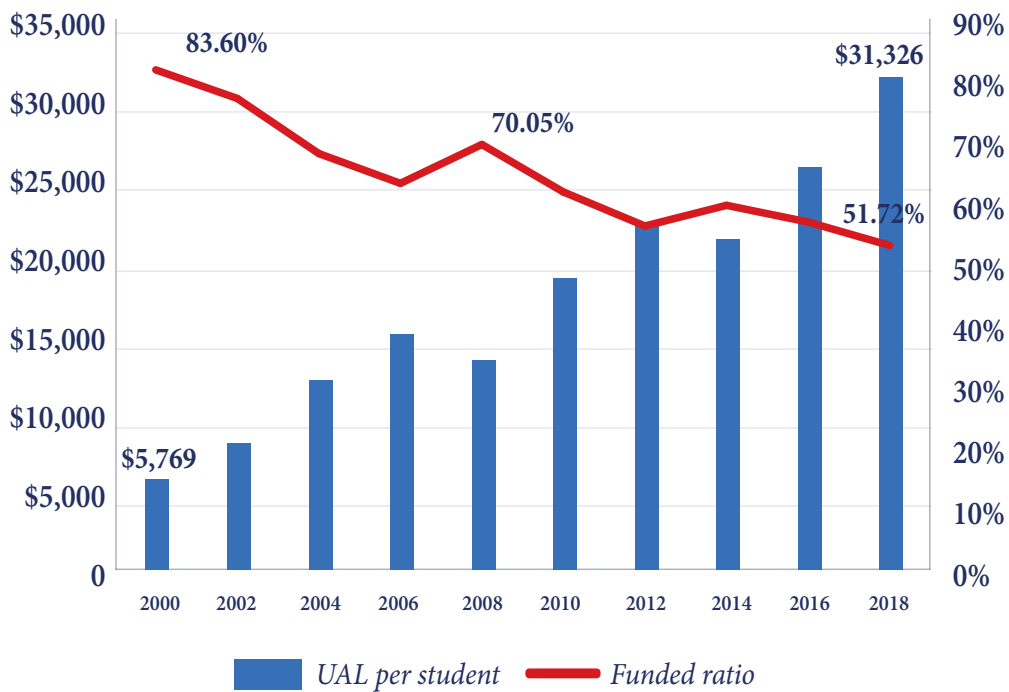
Source: Author's calculations based on data from CTRS actuarial valuation reports, U.S. Bureau of Labor Statistics, and the National Center for Education Statistics, U.S. Department of Education.

Employer pension costs have been increasing during the past couple decades and comprise an increasing share of resources directed at public school classrooms. Figure 2 plots the state's annual required contributions and actual contributions on a per-student basis from fiscal years 2000 to 2018. The spike in 2008 reflects the $2 billion bond issued for pension payments. In 2000, the state contributed $205 million, or $369 per student. State contributions were 4% of current expenditures for public schools. By 2018, taxpayer costs for teacher pensions increased four-fold (after netting out inflation) to about $1.3 billion, or $2,400 per student. This represents 12% of resources directed towards public school classrooms.[7]

Robert Costrell, an economist and renowned pension expert at the University of Arkansas, documented the trend in employer pension costs for public school teachers at the national level – these costs more than doubled between 2004 and 2018.[8] The pattern he observed mirrors the pattern we see in Connecticut during the same period.

Costrell also documented the rise in employer costs for Connecticut's system. He attributed amortization payments for unfunded liabilities and pension obligation bond debt service to 90% of rising employer costs between 2002 and 2017.[9] These rising costs are not because of better pension benefits for teachers currently in the classroom. Rather, these rising costs are being driven by amortizing pension debt. And these rising costs are borne nearly entirely by the state.

Figure 2: Required versus actual employer contributions per student

Employer annual required contributions per student compared to actual employer contributions per student, fiscal years 2000-2018 ($ adjusted for inflation)
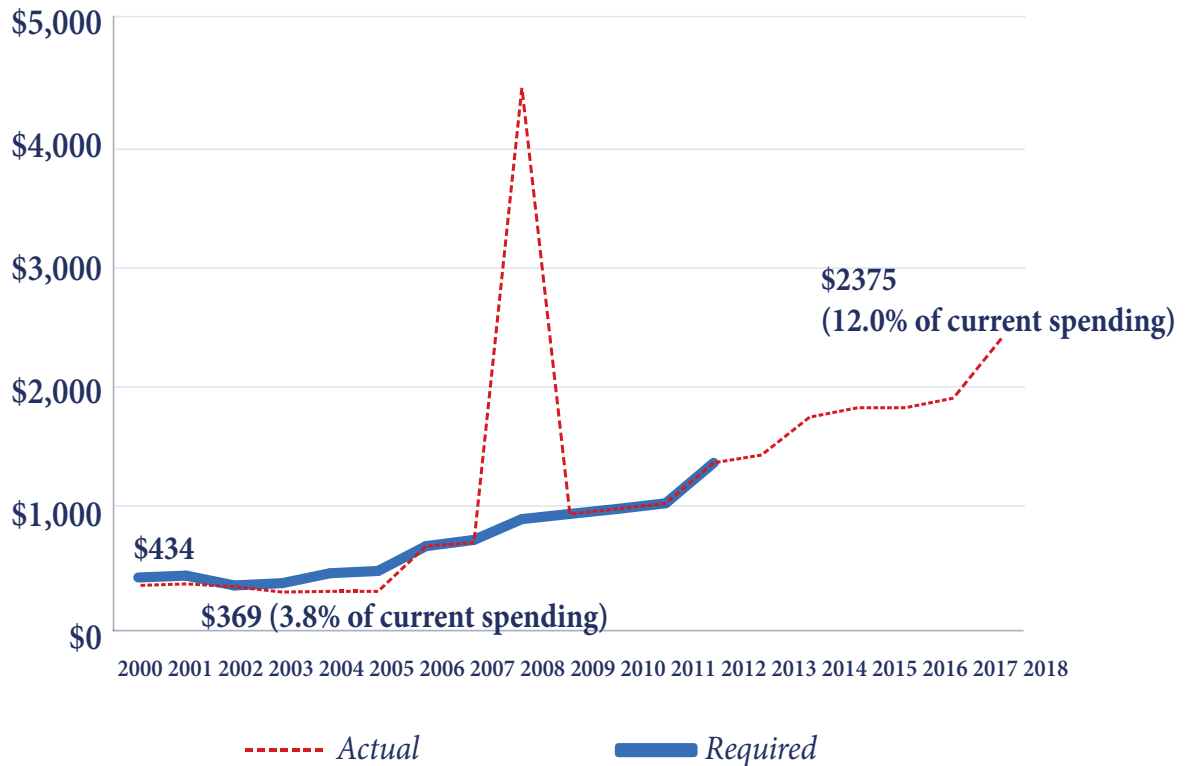
After FY 2012, GASB no longer required state-sponsored retirement systems to report annual required contributions. While some systems continued to make this calculation and disclose it to the public, CTRS stopped reporting it in its actuarial valuation reports after FY 2012

Source: Author's calculations based on data from CTRS, Connecticut Department of Education, U.S. Bureau of Labor Statistics, and National Center for Education Statistics, U.S. Department of Education

Between fiscal years 2000 and 2018, the total cost of the plan increased 2.5-fold, increasing from 13.64% of payroll to 34.77%. Figure 3 displays the breakdown of the plan's overall costs (expressed as percent of earnings) for the unfunded actuarial liabilities, state normal cost and teacher contributions components.

In 2000, the total cost of pre-funding the plan was 13.64%. This was funded by teacher contributions (6% of payroll) and contributions from the state (7.64%). Of the state's cost, 3.80% of earnings covered the employer's normal cost and 3.84% covered unfunded liabilities.

All of a teachers' contributions are applied to normal costs, and the state's portion of normal costs is the difference between total normal costs and teacher contributions. The state also covers the unfunded liabilities share of costs. Total normal costs (teacher contributions plus employer normal cost contributions) remained steady over the period, rising slightly from 9.80% in 2000 to 13.73% in 2018.[10]

Teacher contribution rates remained flat throughout the period, at 6% of earnings. Beginning Jan. 1, 2018, teacher contribution rates for pensions increased by 1 percentage point to 7% of earnings.

Figure 3: Components of pension contribution rates for CTRS

Total, teacher, and state contribution rates as a percentage of payroll, fiscal years 2000-2018
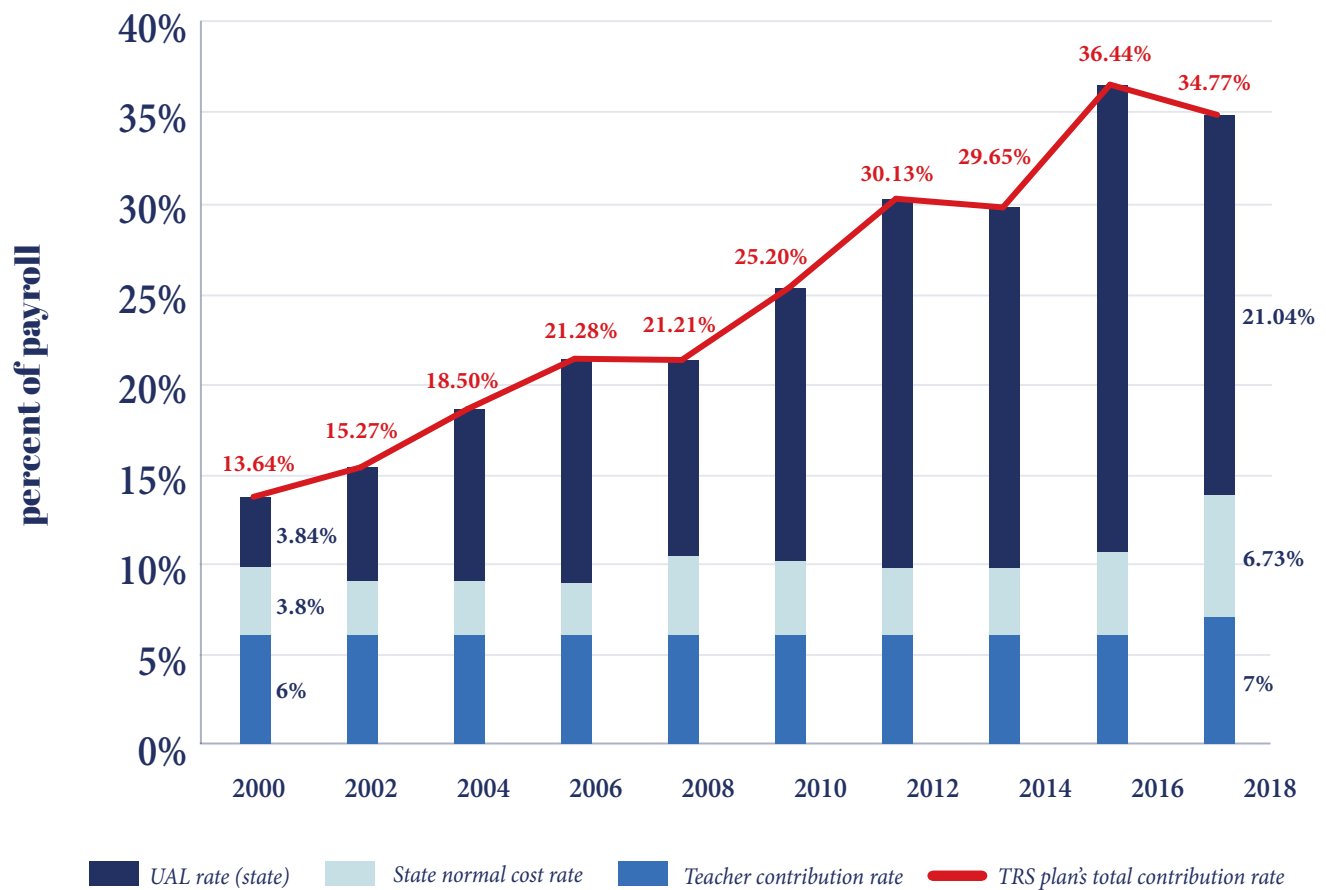

The increase in pension costs is almost entirely borne by the state. The state contribution rate nearly quadrupled from 7.64% in 2000 to 27.77% in 2018.[11] The increase in employer costs is driven by the unfunded actuarial liabilities component, which ballooned from 3.84% in 2000 to 21.04% of payroll in 2018. The share of employer costs that have increasingly gone towards paying for unfunded liabilities is striking.

Figure 4 shows that in 2000, employer contributions were split evenly between unfunded actuarial liabilities and normal costs. By 2016, however, 85% of employer contributions went towards paying down unfunded liabilities while just 15% of contributions were for normal costs. These shares converged slightly in 2018, with 76% of employer costs devoted to pension debt and 24% for normal costs.[12]

Figure 4: Connecticut's employer normal costs and pension debt as shares of required contributions

CTRS annual required contributions for fiscal years 2000-2018, showing shares of employer normal costs and unfunded liabilities
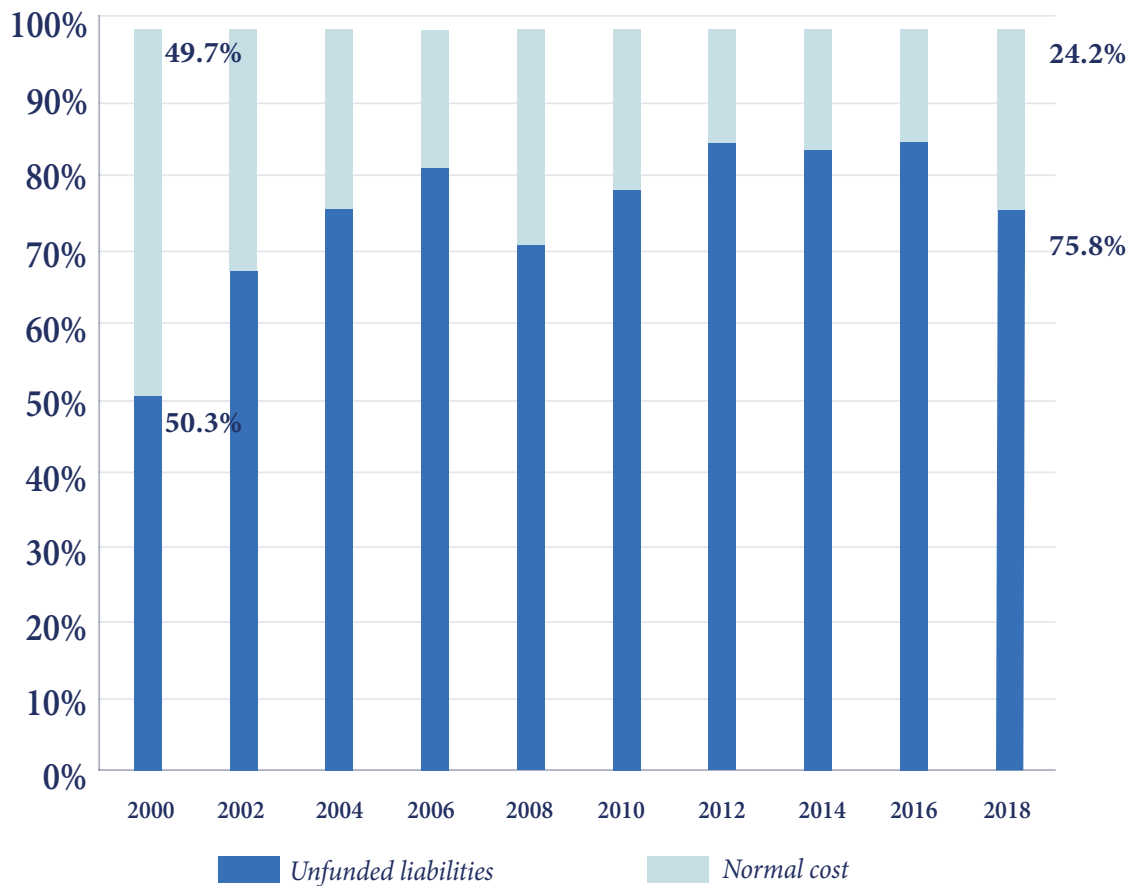
Sources: Author's calculations based on Connecticut Teachers' Retirement System actuarial valuation reports

This arrangement creates substantial loss of opportunity for teachers and children in the classroom today. Unfunded liabilities represent resources that could be deployed in other areas of education that could have potential benefits for students. For example, these resources could have been directed towards increasing teacher take-home pay, which could facilitate recruiting and retaining quality teachers, or these resources could have also been used for student activities such as field trips. There is an emerging body of rigorous research that activities such as visiting museums and live theater performances improve social and cognitive effects and civic values of students.[13]

The discussion so far has focused on major funding issues with the CTRS plan. To be sure, an important intermediary goal of public schools is to recruit and retain a high-quality workforce. Some argue that defined benefit plans are effective instruments that do just that. But are these plans effective at accomplishing goals of teacher recruitment and retention? The history of defined benefit plans spans more than a century.[14] CTRS itself was established in 1917. Although evolution of this plan is beyond the scope of this paper, it is important for stakeholders to understand how benefits accrue under these plans. Do these plans make sense for today's workforce? What are

the incentives underlying these plans, and what implications do they have for teachers? Who are the "winners and losers" under these plans? The next section aims to address these questions.

While funding issues that shroud public worker pensions in Connecticut give pause for considering reform, there are other reasons for considering reform not related to funding.

How benefits accrue under CTRS

Measuring pension wealth

Depicting the value of one's pension under a final-salary defined benefit plan is complicated for several reasons. First, the value of one's lifetime pension can vary significantly depending on when a worker separates from service. If a worker separates from service before reaching retirement eligibility, she may leave her contributions with the pension fund and defer her benefit, meaning she may start collecting pension payments once she reaches retirement eligibility. The potential effects of inflation can complicate how one values this benefit and should be accounted for.

Second, benefits under defined benefit plans are a function of tenure, age and salary. Thus, accrual patterns can be highly nonlinear and differ dramatically for different entry and separation points. The unsmooth, nonlinear patterns can have important implications for incentives that teachers face when it comes to timing their retirement. Sometimes these incentives may conflict with other circumstances in the worker's life which may also influence retirement decisions.

Third, workers receive a stream of benefit payments for the rest of their lives. The number of years of payments that workers receive can vary from worker to worker and is unknown. Thus, the period that workers collect a pension (and the overall value of that pension) will vary.

Fourth, how an individual values a given amount of money over time varies. One dollar today is not the same as one dollar 10 years in the future. This can complicate comparisons of benefits at different points in time.

Pension wealth, popularized by Costrell and Podgursky from their seminal work on teacher pensions, is one measure that attempts to account for these different layers of complexity.[15] It is the expected present value of the stream of pension payments for a worker, conditional on entry and separation age, and discounted for survival probabilities. Pension wealth is expressed as a lump sum. One way to think of it is the value of a pot of money that a teacher receives during retired life.

The extent that future benefits are discounted is important. A higher discount rate implies less pension wealth because pension wealth equals promised future benefits discounted to their "present value." Present value conveys that $100 today is worth less than $100 in the future, and the number of dollars required to generate $100 in the future depends on the discount rate. The higher the discount rate, the fewer dollars required to generate some given future amount, and vice versa.

Pension wealth (PW) is defined by the following formula:

$$PW(S)= \sum_{A \geq S} \frac{Ann(A|S)*Surv(A|S)}{(1+r)^{(A-S)}}$$

where *Ann* is the value of the annuity, collectible at age *A* and conditional on separation from covered service at age *S*. In words, pension wealth is the present value of the stream of pension payments conditional on separation, weighted by conditional survival probabilities, *Surv(A|S)*, and discounted back to the present at rate *r*.

Pension wealth calculations are made for a representative female teacher who begins teaching at age 25.[16] The analysis uses teacher salary schedules for the Hartford public school district and draws survival probabilities from the Center for Disease Control's Life Tables.[17] Because we are applying survival rates, we are calculating expected pension wealth, referred to simply as pension wealth throughout this paper.

Estimates are generated assuming an 8% nominal interest rate (including 2.5% inflation). A 1% cost-of-living allowance is applied each year, not compounded. Final average salary under the CTRS plan is based on three years of one's highest salary, and benefits are capped at the lesser of 75% of final average salary or $3,600 per month. The analysis does not assume any survivor or disability benefits.

CTRS plan

Connecticut public school teachers are covered by CTRS. Under this plan, teachers may retire upon reaching various retirement eligibility criteria. Retirement eligibility depends on both age and the number of years of service. This section describes the pension plan for teachers hired on or after July 1, 2007, and describes the main components of the plan (normal retirement, early retirement, deferred retirement and refund benefits). CTRS also provides benefit options such as partial refund option, survivorship benefits and disability benefits. The present analysis also focuses only on pensions and does not consider post-employment retirement benefits, which is mainly retiree healthcare.

Teachers become vested in CTRS with 10 years of service. Upon vesting, teachers may separate from the system at any time and start collecting pension benefits upon reaching retirement eligibility. Pension benefits will be based on a multiplier (1% to 2%), years of service and the average of one's final three years of salary.

A teacher may qualify for **normal retirement** and can start collecting full pension benefits at age 60 with 20 years of service. After attaining at least 35 years, teachers may retire anytime. For example, a teacher who starts teaching under CTRS at age 22 and accrues 35 years of service may retire and collect a full benefit at age 57. A teacher who entered service at age 30 would earn 20 years of service with uninterrupted service by age 50. She would be eligible to retire and collect benefits once she turns age 60. A teacher retiring with a normal benefit will accrue 2% of final average salary for each year of service.

Teachers may also qualify for **early retirement** and collect a reduced benefit. Teachers may receive a reduced benefit by retiring at age 55 with 20 years, or any age with 25 years. Her pension benefit would be actuarially reduced. How much one's pension is discounted will depend on how far away that person is from normal retirement. Discounting of benefits will also differ for teachers who have at least 30 years and less than 30 years.

CTRS also provides a **proratable retirement** option. Under this option, vested teachers who reach age 60 with less than 20 years may retire at age 60 with a reduced benefit.

Vested teachers who leave the system before reaching retirement eligibility face two choices. The teachers may receive a **deferred retirement** by leaving their contributions with TRS and begin collecting a pension upon reaching retirement age. For example, a teacher who begins teaching in CT at age 25 and separates from CTRS at age 45 (after 20 years) would be eligible to collect pension payments upon turning age 60. For teachers who would not have attained 20 years of service by retirement age, a retirement reduction would be applied to the benefit.

Teachers who leave any time before reaching retirement eligibility may also elect to receive a **refund** of their contributions with interest instead of a pension. As with most public defined benefit plans for teachers in other states, teachers who elect for a refund do not receive the employer portion of contributions.

Retirement benefits under this plan accrue in a complex and highly nonlinear manner, the topic of the next section.

Pension wealth accrual for a teacher in Hartford Public School District

Figure 5 depicts how pension wealth accrues for a teacher who entered the retirement system at age 25. The picture shows the backloaded nature of this plan, a typical feature of defined benefit plans. That is, pension benefit accrual is slow early in one's career and ramps up when key retirement eligibility criteria are met.[18]

Under this plan, a teacher vests after reaching 10 years of service and becomes eligible to collect pension payments starting age 60.

After vesting, pension wealth accrues slowly up to age 44. During this portion of her career, a vested teacher who separates and defers a pension benefit can begin drawing payments at age 60. If she separates from service right after vesting, her pension wealth, the expected present value of the stream of payments she would be able to collect starting at age 60, is about $22,000. At age 44, her pension wealth is about $98,000.

At age 45 with 20 years of service our teacher qualifies for a reduced benefit and can begin collecting payments at age 55. Although the benefit is actuarially reduced, she can now collect five additional years of pension payments. By working from age 44 to age 45, her pension wealth increases by about $27,000: from $98,000 to $125,000. From age 45 to age 50, growth in pension wealth accrual increases.
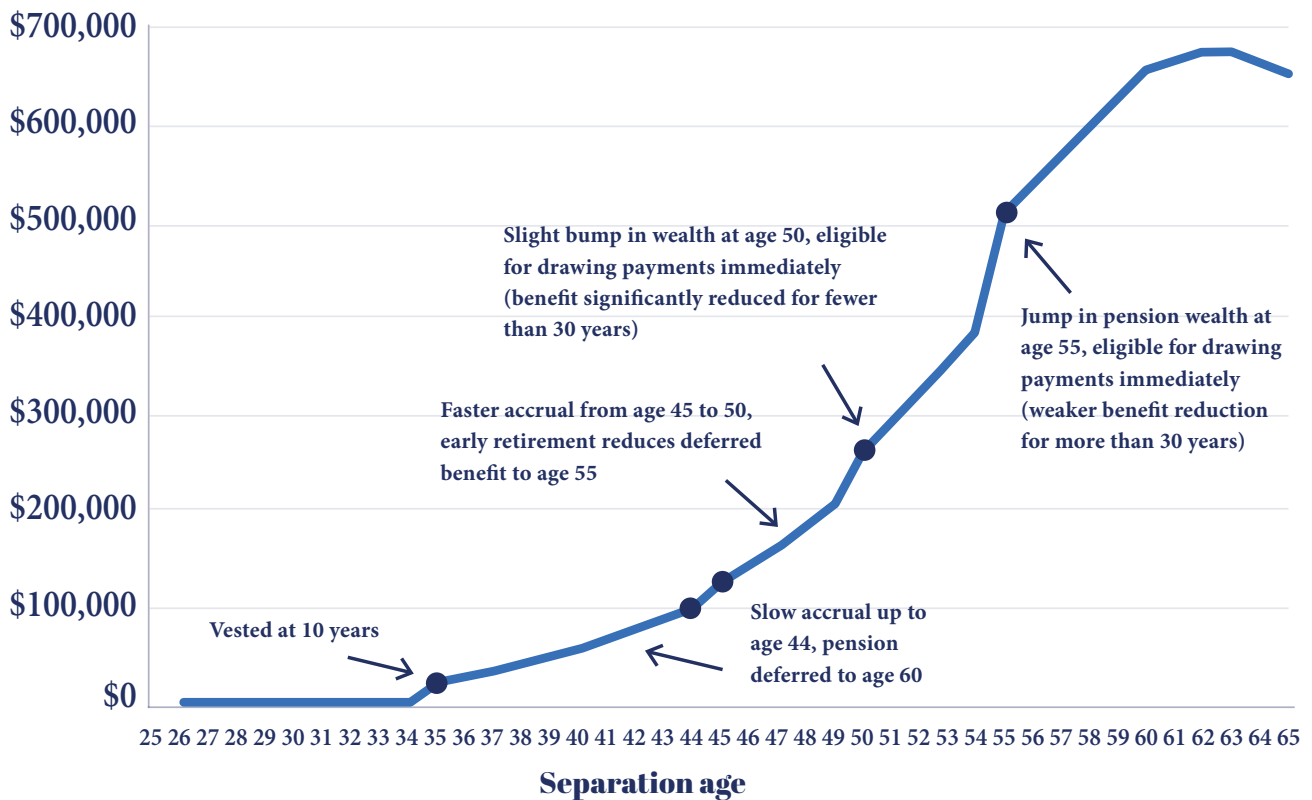
At age 49, her pension wealth is worth about $206,000. She could defer her pension until age 55 if she retired at this point. If she waits one more year and separates from the system at age 50, she becomes eligible to draw pension payments immediately. This represents five additional years of pension payments, and the value of her pension wealth jumps by almost $55,000 to $260,000.

The pension plan applies different sets of actuarial discounts for teachers with less than 30 years and for teachers with at least 30 years. For teachers who separate with less than 30 years, pension benefits will be reduced at a greater rate than teachers with at least 30 years of service. Our representative teacher can begin collecting pension benefits immediately at age 50, but those benefits will be reduced at a greater rate. By waiting until she has 30 years at age 55, she can receive a significant boost to her pension. Her pension wealth at age 54, with 29 years of service, is about $385,000. One additional year of work will boost her pension wealth by about $123,000 to $508,000.

From this point on, the rate of pension wealth accrual decreases. It reaches its peak at age 62, reaching $666,000, and then declines thereafter.[19]

Figure 5: Pension wealth growth for a female teacher in Hartford, Conn.

Gross pension wealth accrual for a teacher in Hartford Public School District, with inflation at 2.5% and real interest rate of 5.5%, from entry age 25 to age 65

Slight bump in wealth at age 50, eligible for drawing payments immediately (benefit significantly reduced for fewer than 30 years)

Jump in pension wealth at age 55, eligible for drawing payments immediately (weaker benefit reduction for more than 30 years)

Faster accrual from age 45 to 50, early retirement reduces deferred benefit to age 55

Vested at 10 years

Slow accrual up to age 44, pension deferred to age 60

Separation age

The accrual patterns under this plan create strong "pull" and "push" incentives. Continuing with our representative teacher example, there is a strong "pull" incentive for her to continue teaching in the system until age 55. As we saw before, she can grow her pension wealth by $123,000 by working that final year from age 54 to 55.

The plan also has strong "push" incentives built in. For our representative teacher, this occurs after age 62, where pension wealth accrual turns negative afterwards. These incentives are evident in Figure 6, which shows the marginal change in pension wealth. This figure depicts how much additional pension wealth a representative teacher accumulates with an additional year of service. It can be thought of as the value of a given year of work at a particular point in one's career. As described before, a year of work right before reaching age 55 is worth about $123,000 in pension wealth.

Such built-in incentives are very common features in many states' defined benefit plans, though the timing and size of these pension spikes varies from plan to plan. Observing these patterns in Connecticut's plan for teachers begs the questions: what is the underlying rationale for having pension spikes occur at these key points in a teacher's career that warrant these incentives? Do teachers become much more effective when they turn age 55 or once they work 30 years? Are teachers least effective at age 62?

Figure 6: Year-over-year change in gross pension wealth for female Connecticut teacher

Change in pension wealth year over year, net of interest and adjusted for inflation, from entry age 25 to age 65
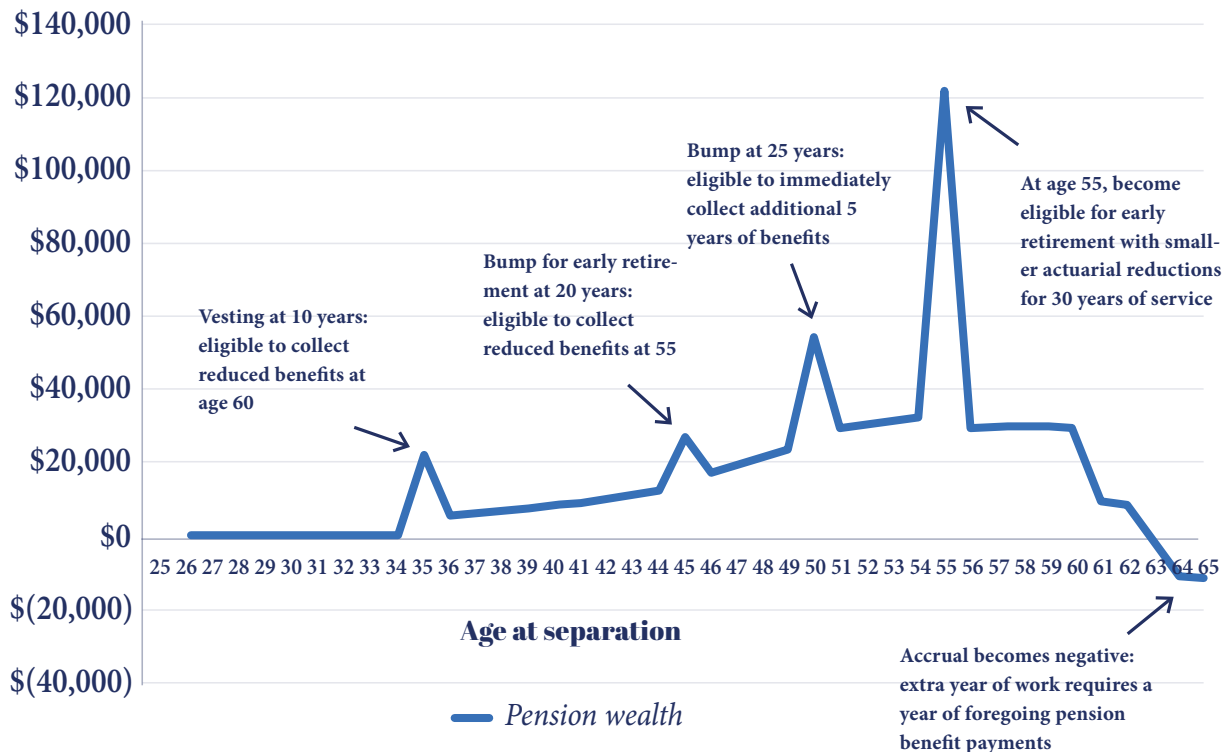
Source: Author's calculations using information from the Connecticut Teachers' Retirement Board.

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Some research finds that, on average, seasoned teachers tend to be more effective than novice teachers, as measured by value-added. There is significant overlap, however, in the distributions of these groups.[20] I am not aware of any evidence that teachers age 55 are more effective than teachers who are not age 55, nor any evidence that teachers who are age 62 are less effective than teachers who are not age 62.

The timing of these incentives is simply arbitrary.

Proponents of defined benefit plans argue that they provide an effective tool for incentivizing teachers to remain in teaching for an entire career. While they are correct that these plans tend to offer higher maximum retirement benefits than alternative plans, teachers who do not remain in a system long enough to maximize these benefits may face significant penalties. Teachers who separate from the system before reaching key eligibility milestones will accumulate much less pension wealth than they would if they remain in the system long enough to reach these key points.

Costrell and Podgursky quantified the differences in pension wealth accumulation between teachers who remain in a single retirement system until reaching retirement eligibility and teachers who split their teaching career between two different retirement systems.[21] They showed that teachers who leave a pension system before reaching retirement eligibility incur considerable losses in their pension wealth, up to half in some cases, relative to teachers who remain in one system until retirement eligibility. This lack of portability and reciprocity among pension systems essentially amounts to a penalty on teacher mobility and partial careers.

What about the distribution of teachers who are winners or losers in this system? Costrell and McGee analyzed individual-level data to study California by comparing the value of benefits with the uniform contribution rate for each teacher.[22] They concluded that "almost two-thirds of all entering teachers, past and present, are losers" (i.e., they received benefits worth less than their contributions).

Without individual level data, another approach to examining this question is by using data from the CTRS. Actuaries routinely publish withdrawal rates based on years of service and age. Pension experts have used these tables to inform retention within given pension plans.[23] From these actuarial tables, we can estimate the percentage of teachers who remain in the pension system conditional on years of service and age.

Figure 7 overlays the pension wealth accrual curve from Figure 5 with a plot of cumulative retention rates based on CTRS assumed withdrawal rates. Based on these rates, an estimated 48% of CTRS members will remain in the system by nine years (prior to reaching the vesting requirement of 10 years) while an estimated 30% of members will remain until age 55.

Figure 7: Hartford teacher pension wealth versus retention

Cumulative retention rates compared to gross pension wealth accrual for a female teacher in Hartford Public School District, with inflation at 2.5% and real interest rate of 5.5%, from entry age 25 to age 65
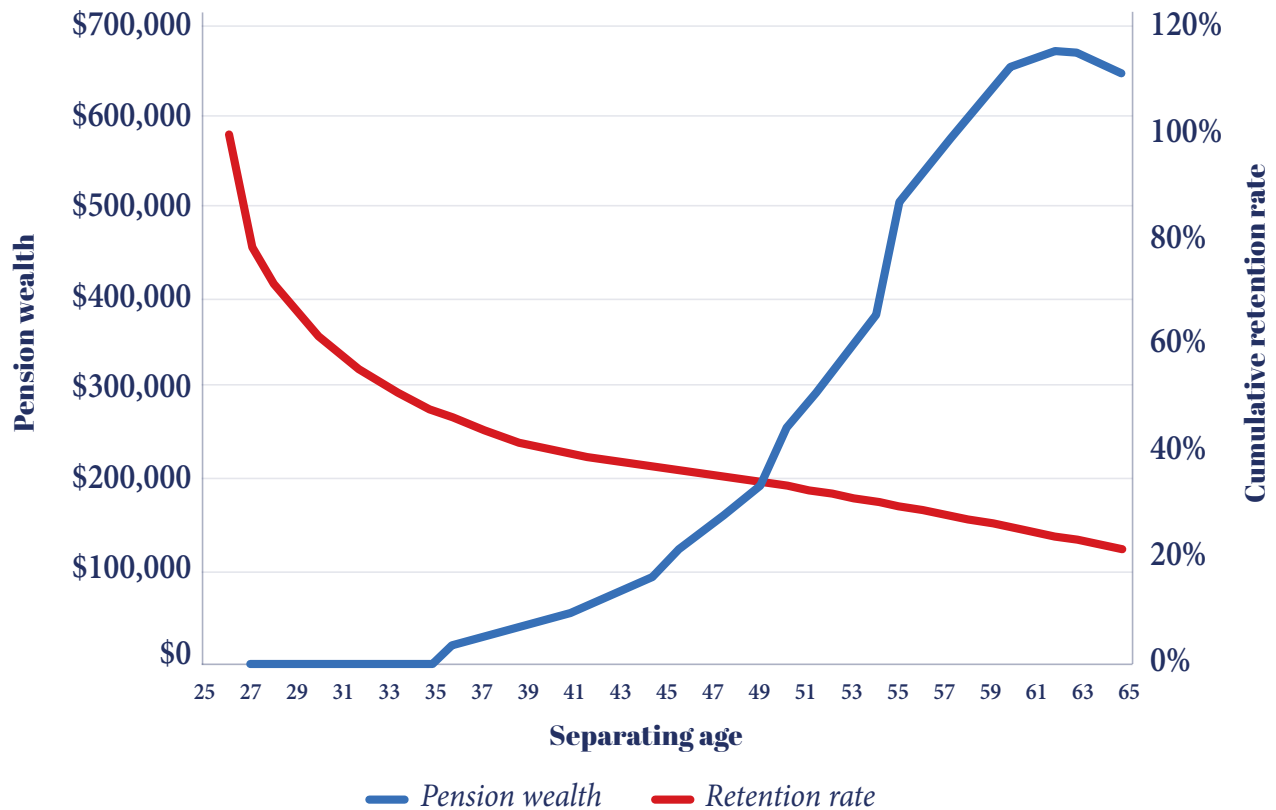
Withdrawal rates reported by CTRS reflect expected separations for retirement reasons other than death and disability

Source: Author's calculations based on withdrawal rates for female members that are reported in the CTRS's FY 2018 actuarial valuation report

Conclusion

Average salaries for teachers in Connecticut have been flat for many years. The estimated average annual salary of teachers in public K-12 schools in Connecticut, after adjusting for inflation, declined by about 2% between fiscal years 2000 and 2017.[24] Given that salaries are set at the district level and depend on factors such as years of experience, credentials and workload, we are limited in what conclusions can be drawn from averages. If any flattening of take-home pay has been going on, then one key suspect is pension costs.

The total cost of the plan nearly tripled from 13.64% of payroll to 34.77%. This increase was due to pension payments increasingly going to cover unfunded liabilities. Employer contributions were split evenly between unfunded actuarial liabilities and normal costs in fiscal year 2000. By fiscal year 2018, however, 76% of employer contributions went towards paying down unfunded liabilities while just 24% of contributions were for normal costs.

This pattern represents a significant cost in lost opportunities for current teachers. The state could have used resources devoted to paying down pension debt for purposes such as raising take-home pay for today's teachers. In the absence of rising costs due to unfunded liabilities, the state also could have deployed these resources in other areas, such as funding other educational areas, providing other public services, or lowering taxes.

Options for pension reform

Connecticut faces deep fiscal challenges from pension debt. In its defined benefit plan, contributions are not directly tied to benefits. Rather, contributions are based on actuarial projections of the plan's cost that rely on a set of assumptions about the plan's experiences such as investment earnings. A first-order policy need is to enact a plan that stops the fiscal bleeding and links contributions directly to benefits. A well-designed account-based retirement plan is one way to accomplish this goal. Examples include cash balance plans and defined contribution plans.

A cash balance plan, a type of defined benefit plan, provides notional accounts that guarantee some base return. The employer and employee both make contributions to the account, and the employer credits a return annually. The benefits are distributed more evenly across different separation points than back-loaded final-salary defined benefit plans such as the one examined in this paper. These plans can also be portable so that teachers who exit a system can take the balance of their account – employer plus employee contributions with credits – with them.

A defined contribution plan is another account-based plan. A 401(k) plan is a common example. As with a cash balance plan, the employer and employee make contributions that are deposited in a retirement account, and these funds are then invested and accrue interest.

When a teacher retires, the balance of his or her account can be withdrawn as a lump sum or converted into an annuity. The costs of these plans are more transparent than defined benefit plans, and the funding of these plans do not rely on as much guesswork about investment performance. In the case of a defined contribution plan, the plan is fully funded if contributions are made in full. This is unlike a defined benefit plan, which can be underfunded even if required contributions are made. To a lesser degree, cash balance plans also face risk of being underfunded if the pension fund's investment returns are less than credits applied to individual accounts.

Portability is a key feature of cash balance and defined contribution plans, meaning that teachers retain the right to the balances of these funds when they switch employers and leave the system. Thus, teachers who separate from service before reaching retirement eligibility, regardless of the reason or their own life circumstances, will not be penalized for leaving the system early.

Because of the link between benefits and contributions under account-based plans, benefits also tend to accrue in a more neutral manner than under a final-salary defined benefit plan, which accrues in a heavily backloaded manner. Account-based plans can be designed to temper or eliminate the underlying pull-push incentives for teachers to reach key retirement milestones regardless of their life circumstances. Alternative retirement designs such as

defined contribution plans can offer more neutral incentives with potential to induce workers, who might other-wise be pushed out early under a defined benefit plan, to remain in service at lower cost.

It is also possible to modify the current plan to increase portability for teachers and engineer benefits to accrue in a smooth manner. Pension plans for teachers in South Dakota and Wisconsin are examples of final-salary defined benefit plans that feature good portability and smooth accrual. The downside, however, is that contributions are not directly linked to pension costs. Therefore, stewards of defined benefit plans must take exceptional care in managing these costs. While the teacher pension plans for South Dakota and Wisconsin teachers are almost fully funded, the funding situation in Connecticut is dramatically different and warrants significant reform.

Public school teachers provide an important public service and did not individually create the funding problems that Connecticut faces. Rather than point blame, the state must confront its reality. The present fiscal climate will grow increasingly more severe without substantive change. Although the fiscal problems facing the state are very serious, they are also quite solvable. All teachers in Connecticut deserve a system that works for all of them.

What about the plan's pension debt?

Even if Connecticut can muster the political will to enact structural reforms for public employee pensions, any reform at best would merely "stop the bleeding." The state would still be on the hook for paying down the system's unfunded liabilities for decades to come. The recent re-amortization of the plan's unfunded liabilities extended this horizon even farther.

Chad Aldeman notes six options that states have for dealing with pension debt:[25]

- Take on more debt by issuing bonds
- Restructure debt
- Voluntary pension buy-outs
- Reducing pension benefits
- Wait and see if investment returns will fill the hole
- Find new sources of revenue.

The first two options have already been taken by Connecticut. None of these options are pleasant, and they come with risk such as potentially harming the state's credit rating.

There is one policy with myriad benefits that could generate savings which could be used for paying down pen-sion debt – expanding educational opportunity through educational choice. By enacting an educational choice program, such as an education savings account program, the state would expand educational options for families who may not be well served by the current public school system. When families exercise choice to access options outside of the public system, dollars shift from a high-risk system to a sector with less risk.

Private school choice programs are usually designed to save money. There have been 50 fiscal analyses that have estimated the fiscal effects of private school choice programs on various groups of taxpayers. Of these analyses, 45 estimated that choice programs generated net savings for taxpayers, four found programs were revenue neutral and one analysis estimated a net cost for taxpayers.[26]

Lueken (2018) estimated the net fiscal effects of 10 tax-credit scholarship programs in seven states on state and local taxpayers.[27] Using a broad range of cautious assumptions about switchers and accounting for variable cost savings, he estimated that these programs generated net savings worth between $1,650 and $3,000 per scholarship through fiscal year 2014.

Another study estimated the net fiscal effects of 16 private school voucher programs, finding that these programs on average generated $3,000 in net savings overall for state and local taxpayers.[28]

And these savings are generated by programs without harm to public school students. Research tends to find that public school students experience modest, albeit positive, benefits in the form of improved test scores. Of 26 studies examining the competitive effects of these programs, 24 find positive effects, one study found negative effects and one study was unable to detect any effects.

Expanding educational opportunity could serve as a release valve to help alleviate pressures from pension debt. Andrews and Lueken (2017) showed how an education savings account program could be designed to generate savings for Connecticut.[29] These savings could then be purposed to reducing pension debt.

For states such as Connecticut that face substantial budgetary challenges, finding ways to pay down debt will be immensely difficult for lawmakers. Policies that expand educational opportunity for families would benefit families and communities. States that enacted school choice programs typically did so to allow families to pursue the education environment they deem best to meet their children's needs. Many families have benefited from these programs. Although multiple policies will be needed to help Connecticut solve the pension problem, expanding educational opportunity should be included in its option set.

Structural reform of the state's teacher retirement system is a necessary condition for returning the state to fiscal stability. Yet even if such change is achieved, the state will still face a mountain of pension debt. Considering the alternatives, educational choice and the expansion of educational opportunity may be the most desirable policy to help tackle this problem.

Appendix

This paper analyzed how pension benefits accrue over time for a representative teacher. The measure used in the analysis, pension wealth, depicts these benefits as a lump sum that teachers would receive upon separation at a given point in their careers. It is not the annuity or monthly payment that teachers receive in practice. Rather, one's pension payment will be defined by a formula:

Annual Payment Benefit = (2%) x (Final Average Salary) x (Years of Service)

The table below shows the annuity and monthly payments associated with the pension wealth curves shown in the main body of the paper. The CTRS plan limits the amount of benefits to either 75% of final average salary or $3,600 per month. The analysis applies the former cap but not the latter. Applying the latter limit to the pension wealth analysis would have the effect of depressing the level of pension wealth in the last several years, though the accrual patterns would be similar to those shown in the paper. That is, it would not have an effect on the underlying incentives.

Table A: Present value of annuity and starting age for pension payments for female teacher entering CTRS at age 25, adjusted for inflation

Separation age	Annuity	Monthly payment	Age to draw pension
35	13,962	1,163	60
36	16,065	1,339	60
37	18,201	1,517	60
38	20,241	1,687	60
39	22,119	1,843	60
40	23,890	1,991	60
41	25,483	2,124	60
42	27,075	2,256	60
43	28,668	2,389	60
44	30,261	2,522	60

Separation age	Annuity	Monthly payment	Age to draw pension
45	22,297	1,858	55
46	23,412	1,951	55
47	24,527	2,044	55
48	25,642	2,137	55
49	26,757	2,230	55
50	19,908	1,659	50
51	22,361	1,863	51
52	24,941	2,078	52
53	27,649	2,304	53
54	30,484	2,540	54
55	40,613	3,384	55
56	43,448	3,621	56
57	46,379	3,865	57
58	49,405	4,117	58
59	52,526	4,377	59
60	55,743	4,645	60
61	57,336	4,778	61
62	58,929	4,911	62
63	59,725	4,977	63
64	59,725	4,977	64
65	59,725	4,977	65

Source: Author's calculations

Bio

Martin Lueken is the director of fiscal policy and analysis for EdChoice, where he focuses on research and analysis of issues that pertain to school choice bills, current programs, and school funding. His work includes providing expert support and advice for policy makers in helping understand the fiscal impact of current school choice programs and potential fiscal effects of programs introduced in state legislatures. He has provided expert testimony and advice about fiscal issues for numerous states that have introduced education choice legislation. His work has been mentioned in various media and education-specific outlets, including The New York Times, The Wall Street Journal, Education Next, Education Week, and The 74.

Marty holds a doctorate in Education Policy from the University of Arkansas, a master's degree in Economics from the University of Missouri, and a bachelor's degree in Physical Education from Eastern Illinois University. He taught English for five years in Japanese public elementary and middle schools.

Endnotes

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[5] Based on the most current actuarial valuation, average pay for active members in CTRS with 25-29 years of service and age 55 to 59 is almost $100,000.
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[6] Marc E. Fitch, "Connecticut pension funding declines 10 percent in seven years," Yankee Institute for Public Policy, https://yankeeinstitute.org/2019/07/23/connecticut-pension-funding-declines-10-percent-in-seven-years/, (July 23, 2019).

[7] The employer contributions reported in this brief are from CTRB actuarial valuation reports. These figures do not include costs for debt service for the pension obligation bond issued on behalf of the TRS in 2008. Debt service costs are funded through the Office of the State Treasurer's Debt Service account and will continue for the life of the bond until 2032. Debt service cost for fiscal year 2019 is $118 million and will increase to $203 million for fiscal year 2022. For further information, please see: Office of Fiscal Analysis, Connecticut General Assembly (2018). "OFA Fiscal Accountability Report: FY 19 - FY 22," (November 15, 2018), https://www.cga.ct.gov/ofa/Documents/year/FF/2019FF-20181115_Fiscal%20Accountability%20Report%20FY%2019%20-%20FY%2022.pdf.

[8] Robert M. Costrell, "Employer Contributions Per Pupil for Retirement Benefits: U.S. Public Elementary and Secondary Schools, teachers & other employees, 2004-2018," http://www.uaedreform.org/downloads/2017/12/employer-contributions-per-pupil-6-8-18.pdf.

[9] For further details about the decomposition of these rising costs, please see:
Robert M. Costrell, "Why Did the Costs of Connecticut Teachers' Pensions Rise So Much?", paper presented at the 40th annual Association for Education Finance and Policy Conference, Feb. 26, 2015, Washington, D.C., http://www.uaedreform.org/downloads/2015/07/why-did-the-costs-of-connecticut-teachers-pensions-rise-so-much.pdf

[10] The system released an actuarial valuation report for FY 2018 prior to passage of HB 7424 and reported that the total contribution rate for the system was 38.04%, unfunded actuarial liabilities rate was 27.50% and total normal cost rate was 10.54%. The updated valuation reported a lower total cost rate of 34.77%, lower unfunded actuarial liabilities rate of 21.04% and higher total normal cost rate of 13.73%. The report did not explain these differences.

[11] Beginning with the June 30, 2018 actuarial valuation, the employer contribution rate is set as though members contribute 6% of pay instead of 7%. Thus, the employer contribution rate for fiscal year 2018 was 32.04% instead of 31.04%.
Cavanaugh Macdonald Consulting LLC, *Connecticut State Teachers' Retirement System Actuarial Valuation as of June 30, 2018*, page 11. https://www.ct.gov/trb/lib/trb/forms/statisticsresearch/SR_ACTVAL18.pdf.

[12] Based on the FY 2018 actuarial valuation released prior to HB 7424, the share of employer costs devoted to unfunded actuarial liabilities and normal costs would have been about 90% and 10%, respectively.

[13] Examples of rigorous studies include:
Jay P. Greene, Heidi H. Erickson, Angela R. Watson, and Molly I. Beck, "The play's the thing: Experimentally examining the social and cognitive effects of school field trips to live theater performances." *Educational Researcher* 47(4), pp. 246-254, (2018), https://journals.sagepub.com/doi/abs/10.3102/0013189X18761034.
Daniel Bowen and Kisida, Brian, *Assessing the Impact of the Holocaust Museum Houston's Field Trips on Adolescents'*

Civic Values, (2017), http://dx.doi.org/10.2139/ssrn.3000551.

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[15] Robert M. Costrell and Michael Podgursky, "Peaks, cliffs, and valleys: The peculiar incentives in teacher retirement systems and their consequences for school staffing," *Education Finance and Policy,* 4(2), pp. 175-211, (2009), https://doi.org/10.1162/edfp.2009.4.2.175.

[16] I assume our teacher works full time and has a bachelor's degree her first five years and a master's degree after five years. I also assume no adjustments for longevity or other add-ons that may be used to calculate final average salary for pension benefits.

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[18] Note that after netting out the teacher's cumulative contributions, the accrual pattern displayed in the figure will remain the same and the level of the curve will shift lower.

[19] Table A in the appendix provides the present value of the annuity, monthly payments and age when pension payments commence for each year of separation.

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[23] For example:

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[29] Lewis M. Andrews and Martin F. Lueken, "*Education Savings Accounts: Empowering Kids and Saving Money in Connecticut*," Yankee Institute for Public Policy, https://yankeeinstitute.org/wp-content/uploads/2017/10/Yankee-Study-ESA-Study-2017-no-marks-1.pdf, (September 2017).