BUCK
A Gallagher Company

Pennsylvania Public School Employees' Retirement System

PSERS

Stress Testing Analysis

December 14, 2023

Agenda

I. Project Overview

II. Scenario Analysis

III. Sensitivity Analysis

IV. Simulation Analysis

V. Appendix

Project Overview

Project Overview

Purpose

- Per Title 24, § 8510, stress testing of the Pennsylvania Public School Employees' Retirement System ("System") is needed for fiscal years beginning after June 30, 2022, and should include the following:
  - **Scenario analysis:** deterministic projections based on the Society of Actuaries' Blue Ribbon Panel
  - **Sensitivity analysis:** impact of the changes to the actuarial assumed rate of return on the System liabilities
  - **Simulation analysis:** stochastic projections providing a wide range of potential future outcomes, simulating the volatility of annual investment returns

Summary of Results

- Funded ratio is expected to grow from 62% to almost 68% over the next 2 years
- Contributions are expected to slightly increase for 10+ years, reducing as bases fully amortize and as the System reaches 100% funding
- The results show a wide range of possible outcomes over the next 30 years. Contribution policy and investment policy should be monitored as System experience unfolds

Scenario Analysis

Deterministic Projections

Scenario	Methodology
Baseline	Asset return for the next 30 years is equal to the System’s expected return assumption (7%)
Excess Return	Asset return for the next 20 years is 2% higher than the System’s expected return assumption (9%), and for the following 10 years is equal to the System’s expected return assumption (7%)
Low Return	Asset return for the next 20 years is 2% lower than the System’s expected return assumption (5%), and for the following 10 years is equal to the System’s expected return assumption (7%)
Low Contribution	Contributions for the next 20 years are 80% of the actuarially-determined contributions, and for the following 10 years are equal to the full actuarially-determined contributions

- Statistics shown are the ones outlined in Title 24, § 8510:
  - “assets, liabilities, unfunded actuarial accrued liabilities, the change in unfunded actuarial accrued liabilities, employer contributions, benefit payments, service costs, payroll and calculations of the ratios of assets to liabilities, employer contributions to payroll and operating cash flow to assets”

Detailed Stress Test - Baseline Scenario

Fiscal Year Ending	Asset Return	Actuarial Liability	Gross Normal Cost	Market Value of Assets	Actuarial Value of Assets	Unfunded AL (MVA)	Change in Unfunded AL (MVA)	Funded Ratio (MVA)	Payroll	Employer Contributions	Employer Contributions (% of Payroll)	Benefit Payments	Net Outflow (BP – Total Cont)
6/30/2022	2.23%	$114.5	$2.1	$70.5	$70.5	$44.0		61.6%	$14.3	$5.0	35.0%	$7.3	$1.1
6/30/2023	3.54%	$117.0	$2.0	$72.1	$73.9	$44.9	$0.9	61.7%	$14.5	$5.2	36.2%	$7.6	$1.2
6/30/2024	7.00%	$119.4	$2.0	$75.8	$77.0	$43.6	-$1.3	63.4%	$15.3	$5.0	33.1%	$7.7	$1.5
6/30/2025	7.00%	$121.8	$2.0	$79.4	$80.4	$42.4	-$1.2	65.2%	$15.4	$5.2	33.5%	$7.9	$1.6
6/30/2026	7.00%	$124.2	$2.0	$83.3	$84.3	$40.9	-$1.5	67.1%	$15.5	$5.3	34.4%	$8.1	$1.6
6/30/2027	7.00%	$126.5	$2.0	$87.4	$88.4	$39.1	-$1.8	69.1%	$15.6	$5.5	35.1%	$8.3	$1.7
6/30/2028	7.00%	$128.8	$1.9	$91.7	$92.6	$37.1	-$2.0	71.2%	$15.7	$5.6	35.6%	$8.5	$1.8
6/30/2029	7.00%	$130.9	$1.9	$96.2	$97.1	$34.7	-$2.4	73.5%	$15.9	$5.7	36.2%	$8.7	$1.8
6/30/2030	7.00%	$133.0	$1.9	$100.9	$102.2	$32.1	-$2.6	75.9%	$16.0	$5.9	36.9%	$8.9	$1.9
6/30/2031	7.00%	$134.9	$1.9	$105.9	$106.5	$29.0	-$3.1	78.5%	$16.1	$6.0	37.5%	$9.2	$2.0
6/30/2032	7.00%	$136.7	$1.8	$111.2	$111.5	$25.5	-$3.5	81.3%	$16.2	$6.2	38.0%	$9.4	$2.1
6/30/2033	7.00%	$138.4	$1.8	$116.7	$117.0	$21.7	-$3.8	84.4%	$16.3	$6.4	39.0%	$9.6	$2.2
6/30/2034	7.00%	$139.9	$1.8	$122.6	$122.8	$17.3	-$4.4	87.7%	$16.4	$6.5	39.8%	$9.9	$2.2
6/30/2035	7.00%	$141.2	$1.7	$128.8	$129.0	$12.4	-$4.9	91.2%	$16.5	$6.7	40.6%	$10.1	$2.3
6/30/2036	7.00%	$142.2	$1.7	$132.2	$132.3	$10.0	-$2.4	92.9%	$16.6	$3.8	22.7%	$10.3	$5.4
6/30/2037	7.00%	$143.1	$1.7	$134.8	$134.9	$8.3	-$1.7	94.2%	$16.7	$3.0	18.2%	$10.5	$6.4
6/30/2038	7.00%	$143.7	$1.6	$137.1	$137.2	$6.6	-$1.7	95.4%	$16.8	$2.7	16.2%	$10.8	$6.9
6/30/2039	7.00%	$144.1	$1.6	$138.9	$138.9	$5.2	-$1.4	96.4%	$16.9	$2.3	13.9%	$11.0	$7.6
6/30/2040	7.00%	$144.2	$1.5	$140.2	$140.3	$4.0	-$1.2	97.2%	$16.9	$2.0	12.0%	$11.2	$8.1
6/30/2041	7.00%	$144.2	$1.5	$141.2	$141.2	$3.0	-$1.0	97.9%	$17.0	$1.8	10.3%	$11.4	$8.5
6/30/2042	7.00%	$143.9	$1.4	$141.3	$141.3	$2.6	-$0.4	98.2%	$17.1	$1.0	5.7%	$11.5	$9.5
6/30/2043	7.00%	$143.4	$1.4	$141.1	$141.1	$2.3	-$0.3	98.4%	$17.2	$0.7	4.3%	$11.6	$9.8
6/30/2044	7.00%	$142.8	$1.4	$140.7	$140.7	$2.1	-$0.2	98.5%	$17.3	$0.7	3.8%	$11.6	$9.9
6/30/2045	7.00%	$142.2	$1.3	$140.4	$140.4	$1.8	-$0.3	98.7%	$17.4	$0.7	4.2%	$11.6	$9.8
6/30/2046	7.00%	$141.6	$1.3	$140.0	$140.1	$1.6	-$0.2	98.9%	$17.6	$0.7	3.8%	$11.5	$9.8
6/30/2047	7.00%	$141.0	$1.3	$139.6	$139.6	$1.4	-$0.2	98.9%	$17.8	$0.4	2.0%	$11.4	$10.0
6/30/2048	7.00%	$140.6	$1.2	$139.3	$139.3	$1.3	-$0.1	99.1%	$18.0	$0.5	2.8%	$11.2	$9.7
6/30/2049	7.00%	$140.3	$1.2	$139.3	$139.3	$1.0	-$0.3	99.2%	$18.3	$0.5	2.7%	$11.1	$9.5
6/30/2050	7.00%	$140.1	$1.2	$139.2	$139.2	$0.9	-$0.1	99.4%	$18.6	$0.4	2.2%	$10.9	$9.4
6/30/2051	7.00%	$140.1	$1.2	$139.3	$139.3	$0.8	-$0.1	99.4%	$19.0	$0.3	1.8%	$10.8	$9.4
6/30/2052	7.00%	$140.2	$1.3	$139.6	$139.6	$0.6	-$0.2	99.5%	$19.4	$0.3	1.8%	$10.6	$9.2

Detailed Stress Test - Excess Return Scenario

Fiscal Year Ending	Asset Return	Actuarial Liability	Gross Normal Cost	Market Value of Assets	Actuarial Value of Assets	Unfunded AL (MVA)	Change in Unfunded AL (MVA)	Funded Ratio (MVA)	Payroll	Employer Contributions	Employer Contributions (% of Payroll)	Benefit Payments	Net Outflow (BP – Total Cont)
6/30/2022	2.23%	$114.5	$2.1	$70.5	$70.5	$44.0		61.6%	$14.3	$5.0	35.0%	$7.3	$1.1
6/30/2023	3.54%	$117.0	$2.0	$72.1	$73.9	$44.9	$0.9	61.7%	$14.5	$5.2	36.2%	$7.6	$1.2
6/30/2024	9.00%	$119.4	$2.0	$77.2	$77.2	$42.2	-$2.7	64.6%	$15.3	$5.0	33.1%	$7.7	$1.5
6/30/2025	9.00%	$121.8	$2.0	$82.5	$80.9	$39.3	-$2.9	67.7%	$15.4	$5.2	33.5%	$7.9	$1.6
6/30/2026	9.00%	$124.2	$2.0	$88.2	$85.3	$36.0	-$3.3	71.0%	$15.5	$5.3	34.3%	$8.1	$1.6
6/30/2027	9.00%	$126.5	$2.0	$94.3	$90.1	$32.2	-$3.8	74.6%	$15.6	$5.4	34.9%	$8.3	$1.7
6/30/2028	9.00%	$128.8	$1.9	$100.9	$95.3	$27.9	-$4.3	78.3%	$15.7	$5.5	35.2%	$8.5	$1.9
6/30/2029	9.00%	$130.9	$1.9	$107.9	$100.9	$23.0	-$4.9	82.4%	$15.9	$5.6	35.5%	$8.7	$2.0
6/30/2030	9.00%	$133.0	$1.9	$115.3	$107.4	$17.7	-$5.3	86.7%	$16.0	$5.7	35.7%	$8.9	$2.2
6/30/2031	9.00%	$134.9	$1.9	$123.2	$113.4	$11.7	-$6.0	91.3%	$16.1	$5.8	35.9%	$9.2	$2.4
6/30/2032	9.00%	$136.7	$1.8	$131.6	$120.4	$5.1	-$6.6	96.3%	$16.2	$5.8	35.8%	$9.4	$2.6
6/30/2033	9.00%	$138.4	$1.8	$140.6	$128.3	-$2.2	-$7.3	101.6%	$16.3	$5.9	36.0%	$9.6	$2.8
6/30/2034	9.00%	$139.9	$1.8	$150.0	$136.6	-$10.1	-$7.9	107.3%	$16.4	$5.9	35.9%	$9.9	$3.1
6/30/2035	9.00%	$141.2	$1.7	$160.0	$145.5	-$18.8	-$8.7	113.4%	$16.5	$5.9	35.6%	$10.1	$3.3
6/30/2036	9.00%	$142.2	$1.7	$167.5	$151.8	-$25.3	-$6.5	117.7%	$16.6	$2.8	16.6%	$10.3	$6.7
6/30/2037	9.00%	$143.1	$1.7	$174.2	$157.5	-$31.1	-$5.8	121.8%	$16.7	$1.8	10.9%	$10.5	$7.9
6/30/2038	9.00%	$143.7	$1.6	$180.8	$163.0	-$37.1	-$6.0	125.8%	$16.8	$1.3	7.5%	$10.8	$8.7
6/30/2039	9.00%	$144.1	$1.6	$187.1	$168.2	-$43.0	-$5.9	129.8%	$16.9	$0.6	3.8%	$11.0	$9.6
6/30/2040	9.00%	$144.2	$1.5	$193.4	$173.6	-$49.2	-$6.2	134.1%	$16.9	$0.5	2.7%	$11.2	$10.0
6/30/2041	9.00%	$144.2	$1.5	$200.1	$179.3	-$55.9	-$6.7	138.8%	$17.0	$0.4	2.4%	$11.4	$10.2
6/30/2042	9.00%	$143.9	$1.4	$207.2	$185.5	-$63.3	-$7.4	144.0%	$17.1	$0.4	2.2%	$11.5	$10.4
6/30/2043	9.00%	$143.4	$1.4	$214.8	$192.2	-$71.4	-$8.1	149.8%	$17.2	$0.3	2.0%	$11.6	$10.6
6/30/2044	7.00%	$142.8	$1.4	$218.8	$199.0	-$76.0	-$4.6	153.2%	$17.3	$0.3	1.8%	$11.6	$10.7
6/30/2045	7.00%	$142.2	$1.3	$223.0	$206.0	-$80.8	-$4.8	156.8%	$17.4	$0.3	1.6%	$11.6	$10.7
6/30/2046	7.00%	$141.6	$1.3	$227.5	$213.2	-$85.9	-$5.1	160.7%	$17.6	$0.2	1.4%	$11.5	$10.7
6/30/2047	7.00%	$141.0	$1.3	$232.5	$220.8	-$91.5	-$5.6	164.8%	$17.8	$0.2	1.3%	$11.4	$10.6
6/30/2048	7.00%	$140.6	$1.2	$238.0	$228.6	-$97.4	-$5.9	169.2%	$18.0	$0.2	1.1%	$11.2	$10.4
6/30/2049	7.00%	$140.3	$1.2	$243.9	$236.7	-$103.6	-$6.2	173.8%	$18.3	$0.2	1.1%	$11.1	$10.3
6/30/2050	7.00%	$140.1	$1.2	$250.5	$245.0	-$110.4	-$6.8	178.7%	$18.6	$0.2	1.0%	$10.9	$10.2
6/30/2051	7.00%	$140.1	$1.2	$257.6	$253.6	-$117.5	-$7.1	183.9%	$19.0	$0.2	0.9%	$10.8	$10.1
6/30/2052	7.00%	$140.2	$1.3	$265.3	$262.4	-$125.1	-$7.6	189.2%	$19.4	$0.2	0.9%	$10.6	$9.9

Detailed Stress Test - Low Return Scenario

Fiscal Year Ending	Asset Return	Actuarial Liability	Gross Normal Cost	Market Value of Assets	Actuarial Value of Assets	Unfunded AL (MVA)	Change in Unfunded AL (MVA)	Funded Ratio (MVA)	Payroll	Employer Contributions	Employer Contributions (% of Payroll)	Benefit Payments	Net Outflow (BP – Total Cont)
6/30/2022	2.23%	$114.5	$2.1	$70.5	$70.5	$44.0		61.6%	$14.3	$5.0	35.0%	$7.3	$1.1
6/30/2023	3.54%	$117.0	$2.0	$72.1	$73.9	$44.9	$0.9	61.7%	$14.5	$5.2	36.2%	$7.6	$1.2
6/30/2024	5.00%	$119.4	$2.0	$74.3	$76.9	$45.1	$0.2	62.2%	$15.3	$5.0	33.1%	$7.7	$1.5
6/30/2025	5.00%	$121.8	$2.0	$76.4	$79.9	$45.4	$0.3	62.7%	$15.4	$5.2	33.5%	$7.9	$1.6
6/30/2026	5.00%	$124.2	$2.0	$78.6	$83.4	$45.6	$0.2	63.3%	$15.5	$5.3	34.4%	$8.1	$1.6
6/30/2027	5.00%	$126.5	$2.0	$80.8	$86.8	$45.7	$0.1	63.9%	$15.6	$5.5	35.3%	$8.3	$1.7
6/30/2028	5.00%	$128.8	$1.9	$83.1	$90.1	$45.7	$0.0	64.5%	$15.7	$5.7	36.0%	$8.5	$1.7
6/30/2029	5.00%	$130.9	$1.9	$85.5	$93.5	$45.4	-$0.3	65.3%	$15.9	$5.9	36.9%	$8.7	$1.7
6/30/2030	5.00%	$133.0	$1.9	$88.0	$97.2	$45.0	-$0.4	66.2%	$16.0	$6.1	37.9%	$8.9	$1.7
6/30/2031	5.00%	$134.9	$1.9	$90.7	$100.0	$44.2	-$0.8	67.2%	$16.1	$6.3	39.1%	$9.2	$1.7
6/30/2032	5.00%	$136.7	$1.8	$93.4	$103.2	$43.3	-$0.9	68.4%	$16.2	$6.5	40.2%	$9.4	$1.7
6/30/2033	5.00%	$138.4	$1.8	$96.4	$106.7	$42.0	-$1.3	69.7%	$16.3	$6.8	41.8%	$9.6	$1.6
6/30/2034	5.00%	$139.9	$1.8	$99.7	$110.4	$40.2	-$1.8	71.3%	$16.4	$7.1	43.4%	$9.9	$1.5
6/30/2035	5.00%	$141.2	$1.7	$103.3	$114.4	$37.9	-$2.3	73.2%	$16.5	$7.5	45.1%	$10.1	$1.4
6/30/2036	5.00%	$142.2	$1.7	$103.9	$115.5	$38.3	$0.4	73.1%	$16.6	$4.7	28.1%	$10.3	$4.4
6/30/2037	5.00%	$143.1	$1.7	$103.9	$115.8	$39.2	$0.9	72.6%	$16.7	$4.1	24.7%	$10.5	$5.1
6/30/2038	5.00%	$143.7	$1.6	$103.6	$115.8	$40.1	$0.9	72.1%	$16.8	$4.0	23.8%	$10.8	$5.4
6/30/2039	5.00%	$144.1	$1.6	$102.8	$115.2	$41.3	$1.2	71.3%	$16.9	$3.8	22.5%	$11.0	$5.8
6/30/2040	5.00%	$144.2	$1.5	$101.6	$114.2	$42.6	$1.3	70.4%	$16.9	$3.7	21.8%	$11.2	$6.2
6/30/2041	5.00%	$144.2	$1.5	$100.2	$112.9	$44.0	$1.4	69.5%	$17.0	$3.6	21.3%	$11.4	$6.4
6/30/2042	5.00%	$143.9	$1.4	$97.9	$110.7	$46.0	$2.0	68.1%	$17.1	$3.1	17.9%	$11.5	$7.1
6/30/2043	5.00%	$143.4	$1.4	$95.5	$108.3	$47.9	$1.9	66.6%	$17.2	$3.1	17.8%	$11.6	$7.2
6/30/2044	7.00%	$142.8	$1.4	$94.9	$105.9	$47.9	$0.0	66.5%	$17.3	$3.2	18.7%	$11.6	$7.0
6/30/2045	7.00%	$142.2	$1.3	$94.7	$104.0	$47.5	-$0.4	66.6%	$17.4	$3.5	20.3%	$11.6	$6.7
6/30/2046	7.00%	$141.6	$1.3	$94.7	$102.5	$46.9	-$0.6	66.9%	$17.6	$3.7	21.2%	$11.5	$6.4
6/30/2047	7.00%	$141.0	$1.3	$94.8	$101.1	$46.2	-$0.7	67.2%	$17.8	$3.7	20.6%	$11.4	$6.3
6/30/2048	7.00%	$140.6	$1.2	$95.5	$100.5	$45.1	-$1.1	67.9%	$18.0	$4.0	22.4%	$11.2	$5.8
6/30/2049	7.00%	$140.3	$1.2	$96.8	$100.6	$43.5	-$1.6	69.0%	$18.3	$4.2	23.2%	$11.1	$5.3
6/30/2050	7.00%	$140.1	$1.2	$98.4	$101.3	$41.7	-$1.8	70.2%	$18.6	$4.3	23.3%	$10.9	$5.0
6/30/2051	7.00%	$140.1	$1.2	$100.4	$102.5	$39.7	-$2.0	71.7%	$19.0	$4.4	23.3%	$10.8	$4.7
6/30/2052	7.00%	$140.2	$1.3	$102.8	$104.4	$37.4	-$2.3	73.3%	$19.4	$4.5	23.3%	$10.6	$4.5

Detailed Stress Test - Low Contribution Scenario

Fiscal Year Ending	Asset Return	Actuarial Liability	Gross Normal Cost	Market Value of Assets	Actuarial Value of Assets	Unfunded AL (MVA)	Change in Unfunded AL (MVA)	Funded Ratio (MVA)	Payroll	Employer Contributions	Employer Contributions (% of Payroll)	Benefit Payments	Net Outflow (BP – Total Cont)
6/30/2022	2.23%	$114.5	$2.1	$70.5	$70.5	$44.0		61.6%	$14.3	$5.0	35.0%	$7.3	$1.1
6/30/2023	3.54%	$117.0	$2.0	$72.1	$73.9	$44.9	$0.9	61.7%	$14.5	$5.2	36.2%	$7.6	$1.2
6/30/2024	7.00%	$119.4	$2.0	$74.7	$75.9	$44.7	-$0.2	62.5%	$15.3	$4.0	26.5%	$7.7	$2.5
6/30/2025	7.00%	$121.8	$2.0	$77.2	$78.2	$44.6	-$0.1	63.4%	$15.4	$4.1	26.8%	$7.9	$2.6
6/30/2026	7.00%	$124.2	$2.0	$79.9	$80.9	$44.3	-$0.3	64.3%	$15.5	$4.3	27.9%	$8.1	$2.6
6/30/2027	7.00%	$126.5	$2.0	$82.7	$83.8	$43.8	-$0.5	65.4%	$15.6	$4.5	28.8%	$8.3	$2.7
6/30/2028	7.00%	$128.8	$1.9	$85.7	$86.7	$43.1	-$0.7	66.6%	$15.7	$4.7	29.7%	$8.5	$2.7
6/30/2029	7.00%	$130.9	$1.9	$88.9	$89.8	$42.0	-$1.1	67.9%	$15.9	$4.9	30.6%	$8.7	$2.7
6/30/2030	7.00%	$133.0	$1.9	$92.3	$93.5	$40.7	-$1.3	69.4%	$16.0	$5.0	31.6%	$8.9	$2.8
6/30/2031	7.00%	$134.9	$1.9	$95.8	$96.4	$39.1	-$1.6	71.0%	$16.1	$5.2	32.6%	$9.2	$2.8
6/30/2032	7.00%	$136.7	$1.8	$99.6	$99.9	$37.1	-$2.0	72.9%	$16.2	$5.4	33.5%	$9.4	$2.8
6/30/2033	7.00%	$138.4	$1.8	$103.6	$103.9	$34.8	-$2.3	74.9%	$16.3	$5.7	34.8%	$9.6	$2.8
6/30/2034	7.00%	$139.9	$1.8	$108.0	$108.2	$31.9	-$2.9	77.2%	$16.4	$5.9	36.0%	$9.9	$2.8
6/30/2035	7.00%	$141.2	$1.7	$112.6	$112.7	$28.6	-$3.3	79.7%	$16.5	$6.2	37.2%	$10.1	$2.9
6/30/2036	7.00%	$142.2	$1.7	$115.0	$115.1	$27.2	-$1.4	80.8%	$16.6	$3.9	23.6%	$10.3	$5.3
6/30/2037	7.00%	$143.1	$1.7	$116.8	$116.9	$26.3	-$0.9	81.6%	$16.7	$3.4	20.6%	$10.5	$6.0
6/30/2038	7.00%	$143.7	$1.6	$118.4	$118.5	$25.3	-$1.0	82.4%	$16.8	$3.3	19.6%	$10.8	$6.4
6/30/2039	7.00%	$144.1	$1.6	$119.6	$119.7	$24.5	-$0.8	83.0%	$16.9	$3.1	18.2%	$11.0	$6.8
6/30/2040	7.00%	$144.2	$1.5	$120.5	$120.6	$23.7	-$0.8	83.5%	$16.9	$2.9	17.1%	$11.2	$7.2
6/30/2041	7.00%	$144.2	$1.5	$121.2	$121.2	$23.0	-$0.7	84.0%	$17.0	$2.8	16.2%	$11.4	$7.5
6/30/2042	7.00%	$143.9	$1.4	$121.1	$121.2	$22.8	-$0.2	84.2%	$17.1	$2.2	12.9%	$11.5	$8.2
6/30/2043	7.00%	$143.4	$1.4	$120.9	$120.9	$22.5	-$0.3	84.3%	$17.2	$2.1	12.3%	$11.6	$8.4
6/30/2044	7.00%	$142.8	$1.4	$121.2	$121.2	$21.6	-$0.9	84.8%	$17.3	$2.7	15.4%	$11.6	$7.9
6/30/2045	7.00%	$142.2	$1.3	$121.7	$121.7	$20.5	-$1.1	85.6%	$17.4	$2.8	16.2%	$11.6	$7.7
6/30/2046	7.00%	$141.6	$1.3	$122.2	$122.3	$19.4	-$1.1	86.4%	$17.6	$2.8	16.0%	$11.5	$7.7
6/30/2047	7.00%	$141.0	$1.3	$122.8	$122.8	$18.2	-$1.2	87.1%	$17.8	$2.6	14.5%	$11.4	$7.7
6/30/2048	7.00%	$140.6	$1.2	$123.8	$123.8	$16.8	-$1.4	88.0%	$18.0	$2.8	15.5%	$11.2	$7.4
6/30/2049	7.00%	$140.3	$1.2	$125.0	$125.1	$15.3	-$1.5	89.1%	$18.3	$2.9	15.6%	$11.1	$7.2
6/30/2050	7.00%	$140.1	$1.2	$126.4	$126.4	$13.7	-$1.6	90.2%	$18.6	$2.7	14.3%	$10.9	$7.2
6/30/2051	7.00%	$140.1	$1.2	$127.8	$127.8	$12.3	-$1.4	91.2%	$19.0	$2.5	13.3%	$10.8	$7.2
6/30/2052	7.00%	$140.2	$1.3	$129.4	$129.4	$10.8	-$1.5	92.3%	$19.4	$2.4	12.5%	$10.6	$7.1

Summary of Scenario Analysis Results

Scenario	5 Years		10 Years		30 Years	
	Cumulative Employer Contributions* ($ Billions)	Funded Ratio (MVA)	Cumulative Employer Contributions* ($ Billions)	Funded Ratio (MVA)	Cumulative Employer Contributions* ($ Billions)	Funded Ratio (MVA)
Baseline	$26.2	69.1%	$55.7	81.3%	$97.2	99.5%
Excess Return	$26.2	74.6%	$54.6	96.3%	$82.4	189.2%
Low Return	$26.3	63.9%	$56.7	68.4%	$143.9	73.3%
Low Contribution	$22.2	65.4%	$47.5	72.9%	$113.0	92.3%

*Employer Contributions accumulated beginning as of 7/1/2022

Key Takeaways

- Contributions are slightly impacted by returns in the short term, but the impact is large over the course of 30 years
- Funded ratio is heavily impacted by both contributions and return, and a wide range of outcomes is displayed at the end of 30 years

Sensitivity Analysis

BUCK
A Gallagher Company

Net Pension Liability with Changes in the Discount Rate

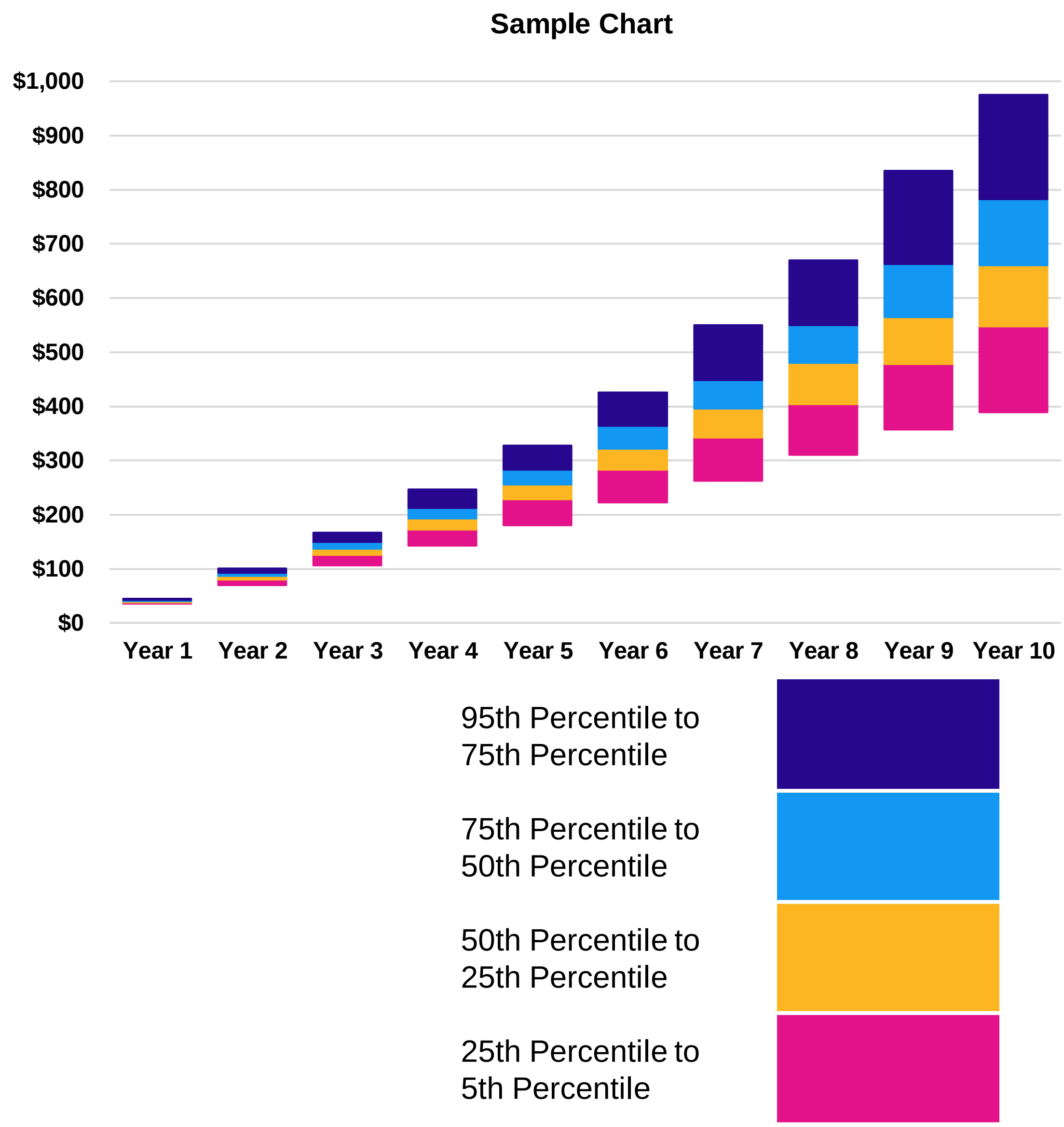
($ Billions)	1% Decrease (6.00%)	Current Discount Rate (7.00%)	1% Increase (8.00%)
Net Pension Liability at 6/30/2023*	$57.7	$44.5	$33.4

*Results are as shown in the GASB 67 report for the fiscal year ending 6/30/2023. Net Pension Liability equals the Total Pension Liability minus the Fiduciary Net Position

Simulation Analysis

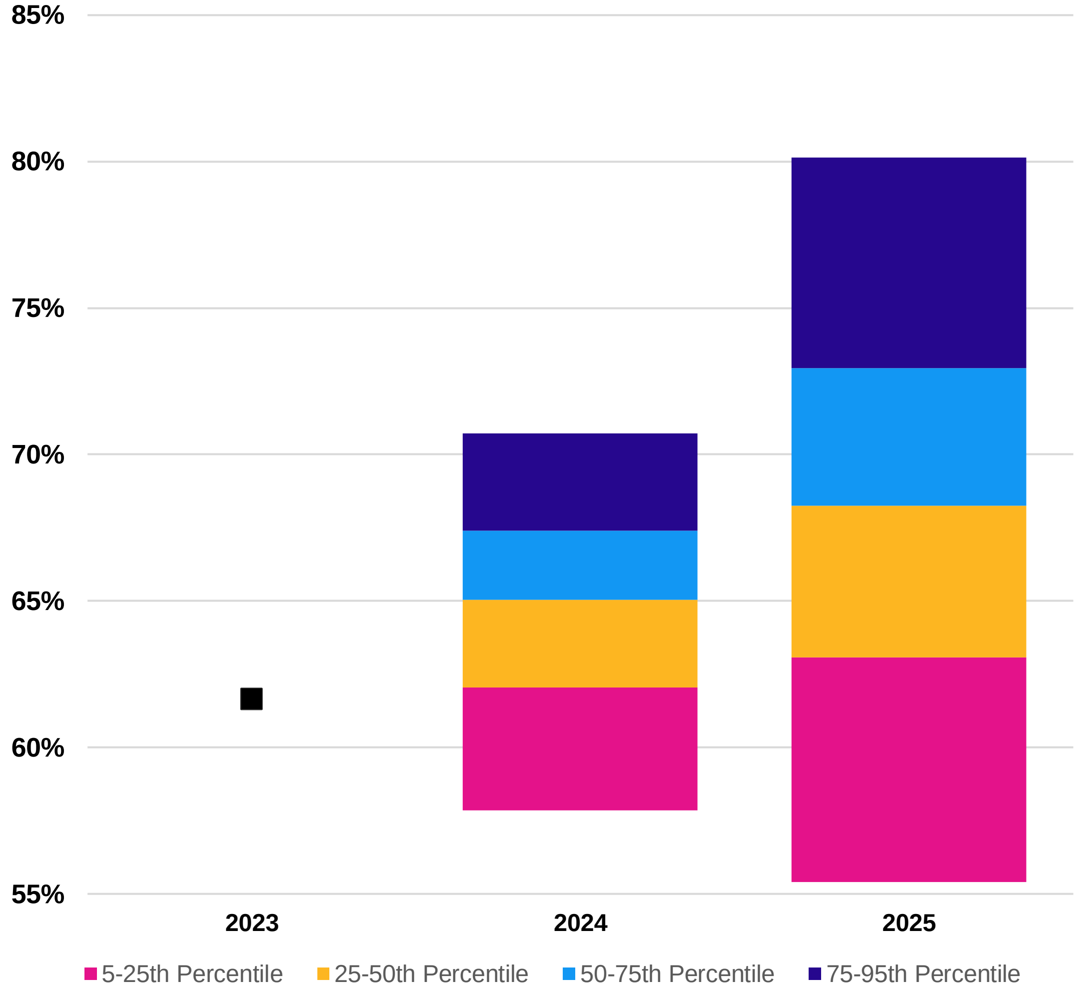
What is Stochastic Modeling?

- Extension of the actuarial valuation process
- 999 actuarial valuations simulations are performed for each of the 30 forecast years. Each of the 999 trials represents a different path that portfolio returns could take over 30 years in different economic and capital market environments
- Results are summarized and ranked for each metric
- Results are shown in bar graphs (see exhibit to the right) that display results from the highest value to the lowest value. The 95th percentile result represents the 950th highest value out of 999 values and the 5th percentile represents the 50th highest value. In evaluating a result:
  - For cost metrics, the 95th percentile, represented as pink, is relatively unfavorable
  - For asset and funded percent metrics, the 95th percentile, represented as purple, is relatively favorable
- Results shown are as of 6/30 of the displayed year



Asset/Liability Projection Stochastic Results

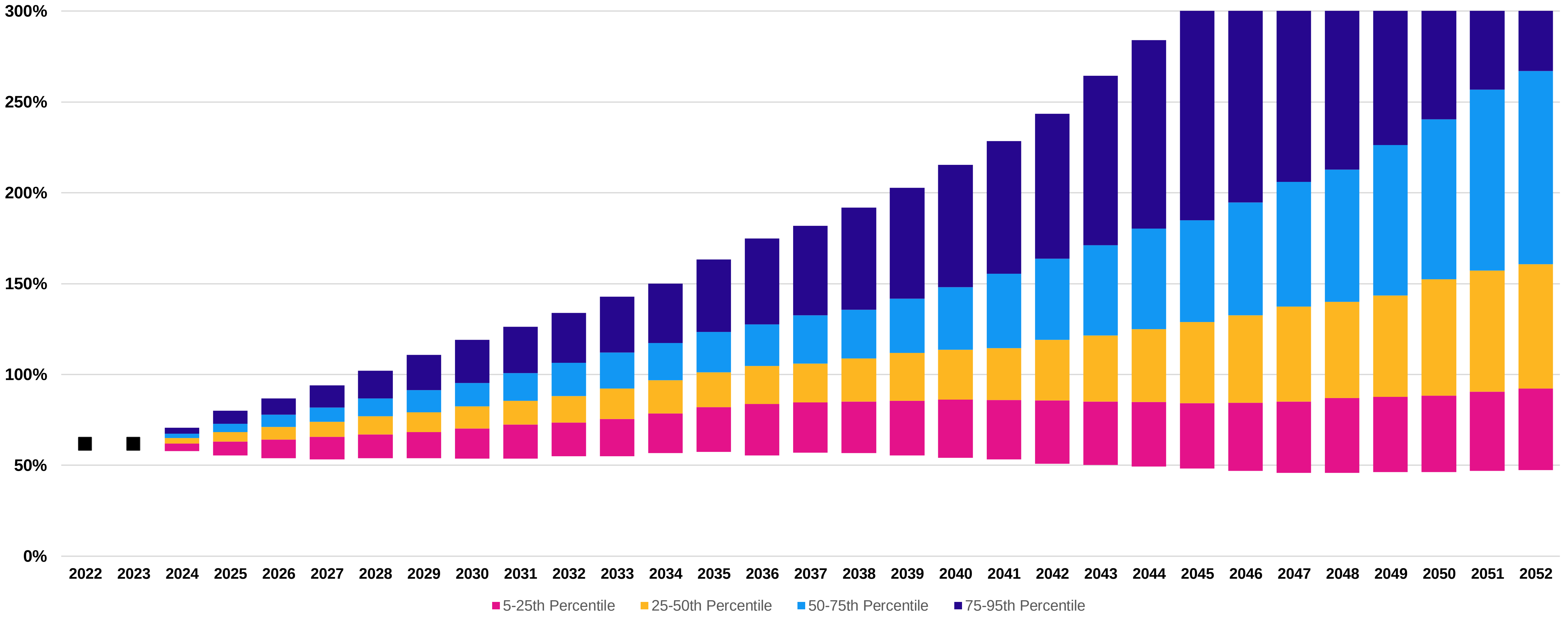
Market Value of Assets and Actuarial Liability Funded Ratio – Short-Term Risk



- The System is ~62% funded on a market value of assets basis as of 6/30/2023
- Over the next 2 years, economic factors can lead to a large range of possible funded ratios, ranging from just above 55% at the 5^{th} percentile to over 80% at the 95^{th} percentile
  - There is a one-in-twenty chance the funded ratio will fall to 55% or lower, and another one-in-twenty chance it will be above 80%

Asset/Liability Projection Stochastic Results

Market Value of Assets and Actuarial Liability Funded Ratio – Long-Term Trends



Asset/Liability Projection Stochastic Results

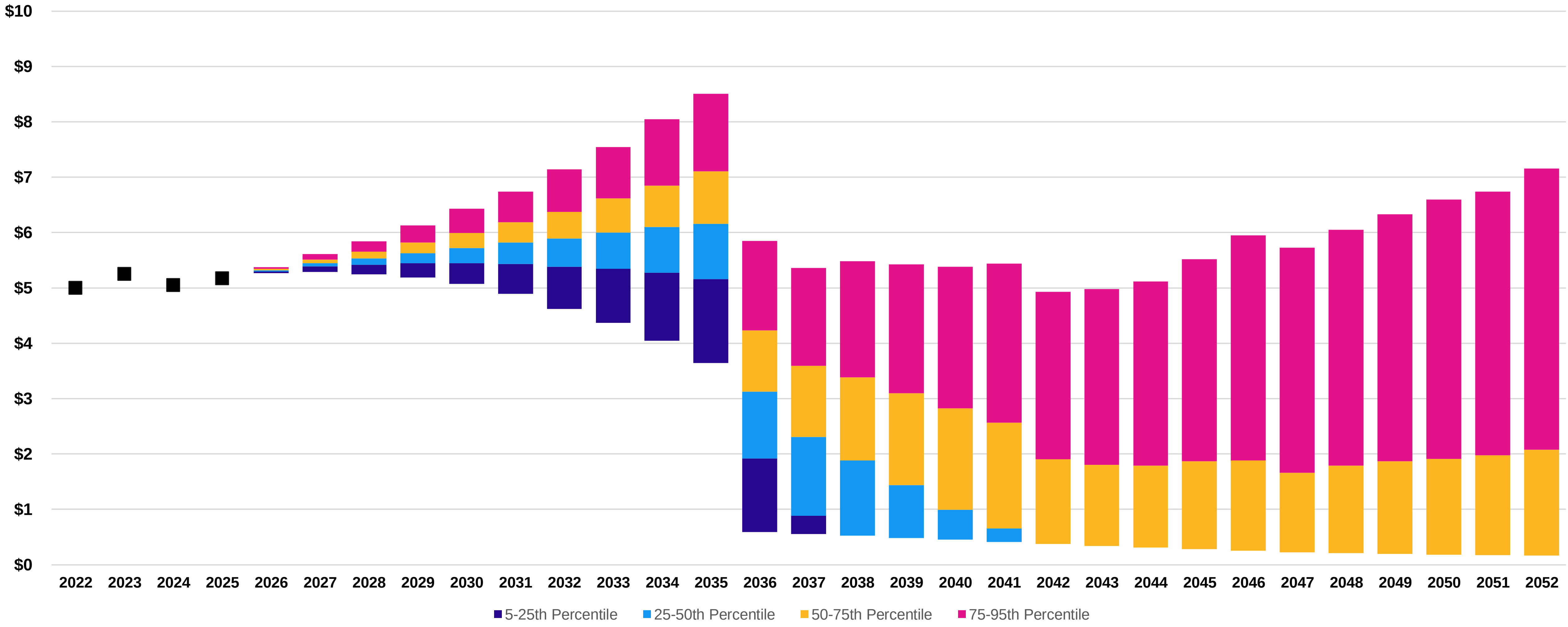
Market Value of Assets and Actuarial Liability Funded Ratio

- At the median result, the System reaches full funding at 6/30/2035
- In the most favorable scenarios, the funded ratio increases significantly. Changes to funding policy and investment policy in future years would impact the trajectory of these results
- In the least favorable scenarios (5th percentile), the funded ratio is approximately 45% in the long term

	2022	2027	2032	2037	2042	2047	2052
95th Percentile	61.7%	94.1%	133.9%	181.8%	243.6%	358.2%	508.8%
75th Percentile	61.7%	81.8%	106.5%	132.6%	163.7%	206.0%	267.1%
50th Percentile	61.7%	73.9%	88.1%	106.0%	119.1%	137.4%	160.8%
25th Percentile	61.7%	65.7%	73.4%	84.6%	85.8%	85.1%	92.2%
5th Percentile	61.7%	53.3%	55.0%	56.9%	50.9%	45.9%	47.3%

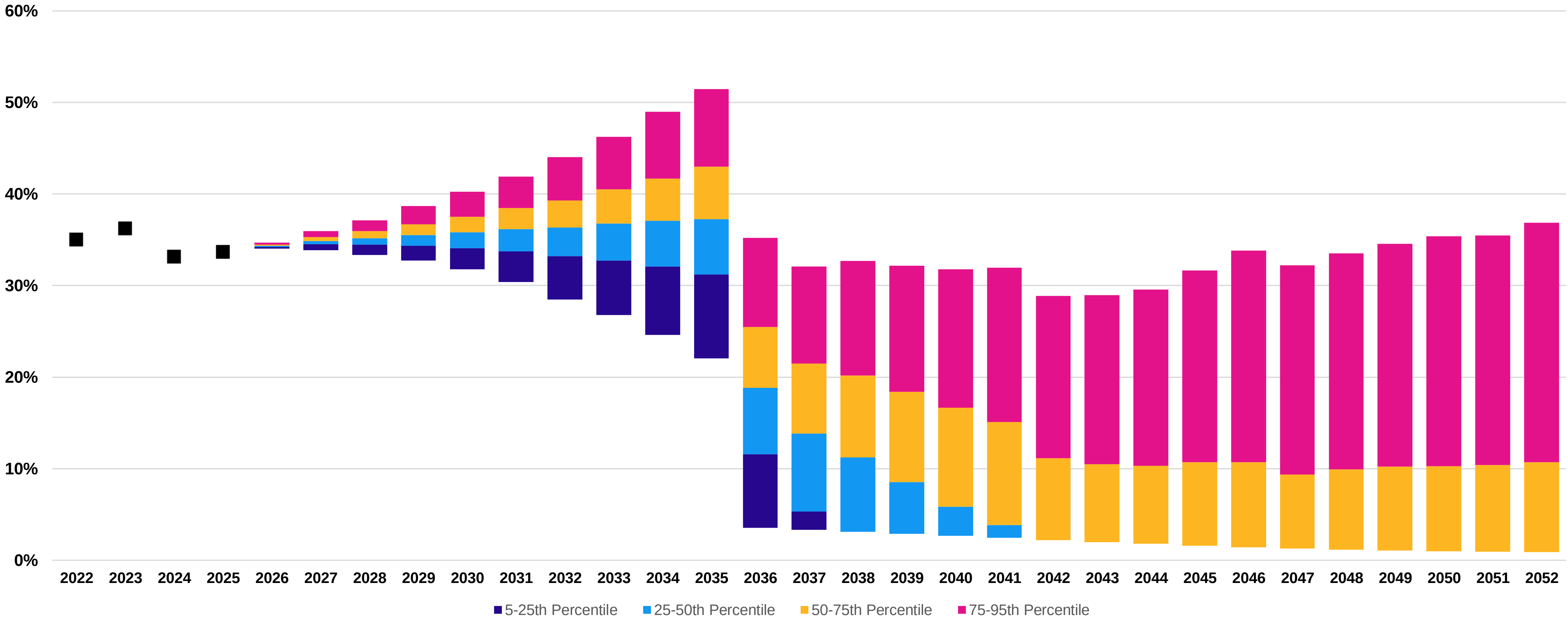
Asset/Liability Projection Stochastic Results

Employer Contribution Amount ($ Billions)



Asset/Liability Projection Stochastic Results

Employer Contribution (Percentage of Payroll)



Asset/Liability Projection Stochastic Results
Employer Contributions

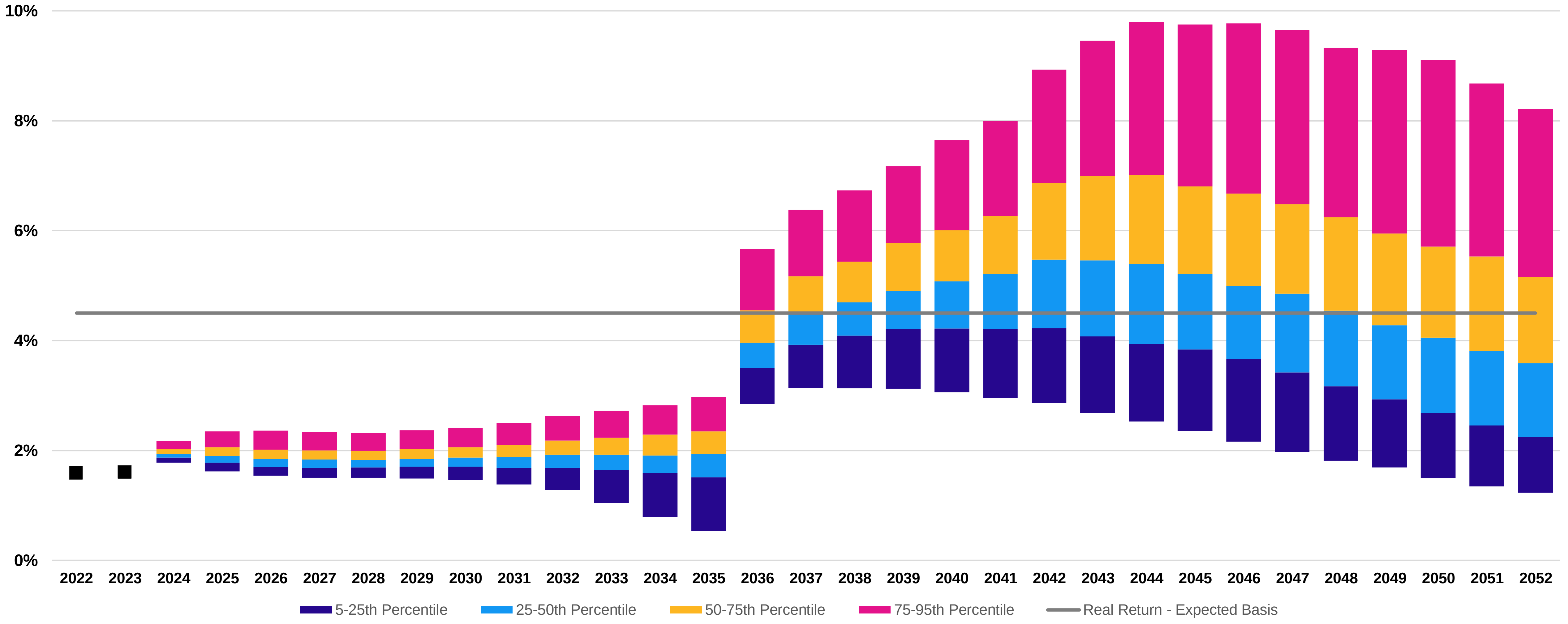
- Large base from the Act 120 fresh start is expected to be fully amortized by 2036, causing a large decrease in contributions
- When the System is fully funded on an actuarial value of assets basis, contributions decrease as there is little to no unfunded liability to amortize
- Employer contributions reflect the Act 120 “floor” of the employer normal cost rate

($ Billions)	2022	2027	2032	2037	2042	2047	2052
95th Percentile	$5.0	$5.6	$7.1	$5.4	$4.9	$5.7	$7.2
75th Percentile	$5.0	$5.5	$6.4	$3.6	$1.9	$1.7	$2.1
50th Percentile	$5.0	$5.4	$5.9	$2.3	$0.4	$0.2	$0.2
25th Percentile	$5.0	$5.4	$5.4	$0.9	$0.4	$0.2	$0.2
5th Percentile	$5.0	$5.3	$4.6	$0.6	$0.4	$0.2	$0.2

Percentage of Payroll	2022	2027	2032	2037	2042	2047	2052
95th Percentile	35.0%	35.9%	44.1%	32.1%	28.9%	32.2%	36.9%
75th Percentile	35.0%	35.3%	39.3%	21.5%	11.1%	9.3%	10.7%
50th Percentile	35.0%	34.9%	36.3%	13.8%	2.2%	1.3%	0.9%
25th Percentile	35.0%	34.5%	33.2%	5.3%	2.2%	1.3%	0.9%
5th Percentile	35.0%	33.9%	28.5%	3.3%	2.2%	1.3%	0.9%

Asset/Liability Projection Stochastic Results

Net Outflow Analysis: (Benefit Payments less Contributions) / Market Value of Assets



Asset/Liability Projection Stochastic Results

Net Outflow Analysis: (Benefit Payments less Contributions) / Market Value of Assets

- Assets are expected to return 7% nominal and 4.5% real (assuming 2.5% inflation)

- As long as net outflow is less than 4.5%, then on an expected basis the System's assets should be adequate to earn enough interest to fund the gap between contributions and benefit payments and maintain purchasing power

- At the median, the net outflow stays near 2% before jumping up in 2036 because of the decrease in contributions. The net outflow decreases towards the end of the 30-year projection period as expected benefit payments reduce and contributions level out

	2022	2027	2032	2037	2042	2047	2052
95th Percentile	1.6%	2.3%	2.6%	6.4%	8.9%	9.7%	8.2%
75th Percentile	1.6%	2.0%	2.2%	5.2%	6.9%	6.5%	5.2%
50th Percentile	1.6%	1.8%	1.9%	4.5%	5.5%	4.9%	3.6%
25th Percentile	1.6%	1.7%	1.7%	3.9%	4.2%	3.4%	2.2%
5th Percentile	1.6%	1.5%	1.3%	3.1%	2.9%	2.0%	1.2%

Summary of Stochastic Results

Portfolio Metrics			Financial Metrics						
			30-Year Funding Ratio		30-Year PV of Employer Contributions* ($ Billions)		30-Year Total Employer Contributions* ($ Billions)		Expected Date of Full Funding
30-Year Geometric Return	30-Year Std. Dev.	Sharpe Ratio	Median	5th Percentile	Median	95th Percentile	Median	95th Percentile	
7.7%	9.4%	0.53	160.8%	47.3%	$50.4	$73.9	$86.2	$180.9	6/30/2035

*Employer Contributions accumulated beginning as of 7/1/2022

Key Takeaways

- Funded ratio is expected to gradually increase over the course of 30 years, with a 5th percentile downside near 45%
- Contributions vary greatly with asset performance, but large decreases are expected in 2036
- Net outflow increases in 2036, so that inflation-adjusted value of System assets reduces from 2037 to 2048, then is expected to grow again in real terms after benefit payments begin to reduce and contributions level out

Appendix

Title 24 | § 8510. Stress Test of System

A. General rule: The board shall conduct an annual stress test of the system and submit the results of the stress test to the Governor, the General Assembly and the Independent Fiscal Office no later than January 1 of each year. The stress test shall include a scenario analysis, simulation analysis and sensitivity analysis. The board shall disclose in the report of the stress test results which industry standards were used and whether any changes to industry standards have been made.

B. Report by Independent Fiscal Office.--No later than March 1 of each year, the Independent Fiscal Office shall produce a report summarizing the results of the stress test, including a calculation of the ratio of projected employer pension contributions to projected State revenues under a scenario analysis.

C. Definitions.--As used in this section, the following words and phrases shall have the meanings given to them in this subsection unless the context clearly indicates otherwise:

"Scenario analysis." Projections of assets, liabilities, unfunded actuarial accrued liabilities, the change in unfunded actuarial accrued liabilities, employer contributions, benefit payments, service costs, payroll and calculations of the ratios of assets to liabilities, employer contributions to payroll and operating cash flow to assets in sufficient number as determined prudent by the board as informed by recognized industry standards.

“Sensitivity analysis." The following:

1. Estimates of the total normal cost and employer normal cost for new employees, calculated using various investment return assumptions in sufficient number as determined prudent by the board as informed by recognized industry standards.
2. Estimates of the unfunded actuarial accrued liability and unfunded liability, calculated using various annual assumed rates of return in sufficient number as determined prudent by the board as informed by recognized industry standards.

"Simulation analysis." Projections of the range of required employer contributions for each of the next 20 years, based on analysis that simulates the volatility of annual investment returns above and below the assumed rate of return, applying methodology determined prudent by the board as informed by recognized industry standards.

(Nov. 25, 2020, P.L.1237, No.128, eff. 60 days)

2020 Amendment. Act 128 added section 8510. Section 7(1) of Act 128 provided that the addition of section 8510 shall apply to fiscal years beginning after June 30, 2022.

Portfolio Analysis
Current Long-Term Policy

- Return, standard deviation, and Sharpe Ratio statistics are calculated using Buck’s January 2023 Capital Market Assumptions
- Asset allocation is based on the allocation plan as of June 30, 2022, shown in the PSERS Investment Report

Asset Class/Metric	Asset Allocation Plan
US Large Cap Equity	10.7%
US Small Cap Equity	1.1%
MSCI EAFE Equity	11.5%
MSCI Emerging Markets Equity	4.7%
Private Equity	12.0%
Total Equity	**40.0%**
Aggregate Bonds	22.2%
Emerging Market Debt	0.6%
Global Debt ex-US	2.3%
Private Debt	7.9%
Total Fixed Income	**33.0%**
Infrastructure	9.0%
Commodities	9.0%
Direct Real Estate	11.0%
Hedge Funds	6.0%
Total Alternative	**35.0%**
Cash/Financing	-8.0%
Total Plan	**100.0%**
30-Year Geometric Return	**7.7%**
30-Year Standard Deviation	**9.4%**
Sharpe Ratio	**0.53**

Buck January 2023 Capital Market Assumptions

Summary of Expected Returns and Standard Deviations

	1st Year	10th Year	10 Years			20th Year	20 Years			30th Year	30 Years		
Asset Class	Arithmetic Mean	Arithmetic Mean	Arithmetic Mean	Geometric Mean	Standard Deviation	Arithmetic Mean	Arithmetic Mean	Geometric Mean	Standard Deviation	Arithmetic Mean	Arithmetic Mean	Geometric Mean	Standard Deviation
Global Equity	12.3%	7.8%	9.2%	8.1%	16.3%	9.5%	9.1%	7.9%	16.5%	9.2%	9.2%	8.0%	16.3%
US All Cap Equity	12.1%	7.6%	9.2%	8.0%	16.9%	9.1%	9.0%	7.7%	17.1%	9.3%	9.1%	7.7%	16.9%
US Large Cap Equity	12.1%	7.6%	9.1%	7.9%	16.9%	9.1%	9.0%	7.6%	17.2%	9.3%	9.0%	7.7%	17.0%
US Mid Cap Equity	12.2%	8.1%	9.3%	8.0%	17.7%	9.3%	9.1%	7.6%	18.0%	9.6%	9.2%	7.7%	17.9%
US Small Cap Equity	12.8%	8.4%	9.7%	8.1%	19.7%	9.7%	9.5%	7.8%	19.8%	10.0%	9.6%	7.9%	19.5%
Low Volatility Equity	8.9%	7.1%	7.7%	7.3%	9.6%	7.4%	7.6%	7.2%	9.7%	8.0%	7.6%	7.2%	9.6%
Global Equity ex US	12.5%	8.2%	9.4%	8.0%	18.5%	10.2%	9.4%	7.9%	18.6%	9.1%	9.5%	8.0%	18.5%
MSCI EAFE Equity	13.3%	7.7%	8.8%	7.2%	19.4%	9.5%	8.9%	7.2%	19.4%	8.6%	8.9%	7.2%	19.2%
MSCI Emerging Markets Equity	10.9%	9.7%	11.3%	7.7%	31.2%	12.2%	11.3%	7.4%	31.0%	10.8%	11.4%	7.4%	31.1%
Private Equity	18.2%	13.1%	14.6%	12.1%	25.9%	14.3%	14.4%	11.7%	25.6%	15.5%	14.6%	11.9%	25.5%
Direct Real Estate	2.9%	8.1%	7.6%	7.2%	9.4%	7.6%	7.7%	7.4%	9.3%	8.0%	7.8%	7.5%	9.4%
REIT	6.5%	8.3%	8.0%	6.4%	20.2%	9.1%	8.7%	7.0%	20.4%	9.3%	8.9%	7.1%	20.4%
Infrastructure	8.5%	5.6%	6.5%	5.9%	12.3%	6.4%	6.5%	5.8%	12.5%	6.6%	6.5%	5.8%	12.4%
Hedge Funds	7.4%	6.0%	6.6%	6.3%	9.2%	6.6%	6.6%	6.2%	9.2%	6.8%	6.6%	6.2%	9.2%
Commodities	11.9%	2.6%	4.8%	2.8%	22.1%	3.9%	4.3%	2.2%	22.0%	2.4%	3.9%	1.8%	21.8%
Aggregate Bonds	2.0%	4.4%	4.5%	4.4%	4.5%	4.5%	4.5%	4.4%	4.5%	4.5%	4.5%	4.4%	4.5%
Intermediate Government	1.3%	4.2%	4.4%	4.3%	3.8%	4.1%	4.2%	4.1%	3.8%	3.9%	4.1%	4.1%	3.8%
Intermediate Corporate	2.8%	5.0%	5.1%	5.0%	4.6%	5.1%	5.0%	4.9%	4.7%	4.9%	5.0%	4.9%	4.7%
Intermediate Credit	2.6%	4.9%	5.0%	4.9%	4.4%	4.9%	4.9%	4.8%	4.5%	4.8%	4.9%	4.8%	4.5%
Intermediate Government/Credit	1.7%	4.4%	4.6%	4.5%	4.0%	4.4%	4.5%	4.4%	4.0%	4.2%	4.4%	4.3%	4.0%
Long Government	0.9%	4.9%	4.4%	3.9%	9.9%	5.1%	4.6%	4.1%	10.2%	4.5%	4.7%	4.2%	10.3%
Long Corporate	5.3%	5.9%	5.6%	5.0%	10.8%	6.3%	5.8%	5.2%	11.1%	5.7%	5.8%	5.2%	11.2%
Long Credit	4.9%	5.8%	5.5%	4.9%	10.5%	6.2%	5.7%	5.1%	10.8%	5.6%	5.7%	5.2%	10.9%
Long Government/Credit	3.3%	5.5%	5.0%	4.6%	10.0%	5.7%	5.2%	4.7%	10.3%	5.1%	5.3%	4.8%	10.3%
STRIPS	3.2%	6.4%	4.9%	3.4%	18.1%	6.7%	5.6%	4.0%	19.0%	5.6%	5.8%	4.1%	19.2%
TIPS	3.5%	4.5%	5.2%	5.2%	4.0%	4.5%	4.9%	4.8%	3.9%	4.3%	4.7%	4.6%	3.9%
Mortgage-Backed Securities	2.0%	4.3%	4.0%	3.9%	4.1%	4.3%	4.1%	4.0%	4.2%	4.4%	4.2%	4.1%	4.1%
US High Yield	5.5%	8.9%	8.4%	8.0%	10.0%	9.2%	8.7%	8.2%	10.3%	9.0%	8.7%	8.2%	10.4%
Emerging Market Debt	6.7%	6.8%	7.2%	6.7%	11.4%	7.4%	7.3%	6.7%	11.4%	7.2%	7.3%	6.8%	11.5%
Global ex-US Debt	1.8%	3.7%	3.5%	3.2%	8.6%	4.0%	3.6%	3.3%	8.6%	3.7%	3.7%	3.4%	8.6%
Private Debt	10.4%	7.4%	8.1%	7.8%	9.0%	8.0%	8.1%	7.7%	9.1%	8.2%	8.1%	7.8%	9.0%
Cash	5.4%	2.9%	3.6%	3.6%	1.8%	3.0%	3.3%	3.3%	1.8%	3.1%	3.2%	3.2%	1.7%
Inflation - Consumer Prices	6.3%	2.5%	3.1%	3.1%	1.5%	2.5%	2.8%	2.8%	1.3%	2.5%	2.7%	2.7%	1.1%
Inflation - Wages	3.7%	3.4%	3.5%	3.5%	0.7%	3.4%	3.5%	3.5%	0.7%	3.5%	3.5%	3.5%	0.7%
Medical Trend - Professional	4.4%	4.1%	4.1%	4.1%	1.3%	4.1%	4.1%	4.1%	1.3%	4.2%	4.1%	4.1%	1.3%
Medical Trend - Hospital	6.9%	5.7%	5.9%	5.9%	1.7%	5.7%	5.8%	5.8%	1.7%	5.7%	5.8%	5.7%	1.7%

Buck January 2023 Capital Market Assumptions

Summary of 10-Year Correlations

	Global Equity	US All Cap Equity	US Large Cap Equity	US Mid Cap Equity	US Small Cap Equity	Low Volatility Equity	Global Equity ex US	MSCI EAFE Equity	MSCI Emerging Markets Equity	Private Equity	Direct Real Estate	REIT	Infrastructure	Hedge Funds	Commodities	Aggregate Bonds	Intermediate Government	Intermediate Corporate	Intermediate Credit	Intermediate Government/Credit	Long Government	Long Corporate	Long Credit	Long Government/Credit	STRIPS	TIPS	Mortgage-Backed Securities	US High Yield	Emerging Market Debt	Global ex-US Debt	Private Debt	Cash	Inflation - Consumer Prices	Inflation - Wages	Medical Trend - Professional	Medical Trend - Hospital
Global Equity	1.0																																			
US All Cap Equity	1.0	1.0																																		
US Large Cap Equity	1.0	1.0	1.0																																	
US Mid Cap Equity	0.9	0.9	0.9	1.0																																
US Small Cap Equity	0.9	0.9	0.9	0.9	1.0																															
Low Volatility Equity	0.7	0.7	0.7	0.6	0.6	1.0																														
Global Equity ex US	0.9	0.7	0.7	0.7	0.7	0.5	1.0																													
MSCI EAFE Equity	0.8	0.7	0.7	0.7	0.7	0.5	0.9	1.0																												
MSCI Emerging Markets Equity	0.6	0.4	0.4	0.4	0.4	0.3	0.7	0.3	1.0																											
Private Equity	0.7	0.7	0.7	0.6	0.6	0.5	0.5	0.5	0.3	1.0																										
Direct Real Estate	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	1.0																									
REIT	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.2	0.3	0.1	1.0																								
Infrastructure	0.8	0.8	0.8	0.7	0.7	0.6	0.6	0.6	0.3	0.6	0.2	0.4	1.0																							
Hedge Funds	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.2	0.5	0.1	0.3	0.4	1.0																						
Commodities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0																					
Aggregate Bonds	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	1.0																				
Intermediate Government	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	1.0	1.0																			
Intermediate Corporate	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	1.0	0.9	1.0																		
Intermediate Credit	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.0	1.0	0.9	1.0	1.0																	
Intermediate Government/Credit	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0																
Long Government	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	1.0	0.9	0.9	0.9	0.9	1.0															
Long Corporate	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.1	0.1	0.2	0.1	0.0	0.9	0.8	0.9	0.9	0.9	0.9	1.0														
Long Credit	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.0	0.9	0.8	0.9	0.9	0.9	0.9	1.0	1.0													
Long Government/Credit	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.0	1.0	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0												
STRIPS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.9	0.9	0.8	0.8	0.9	1.0	0.9	0.9	1.0	1.0											
TIPS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.9	1.0	0.9	0.9	1.0	0.9	0.8	0.8	0.9	0.8	1.0										
Mortgage-Backed Securities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	1.0	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.9	0.9	0.9	1.0									
US High Yield	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.2	0.1	0.2	0.2	0.1	0.0	0.7	0.6	0.9	0.8	0.7	0.6	0.9	0.9	0.8	0.6	0.6	0.6	1.0								
Emerging Market Debt	0.4	0.2	0.2	0.2	0.2	0.2	0.5	0.2	0.7	0.2	0.1	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.0							
Global ex-US Debt	0.2	0.1	0.1	0.1	0.1	0.1	0.3	0.1	0.4	0.1	0.1	0.1	0.1	0.1	0.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.5	1.0						
Private Debt	0.9	0.9	0.9	0.8	0.8	0.7	0.7	0.7	0.4	0.7	0.2	0.5	0.7	0.5	0.0	-0.1	-0.1	0.0	0.0	-0.1	-0.1	0.1	0.1	0.0	-0.1	-0.1	-0.1	0.2	0.2	0.1	1.0					
Cash	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.2	0.3	0.2	0.3	0.3	0.1	0.1	0.1	0.1	0.1	0.4	0.3	0.1	0.0	0.0	0.1	1.0				
Inflation - Consumer Prices	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	-0.1	0.0	0.1	0.0	0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	0.0	0.0	-0.1	-0.1	0.1	-0.1	-0.1	0.0	-0.1	0.1	0.6	1.0			
Inflation - Wages	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.1	0.2	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.1	0.6	0.5	1.0		
Medical Trend - Professional	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.4	0.2	0.5	1.0	
Medical Trend - Hospital	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.1	0.6	0.5	0.7	0.7	1.0

Actuarial Assumptions and Methods

- The projections provided were prepared using the same data, actuarial methods and assumptions that were used for the June 30, 2022 actuarial valuation and the following assumptions for future valuations:
  - The active workforce size is assumed to remain constant; and
  - Future new employees have similar characteristics (age/gender/salary) to new employees for the period July 1, 2019 through June 30, 2022. Among new school employees hired on or after July 1, 2022, 98% will become Class T-G members, 1% will elect Class T-H membership, and 1% will elect Class DC participation.
- Key assumptions:
  - Expected Rate of Return on Assets: 7.00%
  - Payroll Growth: 3.25%
  - Average Salary Increase: 4.50%
  - Inflation: 2.50%
- The projections reflect the ACT 5 risk-sharing provisions for TE/TF/TG/TH members. We caution that the System assets and projected unfunded accrued liability amortization schedules reflect the under/over contribution from the basic member rate resulting from the assumed asset returns, the corresponding System accrued liabilities do not reflect the decrease/increase in the affected members' contribution rates. Stress-testing for future alternative System returns that are different from the assumed 7.00% per annum may also affect the projected System liabilities due to the shared-risk member contributions due to incidence of return of contributions for non-vested members, Option 4 lump sum withdrawals, etc.
- Asset figures reflect actual market asset value of $72.112 billion as of June 30, 2023.
- The health insurance premium assistance assets and liabilities have been excluded from this analysis.
- Please see the June 30, 2022 actuarial valuation report for all other actuarial assumptions and methods.

Actuarial Certifications

This report was prepared under the supervision of Stuart Schulman, a Fellow of the Society of Actuaries, an Enrolled Actuary, and a Member of the American Academy of Actuaries; and David Driscoll, a Fellow of the Society of Actuaries, an Enrolled Actuary, and a Member of the American Academy of Actuaries, who have met the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein. We are available to answer any questions on the material in this report or to provide explanations or further details as appropriate. We are not aware of any direct or material indirect financial interest or relationship, including investments or other services that could create a conflict of interest, or that would impair or appear to impair the objectivity of our work.

Future actuarial measurements may differ significantly from current measurements due to plan experience differing from that anticipated by the economic and demographic assumptions, increases or decreases expected as part of the natural operation of the methodology used for these measurements, and changes in plan provisions or applicable law. Because of limited scope, Buck performed no analysis of the potential range of such future differences outside of what is presented in this report.

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Buck’s Capital Market assumptions are based on a model developed by Conning and Company called “GEMS.” At the beginning of the year (or more frequently), Buck determines a set of “standard” capital market assumptions based on the output from the GEMS model. The model incorporates historical data (back to inception of various indices), and uses a factor model to forecast future values for all relevant asset classes. GEMS captures the real-life fact that means volatilities and correlations are determined dynamically and can change over time. This means that expected returns over, say, a 10-year horizon may not equal those over a 20-year horizon. Based on a Monte Carlo-type analysis, we derive sample means, standard deviations and correlations for reporting purposes. GEMS can model the economies of the USA, UK, Switzerland, Canada and Germany in an internally consistent manner, and can therefore capture forecasted currency effects and interest disparities between and among the Dollar, Pound, Swiss Franc, Canadian Dollar and Euro.

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