VRS Stress Test and Sensitivity Analysis

Report to the General Assembly of Virginia

October 2023

Virginia Retirement System

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STRESS TEST AND SENSITIVITY ANALYSIS MANDATE

Section 51.1-124.30:1 of the *Code of Virginia* requires the Virginia Retirement System (VRS) to formally adopt a policy to regularly report sensitivity and stress testing analyses for members of the General Assembly (Appendix). The analyses shall include projections of benefit levels, pension costs, liabilities, and debt reduction under various economic and investment scenarios.

Stress testing, also known as scenario testing, is an analysis or simulation designed to measure the effect on the plans of various projected, generally adverse, investment and actuarial events.

Sensitivity testing examines the effect on the plan of different actuarial assumptions and methods.

This report provides an analysis of the potential impact of various scenarios and hypothetical situations on VRS-administered retirement plans and supports transparency with regard to the future health of the retirement system.

It should be noted that when VRS examines future potential outcomes for the plans, probabilities exist for both positive and negative scenarios. This report focuses primarily on the negative scenarios as they help to identify those areas of risk that generally provide the most challenges to plan sponsors.

In addition to the mandate set forth in the *Code of Virginia* above, the Actuarial Standards Board requires actuaries to perform assessments of risk through Actuarial Standard of Practice No. 51: "Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions". The annual funding valuation reports include risk and plan maturity measures, discount rate sensitivity, as well as deterministic projections of contribution rates including asset return sensitivity. The risk analysis herein complements and enhances the risk measures shown in VRS' annual funding actuarial reports which can found on the VRS website at the link below.

Virginia Retirement System Actuarial Valuation as of June 30, 2022 (varetire.org)

EXECUTIVE SUMMARY

The purpose of this report is to assist the VRS Board of Trustees, the Virginia General Assembly, the Governor, stakeholders, and the public to better understand and assess the risks inherent in the funding of the pension system. This year's report investigates various possible risks faced by VRS and measures their potential impact on the defined benefit programs.

After market returns far exceeded expectations in fiscal year 2021, fiscal year 2022 was a difficult year that saw many pension systems post negative returns for the year. VRS recorded a 0.6% return for the year, which was below the expected long-term rate of 6.75% but exceeded many of its peers in a challenging year for investments. The volatile markets highlight the need to explore opportunities to further strengthen the health of the plans, particularly the statewide retirement and Other Post-Employment Benefits (OPEB) plans.

Key results and findings of this report:

- Following robust market returns in fiscal year 2021, future investment performance in the near term may be materially lower than both historic norms as well as projected returns over longer timeframes. This was true for fiscal year 2022 in which VRS had an investment return of 0.6% and the recently announced fiscal year 2023 return of 6.1% came in below the assumed 6.75% return.
- New target fund allocation was adopted and reflected in projections throughout this report.
- Significant resources must remain dedicated to addressing the amortization of the legacy unfunded liabilities.
- Analysis suggests that accelerating the payback of the legacy unfunded liabilities could provide significant long-term savings and better position the statewide plans to weather future volatility in investment returns, thereby serving to reduce investment risk.
    - In recognition of the importance of reducing long-term liabilities with the benefit of achieving savings over time, the Governor and legislature provided a one-time infusion of $750 million in June 2022 with an additional $275 million provided in June 2023. In addition, the Governor and General Assembly also expect to provide $55 million in June 2024 to certain Health Insurance Credit programs.

    - Further, to provide additional funds into the plans, the Governor and General Assembly maintained the contribution rates in FY 2023 and FY 2024 at the same level as the previous biennium which improves plan health by lowering unfunded liabilities and generating savings over time. (Due to exceptional FY 2021 investment performance, the rates for FY 2023 and FY 2024 would have otherwise declined.)
- As roughly two-thirds of benefits are funded by investment income, receiving 100% of the Board-certified actuarially determined contributions not only avoids adding unfunded liabilities to the plans, but also ensures timely availability of assets to be invested to take advantage of compound interest. Of note, the Governor and General Assembly met and even accelerated the statutory requirement to fund 100% of the Board-certified contribution rates.
- Pension reforms, specifically plan design changes over the past decade, have reduced the future costs of benefits. In addition, these reforms have reduced employers' risk by introducing shared risk through the defined contribution component of the Hybrid Retirement Plan. Approximately 30% of a hybrid plan member's benefit has no future investment or longevity risk for employers.

This report is intended to assist policymakers and stakeholders in assessing the soundness of the System. To better understand the risks associated with funding the System, this report examines a range of potential outcomes that could endanger the long-term funding of the System and prevent the System from reaching full funding. Again, this report focuses primarily on analyzing negative outcomes, since such outcomes would result in the greatest challenges for the plan sponsors and System.

This report is based on the June 30, 2022 Annual Actuarial Valuation. In this report, the focus is on:

- Muted economic forecasts including higher than expected inflation and more volatility in the markets.
- Non-investment related risks that can impact plan cash flow and costs.

Investment Rate of Return Assumption

Pension plans are generally prefunded, meaning money is invested during a member's career so that by the time the member retires adequate funds will exist to pay benefits throughout the member's retirement. Investment earnings on plan contributions currently account for nearly two-thirds of pension benefit payment funding. The discount rate – the rate used to determine the present value of future benefit payments – influences the level of contributions required, assuming they (in combination with invested assets) will generate investment income throughout a member's career and into retirement. VRS uses the assumed long-term rate of return as the plan discount rate and these terms are used interchangeably in this report.

The discount rate reflects expectations of what investment earnings the markets will deliver in the future, and it is calculated based on two components: expected price inflation and real rate of return[1]. A change in either of those components over the long term would necessitate further evaluation of the discount rate.

Fund long-term health requires careful management and decision making for the asset allocation needed to fund members' pensions and OPEBs, such as group life insurance and the health insurance credit, over the long term. The VRS Board of Trustees recently conducted an Asset Liability Modeling Study (ALM) in June 2023 to ensure prudent and responsible investment practices and strategies are being used in recommending and deploying investment allocations.

As part of the ALM, the VRS investment team updated their capital market outlooks. Since the discount rate is a long-term assumption, VRS focuses on the 20-year outlook, but also considers shorter-term market expectations. The exhibit below shows the current target weights of each asset class along with the expected return and corresponding volatilities.

[1] The Real Rate of Return measures the percentage return earned on an investment after adjusting for the inflation rate, unlike the nominal rate. The nominal rate of return is the amount of money generated by an investment before factoring in expenses such as investment fees and inflation. If an investment generated a 10% return, the nominal rate would equal 10%. After factoring in inflation during the investment period, the actual "real" return would likely be lower.

Exhibit 1

Previous Target Allocation

Asset Class	Current Wt.	E(r)	E(σ)
Public Equity	34.0%	7.0%	18.1%
Fixed Income	15.0%	4.9%	5.6%
Credit Strategies	14.0%	7.9%	6.4%
Real Assets	14.0%	6.5%	14.3%
Private Equity	16.0%	9.0%	23.1%
PIP	2.0%	7.8%	19.4%
Dstrat	2.0%	6.7%	12.4%
RBI	2.0%	6.2%	5.1%
Cash	1.0%	3.7%	0.5%
Currency Return Addition		*0.1%*	
Total Fund		**7.1%**	**12.6%**

Due to the divergence between expected returns over the near term, i.e., the next five to 10 years, and over the longer term, i.e., 20 to 30 years, reflecting a blended discount rate to incorporate near-term uncertainty in the markets requires selecting a discount rate below the median expected long-term rate of return. As displayed in Exhibit 1 above, while the median return of 7.1% is expected to be achieved 50% of the time, selecting a discount rate of 6.75% would move the assumption closer to the 45th percentile, providing approximately a 55% chance of achieving the long-term rate of return over time.

In June 2023 the VRS Board selected and approved a new long-term strategic asset allocation which will be implemented over the next several years. The new strategic allocation is still expected to provide a median return of 7.1% but has a lower volatility which drops from 12.6% to 12.0% under the new allocation. The new allocation is shown below in Exhibit 2.

Exhibit 2

Newly Adopted Target Allocation

Asset Class	Current Wt.	Current E(r)	Current E(σ)
Public Equity	32.0%	7.0%	18.1%
Fixed Income	16.0%	4.9%	5.6%
Credit Strategies	16.0%	7.9%	6.4%
Real Assets	15.0%	6.5%	14.3%
Private Equity	15.0%	9.0%	23.1%
PIP	1.0%	7.8%	19.4%
Dstrat	1.0%	6.7%	12.4%
RBI	5.0%	6.2%	5.1%
Cash	-1.0%	3.7%	0.5%
Currency Return Addition		*0.1%*	
Total Fund		**7.1%**	**12.0%**

VRS maintained the 6.75% return assumption following the June 2023 ALM project. With the median return of 7.1%, the 6.75% reflects short-term volatility and will provide approximately 55% chance of meeting the long-term rate of return.

INVESTMENT RISK

Possible Future Outcomes

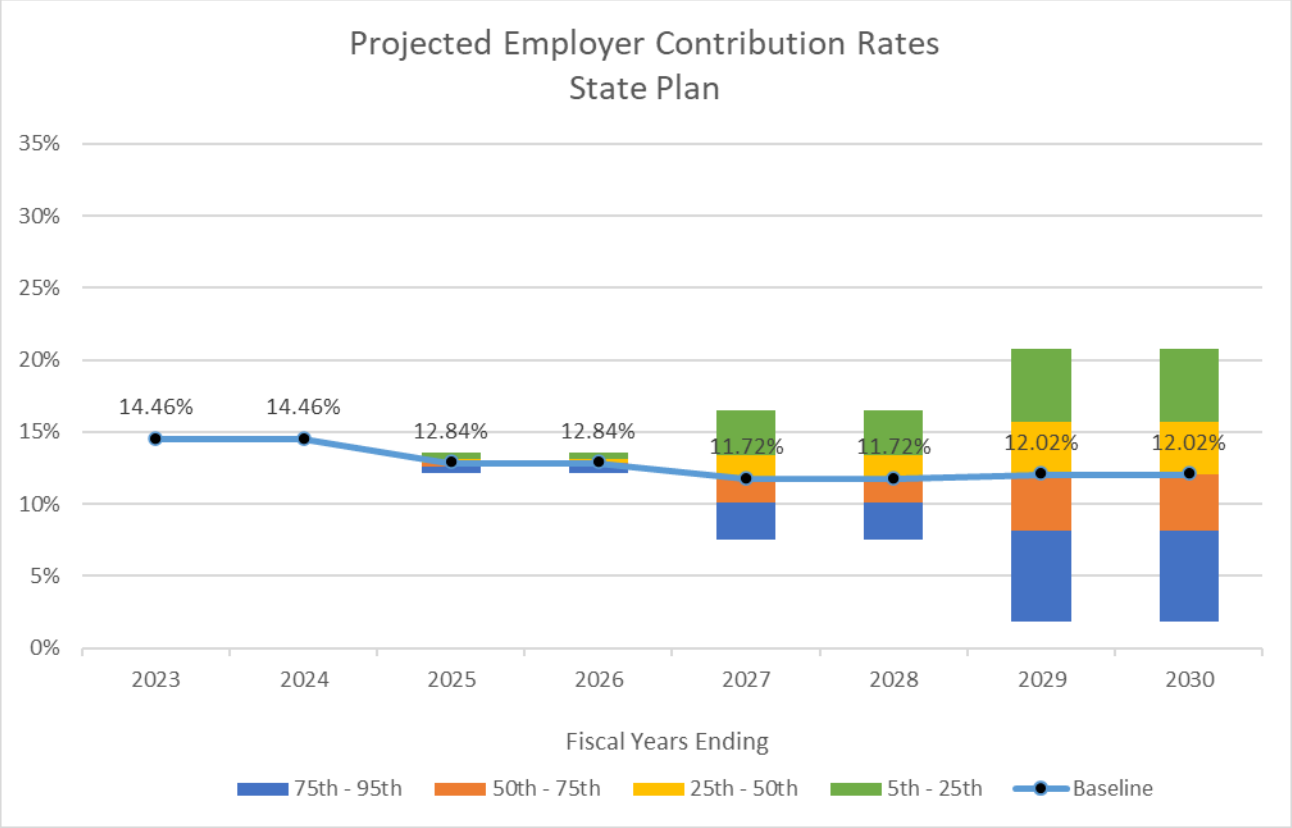
Investment returns will have a greater impact on the funding of the plans as the VRS plans continue to mature. When investment returns are below expectations, the unfunded actuarial accrued liability increases and additional contributions are needed, which historically have been funded by employers.

Exhibit 3 shows probabilistic or stochastic projections of future investment returns and the impact on future contribution rates for the State plan. These stochastic projections are based on VRS' 2023 capital market outlook and newly adopted target asset allocation. Under the "baseline" scenario the State plan employer contribution rates are expected to trend lower with a 50% probability that employer contribution rates will be

between 8.12% and 15.66% by fiscal year 2029 with an expected employer rate of 12.02%.

The 20-year capital market assumptions will be the "baseline" scenario used in the scenario testing that follows later in the report.

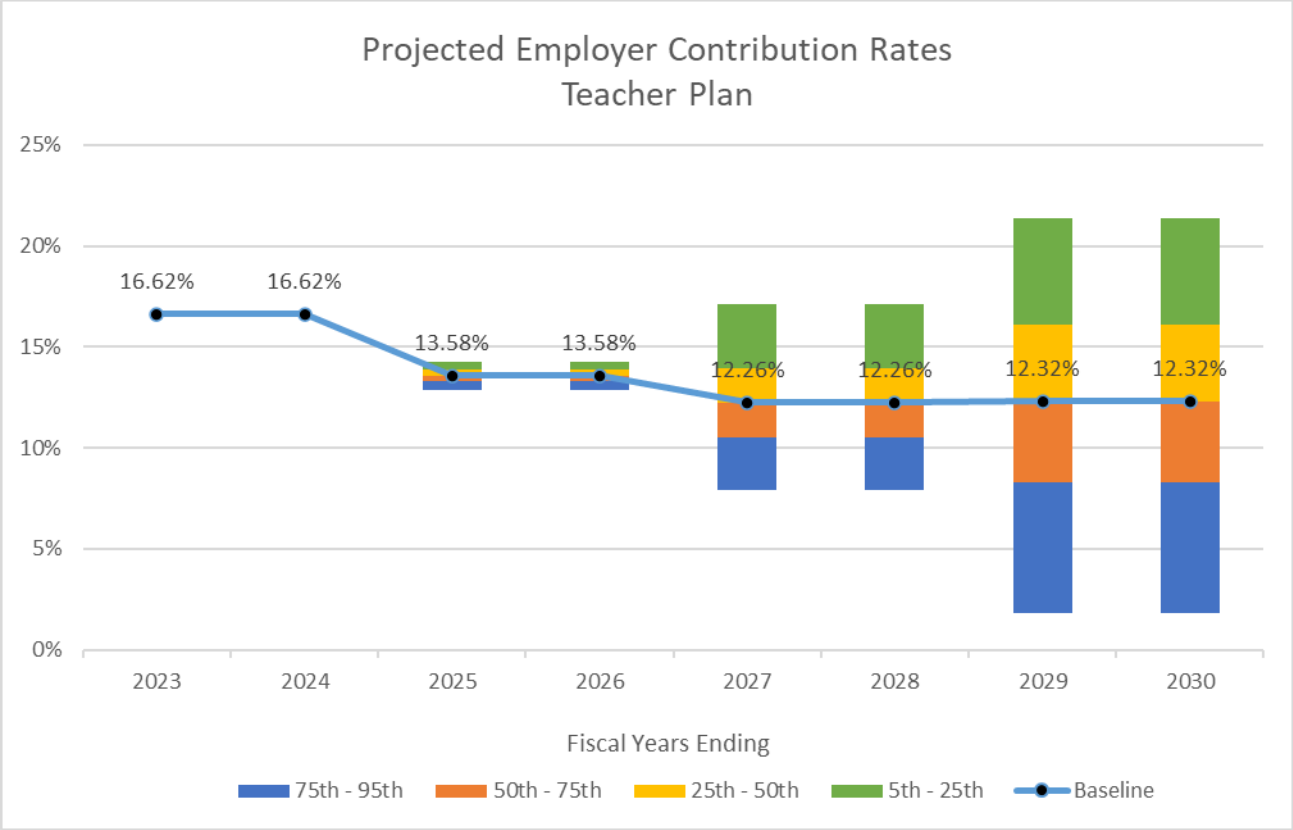
Exhibit 3 – Stochastic Basis



Results based on June 30, 2022 actuarial valuation and estimated 4.5% fiscal year 2023 fund return.

Exhibit 4 shows the probabilistic or stochastic projections of future investment returns and the impact on future contribution rates for the Teacher plan. The Teacher plan employer rates are also expected to trend lower with a 50% probability that by fiscal year 2029 employer rates will be between 8.31% and 16.10%, with an expected contribution rate of 12.32%.

Exhibit 4 – Stochastic Basis



Results based on June 30, 2022 actuarial valuation and estimated 4.5% fiscal year 2023 fund return.

Scenario Testing (Unexpected or Unpredictable Economic Events)

Fiscal year 2022 saw a decline in the markets following the major rebound in 2021. Markets remain volatile with higher than expected inflation still an issue.

The VRS investment team compiled four economic scenarios that provide a framing of global economic outcomes that could possibly occur over the next several years. The following four illustrative scenarios are designed to show the potential magnitude of the impacts on plan funding. There is no degree of certainty that any of these scenarios will correctly simulate what will actually occur over the next several years. With the exception of the Lost Decade scenario, the other scenarios are front-loaded, meaning that

the impact is modeled to occur over the next several years. The Lost Decade scenario persists throughout the entire 20-year projection period.

Keep in mind that VRS still has considerable legacy unfunded liabilities. As a result, the plans are subject to greater risk than plans that have smaller unfunded liabilities.

Although merely illustrations, the stress testing scenarios help to highlight the vulnerability of the fund to unexpected market shocks and the magnitude by which these scenarios can quickly degrade funded status and accelerate employer contribution requirements.

- **Baseline** – Estimated fiscal year 2023 return of 4.5% followed by annual returns of 6.75%. Note that the actual fiscal year 2023 return was 6.1%, but due to the timing of the analysis required for the report an estimate of 4.5% was used for illustrative purposes.
- **Soft Landing** - This is an ideal case in which inflation responds immediately to Federal Reserve policy moves and is back to a targeted 2.5% by the end of 2023 calendar year. Both inflation and real growth surprise to the upside along with earnings growth and sentiment drives returns on all asset classes above expectations for years 1-2 before settling back to the baseline.
- **Hard Landing -** Growth expectations are retracted, inflation is persistent especially in services, and higher nominal rates result in a significant slowdown in housing and consumer durables. Households continue to spend down savings inventoried during the pandemic while real incomes continue to fall off. The Federal Reserve is forced into a more aggressive rate hiking cycle that is not priced into the market. Real economic growth is hit hard along with risk assets which take 4 years to recover to pre-landing levels.
- **No Landing** - Inflation persists and Federal Reserve policy is ineffective at achieving a non-inflationary equilibrium. Short rates (and inflation) therefore

remain 'elevated' though not excessive and real growth equilibrates around its historical average of 3%. While risk assets do comparatively well (above expectations), fixed income and credit as well as real assets take several years to return to their long run target returns.

- **Lost Decade (Japan)** - The economy collapses into an extended low growth, deflationary equilibrium similar to Japan's experience beginning in the 1990's. Risk assets such as public equity and real assets are especially hit hard. Fund returns equilibrate around 2.5% annually with very little volatility. Policy is ineffectual.

The VRS scenario testing produces 20 years of 10,000 trials for each given investment scenario. The analysis provided below shows the median cumulative asset returns for the various scenarios.

Asset/Liability modeling is not an exact science, but rather a long-term trend predictor and risk measuring tool. Results should not be viewed on an absolute basis but rather on a relative basis compared to alternative options.

It should be noted that if protracted unfavorable economic experience were to occur, it is likely that plan design changes would be considered to maintain the long-term health of the funds. This was the case following the Great Recession when a series of pension reforms were instituted to lower the future costs of the plans.

Exhibit 5 shows the cumulative returns for each of the economic scenarios. Note that the estimated return for 2023 was assumed for purposes of this analysis to be 4.5% based on fund returns when analysis was performed.

Highlights of Exhibit 5:

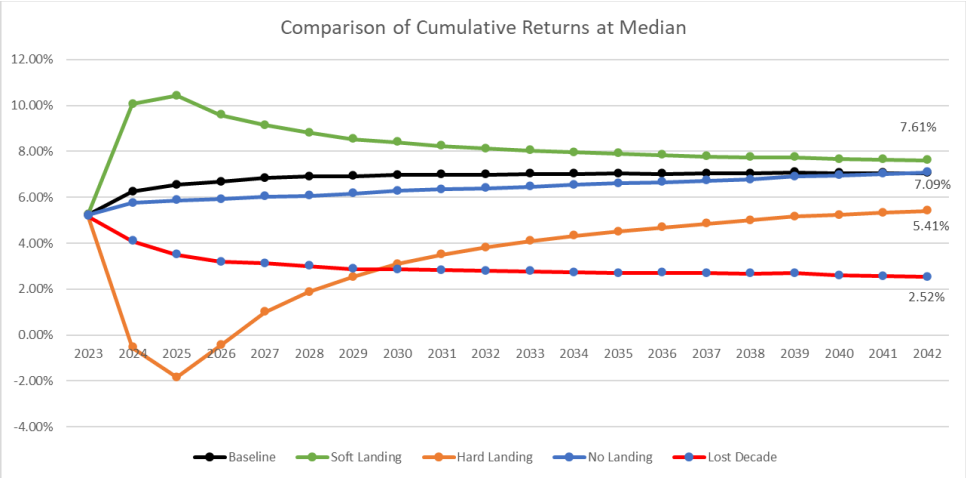
- **Soft Landing** models double-digit returns over the first two years before reverting back towards the assumed rate of return. The additional gains help to

lower unfunded liabilities and plan costs as the gains are recognized over the first 5-6 years.

- **Hard Landing** models negative returns over the first two years before reverting back towards the assumed rate of return by year 4. The impact of the large losses immediately impact funded status and begin to impact employer rates over the subsequent rate settings which last over many years due to recognizing the unfunded liabilities over 20 years.
- **No Landing** models persistent high inflation and while risk assets do comparatively well (above expectations), fixed income, credit, as well as real assets take several years to return to their long run target returns.
- **Lost Decade** models lower than expected returns over the total 20-year period, similar to what Japan experienced in the 1990's, so rather than a shock scenario, it shows the impact if constantly missing expected returns by 300 to 400 basis points each year.

As expected, soft landing will produce more favorable outcomes than the baseline and hard landing produces poor results in the short-term but then rebounds. The worse scenario from a long-term investment perspective would be a lost decade. Scenarios depicted tend to focus on poorer outcomes to focus on the downside risk.

Exhibit 5



FUTURE RISK ANALYSIS

When analyzing the impacts of the scenario testing we focused on three key measures in this report:

- Employer contribution levels as a percentage of payroll
- Future funded status
- Cash flow needs – defined as benefit payments minus contributions

The analyis was done for the State and Teacher retirement plans since they are the two largest plans administered by VRS.

Employer Contribution Levels

Below are estimated impacts on employer contribution levels under the various economic scenarios. Because VRS does rate-setting every two years and has various risk mitigation tools in play such as asset-smoothing and 20-year amortization of gains and losses, the contribution impacts are more of a longer-term risk measure as impacts are blended into the rates over time. These are economic driven impacts which show the effect of adverse investment returns on employer rates over time.

Highlights of Exhibits 6 and 7:

- The baseline scenario assumes that the plan will achieve the assumed 6.75% investment return each year. Under this scenario contribution rates for the State and Teacher plans are expected to trend lower over the next decade.
- Hard Landing, Lost Decade, and No Landing all include investment returns below the expected rate of return for an extended period of time. The impact on contribution rates is directly in line with the level of fund underperformance relative to the assumed rate of return of 6.75%. Larger draw downs on the fund require larger increases in employer rates which are blended in over-time, and then are maintained at higher rates until the unfunded liabilities are paid off over 20 years.

- Conversely, the soft landing scenario shows the positive impact of higher than expected returns, which would lower employer contribution requirements as gains would be recognized overtime.

Exhibit 6 – State Plan Employer Contribution Rate Impacts

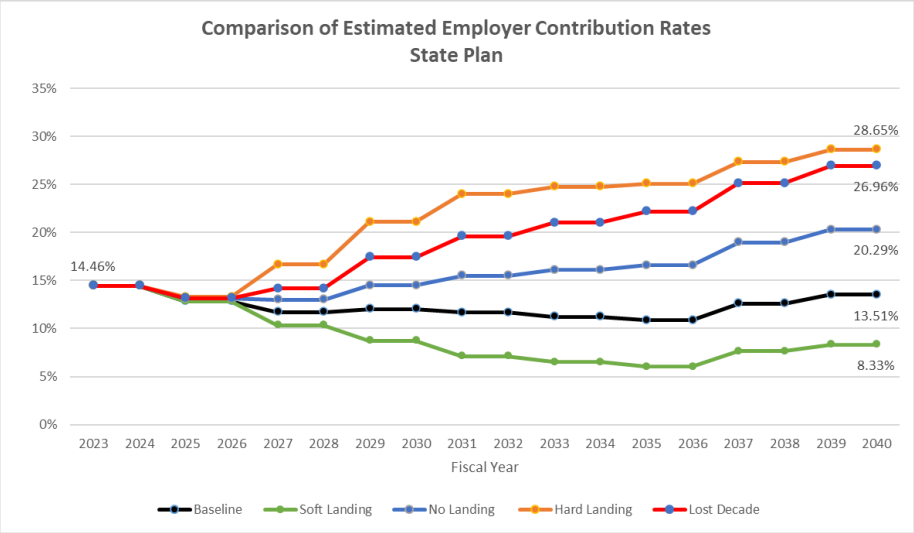
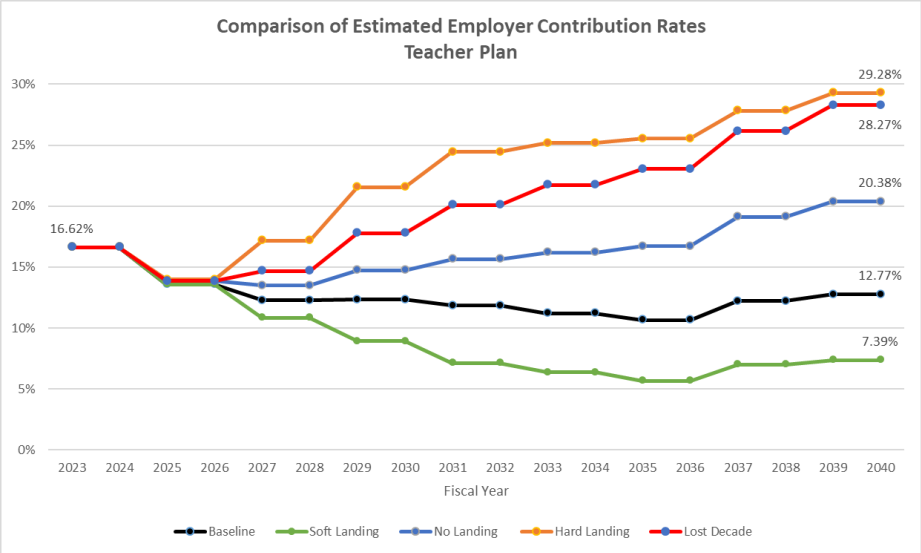


Exhibit 7 – Teacher Plan Employer Contribution Rate Impacts



Future Funded Status

Funded status is an important measure of plan health but is a bit harder to utilize under these scenarios since the contribution streams differ by scenario, and we assume for the study that 100% of the required contribution would be funded. Because of this, they become more of a short to mid-term measure of the impacts of the economic scenario.

Highlights of Exhibits 8 and 9:

- The baseline scenario shows a steady increase in funded level as no new unfunded liabilities are generated and legacy unfunded liabilities continued to be paid down.
- Soft Landing anticipates investment gains which accelerate funded status improvement.
- Hard Landing, Lost Decade, and No Landing all include investment losses which decrease the plan funded status. This leads to higher employer contributions and pushes out the time to attaining the 100% funded level. Large draw downs on the fund immediately impact funded status and subsequently require larger contributions to pay down the additional unfunded liabilities which are amortized over 20 years.

Exhibit 8

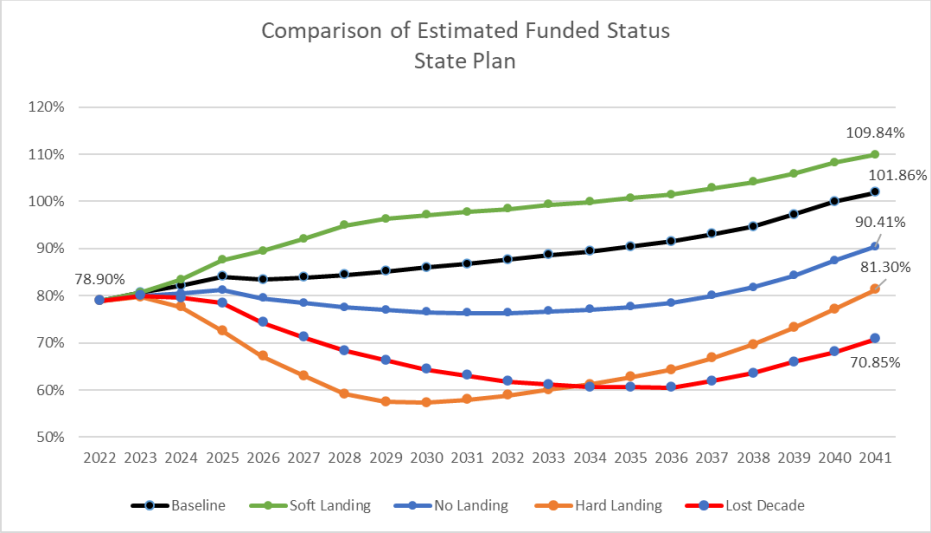
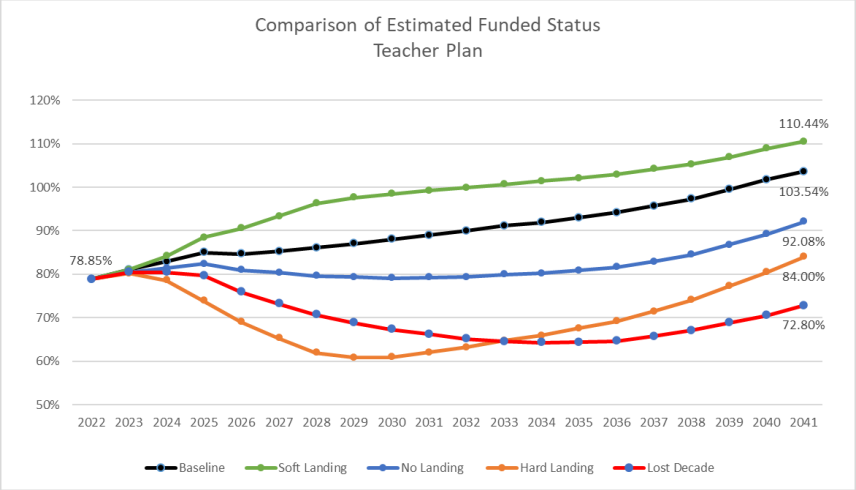


Exhibit 9



Cash Flow Projections

Defined benefit pension plans are designed to provide employees with a guaranteed income stream upon retirement. Contributions to VRS plans are generally shared by employees and their employer and are a systematic way of prefunding the system's costs. The benefit of prefunding is that investment returns on the prefunded plan assets reduce the employer's long-term contributions.

Retirement plans that have been in operation for a number of years generally have contributions coming into the plan and benefits being paid out. The net (non-investment) cash flow is the difference between the contributions collected (inflows) and the benefits and expenses (outflows) of the fund. These cash flows will vary for each plan because all plans have different demographics and maturities.

Mature plans often have negative cash flows over time, which is considered the normal cycle of pension plans. Negative cash flows do not necessarily imply a plan is in trouble. In fact, part of the benefit and efficiency of prefunding derives from investment returns paying a significant portion of the benefit payments.

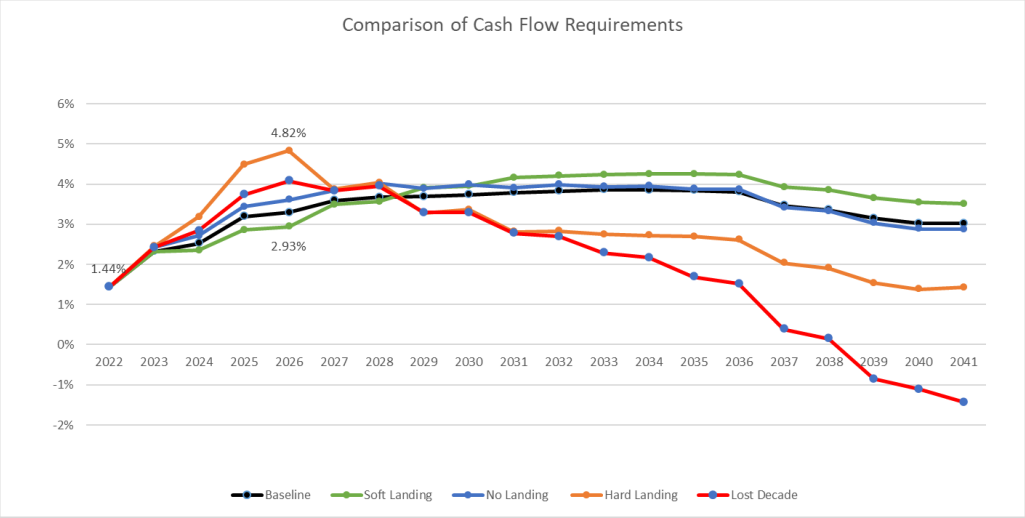
The cash flow percentage is the plan contributions minus benefit payments and administrative expenses divided by the market value of assets. The percentage reflects

the investment rate of return needed to keep the plan cash flow neutral for the year. Therefore, higher values mean more risk to the plan.

Highlights of Exhibit 10:

- Cash flow percentage of 1.44% for 2022 was lower than usual due to cash infusions included in the 2022/2023 State budget.
- The baseline scenario expects gradual increases in cash flow requirements peaking in 2033 at 3.86%.
- Soft Landing anticipates lower cash flow in the near term due to additional investment gains, but eventually peaks in 2034 at 4.25% due to lower contributions coming into the fund.
- Hard Landing and No Landing scenarios have higher cash flow needs in the short term due to higher than expected inflation which causes higher benefit payments, with Hard Landing scenario peaking in 2026 at 4.82%. Cash flow needs begin to decrease for these scenarios as employer contributions increase.
- The Lost Decade scenario shows a slight increase in cash flow needs due to lower than expected asset returns, but as contribution rates begin to increase over time the cash flow needs drop as higher contributions are expected to cover persistent investment losses.

Exhibit 10



Results based on June 30, 2022 actuarial valuation.

Exhibit 11

Peak Negative Cashflow

	Baseline	No Landing	Hard Landing	Soft Landing	Lost Decade
Year of Peak Cashflow Needs	2033	2028	2026	2034	2026
Cash Flow Requirement	3.86%	4.02%	4.82%	4.25%	4.08%

Results based on median results of each scenario.

During periods of prolonged volatility, assets in plans with less liquidity are more likely to be sold at a loss and as a result these losses may contribute to decreasing funded ratios. In the U.S., public sector pension plans, including VRS, generally hold some portion of the fund in cash and short-term investments to pay ongoing expenses, such as benefit payments and administrative costs.

Other Risks

The exhibit below highlights some non-investment related risks that could have an immediate or short-term impact on plan cash flows, costs, and liabilities. In most of these categories, the impact is related to how actual experience differs from the actuarial assumptions.

Exhibit 12

Item	Current Assumption	Impacts	Contribution Impacts	Cash Flow Impacts
Inflation	2.50%	Benefit Payments & Liabilities	Amortized over 20 Years	Immediate
Merit Increases	Variable based on Age & Service	Payroll & Normal Cost Rates	Immediate	Immediate
Longevity	Improvements factored in each year	Liabilities	Amortized over 20 Years	Small Impact Immediately
Unanticipated Retirements	Based on Plan Experience & Updated Every 4 Years	Benefit Payments, Covered Payroll, and increased Cash Flow	Amortized over 20 Years	Immediate
Workforce Reduction	Not Assumed	Lower Normal Cost but also Lower Covered Payroll	Immediate	Smaller Contributions but higher rates as percentage of payroll. Shifting costs in cost-sharing plans.
Legislative Changes	Not Assumed	Depends on Design	Depends on Design	Most Likely Immediate

Inflation – VRS assumes long-term inflation will be 2.50%. During periods where inflation is higher than expected it has an immediate impact on plan benefits due to cost of living adjustments which increases cash flow needs and plan liabilities which will increase employer contributions over time.

Merit Increases – VRS assumes merit increases that vary based on age and service. Merit increases in excess of what is assumed have an immediate impact by raising the annual normal cost rate and covered payroll. Conversely, since unfunded liabilities are amortized over covered payroll, if the population remains constant, the higher covered payroll could help to offset some of the impacts of the increased liability by maintaining costs at a similar level of covered payroll.

Longevity – Younger generations living longer than older generations is anticipated in the VRS mortality tables by recognizing mortality improvements. These impacts are generally recognized over longer periods of time and therefore have a relatively small impact in the near term.

Unanticipated Retirements – Members retiring earlier than expected can have immediate impacts to cash flow requirements, decreases in covered payroll, and potential increases in plan liabilities which will increase contribution rates.

Workforce Reduction – VRS assumes that all plans are on-going and that they will have a relatively level population. In plans that have a relatively large unfunded liability, a decreasing workforce can cause an increase in the contribution rates due to a smaller covered payroll over which to collect contributions.

Legislative Changes - As plan funding levels have improved VRS has seen an uptick in requests to enhance certain benefits. While funding levels have improved, unfunded liabilities of over $20 billion still remain to be paid down. As enhancements are considered, focus should not only be placed on the contribution rates required to fund the benefits, but also the unfunded liabilities immediately generated. Again, unfunded liabilities have the potential to create additional volatility in contribution rates.

Strategies to Enhance Funding

VRS continues to support strategies to lower the legacy unfunded liabilities of the plans. While these various techniques could save employers money on future contributions, increasing contributions during a fiscal crisis, even to ultimately save money, might not be a practicable or realistic approach. Nevertheless, when revenues and fiscal conditions allow, these alternatives may serve to reduce future employer expenditures and are worth discussing here.

A decade of bull markets has shown that investment returns alone will not get rid of the legacy unfunded liabilities, which were in part the result of a failure to fund the actuarially determined and Board-certified contribution rates. Recent financial crises such as the Global Financial Crisis and impacts of the COVID-19 pandemic have shown that plans with greater unfunded liabilities will continue to be more vulnerable to market downturns. This suggests that a dedicated effort to pay down unfunded liabilities on a more accelerated basis may help to cushion any potential uncertainty that could occur with future market downturns. In recognition of the importance of reducing long-term liabilities with the benefit of achieving savings over time, the Governor and legislature provided a one-time infusion of $750 million in June 2022 with an additional

$275 million provided in June 2023. In addition, the Governor and General Assembly also expect to provide $55 million in June 2024 to certain Health Insurance Credit programs.

Reduce Amortization Periods of Unfunded Liabilities

Although the current funding policy puts the plans on a path to full funding by 2044, it is important to understand how the legacy unfunded liability is being amortized and how it is expected to change over time.

To keep plan costs level over time, unfunded liabilities are amortized using a "level percentage of payroll" method. This method assumes that payroll will increase over time due to both inflation and merit increases, so it aims to collect roughly the same percentage of payroll each year, which should inherently collect larger dollars in later years as payrolls increase. "Back-loaded" funding methods are commonly used to fund public sector plans; though some plans opt to use revenue growth rather than payroll growth as the basis for the growth rate. The alternative would be to amortize unfunded liabilities as a "level dollar", which would collect the same cash contribution each year similar to a home mortgage. This approach generally causes "front-loading" of contributions by paying a higher percentage of contributions as a percent of payroll early in the amortization period and a smaller percentage toward the end of the amortization period.

In 2013 when VRS updated its funding policy, one of the changes was to move from open to closed amortization periods in order to pay down unfunded liabilities. It was decided that all future gains and losses would be amortized over 20-year closed periods. This method avoids "negative amortization" and also pays down losses more closely related to the working lifetime of members rather than pushing costs beyond their working career. Negative amortization occurs when the amortization payment is set too low to cover the interest payment on the outstanding balance, which results in an increase in the principal balance of the loss.

The legacy unfunded liability established as of 2013 was amortized over a 30-year closed period, but with the upcoming 2023 valuation the legacy unfunded liability will also have 20 years remaining.

As of June 30, 2022, the State plan legacy unfunded liability has 21 years of the original 30 years remaining to be paid, with an outstanding balance of $7.5 billion. Under the

current amortization schedule, $6.8 billion of interest will be paid over the next 21 years on the $7.5 billion outstanding balance. To illustrate the impact of reducing the amortization period by just one year, exhibit 13 below shows estimated savings of reducing the amortization period and the corresponding increase in annual contribution rates. For example, adjusting the remaining amortization period for the legacy unfunded liability down to 20 years beginning with the 2022 valuation would have saved the State approximately $450 million in interest payments. The shorter amortization period would increase contribution rates by approximately 0.36% of covered payroll each year of the remaining amortization period. The exhibit also shows the additional savings for shortening the amortization by up to five years.

Exhibit 13

Amortization of Legacy Unfunded Liability
State Plan

Unfunded Balance as of 2022 - $7,489,568,100

Amortization Period	Cumulative Payments over Amortization Period	Interest Paid Over Amortization Period	Amortization Payment as Percentage of Payroll	Increase in Annual Payment	Estimated Increase in Funding Initial Year	Estimated Total Savings
21	$14,286,815,900	$6,797,247,700	10.65%			
20	$13,837,180,300	$6,347,612,100	11.00%	0.36%	$16,754,000	$449,635,600
19	$13,401,262,200	$5,911,694,000	11.40%	0.76%	$35,350,000	$885,553,700
18	$12,978,655,500	$5,489,087,300	11.84%	1.20%	$56,095,000	$1,308,160,400
17	$12,568,965,800	$5,079,397,600	12.34%	1.70%	$79,369,000	$1,717,850,100
16	$12,171,810,200	$4,682,242,000	12.90%	2.26%	$105,647,000	$2,115,005,700

Results based on June 30, 2022 actuarial valuation.

Note that any impacts that result in flat or even declining workforce/payroll in the public sector, similar to what occurred after the Global Financial Crisis in 2008-2009, would likely result in increases in amortization payments as a percentage of payroll due to payments to the unfunded liability being less than expected. When actual payroll is less than expected, less dollars are contributed to the fund under the percentage of payroll amortization method. Therefore, future contribution rates will need to increase in order to collect the necessary contributions over a smaller payroll base.

Maintain Current Contribution Rates

Maintaining current contribution levels following years in which the plan experiences actuarial gains could help create a cushion against future actuarial losses while improving the plan funded status. This strategy was used in the 2022 Appropriation Act and provided approximately $367 million in additional funds for the State and Teacher plans. This action is expected to lower unfunded liabilities for the State plan by approximately $34 million over the two years and lower future contribution rates by 5 basis points, while the Teacher plan will have approximately $382 million in reduced unfunded liabilities and future contribution rates will be reduced by 30 basis points.

Limitations on Benefit Enhancements

Another strategy adopted by the VRS Board of Trustees is to require political subdivision plans to meet specific funding measures in order to make modifications or enhancements to benefits. Plans are required to be at least 75% funded after any plan changes, which would require the employer electing a benefit modification or enhancement to make a lump sum payment at the time of a plan design change in order to maintain the plan funding level. This prevents employers from adding unfunded liabilities to their plans that can cause contribution rate volatility that the employer may not be able to afford in future years.

Legislatively mandated benefit expansions, however, must be provided by all employers despite the employer's funded status. In addition, some benefit enhancements can create immediate liabilities. As benefits enhancements are considered, focus should not only be placed on the contribution rates required to fund the benefits, but also the unfunded liabilities generated. Again, unfunded liabilities have the potential to create additional volatility in contribution rates.

FINDINGS & CONCLUSIONS

Although market returns for fiscal year 2021 exceeded expectations, an increase in gloomy developments during FY 2022 and into FY 2023 has caused several risks to materialize in the economy which could impact VRS' pension and OPEB plans.

As plans mature and assets continue to grow, downside investment risk will have a bigger impact on plan funded status and employer contribution rates.

Opportunities exist to proactively address some of these concerns and to better position the retirement plans to provide the financial stability for current and future members of VRS. Accelerating payback of the legacy unfunded liability has the potential to save billions in future employer contributions while enhancing the funded status of the retirement plans. This could be achieved by:

- Reducing amortization periods for remaining legacy unfunded payments.
- Maintaining current employer contribution rates when positive experience would otherwise allow for a reduction in employer rates.
- Adjusting methodology used to amortize unfunded liabilities.
- Avoiding the expansion of benefits across pension and OPEBs if corresponding lump-sum payments aren't provided to cover the increases in liabilities; especially while plans remain underfunded.

Next Steps

- Due to the current economic conditions, including high inflation, slowing growth, and geopolitical developments, analysis of future impacts on the VRS fund will continue as new information becomes available.
- VRS investment team will be implementing strategic asset allocation changes over next three years associated with new target allocation adopted in June 2023.
- While actions taken by the Governor and General Assembly in 2022 including maintaining higher contribution rates and infusing additional dollars serve to improve plan health, these actions do not immunize the fund from downside risk because unfunded liabilities remain and economic conditions, especially in the near term, are uncertain.
- VRS will continue to monitor the health of the plans and is committed to providing robust analysis for consideration by the VRS Board of Trustees and other stakeholders.

APPENDIX

§ 51.1-124.30:1. Adoption of stress testing and reporting policies.

The Virginia Retirement System (VRS) shall adopt a formal policy to:

1. Develop and regularly report sensitivity and stress test analyses. Such analyses and reporting shall include projections of benefit levels, pension costs, liabilities, and debt reduction under various economic and investment scenarios;
2. Improve investment transparency and reporting policy by (i) providing a clear and detailed online statement of investment policy; (ii) including one-year, three-year, five-year, and 10-year investment performance data in quarterly investment reports; (iii) including 20-year and 25-year investment performance data in annual investment reports; (iv) reporting net investment returns on a quarterly basis; and (v) reporting gross investment returns and returns by asset class on an annual basis; and
3. Regularly report investment performance and expenses such as external manager fees, carried interest fees, and investment department expenses for all asset classes, including private equity, public equity, fixed income, credit strategies, real assets, strategic opportunities, and other investments.

2017, c. 639.