APPENDIX 2

REFORM THE TEACHERS RETIREMENT SYSTEM

Key Recommendations:

- **Building on the 2017 SEBAC deal, implement legislation to revise the benefit structure, funding policy and amortization schedule for the Teachers Retirement System ("TRS"), in exchange for the contribution of a 30-year stream of the State's lottery net income to reduce TRS's unfunded liabilities and its annual required contribution ("ARC").**

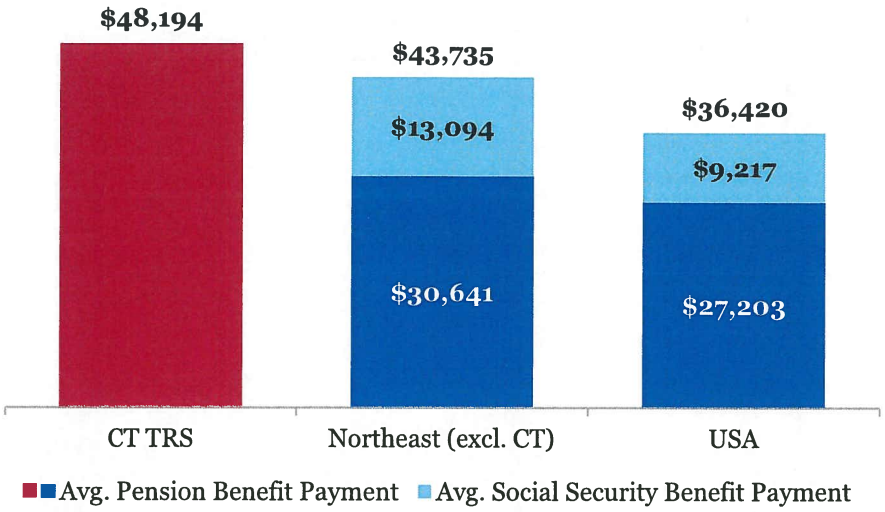
Rationale:

Three key factors determine the overall health of any pension system – the amount and timing of benefits to be paid to employees and retirees, the balance of assets in and ongoing cash contributions made by plan sponsors to the fund, and the returns on the fund's invested assets. A confluence of historical issues related to each of these factors has caused Connecticut's two main pensions, SERS and TRS, to be financially challenged. As a result, the contributions now required to be made to these two systems have placed significant pressure on Connecticut's budget and are crowding out spending on other programs. The following section addresses these issues and the Commission's recommendations related to TRS in particular.

While teachers are employees of municipalities and towns in Connecticut, which set their salaries and wages, the pension liability of TRS is borne by the State. TRS's funding policies and benefits are set by the Legislature through statute and are not subject to collective bargaining.

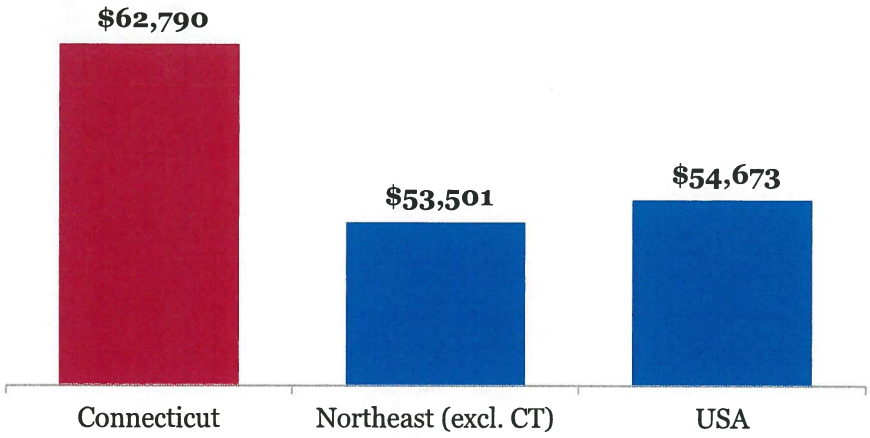
TRS's pension benefits are relatively generous when compared to benefits provided to public teachers nationwide, both for states where teachers can participate in Social Security, and those whose teachers are ineligible for Social Security. Connecticut is one of 15 states where teachers are partially or entirely ineligible for Social Security. A comparison of Connecticut teachers' benefits to other states, both including and excluding Social Security, shows that Connecticut's average benefit payment for public teachers is higher than the Northeast and U.S. averages. The difference between Connecticut's benefits and those of other states including Social Security may be understated, as it does not account for the annual contributions that must be made by teachers in other states to earn Social Security when they retire.

Average Pension and Social Security Benefit Payments per Beneficiary as of FY 2016[1]



These benefits drive the size of the overall pension obligation and are high even as State teachers are paid average annual wages that are approximately 17% and 15% higher than those of state teachers in the Northeast and across the nation, respectively.[2]

Average Annual Wages per State Teacher as of FY 2016[2]



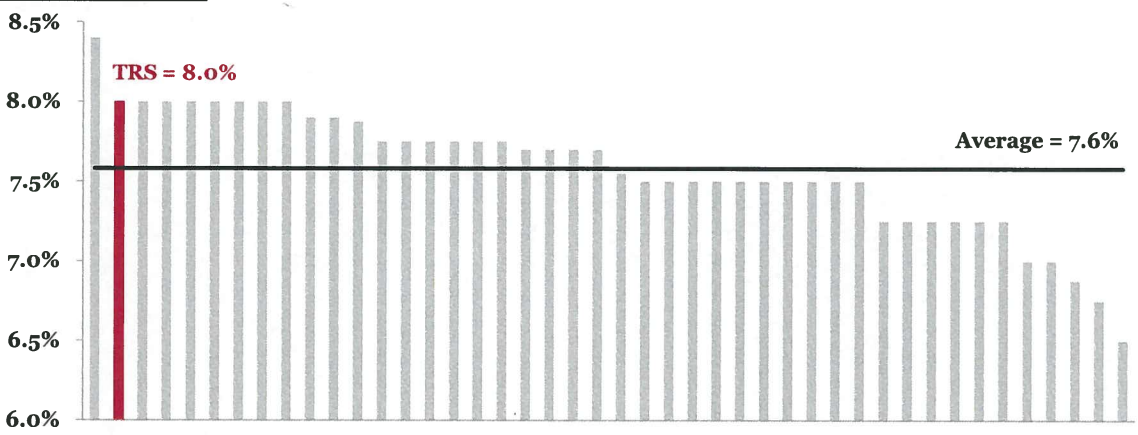
[1] Average Pension Benefit Payments: The Pew Charitable Trusts. Average Social Security Benefits: Social Security Administration, "OASDI Beneficiaries by State and County, 2015," published August 2016. Teachers in states that at least partially exclude teachers from Social Security are designated as receiving no Social Security benefit payments for purposes of the comparison.

[2] Average annual wage salary data for elementary and secondary school teachers, junior college teachers, and college and university teachers. Averages assume equal weighting across states. Quarterly Census of Employment and Wages – Bureau of Labor Statistics, 2016.

Over many years, Connecticut did not provide TRS with adequate funding to cover the accrual of these future benefit payments, causing the system's unfunded liability to grow. Between 1983 and 2014, inadequate contributions caused $5.5 billion of the $8.5 billion net increase in the TRS Unfunded Actuarial Accrued Liability ("UAAL").[3]

Further, the State calculated its pension liabilities using investment return assumptions that, at the time, were among the highest of all states and far exceeded the funds' actual investment returns. Even after being reduced from 8.5% to 8.0% in FY 2017, TRS's investment return assumption ("discount rate") is still among the highest across the 44 largest teachers' pension systems.

Comparative Discount Rates for Public Teachers' Retirement Systems (As of February 2017)[4]



The fund's current discount rate assumption far exceeds both realized annualized returns and returns of other teachers' retirement systems. The fund's returns are well below the returns of other teachers' retirement systems, as evidenced by a Pew study comparing results for the 14 largest public teachers' systems for the 10-year period through FY 2015. As shown below, TRS realized a 10-year annualized return of 6.3% through 2015 as compared to the average for teachers' retirement systems of 6.8%. TRS's investment return deteriorated even further over the most recent 10-year period through FY 2017 to 5.6%.[5]

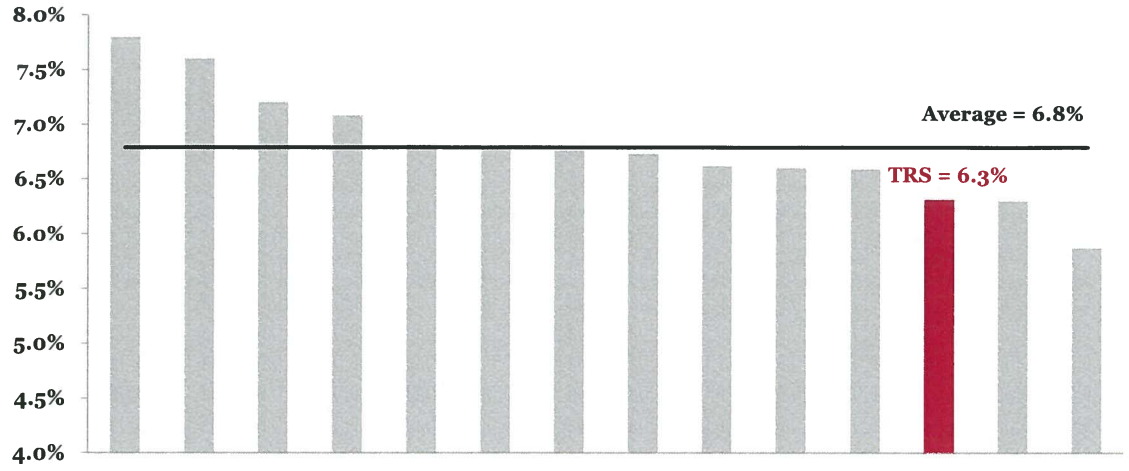
---

[3] Final Report on Connecticut's State Employees Retirement System and Teachers' Retirement System, Center for Retirement Research at Boston College, November 2015. Inadequate contributions defined as (1) calculating an annually required contribution below the amount required to keep the unfunded liability from growing each year (i.e., using a level percent of payroll approach that, even if paid, allows the UAAL to grow for many years before declining) and (2) making a payment less than the calculated annually required contribution.

[4] Based on the 44 largest public teachers' pension funds. NASRA, "NASRA Issue Brief: Public Pension Plan Investment Return Assumptions," updated February 2017.

[5] Reported net of all fees and expenses, for ten years ending December 31, 2017. CT Treasurer's Office Pension Fund Performance.

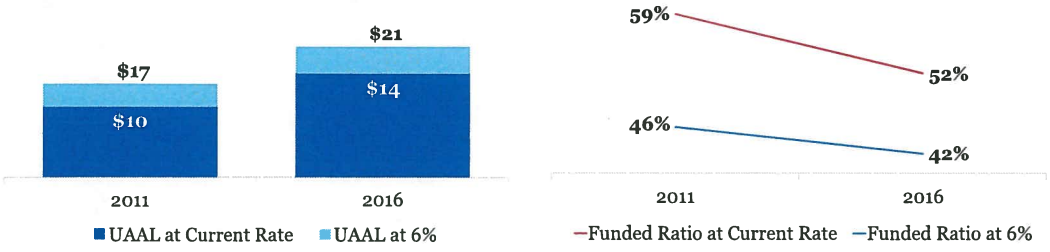
10-Year Investment Return for Public Teachers' Retirement Systems (Through 2015)[6]



The combination of a high investment return assumption and less-than-expected actual returns caused the State to consistently underestimate the amount of its pension funding requirements, allowing liabilities to accrue and exacerbating the underfunding issue.

As a result of all of these issues, the TRS ratio of assets to its total future liabilities (the "funded ratio") was at the relatively low level of 52% in FY 2016. Using a more realistic return assumption of 6%, the funded ratio would be even lower at 42%.[7]

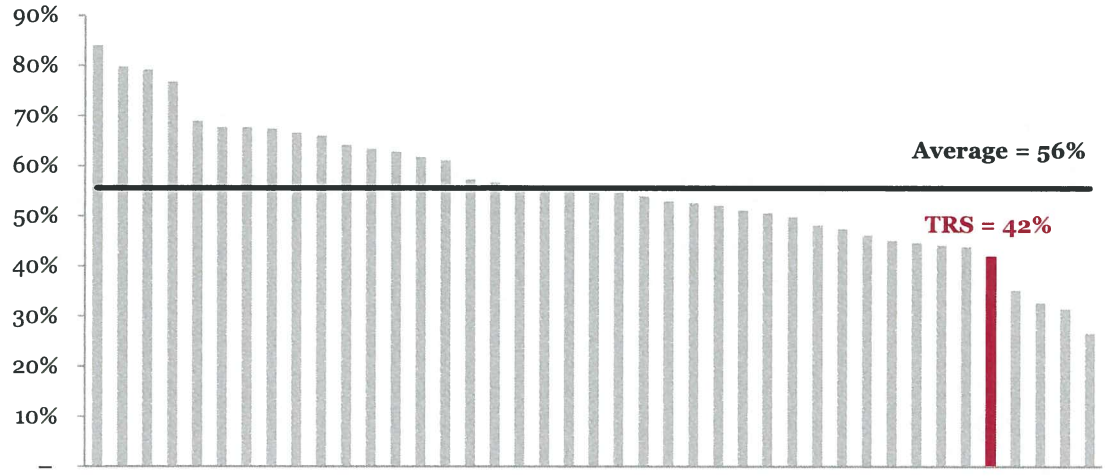
TRS Unfunded Pension Liability and Funded Ratio at Current and 6% Investment Return Assumptions ($ in billions)[7]



By contrast, public teachers' pension systems nationwide had an average funded ratio of 66% in FY 2016. Assuming a uniform discount rate of 6% across all teachers' plans for 2016, the average funded ratio would be 56%.[8]

[6] Based on the 14 largest public teachers' pension funds that report net of fees and on a June 30 fiscal year basis. The Pew Charitable Trusts, "State Public Pension Funds Increase Use of Complex Investments," dated April 2017.
[7] Valued using a blended discount rate weighted by reported liabilities. UAAL based on market value of assets and liabilities adjusted using formula based on AAL sensitivity and convexity. The Pew Charitable Trusts.
[8] Includes teacher plans and university plans. The Pew Charitable Trusts.

FY 2016 Funded Ratios for 41 Public Teachers' Retirement Systems at a Uniform 6% Discount Rate[8]



Finally, current law provides for TRS to be fully funded by 2032. This policy, however, causes the ARC to spike to an unsustainable level for the State, which the State is unlikely to meet given its other obligations.

The Commission believes that each leg of the pension stool (funding levels, return assumption and benefits) must be addressed separately and sustainably in order to ensure the long-term health of TRS.

Specific Recommendations:

The Commission recommends that the State enact the necessary legislation to reform the TRS system, by addressing each of the three components of the TRS problem as follows:

Fund Assets and Cash Flow

- By June 2019, irrevocably contribute the cash flows of CT Lottery for a period of 30 years to TRS, which will provide direct funding for a portion of the annual required contribution, reduce the aggregate ARC, and improve the funded ratio. This should be completed only to the extent benefits are restructured as set forth below.
- Complete other transactions to monetize underutilized or undervalued state assets and contribute that value to the TRS pensions in exchange for further benefit modifications.
- Redeem or refinance the State's pension obligation bonds on March 15, 2025, which is the earliest date by which all of the bonds then outstanding may be defeased. After defeasing the pension obligation bonds, restructure the TRS amortization schedule by reaching full funding by 2045 instead of 2032, measured using a 6% discount rate, thereby providing additional time and flexibility for the State to meet the ARC on a permanent basis while at the same time following a policy that is expected to reduce the unfunded pension liability every year.

- Prohibit pension holidays (both full and partial) to ensure that the State does not use year-over-year reductions in pension contributions as a tool to close budget gaps. While pension holidays have not recently been an issue for Connecticut, there is no guarantee that future administrations will not use this tactic to underfund the pension systems.
- Set the State's contributions at a level that will reduce the unfunded liability from day one by implementing risk sharing mechanisms discussed below, to prevent pension debt from growing even if returns are lower than expected, and reduce risk of fiscal distress in an economic downturn.
- Develop a plan to manage through an economic downturn as described above and informed by stress testing analysis that is now required by law.

Investment Returns

- Require the Treasurer to publish and set the discount rate used to calculate the TRS unfunded liability, with the Comptroller to certify that the rate is in line with recent historical returns of both Connecticut and other public pensions. For purposes of the analysis set forth herein, we have assumed that the rate would be reduced to 6%.

Restructuring of Benefits

In exchange for the State's contribution of the lottery as set forth above, the Commission recommends that the State implement legislation to restructure unvested pension benefits for existing employees and pension benefits for new employees as follows:

- The addition of a new tier of benefits for newly hired employees, providing them retirement benefits through a well-designed hybrid pension plan that combines smaller, defined benefit pensions with defined contribution plans without social security. The hybrid pension plan would be provided to all new incoming teachers, while the existing teachers would be provided with the option to elect into a new hybrid plan. By combining a smaller, defined benefit plan with a defined contribution component, the hybrid plan would allow the State to improve the predictability of its costs and would reduce the investment risk to the State that is inherent in a defined benefit-only plan.
- Implementation of formal cost-sharing, or risk sharing, provisions that distribute unexpected cost increases resulting from deviations from investment return expectations between the State and the employees. A formal risk-sharing policy would allow the plan to make adjustments to the benefit increases after retirement (such as cost of living adjustments, or "COLAs"[9]) based on the rate of investment return or funding level. In other words, the risk sharing provision would cap the State's contributions to the defined benefit portion of the plan to the amounts that the State would otherwise owe assuming the returns equal the discount rate. In the instance the investment returns are less than the target returns, the benefits would be reduced. Incorporating this type of policy would allow the State to better manage

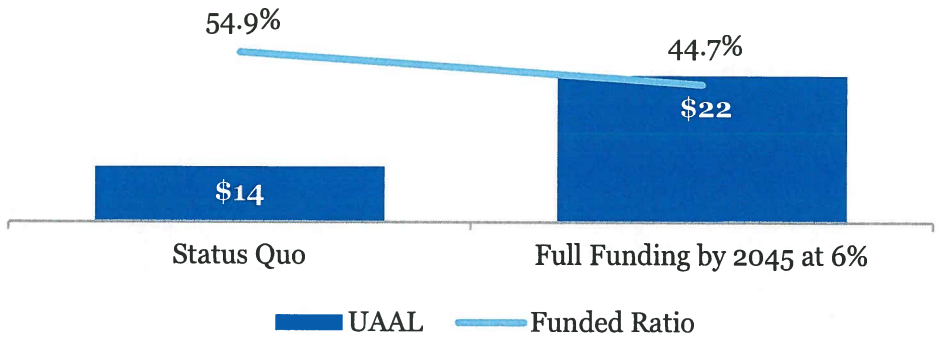
[9] A COLA is the change in one's monthly retirement benefit to account for increasing prices or inflation.

risk and cost uncertainty to ensure that the pension system is affordable and sustainable.

Impact of Reamortization and 6% Discount Rate Recommendations:

Reducing the discount rate in FY 2019 from 8% to 6% has the effect of increasing TRS's UAAL from $14 billion to $22 billion and reducing its funded ratio from 54.9% to 44.7% in that year.

FY 2019 TRS Pension Liability and Funded Ratio: Status Quo vs. Full Funding by 2045 at 6% ($ in billions)[10]



Reducing the discount rate also has the impact of significantly increasing contributions versus the status quo in order to fill the now larger gap. However, such a scenario is unrealistic and would likely not be adopted by itself, especially with a required full funding date of 2032 – less than 15 years away. As such, the Commission would propose reamortizing the unfunded liability over a longer period of time to mitigate the impact of the discount rate change.

However, under Section 8 of Public Act 07-186, there are certain limitations ("covenants") that may prohibit the State from diminishing the ARC as long as the pension obligation bonds are outstanding. For this reason, the State could consider defeasing the bonds at the earliest possible date, which is March 15, 2025. At that point, the State could reamortize the unfunded TRS liability without the risk of tripping the applicable bond covenant.

Starting in FY 2026, the Commission would propose reamortizing the remaining unfunded liability over a 20 year period, which is within the time frame recommended by the Conference of Consulting Actuaries, the American Academy of Actuaries and the "Blue Ribbon Panel" commissioned by the Society of Actuaries.[11] The reamortization

[10] The Pew Charitable Trusts.
[11] Segal Consulting, "Actuarial Funding Policy Guidance: Comparison of Recommendations Reveals Considerable Consensus – and a Few Notable Differences," October 2014. All three reports agree that 15 to 20 years is the preferred range for UAAL amortization periods.

over an additional 20 years also permits a much more gradual increase in the State's ARC, such that the CAGR through the date of full funding in 2045 is 3% (i.e., budget sustainable). In comparison, under the status quo the CAGR through the date of full funding in 2032 is 5%.

Despite these benefits, the reduction in the discount rate has such a significant impact that total contributions through 2045 are still $29 billion higher than under the status quo (and $31 billion higher over the full 30-year projection range).

FY 2020 – 2049 Annual Change in State Contributions to TRS ($ in millions)[10]

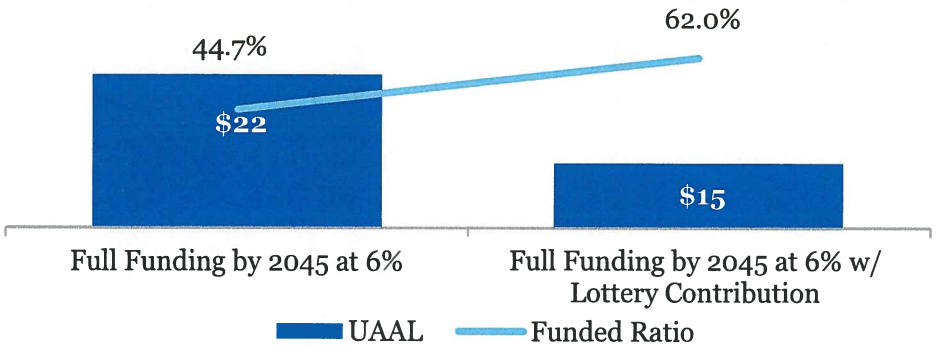
Fiscal Year	Status Quo	Adjustments Restructuring and Reduced Discount Rate	State Contributions to TRS w/out Lottery Contribution
2020	$1,428	–	$1,428
2021	1,480	–	1,480
2022	1,532	–	1,532
2023	1,821	–	1,821
2024	1,883	–	1,883
2025	1,945	–	1,945
2026	2,011	(19)	1,992
2027	2,079	(39)	2,040
2028	2,149	(60)	2,089
2029	2,222	(83)	2,139
2030	2,300	(110)	2,190
2031	2,384	(141)	2,243
2032	2,478	(181)	2,297
2033	397	1,955	2,352
2034	346	2,063	2,408
2035	354	2,112	2,466
2036	365	2,160	2,525
2037	377	2,209	2,586
2038	287	2,360	2,648
2039	297	2,415	2,711
2040	306	2,470	2,776
2041	316	2,527	2,843
2042	327	2,585	2,911
2043	337	2,644	2,981
2044	348	2,704	3,053
2045	360	1,072	1,431
2046	371	492	864
2047	383	508	892
2048	396	525	921
2049	409	542	951
Total	**$31,687**	**$30,709**	**$62,396**

It is important to note that the scenario shown herein is illustrative and is not based on actuarial calculations of the contributions. However, the Commission believes that it is possible for the Legislature to provide a set of instructions via statute to the actuary that could achieve the key objectives set forth above while at the same time avoiding any issues under the applicable bond covenants.

Impact of CT Lottery Concession Recommendation:

In connection with the restructuring changes described above, the Commission recommends the State contribute a 30-year stream of CT Lottery net proceeds to TRS at fair market value to defease a portion of the unfunded liability. While any transaction would need to be done on an arms-length basis with appropriate protections for both the State and the pension systems, the transaction would improve the funded status of the pension system dramatically. Relative to the restructured scenario described above and assuming a hypothetical value of the CT Lottery cash flow stream of approximately $7 billion, the UAAL would be reduced to $15 billion and the funded ratio would increase to 62% in FY 2019.

FY 2019 TRS Pension Liability and Funded Ratio: Full Funding by 2045 at 6% vs. Full Funding by 2045 at 6% with Lottery Contribution ($ in billions)[10]



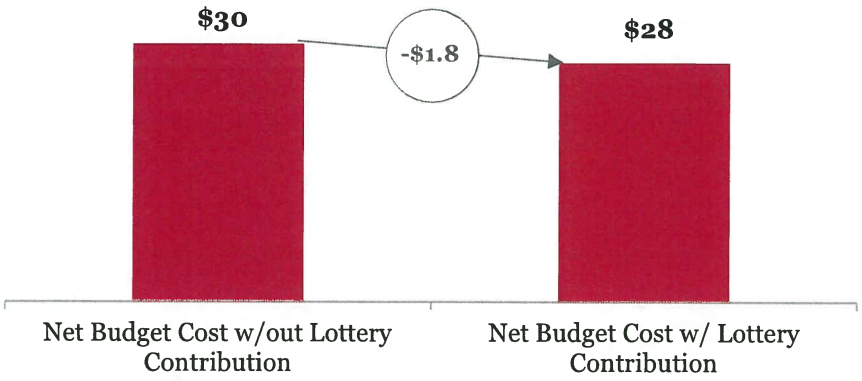
The transaction would be structured as follows:

1. The state would contribute the CT lottery cash flow stream to TRS at fair market value;
2. TRS's funded level would increase by the fair market value of the CT Lottery asset, thereby reducing the net pension liability;
3. As a result of a reduction in TRS's net pension liability, the State's ARC would decrease;
4. In the first half of the 30-year concession, total costs to the State would be reduced in excess of the foregone lottery cash flows due an improvement in TRS's unfunded liability.

To relieve pressure on the State budget in any given year, the reduction in the ARC from the contribution of CT Lottery to TRS must be greater than the amount of revenues contributed in the transaction, as such revenues would have otherwise been received by the General Fund. Preliminary analysis suggests that the transaction would in fact be a net positive to the General Fund over the first 15 years of the concession. On a nominal, or undiscounted, basis the savings to the General Fund over the first 15 years would be $1.8 billion. On a present value basis, discounted at 6%, the savings would

total $1.2 billion. These savings would provide the State with the flexibility to focus on budgetary discipline, investing in pro-growth initiatives and expanding the economy.

FY 2020 – 2034 TRS Net Budget Cost Reduction ($ in billions, nominal)[10]



As shown below, of the $1.8 billion of nominal savings, $233 million are generated in sample fiscal year 2025.

Single Year Impact on General Fund Budget ($ millions)[10]
Sample Year FY 2025

Transferred Lottery Net Proceeds	($427)
Reduction in ARC Expense from Lottery Net Proceeds	427
Additional Reduction in ARC due to Improved Asset Position	233
Net Benefit	**$233**

A net benefit such as the one generated in 2025 would occur for the first 15 years of the concession. After 2034, the transaction becomes dilutive to the budget for the remainder of the 30-year period. On a present value basis, however, the impact is substantially mitigated by the fact that this dilution occurs far into the future. Over the entire 30-year period of the lottery contribution, the increase in net budget costs is $4.3 billion, but on a present value basis (discounted at 6%) this figure is only $196 million.

FY 2020 – 2049 Annual Change in State Contributions to TRS ($ in millions)[10]

Fiscal Year	State Contributions to TRS w/out Lottery Contribution	Adjustments		State Contributions to TRS w/ Lottery Contribution	Present Value of Increase / (Further Reduction) in ARC
		CT Lottery Net Proceeds	Increase / (Further Reduction) in ARC		
2020	$1,428	($371)	($7)	$1,049	($7)
2021	1,480	(383)	(6)	1,091	(5)
2022	1,532	(396)	(2)	1,135	(1)
2023	1,821	(406)	(232)	1,182	(184)
2024	1,883	(416)	(233)	1,233	(174)
2025	1,945	(427)	(233)	1,285	(165)
2026	1,992	(437)	(215)	1,340	(143)
2027	2,040	(448)	(195)	1,396	(123)
2028	2,089	(458)	(174)	1,456	(103)
2029	2,139	(469)	(152)	1,518	(85)
2030	2,190	(482)	(127)	1,581	(67)
2031	2,243	(495)	(102)	1,646	(50)
2032	2,297	(509)	(74)	1,714	(35)
2033	2,352	(523)	(45)	1,784	(20)
2034	2,408	(537)	(13)	1,857	(6)
2035	2,466	(552)	20	1,934	8
2036	2,525	(567)	55	2,013	20
2037	2,586	(582)	93	2,096	32
2038	2,648	(597)	132	2,183	44
2039	2,711	(612)	174	2,274	54
2040	2,776	(624)	219	2,371	64
2041	2,843	(637)	266	2,472	74
2042	2,911	(650)	316	2,578	83
2043	2,981	(663)	369	2,687	91
2044	3,053	(676)	425	2,801	99
2045	1,431	(689)	1,103	1,845	242
2046	864	(703)	703	864	146
2047	892	(717)	717	892	140
2048	921	(731)	731	921	135
2049	951	(746)	746	951	130
Total	**$62,396**	**($16,505)**	**$4,259**	**$50,150**	**$196**

Despite out-year increases in the ARC, the lottery transfer makes sense for a number of reasons. First, the lottery net proceeds provide a dedicated funding source for TRS, which is severely underfunded and currently poses a significant risk to the State's credit rating and ability to raise low-cost debt.

Second, the contribution replaces a portion of the current stream of cash flows coming from the State, which is subject to annual appropriation, with a guaranteed stream of cash flows from CT Lottery. This locks up those cash flows, ensuring that TRS can invest them alongside other plan assets and generate compounding interest. Over the course of the 30-year contribution, assuming a 6% investment return assumption, the interest earned on the lottery income would total $12.4 billion on a nominal basis or $3.6 billion on a present value basis.[12]

Third, the transaction is accretive to the General Fund budget for the first 15 years of the transaction. The savings in pension contributions during this time could allow the State to fund critical investments in transportation and economic growth that could more

[12] Interest is calculated using the mid-year convention.

than offset the increase in costs for the General Fund in the outer years of the concession.

Finally, from the perspective of TRS, the lottery contribution significantly offsets an otherwise 97% increase in required contributions due from the State as a result of the recommended restructuring. The following chart illustrates the cumulative impact of all recommended changes on the required contributions due from the State over a 30-year projection horizon.

FY 2020 – 2049 Cumulative Change in Required Contributions Due from the State: Status Quo vs. Full Funding by 2045 at 6% vs. Full Funding by 2045 at 6% with Lottery Contribution ($ in billions)[10]