CENTER for RETIREMENT RESEARCH at BOSTON COLLEGE

LEGACY PENSION DEBT REPORT: CONNECTICUT TEACHERS' RETIREMENT SYSTEM

Center for Retirement Research at Boston College

SPECIAL REPORT
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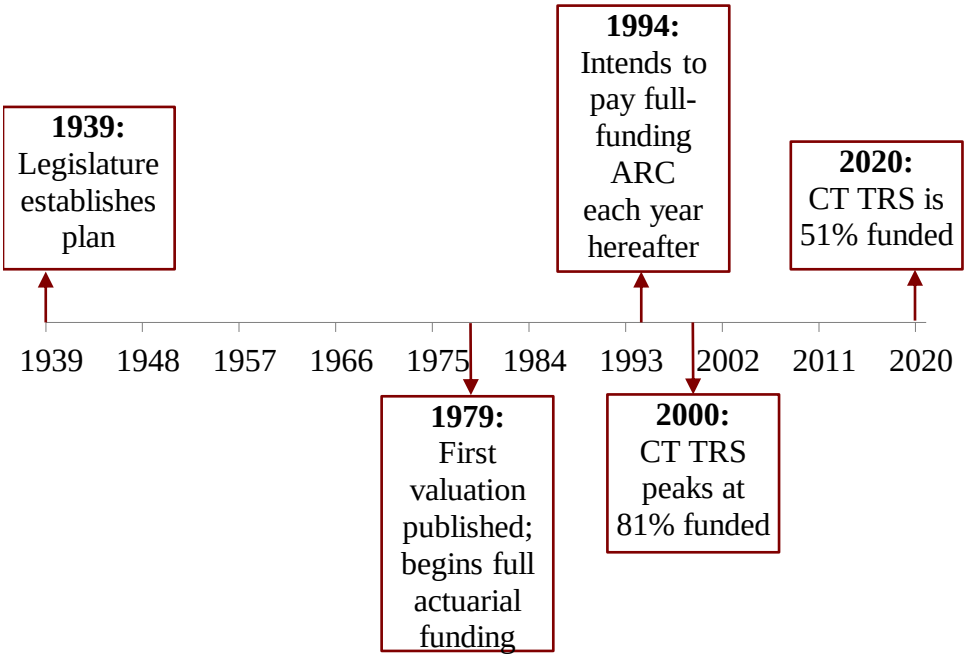
Legacy Pension Debt Report:
Connecticut Teachers' Retirement System

This goal of this report on the Connecticut Teachers' Retirement System is twofold. The first is to highlight the extent to which the plan's current unfunded actuarial liability reflects unfunded liabilities that existed before modern actuarial funding practices were adopted. The second goal is to present a new funding approach that separates the funding of these legacy liabilities from other pension liabilities while valuing liabilities in a manner more consistent with modern accounting and finance. The hope is that separating historical pension debt from ongoing pension liabilities provides a clearer way forward for government employers, employees, and taxpayers.

I. A Brief Overview of the Funding History

The Connecticut Teachers' Retirement System (CT TRS) has provided benefits to its members since at least 1939 but only initiated actuarial funding in 1979 (see Figure 1). The long period of promising benefits without a policy for prefunding those benefits resulted in a $2.3 billion legacy pension debt in 1979 that is a still a burden on CT TRS today.

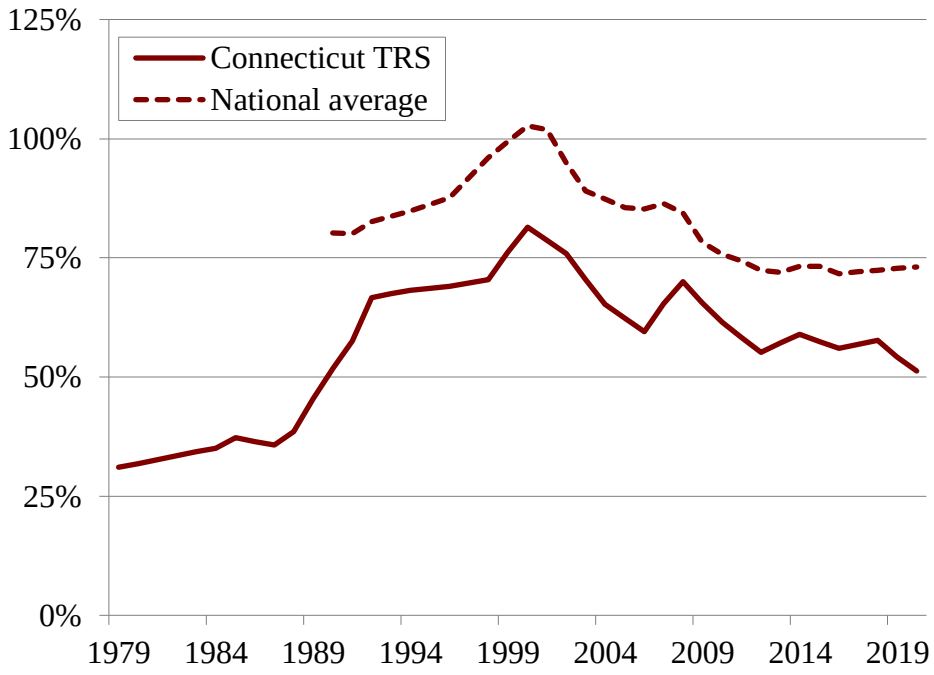
Figure 1. *Timeline of Key Funding Events for CT TRS, 1939-2020*



Sources: CRR calculations based on various financial reports for CT TRS.

Currently, about $12.6 billion – or about 70 percent of CT TRS's total unfunded liability – is due to legacy debt.[1] Partly due to the late transition to actuarial prefunding, the funded status for CT TRS has consistently lagged that of the average state and local pension plan (see Figure 2).

Figure 2. *Funded Ratio of CT TRS Compared to the National Average, 1979-2020*



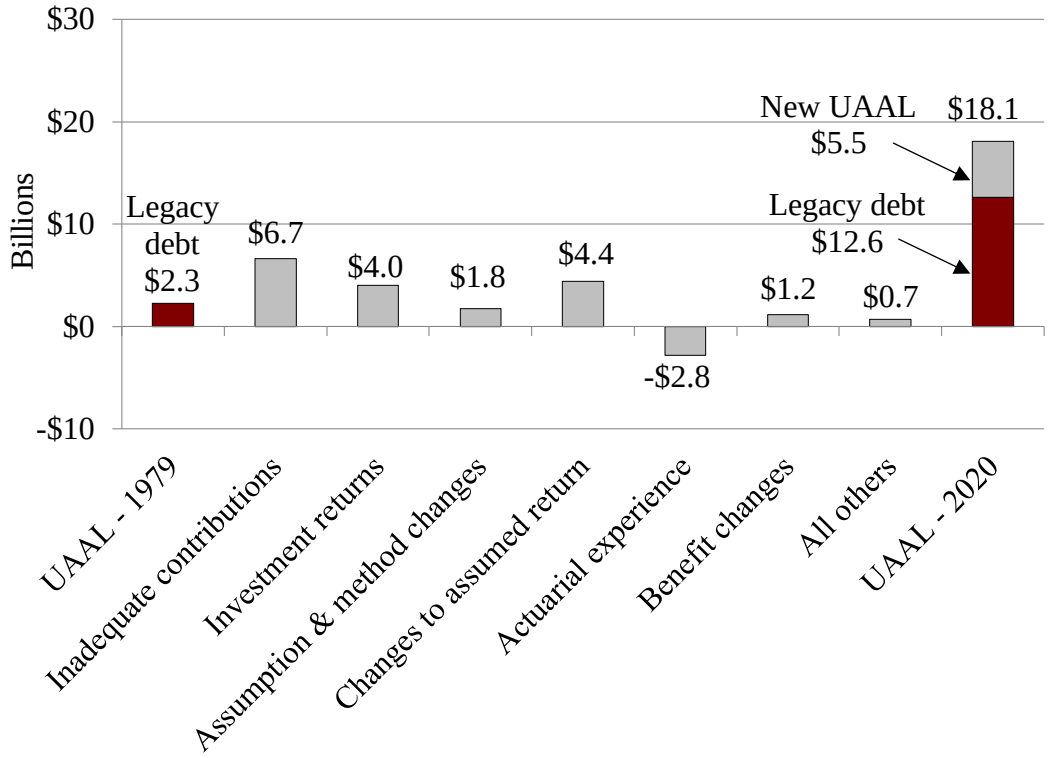
Note: Missing data points estimated using straight-line interpolation between actual data points.
Sources: CRR calculations based on various financial reports for CT TRS; Zorn (1990-2000); and the *Public Plans Database* (2001-2020).

II. Sources of the Current Unfunded Liabilities

The increase in CT TRS's total unfunded actuarial accrued liability (UAAL) since 1979 is due to a number of factors shown in Figure 3.

[1] See Aubry (2022) for a complete description of how Legacy Debt is calculated. Technically, the calculation is as follows. First, the initial debt in the legacy system is rolled forward each year using a standard formula for tracking growth in unfunded liabilities: legacy liability (t) = legacy liability(t-1) + interest on legacy liability(t-1) – apportioned amortization payment (t) + apportioned actuarial gains and losses on the accrued liability (t). Then, the annual accrued liability for the ongoing system equals the retirement system's reported accrued liability in the year minus the estimated legacy liability. The amortization payment apportioned to legacy debt in each year is based on the relative sizes of the prior year's: 1) legacy liability; and 2) the additional unfunded accrued liability in the ongoing system. The gains and losses apportioned to the legacy debt each year are based on the relative sizes of the prior year's: 1) legacy liability; and 2) the additional accrued liability in the ongoing system. In general, this approach results in legacy liabilities growth that is similar to the growth in total unfunded liabilities over time (minus the impact of investment performance).

Figure 3. *Sources of Change to UAAL for CT TRS, 1979-2020*



Sources: CRR calculations based on various financial reports for CT TRS.

Inadequate Contributions. Paying down unfunded liabilities is a two-step process. First, the amortization payment calculated by the actuary must truly reduce the unfunded liability. Second, the sponsor (the State of Connecticut) must actually make the full payment. Since 1979, failures in both areas have resulted in a combined $6.7 billion increase in CT TRS's unfunded liabilities.

Figure 4 presents three contribution amounts for CT TRS from 1979 to the present: 1) actual employer contributions; 2) the calculated actuarially required contributions (ARC); and 3) the minimum contributions required to keep the unfunded liability from growing in dollar terms.[2]

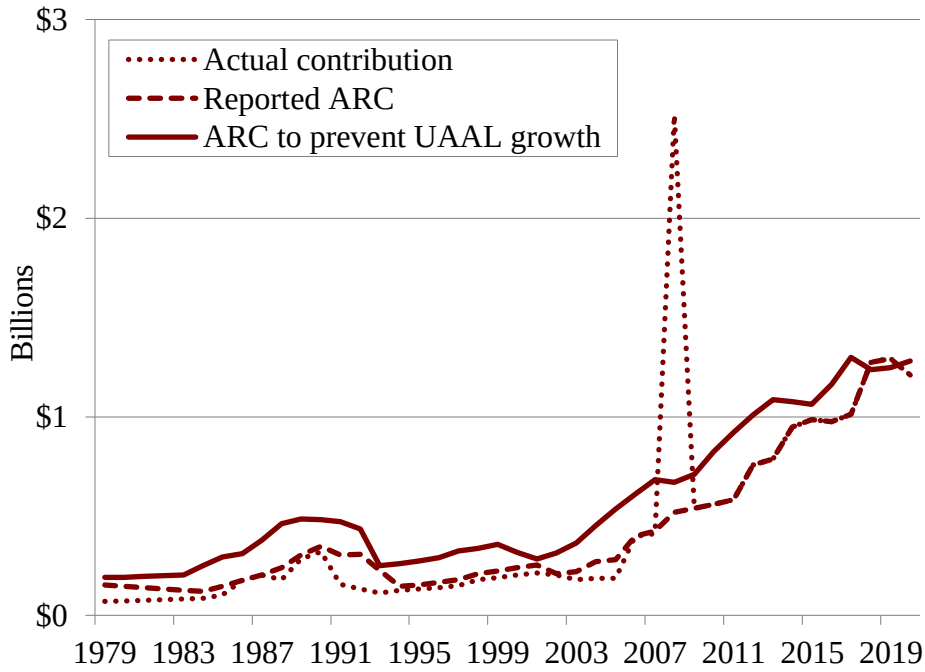
Like many other retirement systems, the calculated amortization payment for most of CT TRS's history has been based on the level-percent approach, which backloads progress toward paying down the unfunded liability. However, beginning with the June 30, 2024, valuation, the calculated amortization payment is scheduled to shift to a level-dollar approach, which frontloads progress towards paying down unfunded liabilities.[3] On the payment side, CT TRS

[2] See Munnell, Aubry, Hurwitz (2013) for details on the various amortization methods used by state and local retirement systems and their impact on funding and contributions.

[3] Another key aspect of the amortization payment is the date at which the unfunded liability is to be fully paid off. From 1979-1992, TRS annually reset its 40-year horizon. Then, in 1992, TRS set the amortization date to 2032. In 2020, that goal was shifted from 2032 to 2048 for existing unfunded liabilities – with any new unfunded liabilities to be paid off within 25 years of when the UAAL occurred. By relaxing its funding goal, TRS reduces the ARC relative what would otherwise be required.

received less than the calculated actuarial contributions for most of the period between 1979 and 2006.[4] But, since 2006, CT TRS has received the calculated ARC in full.

Figure 4. *ARC, Contribution to Prevent UAAL Growth, and Actual Contributions for CT TRS, 1979-2020*



Note: 2008's payment includes $2 billion in pension obligation bonds.
Sources: CRR calculations based on various financial reports for CT TRS.

Assumed and Actual Investment Returns. One of the more impactful and contentious actuarial assumptions for public pensions is the rate used to discount promised benefits. For virtually all public plans, this rate is the long-term investment return.[5] A lower assumed return produces higher reported liabilities and required contributions, while higher assumed returns produce the opposite. But, when actual returns fall short of expectations, additional unfunded liabilities (requiring higher contributions) result.

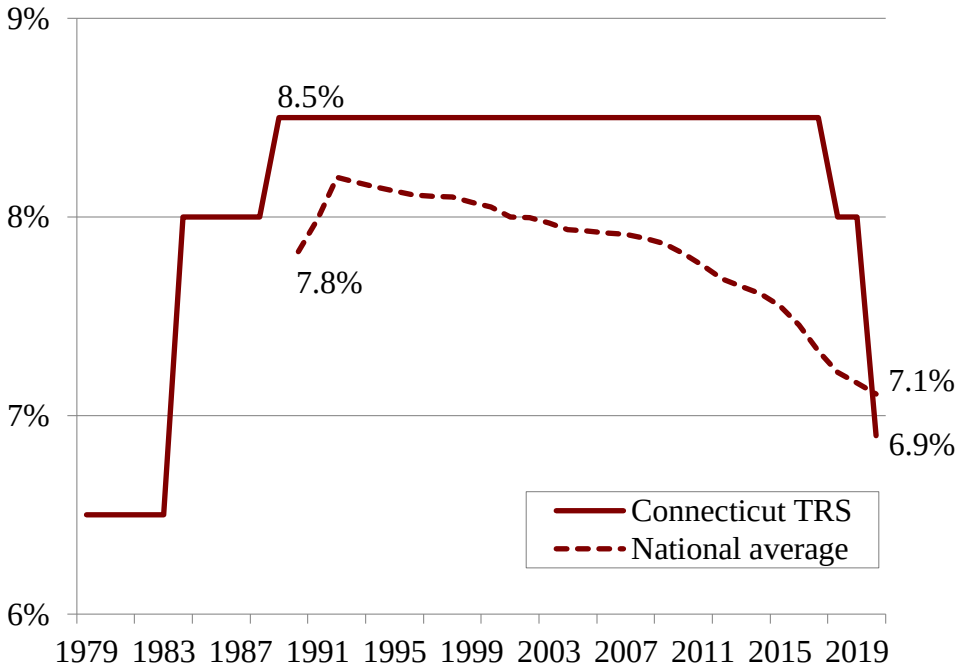
To date, the general path of the assumed return for CT TRS has been similar to that of most retirement systems (see Figure 5). CT TRS experienced an initial period of rising assumed rates of return in the 1970s and 1980s as the pension fund shifted from an investment portfolio

[4] To ease the initial transition from pay-go to prefunding benefits, State statute provided a ramp-up schedule to full payment of the ARC by 1993. But, then, in many of the years between 1993 and 2006, CT TRS did not receive the full ARC.

[5] Single-employer plans in the private sector use the interest rate on investment-grade corporate bonds to value future benefits because, it is presumed, the risk of default on corporate bond payments is similar to the risk of default on payment of corporate pension benefits. Unlike these private sector plans, public pensions use the actuarially assumed rate of return on their investments as the discount rate to value liabilities. Thus, investing in riskier assets that increase the expected return for the investment portfolio also reduces the reported value of benefits and, consequently, the actuarially required contribution.

consisting of predominantly bonds to one allocated toward equities. Assumed returns were relatively steady from the late 1990s to the mid-2000s, before a period of rate reduction in the wake of the Global Financial Crisis (GFC).[6] On net, the various adjustments to the assumed return have increased CT TRS's liabilities by $4.4 billion since 1979.

Figure 5. *Assumed Return for CT TRS Compared to the National Average, 1979-2020*

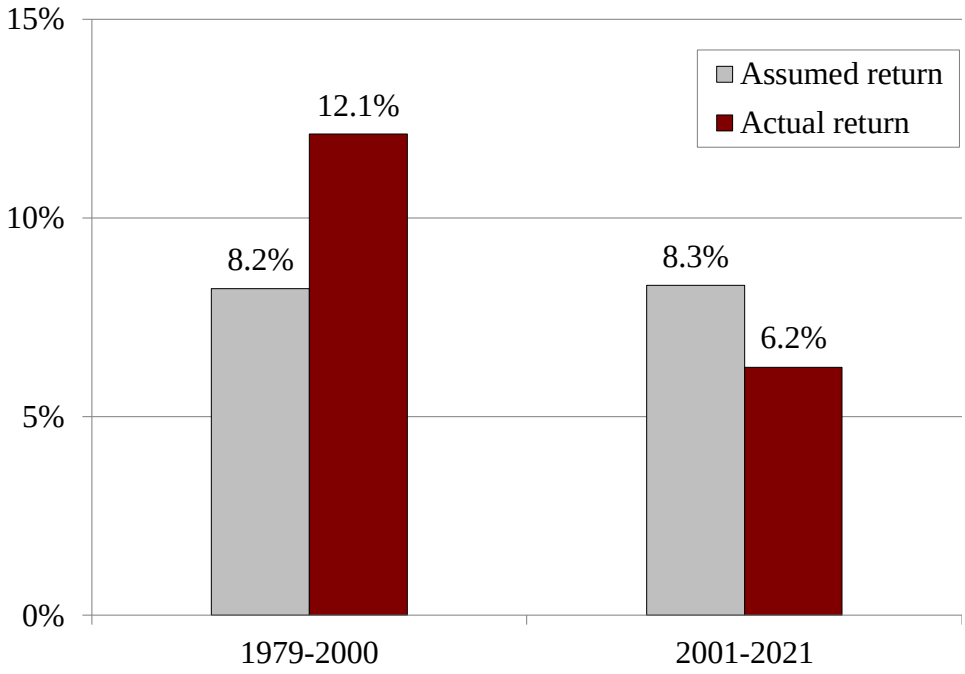


Sources: CRR calculations based on various financial reports for CT TRS; PENDAT (1990-2000); and *Public Plans Database* (2001-2020).

Looking back, the historical investment return for CT TRS has also been similar to that of most public retirement systems – returns generally exceeded assumptions prior to 2000 and fell short afterward (Figure 6). The differences between the actual and assumed returns have generated $4.0 billion in unfunded liabilities since 1979.

[6] See Aubry and Wandrei (2019) for details on how, for many state and local government retirement systems, a decline in their assumed return masks an increase in the assumed *real* (i.e., net of inflation) return, which lowers costs.

Figure 6. *Annualized Returns for CT TRS, 1979-2000 and 2001-2021*

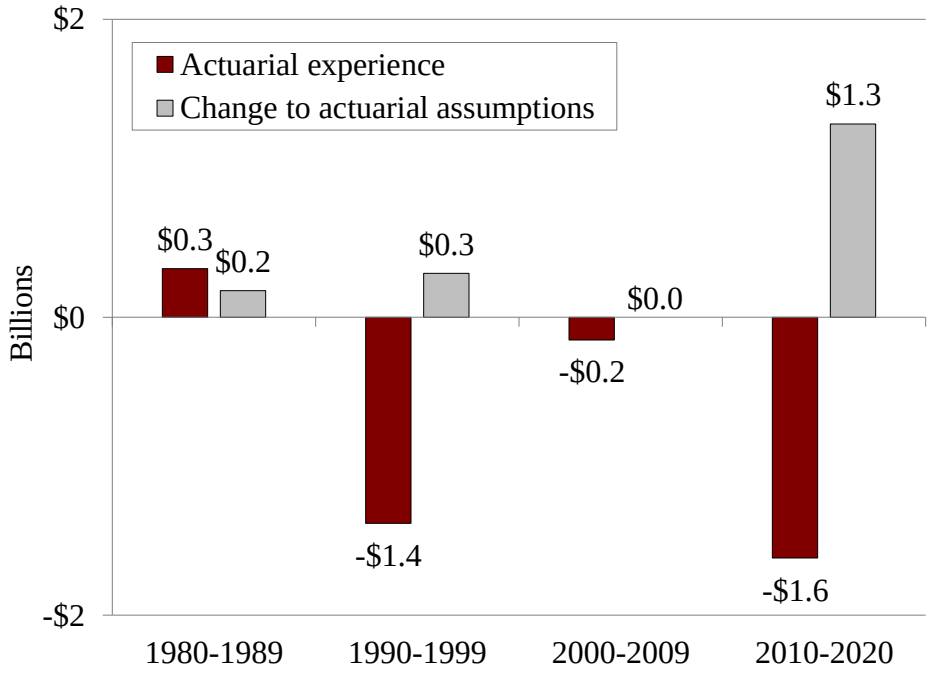


Sources: CRR calculations based on various financial reports for CT TRS; PENDAT (1990-2000); and *Public Plans Database* (2001-2020).

Demographic Assumptions and Actual Experience. In addition to the assumed return, the value of liabilities depends on a series of assumptions about plan members' future pay, tenure, retirement age, and mortality. To the extent that the experience of plan members deviates from these assumptions in ways that increase future benefits (e.g., retirees living longer than assumed), unfunded liabilities will arise.

The data show that while the changes to demographic assumptions tended to increase expected liabilities, the actual activity of CT TRS members relative to assumptions tended to produce lower-than-expected liabilities (see Figure 7).

Figure 7. *Change in UAAL for CT TRS from Actuarial Experience and Assumptions, 1980-2020*



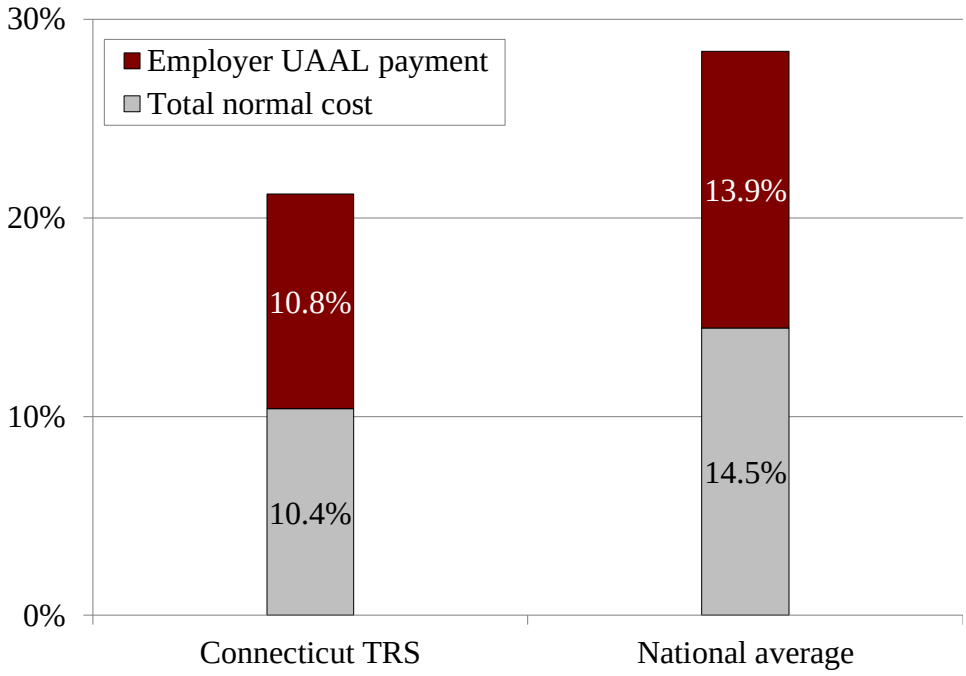
Sources: CRR calculations based on various financial reports for CT TRS.

Benefit Changes. Like most other state and local government retirement systems across the U.S., the benefits provided by CT TRS were mostly expanded throughout its history leading up to the GFC. Unlike most other retirement systems, CT TRS made only minimal cuts to benefits in the wake of the GFC by limiting the COLA.

As a policy response, minor benefit reforms make sense because very little suggests that overly generous benefits were a primary reason for the rise in CT TRS's unfunded liabilities and costs. Prior to the benefit cuts, the cost of the benefits earned each year by members – the normal cost – was below average (see Figure 8).[7] And government agencies that cut benefits to control costs without carefully assessing the competitiveness of public sector compensation risks under-compensating workers, which eventually leads to understaffing or a lower quality workforce.

[7] Members of CT TRS are among the roughly 25 percent of state and local workers nationwide who are not covered by Social Security. For more on the retirement benefits of state and local workers who are not covered by Social Security see Aubry et al (2022).

Figure 8. *Actuarial Costs for CT TRS Compared to the National Average, 2009*



Note: The actuarial costs for CT TRS are based on an 8.5-percent discount rate, while the average for PPD plans is 8.2 percent.
Sources: CRR calculations based on the *Public Plans Database;* and various financial reports for CT TRS.

The bottom line, however, is that a $2.3 billion liability inherited from before modern actuarial funding was adopted has grown to $12.6 billion since then. This raises questions about how these liabilities should be managed going forward. The next section proposes a new approach that separates the funding of legacy liabilities from other pension liabilities, while valuing liabilities in a manner more consistent with modern accounting and finance. Hopefully, it provides a clearer way forward for government employers, employees, and taxpayers.

III. A New Approach

The current approach for managing pension liabilities suffers from three problems:

1. *It does not recognize the unique aspect of legacy liabilities.* The current approach to actuarial funding allocates the costs of pension benefits to the period when the benefit was promised and earned, which limits the spillover costs from one generation to the next.[8] Legacy liabilities do not fit this framework. Choosing any single future generation

[8] Each year, government workers earn a higher promised retirement benefit because of increases inboth their salaries (on which their benefit payouts are based) and their years of tenure in government (which determine the percentage of their salary they receive as a benefit payout). Each year's normal cost represents the current value of that increase in promised future benefits to workers. In theory, paying the normal cost would result in each generation paying for promised benefits as they are earned. In practice, however, the value of future benefits is impossible to determine precisely. and additional contributions are typically required in later periods to ensure the cost of benefits earned in prior periods does not spill too far into other generations.

to bear the full cost of legacy liabilities is arbitrary because no future generation is more responsible for the legacy debt than any other.

2. *It attributes the costs associated with historical liabilities to current workers.* Actuarially required pension contributions consist of two parts: 1) the cost of benefits earned due to continued employment (the normal cost); and 2) the cost of unfunded benefits from the past (the amortization payment). The normal cost is variable; the amortization payment is fixed. To improve resource allocation and decision making, managerial accounting differentiates between fixed and variable costs. However, government managers often view both the fixed and variable components of pension costs as a single variable cost.

3. *It uses assumed investment returns to value future benefits*. Using the assumed return to value benefits understates their cost and likely pushes some of that cost onto future generations.[9] Modern finance theory maintains that the value of a government's promise to pay future benefits should resemble the value of other similar government promises of future payments.[10] The obvious candidate is municipal bonds which require the issuing government to promise to make payments to bondholders.[11]

To address these issues, this *brief* suggests a new approach that:

1. adopts modern finance techniques by using the average yield on investment-grade municipal bonds (after adjusting for tax exemption) to calculate liabilities and required contributions;[12]
2. treats unfunded liabilities and normal costs as fixed and variable costs, respectively; and
3. separates legacy unfunded liabilities and spreads the costs over multiple generations.

At a high level, the new approach presents a trade-off. One the one hand, it increases annual pension costs by appropriately valuing promised benefits to limit unintended generational spillover. On the other hand, it reduces the annual costs of legacy liabilities by spreading them over multiple generations. So, while the new approach involves a more rational allocation of costs, it is not obvious how it will affect annual costs overall. Figure 9, which compares the new approach with the required contributions for a more typical actuarial approach, reveals that

[9] For more details, see Bronner, et al. (2008); Bader and Gold (2003); Gold and Latter (2008); Novy-Marx and Rauh (2009a); and Arnott (2005).

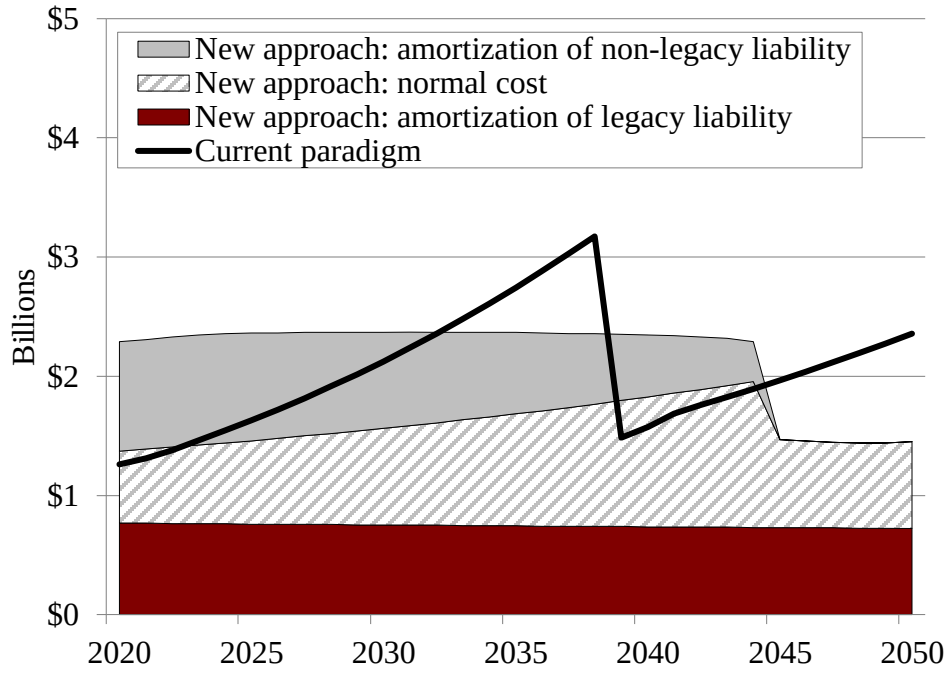
[10] In economics and finance, the analysis of choice under uncertainty identifies the discount rate for riskless payoffs with the riskless rate of interest. See Gollier (2001) and Luenberger (1997). This correspondence underlies much of the current theory and practice for the pricing of risky assets and liabilities, and the setting of risk premiums. See Sharpe, Alexander, and Bailey (2003); Bodie, Merton, and Cheeton (2008); and Benninga (2008).

[11] Ideally, the discount rate would reflect the risk of the liabilities themselves, would be based on fully taxable securities (because pension benefit payments are, generally, subject to individual federal income tax), and would not have a premium for liquidity (because promised pension payouts cannot be easily traded on the open market).

[12] Novy-Marx and Rauh (2009b) employ a *state specific* taxable municipal bond rate based on the zero-coupon municipal bond curve. Their rationale is that states are equally likely to default on their pension obligations as on their other debt.

contributions under the new approach are initially higher but ultimately lower and much more consistent.[13]

Figure 9. *Projected Contributions for CT TRS, by Approach, 2020-2050*



Source: CRR calculations.

Separating fixed historical costs from ongoing variable costs also has important implications for how government agencies and the public view the cost of government workers. To illustrate, Figure 10 presents the perceived variable retirement costs for members of CT TRS under the current paradigm and under the new approach. Even though the cost of accruing retirement benefits (the normal cost) is higher under the new approach, excluding fixed amortization costs

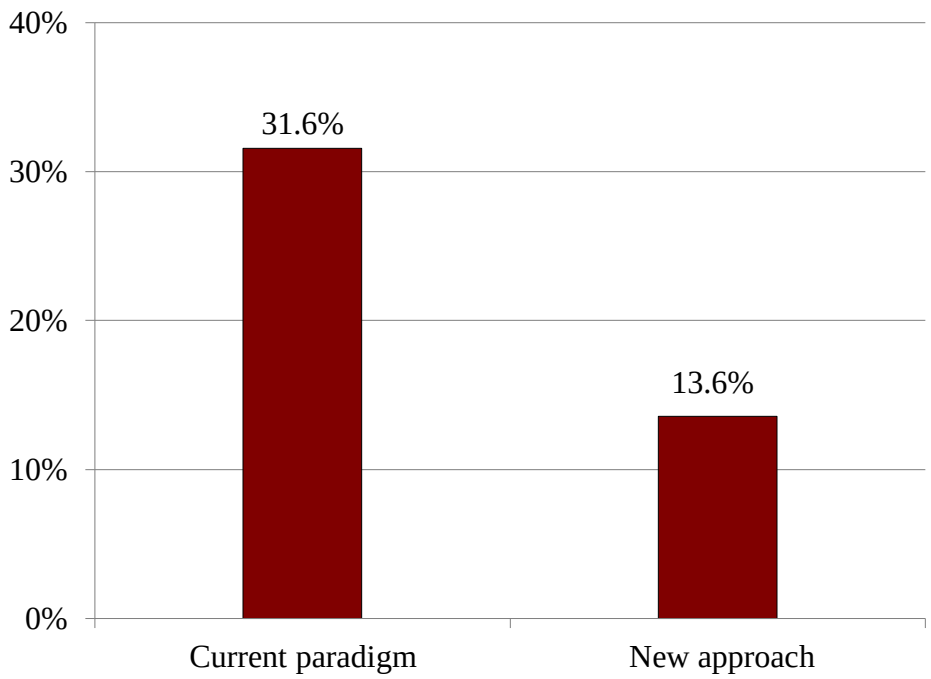
[13] Under the typical actuarial approach, contributions are based on pension benefits valued using the actuarially assumed return. Amortization payments reflect a 25-year level-percent-of-payroll approach (assuming 2-percent payroll growth) that is closed initially and rolling afterward.

Under the new approach, contributions are based on pension benefits valued at a 4.5-percent discount rate (using an actuarial rule of thumb that every 1-percent reduction in the discount rate increases liabilities by 12.5 percent and normal costs by 22.5 percent). Amortization payments reflect a 4.51-percent interest payment on legacy liabilities (to pay a tiny fraction of the principal on the legacy debt each period), a closed 25-year level-dollar amortization of current non-legacy liabilities, and a 10-year level-dollar amortization of any new non-legacy liabilities.

In terms of investment performance, realized investment returns are assumed to be 5.5 percent annually. A higher return would lower costs under both the typical and new approaches but would not materially change the cost difference between the two. Importantly, the average annualized return for public plans since 2001 has been roughly 6 percent. Additionally, Aubry and Crawford (2019) suggest that some of the investment risk taken by public pensions is related to the fact that actuarial contributions are based on the expected return to the portfolio. Under the new approach that uses bond yields to value benefits, public pension asset allocation would likely be more similar to the average allocation of large active private sector pension plans. Based on a 2019 CAPM produced by Pension Consulting Alliance, such an allocation produces an average expected return and standard deviation of 5.5 percent and 7 percent, respectively.

appropriately reduces the retirement cost associated with the ongoing employment of government workers.

Figure 10. *Perceived Variable Retirement Cost for CT TRS, by Approach*



Notes: Retirement cost under the current paradigm is equal to the employer normal cost plus UAAL valued using the assumed return. Retirement cost under the new approach is equal to the total normal cost valued using a 4.5-percent discount rate, less employee contributions.
Source: CRR calculations.

Implementing the New Approach in Practice

As noted in the prior section, a key feature of the new framework is making a clear distinction between the fixed legacy cost from benefits earned in a much earlier era and the costs stemming from benefits earned by more recent cohorts. Structurally, the best way would be to break the existing retirement system into two separate entities – the Legacy System and the Pension System.[14]

[14] The Legacy System would begin with no assets and all the legacy liability while the Pension System would begin with all the retirement system assets and all the non-legacy liability. To pay down the legacy liability over as many generations as possible, government employers would make payments to the Legacy System that are only slightly greater than the annual interest accruing on the legacy liability. To fund non-legacy liabilities, normal costs plus amortization of non-legacy liabilities would be contributed to the Pension System. The current non-legacy liability could be amortized within roughly a generation's time – say, 25 years. (The average amortization period in the Public Plans Database is about 23 years.) Any future unfunded liabilities could be amortized over the average work life of plan members – currently, about 10 years. Finally, annual benefits to current retirees would be paid from the government contributions to the Legacy System first and then from Pension System assets. Importantly, most of the management of the original retirement system – e.g., the retirement board, actuarial staff, investment staff, member services staff, etc. – would transfer to the Pension System. The main purpose of the Legacy System's board and

Creating a totally separate government entity for managing the legacy liability would reduce the distorting effect that these liabilities have on the policy discourse around benefit generosity and the Pension System's management. Specifically, it would free the Pension System from constantly answering for a relatively intractable portion of the unfunded liability, allowing it to focus on the best way to manage ongoing liabilities. Second, two separate systems would make the distinction between fixed and variable costs clearer to government employers because they would be charged fixed legacy debt payments from one entity – the Legacy System – and a per-employee retirement cost from another entity – the Pension System.

Of course, the new approach presents a relatively dramatic shift in pension funding policy that would raise concerns for some. For example, the use of bond yields to value liabilities will increase reported liabilities, which some may take as an indication of worsening plan finances. In reality, little about the retirement system's finances will have changed – asset levels, the promised benefit payouts, and the contractual obligation to fulfill promised benefits are the same.[15] Another concern might be that the use of bond yields may suggest that retirement systems should invest only in bonds.[16] But, public pensions could still take risks in their investment portfolios under the new approach.[17] Even among the largest private sector pension plans, which are required to use corporate bond rates to calculate liabilities and required contributions, equities still make up over half of the average investment portfolio.[18]

Finally, some may simply dislike the notion of deliberately lengthening the pay down of some pension liabilities. But, given that promised benefits must be paid – and it is unrealistic to think unfunded liabilities can be paid down more quickly – this new approach provides a practical way forward. It relies on a rational allocation of costs that recognizes the full cost of promised pension benefits while presenting a credible plan for managing the cost. Although the new approach would increase costs somewhat, it would improve intergenerational fairness, produce better resource allocation by government, and ultimately enhance public credibility.

IV. Conclusion

This *Report* takes a historical look at public pension underfunding to motivate a more transparent funding policy going forward. It hinges on a key finding – that CT TRS is still burdened by unfunded liabilities accumulated before modern actuarial funding began. This legacy debt poses

staff would be to charge the government for legacy liability payments and then disburse those payments to pay annual retiree benefits.

[15] At the same time, using bond yields may discourage the use of pension obligation bonds for so-called investment arbitrage.

[16] The problem with this argument is that it assumes an extreme degree of risk aversion. If sponsors of public plans were averse to all risk, they would require the pension funds to hold only Treasury securities. But, if sponsors are willing to take at least as much risk as the average investor, the premiums on stocks and bonds cover their cost of holding these investments. See Munnell et al (2010) and Bader and Gold (2007) for further discussion on the implications that modern finance valuations have on investment decisions.

[17] Assets in the pension system trust fund would likely be invested more like those of a large private sector plan, while the assets in the Legacy Fund would be held in cash or invested in short-term liquidity so that they could be used immediately to pay benefits.

[18] Following modern finance theory, the discount rate used to value the liabilities of private sector pension plans is based on the yield for investment-grade corporate bonds. See Andonov, Bauer, and Cremers (2017) and Rauh (2009) for prior analyses on pension asset allocation.

a different policy challenge than other sources of unfunded liability, because legacy debt reflects the cost from an older way of managing promised retirement benefits. And, because it stems from a much earlier era, it does not fit within a modern actuarial framework that is designed to allocate costs to the period when benefits are earned.

Given the challenges that legacy debt poses to current funding policy, this *Report* presents a new approach that separates the funding of legacy liabilities from other pension liabilities, while valuing liabilities in a manner more consistent with modern accounting and finance. Ultimately, the new approach presents a trade-off. It increases annual pension costs by appropriately valuing the government's promise to pay future benefits in retirement. At the same time, though, it reduces the annual costs of legacy liabilities by appropriately spreading them over multiple generations. So, while the new approach will increase costs somewhat, it involves a more rational allocation of costs that results in improved intergenerational fairness, better resource allocation by government, and – ultimately – greater public credibility.

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