

February 11, 2021

Shad White
Mississippi State Auditor
Office of the State Auditor
501 North West Street
Suite 801, Woolfolk Building
Jackson, MS 39201

Dear Auditor White,

This letter and attached report are provided in response to your letter of December 14, 2018, in which you requested a stress test analysis of Mississippi's public pension systems. The analysis of the Mississippi Public Employees' Retirement System (PERS) included in the report follows Pew's *Foundation for Public Pension Risk Reporting*- a framework for public pension risk measurement designed to aide long-term budget planning and decision making for government plan sponsors and finance officials. The Foundation builds on existing actuarial projections and standards for risk reporting and focuses on the potential impacts of investment risk and contribution risk on government budgets and pension balance sheets.

The key findings of the analysis include:

- **Lower than expected investment returns have been the largest source of increasing pension debt.** Between fiscal years 2000 and 2020, PERS annual returns tracked closely with the broader market and averaged 6.5%, compared to assumed rates of between 7.75% and 8.00%, accounting for \$8B in additional unfunded liabilities.
- **Increased annual contributions have been less than the amount needed to improve funding levels.** Since fiscal year 2000, annual state contributions increased by over 50% as a percentage of both revenue and payroll, but still fell short of the amount needed to reduce pension debt. During that period, the funded ratio fell from 90% to 59% in 2020 and the ratio of operating cash flow to assets declined to 9th worst among states by 2018.
- **Investment returns are expected to be lower than the assumed rate going forward.** We estimate long-term expected returns of between 6.2% to 6.6% over 20 years, as compared to the plan's assumed rate of 7.75%, based on the PERS investment policy and the latest outlook for the economy and asset returns.
- **Significant increases in annual required contributions due to lower investment returns are likely.** Based on the outlook for investment returns, we estimate a roughly 70% probability that annual payments as a share of revenue will need to increase by nearly 20% over the next decade, or \$200M in today's dollars, assuming requirements to increase payments under current funding policies are met.
- **Increased funding may be necessary to prevent fiscal distress.** In scenarios assuming contributions remain fixed at 10% of revenue, we estimate a greater than 15% chance of long-term insolvency. While hypothetical, this result supports the current policy to increase contributions by some measure.
- **Based on these results, policymakers could consider several changes to improve fiscal stability.** In particular, our results align with the recent analysis from the plan actuary that will require the board to consider contribution increases of at least \$150M to \$200M in FY2023, when the economy is expected to be in recovery. In addition, our commentary below identifies additional considerations for policymakers including further reductions to the assumed rate of return.

All projections and calculations by The Pew Charitable Trusts and The Terry Group are based on assumptions and other data available in public documents. Baseline projections are designed to match as closely as possible, but not replicate, official projections developed by plan actuaries. Unless otherwise noted, historical data for MS PERS is presented through FY 2020 while historical data for 50-state rankings and national averages use the most recent year for which comprehensive data were available for all 50 states.

We hope this stress test report will be of use in your efforts to inform a broad range of stakeholders on the fiscal condition of Mississippi's largest retirement system; the impact that current economic conditions may have on that system; and to develop policies that address the associated risks of market and economic uncertainty.

Sincerely,

Mike Lowenthal
Senior Manager
Strengthening Public Sector Retirement Systems
The Pew Charitable Trusts

David Draine
Senior Officer
Strengthening Public Sector Retirement Systems
The Pew Charitable Trusts

Introduction

This stress test analysis of the Mississippi Public Employees' Retirement System (PERS), which administers pension benefits for more than 250,000 active and retired state workers and teachers, was prepared by Pew at the request of the Mississippi Office of the State Auditor. The analysis follows Pew's *Foundation for Public Pension Risk Reporting*—a framework for public pension risk measurement developed in collaboration with the Harvard Kennedy School's Mossavar-Rahmani Center for Business and Government.

Informed by historical trend analysis and using the most recent actuarial projections as a baseline, the Foundation is designed to aid long-term budget planning and decision making for government plan sponsors and finance officials. To do this, we apply standard quantitative analyses to assess the potential impacts of **investment risk**—the risk that investment returns are not as expected—and **contribution risk**—the risk that contributions fall short of the rate required to meet funding objectives—on government budgets and pension balance sheets. First released in 2018, a recent update to the Foundation reflects changes to economic scenarios and assumptions to account for the realized and potential impacts of COVID-19 on state finances and pension investments. **(Appendix 1)**

The stress test analysis for PERS accounts for these changes in economic outlook, as well as the results of the annual actuarial valuation released on December 15th, 2020. In that study, PERS reported a total of \$47B in pension liabilities as of fiscal year (FY) 2020 with a **funded ratio** of 59% based on the market value of assets—below the average of 73% for state sponsored pension plans across the U.S. Employer contributions into the pension systems totaled \$1.2B in FY 2020—an amount equal to 17.4% of covered payroll or an estimated 10% of state own-source revenue (OSR), a measure of revenue tracked by the US Census Bureau that includes taxes and fees controlled by the state. These data, along with baseline projections included in the actuarial valuation, provide a reference point for 20-year historical trend analysis and a starting point for 20-year forward-looking risk analysis.

Key Findings of these analyses include:

- **Lower than expected investment returns have been the largest source of increasing pension debt.** Between fiscal years 2000 and 2020, PERS annual returns tracked closely with the broader market and averaged 6.5%, compared to assumed rates of between 7.75% and 8.00%, accounting for \$8B in additional unfunded liabilities.
- **Increased annual contributions have been less than the amount needed to improve funding levels.** Since fiscal year 2000, annual state contributions increased by over 50% as a percentage of both revenue and payroll, but still fell short of the amount needed to reduce pension debt. During that period, the funded ratio fell from 90% to 59% in 2020 and the ratio of operating cash flow to assets declined to 9th worst among states by 2018.
- **Investment returns are expected to be lower than the assumed rate going forward.** We estimate long-term expected returns of between 6.2% to 6.6% over 20 years, as compared to the plan's assumed rate of 7.75%, based on the PERS investment policy and the latest outlook for the economy and asset returns.
- **Significant increases in annual required contributions due to lower investment returns are likely.** Based on the outlook for investment returns, we estimate a roughly 70% probability that annual payments as a share of revenue will need to increase by nearly 20% over the next decade, or \$200M in today's dollars, assuming requirements to increase payments under current funding policies are met.
- **Increased funding may be necessary to prevent fiscal distress.** In scenarios assuming contributions remain fixed at 10% of revenue, we estimate a greater than 15% chance of long-term insolvency. While hypothetical, this result supports the current policy to increase contributions by some measure.
- **Based on these results, policymakers could consider several changes to improve fiscal stability.** In particular, our results align with the recent analysis from the plan actuary that will require the board to consider contribution increases of at least \$150M to \$200M in FY2023, when the economy is expected to be in recovery. In addition, our commentary below identifies additional considerations for policymakers including further reductions to the assumed rate of return.

Historical Trend Analysis

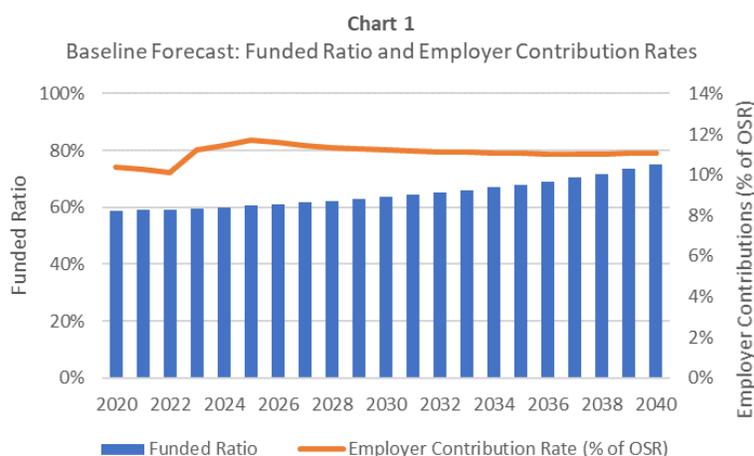
Between fiscal years 2000 and 2020, PERS pension debt, measured on a market value basis, increased by nearly \$19B due to a combination of lower than expected investment returns, insufficient contributions, benefit increases and other actuarial experience and assumptions (**Figure 1 and 2**). The difference between actual investment performance—which averaged 6.5% annually—and an assumed rate of return that ranged from 7.75% to 8%—was the largest contributor, accounting for over \$8B of the increase in unfunded liabilities.

It is important to note that PERS investment performance has been comparable to, and generally above, the median return for other public pension funds. However, the impact of the historical shortfall between actual and assumed rates of return help to inform the forward-looking analysis on investment risk that follows. Separately, we also note that the overall increase of \$18.7B in pension debt over 20-years does include the estimated \$1.3 billion impact of benefit increases adopted in the early 2000's, but not an increase in benefits from 1999.

Over the same 20-year period, annual contributions from the state budget to PERS increased by over 50% as a percentage of both covered payroll and OSR (**Figure 3**). However, since 2000, PERS' **funded ratio** fell from 90% in 2000 to 59% in 2020 and the **operating cash flow to assets ratio**, for the state, declined from 0.7% to -3.9% by 2019—more than a full percentage point below the national average as of 2019 (**Figure 4**). Pew identifies an operating cash flow of -5% or worse as an early indicator of potential fiscal distress. The deterioration of these metrics indicates that rising contributions have not fully offset underperforming investments and other sources of underfunding.

Baseline Projections

Baseline projections in **Chart 1** show that the state's contribution rate is projected to increase to more than 11% of OSR, or 20% of payroll, over the next decade, with the ratio of employer contributions to revenue higher over the next several years due to both lower revenue resulting from the pandemic and a contribution increase called for under the board's signal light funding policy discussed in more detail in **Appendix 3** and below. These projections assume all plan assumptions are met each year, including 7.75% annual investment returns. Note that the plan's 7.75% investment return assumption is above the national average of 7.2% with only 13 state-run pension plans having a higher return target than Mississippi PERS as of 2017.



Source: The Terry Group and The Pew Charitable Trusts

Stress Test Analysis

Investment returns are expected to be lower than the assumed rate going forward.

Mississippi's historical investment experience demonstrates that annual returns have fluctuated significantly, tracking closely with the up and down swings of the stock market (**Figure 5**). Looking forward, financial experts anticipate investments will perform below historical averages over the next 10-20 years, due to the expectation that economic growth, returns on stocks, and interest rates for bonds will be lower than they have been in the past. Consistent with this outlook, we estimate long-term expected returns of 6.2% to 6.6%, based on PERS' current asset allocation, with a 70% probability of compound returns falling below the assumed rate of 7.75% over the next 20 years. These results are based on simulation analysis designed to replicate real world conditions using Pew's capital market assumptions and PERS current target asset allocations across stocks (61%), bonds and cash (21%), and alternative investments (18%).

To account for this uncertainty, the Government Accounting Standards Board (GASB) requires plans to report funding levels under a range of investment return assumptions as part of their annual reporting. The attached **Pension Risk Dashboard** presents this sensitivity analysis for PERS, along with an estimated calculation of plan liabilities at a sample municipal borrowing rate of 3% informed by proposed changes to Actuarial Standard of Practice No. 4. The purpose of these calculations is not to offer a “correct” liability measure but rather to offer measures of the level of risk being taken on by plan sponsors in targeting funding goals based on the current assumed rate of return.

Significant increases in future contributions due to lower than expected investment returns are likely.

To evaluate the potential impact of market volatility moving forward and calculate probabilities that certain outcomes occur, we use simulation analysis to generate thousands of forward-looking trials of possible market performance and present a range of outcomes for various financial measures (**Appendix 5**). Based on the range of employer contribution results presented in **Figure 6**, we estimate a nearly 70% probability that annual required contributions as a share of revenue will increase from the current rate of about 10% to around 12% – a 20% increase or \$200 million in terms of current state OSR – over the next decade.

These projected contribution increases occur in accordance with the current funding policy, which measures success along three metrics, including an 80% funding target by 2047. This policy calls for annual increases if the three metrics falls short of pre-defined thresholds—signaled by “red lights” in plan reporting (**Table 1**). The size of the adjustment is based on the amount required to put all measures back into the “green light” category.

Table #1: Summary of MS PERS Signal Light Funding Policy Thresholds

Status	Funded Ratio in 2047	Operating Cash Flow	ADC / Fixed Contribution Rate (FCR)
Green	Above 80%	Above -6%	At or below 100%
Yellow	Between 65% and 80%	Between -6% and -7.75%	Between 100% and 110%
Red	Below 65%	Below -7.75%	Above 110%

Source: 2020 Mississippi PERS [actuarial valuation](#), Schedule F, pages 43-48.

Scenario analysis illustrates how the signal light policy is applied under a **fixed 5% return scenario** that assumes 5% returns in each year of the forecast period and an **asset shock scenario** that consists of an initial investment loss of more than 20% over two years, followed by three years of economic recovery and lower returns of 5% over the remaining years of the projection period.

Under the asset shock scenario, the immediate investment losses trigger all three signal lights resulting in a significant contribution increase in 2024 and 2025—with employer contributions rising from 10.4% of OSR in 2020 to 17.4% of OSR in 2025. Also, contribution requirements nearly double over the entire 20-year period. In a scenario with long-term returns of 5%, while only two of the three signal lights (funded ratio and ADC) are triggered immediately, steep contribution increases do eventually become required later in the projection period (**Figure 7**).

Importantly, these findings are supported by a recent analysis by the PERS actuary which finds that contributions would need to increase even if investment returns meet expectations. As dictated by the signal light policy, the PERS board will be required to consider contribution increases of at least \$150M to \$200M starting in FY 2023. The range covers the required increase under current assumptions as well as projections assuming a lowering of the discount rate to meet recommendations in the 2019 experience study and anticipated similar conclusions from the upcoming experience study.

The plan actuary also contemplates a contribution rate under a 7.25% assumed rate of return which would result in an increase closer to \$300M (**Table 2**). This consideration is based on the expectation that the upcoming 2021

experience study could recommend a further reduction in the assumed rate of return, below the 7.5% recommended as part of the 2019 study.

Table #2: Recommended Increases in the Fixed Contribution Rate

	Using 7.75% Assumption	Using 7.50% Assumption	Using 7.25% Assumption
Fixed Contribution Rate (FCR)	19.60%	20.50%	22.25%

Source: Cavanagh Macdonald. [Report on the Thirty-Year Projections of the Mississippi Retirement Systems. Prepared as of June 30, 2020.](#) Page 40.

Increased funding may be necessary to prevent fiscal distress.

Under both the fixed 5% and asset shock scenarios, the signal light policy proves effective at maintaining plan funding above 40% throughout the projection period. And although modeling investment risk is at the heart of stress testing, policymakers’ responses to addressing lower returns, in terms of making annual required contributions, can also be a source of risk to plans’ fiscal health. To examine the impact of contribution risk, we assess the potential impact on the pension system’s funded status under the same 5% return and asset shock scenarios, assuming that policymakers do not adjust contributions as called for under the plan funding policy and instead hold them constant as a share of revenue in each year of the forecast period. We refer to this as a **revenue-constrained contribution policy** assumption.

Under this assumption, the funded ratio remains stable if the 7.75% investment assumption is achieved, falls to around 20% under 5% returns, and approaches insolvency in the asset shock scenario (**Figure 8**). Based on this assessment of contribution risk, we find that the signal light adjustments are not only effective at helping to achieve funding goals but also help preserve plan solvency in downside scenarios.

Policy Considerations

Based on these results, policymakers could consider several changes to improve fiscal stability.

The results presented in the previous sections align with a recent analysis from the plan actuary that will require the board to consider contribution increases of at least \$150M to \$200M in FY 2023 and illustrate the risk of the potential need for further contribution increases. In particular, the results of investment risk analysis indicate that there is a 70% probability that compound investment returns fall below the current assumed rate of 7.75% over the next 20 years. Pew’s research indicates that the long-term outlook for a typical public pension plan’s returns over the next 20 years is likely to be between 6.0% and 6.5%, in part due to a reduction in the outlook for interest rates and bond yields triggered by the COVID-19 pandemic. As a result, we estimate that over the next decade, the state will likely need to increase annual contributions as a share of revenue by nearly 20% or more than \$200 million in today’s dollars.

Scenario analysis designed to measure contribution risk, moreover, indicates that increasing annual pension contributions is essential. For example, in a lower 5% return scenario, without any increase in the employer contribution rate, we estimate that PERS assets would begin to decline within two years and fall below 25% funded by 2040.

Based on these results, policymakers might also consider additional adjustments to make costs more certain, including lowering the assumed rate of return beyond the scheduled reductions that would occur if investment returns exceed expectations, simplifying the funding policy to reduce the risk of sudden contribution increases in the future, and adopting variable COLA policies or other tools to adjust benefits automatically based on investment returns and actuarial conditions. For example, a variable COLA benefit that is tied to the Consumer Price Index (CPI) has emerged as a common practice among the best run public sector retirement systems.

Pension Risk Dashboard

Public Employees' Retirement System of Mississippi

Sensitivity Analysis

Investment Return Assumption	Expected	1% Above	1% Below	Muni / Low Rate
	7.75%	8.75%	6.75%	3.00% / 5.00%*
Pension Liability (\$B)				
Market Value of Assets	27.8	27.8	27.8	27.8
Actuarial Accrued Liability	47.4	42.6	53.1	88.2
Unfunded Liability	19.5	14.8	25.2	60.3
Funded Ratio	59%	65%	52%	32%
Normal Cost: Latest Tier (% of Payroll)				
Total Normal Cost	11.1%	9.3%	13.5%	20.5%
Employee Contribution	9.0%	9.0%	9.0%	9.0%
Employer Normal Cost	2.1%	0.3%	4.5%	11.5%
Normal Cost: Total Workforce (% of Payroll)				
Total Normal Cost	11.7%	9.9%	14.0%	20.7%
Employee Contribution	9.0%	9.0%	9.0%	9.0%
Employer Normal Cost	2.7%	0.9%	5.0%	11.7%

*3.00% is used to measure the pension liability. 3.00% is a sample municipal borrowing rate informed by proposed changes to Actuarial Standards of Practice No. 4. For normal cost, a low rate of return of 5% is used to approximate the 25th percentile of expected returns.

Stochastic Analysis

Projected Investment Returns Over 10 and 20 Years					
Percentile	5 th	25 th	50 th	75 th	95 th
10 Years	0.5%	3.8%	6.3%	8.7%	12.2%
20 Years	2.0%	4.5%	6.2%	8.0%	10.5%
Probability of Specific Events Over 10 and 20 years					
Affordability Measures	Current	Probability			
	2020	2021-2030	2031-2040		
Contributions/OSR increases 4pp	10.4%	46%	66%		
Contributions/OSR increases 2pp	10.4%	70%	80%		
Contributions/Payroll increases 5pp in any single year	17.4%	22%	31%		
Solvency Measures					
Operating Cash Flow Ratio < -5%	-4.4%	86%	54%		
Funded Ratio > 100%	58.8%	7%	25%		
Funded Ratio decreases 10pp	58.8%	57%	54%		
Funded Ratio = 0% (revenue-constrained policy)*	58.8%	0%	16%		

*Revenue-constrained policy assumes employers hold contributions fixed as percentage of state own-source revenue (OSR). This same assumption is analyzed in the contribution risk section.

Scenario Analysis: Investment Risk

	Reported		Projected	
	2020	2025	2030	2040
Contributions (% of OSR)				
Baseline	10%	12%	11%	11%
5% Returns	10%	12%	14%	17%
Asset Shock*	10%	17%	16%	20%
Operating Cash Flow Ratio				
Baseline	-4%	-5%	-5%	-4%
5% Returns	-4%	-5%	-5%	-2%
Asset Shock	-4%	-3%	-4%	-1%
Funded Ratio				
Baseline	59%	61%	64%	75%
5% Returns	59%	52%	48%	49%
Asset Shock	59%	45%	44%	49%

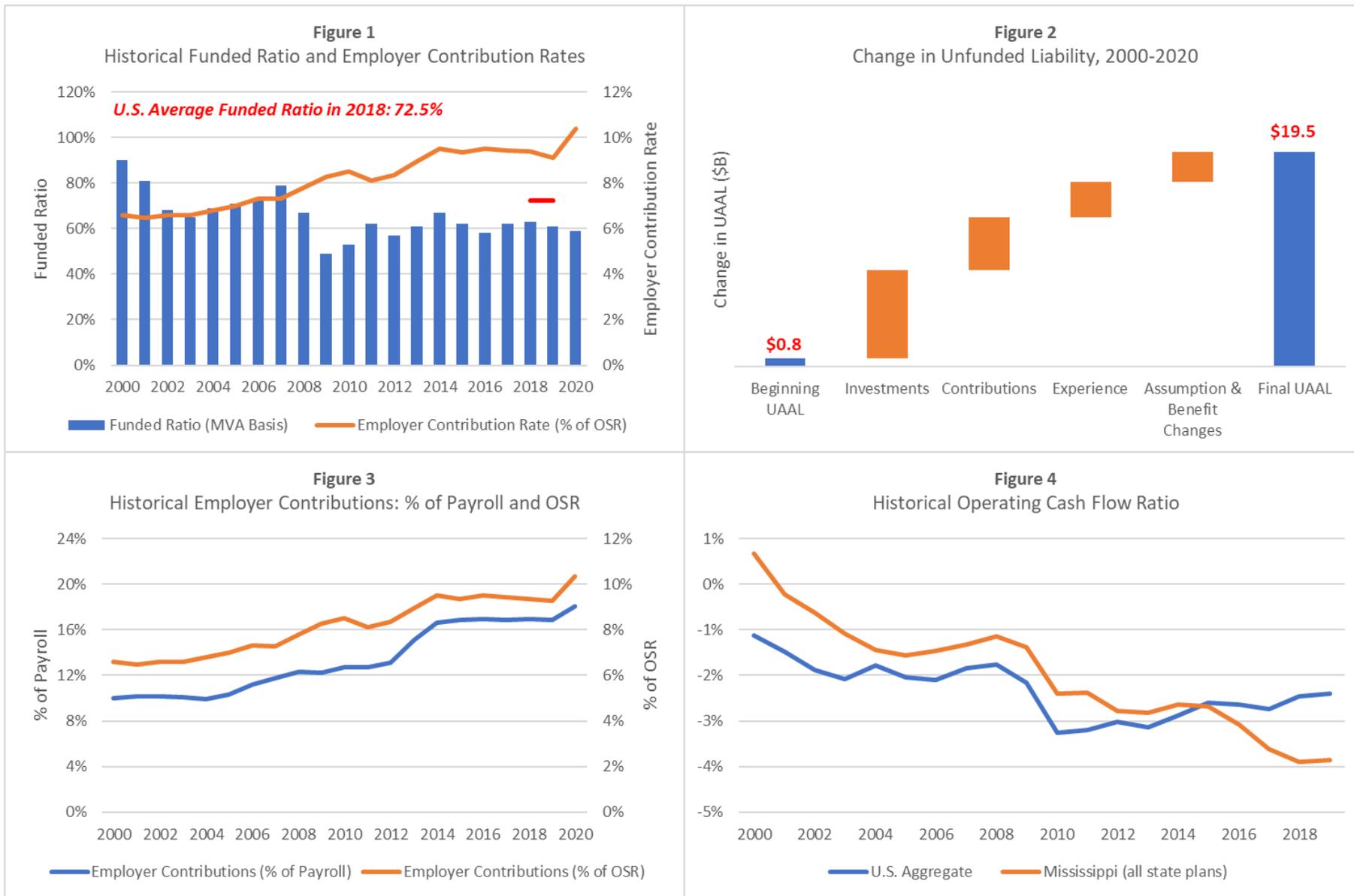
*Asset shock is a hypothetical scenario with portfolio returns of -15% and -10% in 2021 and 2022; a three-year recovery beginning in 2023 with returns of 25%, 10% and 10%; and 5% returns in 2026 and beyond.

Scenario Analysis: Contribution Risk*

	Reported		Projected	
	2020	2025	2030	2040
Contributions (% of OSR)				
Baseline	10%	10%	10%	10%
5% Returns	10%	10%	10%	10%
Asset Shock	10%	10%	10%	10%
Operating Cash Flow Ratio				
Baseline	-4%	-5%	-6%	-5%
5% Returns	-4%	-6%	-7%	-14%
Asset Shock	-4%	-7%	-10%	-48%
Funded Ratio				
Baseline	59%	60%	61%	67%
5% Returns	59%	52%	43%	21%
Asset Shock	59%	42%	32%	4%

*Analyzes the same three investment risk scenarios with the added impact of contribution risk, represented by the risk that employers keep contributions fixed at their 2019 share of own-source revenue (OSR).

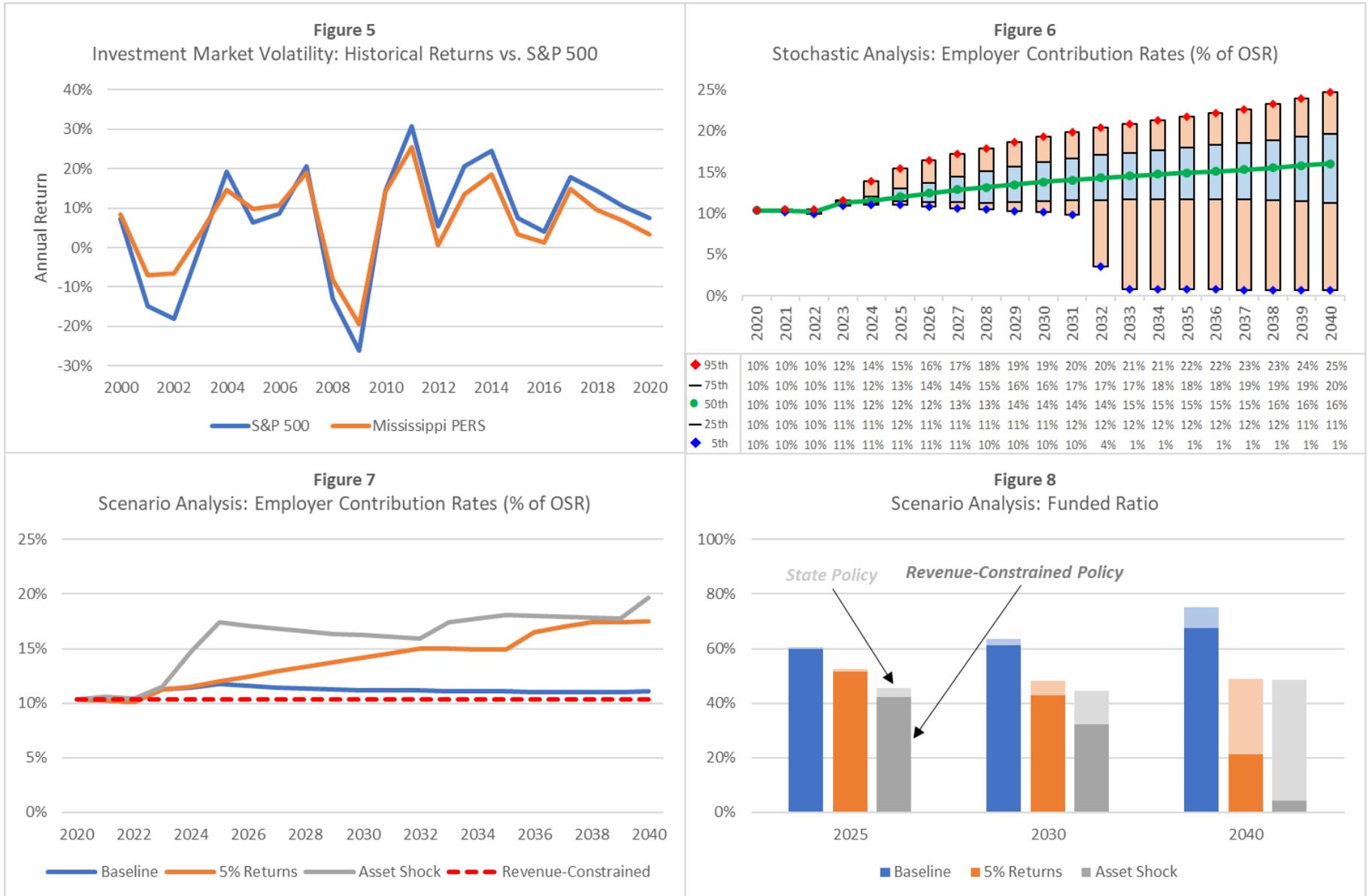
Figures 1-4 Public Employees' Retirement System of Mississippi



Notes: Figure 4 is based on data from the U.S. Census Bureau Annual Survey of Public Pensions, which reports data at the state and local level for all 50 states but not for individual plans. As of this writing, survey results have only been published through 2019.

Sources: The Pew Charitable Trusts, U.S. Census Bureau, and Mississippi PERS comprehensive annual financial reports and actuarial valuations.

Figures 5-8 Public Employees' Retirement System of Mississippi



Sources: "PERS Facts & Figures For Fiscal Year 2020", The Terry Group, and The Pew Charitable Trusts

Appendix #1: Foundation for Public Pensions Risk Reporting 2021 Update

Risk reporting for public pensions should be transparent and accessible to all stakeholders and designed to inform long-term planning and decision making. First published in 2018, *Pew's Foundation for Public Pension Risk Reporting* provides a comprehensive starting point for pension stress test and risk analysis, with the government plan sponsor as the primary target audience. Building on existing actuarial projections and reporting standards, the framework is designed to assist budget decision makers and government finance officials in evaluating the impact of investment and contribution risk on government budgets, pension system balance sheets, and the cost of current benefits under a range of economic conditions.

Beginning with the 2018 framework, this update reflects the dynamic nature of stress testing analysis. Reporting standards and practices evolve over time, and the ups and downs of the national economy prompt the routine need to adjust baseline assumptions and projections. For example, the current updates reflect recently proposed changes to actuarial standards, emerging best practices of states that have adopted public risk reporting requirements, and explicitly identifies the need to account for workforce reductions in a downturn when measuring contribution risk. The supporting notes to the framework also capture revisions to our assumptions and methodology about revenue and investment returns impacted by the COVID-19 pandemic, as well as further information on risk tolerance measures as critical budget management tools to actively monitor and manage key risks during all cycles of the economy, but especially during an economic downturn and expected recovery.

Overall, risk assessment should build on existing actuarial reporting, be tailored to the individual policies and features of the pension plan, and employ forward-looking projections of at least 5-20 years and include:

1. Sensitivity analysis of plan liabilities to different investment return assumptions, including the low-default-risk obligation measure as outlined in proposed changes to Actuarial Standard of Practice (ASOP) No.4;
2. Scenario analysis to assess investment risk, using regularly updated baseline projections that account for current economic conditions, and including (a) a low return scenario assuming a fixed reduced rate of return (for example, 5% or the 25th percentile of projected returns) on assets; and (b) a downside, asset shock scenario that includes an initial loss of 20% on plan investments, followed by a period of recovery, and then low returns over the remaining period.ⁱ
3. To assess contribution risk, projections and measurements for modified versions of the scenarios above, assuming (a) full actuarial contributions based on current funding policies; and (b) contributions that are constrained by the rate of revenue growth (i.e. fixed as a percent of revenue). Projections of plan contributions in these scenarios should account for any impact of recession-related payroll reductions, particularly for plans with fixed-rate funding policies;
4. Projections using stochastic analysis to simulate the volatility of annual investment returns above and below the expected rate of return, in order to measure the range of possible contributions and financial positions over the forward-looking projection period; and
5. Sensitivity analysis of service costs for current benefits, under the latest tier and the entire population as a whole, to different investment return assumptions.

ⁱ See notes for details of how Pew incorporates the impact of the pandemic into developing baseline and downside scenarios, including use of the assumptions published by the Federal Reserve Board for its annual bank stress tests.

To date, 12 states have enacted statutory requirements for risk reporting targeted to government plan sponsors.ⁱⁱ Legislation in these states establishes the scope of analysis and reporting, as well as the process for submitting the results to policymakers.

The resulting metrics provide executive and legislative officials information that supports active monitoring of risk and measures of risk tolerance, a data-driven approach to long-term budgeting through all cycles of the economy, and a framework to evaluate the impact of proposed or adopted policy changes.

ⁱⁱ As of November 2020, 12 states have enacted statutory requirements for routine risk reporting: Since 2017 alone, 10 states have adopted requirements through legislation, including: Virginia (2017), Hawaii (2017), Connecticut (2017), New Jersey (2018), Colorado (2018), Maryland (2018), Indiana (2019), Montana (2019), North Carolina (2020), and Pennsylvania (2020) joining early adopters Washington state (2007) and California (2011).

Appendix #2: Summary of 50-State Data

Table 1: Funding and Contributions (2018)

	Mississippi PERS	50 state Rank	National Average	Comments
Funded Ratio	63%	39 th	72.5%	In 2000, MS was 90% funded.
Net Amortization /Payroll	-5.7%	41 st	-1.8%	Plans with negative amortization will see pension debt rise even if all plan assumptions are achieved.
Operating Cash Flow/Assets	-4.38%	42 nd	-3.0%	Pew considers operating cash flow below -5% as indicator of risk of future fiscal distress. Signal light policy recommends contribution increases at -7.75%.

Notes: Net amortization is calculated as the difference between contributions and service cost plus interest on the existing pension debt and is presented as a percentage of payroll to provide a comparable snapshot of whether contribution payments are adequate to reduce pension debt. Operating cash flow to assets provides a benchmark for a rate of return to ensure asset balances do not decrease.

Sources: Comprehensive annual financial reports, actuarial reports and valuations, or other public documents, or as provided by plan.

Table 2: Investments (2017)

	Mississippi PERS	National Average	Comments
Asset Allocation	63% Equity 20% Fixed income 17% Alternatives	49% Equity 25% Fixed income 26% Alternatives	National allocation to alternatives increased from 11% in 2006 to 26% in 2017.
10-year Performance (2020)	9.44%	8.64%	Returns are gross of fees. National average based on TUCs research which is also gross of fees.
Fees	36 basis points	41 basis points	MS is near the median in terms of investment fees for the 73 state pension funds Pew tracks, as of 2017 data.
Assumed Rate of Return	7.75%	7.24%	Only 13 states had a higher assumed rate of return in 2017. National average has declined from 8% in 2007 to 7.24% in 2017.

Notes: Pew tracks performance metrics and asset allocation policies for 73 state pension funds.

Sources: Comprehensive annual financial reports, actuarial reports and valuations, or other public documents, or as provided by plan. National investment data from the Wilshire Trust Universe Comparison Service (TUCS).

Table 3: Current Plan Design

Mississippi PERS (Tier 4)		Comments
Plan Type	Defined Benefit	Final average salary defined benefit plans remain the most common for state workers. Alternative plan designs – such as hybrid plans – are used in 17 states as either the primary plan or default option for participating state employees/teachers.
Benefit Multiplier	2%: up to 30 YOS 2.5%: > 30 YOS	1.8% national average for final average salary DB plans that participate in Social Security.
COLA	3%, automatic	Around 60% of state and teacher plans that participate in Social Security offer an automatic COLA while another 25% provide them on an ad-hoc basis. Among the automatic COLAs, more than half are tied to CPI.
Employee Contribution	9%	General state employee members contribute to the plan at a higher rate than the national average of 6.6%.
Social Security	Yes	MS PERS is one of 64 state and teacher plans that participate in Social Security. 19 state and teacher plans don't participate.
Cost Sharing Features	None	17 states utilize defined benefit cost sharing features that automatically adjust contributions or benefits

Notes: For the purpose of comparing plan designs in this table, we've considered the most recent benefit tier. For purposes of actuarial modeling, Pew projections incorporate all benefit tiers.

Source: Pew analysis of the Urban Institute State and Local Employee Pension Plan (SLEPP) database; and state plan financial reporting, member handbooks, and other public documents.

Table 4: OPEB (2016)

Mississippi PERS		Comments
Total Liability	\$709 M	States reported a total liability of \$696 billion in non-pension retirement benefits for their employees, known as other post-employment benefits (OPEB), in 2016. This figure represents a 0.4 percent increase from 2015, when states reported \$692 billion in liabilities.
Premium Classification	Coverage Only	MS is one of 9 states that offer coverage to retirees but do not contribute to the premium.
Liability/Personal Income	0.67%	National average is 4.57%. MS ranks 38 th . States that provide coverage without contributions rank at the lower end of the liability scale.
Participating employees	States and Teachers	MS is one of 16 states to offer coverage to state employees and teachers. Other states limit coverage to state employees only or include local government employees.

Sources: Comprehensive annual financial reports, actuarial reports and valuations, or other public documents, or as provided by plan.

Appendix #3: Mississippi PERS Funding Policy

The Mississippi PERS funding policy sets the overall funding goals and objectives for the system and establishes a “Signal Light” approach that is used to determine the adequacy of employer contributions and measure progress toward achieving those goals. The policy stipulates that three Signal Light metrics be measured each year and documented in a projection report on a scale ranging from green (passing grade) to yellow (warning) to red (failing grade).¹ The plan’s three metrics are:

1. Projected funded ratio in 2047
2. Cash flow as a percentage of assets throughout the forecast period
3. Actuarially determined contribution rate (ADC) as a ratio of the Fixed Contribution Rate (FCR)

The 2047 funded ratio metric analyzes the projected funded ratio for the plan in 2047 based on the latest valuation results. The cash flow metric assesses the system’s worst projected cash flow ratio over the entire forecast period. The contribution ratio metric is measured on a “point-in-time” basis using the latest valuation. The signal light definitions for each metric are as follows:

Table 1: Summary of MS PERS Signal Light Funding Policy Thresholds

Status	Funded Ratio in 2047	Operating Cash Flow	ADC / Fixed Contribution Rate (FCR)
Green	Above 80%	Above -6%	At or below 100%
Yellow	Between 65% and 80%	Between -6% and -7.75%	Between 100% and 110%
Red	Below 65%	Below -7.75%	Above 110%

According to the policy, if any of the three metrics results in a red signal light, the actuary “will determine and recommend to the Board an employer contribution rate increase to consider that is sufficient enough to get all three metrics back in the Green Signal Light status.” If the Board accepts the recommendation, the contribution increase will take effect the July 1st 18 months following the completion of the projection report (e.g., if the 2020 projection report recommends a contribution increase—which it does—if accepted it would become effective in the fiscal year beginning July 1, 2022).

Because the policy is relatively new, there is limited experience implementing it. As a result, in modeling the plan, we were required to make several assumptions regarding how the policy would be interpreted in practice.

First, we assumed all contribution increases recommended based on the current policy would be accepted by the Board. While the Board appears to have the right to modify or decline any recommendation made by the actuary, we believed it would be most informative for plan sponsors and administrators to see plan funding progress and the course of employer contributions in simulations where the policy is followed exactly as designed.

Second, whenever a signal light is triggered (i.e. turns red) in our model, the recommended contribution increase is scheduled to take effect with a lag, as stipulated in the Board’s funding policy. Therefore, if a

signal light turns red in FY 2020, the corresponding contribution increase would be scheduled to take effect beginning FY 2023.

Finally, our model does not factor scheduled contribution increases into intervening signal light assessments. If, for example, a contribution increase was scheduled for FY 2023 (due to a red light in FY 2020), the prospective increase would not be factored into signal light assessments in FY 2021 or FY 2022. Thus, whenever a signal light turns red, it is likely to remain red for the next two years until the scheduled contribution increase actually comes into effect, triggering additional contribution increases in successive years (that is, unless high investment returns in intervening years are enough to reverse the signal light status on their own).

¹ For more information on the board's funding policy, see Schedule F on pages 43-48 of [the 2020 Mississippi PERS actuarial valuation](#).

Appendix #4: Revenue Projection Method

Forecasts of future state revenues are necessary for presenting forward-looking risk metrics in relation to available state resources. We estimate Own Source Revenue (OSR) — defined as total revenues minus any revenues from intergovernmental transfers, utilities, liquor stores and insurance trusts — using three sources of data: the Census’s Annual Survey of State Government Finances,ⁱ state-provided projected changes in general fund revenues as of December 2019 and October 2020,ⁱⁱ and Moody’s January 2020 and July 2020 projections of Gross State Product (GSP).ⁱⁱⁱ First, we observe historical OSR; second, we estimate OSR pre-pandemic; third, we project OSR post-pandemic.

Specifically, historical OSR is observed using Census data through 2018, the latest year for which Annual Survey of State Government Finances data were available (2019 data were subsequently released after Pew’s stress test model was created).

For pre-COVID-19 pandemic estimates, we then use state-provided growth rates as of December 2019 for the General Fund to estimate OSR for 2019 and 2020. Finally, for each year 2020 and later, we use rates of growth in GSP, as provided by Moody’s as of January 2020, to calculate how OSR was expected to grow before the COVID-19 pandemic emerged.

Based on the most recent analysis by the Congressional Budget Office,^{iv} we estimate that any COVID-19-related decline in revenue will occur during 2020 and 2021, after which a subsequent recovery will span 2022 through 2025. These effects are implicitly incorporated into our OSR estimates in three ways. First, revenues for 2020 and 2021 were estimated using the state’s revised revenue estimate as of October 2020, which projects that, as a result of the pandemic, Mississippi’s revenue will be 3.0 percent lower than previously estimated for 2020; and 4.6 percent lower than previously estimated for 2021. Second, the Moody’s projections of GSP as of July 2020, which include estimates of the impact of the COVID-19 pandemic, are used to estimate OSR growth in the years after 2025. Third, the estimated revenues for 2022 to 2025 were calculated based on the historical relationship between revenue and GSP during past recoveries.

We estimate the relationship between GSP and OSR during the recession and recovery by using both state-provided OSR estimates and Moody’s GSP growth rates. Mississippi’s estimated 4.6 percent decline in revenue due to the COVID-19 pandemic in 2021 is significantly lower than Moody’s forecast of a 12 percent decline in the state’s GSP for that same year. However, based on past experience, we expect the ratio of revenue to GSP to return to the level experienced in 2018 by 2025.^v We approximate this effect by using a constant 2.9 percent growth rate for OSR from 2022 to 2025, which is slower than the growth in GSP during that period, which is expected to average 3.5 percent.

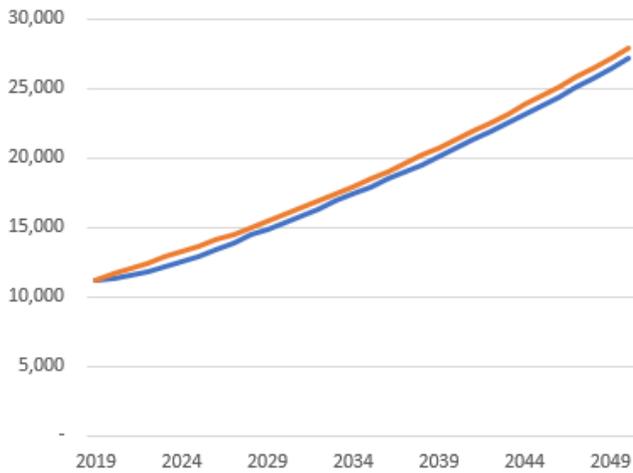
Following our previous research, we continue to assume that the relationship in growth between OSR and GSP will hold over the long run. Therefore, starting in 2025, we assume OSR will grow at the same rate as projected GSP, which holds the ratio of revenue to GSP constant. Figure 1 illustrates the differences between pre- and post-pandemic projections of OSR levels and growth rates.

APPENDIX FIGURE 1

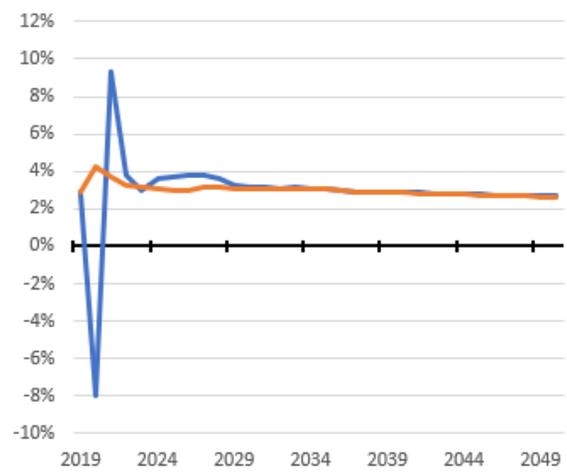
Mississippi Own-Source Revenue (OSR)

Pre-COVID-19 projections compared with revenue estimates account for the anticipated impact of the pandemic

(a) Projected OSR Levels (\$ Millions)



(b) Projected OSR Growth Rates



Source: Pew analysis of Moody's and U.S. Census data

Pension contributions may be made by both state and local governments. We use OSR to estimate how projected pension costs change in relationship to available resources. In the long run, our OSR projections grow at the same rate as state GDP which is a measure of the change in total resources that state or local governments could draw revenue from.

ⁱ Own Source Revenue is all revenue except for transfers from federal and local government, liquor stores, utilities, and revenue from trusts such as pension and workers compensation. Available at www.census.gov/programs-surveys/state.html.

ⁱⁱ General fund revenue. Available at <http://www.lbo.ms.gov/Home/Publications>.

ⁱⁱⁱ Available at <https://economy.com/>.

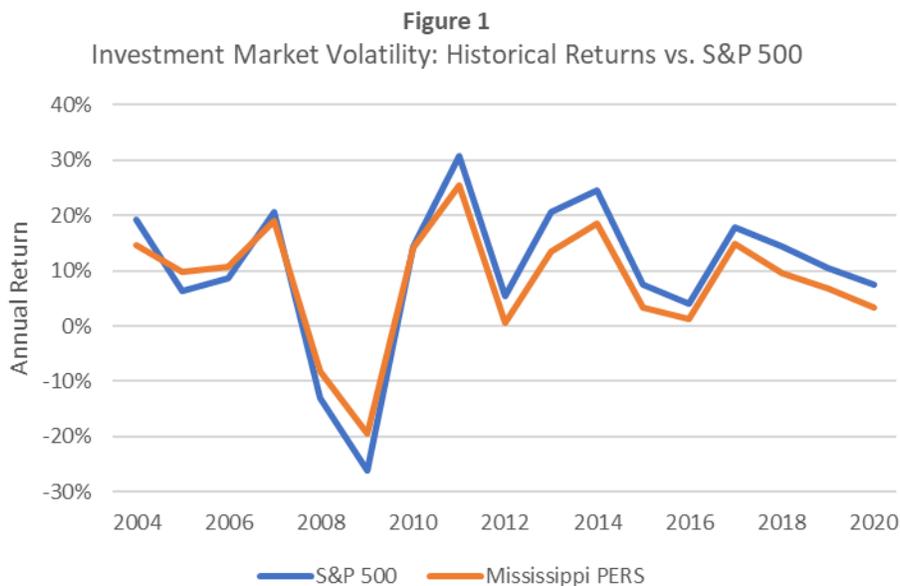
^{iv} Available at <https://www.cbo.gov/publication/56351>.

^v See Chernick, H., Reimers, C., & Tennant, J. (2014). Tax Structure and Revenue Instability: The Great Recession and the States. *IZA Journal of Labor Policy*, 3, 1-22. doi.org/10.1186/2193-9004-3-3, Kodrzycki, Yolanda K. *Proceedings of the Annual Conference on Taxation*. 11/13/2014, Issue 107, preceding p1-37, McGranahan, L., & Mattoon, R.H. (2012). State Tax Revenues Over the Business Cycle: Patterns and Policy Responses. *Chicago Fed Letter*, 299, 1-4, and Stinson, T.F. (2006). Sources of Error in State Revenue Forecasts or How Can the Forecast Possibly Be So Far Off. *Journal of Public Budgeting, Accounting & Financial Management*, 18(1), 100-126. doi.org/10.1108/JBAFM-18-01-2006-B005.

Appendix #5: Measuring the Impact of Market Volatility through Stochastic Analysis

Investment risk can be significantly amplified when market swings are included in stress test analysis. Between 2000 and 2010, for example, two stock market corrections and recessions had the effect of lowering Mississippi’s funded ratio from 90% to 53%. Volatility can also be a factor even when plan assumptions are met. While returns averaged roughly 8% between fiscal years 2012 and 2020 (i.e., since the Great Recession and recovery), they ranged from roughly 0.6% to 18.6% on an annual basis (see **Figure 1**).

This section applies stochastic analysis to assess the impact of annual fluctuations in investment returns, or market volatility.¹ By generating thousands of forward-looking trials of possible market performance, stochastic analysis allows us to evaluate the probability of various financial outcomes when annual returns are allowed to fluctuate. We specifically focus on three concepts: (1) **sequencing of returns**; (2) the **range of possible outcomes** for plan funded status; and (3) the **range of required contribution rates** (as a percentage of payroll) over a 20-year forecast period. We summarize our findings on each of these points below.

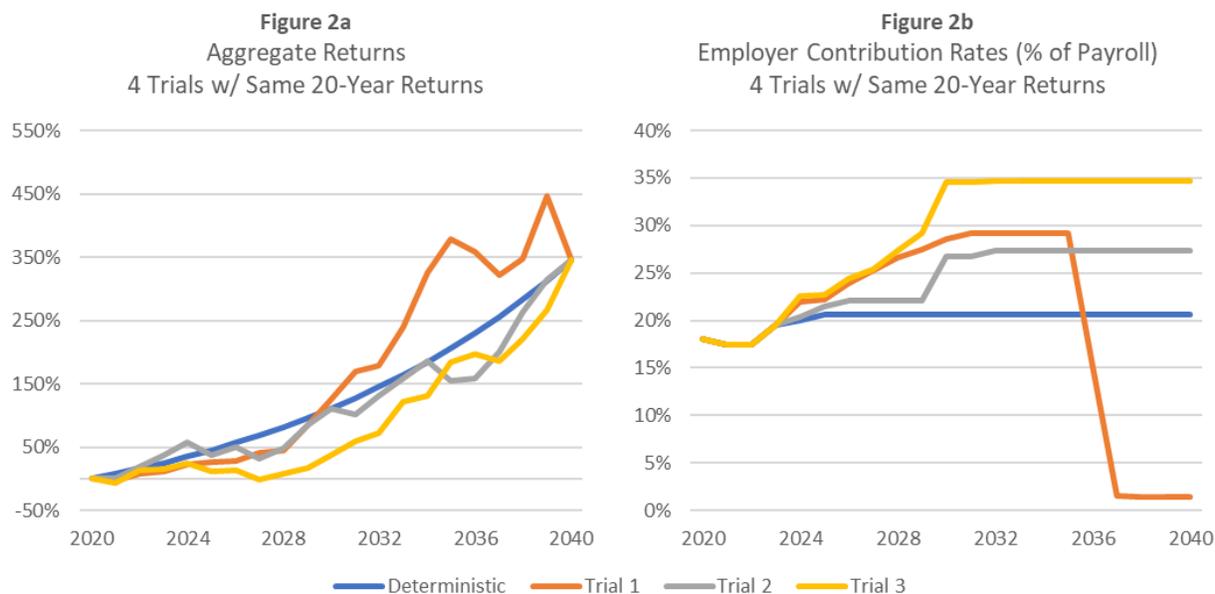


Source: “PERS Facts & Figures for Fiscal Year 2020” and Pew analysis of Yahoo! Finance data

Sequencing of Returns

The first takeaway from stochastic analysis is that the sequence of returns matters. Even when returns average the target rate over time, sequences in which higher returns occur first often lead to lower employer costs over time due to the impact of compounding returns. However, when lower returns occur first, it may result in a smaller asset base for investment gains later on unless offsetting increases in contributions are made. The reason is due to the combined impact of compounding returns along with negative cash flows. When lower returns occur first, it results in a smaller asset base for investment gains later on.

As an example, see **Figure 2a**, which illustrates 4 trials in which PERS could meet its investment return target over a 20-year timeframe. Each line represents a different sequence of returns, or trial, that meets the target rate of return of 7.75%. Returns fluctuate from that assumed rate annually, except for the deterministic trial, in which they are constant. In the end, the combined assumed rate of return is achieved in each case; however, as illustrated in **Figure 2b**, outcomes for required contributions vary dramatically in each trial due to differences in the sequence of returns.



Source: The Terry Group and The Pew Charitable Trusts

In Trial 3, for example, low returns in the first years of the forecast period slow initial asset growth and prompt an earlier increase in the contribution rate due to the signal light rules. Conversely, higher early returns in Trial 1 contribute to a larger-than-expected asset base, resulting in the plan reaching full funding and a dramatic drop in the employer contributions during the 20-year forecast period. In all cases, the employer contribution rate is more volatile in the stochastic simulation analysis than when using a fixed, stable rate of return.

A Wide Range of Possible Outcomes

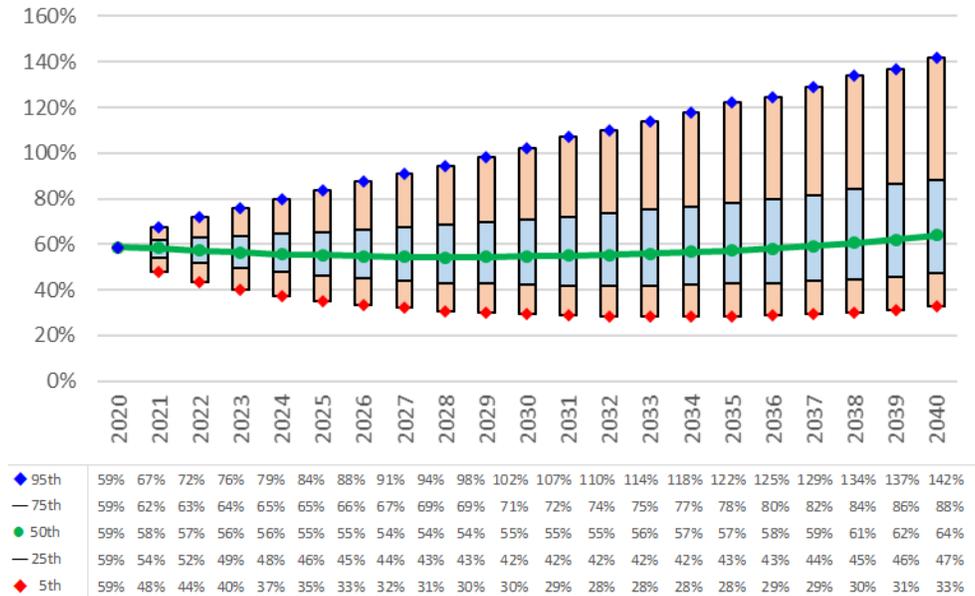
The analysis above illustrates the impact of market volatility on employer contributions using a limited set of simulations, in which 20-year returns meet the combined expected rate of return of 7.75% for PERS.

Examining the full range of 10,000 stochastic trials produced by Pew’s stress test model provides a more complete picture of the **range of possible outcomes** given the impact of both short-term market volatility and long-term economic trends. **Figure 3** shows the results of that analysis on funded ratio and reinforces the assessment that the signal light policy leads to improved funding levels over time.

The green line in the figure illustrates the median outcome expected, given Pew’s capital market assumptions, and shows a steady increase in the plan’s funded status over time, assuming the state adheres to the signal light rules. Our capital market assumptions result in a median 20-year annualized return of 6.2% roughly 1.5% percentage points lower than the current PERS assumption.²

Many of the trials from our stochastic analysis show positive results – for example, in approximately 25% of scenarios we see the plan achieve full funding between 2031 and 2040 if the signal light policy is followed. However, by 2040, only slightly more than half (57%) of scenarios yield improved financial position for the plan. It is also important to note that market volatility – particularly during a downturn – may prompt higher contribution requirements that must be made if these outcomes are to be realized.

Figure 3
Range of Projected Funded Ratios



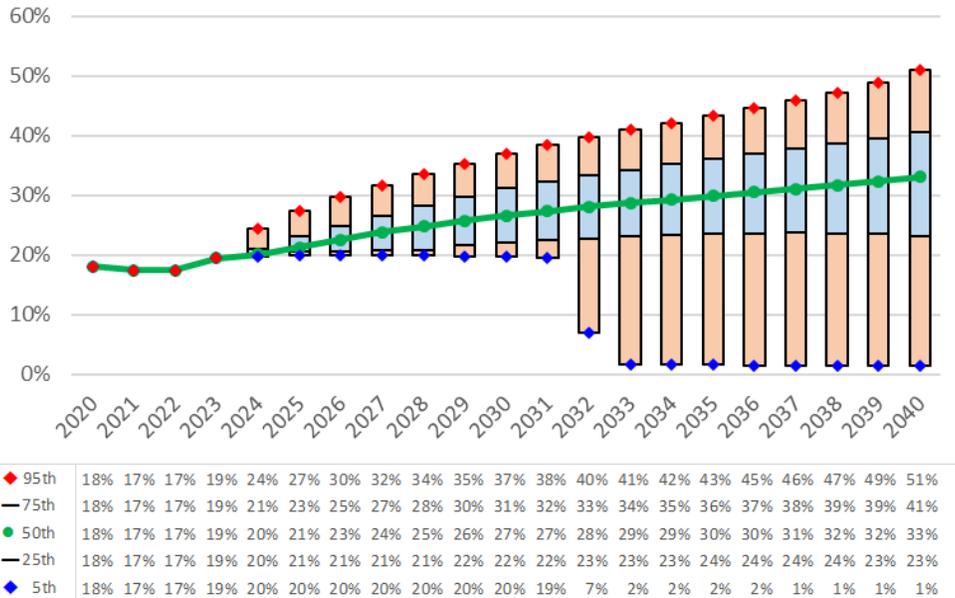
Source: The Terry Group and The Pew Charitable Trusts

Range of Potential Required Contributions

Stochastic analysis can also be used to evaluate the budget uncertainty implicit in projections for future plan funding. **Indeed, our modeling finds a significant probability that plan costs edge higher over the next 20 years.**

For example, **Figure 4** illustrates the estimated range of projected required contributions over the 20-year forecast period given the same market volatility and economic cycles examined above. The median outcome, according to our modeling, is that contributions rise by more than 10% of payroll, to 33%, over the next 20 years. Moreover, we find a meaningful probability of more extreme increases in contributions becoming required. **Figure 4**, for example, shows there is a greater than 25% probability that employer contributions rise to 40% of payroll or more by 2040, and a 6% chance they eclipse 50% over the same timeframe.

Figure 4
Range of Projected Employer Contribution Rates (% of Payroll)



Source: The Terry Group and The Pew Charitable Trusts

¹ Stochastic simulations are used in Pew’s stress test analysis to model the probabilities of various financial outcomes given specified means and standard deviations of economic variables and market returns. Our stress test model generates 10,000 runs for each simulation, which yields a distribution of investment returns for each year. For more information, see: Mennis, Greg, Susan Banta and David Draine. (2018). Assessing the Risk of Fiscal Distress for Public Pensions: State Stress Test Analysis. Mossavar-Rahmani Center for Business and Government Working Paper Series, no. 92. Available at https://www.hks.harvard.edu/sites/default/files/centers/mrcbg/files/AWP_92_final.pdf.

² For a detailed description of Pew’s capital market assumptions, see Mennis et al. (2018).

Appendix #6: Stress Test Model Output

Exhibit	Plan(s) Included	Description
1	PERS	30-year projections: expected (7.75%) returns, state contribution policy
2	PERS	30-year projections: fixed 5% returns scenario, state contribution policy
3	PERS	30-year projections: asset shock scenario, state contribution policy
4	PERS	30-year projections: expected (7.75%) returns, revenue-constrained contribution policy
5	PERS	30-year projections: fixed 5% returns scenario, revenue-constrained contribution policy
6	PERS	30-year projections: asset shock, revenue-constrained contribution policy
7	PERS	Comparison of key fiscal metrics at 5-, 10-, and 20-year intervals across all scenarios and stochastic trials

Notes and Disclosures

The information in this report is based on the valuation results of the Public Employees' Retirement System (PERS) of Mississippi as of June 30, 2020. Projections are based on a roll-forward model using publicly available actuarial data and assumptions.

Exhibit 1

Mississippi Retirement System 30-Year Projections

Plans included: Public Employees' Retirement System (PERS)

State contribution policy at assumed return (7.75%)

SMMs

Fiscal Year	Pension Liability (Actuarial Accrued Liability)						Pension Assets (Market Value)					Change in Pension Debt			Cash Flow		Employer Contribution		
	Payroll	Beginning of Period	Service Cost	Interest	Benefit Payments	End of Period	Beginning of Period	Total Contribution	Interest	Benefit Payments	End of Period	Pension Debt	\$	% of Payroll	% Funded	% of Assets	\$	% Change	% Payroll
2021	6,818	47,354	692	3,584	(3,093)	48,537	27,827	1,800	2,095	(3,093)	28,630	19,907	380	6%	59%	-5%	1,186	1%	17%
2022	6,908	48,537	698	3,670	(3,235)	49,670	28,630	1,824	2,153	(3,235)	29,371	20,299	392	6%	59%	-5%	1,202	1%	17%
2023	7,046	49,670	709	3,754	(3,370)	50,762	29,371	2,008	2,212	(3,370)	30,220	20,542	243	3%	60%	-5%	1,373	14%	19%
2024	7,197	50,762	721	3,834	(3,501)	51,815	30,220	2,086	2,276	(3,501)	31,081	20,734	192	3%	60%	-5%	1,439	5%	20%
2025	7,365	51,815	734	3,913	(3,592)	52,871	31,081	2,179	2,342	(3,592)	32,011	20,860	126	2%	61%	-5%	1,516	5%	21%
2026	7,546	52,871	750	3,991	(3,718)	53,894	32,011	2,232	2,411	(3,718)	32,937	20,957	97	1%	61%	-5%	1,553	2%	21%
2027	7,740	53,894	766	4,066	(3,844)	54,881	32,937	2,290	2,480	(3,844)	33,862	21,019	62	1%	62%	-5%	1,593	3%	21%
2028	7,943	54,881	784	4,139	(3,970)	55,834	33,862	2,350	2,549	(3,970)	34,791	21,043	23	0%	62%	-5%	1,635	3%	21%
2029	8,156	55,834	802	4,208	(4,102)	56,742	34,791	2,412	2,618	(4,102)	35,720	21,022	(20)	0%	63%	-5%	1,678	3%	21%
2030	8,380	56,742	822	4,275	(4,224)	57,615	35,720	2,479	2,688	(4,224)	36,662	20,953	(70)	-1%	64%	-5%	1,725	3%	21%
2031	8,611	57,615	842	4,339	(4,345)	58,451	36,662	2,547	2,758	(4,345)	37,622	20,829	(124)	-1%	64%	-5%	1,772	3%	21%
2032	8,850	58,451	864	4,400	(4,462)	59,253	37,622	2,618	2,830	(4,462)	38,608	20,645	(184)	-2%	65%	-5%	1,821	3%	21%
2033	9,098	59,253	886	4,459	(4,577)	60,022	38,608	2,691	2,905	(4,577)	39,627	20,394	(251)	-3%	66%	-5%	1,872	3%	21%
2034	9,356	60,022	910	4,516	(4,689)	60,759	39,627	2,767	2,982	(4,689)	40,688	20,070	(324)	-3%	67%	-5%	1,925	3%	21%
2035	9,622	60,759	935	4,570	(4,795)	61,467	40,688	2,846	3,063	(4,795)	41,802	19,666	(405)	-4%	68%	-5%	1,980	3%	21%
2036	9,899	61,467	960	4,622	(4,896)	62,153	41,802	2,928	3,148	(4,896)	42,982	19,172	(494)	-5%	69%	-5%	2,037	3%	21%
2037	10,186	62,153	987	4,673	(4,991)	62,822	42,982	3,013	3,238	(4,991)	44,241	18,580	(592)	-6%	70%	-5%	2,096	3%	21%
2038	10,486	62,822	1,015	4,722	(5,079)	63,481	44,241	3,102	3,335	(5,079)	45,600	17,881	(699)	-7%	72%	-4%	2,158	3%	21%
2039	10,798	63,481	1,045	4,772	(5,155)	64,142	45,600	3,194	3,441	(5,155)	47,079	17,063	(818)	-8%	73%	-4%	2,222	3%	21%
2040	11,122	64,142	1,075	4,822	(5,223)	64,816	47,079	3,290	3,556	(5,223)	48,702	16,114	(948)	-9%	75%	-4%	2,289	3%	21%
2041	11,457	64,816	1,107	4,873	(5,283)	65,513	48,702	3,389	3,682	(5,283)	50,490	15,024	(1,091)	-10%	77%	-4%	2,358	3%	21%
2042	11,804	65,513	1,141	4,926	(5,337)	66,243	50,490	3,492	3,822	(5,337)	52,466	13,777	(1,246)	-11%	79%	-4%	2,429	3%	21%
2043	12,160	66,243	1,175	4,982	(5,390)	67,010	52,466	3,850	3,986	(5,390)	54,911	12,099	(1,678)	-14%	82%	-3%	2,755	13%	23%
2044	12,527	67,010	1,210	5,041	(5,438)	67,824	54,911	3,977	4,177	(5,438)	57,627	10,196	(1,903)	-15%	85%	-3%	2,850	3%	23%
2045	12,905	67,824	1,247	5,104	(5,485)	68,689	57,627	4,110	4,390	(5,485)	60,642	8,047	(2,149)	-17%	88%	-2%	2,949	3%	23%
2046	13,294	68,689	1,285	5,171	(5,531)	69,614	60,642	4,234	4,626	(5,531)	63,972	5,642	(2,404)	-18%	92%	-2%	3,038	3%	23%
2047	13,695	69,614	1,324	5,242	(5,578)	70,602	63,972	4,362	4,886	(5,578)	67,641	2,961	(2,682)	-20%	96%	-2%	3,129	3%	23%
2048	14,108	70,602	1,364	5,319	(5,623)	71,662	67,641	4,493	5,173	(5,623)	71,684	(22)	(2,983)	-21%	100%	-2%	3,224	3%	23%
2049	14,535	71,662	1,406	5,401	(5,667)	72,802	71,684	1,442	5,367	(5,667)	72,826	(24)	(2)	0%	100%	-6%	133	-96%	1%
2050	14,975	72,802	1,450	5,489	(5,712)	74,029	72,826	1,486	5,455	(5,712)	74,055	(26)	(2)	0%	100%	-6%	138	4%	1%

Exhibit 2

Mississippi Retirement System 30-Year Projections

Plans included: Public Employees' Retirement System (PERS)

State contribution policy at low (5%) returns

SMMs

Fiscal Year	Pension Liability (Actuarial Accrued Liability)						Pension Assets (Market Value)					Change in Pension Debt			Cash Flow		Employer Contribution		
	Payroll	Beginning of Period	Service Cost	Interest	Benefit Payments	End of Period	Beginning of Period	Total Contribution	Interest	Benefit Payments	End of Period	Pension Debt	\$	% of Payroll	% Funded	% of Assets	\$	% Change	% Payroll
2021	6,818	47,354	692	3,584	(3,093)	48,537	27,827	1,800	1,346	(3,093)	27,880	20,657	1,130	17%	57%	-5%	1,186	1%	17%
2022	6,908	48,537	698	3,670	(3,235)	49,670	27,880	1,824	1,345	(3,235)	27,814	21,856	1,199	17%	56%	-5%	1,202	1%	17%
2023	7,046	49,670	709	3,754	(3,370)	50,762	27,814	2,008	1,343	(3,370)	27,794	22,968	1,112	16%	55%	-5%	1,373	14%	19%
2024	7,197	50,762	721	3,834	(3,501)	51,815	27,794	2,097	1,341	(3,501)	27,731	24,084	1,117	16%	54%	-5%	1,449	6%	20%
2025	7,365	51,815	734	3,913	(3,592)	52,871	27,731	2,216	1,338	(3,592)	27,693	25,178	1,093	15%	52%	-5%	1,553	7%	21%
2026	7,546	52,871	750	3,991	(3,718)	53,894	27,693	2,351	1,336	(3,718)	27,663	26,230	1,053	14%	51%	-5%	1,672	8%	22%
2027	7,740	53,894	766	4,066	(3,844)	54,881	27,663	2,498	1,335	(3,844)	27,652	27,230	1,000	13%	50%	-5%	1,801	8%	23%
2028	7,943	54,881	784	4,139	(3,970)	55,834	27,652	2,641	1,334	(3,970)	27,657	28,177	947	12%	50%	-5%	1,926	7%	24%
2029	8,156	55,834	802	4,208	(4,102)	56,742	27,657	2,788	1,334	(4,102)	27,677	29,065	888	11%	49%	-5%	2,054	7%	25%
2030	8,380	56,742	822	4,275	(4,224)	57,615	27,677	2,939	1,336	(4,224)	27,727	29,887	822	10%	48%	-5%	2,185	6%	26%
2031	8,611	57,615	842	4,339	(4,345)	58,451	27,727	3,094	1,339	(4,345)	27,815	30,636	749	9%	48%	-5%	2,319	6%	27%
2032	8,850	58,451	864	4,400	(4,462)	59,253	27,815	3,252	1,343	(4,462)	27,948	31,306	669	8%	47%	-4%	2,455	6%	28%
2033	9,098	59,253	886	4,459	(4,577)	60,022	27,948	3,343	1,349	(4,577)	28,062	31,959	654	7%	47%	-4%	2,524	3%	28%
2034	9,356	60,022	910	4,516	(4,689)	60,759	28,062	3,437	1,354	(4,689)	28,165	32,594	634	7%	46%	-4%	2,595	3%	28%
2035	9,622	60,759	935	4,570	(4,795)	61,467	28,165	3,535	1,358	(4,795)	28,263	33,205	611	6%	46%	-4%	2,669	3%	28%
2036	9,899	61,467	960	4,622	(4,896)	62,153	28,263	3,942	1,370	(4,896)	28,678	33,475	270	3%	46%	-3%	3,051	14%	31%
2037	10,186	62,153	987	4,673	(4,991)	62,822	28,678	4,139	1,393	(4,991)	29,218	33,603	128	1%	47%	-3%	3,222	6%	32%
2038	10,486	62,822	1,015	4,722	(5,079)	63,481	29,218	4,349	1,422	(5,079)	29,911	33,569	(34)	0%	47%	-2%	3,406	6%	32%
2039	10,798	63,481	1,045	4,772	(5,155)	64,142	29,911	4,479	1,457	(5,155)	30,692	33,449	(120)	-1%	48%	-2%	3,507	3%	32%
2040	11,122	64,142	1,075	4,822	(5,223)	64,816	30,692	4,613	1,497	(5,223)	31,580	33,236	(214)	-2%	49%	-2%	3,612	3%	32%
2041	11,457	64,816	1,107	4,873	(5,283)	65,513	31,580	4,752	1,543	(5,283)	32,593	32,921	(315)	-3%	50%	-2%	3,721	3%	32%
2042	11,804	65,513	1,141	4,926	(5,337)	66,243	32,593	4,896	1,595	(5,337)	33,747	32,496	(424)	-4%	51%	-1%	3,834	3%	32%
2043	12,160	66,243	1,175	4,982	(5,390)	67,010	33,747	5,044	1,654	(5,390)	35,055	31,955	(541)	-4%	52%	-1%	3,950	3%	32%
2044	12,527	67,010	1,210	5,041	(5,438)	67,824	35,055	6,386	1,751	(5,438)	37,753	30,070	(1,885)	-15%	56%	3%	5,259	33%	42%
2045	12,905	67,824	1,247	5,104	(5,485)	68,689	37,753	7,475	1,910	(5,485)	41,653	27,036	(3,034)	-24%	61%	5%	6,313	20%	49%
2046	13,294	68,689	1,285	5,171	(5,531)	69,614	41,653	9,552	2,155	(5,531)	47,828	21,786	(5,251)	-39%	69%	10%	8,355	32%	63%
2047	13,695	69,614	1,324	5,242	(5,578)	70,602	47,828	9,840	2,468	(5,578)	54,558	16,044	(5,742)	-42%	77%	9%	8,607	3%	63%
2048	14,108	70,602	1,364	5,319	(5,623)	71,662	54,558	10,137	2,810	(5,623)	61,882	9,780	(6,264)	-44%	86%	8%	8,867	3%	63%
2049	14,535	71,662	1,406	5,401	(5,667)	72,802	61,882	10,443	3,182	(5,667)	69,840	2,962	(6,818)	-47%	96%	8%	9,135	3%	63%
2050	14,975	72,802	1,450	5,489	(5,712)	74,029	69,840	10,760	3,585	(5,712)	78,473	(4,444)	(7,406)	-49%	106%	7%	9,412	3%	63%

Exhibit 3

Mississippi Retirement System 30-Year Projections

Plans included: Public Employees' Retirement System (PERS)

State contribution policy under asset shock scenario

SMMs

Fiscal Year	Pension Liability (Actuarial Accrued Liability)						Pension Assets (Market Value)					Change in Pension Debt			Cash Flow		Employer Contribution		
	Payroll	Beginning of Period	Service Cost	Interest	Benefit Payments	End of Period	Beginning of Period	Total Contribution	Interest	Benefit Payments	End of Period	Pension Debt	\$	% of Payroll	% Funded	% of Assets	\$	% Change	% Payroll
2021	6,818	47,354	692	3,584	(3,093)	48,537	27,827	1,800	(4,098)	(3,093)	22,436	26,101	6,574	96%	46%	-5%	1,186	1%	17%
2022	6,908	48,537	698	3,670	(3,235)	49,670	22,436	1,824	(2,194)	(3,235)	18,831	30,839	4,738	69%	38%	-6%	1,202	1%	17%
2023	7,008	49,670	705	4,840	(3,370)	51,845	18,831	1,996	4,544	(3,370)	22,001	29,844	(995)	-14%	42%	-7%	1,366	14%	19%
2024	7,118	51,845	743	3,893	(3,501)	52,980	22,001	2,440	2,137	(3,501)	23,077	29,902	58	1%	44%	-5%	1,799	32%	25%
2025	7,244	52,980	756	3,967	(3,592)	54,112	23,077	2,849	2,260	(3,592)	24,595	29,517	(385)	-5%	45%	-3%	2,197	22%	30%
2026	7,382	54,112	771	3,916	(3,718)	55,080	24,595	2,902	1,195	(3,718)	24,975	30,106	589	8%	45%	-3%	2,238	2%	30%
2027	7,530	55,080	783	3,982	(3,844)	56,001	24,975	2,961	1,212	(3,844)	25,303	30,698	592	8%	45%	-4%	2,283	2%	30%
2028	7,685	56,001	797	4,044	(3,970)	56,873	25,303	3,022	1,227	(3,970)	25,582	31,291	593	8%	45%	-4%	2,330	2%	30%
2029	7,847	56,873	811	4,103	(4,102)	57,686	25,582	3,085	1,239	(4,102)	25,804	31,881	590	8%	45%	-4%	2,379	2%	30%
2030	8,018	57,686	827	4,158	(4,224)	58,446	25,804	3,153	1,248	(4,224)	25,981	32,465	583	7%	44%	-4%	2,431	2%	30%
2031	8,194	58,446	843	4,208	(4,345)	59,152	25,981	3,222	1,255	(4,345)	26,113	33,038	574	7%	44%	-4%	2,484	2%	30%
2032	8,375	59,152	860	4,255	(4,462)	59,804	26,113	3,293	1,261	(4,462)	26,205	33,599	561	7%	44%	-4%	2,539	2%	30%
2033	8,563	59,804	877	4,298	(4,577)	60,402	26,205	3,634	1,270	(4,577)	26,532	33,870	271	3%	44%	-4%	2,863	13%	33%
2034	8,756	60,402	895	4,337	(4,689)	60,946	26,532	3,796	1,288	(4,689)	26,927	34,019	149	2%	44%	-3%	3,008	5%	34%
2035	8,957	60,946	914	4,372	(4,795)	61,437	26,927	3,969	1,309	(4,795)	27,409	34,028	9	0%	45%	-3%	3,163	5%	35%
2036	9,163	61,437	934	4,404	(4,896)	61,879	27,409	4,060	1,332	(4,896)	27,905	33,974	(54)	-1%	45%	-3%	3,236	2%	35%
2037	9,377	61,879	955	4,432	(4,991)	62,274	27,905	4,155	1,356	(4,991)	28,426	33,849	(125)	-1%	46%	-3%	3,311	2%	35%
2038	9,600	62,274	977	4,457	(5,079)	62,629	28,426	4,254	1,382	(5,079)	28,983	33,647	(202)	-2%	46%	-3%	3,390	2%	35%
2039	9,831	62,629	1,000	4,479	(5,155)	62,953	28,983	4,356	1,410	(5,155)	29,594	33,359	(287)	-3%	47%	-3%	3,471	2%	35%
2040	10,071	62,953	1,024	4,500	(5,223)	63,254	29,594	4,867	1,451	(5,223)	30,690	32,564	(795)	-8%	49%	-1%	3,961	14%	39%
2041	10,317	63,254	1,048	4,520	(5,283)	63,539	30,690	5,079	1,509	(5,283)	31,996	31,544	(1,021)	-10%	50%	-1%	4,151	5%	40%
2042	10,571	63,539	1,074	4,538	(5,337)	63,814	31,996	5,304	1,578	(5,337)	33,541	30,273	(1,271)	-12%	53%	0%	4,353	5%	41%
2043	10,830	63,814	1,100	4,556	(5,390)	64,081	33,541	5,435	1,657	(5,390)	35,243	28,838	(1,435)	-13%	55%	0%	4,460	2%	41%
2044	11,096	64,081	1,127	4,574	(5,438)	64,344	35,243	5,568	1,743	(5,438)	37,116	27,228	(1,610)	-15%	58%	0%	4,569	2%	41%
2045	11,367	64,344	1,155	4,592	(5,485)	64,605	37,116	5,704	1,839	(5,485)	39,173	25,431	(1,797)	-16%	61%	1%	4,681	2%	41%
2046	11,646	64,605	1,183	4,609	(5,531)	64,866	39,173	5,844	1,943	(5,531)	41,429	23,437	(1,995)	-17%	64%	1%	4,796	2%	41%
2047	11,931	64,866	1,213	4,626	(5,578)	65,127	41,429	5,987	2,058	(5,578)	43,896	21,231	(2,206)	-18%	67%	1%	4,913	2%	41%
2048	12,224	65,127	1,243	4,644	(5,623)	65,390	43,896	6,134	2,183	(5,623)	46,589	18,801	(2,430)	-20%	71%	1%	5,034	2%	41%
2049	12,524	65,390	1,274	4,662	(5,667)	65,659	46,589	6,285	2,319	(5,667)	49,526	16,133	(2,668)	-21%	75%	1%	5,157	2%	41%
2050	12,832	65,659	1,306	4,680	(5,712)	65,933	49,526	6,439	2,468	(5,712)	52,722	13,211	(2,922)	-23%	80%	1%	5,284	2%	41%

Exhibit 4

Mississippi Retirement System 30-Year Projections

Plans included: Public Employees' Retirement System (PERS)

Revenue-constrained contribution policy at assumed return (7.75%)

SMMs

Fiscal Year	Pension Liability (Actuarial Accrued Liability)						Pension Assets (Market Value)						Change in Pension Debt			Cash Flow		Employer Contribution		
	Payroll	Beginning of Period	Service Cost	Interest	Benefit Payments	End of Period	Beginning of Period	Total Contribution	Interest	Benefit Payments	End of Period	Pension Debt	\$	% of Payroll	% Funded	% of Assets	\$	% Change	% Payroll	
2021	6,818	47,354	692	3,584	(3,093)	48,537	27,827	1,808	2,096	(3,093)	28,638	19,899	372	5%	59%	-5%	1,195	2%	18%	
2022	6,908	48,537	698	3,670	(3,235)	49,670	28,638	1,851	2,155	(3,235)	29,409	20,261	363	5%	59%	-5%	1,229	3%	18%	
2023	7,046	49,670	709	3,754	(3,370)	50,762	29,409	1,899	2,211	(3,370)	30,148	20,613	352	5%	59%	-5%	1,265	3%	18%	
2024	7,197	50,762	721	3,834	(3,501)	51,815	30,148	1,949	2,265	(3,501)	30,862	20,954	340	5%	60%	-5%	1,302	3%	18%	
2025	7,365	51,815	734	3,913	(3,592)	52,871	30,862	2,002	2,319	(3,592)	31,591	21,280	327	4%	60%	-5%	1,339	3%	18%	
2026	7,546	52,871	750	3,991	(3,718)	53,894	31,591	2,070	2,373	(3,718)	32,316	21,578	298	4%	60%	-5%	1,391	4%	18%	
2027	7,740	53,894	766	4,066	(3,844)	54,881	32,316	2,140	2,426	(3,844)	33,038	21,843	265	3%	60%	-5%	1,444	4%	19%	
2028	7,943	54,881	784	4,139	(3,970)	55,834	33,038	2,211	2,480	(3,970)	33,759	22,074	231	3%	60%	-5%	1,496	4%	19%	
2029	8,156	55,834	802	4,208	(4,102)	56,742	33,759	2,279	2,533	(4,102)	34,470	22,273	198	2%	61%	-5%	1,545	3%	19%	
2030	8,380	56,742	822	4,275	(4,224)	57,615	34,470	2,348	2,586	(4,224)	35,179	22,435	163	2%	61%	-5%	1,594	3%	19%	
2031	8,611	57,615	842	4,339	(4,345)	58,451	35,179	2,419	2,638	(4,345)	35,892	22,559	124	1%	61%	-5%	1,644	3%	19%	
2032	8,850	58,451	864	4,400	(4,462)	59,253	35,892	2,492	2,692	(4,462)	36,613	22,640	81	1%	62%	-5%	1,695	3%	19%	
2033	9,098	59,253	886	4,459	(4,577)	60,022	36,613	2,567	2,746	(4,577)	37,349	22,673	33	0%	62%	-5%	1,748	3%	19%	
2034	9,356	60,022	910	4,516	(4,689)	60,759	37,349	2,644	2,801	(4,689)	38,105	22,654	(19)	0%	63%	-5%	1,802	3%	19%	
2035	9,622	60,759	935	4,570	(4,795)	61,467	38,105	2,723	2,858	(4,795)	38,890	22,577	(77)	-1%	63%	-5%	1,857	3%	19%	
2036	9,899	61,467	960	4,622	(4,896)	62,153	38,890	2,804	2,917	(4,896)	39,715	22,438	(139)	-1%	64%	-5%	1,913	3%	19%	
2037	10,186	62,153	987	4,673	(4,991)	62,822	39,715	2,885	2,980	(4,991)	40,590	22,232	(206)	-2%	65%	-5%	1,969	3%	19%	
2038	10,486	62,822	1,015	4,722	(5,079)	63,481	40,590	2,969	3,047	(5,079)	41,528	21,953	(279)	-3%	65%	-5%	2,026	3%	19%	
2039	10,798	63,481	1,045	4,772	(5,155)	64,142	41,528	3,056	3,120	(5,155)	42,548	21,593	(359)	-3%	66%	-5%	2,084	3%	19%	
2040	11,122	64,142	1,075	4,822	(5,223)	64,816	42,548	3,146	3,199	(5,223)	43,670	21,146	(448)	-4%	67%	-5%	2,145	3%	19%	
2041	11,457	64,816	1,107	4,873	(5,283)	65,513	43,670	3,238	3,286	(5,283)	44,912	20,602	(544)	-5%	69%	-5%	2,206	3%	19%	
2042	11,804	65,513	1,141	4,926	(5,337)	66,243	44,912	3,331	3,383	(5,337)	46,289	19,954	(648)	-5%	70%	-4%	2,269	3%	19%	
2043	12,160	66,243	1,175	4,982	(5,390)	67,010	46,289	3,427	3,491	(5,390)	47,817	19,194	(760)	-6%	71%	-4%	2,332	3%	19%	
2044	12,527	67,010	1,210	5,041	(5,438)	67,824	47,817	3,525	3,610	(5,438)	49,514	18,310	(884)	-7%	73%	-4%	2,398	3%	19%	
2045	12,905	67,824	1,247	5,104	(5,485)	68,689	49,514	3,626	3,743	(5,485)	51,398	17,292	(1,018)	-8%	75%	-4%	2,465	3%	19%	
2046	13,294	68,689	1,285	5,171	(5,531)	69,614	51,398	3,729	3,890	(5,531)	53,486	16,128	(1,163)	-9%	77%	-4%	2,532	3%	19%	
2047	13,695	69,614	1,324	5,242	(5,578)	70,602	53,486	3,834	4,053	(5,578)	55,794	14,808	(1,321)	-10%	79%	-3%	2,601	3%	19%	
2048	14,108	70,602	1,364	5,319	(5,623)	71,662	55,794	3,941	4,234	(5,623)	58,345	13,316	(1,491)	-11%	81%	-3%	2,671	3%	19%	
2049	14,535	71,662	1,406	5,401	(5,667)	72,802	58,345	4,051	4,433	(5,667)	61,163	11,640	(1,677)	-12%	84%	-3%	2,743	3%	19%	
2050	14,975	72,802	1,450	5,489	(5,712)	74,029	61,163	4,165	4,653	(5,712)	64,269	9,761	(1,879)	-13%	87%	-3%	2,817	3%	19%	

Exhibit 5

Mississippi Retirement System 30-Year Projections

Plans included: Public Employees' Retirement System (PERS)

Revenue-constrained contribution policy at low (5%) returns

SMMs

Fiscal Year	Pension Liability (Actuarial Accrued Liability)						Pension Assets (Market Value)					Change in Pension Debt			Cash Flow		Employer Contribution		
	Payroll	Beginning of Period	Service Cost	Interest	Benefit Payments	End of Period	Beginning of Period	Total Contribution	Interest	Benefit Payments	End of Period	Pension Debt	\$	% of Payroll	% Funded	% of Assets	\$	% Change	% Payroll
2021	6,818	47,354	692	3,584	(3,093)	48,537	27,827	1,808	1,346	(3,093)	27,889	20,648	1,121	16%	57%	-5%	1,195	2%	18%
2022	6,908	48,537	698	3,670	(3,235)	49,670	27,889	1,851	1,346	(3,235)	27,851	21,819	1,171	17%	56%	-5%	1,229	3%	18%
2023	7,046	49,670	709	3,754	(3,370)	50,762	27,851	1,899	1,342	(3,370)	27,722	23,040	1,221	17%	55%	-5%	1,265	3%	18%
2024	7,197	50,762	721	3,834	(3,501)	51,815	27,722	1,949	1,334	(3,501)	27,503	24,312	1,272	18%	53%	-6%	1,302	3%	18%
2025	7,365	51,815	734	3,913	(3,592)	52,871	27,503	2,002	1,321	(3,592)	27,235	25,636	1,324	18%	52%	-6%	1,339	3%	18%
2026	7,546	52,871	750	3,991	(3,718)	53,894	27,235	2,070	1,306	(3,718)	26,894	27,000	1,364	18%	50%	-6%	1,391	4%	18%
2027	7,740	53,894	766	4,066	(3,844)	54,881	26,894	2,140	1,287	(3,844)	26,477	28,404	1,404	18%	48%	-6%	1,444	4%	19%
2028	7,943	54,881	784	4,139	(3,970)	55,834	26,477	2,211	1,265	(3,970)	25,983	29,850	1,446	18%	47%	-7%	1,496	4%	19%
2029	8,156	55,834	802	4,208	(4,102)	56,742	25,983	2,279	1,238	(4,102)	25,399	31,343	1,493	18%	45%	-7%	1,545	3%	19%
2030	8,380	56,742	822	4,275	(4,224)	57,615	25,399	2,348	1,207	(4,224)	24,730	32,885	1,541	18%	43%	-7%	1,594	3%	19%
2031	8,611	57,615	842	4,339	(4,345)	58,451	24,730	2,419	1,172	(4,345)	23,976	34,475	1,590	18%	41%	-8%	1,644	3%	19%
2032	8,850	58,451	864	4,400	(4,462)	59,253	23,976	2,492	1,133	(4,462)	23,139	36,115	1,640	19%	39%	-8%	1,695	3%	19%
2033	9,098	59,253	886	4,459	(4,577)	60,022	23,139	2,567	1,089	(4,577)	22,218	37,804	1,689	19%	37%	-9%	1,748	3%	19%
2034	9,356	60,022	910	4,516	(4,689)	60,759	22,218	2,644	1,042	(4,689)	21,215	39,543	1,739	19%	35%	-9%	1,802	3%	19%
2035	9,622	60,759	935	4,570	(4,795)	61,467	21,215	2,723	991	(4,795)	20,134	41,334	1,791	19%	33%	-10%	1,857	3%	19%
2036	9,899	61,467	960	4,622	(4,896)	62,153	20,134	2,804	935	(4,896)	18,977	43,177	1,843	19%	31%	-10%	1,913	3%	19%
2037	10,186	62,153	987	4,673	(4,991)	62,822	18,977	2,885	877	(4,991)	17,747	45,074	1,898	19%	28%	-11%	1,969	3%	19%
2038	10,486	62,822	1,015	4,722	(5,079)	63,481	17,747	2,969	814	(5,079)	16,453	47,028	1,953	19%	26%	-12%	2,026	3%	19%
2039	10,798	63,481	1,045	4,772	(5,155)	64,142	16,453	3,056	749	(5,155)	15,103	49,039	2,011	19%	24%	-13%	2,084	3%	19%
2040	11,122	64,142	1,075	4,822	(5,223)	64,816	15,103	3,146	682	(5,223)	13,708	51,108	2,069	19%	21%	-14%	2,145	3%	19%
2041	11,457	64,816	1,107	4,873	(5,283)	65,513	13,708	3,238	612	(5,283)	12,274	53,239	2,131	19%	19%	-15%	2,206	3%	19%
2042	11,804	65,513	1,141	4,926	(5,337)	66,243	12,274	3,331	540	(5,337)	10,809	55,434	2,195	19%	16%	-16%	2,269	3%	19%
2043	12,160	66,243	1,175	4,982	(5,390)	67,010	10,809	3,427	467	(5,390)	9,313	57,697	2,263	19%	14%	-18%	2,332	3%	19%
2044	12,527	67,010	1,210	5,041	(5,438)	67,824	9,313	3,525	393	(5,438)	7,793	60,031	2,333	19%	11%	-21%	2,398	3%	19%
2045	12,905	67,824	1,247	5,104	(5,485)	68,689	7,793	3,626	317	(5,485)	6,251	62,438	2,407	19%	9%	-24%	2,465	3%	19%
2046	13,294	68,689	1,285	5,171	(5,531)	69,614	6,251	3,729	241	(5,531)	4,690	64,924	2,486	19%	7%	-29%	2,532	3%	19%
2047	13,695	69,614	1,324	5,242	(5,578)	70,602	4,690	3,834	163	(5,578)	3,108	67,494	2,570	19%	4%	-37%	2,601	3%	19%
2048	14,108	70,602	1,364	5,319	(5,623)	71,662	3,108	3,941	85	(5,623)	1,510	70,151	2,658	19%	2%	-54%	2,671	3%	19%
2049	14,535	71,662	1,406	5,401	(5,667)	72,802	1,510	4,149	8	(5,667)	0	72,802	2,651	18%	0%	-101%	2,841	6%	20%
2050	14,975	72,802	1,450	5,489	(5,712)	74,029	0	5,742	(31)	(5,712)	0	74,029	1,227	8%	0%	N/A	4,394	55%	29%

Exhibit 6

Mississippi Retirement System 30-Year Projections

Plans included: Public Employees' Retirement System (PERS)

Revenue-constrained contribution policy under asset shock scenario

SMMs

Fiscal Year	Pension Liability (Actuarial Accrued Liability)						Pension Assets (Market Value)					Change in Pension Debt			Cash Flow		Employer Contribution		
	Payroll	Beginning of Period	Service Cost	Interest	Benefit Payments	End of Period	Beginning of Period	Total Contribution	Interest	Benefit Payments	End of Period	Pension Debt	\$	% of Payroll	% Funded	% of Assets	\$	% Change	% Payroll
2021	6,818	47,354	692	3,584	(3,093)	48,537	27,827	1,786	(4,097)	(3,093)	22,423	26,114	6,587	97%	46%	-5%	1,172	0%	17%
2022	6,908	48,537	698	3,670	(3,235)	49,670	22,423	1,817	(2,192)	(3,235)	18,813	30,857	4,744	69%	38%	-6%	1,195	2%	17%
2023	7,008	49,670	705	4,840	(3,370)	51,845	18,813	1,862	4,524	(3,370)	21,827	30,018	(840)	-12%	42%	-8%	1,231	3%	18%
2024	7,118	51,845	743	3,893	(3,501)	52,980	21,827	1,908	2,094	(3,501)	22,329	30,651	633	9%	42%	-7%	1,268	3%	18%
2025	7,244	52,980	756	3,967	(3,592)	54,112	22,329	1,958	2,142	(3,592)	22,837	31,275	624	9%	42%	-7%	1,306	3%	18%
2026	7,382	54,112	771	3,916	(3,718)	55,080	22,837	2,020	1,085	(3,718)	22,225	32,856	1,581	21%	40%	-7%	1,356	4%	18%
2027	7,530	55,080	783	3,982	(3,844)	56,001	22,225	2,085	1,053	(3,844)	21,518	34,483	1,627	22%	38%	-8%	1,407	4%	19%
2028	7,685	56,001	797	4,044	(3,970)	56,873	21,518	2,150	1,016	(3,970)	20,715	36,158	1,675	22%	36%	-8%	1,459	4%	19%
2029	7,847	56,873	811	4,103	(4,102)	57,686	20,715	2,212	974	(4,102)	19,799	37,886	1,728	22%	34%	-9%	1,506	3%	19%
2030	8,018	57,686	827	4,158	(4,224)	58,446	19,799	2,276	926	(4,224)	18,777	39,669	1,782	22%	32%	-10%	1,554	3%	19%
2031	8,194	58,446	843	4,208	(4,345)	59,152	18,777	2,340	873	(4,345)	17,645	41,506	1,837	22%	30%	-11%	1,603	3%	20%
2032	8,375	59,152	860	4,255	(4,462)	59,804	17,645	2,406	815	(4,462)	16,405	43,399	1,893	23%	27%	-12%	1,653	3%	20%
2033	8,563	59,804	877	4,298	(4,577)	60,402	16,405	2,475	752	(4,577)	15,054	45,348	1,949	23%	25%	-13%	1,704	3%	20%
2034	8,756	60,402	895	4,337	(4,689)	60,946	15,054	2,545	683	(4,689)	13,594	47,352	2,005	23%	22%	-14%	1,757	3%	20%
2035	8,957	60,946	914	4,372	(4,795)	61,437	13,594	2,616	609	(4,795)	12,023	49,414	2,062	23%	20%	-16%	1,810	3%	20%
2036	9,163	61,437	934	4,404	(4,896)	61,879	12,023	2,689	529	(4,896)	10,345	51,534	2,120	23%	17%	-18%	1,865	3%	20%
2037	9,377	61,879	955	4,432	(4,991)	62,274	10,345	2,763	444	(4,991)	8,561	53,714	2,180	23%	14%	-22%	1,919	3%	20%
2038	9,600	62,274	977	4,457	(5,079)	62,629	8,561	2,839	354	(5,079)	6,675	55,954	2,241	23%	11%	-26%	1,975	3%	21%
2039	9,831	62,629	1,000	4,479	(5,155)	62,953	6,675	2,917	259	(5,155)	4,696	58,258	2,303	23%	7%	-34%	2,032	3%	21%
2040	10,071	62,953	1,024	4,500	(5,223)	63,254	4,696	2,997	160	(5,223)	2,631	60,624	2,366	23%	4%	-47%	2,091	3%	21%
2041	10,317	63,254	1,048	4,520	(5,283)	63,539	2,631	3,079	57	(5,283)	484	63,055	2,432	24%	1%	-84%	2,151	3%	21%
2042	10,571	63,539	1,074	4,538	(5,337)	63,814	484	4,861	(8)	(5,337)	0	63,814	759	7%	0%	-98%	3,910	82%	37%
2043	10,830	63,814	1,100	4,556	(5,390)	64,081	0	5,411	(21)	(5,390)	0	64,081	267	2%	0%	N/A	4,436	13%	41%
2044	11,096	64,081	1,127	4,574	(5,438)	64,344	0	5,460	(21)	(5,438)	0	64,344	263	2%	0%	N/A	4,461	1%	40%
2045	11,367	64,344	1,155	4,592	(5,485)	64,605	0	5,507	(22)	(5,485)	0	64,605	261	2%	0%	N/A	4,484	1%	39%
2046	11,646	64,605	1,183	4,609	(5,531)	64,866	0	5,554	(23)	(5,531)	0	64,866	261	2%	0%	N/A	4,505	0%	39%
2047	11,931	64,866	1,213	4,626	(5,578)	65,127	0	5,602	(23)	(5,578)	0	65,127	261	2%	0%	N/A	4,528	0%	38%
2048	12,224	65,127	1,243	4,644	(5,623)	65,390	0	5,647	(24)	(5,623)	0	65,390	263	2%	0%	N/A	4,547	0%	37%
2049	12,524	65,390	1,274	4,662	(5,667)	65,659	0	5,692	(25)	(5,667)	0	65,659	269	2%	0%	N/A	4,564	0%	36%
2050	12,832	65,659	1,306	4,680	(5,712)	65,933	0	5,737	(25)	(5,712)	0	65,933	274	2%	0%	N/A	4,582	0%	36%

Exhibit 7

State
Mississippi
Plans Included
Public Employees' Retirement System

Metrics	State Policy (Current Contribution Policy)									Sustainable Budget (Fixed % of OSR)								
	Deterministic 7.75%			Deterministic 5%			Deterministic 9%			Deterministic 7.75%			Deterministic 5%			Deterministic 9%		
	Current Plan Assumptions			Low Return			High Return			Current Plan Assumptions			Low Return			High Return		
	2025	2030	2040	2025	2030	2040	2025	2030	2040	2025	2030	2040	2025	2030	2040	2025	2030	2040
Balance Sheet Measures																		
Market Value of Assets (MVA)	32,011	36,662	48,702	27,693	27,727	31,580	34,133	42,283	69,229	31,591	35,179	43,670	27,235	24,730	13,708	33,731	40,878	64,222
Actuarial Accrued Liability (AAL)	52,871	57,615	64,816	52,871	57,615	64,816	52,871	57,615	64,816	52,871	57,615	64,816	52,871	57,615	64,816	52,871	57,615	64,816
Unfunded Actuarial Accrued Liability (UAAL)	20,860	20,953	16,114	25,178	29,887	33,236	18,738	15,332	(4,413)	21,280	22,435	21,146	25,636	32,885	51,108	19,140	16,737	594
Funded Ratio	60.5%	63.6%	75.1%	52.4%	48.1%	48.7%	64.6%	73.4%	106.8%	59.8%	61.1%	67.4%	51.5%	42.9%	21.1%	63.8%	70.9%	99.1%
AAL Compound Annual Growth Rate	2.2%	2.0%	1.6%	2.2%	2.0%	1.6%	2.2%	2.0%	1.6%	2.2%	2.0%	1.6%	2.2%	2.0%	1.6%	2.2%	2.0%	1.6%
Change in AAL from Prior Year (%)	2.0%	1.5%	1.1%	2.0%	1.5%	1.1%	2.0%	1.5%	1.1%	2.0%	1.5%	1.1%	2.0%	1.5%	1.1%	2.0%	1.5%	1.1%
Cash Flow Measures																		
Benefit Payments	3,592	4,224	5,223	3,592	4,224	5,223	3,592	4,224	5,223	3,592	4,224	5,223	3,592	4,224	5,223	3,592	4,224	5,223
Total Contributions	2,179	2,479	3,290	2,216	2,939	4,613	2,162	2,459	3,264	2,002	2,348	3,146	2,002	2,348	3,146	2,002	2,348	3,146
Negative Operating Cash Flow	1,413	1,746	1,933	1,375	1,286	609	1,430	1,765	1,958	1,589	1,876	2,077	1,589	1,876	2,077	1,589	1,876	2,077
Benefit Payments / Beginning of Period MVA	11.6%	11.8%	11.1%	13.0%	15.3%	17.0%	11.0%	10.4%	8.0%	11.6%	12.3%	12.3%	13.1%	16.6%	34.6%	11.1%	10.7%	8.6%
Operating Cash Flow to Assets Ratio	-4.5%	-4.9%	-4.1%	-5.0%	-4.6%	-2.0%	-4.4%	-4.4%	-3.0%	-5.1%	-5.4%	-4.9%	-5.8%	-7.4%	-13.7%	-4.9%	-4.8%	-3.4%
Change in MVA from Prior Year (%)	3.0%	2.6%	3.4%	-0.1%	0.2%	2.9%	4.4%	4.4%	5.8%	2.4%	2.1%	2.6%	-1.0%	-2.6%	-9.2%	3.9%	4.0%	5.4%
Own Source Revenue (OSR)	12,919	15,377	20,691	12,919	15,377	20,691	12,919	15,377	20,691	12,919	15,377	20,691	12,919	15,377	20,691	12,919	15,377	20,691
OSR Compound Annual Growth Rate	2.7%	3.1%	3.1%	2.7%	3.1%	3.1%	2.7%	3.1%	3.1%	2.7%	3.1%	3.1%	2.7%	3.1%	3.1%	2.7%	3.1%	3.1%
Change in OSR from Prior Year (%)	2.9%	3.2%	2.9%	2.9%	3.2%	2.9%	2.9%	3.2%	2.9%	2.9%	3.2%	2.9%	2.9%	3.2%	2.9%	2.9%	3.2%	2.9%
Employer Contributions / OSR	11.7%	11.2%	11.1%	12.0%	14.2%	17.5%	11.6%	11.1%	10.9%	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%
Total Contributions / OSR	16.9%	16.1%	15.9%	17.2%	19.1%	22.3%	16.7%	16.0%	15.8%	15.5%	15.3%	15.2%	15.5%	15.3%	15.2%	15.5%	15.3%	15.2%
Payment and Contribution Measures																		
Employer Contributions (ERC)	1,516	1,725	2,289	1,553	2,185	3,612	1,499	1,705	2,263	1,339	1,594	2,145	1,339	1,594	2,145	1,339	1,594	2,145
Change in ERC from Prior Year (%)	5.4%	2.7%	3.0%	7.2%	6.4%	3.0%	4.6%	2.7%	3.0%	2.9%	3.2%	2.9%	2.9%	3.2%	2.9%	2.9%	3.2%	2.9%
Employee Contributions (EEC)	663	754	1,001	663	754	1,001	663	754	1,001	663	754	1,001	663	754	1,001	663	754	1,001
Payroll	7,365	8,380	11,122	7,365	8,380	11,122	7,365	8,380	11,122	7,365	8,380	11,122	7,365	8,380	11,122	7,365	8,380	11,122
Employer Contribution / Payroll	20.6%	20.6%	20.6%	21.1%	26.1%	32.5%	20.4%	20.3%	20.3%	18.2%	19.0%	19.3%	18.2%	19.0%	19.3%	18.2%	19.0%	19.3%
Employee Contribution / Payroll	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%
Total Contributions / Payroll	29.6%	29.6%	29.6%	30.1%	35.1%	41.5%	29.4%	29.3%	29.3%	27.2%	28.0%	28.3%	27.2%	28.0%	28.3%	27.2%	28.0%	28.3%
Normal Cost	734	822	1,075	734	822	1,075	734	822	1,075	734	822	1,075	734	822	1,075	734	822	1,075
Net amortization \$	(108)	91	976	(328)	(55)	1,080	(0)	441	2,370	(308)	(142)	476	(568)	(845)	(1,651)	(183)	234	1,900
Net amortization \$ / Payroll	-1.5%	1.1%	8.8%	-4.5%	-0.7%	9.7%	0.0%	5.3%	21.3%	-4.2%	-1.7%	4.3%	-7.7%	-10.1%	-14.8%	-2.5%	2.8%	17.1%
Investment Performance																		
Compounded Annual Growth - From Start Date	7.75%	7.75%	7.75%	5.00%	5.00%	5.00%	9.00%	9.00%	9.00%	7.75%	7.75%	7.75%	5.00%	5.00%	5.00%	9.00%	9.00%	9.00%
Compounded Annual Growth - Segments	7.75%	7.75%	7.75%	5.00%	5.00%	5.00%	9.00%	9.00%	9.00%	7.75%	7.75%	7.75%	5.00%	5.00%	5.00%	9.00%	9.00%	9.00%

Note: Dollar Figures in Millions

Exhibit 7

State
Mississippi
Plans Included
Public Employees' Retirement System

Metrics	State Policy (Current Contribution Policy)									Sustainable Budget (Fixed % of OSR)								
	Stochastic Run - Baseline CMA									Stochastic Run - Baseline CMA								
	25th Percentile			50th Percentile			75th Percentile			25th Percentile			50th Percentile			75th Percentile		
	2025	2030	2040	2025	2030	2040	2025	2030	2040	2025	2030	2040	2025	2030	2040	2025	2030	2040
Balance Sheet Measures																		
Market Value of Assets (MVA)	24,696	24,481	30,138	29,698	31,814	40,444	35,277	41,341	55,753	24,121	20,513	9,217	29,139	28,501	21,994	34,779	39,049	43,933
Actuarial Accrued Liability (AAL)	53,328	58,121	63,178	53,754	58,187	63,053	54,025	58,391	63,312	53,328	58,121	63,178	53,754	58,187	63,053	54,025	58,391	63,312
Unfunded Actuarial Accrued Liability (UAAL)	28,632	33,640	33,040	24,056	26,374	22,609	18,748	17,050	7,559	29,207	37,608	53,961	24,615	29,686	41,059	19,246	19,342	19,379
Funded Ratio	46.3%	42.1%	47.7%	55.2%	54.7%	64.1%	65.3%	70.8%	88.1%	45.2%	35.3%	14.6%	54.2%	49.0%	34.9%	64.4%	66.9%	69.4%
AAL Compound Annual Growth Rate	2.4%	2.1%	1.5%	2.6%	2.1%	1.4%	2.7%	2.1%	1.5%	2.4%	2.1%	1.5%	2.6%	2.1%	1.4%	2.7%	2.1%	1.5%
Change in AAL from Prior Year (%)	2.0%	1.4%	0.5%	2.3%	1.3%	0.5%	2.2%	1.3%	0.5%	2.0%	1.4%	0.5%	2.3%	1.3%	0.5%	2.2%	1.3%	0.5%
Cash Flow Measures																		
Benefit Payments	3,592	4,224	5,223	3,592	4,224	5,223	3,592	4,224	5,223	3,592	4,224	5,223	3,592	4,224	5,223	3,592	4,224	5,223
Total Contributions	2,251	3,085	4,900	2,229	2,789	4,132	2,175	2,567	3,235	1,967	2,278	3,285	1,976	2,277	3,206	1,975	2,302	3,105
Negative Operating Cash Flow	1,340	1,139	323	1,362	1,435	1,091	1,417	1,657	1,988	1,625	1,946	1,938	1,615	1,947	2,017	1,616	1,923	2,117
Benefit Payments / Beginning of Period MVA	13.9%	16.7%	17.6%	12.1%	13.2%	13.4%	10.7%	10.4%	9.7%	14.1%	19.0%	46.7%	12.2%	14.4%	22.5%	10.8%	10.9%	12.0%
Operating Cash Flow to Assets Ratio	-5.2%	-4.5%	-1.1%	-4.6%	-4.5%	-2.8%	-4.2%	-4.1%	-3.7%	-6.4%	-8.8%	-17.3%	-5.5%	-6.6%	-8.7%	-4.8%	-5.0%	-4.9%
Change in MVA from Prior Year (%)	-4.1%	-3.0%	1.6%	-0.2%	-0.5%	3.8%	5.0%	2.0%	3.3%	-5.3%	-7.7%	-17.6%	-1.2%	-2.9%	-5.1%	4.4%	1.0%	1.3%
Own Source Revenue (OSR)	12,742	15,120	20,968	12,806	15,121	20,700	12,808	15,273	20,953	12,742	15,120	20,968	12,806	15,121	20,700	12,808	15,273	20,953
OSR Compound Annual Growth Rate	2.4%	3.0%	3.1%	2.5%	3.0%	3.1%	2.5%	3.1%	3.1%	2.4%	3.0%	3.1%	2.5%	3.0%	3.1%	2.5%	3.1%	3.1%
Change in OSR from Prior Year (%)	2.8%	3.1%	3.0%	2.7%	3.2%	3.0%	2.9%	3.0%	3.1%	2.8%	3.1%	3.0%	2.7%	3.2%	3.0%	2.9%	3.0%	3.1%
Employer Contributions / OSR	12.6%	15.7%	19.0%	12.3%	13.8%	15.6%	11.9%	12.1%	11.1%	10.4%	10.4%	11.3%	10.4%	10.4%	11.1%	10.4%	10.4%	10.5%
Total Contributions / OSR	17.7%	20.4%	23.4%	17.4%	18.4%	20.0%	17.0%	16.8%	15.4%	15.4%	15.1%	15.7%	15.4%	15.1%	15.5%	15.4%	15.1%	14.8%
Payment and Contribution Measures																		
Employer Contributions (ERC)	1,605	2,374	3,985	1,581	2,080	3,225	1,528	1,849	2,320	1,321	1,567	2,369	1,328	1,568	2,298	1,328	1,583	2,191
Change in ERC from Prior Year (%)	9.5%	8.0%	5.9%	7.3%	4.7%	3.8%	5.9%	4.0%	2.0%	2.8%	3.1%	5.4%	2.7%	3.2%	5.0%	2.9%	3.0%	3.9%
Employee Contributions (EEC)	646	711	915	648	709	907	647	718	915	646	711	915	648	709	907	647	718	915
Payroll	7,177	7,899	10,169	7,205	7,882	10,080	7,193	7,983	10,164	7,177	7,899	10,169	7,205	7,882	10,080	7,193	7,983	10,164
Employer Contribution / Payroll	22.4%	30.1%	39.2%	21.9%	26.4%	32.0%	21.2%	23.2%	22.8%	18.4%	19.8%	23.3%	18.4%	19.9%	22.8%	18.5%	19.8%	21.6%
Employee Contribution / Payroll	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%
Total Contributions / Payroll	31.4%	39.1%	48.2%	30.9%	35.4%	41.0%	30.2%	32.2%	31.8%	27.4%	28.8%	32.3%	27.4%	28.9%	31.8%	27.5%	28.8%	30.6%
Normal Cost	732	811	1,036	742	812	1,027	749	825	1,035	732	811	1,036	742	812	1,027	749	825	1,035
Net amortization \$	(450)	(59)	1,516	(188)	139	1,435	24	522	1,603	(766)	(1,123)	(1,544)	(472)	(589)	(709)	(203)	109	674
Net amortization \$ / Payroll	-6.3%	-0.7%	14.9%	-2.6%	1.8%	14.2%	0.3%	6.5%	15.8%	-10.7%	-14.2%	-15.2%	-6.6%	-7.5%	-7.0%	-2.8%	1.4%	6.6%
Investment Performance																		
Compounded Annual Growth - From Start Date	2.8%	3.8%	4.5%	6.3%	6.3%	6.2%	9.7%	8.7%	8.0%	2.8%	3.8%	4.5%	6.3%	6.3%	6.2%	9.7%	8.7%	8.0%
Compounded Annual Growth - Segments	2.8%	4.8%	5.2%	6.3%	6.2%	6.2%	9.7%	7.7%	7.2%	2.8%	4.8%	5.2%	6.3%	6.2%	6.2%	9.7%	7.7%	7.2%

Note: Dollar Figures in Millions

Exhibit 7

State

Mississippi

Plans Included

Public Employees' Retirement System

Metrics	State Policy (Current Contribution Policy)						Sustainable Budget (Fixed % of OSR)					
	Deterministic			Deterministic			Deterministic			Deterministic		
	"Low-for-long" Economic Scenario			"Asset Shock" Economic Scenario			"Low-for-long" Economic Scenario			"Asset Shock" Economic Scenario		
	2025	2030	2040	2025	2030	2040	2025	2030	2040	2025	2030	2040
Balance Sheet Measures												
Market Value of Assets (MVA)	26,990	26,630	28,381	24,595	25,981	30,690	26,537	23,555	10,081	22,837	18,777	2,631
Actuarial Accrued Liability (AAL)	52,651	56,701	60,567	54,112	58,446	63,254	52,651	56,701	60,567	54,112	58,446	63,254
Unfunded Actuarial Accrued Liability (UAAL)	25,660	30,072	32,185	29,517	32,465	32,564	26,114	33,146	50,486	31,275	39,669	60,624
Funded Ratio	51.3%	47.0%	46.9%	45.5%	44.5%	48.5%	50.4%	41.5%	16.6%	42.2%	32.1%	4.2%
AAL Compound Annual Growth Rate	2.1%	1.8%	1.2%	2.7%	2.1%	1.5%	2.1%	1.8%	1.2%	2.7%	2.1%	1.5%
Change in AAL from Prior Year (%)	1.9%	1.2%	0.3%	2.1%	1.3%	0.5%	1.9%	1.2%	0.3%	2.1%	1.3%	0.5%
Cash Flow Measures												
Benefit Payments	3,592	4,224	5,223	3,592	4,224	5,223	3,592	4,224	5,223	3,592	4,224	5,223
Total Contributions	2,188	2,890	4,547	2,849	3,153	4,867	1,976	2,275	2,939	1,958	2,276	2,997
Negative Operating Cash Flow	1,403	1,334	676	743	1,072	355	1,616	1,950	2,284	1,634	1,949	2,225
Benefit Payments / Beginning of Period MVA	13.2%	15.8%	18.9%	15.6%	16.4%	17.6%	13.3%	17.3%	44.1%	16.1%	21.3%	111.2%
Operating Cash Flow to Assets Ratio	-5.2%	-5.0%	-2.4%	-3.2%	-4.2%	-1.2%	-6.0%	-8.0%	-19.3%	-7.3%	-9.8%	-47.4%
Change in MVA from Prior Year (%)	-0.6%	-0.2%	2.4%	6.6%	0.7%	3.7%	-1.5%	-3.3%	-14.9%	2.3%	-5.2%	-44.0%
Own Source Revenue (OSR)	12,793	15,078	19,896	12,594	14,989	20,170	12,793	15,078	19,896	12,594	14,989	20,170
OSR Compound Annual Growth Rate	2.5%	2.9%	2.9%	2.2%	2.9%	2.9%	2.5%	2.9%	2.9%	2.2%	2.9%	2.9%
Change in OSR from Prior Year (%)	2.7%	3.0%	2.7%	3.0%	3.2%	2.9%	2.7%	3.0%	2.7%	3.0%	3.2%	2.9%
Employer Contributions / OSR	12.0%	14.5%	18.5%	17.4%	16.2%	19.6%	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%
Total Contributions / OSR	17.1%	19.2%	22.9%	22.6%	21.0%	24.1%	15.4%	15.1%	14.8%	15.5%	15.2%	14.9%
Payment and Contribution Measures												
Employer Contributions (ERC)	1,539	2,179	3,671	2,197	2,431	3,961	1,326	1,563	2,063	1,306	1,554	2,091
Change in ERC from Prior Year (%)	7.5%	6.3%	5.4%	22.1%	2.2%	14.1%	2.7%	3.0%	2.7%	3.0%	3.2%	2.9%
Employee Contributions (EEC)	649	712	876	652	722	906	649	712	876	652	722	906
Payroll	7,215	7,906	9,732	7,244	8,018	10,071	7,215	7,906	9,732	7,244	8,018	10,071
Employer Contribution / Payroll	21.3%	27.6%	37.7%	30.3%	30.3%	39.3%	18.4%	19.8%	21.2%	18.0%	19.4%	20.8%
Employee Contribution / Payroll	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%
Total Contributions / Payroll	30.3%	36.6%	46.7%	39.3%	39.3%	48.3%	27.4%	28.8%	30.2%	27.0%	28.4%	29.8%
Normal Cost	720	775	941	756	827	1,024	720	775	941	756	827	1,024
Net amortization \$	(375)	(78)	1,209	(82)	18	1,480	(614)	(897)	(1,689)	(1,062)	(1,343)	(2,329)
Net amortization \$ / Payroll	-5.2%	-1.0%	12.4%	-1.1%	0.2%	14.7%	-8.5%	-11.3%	-17.4%	-14.7%	-16.7%	-23.1%
Investment Performance												
Compounded Annual Growth - From Start Date	4.6%	4.8%	4.9%	3.0%	4.0%	4.5%	4.6%	4.8%	4.9%	3.0%	4.0%	4.5%
Compounded Annual Growth - Segments	4.6%	5.0%	5.0%	3.0%	5.0%	5.0%	4.6%	5.0%	5.0%	3.0%	5.0%	5.0%

Note: Dollar Figures in Millions