THE BURDEN OF THE TEACHERS RETIREMENT SYSTEM IN GEORGIA

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ABSTRACT

The Teachers Retirement System (TRS) of Georgia was established to provide a reliable retirement income to Georgia educators. The system's unfunded liabilities is $23.7 billion and growing. This research analyzes how changing the formula used to calculate defined benefits would change the unfunded liabilities. We simulate the impact of changes in the assumed rate of return on investments, member contribution, the multiplier, the number of years of income, and cost of living adjustment. We simulate these changes for a hypothetical individual, project it for the entire system, and use a Monte Carlo simulation to account for uncertainty.

INTRODUCTION

The Teachers Retirement System (TRS) of Georgia is responsible for providing its teachers with a fixed, monthly pension determined by the following formula:

$$Monthly\ pension = average\ monthly\ salary\ (highest\ consecutive\ 24\ months) * 2\%\ (multiplier) * years\ in\ service\ (maxed\ out\ at\ 40\ years).$$

(equation 1)

For instance, a member working for 30 years and earning an average monthly salary of

$5,000 (for the highest consecutive 24 months) would start with a monthly $3,000 in retirement income. During retirement, members are also eligible for a Cost of Living Adjustment (COLA). Based on current rules, this means that retired members' monthly income can be increased by 1.5% two times a year. (The COLA is not guaranteed and is applied if inflation is high).

The TRS has a major impact on the Georgia economy: exceeding $78.1 billion in assets, creating 66,000 jobs and contributing $7.42 billion in total economic output (TRS, 2020).

However, the current level of unfunded liabilities, $23.7 billion in 2020, is threatening the sustainability of the system.

This research aims to analyze how to improve the financial sustainability of the TRS by adjusting the different elements of the benefit formula as well as other factors impacting the unfunded liabilities.

THE BURDEN OF THE TEACHERS RETIREMENT SYSTEM IN GEORGIA

The Teachers Retirement System (TRS) is a network of state and city-level organizations that administers retirement funds for public education employees along with other education-related workers (Kagan, 2019). The TRS manages, what we call defined benefit (DB) plans, plans that in exchange of employer contributions during the active years promise a fixed amount of monthly income during retirement until the member's death (and, in some cases, to the spouse after the member's death)[1].

The advantage of DB plans is that they provide a steady and predictable income in retirement since any risk of investment stays with the TRS fund and the member's monthly pension will not be affected by the performance of the investment made by the system. This is in stark contrast to what we call defined contribution (DC) plans, such as 401K accounts, that are popular in the private sector. Employees enrolled in DC plans typically contribute a tax-deferred amount, part of which may be matched by the employer. For DC plans the employee is responsible to make investment decisions, which will impact how much money the employee will have in retirement. So, while DB plans basically promise a fixed benefit in retirement until the member's death, employees enrolled in DC plans have accounts with a balance that fluctuates depending on the performance of the invested amount.

A problem with DB plans occurs when the value of assets held by the retirement system is less than the actuarial value of the promised liabilities, i.e. when the system has unfunded liabilities. Eventually this problem can escalate into a situation where the DB plan contributions from active members and earnings on accumulated assets do not cover the promised benefit payout to retired members and even result in an inability to meet payout obligations. The longer life expectancy coupled with lower interest rates and lower investment returns earned during the first two decades of the 2000s have exposed the risks of DB plans. According to Public Plans Data (2020), public pension plans in the U.S. were 102% funded in 2001 but only 72.2% funded in 2019.

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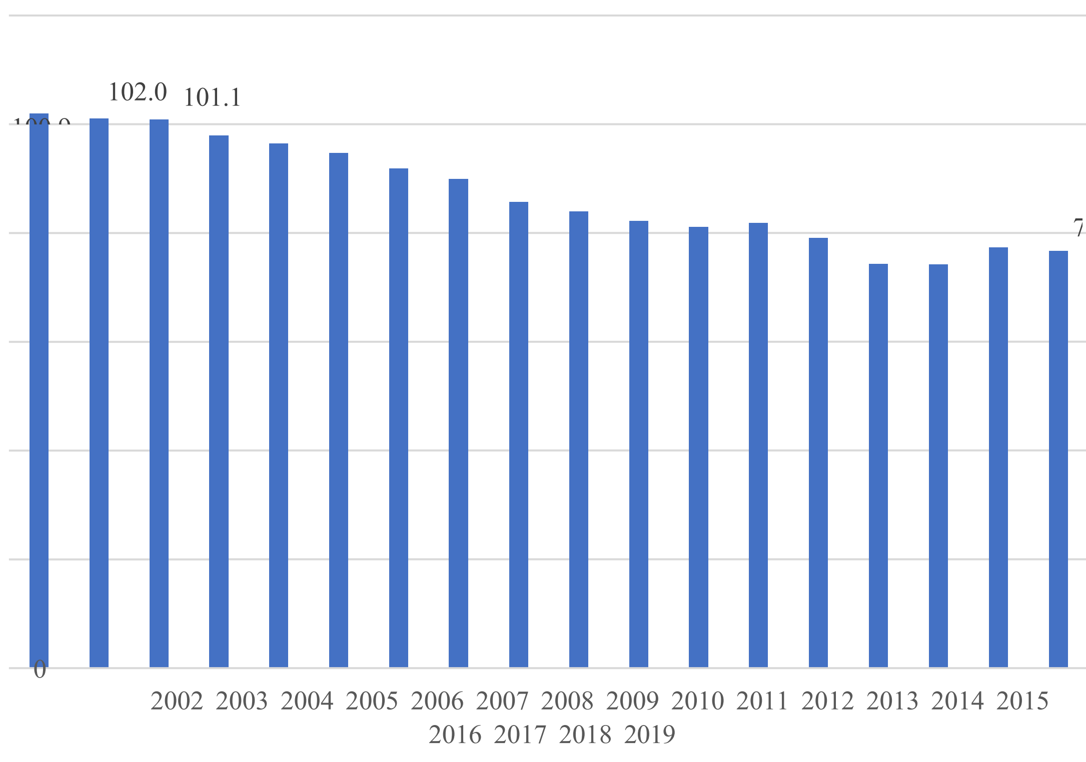
[1] Indeed, there are multiple plans members can choose from. In what is referred to as a survivorship plan, members can select to provide a lump-sum payment or monthly benefit payment to their beneficiary. In such a case the member's benefit would be reduced. Since the most members select the regular plan with the maximum payout to the member, we will use that as the base of our simulation and disregard the other options. For more detail on all the options, see page 12 of Teachers Retirement System of Georgia [TRSG], (2020).

THE TEACHERS RETIREMENT SYSTEM IN GEORGIA

As of the most recent fiscal year report, the Georgia TRS manages over 231,000 active member accounts and pays a pension to over 135,000 retired members and survivors with an average monthly benefit of $3,190. The overall benefits paid to retired members grew to over $5 billion for the first time in 2020 (TRSG, 2020). As a result of demographic trends and recent developments in the financial markets, the TRS of Georgia has not been immune to the overall national trend in unfunded liabilities. The actuarial value of plan assets in TRS in 2019 was

$78.1 billion, while the liabilities grew to $101.8 billion for a funding ratio of 76.7% (TRSG, 2020). In contrast, the actuarial value of plan assets in 2002 was $40.5 billion, while the actuarial value of liabilities amounted to $39.7 billion for a funding ratio of 102% (TRSG, 2008). Figure 1 shows this trend year by year.

Figure 1. Funded ratio in the Teachers Retirement System of Georgia



While the state has the ability to pay monthly income to its current retirees, without significant changes, at some point outside funding is likely to be required to meet the system's obligations. This means either a reallocation of state tax revenues or an overall increase in state taxes, both of which may pose politically unfavorable consequences. As a matter of fact, in only the past three years, the state has poured nearly $600 million dollars of taxpayer money into the system in the hope that it will alleviate the problem (Kagan, 2019). Another recent significant change was in 2012 when the member contribution rate was increased from 5.53% to 6.00% (TRSG, 2020). However, these changes could only temporarily break the overall trend and the funded ratio is likely to decrease further in the absence of a more significant change. Also, the state and school districts currently spend around $2 billion dollars per year on the TRS (Salzer,

2019). An audit performed by the senate budget committee claims that amount will climb to $2.4 billion per year by 2025 and $4 billion per year by 2045 if no changes are made (Salzer, 2019).

As a matter of fact, the state and school district contributions grew by 67% between 2002 and 2017, while Georgia's economy only grew by 23% during the same timeframe (Sidorova and Niraula, 2018).

THE INDIVIDUAL'S BURDEN

In the TRS, active members currently contribute 6% of their salary[2], which is then invested by the TRS with the stated goal of obtaining a 7.25% annual return[3]. Once members begin to collect retirement benefits, the amount paid to the retired member is deducted from the member's balance while leaving the remainder invested. The question is at what point in their retirement will members begin to exhaust their accumulated account balance and start to 'burden' the system.

In this section, we will take a hypothetical individual and analyze how changing different factors impact when this individual's balance turns negative. The factors that we are looking at are the ROI on TRS investments, the active member's contribution rate, the multiplier (in equation 1), the number of years calculated in the average (in equation 1), and the COLA.

The hypothetical individual whose retirement account we will simulate begins working at the age of 43 at a $49,250 starting salary[4]. The member's salary grows at 1% per year until retirement at the age of 65 at which time the member begins collecting his/her benefit. Selecting a different starting salary will change the balance, but will not change the number of years after which the individual exhausts his/her account.

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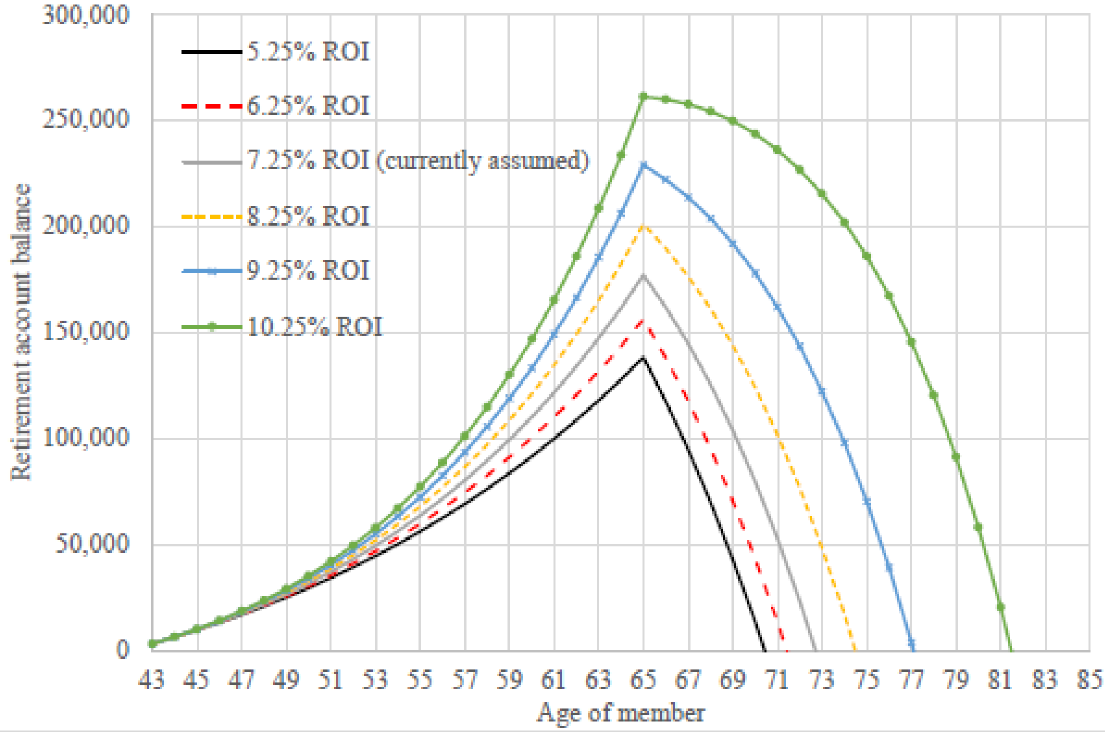
[2] The employee contribution is supplemented by an employer contribution, but since that is equivalent with the government taking money from one pocket and putting it into another one, we will only take the employee contribution into account.

[3] We use this rate of return in our baseline analysis on all balances, unless stated otherwise.

[4] We picked the starting salary amount so that after 23 years of service and about a growth of 1% per year the individual's final salary equals what is reported for the average final year salary for those retiring in FY2020.

Also, we decided that our individual starts at the age of 43 and works until retirement, since based on the most recent financial report, the average number of active years for those retiring in Fiscal Year 2020 (FY2020) is around 23 years (CRFA, 2020)[5]. Figures 2.a-d. show the impact of changing one factor at a time. For instance, when we present the impact of the different rates of return on investment, the other factors determining the balance are assumed constant. This means that the member's contribution rate stays constant at 6%, the multiplier is 2%, the COLA during retirement is 3.02% (which is 2*1.5% compounded), and the average salary used in the calculation are the last two years.

Figure 2.a. Retirement account balance with different return on investment (ROI)



[5] The assumed retirement age of 65 is between the earliest age individuals can claim Social Security (62) and the full retirement age of 67 years of age. While many claim Social Security benefits as early as possible, the more educated tend to retire at later ages (Knoll and Olsen, 2014).

Figure 2.a shows that a retiree under the current rules and with the currently assumed rate of return of 7.25% would exhaust his/her retirement balance at about 73 years of age, 8 years after retirement. If the return on investments is somewhat lower, for instance only 5.25% on average, the balance would be exhausted before the member turns 71, less than 6 years after retirement. This is important, since based on current statistics, a 65-year old is expected to live an extra 20 years on average (Moore, 2018), and is also significant because based on the current rules even a generous 10.25% ROI would not be sufficient for the member's balance to stay positive.

Georgia's House Retirement Committee has proposed (HB 662) to lower the assumed rate of return (ARR) from 7.25% to 6.75%. This alone would result in an additional $17.7 billion in contributions over the next 30 years. "The act of lowering a pension fund's assumed rate of return has the effect of reducing expected contributions resulting from investment gains, which means the system will need higher annual contributions from taxpayers and/or its members to maintain its current funding trajectory". (Sidorova & Gilroy, 2020).

Figure 2.b. Balance with different member contribution rates

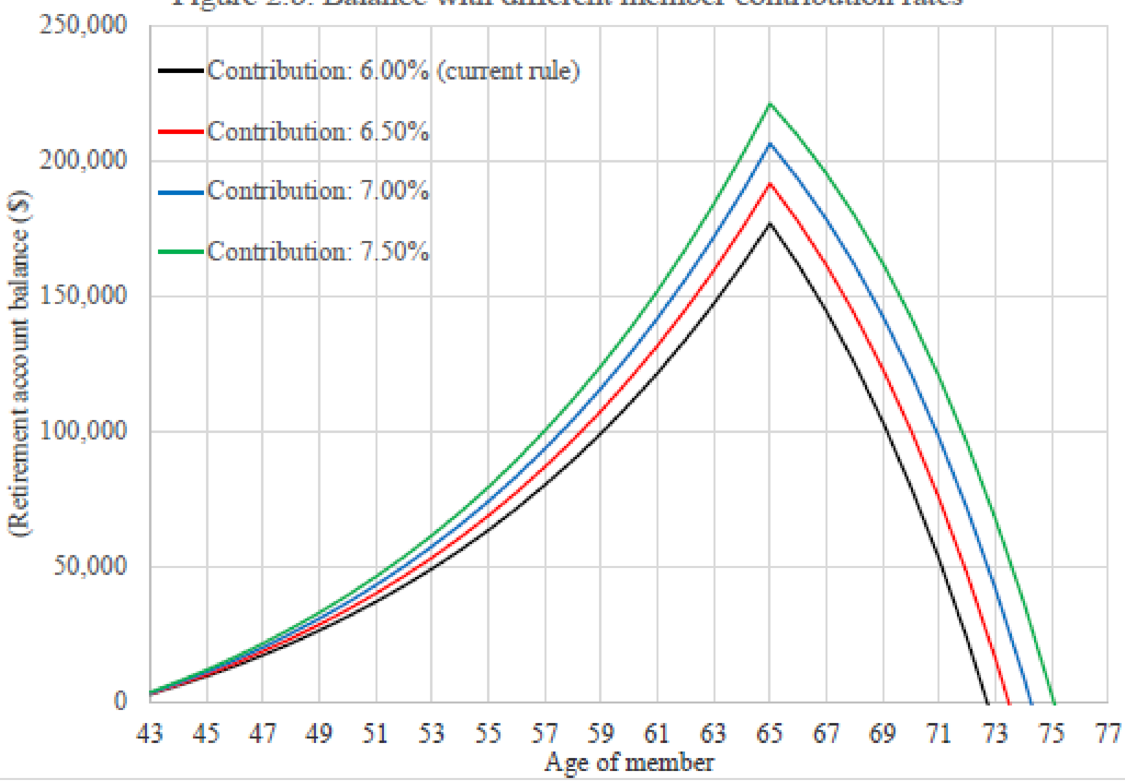


Figure 2.b. shows what happens if the employee's contribution is increased from the current 6% to 6.5%, 7%, and 7.5% (the assumed rate of return of investment is the currently assumed 7.25%). We see that even a drastic increase of 1.5 percentage-points in the member's contribution rate only gains a little over 3 years and the balance would still be exhausted before the member reaches age 75.

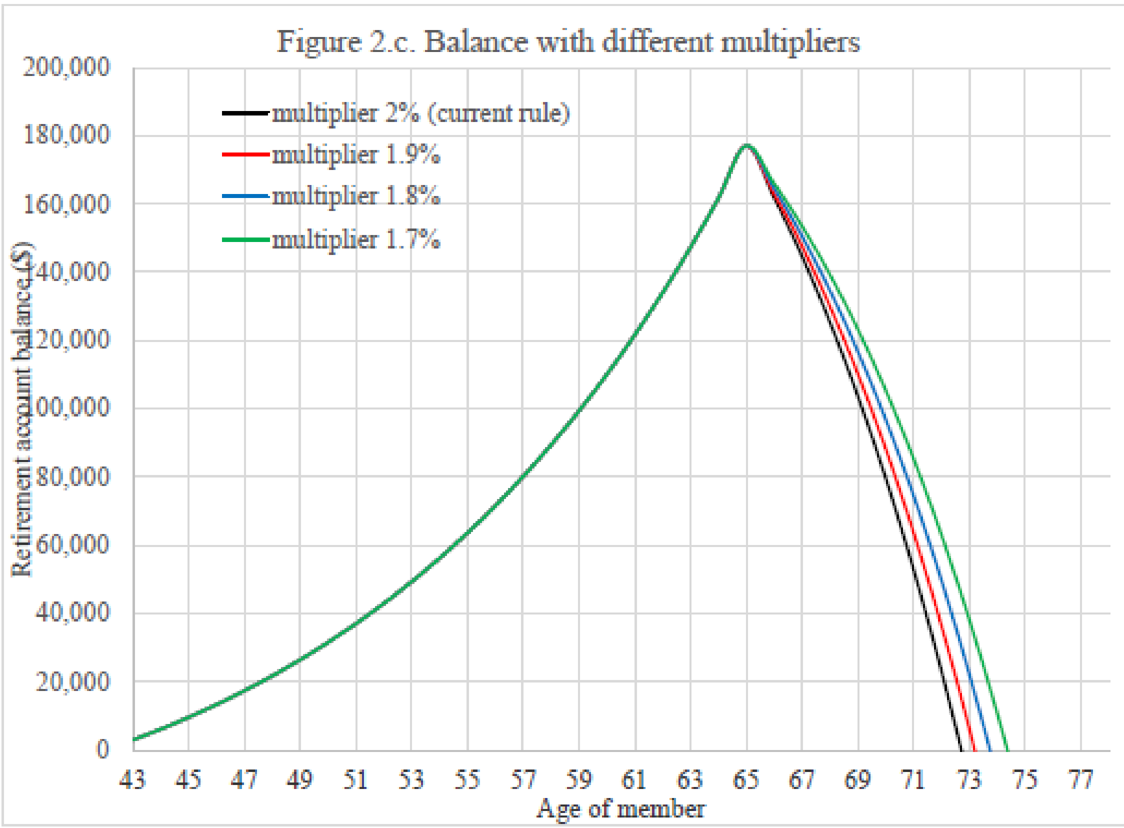
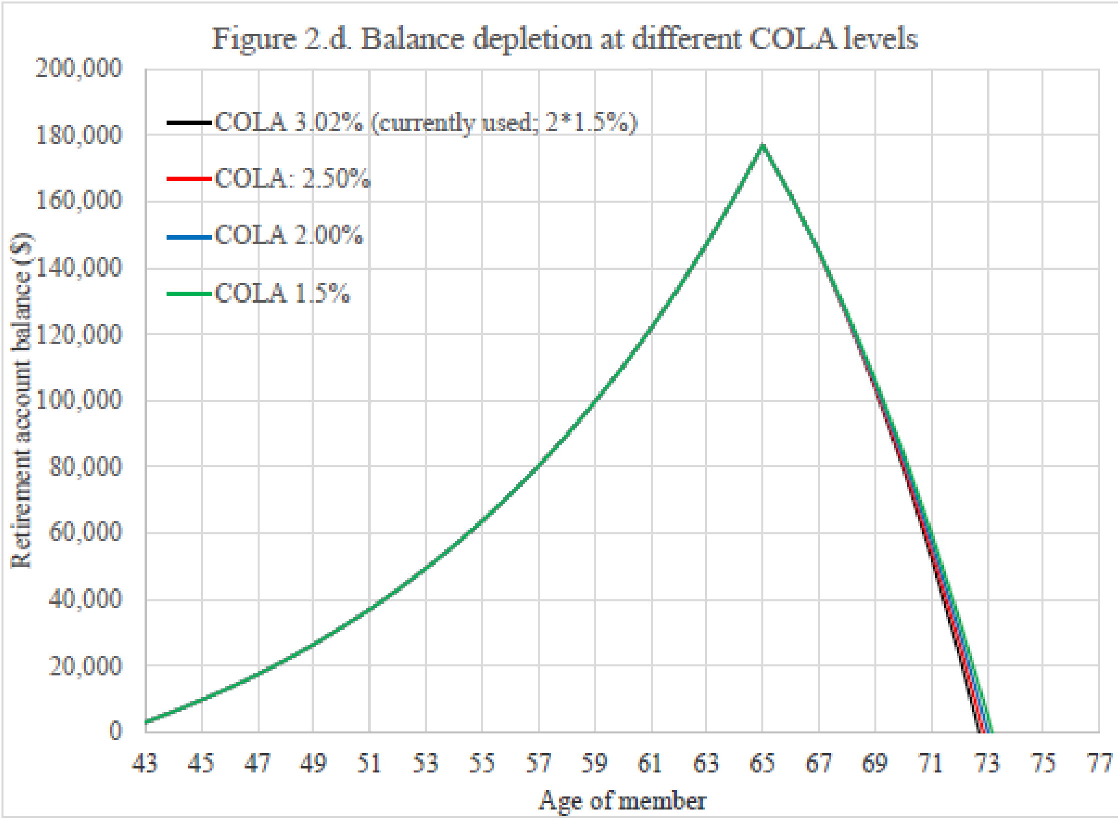


Figure 2.c shows that decreasing the multiplier from 2% to 1.7% only extends the balance life by less than 3 years.



Finally, Figure 2.d. shows the impact of changing the COLA adjustment, which is currently 1.5% twice a year if the value of the Consumer Price Index is greater than the retired member's calculated base index (average monthly CPI over a 6-month period). The figure shows that reducing the COLA from a cumulative 3.02% to a cumulative 1.5% is not too meaningful in helping to extend the retirement account balance.

ACCUMULATED IMPACT

In this section we will look at the magnitude of the potential dollar savings for a cohort retiring at the same time for each factor change: multiplier, number of years used in the calculation of the highest consecutive salary, the COLA, and the contribution rate. The most recent financial report shows that 6890 individuals retired during FY2020 and the average monthly income for those retiring was $5,107.67 in their final year of work (CRFA, 2020). The average of the last year's monthly income was $5,080.38 in FY2019. We make the assumption that these two amounts fairly represent the highest 24 months of income for those retiring in FY2020. Therefore, the average monthly income that was used in the formula (equation 1) for members of a cohort is $5,094.03 ([$5,107.67+$5,080.38]/2). Using this amount with 23 years of service, such a retiree would be eligible for an initial benefit amount of $2,343.25.

$$\$5{,}094.03 * 0.02 * 23 = \$2{,}343.25$$

Such an individual starting with about $28,000 retirement income during the first year in retirement who gets a 3.02% COLA yearly and who lives 20 years after retiring would exhaust his/her account at about 73 years of age and would collect over $500,000 during the rest of his/her life. This amount of over $500,000 is the amount of unfunded liability the system accumulates for one such retiree.

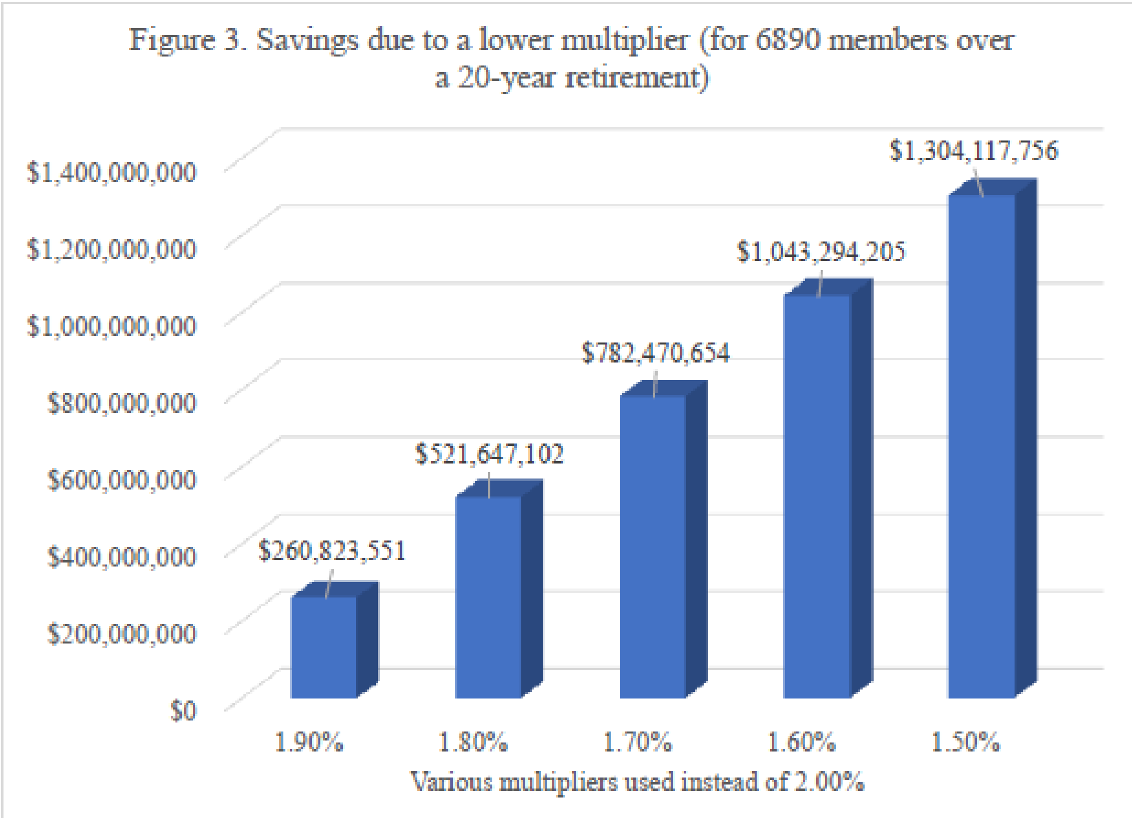
The multiplier (currently 2%)

The multiplier is a fixed number determined by each state to be used in their specific TRS formula. The current Georgia multiplier is 2%.

Table 1. Income in retirement with different multipliers

Multiplier	2.0%	1.9%	1.8%	1.7%	1.6%	1.5%
monthly income in 1st year of retirement	$2,343	$2,226	$2,109	$1,992	$1,875	$1,757
annual income in 1st year of retirement	$28,119	$26,713	$25,307	$23,901	$22,495	$21,089
total ret. income for a 20-year lifespan after retirement	$757,108	$719,252	$681,397	$643,541	$605,686	$567,831
Per person saving over 20-years		$37,855	$75,711	$113,566	$151,422	$189,277
Total savings for 6890 retired individuals	$5,216,471,025	$4,955,647,473	$4,694,823,922	$4,434,000,371	$4,173,176,820	$3,912,353,268
Cohort saving		$260,823,551	$521,647,102	$782,470,654	$1,043,294,205	$1,304,117,756

The potential savings by using 1.90% instead of 2% as the multiplier in equation 1 is about $38,000 for a single individual (the difference between $757,108 and $719,252) and about $260.1 million for a single cohort (6890 people retiring in the same year). The potential savings are shown in Table 1 and Figure 3



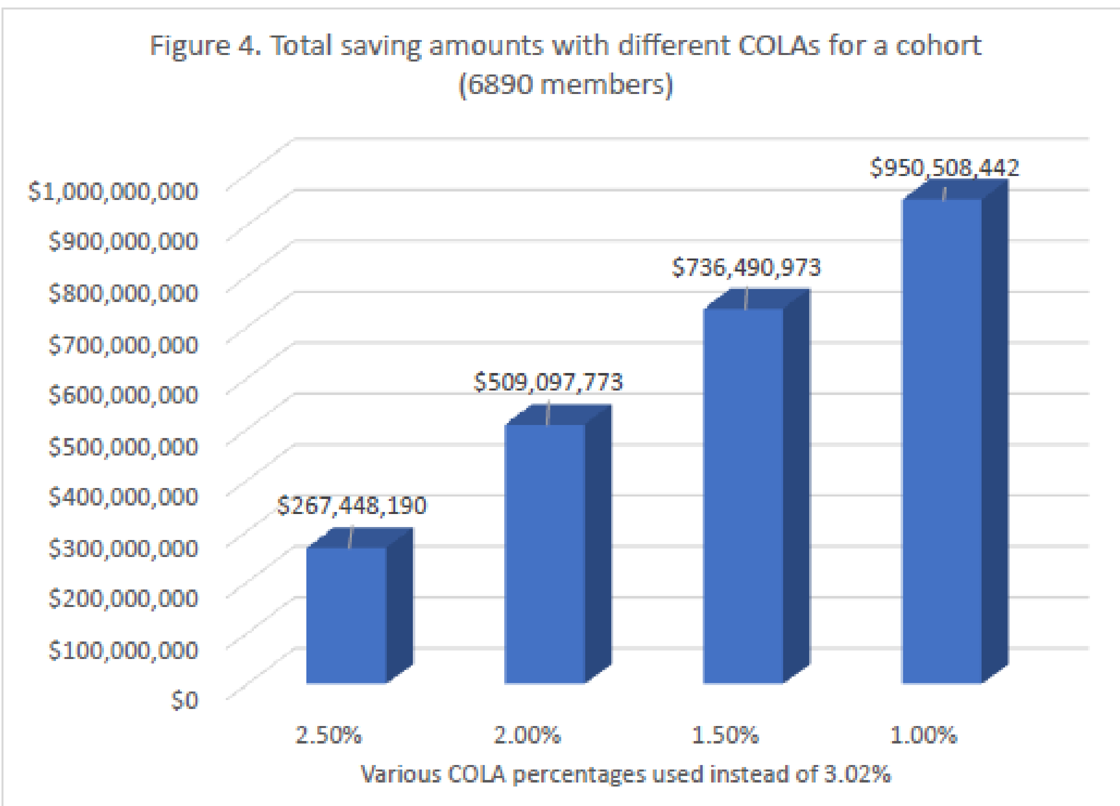
Cost of Living Adjustment (currently 1.5% twice, if applicable)

As stated above, currently benefits can be adjusted twice annually by 1.5%, once in January and once in July. If the adjustment is awarded twice, that is equivalent to a 3.02% annual increase on a compounded basis. Based on our calculations, the Base CPI Index has exceeded the considered CPI number 35 out of 41 times since 2000. That means that TRS applied the COLA adjustment 35 out of 41 times in the past two decades. At the same time the COLA adjustment used by the Social Security Administration averages out to about an annual 2.1% and is only 1.65% considering the average in the last decade.

Table 2 and Figure 4 show the potential savings at various levels of COLA. We see that over a 20-year lifespan after retirement if an annual 2.5% COLA was used, the potential saving for one member would be almost $39,000. Again, this is about 8% of the about $500,000, which is the total amount we estimate an individual with a 20-year lifespan in retirement would draw from the system after depleting his/her balance. The amount of saving from using an annual COLA of 2.5% for an entire cohort would be $267 million. Obviously, reducing the COLA even further would increase the savings even more.

Table 2. Income in retirement with different COLA

COLA	3.02%	2.50%	2.00%	1.50%	1.00%
monthly income in 1st year of retirement	$2,343	$2,343	$2,343	$2,343	$2,343
annual income in 1st year of retirement	$28,119	$28,119	$28,119	$28,119	$28,119
total ret. income for a 20-year retirement lifespan	$757,108	$718,291	$683,218	$650,215	$619,153
Individual saving		$38,817	$73,889	$106,893	$137,955
Total for 6890 retired individuals	$5,216,471,025	$4,949,022,835	$4,707,373,251	$4,479,980,051	$4,265,962,583
Cohort saving		$267,448,190	$509,097,773	$736,490,973	$950,508,442

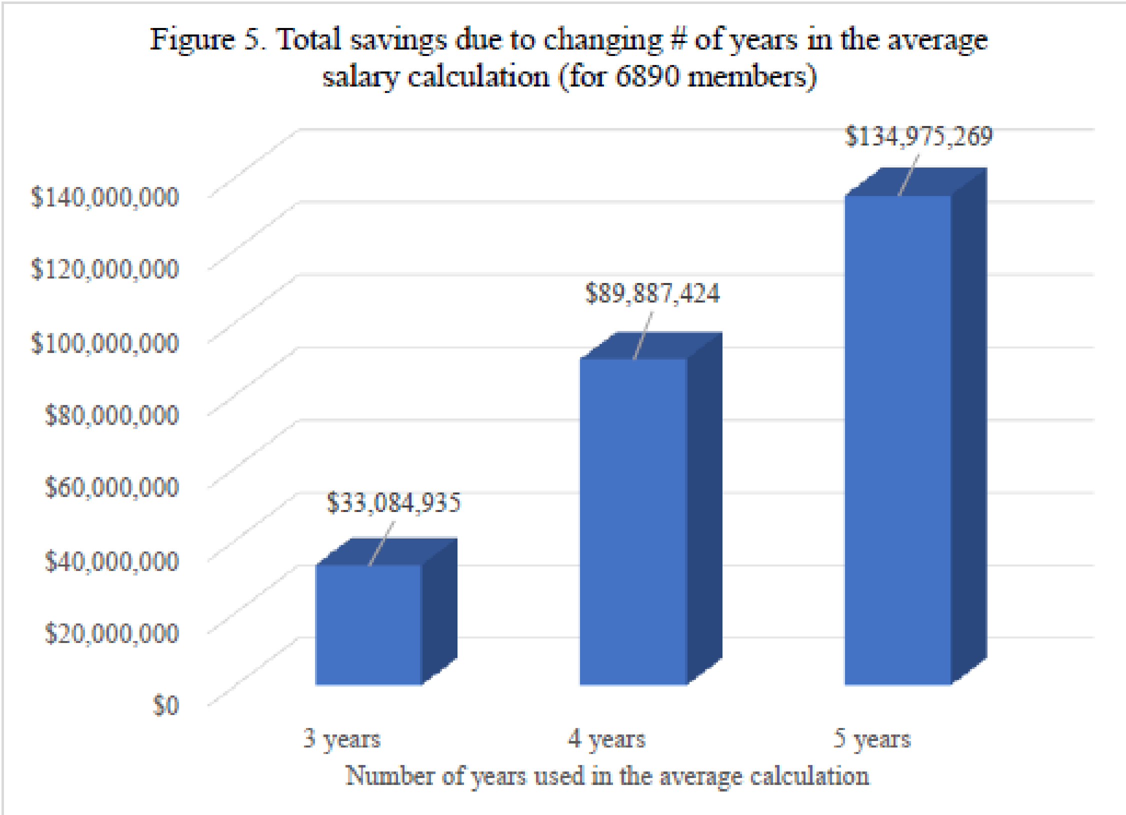


Average salary (currently based on the highest consecutive 24 months)

The formula (equation 1) considers the average salary of the highest consecutive 24 months. There are a number of other states that use 3-5 years of average salary in their formulas. For the sake of simplicity, we assume that the highest 24 consecutive months are the last two years of the members active years. Table 3 and Figure 5 show the potential savings that could be achieved by increasing that to 3-5 years.

Table 3. Income in retirement with averaging the last 2-5 years of income

# of years in the formula	2 years (current rule)	3 years	4 years	5 years
Monthly income in 1st year of retirement	$2,343	$2,328	$2,303	$2,28
Annual income in 1st year of retirement	$28,119	$27,941	$27,634	$27,39
Total ret. income for a 20- year retirement lifespan	$757,108	$752,306	$744,061	$737,51
Individual saving		$4,802	$13,046	$19,59
Total for 6890 retired individuals	$5,216,471,025	$5,183,386,090	$5,126,583,601	$5,081,495,75
Cohort saving		$33,084,935	$89,887,424	$134,975,26



Using the highest 36 consecutive months' salary (3 years) would only save less than $5,000 during an individual's life span. Increasing the average to 5 years would save around $20,000 for the individual. The savings for the cohort in our simulation would be about $33 million if 3 years were used in the average salary calculation and about $135 million if 5 years were used.

Member contribution (currently 6% of salary)

The state of Georgia currently requires a 6.00% contribution of salary for active members. This rate has been unchanged since July 2012 and prior to that it was 5.53%. Below we simulate the total contributions of a hypothetical employee starting with a $49,250 annual income which increases by an average rate of 1% annually. Contributions are assumed to be invested in the TRS at a 7.25% annual return. Such an individual would have about $177,053 in his or her account after 23 years of work. If the member contribution rate is increased to 6.50%, the balance at retirement increases to $191,807, i.e. $14,754 more. Obviously, the saving is even higher if the contribution rate is increased to 7.0% or 7.5%.

Table 4. Total lifetime contribution of someone with a starting salary of $49,250 who works 23 years				
Contribution rate	6.00%	6.50%	7.00%	7.50%
Balance at retirement	$177,053	$191,807	$206,562	$221,316
Individual saving		$14,754	$29,509	$44,263
For 6890 members	$1,219,893,459	$1,321,551,248	$1,423,209,036	$1,524,866,824
Total saving for cohort		$101,657,788	$203,315,577	$304,973,365

Table 4 shows these differences in balance and Figure 6 shows the potential savings for the entire cohort of 6890 retirees.

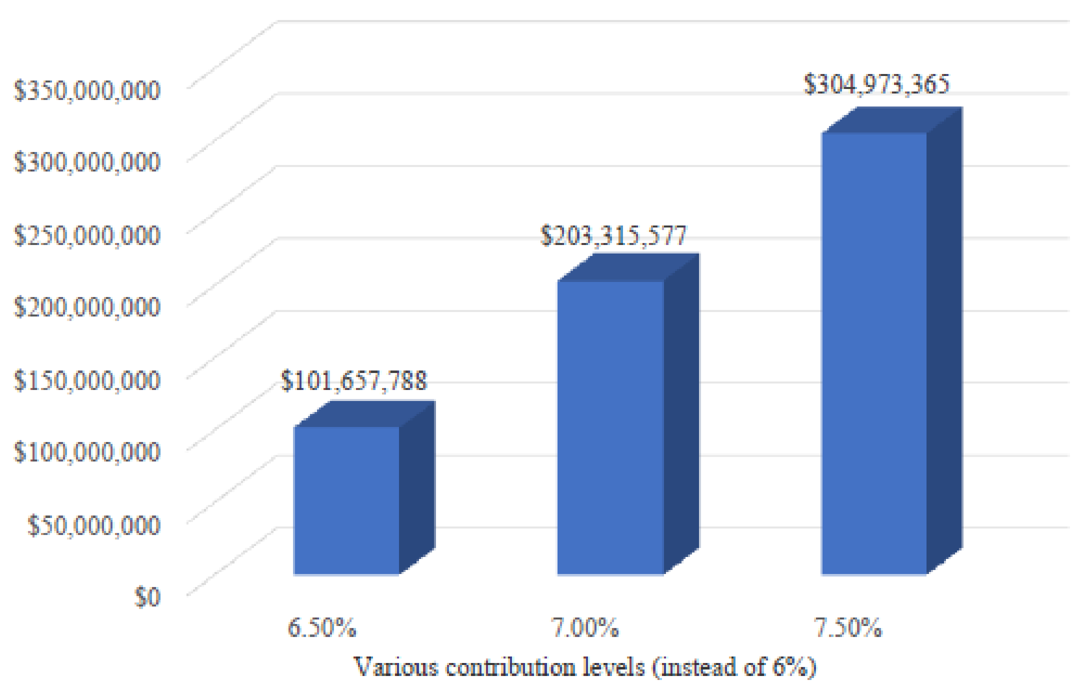


Figure 6. Savings due to changes in member contributions (for a cohort fo 6890 members)

MONTE CARLO SIMULATION

To complete our analysis, we use Monte Carlo simulation to account for uncertainty in our analysis. Salary growth does not stay constant at 1%, the ROI on investment is not 7.25% in every single year, the COLA is applied only when inflation is high, and some people do not live

20 years after retirement (or do not survive until retirement). The goal of the simulation exercise is to see how many people would collect more money from the TRS system than what they paid in, and how much unfunded liabilities would increase or decrease for an individual. We repeat the simulation 1000 times to minimize the impact of outliers. There are a few common features for these 1000 simulations: starting salary ($35,000), the age at which the individual starts working (30), and the retirement age (62), if he or she survives to that age. The other features determining retirement benefits are random: the lifespan, the rate of return on the balance, salary increases, and COLA adjustment during retirement. To acknowledge that these values may vary from year to year, we generate the following random numbers:

Life span: Each year a randomly generated number is compared against the average of the male-female age-specific survival probabilities from 2017 (Social Security Administration [SSA], 2020). If the randomly generated number is lower than the age specific probability, then the person is assumed not to survive that age, otherwise the individual stays in the system for next year.

Rate of return on investment: The annual rate of return numbers is randomly generated from a normal distribution with a mean of 7.4% and a standard deviation of 8.1% - which is the average annual return of the TRS and its standard deviation since 2004. The average rate of return and its standard deviation were calculated for years 2004-2020 Comprehensive Annual Financial Reports (2008-2020).

Income growth: Salary increases are randomly generated from a normal distribution with a 1.9% mean and 1.4% standard deviation, with the limitation of denying negative outputs and replacing them with zero. The average of the annual salary growth rate and its standard deviation are calculated for years 2003-2019 (CAFR, 2020-2008).

Inflation: Annual inflation values, which directly impact the usage of COLA, are randomly generated from a normal distribution with a mean of 2.1% and 1.1% standard deviation, taken from the average inflation rates from 2001 – 2019 (Federal Reserve Economic Data, 2020). If the inflation output is larger than 1% during a retirement year, then COLA is applied at a 3.02% rate.

If the individual survives until age 62, he or she retires and starts collecting the calculated benefit amount until a random death (at which point in time the simulation stops). Then we look at whether this individual has depleted his/her account or died before the balance turned negative, and how much money the individual cost the system after balance depletion.

The advantage of using a large number of simulations is that we minimize the impact of extremes. For instance, if we were to use only one simulation, the outcome of that could be driven by unlikely events such as a long series of very low returns on investment. Since returns are randomly generated, it could happen for one individual that the random generator creates low (or very high) returns for many years. By increasing the number of simulations and looking at the average of the outcomes, we are minimizing the influence of such outliers. The simulation could be thought of as a way of estimating what to anticipate from an uncertain future.

Table 5 shows the results of our simulations. Each column presents numbers from a different specification. The first column shows the baseline. About three fourths of the simulations ended up with a negative balance, or a net burden. The median net burden is about

$825,000. The table also shows the average, the 75th percentile, the 25th percentile and the largest burden amount. We also show the average life expectancy, which is always between 79-81 years of age (which, reassuringly, is around the average life expectancy).

Columns 2 and 3 show the results when the multiplier is decreased to 1.9% and 1.8% respectively. Columns 4 and 5 show what happens if the member contribution rate is increased to 6.5% and 7.0%, respectively. Columns 6 and 7 show results when the average salary calculation is over 3 and 4 years, respectively, instead of 2 years. Columns 8 and 9 shows what happens when COLA is reduced to 2.5% and 2.0%, respectively. Column 10 shows the results with a combination of changes. The numbers show that even with a pretty ambitious change, where the multiplier is lowered to 1.9%, the active member contribution is increased to 6.5%, the time throughout which the active salary is averaged is increased to four years and the COLA is decreased to 2% (Column 10), over 65% of the total simulations run out of money and contribute to unfunded liability. These results suggest that further tax increases and/or a reallocations of tax revenue are unavoidable if we want to keep the system afloat.

Table 5. Simulations under various scenarios

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Starting salary ($)	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000
starting age	30	30	30	30	30	30	30	30	30	30
multiplier	2.00%	1.90%	1.80%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	1.90%
contribution	6.00%	6.00%	6.00%	6.50%	7.00%	6.00%	6.00%	6.00%	6.00%	6.50%
# of years averaged	2 years	2 years	2 years	2 years	2 years	3 years	4 years	2 years	2 years	4 years
COLA (annual)	3.02%	3.02%	3.02%	3.02%	3.02%	3.02%	3.02%	2.50%	2.00%	2.00%
How many (out of 1000) times do we run out of money?	743	713	663	696	677	704	705	733	677	653
Average net burden ($)	897,873	858,674	779,353	953,227	867,683	867,568	891,396	859,529	769,575	684,727
Median net burden ($)	825,641	770,848	727,377	887,394	800,642	783,562	804,814	824,279	719,440	657,674
75 percentile of net burden ($)	473,644	412,878	394,542	492,677	444,147	413,285	424,386	446,977	396,102	338,558
25 percentile of net burden ($)	1,287,798	1,223,829	1,094,693	1,322,042	1,200,994	1,253,929	1,271,340	1,174,824	1,083,653	937,301
Most net burden ($)	3,596,214	3,095,693	2,748,583	3,045,369	3,011,430	3,401,167	3,215,011	2,565,138	3,327,954	2,404,189
Average age at death	79.33	79.95	78.63	79.79	79.60	78.86	79.07	80.11	78.08	79.27

CONCLUSION

The primary responsibility of TRS is to provide teachers in Georgia with a reliable pension plan that is sustainable for the members' entire retirement period. Members of the TRS contribute a percentage of their salary throughout their years of service to receive a fixed, monthly pension in retirement. This fixed amount is calculated by a state formula that takes into consideration the members' years of service, multiplier, and the final average salary. However, for each of the past few years, the TRS has seen an unprecedented increase in unfunded liabilities. Considering that experts anticipate lower returns than what is assumed by the TRS (Benz, 2020), the Teacher Retirement System is in danger of being unable to meet its obligations without substantial help from the state.

This research focused on calculating approximations of the amount of money that can be saved by the state by readjusting the various factors of the TRS formula. Our research indicates that even small changes like reducing the state multiplier or increasing the number of years used to calculate the final average salary, could save the state a substantial amount. However, the presented changes are still not enough to sustain the long-term viability of the system. For example, by reducing the multiplier to 1.9%, increasing the required contribution to 6.5%, reducing COLA to 2%, and increasing the number of years used to calculate final average salary to four years, the cumulative savings could sum up to around $1 billion for a single cohort over twenty years, which is only a third of what the most recent cohort is anticipated to draw from the system after their balance is depleted.

In order to sustain the long-term viability and continue to provide a safety net in retirement for members in the TRS it is imperative that the state, specifically the legislators, take notice of this dire situation and work on putting measures in place that improve the financial strength of the Teachers Retirement System in Georgia.

REFERENCES

Benz, C. (2020). *Experts Forecast Long-Term Stock and Bond Returns: 2020 Edition*. Morningstar.com. https://www.morningstar.com/articles/962169/experts-forecast-long- term-stock-and-bond-returns-2020-edition

Federal Reserve Bank of St. Louis. (2000) Consumer Price Index for All Urban Consumers: All Items in U.S. City Average. Retrieved December 8, 2020, from https://fred.stlouisfed.org/series/CPIAUCSL.

Kagan, J. (2019) *Teacher Retirement System (TRS)*. Investopedia.com. https://www.investopedia.com/terms/t/trs.asp

Knoll, M. A. Z, and Olsern, A. (2014). Incentivizing Delayed Claiming of Social Security Retirement Benefits Before Reaching the Full Retirement Age, Social Security Bulletin, 74(4). https://www.ssa.gov/policy/docs/ssb/v74n4/v74n4p21.html

Moore, S. (2018). *How Long Will Your Retirement Really Last?* Forbes.com. https://www.forbes.com/sites/simonmoore/2018/04/24/how-long-will-your-retirement-last/?sh=21f477f47472

Public Plans Data. (2020). *Quick Facts*. Publicplansdata.org. https://publicplansdata.org/quick-facts/national/

Sidorova, J. and Gilroy, L. (2020). The Impact of Proposed Changes to Georgia's Teachers Retirement System. The Reason Foundation. https://reason.org/commentary/the-impacts-of-proposed-changes-to-georgias-teacher-retirement-system/

Sidorova, J. and Niraula, A. (2018). Georgia's Teachers Retirement System: Historic solvency analysis and prospects for the future. The Reason Foundation. https://secureservercdn.net/198.71.233.138/m01.813.myftpupload.com/wp-content/uploads/2018/09/IATRSUpdated09272018_no_markup.pdf

Salzer, J. (2019, January 24). Audit: Georgia could save hundreds of millions on teacher pensions. *Atlanta Journal Constitution*. https://www.ajc.com/news/state--regional-govt--politics/audit-georgia-could-save-hundreds-millions-teacher-pensions/yGZSwvypLJkGnhSBvcYn4O/

Social Security Administration. (2020). Period Life Table, 2017. Retrieved March 8, 2020 from https://www.ssa.gov/oact/STATS/table4c6.html.

Teachers Retirement System of Georgia (TRSG). (2020-2008). Comprehensive Annual Financial Report. Retrieved December 8, 2020 from https://www.trsga.com/publications/.

Teachers Retirement System of Georgia (TRS). (2020). Economic Impact. Retrieved December 8, 2020 from https://www.trsga.com/about-us/economic-impact/.