Appendices

Public Employees' Retirement System of Mississippi

State of the Plan

December 19, 2017

This page left blank intentionally.

Table of Contents

Appendix A | PERS Funding Policy and Objectives

In 2012, the PERS Board revised its funding policy to provide a funded ratio of at least 80 percent in 2042 while reducing the volatility in the contribution rate. The current policy follows:

The purpose of the funding policy is to state the overall funding goals for the PERS, the benchmarks that will be used to measure progress in achieving those goals, and the methods and assumptions that will be employed to develop the benchmarks.

I. Funding Goals

The objective in requiring employer and member contributions to the System is to accumulate sufficient assets during a member's employment to fully finance the benefits the member receives throughout retirement. In meeting this objective, the System will strive to meet the following funding goals:

- To maintain an increasing ratio of system assets to accrued liabilities and reach an 80 percent minimum funded ratio in 2042;
- To maintain adequate asset levels to finance the benefits promised to members;
- To develop a pattern of stable contribution rates when expressed as a percentage of member payroll as measured by valuations prepared in accordance with the principles of practice prescribed by the Actuarial Standards Board, with a minimum employer contribution equal to the normal cost determined under the Entry Age Normal funding method;
- To provide intergenerational equity for taxpayers with respect to System costs; and
- To fund benefit improvements through increases in contribution rates in accordance with Article 14, § 272A, of the Mississippi Constitution.

II. Benchmarks

To track progress in achieving the previously outlined funding goals, the following benchmarks will be measured annually as of the actuarial valuation date (with due recognition that a single year's results may not be indicative of long-term trends):

- **Funded ratio** – The funded ratio, defined as the actuarial value of System assets divided by the System's actuarial accrued liability, should be increasing over time, before adjustments for changes in benefits, actuarial methods, and/or actuarial assumptions, with a target of at least 80 percent in 2042. If the projected funded ratio is less than 60 percent in 2042 or if the projected funded ratio is projected to be less than 75 percent in 2042 following two consecutive annual actuarial valuations, a contribution rate increase will be determined that is sufficient to generate a funded ratio of 85 percent in 2042. If a funded ratio of 100 percent or more is attained, and is projected to remain above 100 percent for the ensuing 30 years following two consecutive annual

actuarial valuations, a reduced contribution pattern will be established provided the projected funded ratio remains at or above 100 percent in every future year.

- **Contribution rate history** – Employer and member contribution rates should be level from year to year when expressed as a percent of active member payroll unless the projected funded ratio reaches a level that triggers a change in contribution rates. The initial employer contribution rates for the Public Employees' Retirement System of Mississippi (PERS) and the Supplemental Legislative Retirement Plan (SLRP) set under this policy as revised October 23, 2012, will be 15.75 percent and 7.40 percent, respectively, of active member payroll effective July 1, 2013.
- **Unfunded Actuarial Accrued Liability (UAAL) amortization period** – The amortization period for the System's UAAL should be declining over time.

III. Methods and Assumptions

The actuarial funding method used to develop the benchmarks will be entry age normal. The method used to develop the actuarial value of assets will recognize the underlying market value of the assets by spreading each year's unanticipated investment income (gains and losses) over a five-year smoothing period (20 percent per year), as adopted by the Board.

The actuarial assumptions used will be those last adopted by the Board based upon the advice and recommendation of the System's actuary. The actuary shall conduct an investigation into the system's experience at least every two years on a rolling four-year basis, and utilize the results of the investigation to form the basis for those recommendations.

The Board will have an audit of the System's actuarial valuation results conducted by an independent actuary at least every five years. The purpose of such a review is to provide a critique of the reasonableness of the actuarial methods and assumptions in use and the resulting actuarially computed liabilities and contribution rates.

IV. Funding Policy Review

The funding policy components and triggers will be reviewed annually following the annual actuarial valuation and in conjunction with the annual projection report and will be amended as necessary following each experience investigation conducted by the Board.

Appendix B | PERS Retirement Tiers

Retirement Tier	Hire/ Entry Date	Vesting Period	Retirement Eligibility	Service Retirement Formula	PLSO* Eligibility	Non-Duty-Related Disability Retirement**
Tier 1	June 30, 1992, or earlier	4 years	25 years at any age or age 60 and vested	2 percent per year for up to 25 years, plus 2.5 percent per year for each year over 25; Minimum monthly benefit under Maximum Retirement Allowance Option of $10 per month for each year of service	28 years at any age or age 63 and vested	Age-Limited Plan, unless elected coverage under Tiered Disability Plan
Tier 2	July 1, 1992, through June 30, 2007	4 years	25 years at any age or age 60 and vested	2 percent per year for up to 25 years, plus 2.5 percent per year for each year over 25; Minimum monthly benefit under Maximum Retirement Allowance Option of $10 per month for each year of service	28 years at any age or age 63 and vested	Tiered Disability Plan
Tier 3	July 1, 2007, through June 30, 2011	8 years	25 years at any age or age 60 and vested	2 percent per year for up to 25 years, plus 2.5 percent per year for each year over 25; Minimum monthly benefit under Maximum Retirement Allowance Option of $10 per month for each year of service	28 years at any age	Tiered Disability Plan
Tier 4	July 1, 2011, or later	8 years	30 years at any age or age 60 and vested	2 percent per year for up to 30 years, plus 2.5 percent per year for each year over 30, with an actuarial reduction for each year of creditable service below 30 or for each year in age below age 65, whichever is less; No minimum monthly benefit	33 years at any age	Tiered Disability Plan

STATE OF MISSISSIPPI

JIM HOOD
ATTORNEY GENERAL

September 14, 2011

Public Employees Retirement System Study Commission
Care of Governor Haley Barbour
P.O. Box 139
Jackson, MS 39205
Hand Delivered, New State Capitol, Room 216

Re: Changes to State Contractual Obligations

Dear Commission Members:

I would like to remind you that, whatever changes might be considered or recommended by the PERS Study Commission, the law requires the State to honor the commitment it has made to hundreds of thousands of retirees, employees and their dependents.

Attached for your review is my Official opinion to the executive director of the system, Pat Robertson, dated February 22, 2010. Citing two Supreme Court decisions as well as the U.S. and Mississippi Constitutions, this opinion makes it clear that employees acquire contractual rights at the time the employees join PERS, and that such rights may not be impaired. Existing employee and retiree benefits may not be reduced without a matching increase in benefits elsewhere. I hope that any recommendations by the Commission and any proposed legislation will be within the lawful power of the State to take.

I appreciate your efforts to find ways to preserve and protect the state's retirement system. I ask that you keep in the forefront of considerations the dedicated men and women of this state who have devoted their working lives to the State of Mississippi, its cities, counties and schools, in return for Mississippi's promise of certain benefits for them and their families in their retirement years.

Sincerely yours,

Jim Hood
Attorney General

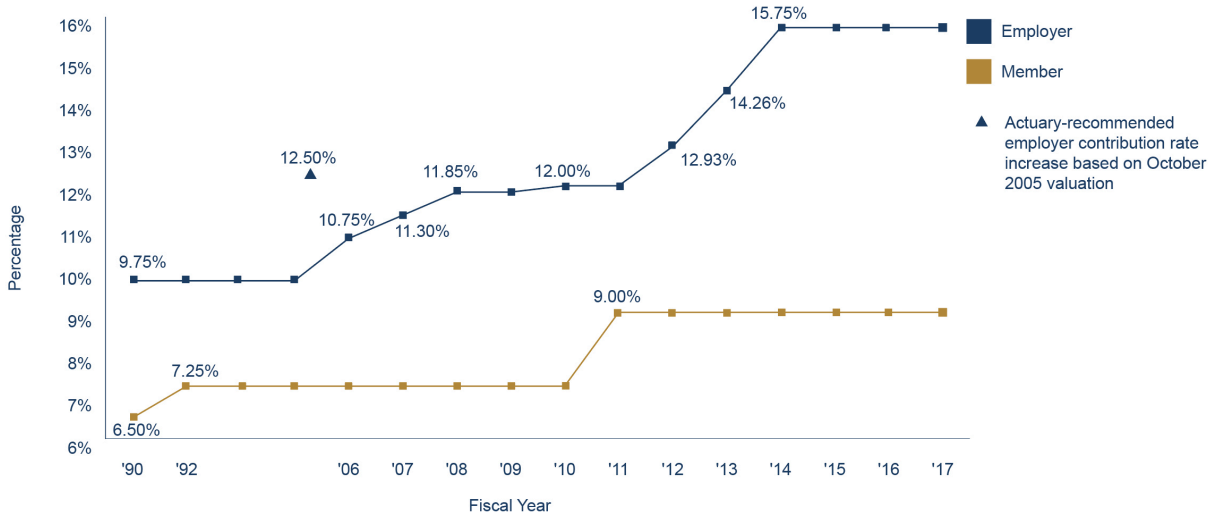
cc: Mississippi State Senate
Mississippi House of Representatives

WALTER SILLERS BUILDING • POST OFFICE BOX 220 • JACKSON, MISSISSIPPI 39205-0220
TELEPHONE (601) 359-3680 • TELEFAX (601) 359-3441

Appendix D | PERS Contribution Rate History

PERS Contribution Rate Change History

Source: PERS Actuarial Valuation Report



Effective Date	1/1/90 *FY '90*	7/1/91 *FY '92*	7/1/05 *FY '06*	7/1/06 *FY '07*	7/1/07 *FY '08*	7/1/09 *FY '10*	7/1/10 *FY '11*	1/1/12 *FY '12*	7/1/12 *FY '13*	7/1/13 *FY '14*
Employer Rate	9.75%	9.75%	10.75%	11.30%	11.85%	12.00%	12.00%	12.93%	14.26%	15.75%
Member Rate	6.50%	7.25%	7.25%	7.25%	7.25%	7.25%	9.00%	9.00%	9.00%	9.00%

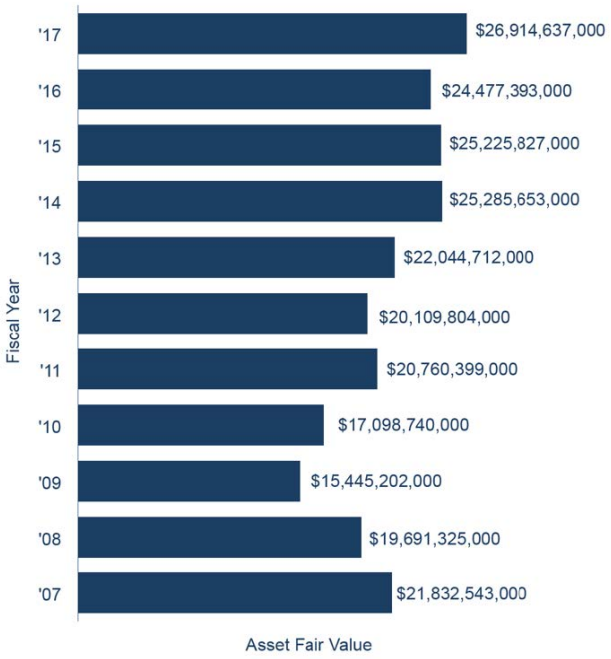
Appendix E | Normal Cost since 1998

	FY 1998	FY 2003	FY 2008	FY 2013	FY 2019
Member Normal Cost	7.25%	7.25%	7.25%	9.00%	8.06%
Employer Normal Cost	2.76%	4.23%	4.02%	2.07%	1.24%
Total Normal Cost	**10.01%**	**11.48%**	**11.27%**	**11.07%**	**9.30%**

Appendix F | PERS Present and Past Investment Performance

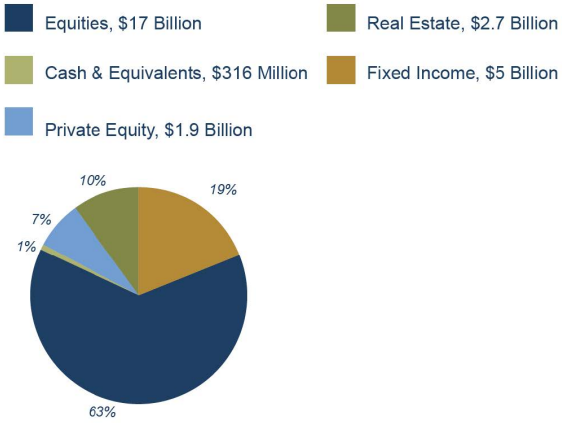
Source: PERS Facts & Figures, As of June 30, 2017

Investment Assets FY 2007 – FY 2017



Investment Asset Allocation – FY 2017

Total Investment Assets for all Systems as of June 30, 2017 = **$26.9 Billion**

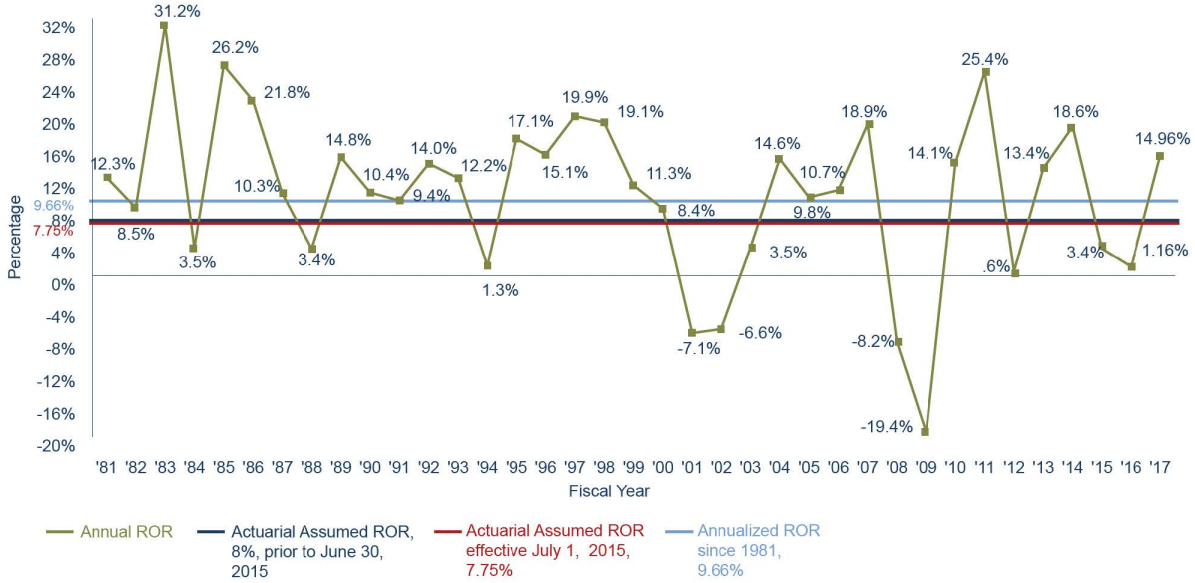


Number of Portfolios: 55

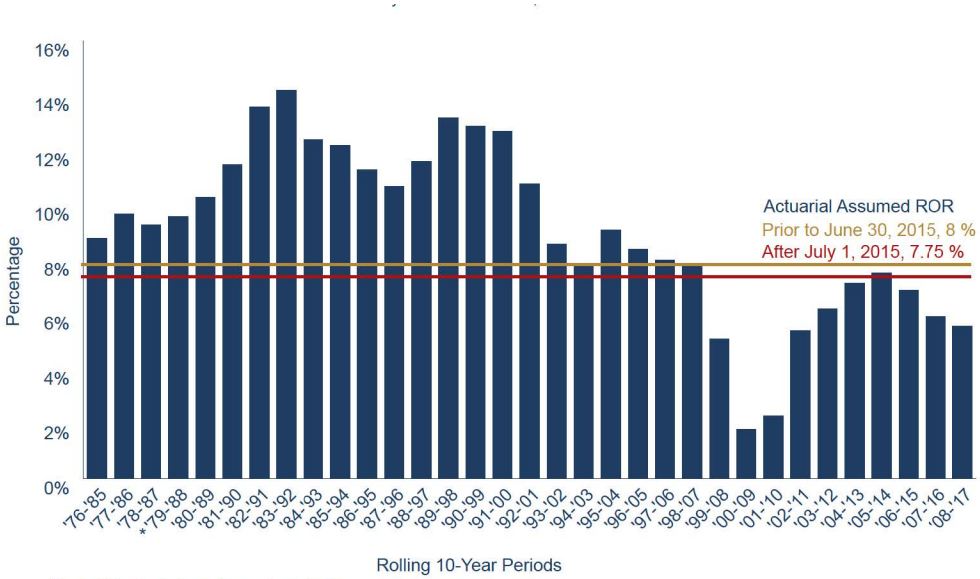
Number of Portfolio Managers: 40

Annual Rates of Return since FY 1981

PERS began equity investments in August 1980. This chart demonstrates the volatility in the markets and the need to focus on the long term.



Investment Annualized Rates of Return



*Calculated - Actual data not available

Historical Returns
as of June 30, 2017

1-Year	14.96%
3 -Year	6.34%
5 -Year	10.08%
10 -Year	5.58%
20 -Year	6.73%
25 -Year	7.94%
30-Year	8.34%

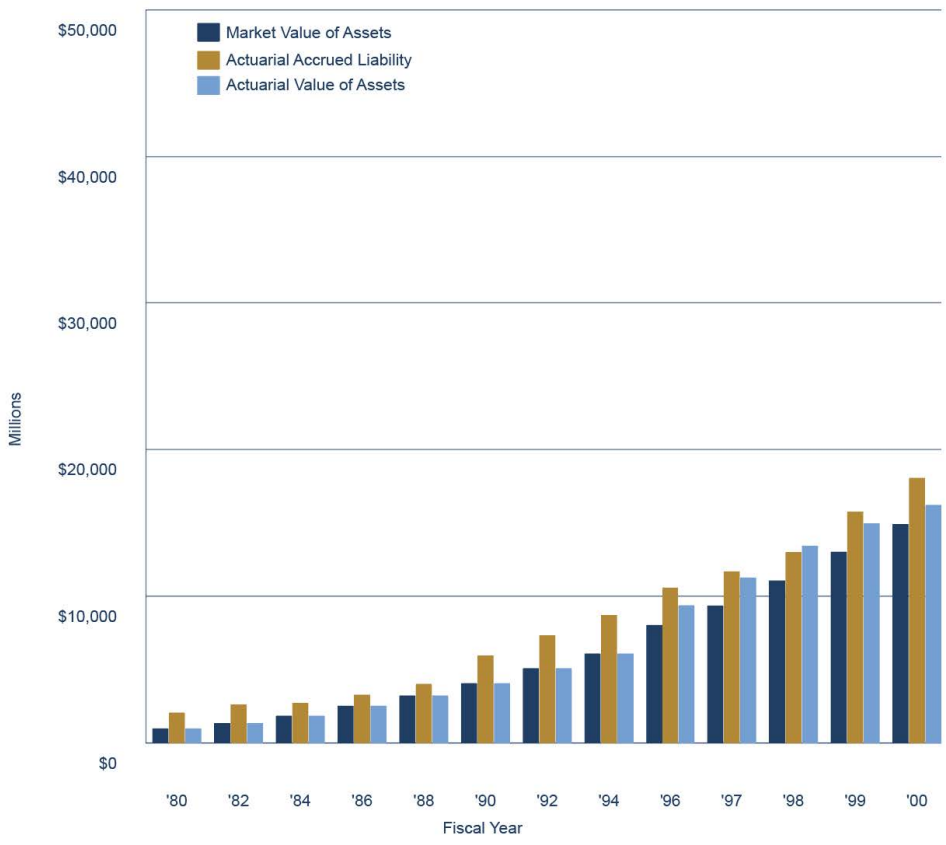
Appendix G | Overview of PERS Performance since 2010

Fiscal Year	2010	2011	2012	2013	2014	2015	2016	2017
Annual Average Benefit with COLA	$18,930	$19,585	$20,185	$20,781	$21,372	$21,968	$22,607	$23,223
Number of Retirees	79,168	83,115	86,829	90,214	93,504	96,338	99,483	102,260
Total Benefits Paid	$1.6 billion	$1.7 billion	$1.9 billion	$2.0 billion	$2.1 billion	$2.2 billion	$2.4 billion	$2.5 billion
Number of Active Members	164,896	161,676	162,311	161,744	161,360	157,215	154,104	152,382
Member Contribution Rate	7.25%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%
Number of Employers	869	872	870	873	871	868	862	861
Employer Contribution Rate	12.00%	12.00%	12.93%	14.26%	15.75%	15.75%	15.75%	15.75%
Total Contributions	$1.2 billion	$1.3 billion	$1.3 billion	$1.4 billion	$1.5 billion	$1.6 billion	$1.6 billion	$1.6 billion
Net Investment Income	$2.1 billion	$4.2 billion	$60.0 million	$2.6 billion	$3.9 billion	$827.7 million	$130.9 million	$3.4 billion
Rate of Return	14.1%	25.4%	0.6%	13.4%	18.6%	3.4%	1.15%	14.96%
Total Net Assets	$16.8 billion	$20.4 billion	$19.8 billion	$21.7 billion	$24.9 billion	$24.9 billion	$24.1 billion	$26.5 billion
Unfunded Accrued Liability	$11.3 billion	$12.3 billion	$14.5 billion	$15.1 billion	$14.4 billion	$16.0 billion	$16.8 billion	$16.8 billion
Actuarial Funded Status	64.2%	62.2%	58.0%	57.7%	61.0%	60.4%	60.0%	61.1%

Appendix H | PERS Funded Status History

Accrued Liability: The actuarial present value of the plan's pension obligations as determined by the entry-age normal actuarial cost method.

Unfunded Accrued Liability: The difference between the actuarial accrued liability and valuation of assets.

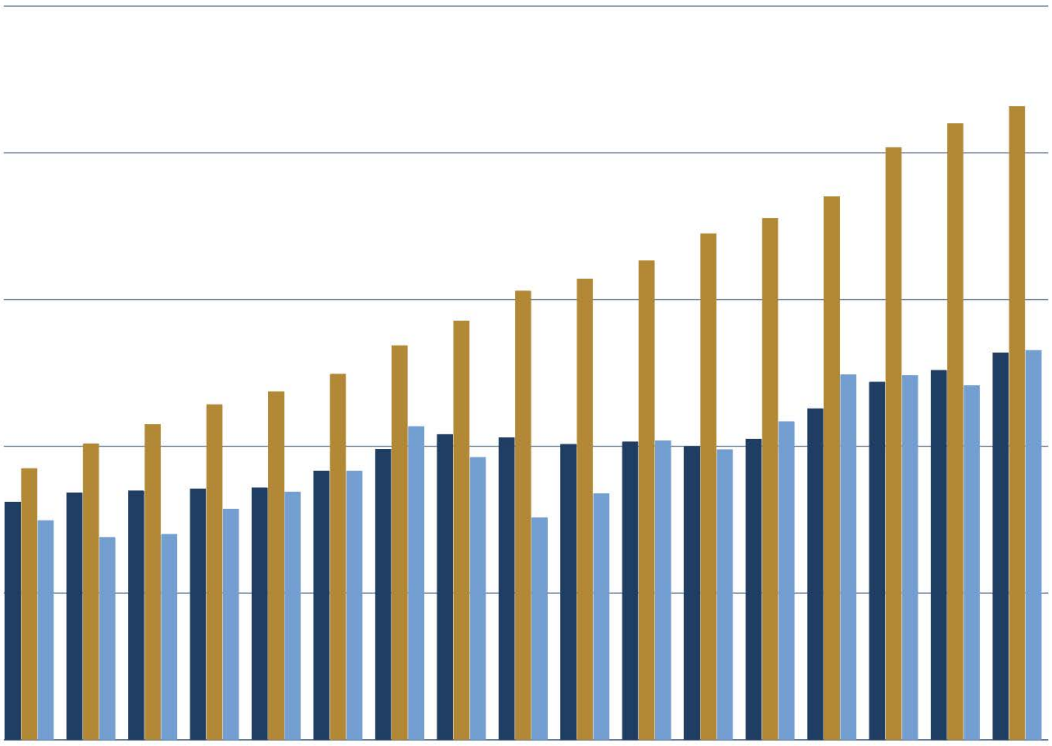


	'80	'82	'84	'86	'88	'90	'92	'94	'96	'97	'98	'99	'00
Actuarial Value Funded Ratio	48%	51%	68%	77%	80%	68%	69%	70%	76%	80%	85%	83%	83%
Market Value Funded Ratio*	48%	51%	68%	77%	80%	68%	69%	70%	89%	96%	103%	95%	90%
Funding Period (Years)	29.0	26.0	17.0	14.0	17.0	29.0	30.0	32.5	19.4	13.4	9.8	15.5	17.4
Actuarially Determined Employer Contributions***	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Percent Employer Contributions	8.00%	8.75%	8.75%	8.75%	8.75%	9.75%	9.75%	9.75%	9.75%	9.75%	9.75%	9.75%	9.75%
Percent Employee Contributions	5.50%	5.50%	6.00%	6.00%	6.00%	6.50%	7.25%	7.25%	7.25%	7.25%	7.25%	7.25%	7.25%
Accrued Liability (In Billions)	$2.1	$2.6	$2.7	$3.3	$4.0	$5.9	$7.3	$8.7	$10.6	$11.7	$13.0	$15.8	$18.1
Unfunded Accrued Liability (In Billions)	$1.1	$1.3	$0.9	$0.8	$0.8	$1.9	$2.2	$2.6	$2.5	$2.3	$1.9	$2.7	$3.2

* *Assets are recorded at book value prior to 1995*

** *Actuarial Assumed ROR effective July, 2015, 7.75%*

*** *Formerly Actuarial Required Contribution*



	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11	'12	'13	'14	'15**	'16	'17
Fiscal Year																	
	88%	83%	79%	75%	72%	73%	74%	73%	67%	64%	62%	58%	58%	61%	60%	60%	61%
	81%	68%	65%	69%	71%	73%	79%	67%	49%	53%	62%	57%	61%	67%	62%	58%	62%
	12.6	22.5	32.7	36.6	28.4	28.7	29.3	29.4	30.0	30.0	30.0	30.0	32.2	29.2	33.9	36.6	38.4
	100%	100%	100%	100%	100%	100%	90%	97%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	9.75%	9.75%	9.75%	9.75%	9.75%	10.75%	11.30%	11.85%	11.85%	12.00%	12.00%	12.93%	14.26%	15.75%	15.75%	15.75%	15.75%
	7.25%	7.25%	7.25%	7.25%	7.25%	7.25%	7.25%	7.25%	7.25%	7.25%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%
	$18.5	$20.2	$21.5	$22.8	$23.7	$24.9	$26.9	$28.5	$30.6	$31.4	$32.7	$34.5	$35.5	$37.0	$40.4	$42.0	$43.2
	$2.3	$3.4	$4.5	$5.7	$6.5	$6.6	$7.1	$7.7	$10.0	$11.3	$12.3	$14.5	$15.1	$14.4	$16.0	$16.8	$16.8

Cavanaugh Macdonald
CONSULTING, LLC
The experience and dedication you deserve

PERS
of MISSISSIPPI

ANALYSIS OF THE FUNDED STATUS CHANGES TO THE

PUBLIC EMPLOYEES' RETIREMENT SYSTEM OF MISSISSIPPI

FROM JUNE 30, 1998 TO JUNE 30, 2016

www.CavMacConsulting.com

Cavanaugh Macdonald
CONSULTING, LLC
The experience and dedication you deserve

March 6, 2017

Board of Trustees
Public Employees' Retirement System of Mississippi
429 Mississippi Street
Jackson, MS 39201-1005

Ladies and Gentlemen:

As requested, we have prepared this report to analyze the changes in the actuarial funding position of the Public Employees' Retirement System of Mississippi (PERS) from June 30, 1998 to June 30, 2016.

This study was based on the financial information contained in the 19 actuarial valuation reports dating from June 30, 1998 through June 30, 2016.

The undersigned are members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

Respectfully submitted,

Edward A. Macdonald, ASA, FCA, MAAA
President

Edward J. Koebel, EA, FCA, MAAA
Principal and Consulting Actuary

Jonathan T. Craven, ASA, EA, FCA, MAAA
Consulting Actuary

EAM/EJK/JTC:kc

3550 Busbee Pkwy, Suite 250, Kennesaw, GA 30144
Phone (678) 388-1700 • Fax (678) 388-1730
www.CavMacConsulting.com
Offices in Englewood, CO • Kennesaw, GA • Bellevue, NE

TABLE OF CONTENTS

ANALYSIS OF THE FUNDED STATUS CHANGES TO THE PUBLIC EMPLOYEES' RETIREMENT SYSTEM OF MISSISSIPPI FROM JUNE 30, 1998 TO JUNE 30, 2016

SECTION I – INTRODUCTION AND METHODOLOGY

This report was conducted at the request of the PERS Board in order to better understand the changes in the Unfunded Actuarial Accrued Liability (UAAL) that have occurred to the System between June 30, 1998 and June 30, 2016. In 1998, the PERS plan was 85% funded on an actuarial value basis (103% on a market value basis) with a UAAL of $1.9 Billion. Today, the plan is 60% funded on an actuarial value basis (58% on a market value basis) with a UAAL of $16.8 Billion.

Actuarial accrued liabilities are the portion of the present value of expected future benefits not covered by future normal cost contributions. If actuarial accrued liabilities at any time are less than the plan's accrued assets, the plan has a surplus. If actuarial accrued liabilities at any time exceed the plan's accrued assets, the difference is called an Unfunded Actuarial Accrued Liability (UAAL). This is a common condition. The existence of a UAAL is not bad, but the changes from year to year are important and should be monitored.

Each time a plan adds a new benefit which applies to service already rendered, or if actual financial experience is less favorable than assumed or actuarial assumptions are strengthened, a UAAL is created. Payments for such UAAL are typically spread over a period of years, called an amortization period. Each time one of these have occurred, PERS has added or subtracted this amount from the initial UAAL. The focal point of this study is to determine the primary sources of growth in the UAAL since 1998.

It should be noted that we did not review contribution deficiency or contribution surplus as a source for changes in the UAAL. Minimum recommended contributions were made or exceeded for all but two of the eighteen years studied. We determined this source to be negligible.

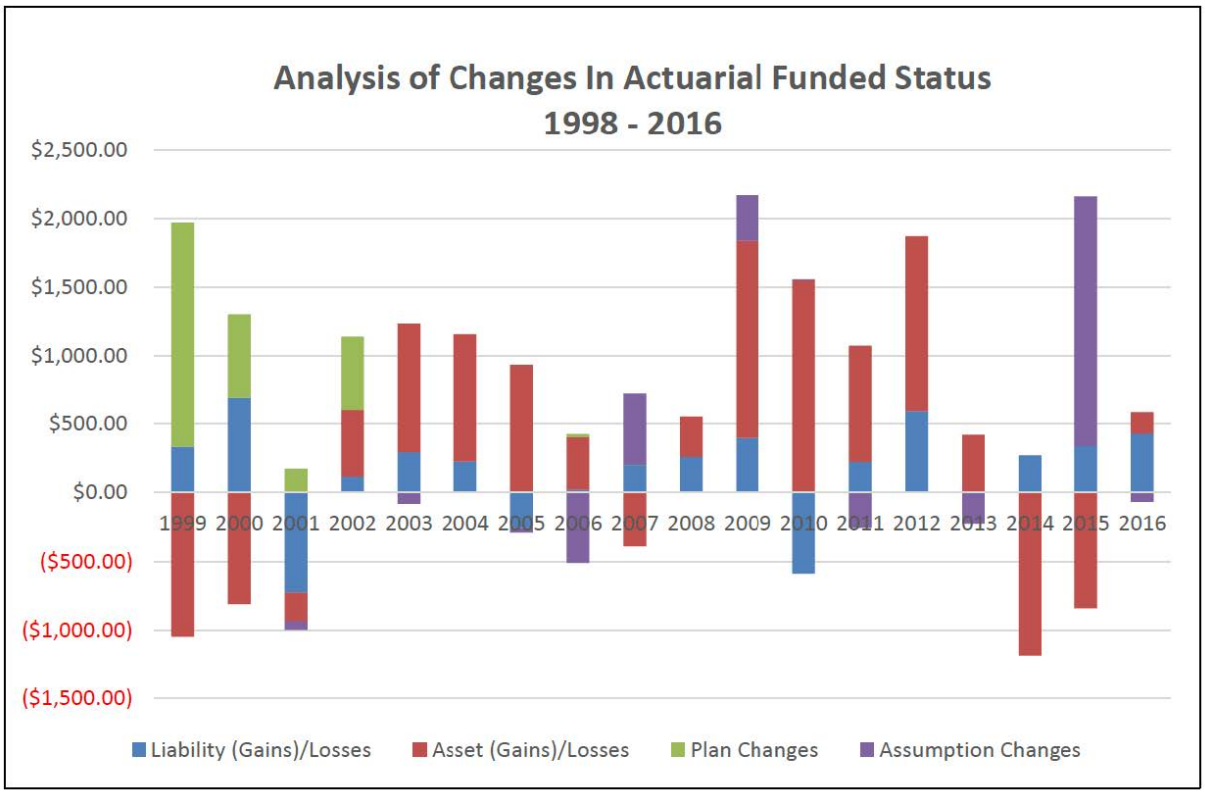
The items we did consider in the study are:

- Membership Data
- Initial Unfunded Actuarial Accrued Liability (UAAL)
- Benefit Changes
- Assumption/Methodology Changes
- Asset Gains and Losses
- Liability and Other Gains and Losses
- Funded Status and Contribution Metrics

We started with the initial UAAL as of June 30, 1998 and rolled it forward to today by applying the assumed long term investment return each year and subtracting the contributions made each year to the System that exceeded the normal cost of the System (those contributions assumed to pay off the UAAL). Each year during this period, experience gains and losses (both liability and asset), plan changes and assumption changes contributed to the growth or decline in the UAAL.

Below is a table summary and graph of all the liability and asset changes, plan changes and assumption changes that occurred since 1998 and the present value of these changes as of June 30, 2016 (a description of each change is explained in more detail later in the report):

Valuation Year	Liability (Gains)/Losses Initial Amount ($ in Millions)	Asset (Gains)/Losses Initial Amount ($ in Millions)	Plan Changes Initial Amount ($ in Millions)	Assumption Changes Initial Amount ($ in Millions)
1999	$335.3	$(1,047.2)	$1,633.8	$0.0
2000	697.9	(809.5)	605.5	0.0
2001	(726.5)	(209.1)	175.1	(60.1)
2002	116.8	485.1	539.4	0.0
2003	295.5	939.2	0.0	(81.2)
2004	228.8	931.1	0.0	0.0
2005	(254.6)	937.0	0.0	(34.6)
2006	20.1	384.0	23.5	(511.1)
2007	203.0	(390.4)	1.1	523.8
2008	259.3	293.3	0.0	0.0
2009	397.1	1,439.6	0.0	331.5
2010	(588.8)	1,552.5	0.0	6.0
2011	223.1	851.5	0.0	(255.6)
2012	591.4	1,280.2	0.0	0.0
2013	4.7	416.8	0.0	(226.1)
2014	270.8	(1,183.8)	0.0	0.0
2015	339.6	(841.3)	0.0	1,821.2
2016	429.2	155.2	0.0	(66.6)
Total	**$2,842.6**	**$5,184.2**	**$2,978.4**	**$1,447.2**
Present Value as of June 30, 2016	**$3,190.6**	**$6,315.1**	**$3,676.3**	**$1,441.3**



From the valuation date each of these gains or losses were experienced, the impact on the UAAL was rolled forward to today using the same methodology as the initial UAAL. The contribution amount that exceeded the normal cost of the System was prorated by the size of the base and applied to each change accordingly.

In the sections that follow, we will review the impact on each of these changes and summarize the proportion to the existing UAAL as of June 30, 2016.

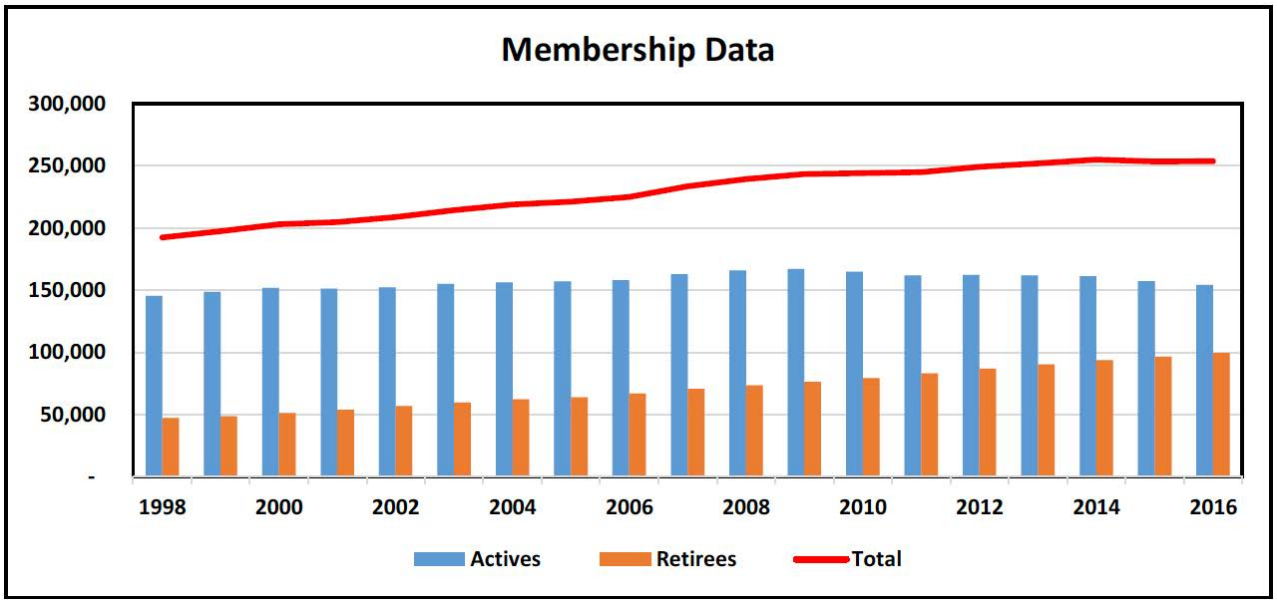
SECTION II – MEMBERSHIP DATA

A comparison of the June 30, 1998 membership counts and the June 30, 2016 membership counts can be seen in the following table:

	1998	2016	Change	% Change
Actives	145,321	154,104	8,783	+ 6.0%
Retirees	47,086	99,483	52,397	+ 111.3%
Total	192,407	253,587	61,180	+ 31.8%
A/R Ratio	3.09	1.55	(1.54)	- 49.9%

The membership counts show a definitive maturation of the System. The active counts increased only 6.0% over the 18 year period but the retiree counts increased by 111.3%. This maturation is also evident in the active/retiree (A/R) ratio which decreased from 3.09 (over 3 actives per retiree) to 1.55 (just over 1.5 actives per retiree). The A/R ratio is an important indicator because contributions to the System are based on active employee payroll. Maturation of the System has an enormous impact on cash flow. Simply put, money is contributed to the System for actives but is taken out of the System for retirees.

The following graph shows the changes in membership counts over the study period:



The following table shows a comparison of June 30, 1998 and June 30, 2016 payroll, contributions and benefit amount information:

	1998	2016	Change	% Change
Compensation ($ million)	3,450.2	6,022.5	2,572.3	+ 74.6%
Average Compensation ($)	23,742	39,081	15,339	+ 64.6%
Total Contribution Rate	17.00%	24.75%	7.75%	+ 45.6%
Total Contributions ($ million)	620.0	1,593.8	973.8	+ 257.1%
Benefit Payments ($ million)	484.7	2,249.0	1,764.3	+ 364.0%
Average Benefit Payment ($)	10,293	22,607	12,314	+ 119.6%

The information in this table also shows evidence of System maturation. Total compensation has increased by 74.6% but total benefit payments have increased by 364.0%. Average compensation has increased 64.6% over the study period for an average of 2.8% per year while the average benefit amount has increased 119.6% over the study period for an average increase of 4.5% per year.

The law governing PERS financing intends that over time the current contributions from the employee and employer will be sufficient to fully finance the benefits the member will receive in retirement. The actuary is directly responsible for determining this contribution rate to support the benefits for each member. The goal is to develop a level cost design for intergenerational equity with respect to System costs. An inevitable by-product of this level cost design is the accumulation of reserve assets. Investment income then becomes a second contributor for benefits to employees and is directly related to the contribution amount from the employer.

This can be seen in the table above. In 1998, contributions to the plan exceeded benefit payments but as PERS has matured, it is relying more and more on invested assets to make up for the difference between the negative cash flow (contributions minus benefit payments) occurring in 2016.

Later on this report, we will discuss the growth in the Entry Age Accrued Liability during this period. These membership changes and the maturation of the System have driven the increase in the Accrued Liability amounts.

SECTION III – ITEMS CONSIDERED

Initial UAAL

The UAAL as of June 30, 1998 was $1,945,461,228. We rolled this amount forward to today by applying the assumed long term investment return each year and subtracting the prorated share of contributions made each year to the System that exceeded the normal cost of the System (those contributions assumed to pay off the UAAL). This base has grown to $2,189,102,107 as of June 30, 2016. As is the design of the level percentage of payroll amortization methodology, contributions made to the base in the first 18 years have been less than the interest accruals and therefore the initial base has actually grown by 12.5% over this period.

Benefit Changes

The changes in benefits that occurred during the study period are summarized in the following table:

	1998	2016	Change	% Change
Multiplier < = 25 YOS	1.875%	2.000%	0.125%	+ 6.7%
Multiplier > 25 YOS	2.000%	2.500%	0.500%	+ 25.0%
COLA	CPI	3.0%	N/A	N/A
Maximum COLA	2.5%	3.0%	0.5%	+ 20.0%
Discretionary COLA from Gains	Yes	No	N/A	N/A

The majority of the significant benefit enhancements were made during the 1999-2002 period. This period includes the end of the 1982-2000 bull market in equities. It is important to note that none of these benefit enhancements were funded through increases to contribution rates. The benefit changes, grouped by effective date, are listed below:

June 30, 1999

- Benefit accrual rate increased from 2.00% to 2.25% for all years of benefit service over 25 for current and future retirees,
- Base Cost of Living Adjustment (COLA) increased to 3% simple up to age 55 and 3% compounded after age 55,
- Reemployed retiree COLA will be based on all fiscal years in retirement, not just the fiscal years in retirement since the last retirement, and

- COLA will be prorated and paid to the beneficiary of a retiree or beneficiary who is receiving the COLA in a lump sum and who dies between July 1 and December 1.

June 30, 2000

- Benefit accrual rate increased from 1.875% to 2.00% for all years of service over 10 and less than 25 for current and future retirees.

June 30, 2001

- Benefit accrual rate increased from 1.875% to 2.00% for all years of service over 5 and less than 25 for current and future retirees.

June 30, 2002

- Benefit accrual rate increased from 1.875% to 2.00% for all years of service up to and including 25 and from 2.25% to 2.50% for all years of service over 25 for current and future retirees,
- The maximum compensation cap was increased to $150,000,
- Provided for free active duty military service for pre-1972 service in the Commissioned Corps of the U.S. Public Health Service for those retiring on or after July 1, 2002,
- Reemployed retiree who has previously been retired for at least one full fiscal year no longer has to wait another full fiscal year for his or her COLA to resume, and
- A local county or municipal elected official who is receiving retirement benefits may receive a salary for the elected position that does not exceed 25% of the retiree's average compensation.

June 30, 2008

- The maximum reportable earned compensation was increased from $150,000 to $230,000 to coincide with the compensation limit set pursuant to Section 401(a)(17) of the Internal Revenue Code, and
- The vesting requirement for those employees hired after July 1, 2007 was increased from 4 to 8 years of service.

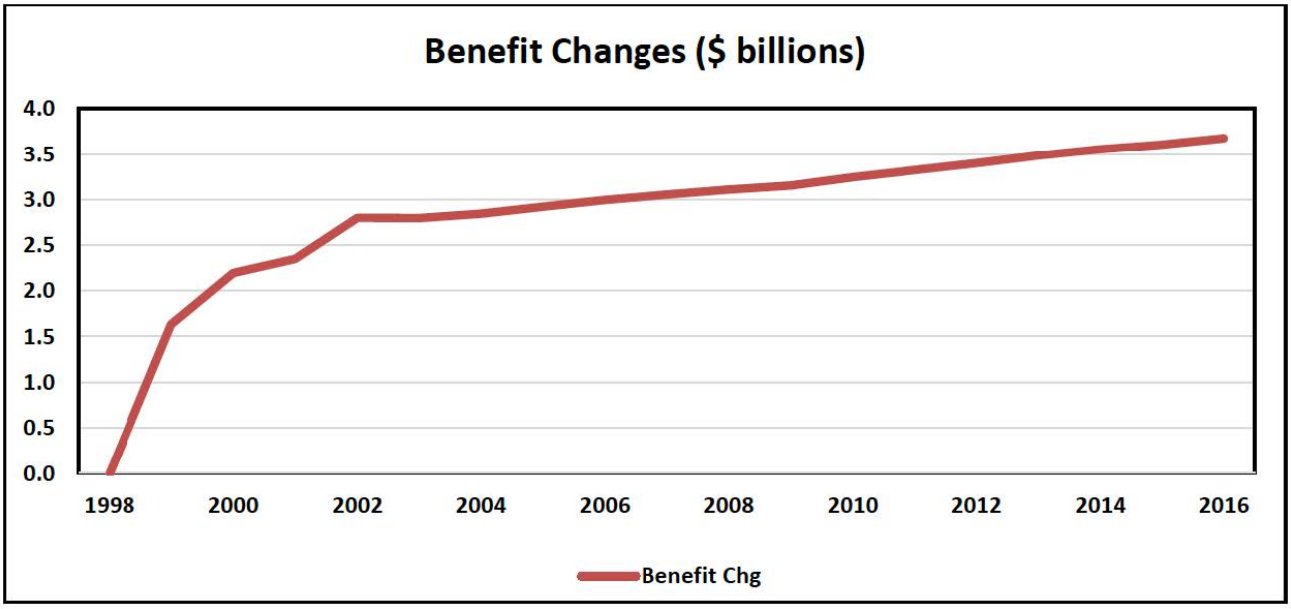
June 30, 2009

- The maximum reportable earned compensation was increased from $230,000 to $245,000 to coincide with the compensation limit set pursuant to Section 401(a)(17) of the Internal Revenue Code.

The following table shows the year of the enhancement, the initial UAAL impact and the remaining impact rolled forward to June 30, 2016:

Year	Initial UAAL ($) millions	UAAL as of 2016 ($) millions
1999	$1,633.8	$1,973.0
2000	605.5	752.0
2001	175.1	219.5
2002	539.4	702.7
2008	23.5	27.8
2009	1.1	1.3
Total	$2,978.4	$3,676.3

The total UAAL due to benefit enhancements shown in the table during the study period using our methodology is $3,676,281,041 and represents approximately 22% of the total UAAL as of June 30, 2016 of $16,812,434,711. The following chart shows the growth of the unfunded liability due to benefit changes over the study period.

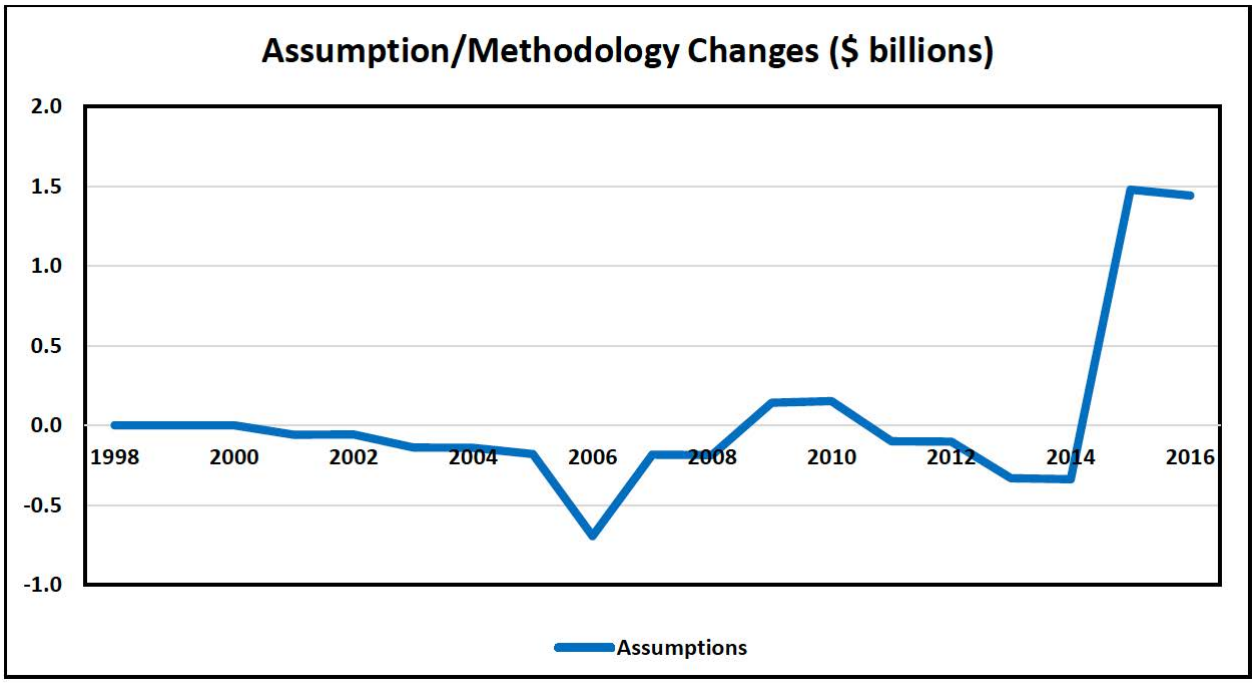


Assumption/Methodology Changes

Due to our review of the actuarial assumptions every two years (on a four year basis), there were several assumption changes during the 18-year study period that either increased or decreased liabilities. Most of the assumption changes throughout the period were minor changes in the demographic assumptions. However, one major change that occurred as of the June 30, 2015 valuation was the decrease in the assumed investment return from 8.00% to 7.75%. This increased the UAAL by $1.8 billion.

There was also a change in the asset smoothing method in 2006 which decreased the UAAL by $511.1 million. This change was a mark to market reset of the asset smoothing method with the addition of an 80% – 120% corridor around the market value of assets. This reset resulted in a reduction in the minimum required contribution amount as well as a reduction in the UAAL amortization period.

The cumulative impact of all assumption and methodology changes to the UAAL during this 18-year period as of June 30, 2016 is $1,441,273,161 or approximately 9% of the total June 30, 2016 UAAL of $16,812,434,711. The following chart shows the growth of the unfunded liability due to assumption changes over the study period.

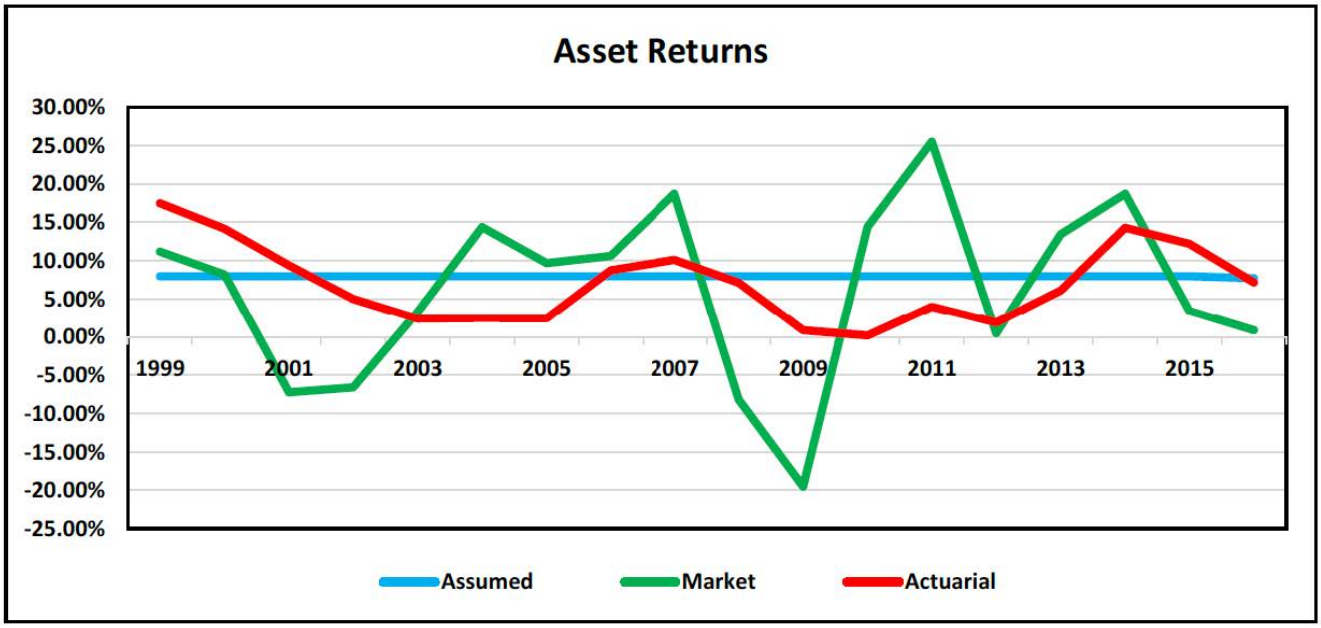


Asset Gains and Losses

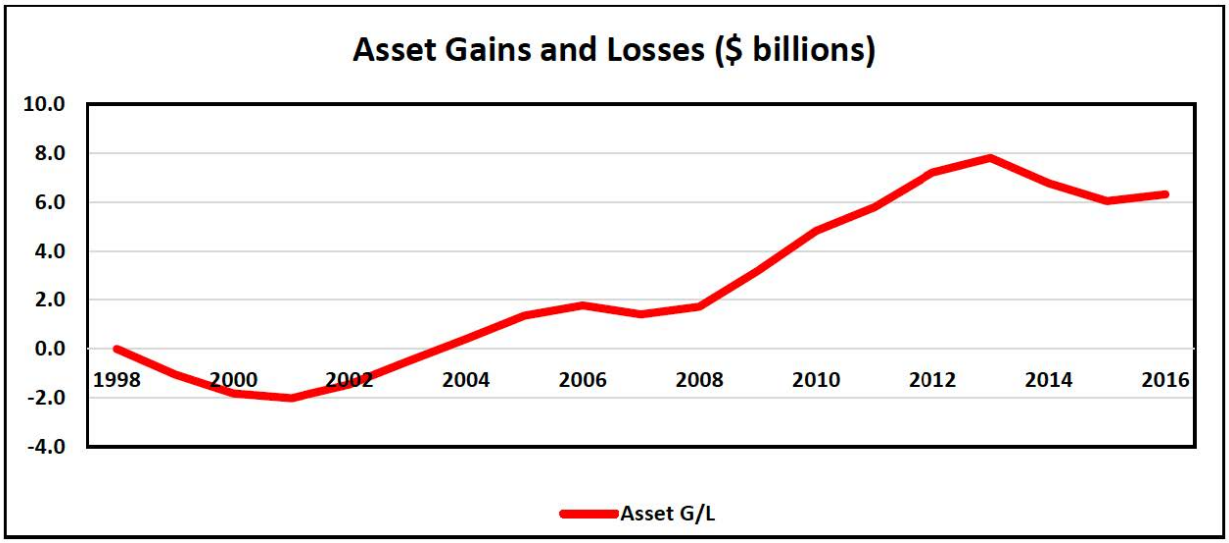
Asset gains and losses are produced when the actual asset returns do not match the expected return assumption. We use a smoothed market related asset value for funding valuations, which we call the actuarial value of assets. The expected return assumption was 8.00% for the first 17 years of the study and then it changed to 7.75% in the last valuation. The geometric mean of the returns over the entire period from 1998 to 2016 are shown in the following table:

	Assumed	Market	Actuarial
Geometric Mean Return	7.99%	5.60%	4.67%

The following chart show the expected return, market return and actuarial return over the 18-year study period:



The losses due to asset performance have been fairly substantial over the 18-year study period. The increase in UAAL as of June 30, 2016 due to asset losses is $6,315,107,355 or approximately 37% of the June 30, 2016 total UAAL. The following chart shows the change in the unfunded liability due to asset gains and losses over the study period.

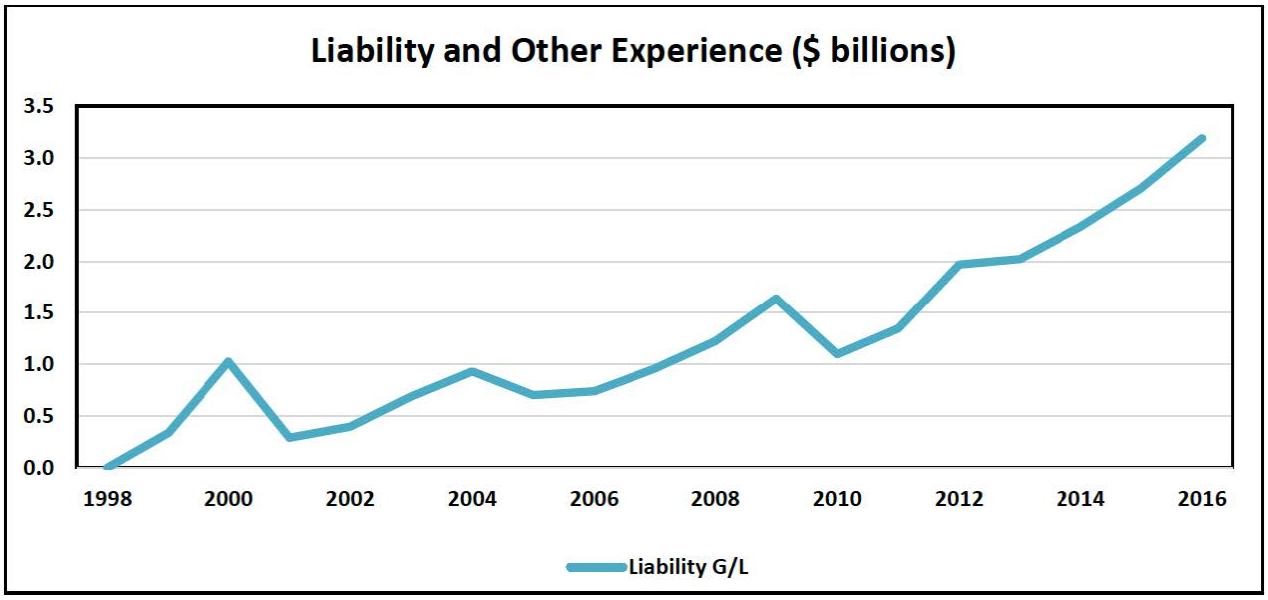


Liability and Other Gains and Losses

Gains and losses due to demographic experience were also tabulated as shown in Section I. An experience gain or loss is the measure of the difference between actual experience and what was expected based upon a set of actuarial assumptions during the period between two actuarial valuation dates. Some examples of such differences are as follows:

Type of Activity	Experience Effect
Age & Service Retirements	If members retire at older ages, there is a gain. If members retire at younger ages, there is a loss.
Withdrawal From Employment	If members terminate employment more than assumed, there is a gain. If members terminate employment less than assumed, there is a loss.
Pay Increases	If there are smaller pay increases than assumed, there is a gain. If greater pay increases than assumed, there is a loss.
Death After Retirement	If retirees live longer than assumed, there is a loss. If not as long, there is a gain.

Other gains and losses include changes to the UAAL due to contribution amounts being more or less than the actuarially determined contribution amount. The cumulative impact of liability and other gains and losses to the UAAL as of June 30, 2016 is $3,190,671,048 or approximately 19% of the total June 30, 2016 UAAL of $16,812,434,711. The following chart shows the change in the unfunded liability due liability and other gains and losses over the study period.



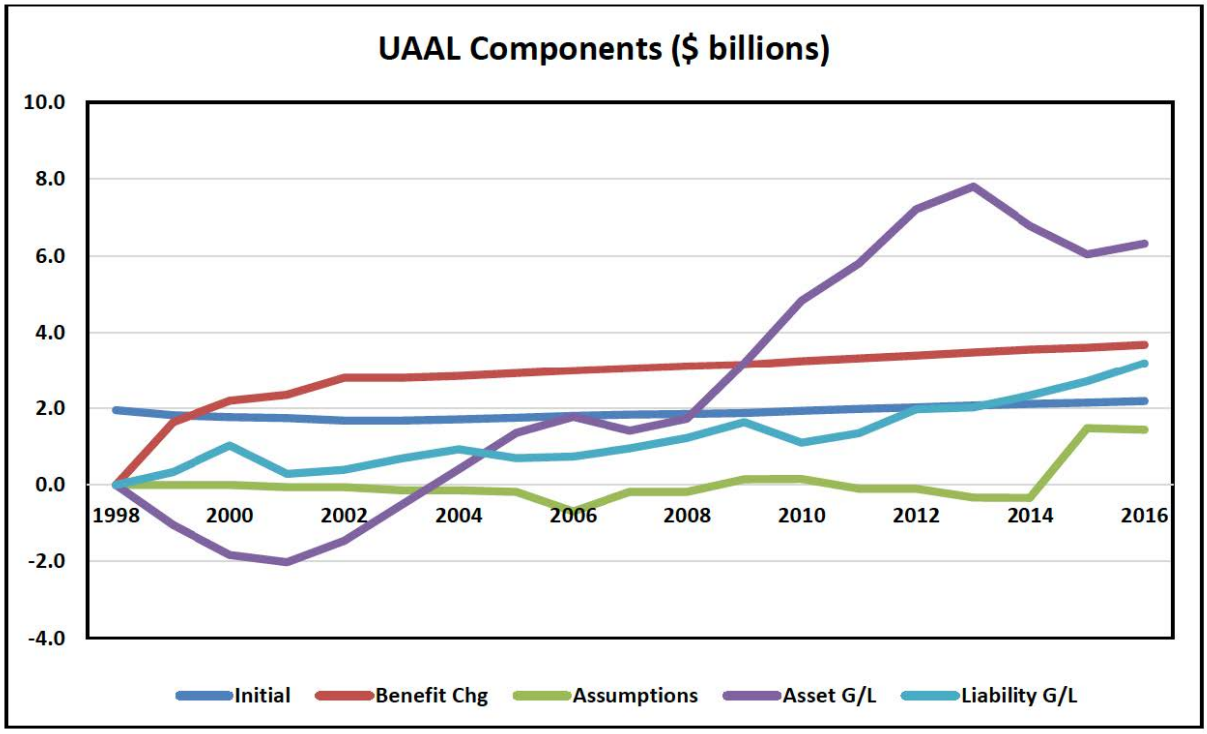
A more detailed graph of liability and asset experience for each year can be found in the appendix.

Valuation and Contribution Metrics

The Entry Age Accrued Liability (EAAL) is the liability due to past service under the entry age normal actuarial cost method, which is used for the PERS valuations. The EAAL increased by 223% over the 18 year period from $13.0 billion to $42.0 billion. However, the actuarial value of assets increased by only 128% during the same period which caused the UAAL to increase substantially (764%). The following table shows a comparison between the 1998 and 2016 results:

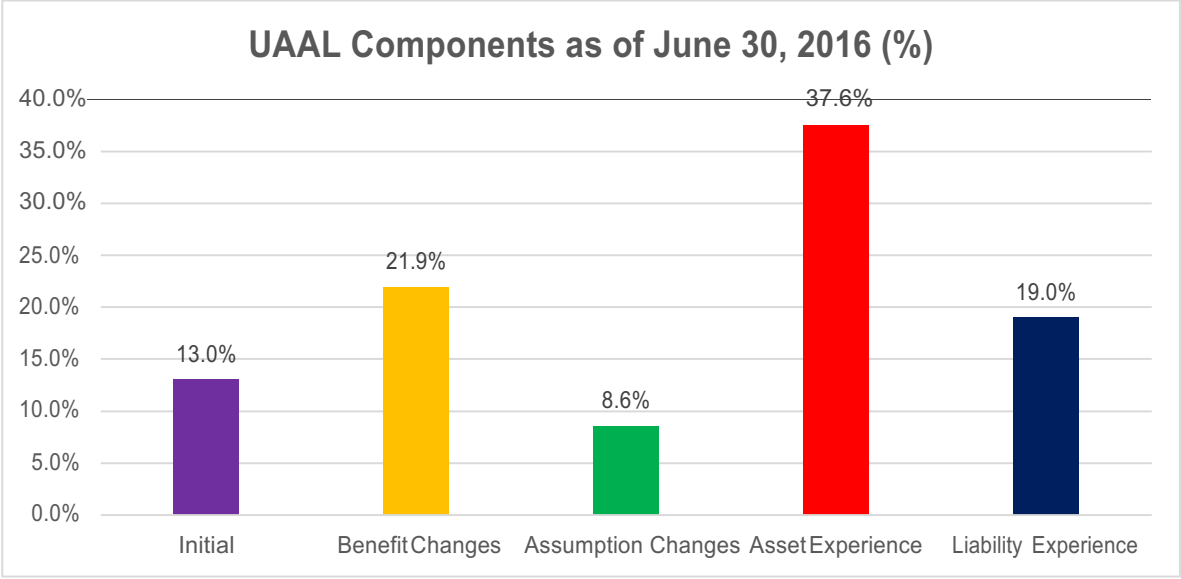
	1998	2016	Change	% Change
Entry Age Accrued Liability ($ million)	$13,004.1	$41,997.5	$28,993.4	+ 223.0%
Actuarial Value of Assets ($ million)	$11,058.6	$25,185.1	$14,126.5	+127.7%
UAAL ($ million)	$1,945.5	$16,812.4	$14,866.9	+ 764.2%

The following chart shows the change in the different components of the UAAL observed for this study:



The initial UAAL in 1998 was $1.946 billion. Benefit enhancements recognized over the next few years surpassed the initial UAAL to become the largest component of the UAAL. Asset gains early in the study period were overcome with losses and surpassed the plan changes as the biggest component of the UAAL in 2009. The severity of the 2008/2009 financial crisis increased asset losses to the level of $6.3 billion as of June 30, 2016.

The following chart shows the components of the UAAL as of June 30, 2016:

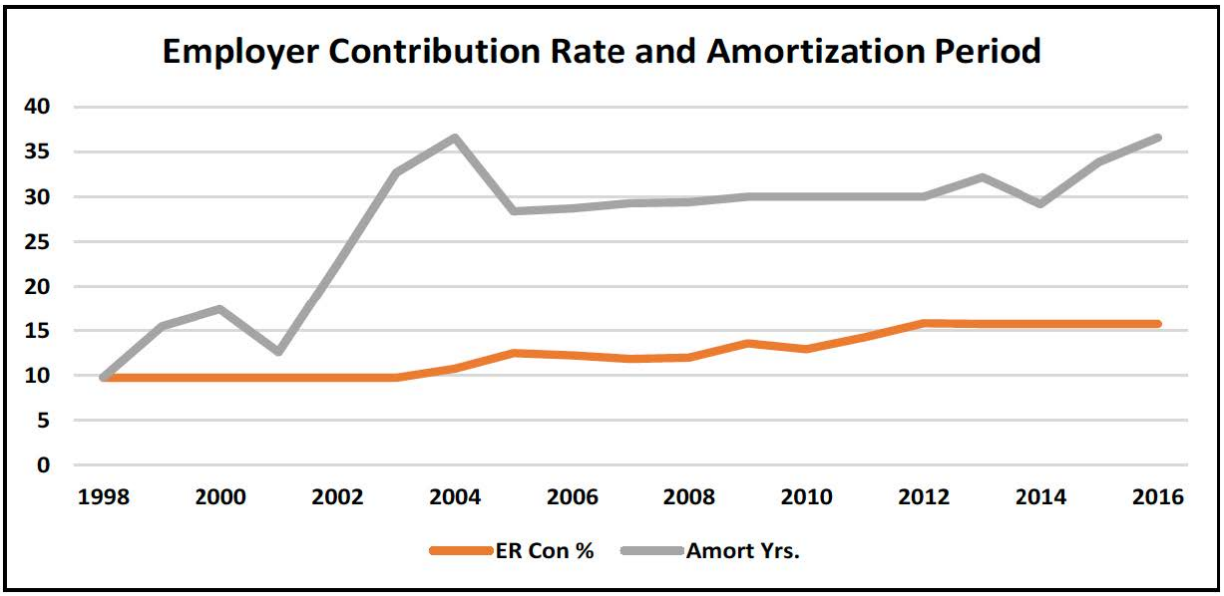


Asset experience represents the largest portion of the UAAL at 37.6% or $6.3 billion. Benefit enhancements are the second largest component of the UAAL at 21.9% or $3.7 billion. They are followed by liability experience at 19.0% or $3.2 billion, the original UAAL at 13.0% or $2.2 billion, and assumption changes at 8.6% or $1.4 billion.

Contribution requirements were lowest at the beginning of the study period. As of June 30, 1998, the employer contribution rate was 9.75% of payroll and was expected to pay off the UAAL in 9.8 years. Benefit improvements recognized as of June 30, 1999 added 10.8 years to the amortization period as did more benefit improvements in 2000, 2001, and 2002. Asset losses also contributed heavily to increases in the amortization period and required contributions. As of June 30, 2016, the employer contribution rate is 15.75% of payroll which is estimated to take 36.6 years to amortize the UAAL. The following table shows the changes in contribution rate and amortization period after a 1998 contribution rate of 9.75% with and amortization period of 9.8 years.

Year	Contribution Rate (%) Payroll	Amortization Period (Years)	Year	Contribution Rate (%) Payroll	Amortization Period (Years)
1999	9.75	15.5	2008	12.00	29.4
2000	9.75	17.4	2009	13.56	30.0
2001	9.75	12.6	2010	12.93	30.0
2002	9.75	22.5	2011	14.26	30.0
2003	9.75	32.7	2012	15.83	30.0
2004	10.75	36.6	2013	15.75	32.2
2005	12.50	28.4	2014	15.75	29.2
2006	12.25	28.7	2015	15.75	33.9
2007	11.85	29.3	2016	15.75	36.6

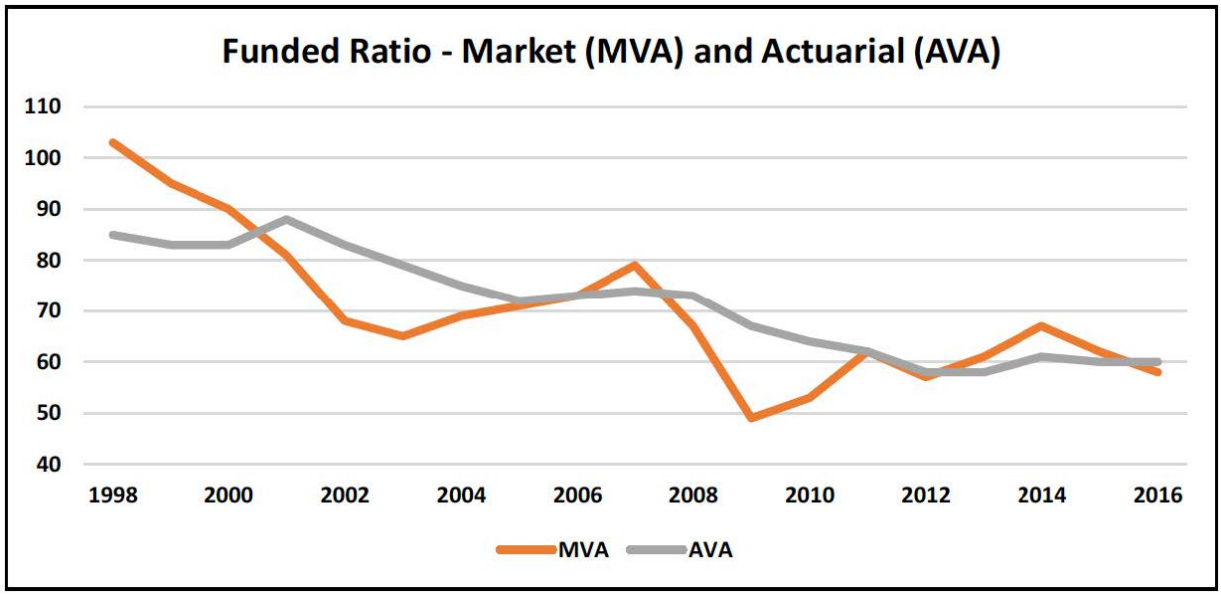
The following chart shows the employer contribution rate and the amortization period required to pay off the UAAL over the study period. The scale represents the percentage of payroll as well as years.



The funded ratio is a commonly used metric to measure the health of a pension plan. The ratio is the value of assets divided by the accrued liability of the System. The following table shows the funded ratios based on the market value of assets as well as the actuarial value of asset. In 1998, the market value funded ratio was 103% while the actuarial value funded ratio was 85%. The following chart shows the funded ratio measured by the market value of assets and the actuarial value of assets over the study period.

Year	Market Value Funded Ratio	Actuarial Value Funded Ratio	Year	Market Value Funded Ratio	Actuarial Value Funded Ratio
1999	95%	83%	2008	67%	73%
2000	90%	83%	2009	49%	67%
2001	81%	88%	2010	53%	64%
2002	68%	83%	2011	62%	62%
2003	65%	79%	2012	57%	58%
2004	69%	75%	2013	61%	58%
2005	71%	72%	2014	67%	61%
2006	73%	73%	2015	62%	60%
2007	79%	74%	2016	58%	60%

The following chart shows the funded ratio measured by the market value of assets and the actuarial value of assets over the study period.

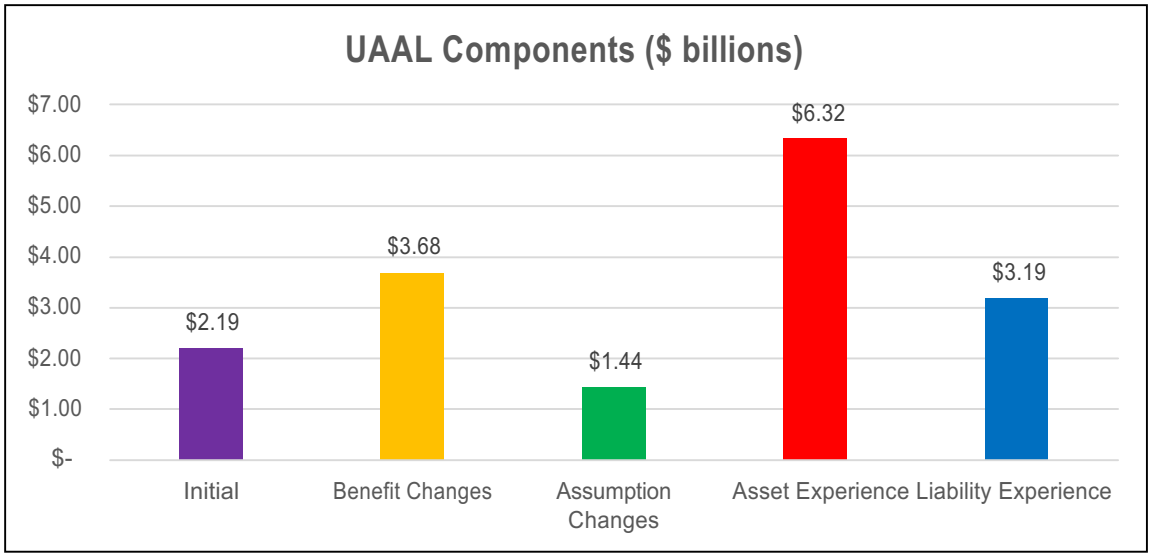


As seen in the chart, the System was 103% funded on a market value basis as of June 30, 1998. Benefit improvements and asset losses quickly deteriorated the funded status which reached a low point of 49% during the financial crisis. The funded status on an actuarial value basis is less volatile due to asset smoothing.

SECTION IV – SUMMARY

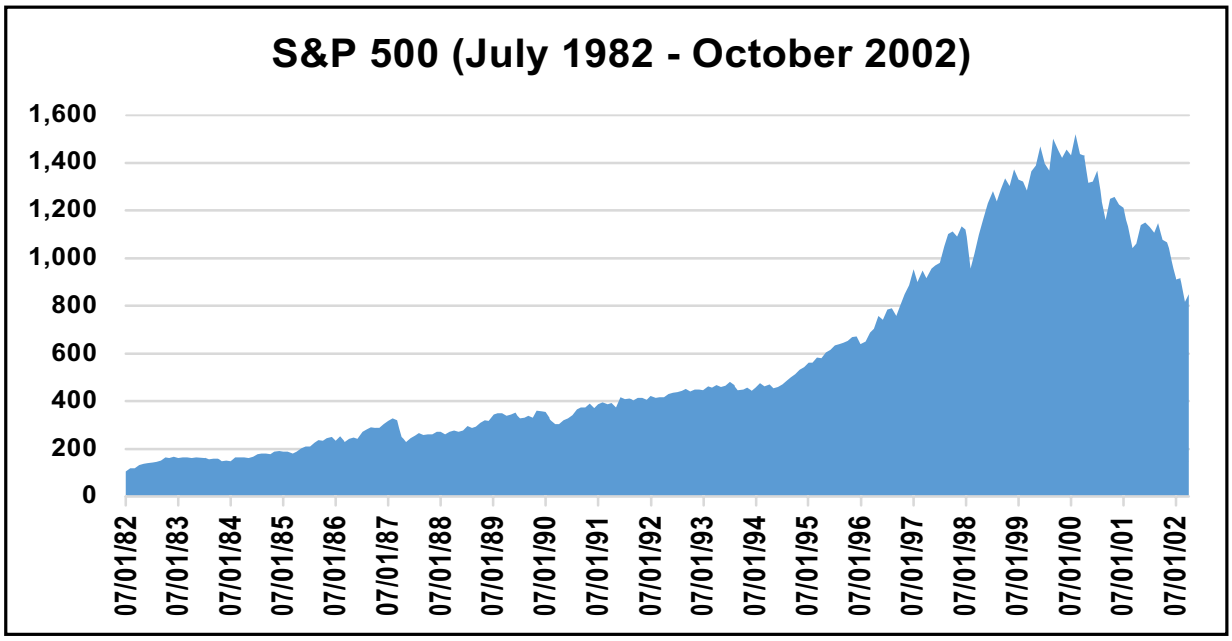
The experience of PERS is similar to many large public systems during this period of time. This study was requested to determine what events caused the significant decline in the actuarial position of PERS from June 30, 1998 to June 30, 2016. The starting date of the study was the year PERS was at the highest level of funding in its history (103% on a market value basis). Starting with the June 30, 1998 UAAL, we used a roll forward methodology to accumulate the initial UAAL amount and the changes in the UAAL over the 18 year period. The components of the UAAL as of June 30, 2016 are shown in the following table and chart:

Component	UAAL as of 2016 ($) millions
Initial UAAL	$2,189.1
Benefit Changes	3,676.3
Assumption Changes	1,441.3
Asset (Gains)/Losses	6,315.1
Liability and Other (Gains)/Losses	3,190.6
Total	$16,812.4



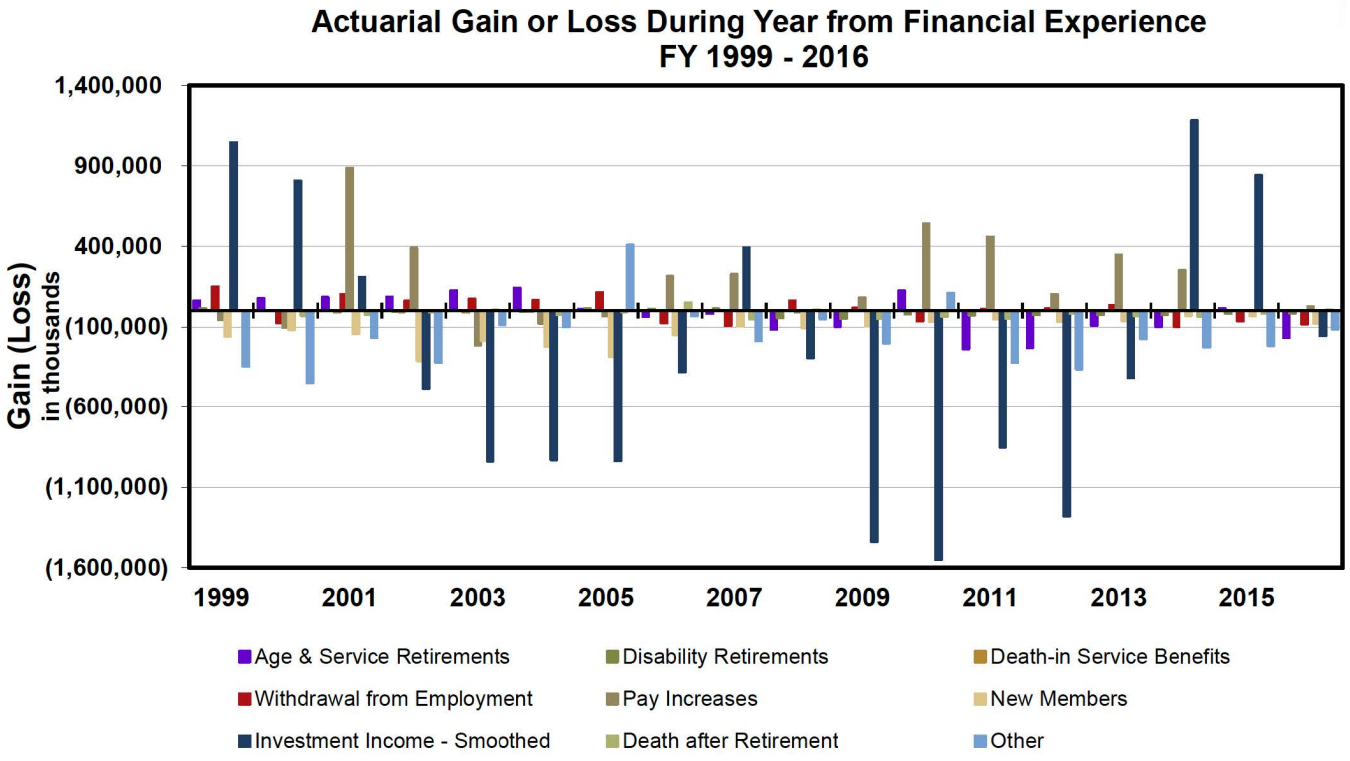
Gains and losses are produced when actuarial assumptions and the actual experience predicted by them deviate from one another. The expected return on assets assumption is especially vulnerable to gains and losses due to the volatility of asset values. Assumptions are changed in an attempt to lessen the size of actuarial liability gains and losses.

The PERS benefit changes made early during the study period were made in a different environment than that of today. The historic bull market in equities that began in 1982 had pushed asset values higher and higher for Systems invested in equities. This was accompanied by a bull market in bonds that started in 1981 with 10 year treasury rates above 15% which also pushed asset values higher (10 year rates were 1.5% as of July 1, 2016). The economic growth of the 1990's was impressive as even the federal government was producing budget surpluses and stopped issuing 30 year treasury bonds in 2001. There was great optimism about the future and how the widespread use of the internet and other technological advancements would make things better. Notice the steepness of the increase in stock prices during the late 1990's in the following chart. This became known as the "internet bubble" after the bubble burst.



It was under these conditions that PERS benefit improvements were made. First in 1999, then again in 2000, 2001, and 2002. During the period of these benefit improvements, the stock market peaked in March 2000 before declining 49% within the next few years. This combination of higher liabilities due to benefit improvements and lower assets due to market losses rapidly deteriorated the funded status of the System (from 103% in 1998 to 65% in 2003 on a market value basis). Since then, the major driver of changes in funded status has been asset performance.

Appendix


Actuarial Gain or Loss During Year from Financial Experience
FY 1999 - 2016
Gain (Loss) in thousands
1,400,000
900,000
400,000
(100,000)
(600,000)
(1,100,000)
(1,600,000)
1999
2001
2003
2005
2007
2009
2011
2013
2015
Age & Service Retirements
Disability Retirements
Death-in Service Benefits
Withdrawal from Employment
Pay Increases
New Members
Investment Income - Smoothed
Death after Retirement
Other

Appendix J | Historical Annualized Rates and Annual Standard Deviation of the CPI-U Over Periods Ending June 30

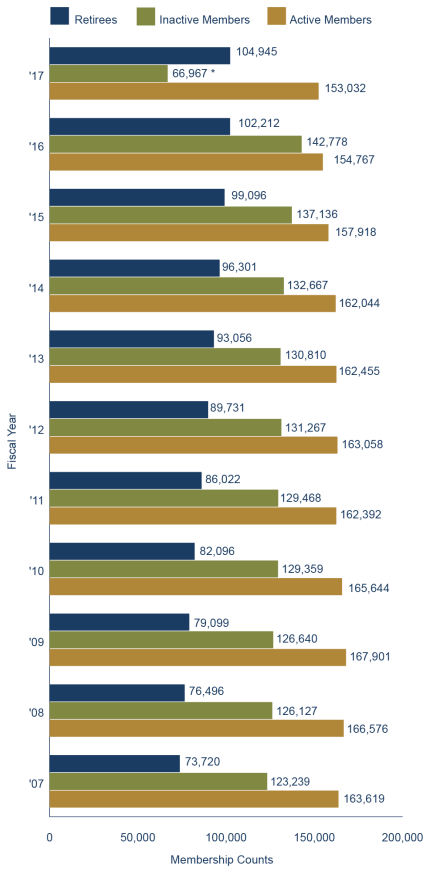
Period	Number of Years	Annualized Rate of Inflation	Annual Standard Deviation
1926-2016	90	2.92%	4.13%
1956-2016	60	3.70%	2.87%
1966-2016	50	4.10%	2.97%
1976-2016	40	3.68%	2.93%
1986-2016	30	2.66%	1.48%
1996-2016	20	2.18%	1.48%
2006-2016	10	1.74%	1.79%

Appendix K | PERS Membership and Retirement Eligibility Percentages

Total System Membership

Source: System Actuarial Valuation Reports

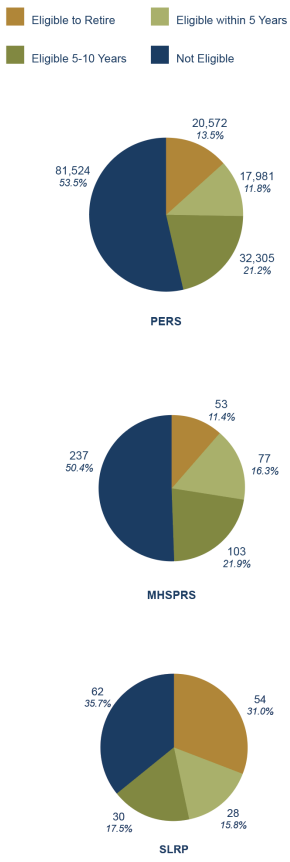
June 30, 2017 = **324,944**



Retirement Eligibility as Percentage of Active Members

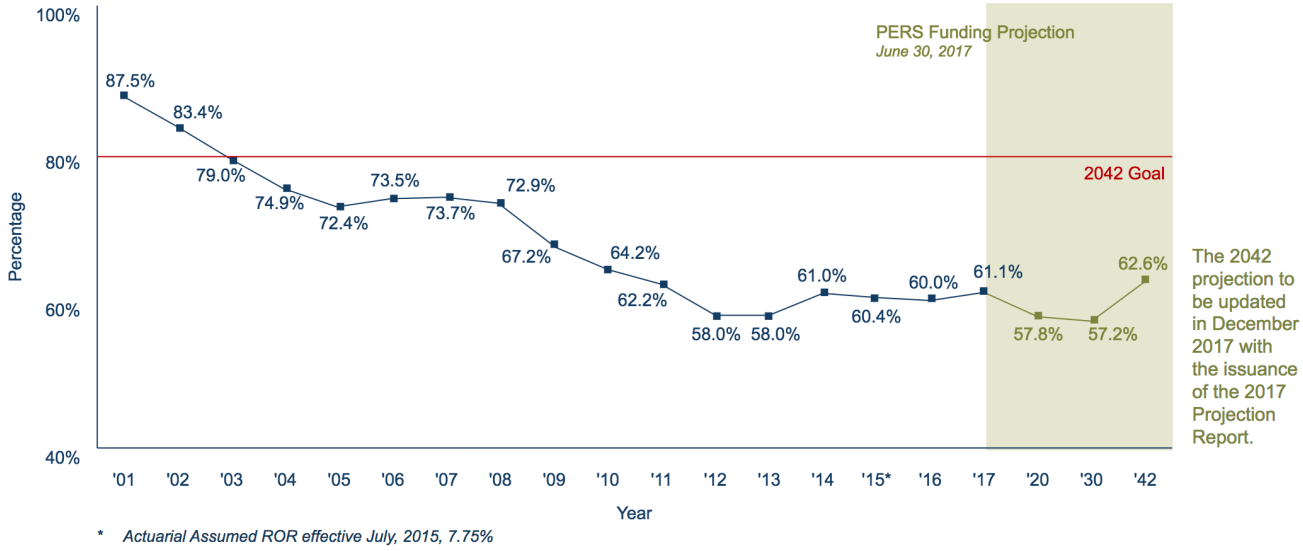
Source: System Actuarial Valuation Reports

June 30, 2017



* *Individual inactive accounts with small residual or zero balances removed from totals. No actuarial valuation measurements affected.*

Appendix L | PERS FY 2016 Funded Status Projection and Projections since 2012



* *Actuarial Assumed ROR effective July, 2015, 7.75%*

- **FY 2012**
  - **2042 Projected Funded Status: 70.8 percent**
  - Return on Investments: .6 percent
  - PERS Funding Policy adopted
- **FY 2013**
  - **2042 Projected Funded Status: 91.02 percent**
  - Return on Investments: 13.4 percent
- **FY 2014**
  - **2042 Projected Funded Status: 109.69 percent**
  - Return on Investments: 18.6 percent
- **FY 2015**
  - **2042 Projected Funded Status: 80.6 percent**
  - Return on Investments: 3.4 percent
  - Economic and demographic assumption changes made
- **FY 2016**
  - **2042 Projected Funded Status: 62.6 percent**
  - Return on Investments: 1.16 percent
- **FY 2017**
  - **2042 Projected Funded Status: To be announced December 18, 2017**
  - Return on Investments: 14.96 percent
  - Economic assumption change made

Appendix M | PERS Benefit Modifications since 1985

July 1, 1985

- Final average compensation calculated using the highest four consecutive years (reduced from highest five consecutive years)
- Liberalized survivor benefit provision to reduce the marriage requirement from 5 years to 1 year and to allow a member to designate a child as beneficiary
- Minimum benefit increased from $5.00 to $7.50 per month for each year of creditable service for current and future retirees
- Eligibility for service retirement reduced from 10 years to 4 years at age 60
- Established “discretionary” COLA provision in addition to the base COLA provision to be paid to eligible retirees based on sufficient actuarial gains
- 3% ad hoc increase for all retirees

July 1, 1986

- Eligibility for non-duty related disability retirement reduced from 10 years to 4 years
- Permanent exemption from 3% penalty
  for those required to retire at age 60
- Retirement incentive granted – one additional year of credit to any member with 30 years of service credit or age 60

July 1, 1987

- Established service retirement eligibility based on 25 & out with reduced benefits
- Benefit accrual increased from 1 - 5/8% to 1- 3/4% for the first 20 years
- Minimum benefit increased from $7.50 to $10.00 per month for each year of service for current and future retirees
- 5% ad hoc increase for all retirees
- Provided elected official leave credit

July 1, 1989

- Unreduced retirement at age 55 with 25 years of service
- Benefit accrual increased from 1-3/4% to 1-7/8% for the first 30 years of service
- Unreduced retirement lowered from age 65 to age 60
- 5% ad hoc increase for all retirees

July 1, 1990

- Provided that base COLA percentage granted shall be cumulative from year to year

July 1, 1991

- Unreduced retirement at any age with 25 years of service

- Benefit accrual increased to 2% for all years of service over 25

July 1, 1992

- Ad hoc increase for those retired prior to July 1, 1991, with more than 25 years of service
- Changed disability benefit from Age-limited to Tiered for new hires and those employed who chose new plan
- Expanded survivor benefits to include automatic spousal and dependent child benefits
- Liberalized definition of average compensation to provide that the highest four years did not have to be consecutive years
- Expanded military service credit to include all active duty military
- Removed reference to "Governor's Salary" and established maximum compensation cap at $125,000

July 1, 1994

- Benefits for all retirees under Joint & Survivor Options 2(5) and 4A(5) were recalculated to remove the reduction imposed for the right to revert to the Maximum

July 1, 1999

- Benefit accrual increased from 2% to 2-1/4% for all years of service over 25 for current and future retirees
- Base COLA increased to 3% simple up to age 55 and 3% compounded after age 55
- Reemployed retiree COLA will be based on all fiscal years in retirement, not just the fiscal years in retirement since the last retirement.
- Provided that the COLA will be prorated and paid to the beneficiary of a retiree or beneficiary who is receiving the COLA in a lump sum and who dies between July 1 and December 1

July 1, 2000

- Benefit accrual increased from 1-7/8% to 2% for all years of service over 10 and less than 25 for current and future retirees

July 1, 2001

- Benefit accrual increased from 1-7/8% to 2% for all years of service over 5 and less than 25 for current and future retirees

July 1, 2002

- Benefit accrual increased from 1-7/8% to 2% for all years of service up to and including 25 and from 2-1/4% to 2-1/2% for all years of service over 25 for current and future retirees
- Increased maximum compensation cap to $150,000
- Provided for free active duty military service for pre-1972 service in the Commissioned Corps of the U.S. Public Health Service for those retiring on or after July 1, 2002
- Reemployed retiree who has previously been retired for at least one full fiscal year no longer has

- to wait another full fiscal year for his or her COLA to resume
- A local county or municipal elected official who is receiving retirement benefits may receive a salary for the elected position that does not exceed 25% of the retiree's average compensation

July 1, 2004

- Provided upon application spousal survivor benefits recalculated due to remarriage

July 1, 2008

- Maximum reportable earned compensation was increased from $150,000 to $230,000 to coincide with the compensation limit set pursuant to Section 401(a)(17) of the Internal Revenue Code
- Vesting requirement for those employees hired on or after July 1, 2007 was increased from 4 to 8 years of service.

July 1, 2010

- Members who retire on or after July 1, 2010 receive additional credit toward retirement for one-half day of leave for each full fiscal year of membership service accrued after June 30, 2010
- Option 4, a 75% joint and survivor annuity, made available to members who retire on or after January 1, 2011

July 1, 2011

- For members hired on or after July 1, 2011, 30 years of creditable service will be required for retirement regardless of age.
- For members hired on or after July 1, 2011, 33 years of creditable service will be required to select a partial lump sum option at retirement.
- For members hired on or after July 1, 2011, the retirement formula will be 2% of average compensation for the first 30 years of creditable service plus 2.5% of average compensation for each year beyond 30 years of creditable service.
- For members hired on or after July 1, 2011, the actuarial reduction for early retirement will be the lesser of the number of years below 30 years of creditable service or the number of years in age a member is below age 65.
- For members hired on or after July 1, 2011, the COLA will be a simple 3% of the annual retirement allowance at retirement up to the fiscal year in which the retired member reaches age 60.
- Thereafter, the COLA will be a compounded 3% for all future years.

Appendix N | PERS Employer and Employee Rates of Contribution and Maximum Covered Earnings

Fiscal Date From	Fiscal Date To	Employer Rate	Maximum Covered Earnings	Employee Rate	Maximum Covered Earnings
2/1/53	6/30/58	2.50%	$6,000	4.00%	$4,800*
7/1/58	6/30/60	2.50	9,000	4.00	7,800*
7/1/60	6/30/66	2.50	15,000	4.00	13,800*
7/1/66	6/30/68	3.00	15,000	4.50	13,800*
7/1/68	3/31/71	4.50	15,000	4.50	15,000
4/1/71	6/30/73	4.50	35,000	4.50	35,000
7/1/73	6/30/76	5.85	35,000	5.00	35,000
7/1/76	6/30/77	7.00	35,000	5.00	35,000
7/1/77	6/30/78	7.50	35,000	5.50	35,000
7/1/78	6/30/80	8.00	35,000	5.50	35,000
7/1/80	6/30/81	8.00	53,000	5.50	53,000
7/1/81	12/31/83	8.75	53,000	6.00	53,000
1/1/84	6/30/88	8.75	63,000	6.00	63,000
7/1/88	6/30/89	8.75	75,600	6.00	75,600
7/1/89	12/31/89	8.75	75,600	6.50	75,600
1/1/90	6/30/91	9.75	75,600	6.50	75,600
7/1/91	6/30/92	9.75	75,600	7.25	75,600
7/1/92	6/30/02	9.75	125,000	7.25	125,000
7/1/02	6/30/05	9.75	150,000	7.25	150,000
7/1/05	6/30/06	10.75	150,000	7.25	150,000
7/1/06	6/30/07	11.30	150,000	7.25	150,000
7/1/07	6/30/08	11.85	150,000	7.25	150,000
7/1/08	6/30/09	11.85	230,000	7.25	230,000
7/1/09	6/30/10	12.00	245,000	7.25	245,000
7/1/10	6/30/11	12.00	245,000	9.00	245,000
7/1/11	12/31/11	12.00	245,000	9.00	245,000
1/1/12	6/30/12	12.93	245,000	9.00	245,000
7/1/12	6/30/13	14.26	250,000	9.00	250,000
7/1/13	6/30/14	15.75	255,000	9.00	255,000
7/1/14	6/30/15	15.75	260,000	9.00	260,000
7/1/15	6/30/17	15.75	265,000	9.00	265,000
7/1/17	6/30/18	15.75	270,000	9.00	270,000

* *From February 1, 1953, through June 30, 1968, the first $100 in monthly earnings or $1,200 in annual earnings were not covered earnings for the employee.*

Spotlight on

Significant Reforms to State Retirement Systems

Keith Brainard and Alex Brown
National Association of State Retirement Administrators

June 2016

Executive Summary

Although states have a history of making adjustments to their workforce retirement programs, changes to public pension plan design and financing have never been more numerous or significant than in the years following the Great Recession.[1] The global stock market crash sharply reduced state and local pension fund asset values, from $3.2 trillion at the end of 2007 to $2.1 trillion in March 2009,[2] and due to this loss, pension costs increased. These higher costs hit state and local governments right as the economic recession began to severely lower their revenues.[3] These events played a major role in prompting changes to public pension plans and financing that were unprecedented in number, scope and magnitude.

Since this time, nearly every state passed meaningful reform to one or more of its pension plans. Although the global market crash and recession affected all plans, differing plan designs, budgets, and legal frameworks across the country defied a single solution; instead, each state met its challenges with tailored changes specific to its unique circumstances. For example, some states faced legal limitations on how much modification could be made to their existing retirement plans. Other states did not require major law changes due to their financial condition or the presence of automatic adjustments in their plan designs.

Balanced Objectives

Public pension reforms typically adjusted retirement plan provisions while balancing multiple stakeholder objectives:

- For employees, competitive compensation that includes income security in retirement;
- For employers, a management tool to maximize the training and experience invested in their employees; and
- For taxpayers, public services performed in the most effective and cost-efficient manner.

These objectives can both conflict with and complement one another. Retirement plan reforms focused on one of these goals, to the exclusion of others, are likely to produce unintended negative outcomes. While public pension changes took different forms throughout the country, reforms generally kept those core features known to balance retirement security, workforce management, and economic efficiencies sought by stakeholders, namely: [4]

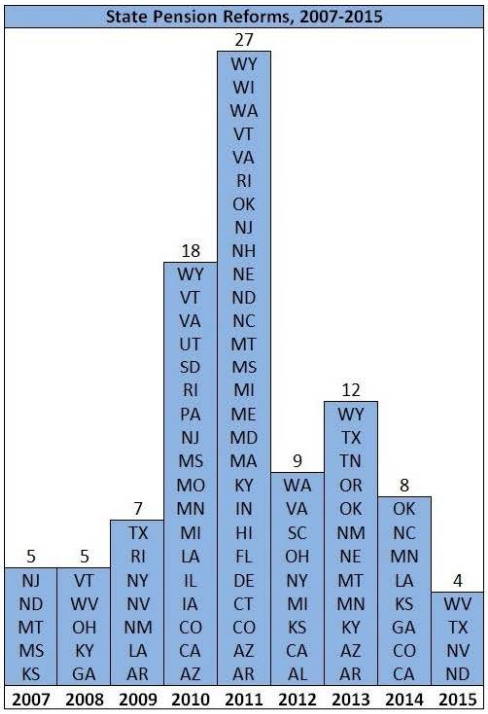
Keith Brainard is research director at the National Association of State Retirement Administrators

Alex Brown is research manager at the National Association of State Retirement Administrators

NASRA gratefully acknowledges the financial support from AARP to undertake this research project

Significant Reforms to State Retirement Systems, National Association of State Retirement Administrators, June 2016

- **Mandatory participation**. Most state and local governments require participation in the retirement program as a condition of employment.
- **Cost sharing between employers and employees**. Public employees typically are required to contribute 5 to 10 percent of their wages on a tax-deferred basis to their state or local pension.



- **Pooled and professionally managed assets**. By providing professional management, greater portfolio diversity and economies of scale, pooled investments in public pension trusts can earn higher returns with lower fees.
- **Targeted income replacement**. Most public pension policies aim to replace a certain percentage of pre-retirement wages to better assure financial independence in retirement.
- **Lifetime benefit payouts**. The vast majority of state and local governments do not allow for lump sum distribution of benefits; rather, they require retirees to take most or all of their pensions in installments over their retired lifetimes. Most also make periodic cost-of-living adjustments to curb the effects of inflation.
- **Survivor and disability benefits**. Many state and local pensions integrate survivor and disability protections into their retirement programs, a particularly critical feature for positions involved in hazardous duty, or a public safety plan.
- **Supplemental savings**. Many governments sponsor a supplemental savings plan in addition to the general retirement plan to allow participants to defer an additional portion of their salary in anticipation of retirement needs, and some governments provide matching contributions and automatic enrollment/escalation features to encourage participation.

Reforms in most cases preserved these important features and modified some combination of required employee contributions, benefit levels, or eligibility for retirement. Many changes also shifted part of the risk associated with the retirement program from the employer to the employee. This risk shift occurred mostly in one of two ways: 1) the level of benefits or employee's costs became dependent on the fiscal condition of the plan, including investment performance; or 2) more of an employee's benefit became dependent on individual savings plans; or both. Most of these changes apply to future employees, but many also impact existing employees and retirees.

While public pension changes took different forms throughout the country, they generally retained those core features known to balance retirement security, workforce management, and economic efficiencies sought by stakeholders.

The following summary identifies the most common types of reforms, including changes that faced legal challenge, self-adjusting plan features that did not require legislative action, and the public pension landscape following these reforms.

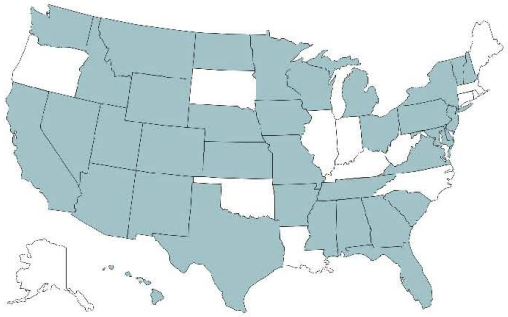
Employees Required to Pay More

Nearly all employees of state and local government are required to contribute toward the cost of their retirement, and in many states, budget challenges and rising pension costs made employee contribution increases a central part of pension reform. Employees in over 40 plans in 36 states were affected by increases to member contribution rates, some that are temporary, but more that are permanent or indefinite.

Most increases impacted current members and new hires, although higher contribution rates in some states applied to new hires only.

While a few state retirement plans prior to the recent reforms did not have mandatory employee pension contributions, nearly all now have this requirement. Some states, such as Missouri, added mandatory employee contributions for new hires only. Other states, such as Florida, enacted a required employee contribution for both new and current employees. States such as Virginia and Wisconsin passed laws requiring new and existing employees to pay the contributions that previously were made by employers in lieu of a salary increase. Of these, the new contribution requirement in Florida was challenged legally, but the Florida Supreme Court ultimately upheld it.

Figure 1. States that have increased employee contribution rates, 2009-2014



Required contribution rates vary among plans, particularly between those that provide a benefit in addition to Social Security and those that provide a public pension benefit instead of Social Security.[5] Employee contribution rates in non-Social Security states generally are higher than in states that participate in Social Security.[6] The median (mid-point) employee contribution rate in non-Social Security states is 8 percent of salary, although this number masks a wide range.[7] The median employee contribution rate in plans that also provide Social Security coverage has risen from 5 to 6 percent during this period of pension reform.[8] This type of change was among the most common reform passed by state legislatures since 2009.

Increases in required employee contributions was among the most common type of pension reform passed by state legislatures since 2009.

Benefits Lowered

Pension benefits are intended to replace a certain amount of an employee's salary in retirement, typically through a formula that provides a percentage of salary for every year worked for the employer. For example, for a worker retiring with 25 years of service with a final average salary of $50,000 in a pension plan that provides 1.5 percent of salary for each year worked, the annual pension benefit would be calculated as follows:

25 x $50,000 x 1.5% = $18,750

As the calculation shows, three components are used to determine an employee's pension benefit: the number of years he or she worked for their employer; their average salary;[9] and the retirement multiplier, which is the percent of income that will be replaced for every year worked. Benefit reductions passed between 2009 and 2014 took a variety of forms, including: 1) An increase to the period used to calculate average salary (usually reducing the salary on which the benefit is based); 2) A reduced retirement multiplier (less percent of income per year worked); and 3) Reducing or eliminating cost-of-living adjustments (COLAs).

Figure 2. States that Reduced Pension Benefits, 2009-2014

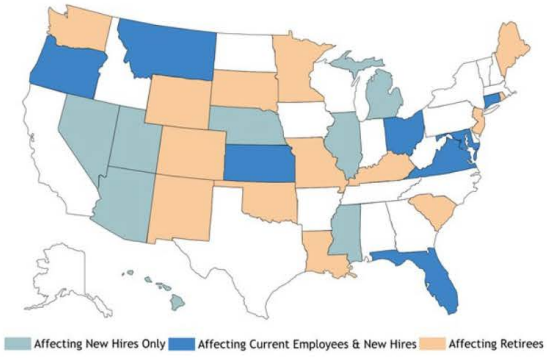
Many plans provide a COLA, which is an increase to benefits while in retirement, made annually or granted by discretion, to protect the benefits from inflation. COLAs vary in amount and often are linked to a gauge of inflation, such as the consumer price index (CPI), which measures the change in prices paid for a representative group of goods and services.

A 2013 study by NASRA and the Center for State and Local Government Excellence found that benefit reforms could reduce the retirement benefit of new employees by between 1 and 20 percent, compared to pre-reform benefits.[10] This finding did not include the future benefit impact through COLA reductions or eliminations, which could be considerable.

COLA Reductions Significantly Impact Benefits

Depending on how long a retiree lives, how much the COLA was reduced, and the actual rate of inflation, a COLA reduction can significantly reduce the value of a benefit over the remaining life of a retiree. An annual COLA of two percent will increase the value of a pension benefit by nearly 50 percent after 20 years (and protect purchasing power from inflation). New COLA formulas for current active employees or new hires offer lower fixed-rate COLAs, which in many cases are linked to an external indicator such as CPI or the plan's funded status.[11] Changes to COLA benefits for retired members were challenged in court in most states where they were passed. The cuts were upheld in most cases, although the Oregon Supreme Court, for example, declared the 2013 reduction in the COLA for retirees in that state unconstitutional.

Figure 3. State COLA Reductions, 2009-2015



Plans that reduced more than one element of the benefit formula (final average salary and retirement multiplier) saw the steepest cuts in benefits for new hires. Those that also changed COLAs further reduced the value of those benefits over time, sometimes significantly.

Employees Required to Work Longer

Pension plans for public employees require employees to work a certain period of time, known as the vesting period, to become eligible to receive any benefit from a pension plan. To begin drawing a benefit, the employee must also reach a second level of retirement eligibility, generally expressed as a certain age, a number of years of employment, or both.

Nine states passed laws that increased the vesting period for new employees, from 5 years to 10. In one case—North Carolina—the state reversed its higher vesting period, citing a lack of meaningful savings from the change and a conflict with the workforce management goals the retirement system is intended to promote.[12]

Other common reforms passed included increases to the age and service requirements that must be met to begin drawing a benefit. Twenty-nine states increased retirement eligibility, affecting over 40 plans, and typically took the form of an increase in age, required years of employment, or a combination of both. These new requirements apply generally to new hires as part of the creation of a new benefit tier, although in a few cases the increased requirement applied to current employees.

In establishing lower benefits for new hires, some states eliminated retirement at any age with a specified amount of service. Increases to retirement eligibility covered a wide range, from an additional one to five years of age needed and/or an additional two to five years of service required to become eligible to begin receiving a retirement benefit. Most increases to the retirement age were by two years, and most increases to required service were by five years.

Twenty-nine states increased retirement eligibility, affecting over 40 plans, and typically took the form of an increase in age, required years of employment, or a combination of both.

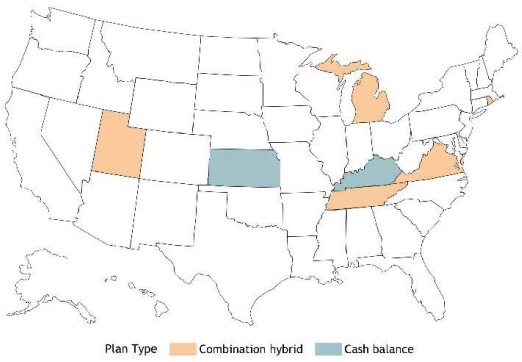
Most States Retained Traditional Pension Plans - But Not All

Nearly every state chose to retain its traditional pension plan and modify employer and employee contributions, restructure benefits, or both, as closing their traditional pension plan to future (and, in some cases, existing) employees could increase—rather than reduce—costs.[13] Providing only an individual account plan (i.e., 401k) does not meet important retirement security, human resource, or budget objectives. Some states, however, have looked at plan types that combine elements of traditional pensions and individual account plans. A combination hybrid plan combines a defined benefit plan, typically with a more modest

level of benefit, with participation in an individual account plan. A cash balance plan features individual employee accounts with guaranteed investment returns on contributions. Most cash balance plans in the public sector require the benefit to be paid in the same way as a traditional pension, that is, monthly payments guaranteed over an employee's lifetime once the employee meets a required minimum age and/or years of employment. Some cash balance plans in the public sector, however, operate more like an individual account plan, where an employee may draw down on their accumulated account in retirement, which can be exhausted. Although hybrid and cash balance plans have been in place in public sector retirement systems for decades, this plan design received increased attention in recent years.

Since 2009, five states—Michigan, Utah, Rhode Island, Virginia, and Tennessee—created combination hybrid plans and two states—Kansas and Kentucky—created cash balance plans for newly hired state or educational employees, or both.[14] Rhode Island was the only state that passed a new plan type—a hybrid plan—requiring participation from some current plan participants.

Figure 4. Statewide Hybrid Plans Established 2009-2014



Two states—Arizona and Oklahoma—enacted legislation closing the traditional pension plan and placing newly hired workers into individual account plans. In Arizona, the change affected only future elected officials, and in Oklahoma, only state employees hired as of November 1, 2015 were affected.

In most cases, changes to plan design were purely prospective, i.e., establishing new plan designs for newly hired workers only. In other cases, a new plan design was coupled with changes to the existing defined benefit plan, in an effort to address the costs.

Nearly every state chose to retain its traditional pension plan and modify employer and employee contributions, restructure benefits, or both.

Pension Reforms Faced Legal Challenges

Roughly half of the states were sued regarding their pension reforms. In many cases, what was upheld in one state was struck down in another. For example, employee contribution increases were upheld in Florida, yet they were found illegal in Arizona. A reduction in retiree cost-of-living calculations was deemed constitutional in Colorado, yet was struck down in Oregon.

Two clauses in the US Constitution often cited as protecting pension benefits include: Article 1, Section 10 (clause 1), known as the Contracts Clause, states that "No State shall enter into any Treaty...impairing the Obligation of Contracts." The Fifth Amendment contains what is called the Takings Clause: "No person shall be ... deprived of life, liberty, or property, without due process of law…" Levels and types of legal protections for public pensions vary by state and are considered by some to be unclear or uncertain.

Self-Adjusting Features Can Alter Plans Considerably

A number of state plans employ self-adjusting features that do not require legislative changes. For example, plans for some or all workers in Arizona, Iowa, Nevada, and Pennsylvania require employee contributions to fluctuate depending upon the plan's actuarial or financial condition. In Idaho and Colorado (for public safety officers), the board of the public retirement systems can increase the employee contribution rate, and in Idaho and some other states, the board can increase the employer contribution rate. In the vast majority of states, the employer contribution rate is automatically adjusted to meet an amount determined by the system's actuary.

Other states automatically alter benefit levels depending on factors such as plan funding ratio, investment performance, inflation, or some combination of these. Retirees of the Wisconsin Retirement System (WRS), for example, receive a benefit that is automatically subject to annual

XXX

adjustment depending on the performance of plan investments. WRS does not provide an annual COLA to retired members; rather, benefits may be adjusted if the fund experiences investment gains, and increases provided in prior years may be adjusted downward or eliminated entirely in years in which investments perform poorly (reductions may never fall below the base benefit). In 2014, WRS announced the first post-retirement benefit increase in five years after several years of favorable investment returns. Some retirees, particularly those who have been retired for longer periods, experienced five consecutive years of reduction in their benefit.

In these and other instances, law changes were not required, but plan financing and benefit levels were nevertheless altered. In some cases, they were altered even more significantly than states that enacted pension reform laws.

Public Pension Landscape Changed to Meet the Unique Needs of Each State

As the Center for Retirement Research at Boston College notes in its issue brief "State and Local Pension Costs: Pre-Crisis, Post-Crisis, and Post-Reform," a state's appetite for pension reform was largely in line with the size of the fiscal issues the state faced. Generally, plans that were more poorly funded enacted reforms that were more comprehensive than states that were well funded.

Each legislature passing pension reform approached the process given their unique set of economic and demographic circumstances. However, one overarching characteristic shared by most of the reforms is a shift from employers to employees of the risk associated with financing retirement benefits.

Most public retirement plans are risk-sharing arrangements, meaning that the plan is designed to have employees share some of the risk of the benefit or its cost. Recent pension reforms clarified, strengthened, or established new risk-sharing mechanisms for benefit levels, required contributions, or delivery of benefits through different plan designs. These new features include, for example, contribution rates or benefits that can increase or decrease depending on factors such as fund investment performance, the funding condition of the plan, and/or the measured increase in the cost of living. In some cases, these changes were made permanent for new employees and some current participants. Other risk-distributing changes were made on an as-needed basis.[17] The outcome of nearly all reforms passed during this period is that public employees are responsible for an increasing share of funding of their retirement benefits and in some cases, the accumulation of their own retirement assets.

One overarching characteristic shared by most of the reforms is a shift from employers to employees of the risk associated with financing retirement benefits.

Retirement plans for public employees were altered in many ways during this reform wave. The state-by-state listing on the following pages presents detailed descriptions of changes affecting contributions, benefits, or eligibility for retirement plans that were affected by pension reform legislation. The details in this section are intended to reflect the pension reforms as passed by the legislature in each state.

NASRA Issue Brief:
State Hybrid Retirement Plans

November 2016

Although hybrid plans have been in place in public sector retirement systems for decades, this type of retirement plan design has received increased attention in recent years. The heightened attention to hybrids has occurred amid the many reforms states have made to public pension benefits and financing arrangements. The new focus on hybrid plans also occurs as states find that closing their traditional pension plan to future (and, in some cases, existing) employees could increase—rather than reduce—costs,[1] and that providing only a 401(k)-type plan does not meet important retirement security, human resource, or fiscal objectives. While most states have chosen to retain their defined benefit (DB) plan by modifying required employer and employee contributions, restructuring benefits, or both,[2] some have looked to so-called "hybrid" plans that combine elements of traditional pensions and individual account plans.

Many defined benefit plans in the public sector already contain hybrid plan elements, which, by definition, shift some risk from the employer to plan participants. Hybrid plan elements commonly incorporated into traditional public sector defined benefit plans include employee contributions or benefits that are linked to the plan's investment performance or actuarial condition. The use of these hybrid plan elements embedded in traditional pension plans are discussed in NASRA Issue Brief: Shared Risk in Public Retirement Plans.

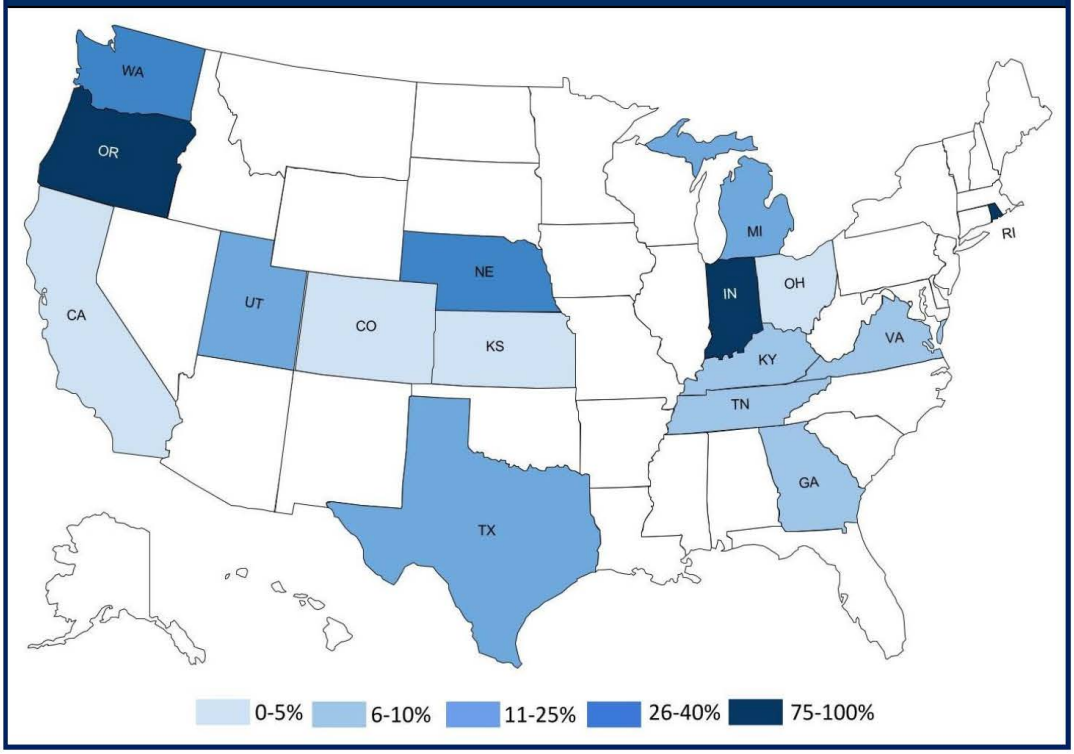
Although hybrid retirement plans take many forms, this brief examines two types in use in the public sector. The first is a cash balance plan, which marries elements of traditional pensions with individual accounts into a single plan (see Table 1). The second type combines a traditional DB plan, usually with a lower level of benefit accrual, with an individual defined contribution (DC) retirement savings account, referred to in this brief as a "DB+DC plan" (see Table 2). Despite variability among these plans, most contain the core features known to promote retirement security: mandatory participation, shared financing between employers and employees, pooled assets invested by professionals, targeted income replacement with survivor and disability protection, and a benefit that cannot be outlived.

Mandatory Participation

In the private sector, less than one-half of the workforce participates in an employer-sponsored retirement plan[3], a factor that contributes to a lack of retirement security. By contrast, for nearly all employees of state and local government, retirement plan participation is mandatory. Figure 1 shows the approximate level of participation in hybrid plans among public employees in states that administer mandatory or optional cash balance and DB+DC plans. In some states employees are required to participate in a hybrid plan; in others, participation is elective. Table 1 and Table 2 identify employee groups affected by hybrid plans and the nature of their participation.

As with other retirement plans for employees of state and local government, participation remains mandatory in most hybrid plans.[2] (Two partial exceptions are the Georgia Employees' Retirement System and the Tennessee Consolidated Retirement System, both of which administer a DB+DC plan. Participation in the DB component of the plans is mandatory; participants may elect to opt-out of the DC component (although the vast majority of participants have not exercised this election).

Figure 1: Percentage of public employees who participate in a hybrid plan in states that administer CB or DB+DC plans as a mandatory or optional primary retirement benefit for groups of general, public safety or K-12 educational employees



Most public employees also have access to a supplemental, voluntary individual retirement savings plan, such as a 401(k), 403(b) or 457 plan. In addition to mandatory participation in the primary plan, some public employers automatically enroll new hires in supplemental retirement savings plans, and participants may opt-out of these plans. The South Dakota Retirement System permits retiring participants to annuitize all or some of their supplemental retirement savings, converting those assets into a lifetime stream of income. Similarly, as shown in Table 3 below, some DB+DC plans permit retiring participants to annuitize all or part of their DC plan assets.

Shared Financing among Employers and Employees

Nearly all traditional pensions in the public sector require employees to contribute toward the cost of their retirement benefit,[4] and in the wake of the 2008-09 market decline and the Great Recession, many states have increased employees' required contributions.[5] Hybrid plans also typically employ a shared financing approach to retirement benefits.

As shown in Table 1, state cash balance plans, which feature annual accruals on employee accounts (cash balances), are funded with mandatory contributions from both employees and employers. As shown in Table 3, DB+DC plans vary regarding how much employees and employers are required to contribute to which plan component. As examples, for the hybrid plans in Indiana, Ohio, Oregon, and Washington, the employer finances the entirety of the DB component, and the DC component is funded by mandatory employee contributions (ranging from 3 percent to 15 percent of salary). The Michigan Public Schools hybrid plan requires employees to contribute to the DB component on a graduated scale based on pay, and employers finance the remainder; employees in the Michigan plan are also required to make a mandatory two-percent-of-salary contribution to the DC component, which employers match at a 50 percent rate.

North Dakota PEP

North Dakota offers most of its workers an optional hybrid retirement plan designed to provide greater portability.

Known as "PEP"—Portability Enhancement Program—North Dakota PERS participants can vest in the employer's portion of the defined benefit plan by participating in a supplemental deferred compensation account, funding a benefit that is more portable than the traditional defined benefit plan and similar to a defined contribution plan

The Georgia Employees' Retirement System hybrid requires employees to contribute 1.25 percent of salary to the DB component, with the remainder financed by the employer. Employees are automatically enrolled in the DC component at 1 percent or 5 percent of salary, depending on date of hire, and may opt out or contribute more. Employers match the first 1 percent of salary and one-half of the next 4 percent of salary voluntarily contributed by the employee to the DC plan.

The Utah Retirement System requires employers to contribute 10 percent of salary (12 percent for public safety) toward the DB plan's cost.[6] If the cost is less than the employer's contribution, the difference goes into employees' individual 401(k) savings account. If the cost of the DB plan exceeds the employer's contribution rate, employees must contribute the difference to the DB plan. In either instance, employees may elect to make additional contributions to the 401(k) plan. (Employers in Utah must also contribute to the Utah Retirement System to amortize the unfunded pension liability.)

Pooled Assets

Retirement assets that are pooled and invested by professionals offer important advantages over individual, self-directed accounts. Combined portfolios have a longer investment horizon, which allows them to be more diversified and to sustain greater market volatility. In addition, the professional asset management and lower administrative and investment costs in pooled arrangements result in higher investment returns.

As with traditional pension plan assets, cash balance plan assets also are pooled, invested by professionals, and guarantee annual returns to plan participants. Likewise, DB+DC plans pool assets in the DB component, and the manner in which DC plan assets are managed varies. Most plans provide a range of risk-based investment options: some are retail mutual funds and others are maintained by the retirement system and available only to plan participants. One example of this is in the Oregon DC component, where assets are pooled and invested in a fund similar to the DB plan fund; plan participants are not required to manage their DC plan assets. Similarly, the state of Washington provides an option for employees to invest their DC assets in a fund that emulates the DB plan fund.

South Dakota Variable Retirement Account

Participants entering the South Dakota Retirement System (SDRS) after 6/30/17 will be enrolled in the Generational benefit structure, which includes a traditional defined benefit with a lower cost level than for workers hired previously. The Generational benefit structure also features a Variable Retirement Account (VRA) that credits a portion of employer contributions to each active participant's account. The VRA will be increased with the actual investment returns of the fund and will be payable as a lump sum, rollover, or annuitized within the plan when participants qualify for retirement, death or disability benefits.

Because SDRS operates within fixed statutory contributions and statutory thresholds for benefit reductions, the VRA exchanges the risk of significant benefit reductions in an economic downturn for incremental adjustments during a participant's career.

Required Lifetime Benefit Payouts

A core objective of a retirement plan should be to provide lifetime income insurance. A major threat to lifetime income is longevity risk, which is the danger of exhausting one's assets before death. Ensuring lifetime income can be accomplished in part by pooling longevity risk, i.e., distributing that risk among many plan participants. The result is that all participants are assured they will not outlive their assets. The alternative is an arrangement, embodied in typical defined contribution plans, in which longevity risk is borne by individuals, and in such cases, a reasonable chance exists, particularly for those who live long lives, that they will, indeed, outlive their assets.

Most public sector plans require some or all of the pension benefit to be paid in the form of an annuity – installments over the remainder of one's life – rather than allowing benefits to be distributed in a lump sum. Annuitizing not only better ensures participants will not exhaust

retirement assets, but it also reduces costs by allowing retirement assets to be invested as part of the trust over a longer period, and by funding for average longevity rather than the maximum longevity.

As examples, the two statewide cash balance plans in Texas require participant accounts to be paid in the form of a lifetime benefit. County and district employees may elect to receive 100% of their own contributions, plus interest, as a partial lump sum upon retirement, and participants in the Texas Municipal Retirement System may elect to take up to 36 months of their benefit as a lump sum, with an actuarial reduction made to their lifetime benefit. The Nebraska cash balance plan gives employees the option of receiving a lifetime benefit payout on any portion of their account balance, and to receive any portion of their retirement benefit as a lump sum.

DB+DC plans normally require the DB portion of the plan to be paid in the form of a lifetime annuity. The DC portion, however, usually may be paid out in various forms including a lifetime benefit, a lump sum or partial lump sum of the account balance, or installments over a certain term (e.g., 5, 10, 15 or 20 years).

Targeted Income Replacement with Social Security, Disability & Survivor Benefits

Pension plans typically are designed to replace a targeted portion of income in retirement, a feature not provided in retirement plans with individual accounts. Approximately 25 percent of state and local government employees do not participate in Social Security.[7] While most public sector retirement plan designs seek to replace a targeted percentage of income, they often also reflect the presence or absence of income from Social Security.

Benefits that provide income insurance in the event of death or disability are an important feature among public sector employers, particularly for jobs that involve hazardous conditions. Most public sector retirement plans—whether traditional or hybrid—include survivor and disability benefits, which is a cost-effective method for sponsoring these benefits.

Conclusion

Nearly every state has made changes in recent years to their retirement plans.[8] While DB plans remain the prevailing model, cash balance and DB+DC plans have been in place for many years in some states, and are new in others. The diversity in public sector plan design reflects the fact that a one-size-fits-all solution does not meet key retirement plan objectives, including the ability of public employers to manage their workforce and to provide an assured source of adequate retirement income for workers. Like defined benefit plans, cash balance and DB+DC plans in the public sector vary from one jurisdiction to the next, and no single design will address the cost and risk factors of every state or local government.

A vital factor in evaluating a retirement plan is the extent to which it contains the core elements known to best meet human resource and retirement policy objectives of state and local governments: mandatory participation, shared financing, pooled investments, targeted income replacement with disability and survivor protections, and lifetime benefit payouts. These features are a proven means of delivering income security in retirement, retaining qualified workers who perform essential public services, and providing an important source of economic stability to every city, town, and state across the country.[9]

The fact that many pension plans sponsored by state and local governments already contain elements of hybrid plans illustrates the important fact that switching to a new hybrid plan design is not necessary to take advantage of hybrid plan design elements. Most public retirement systems seek to provide a benefit that meets these objectives while balancing risk between employees and employer units. The information in the tables below illustrates the degree to which states are using various cash balance and DB+DC designs to achieve these objectives.

Appendix Q | Moody's: Pension Reform Flexibility Affects Government Credit Quality

MOODY'S
INVESTORS SERVICE

SECTOR IN-DEPTH
17 October 2017

Rate this Research

Contacts

Thomas Aaron +1.312.706.9967
VP-Senior Analyst
thomas.aaron@moodys.com

Marcia Van Wagner 212-553-2952
VP-Sr Credit Officer
marcia.vanwagner@moodys.com

Timothy Blake 212-553-4524
MD-Public Finance
timothy.blake@moodys.com

CLIENT SERVICES

Americas	1-212-553-1653
Asia Pacific	852-3551-3077
Japan	81-3-5408-4100
EMEA	44-20-7772-5454

State and local government - US

Pension reform flexibility affects government credit quality

Financial pressure from pensions, other expenditure needs and slow revenue growth has prompted many state and local governments to attempt pension benefit reforms. State court decisions that uphold or overturn reform efforts, and the extent to which benefit changes are an option for improving pension funding, can significantly affect the credit quality of governments within a given state. The pace of legislative reform efforts and corresponding judicial decisions is elevated and ongoing across the country.

» **Key legal questions often center on the flexibility to alter prospective benefits for current employees and/or cost-of-living adjustments (COLAs) for current employees and retirees.** Benefit changes that affect only new employees generally take years to produce material savings. Some governments, such as the State of New York (Aa1 stable), are limited by their state constitutions to only these types of changes. Courts have decided that other governments, such as Oregon (Aa1 stable), may not impair accrued benefits, but can reduce prospective benefit and COLA accruals for current employees.

» **Judicial decisions on benefit changes can have material credit effects for governments.** For example, the State of New Jersey (A3 stable) averted a substantial liability increase in 2016 when its highest court upheld a COLA suspension, while Arizona (Aa2 stable) governments face substantial pension cost increases associated with two legal decisions by the state's Supreme Court. A ruling on the breadth of constitutional pension benefit protections by the Illinois (Baa3 negative) Supreme Court was a driving factor when we lowered the City of Chicago's (Ba1 negative) rating below investment grade.

» **Legal flexibility to achieve reforms does not necessarily translate into practical feasibility or political willingness to curtail liabilities.** Governments such as the State of Ohio (Aa1 stable) and the City of Dallas (A1 negative) have implemented pension benefit reforms to avoid or limit rapidly growing costs. The extent to which these governments can rely on additional reforms to prevent pensions from pressuring budgets in the future is uncertain. Conversely, facing a legal prohibition, the State of Arizona obtained voter approval for a constitutional amendment that enabled modest changes to certain COLA-type benefits.

» **New strategies unrelated to benefit changes are gaining momentum, with varying credit impact.** The City of Jacksonville, FL (Aa2 stable), among others, has sought to address rising pension liabilities and costs with dedicated, future revenue streams. The State of Missouri (Aaa stable), for example, is seeking liability reductions through voluntary buyout offers.

Exhibit 1

Public pension legal summary matrix

Alabama - Georgia

State	State constitution explicitly mentions benefit protections?	Prospective changes to current employee benefits (other than COLAs) and/or contributions allowable?	Flexibility to alter retiree COLAs?	Prospective changes to COLA accruals allowable?	Relevant court case(s)?	Discussion
AL	No	Yes, for those not yet eligible to retire.	Uncertain	Likely yes.	Calvert v. Gadsden (Supreme Court of AL, 1984)**; Taylor v. Gadsden (US Court of Appeals, 2014)	The state's Supreme Court ruled that benefits were protected only once the employee is eligible to retire. In a separate case, the court ruled that contribution rates were not contractually protected.
AK	Yes	No	No	No	Hammond v. Hoffbeck (Supreme Court of AK, 1981)**	Alaska has clear constitutional protections of pension benefits, strictly limiting reform flexibility.
AZ	Yes	No	One-time only, via constitutional amendment.	One-time only, via constitutional amendment.	Fields v. Elected Officials Retirement Plan; Hall v. EORP (Supreme Court of Arizona, 2014 and 2016)**	Voters amended the state's constitution in 2016 to replace permanent benefit increases with more predictable COLAs. The change was applied only prospectively and included retirees. All other elements of Arizona public pension benefits are strictly protected.
AR	No	Yes	Uncertain	Uncertain	Jones v. Cheney; Robinson v Taylor (Supreme Court of AR, 1973 and 2000)**	Benefits are protected once an employee is vested. The state Supreme Court suggests that for non-contributory plans, there is no contractual obligation to provide a particular level of benefits. No precedent-setting ruling on COLA protections has been made by a state court.
CA	No	No	No	No	Yes, but cases are also under consideration by the state's highest court.	The "California Rule," developed over decades through a number of state Supreme Court decisions, effectively limits reforms to future employees only, unless offset by a "comparable new advantage."
CO	No	Yes, for those not yet eligible to retire.	Yes	Yes	Justus v. State (Supreme Court of Colorado, 2014)**	The state's highest court upheld statewide benefit changes passed in 2010. The court upheld prospective COLA changes, including those applied to retirees. It also upheld core benefit changes applied to employees that had not yet met retirement eligibility requirements.
CT	No	Yes, but not unilaterally.	No	Yes, but not unilaterally	Pineman v. Oechslin; Levine v. State Teachers Retirement Bd. (Supreme Court of CT, 1985 and 1998)**	Benefit changes can be made only by revising labor contracts. The state's recent agreement with its bargaining units (SEBAC) increased contributions for current workers and changed COLAs for those retiring after 2022.
DE	No	Yes	Yes, ad hoc COLA awards.	Yes, ad hoc COLA awards.	Dorsey v. State (Supreme Court of Delaware, 2000)**	Benefits are protected for vested employees, which for most employees requires five years of credited service.
FL	No	Yes	No	Yes	Scott v. Williams (Florida Supreme Court, 2013)**	Florida's Supreme Court found that prospective changes to employee contribution requirements for the same benefit package, as well as COLA accruals for future years of service, were allowable.
GA	No	No	Yes, ad hoc COLA awards.	Yes, ad hoc COLA awards.	Swann v. Bd. of Trustees (Supreme Court of Georgia, 1987)**	Courts have ruled that for contributory plans, statutory benefits become part of the employment contract and cannot be changed. Furthermore, benefits are protected even if the employee is not vested.

Relevant court decisions marked with ** are from a given state's highest court.

Source: Moody's Investors Service, actuarial valuations, legal opinions, National Association of State Retirement Administrators, Boston College Center for Retirement Research

Exhibit 2

Public pension legal summary matrix

Hawaii - Maryland

State	State constitution explicitly mentions benefit protections?	Prospective changes to current employee benefits (other than COLAs) and/or contributions allowable?	Flexibility to alter retiree COLAs?	Prospective changes to COLA accruals allowable?	Relevant court case(s)?	Discussion
HI	Yes	Yes	No	Uncertain	Kaho'ohanohano v. State (Supreme Court of HI, 2007)**	The constitutional prohibition on diminishment or impairment of benefits extends to the finding that diversions of required employer pension contributions are unconstitutional.
ID	No	No	No	No	Nash v. Boise City Fire Dept; Hansen v. City of Idaho Falls (Supreme Court of Idaho, 1983 and 1968)**	The Idaho Supreme Court ruled that modifications to pension benefits are allowable if the changes preserve the flexibility and integrity of the system. The parameters defining flexibility and integrity are not established.
IL	Yes	No	No	No	Heaton v. Quinn (Illinois Supreme Court, 2015)**	The Illinois Supreme Court has ruled that benefits in place when an employee is hired are protected from being diminished or impaired under the state's constitution.
IN	No	Yes	Yes	Yes	Haverstock v. Public Employees Retirement Fund (Court of Appeals of Indiana, 1986)	Benefits are protected only once an employee retires. COLAs are subject to approval by the general assembly.
IA	No	Yes	Yes	Yes	Iowa City v. White (IA Supreme Court, 1961)**	Benefits are protected only once an employee retires. For IPERS, COLA payments depend on plan funded status.
KS	No	Yes, but limited	Yes, but limited depending on date of hire	Yes	Singer v. City of Topeka (Kansas Supreme Court, 1980)**	The Kansas Supreme Court ruled that limited modifications to benefits are allowable if accompanied by offsetting advantages. KRS reforms suspended COLAs for retirees but other benefit reforms applied only to new hires.
KY	No	Yes, for those not yet eligible to retire.	Yes	Yes	Jones v. Bd of Trustees (KY Supreme Ct, 1995)**	Benefits are protected for employees eligible to retire. Reforms have suspended COLAs for active and retired participants.
LA	Yes	Yes	Yes	Yes	No	Accrued benefits are protected for vested employees. Changes carrying higher actuarial costs require a legislative supermajority. Reforms have included reduced COLAs for current and future retirees, and benefit changes for new hires.
ME	No	Yes, for non-vested employees.	Yes	Yes	Maine Association of Retirees v Board of Trustees (US Court of Appeals, 2014)	Reforms included COLA changes for current and future retirees and benefit changes for non-vested actives. In Maine Association of "Retirees v Board of Trustees," the First Circuit held that COLA changes are allowable.
MD	No	Yes	No	Yes	Davis v. Annapolis (Court of Special Appeals of MD, 1993)	In its 2011 reform, the state increased contributions for both new and current members and changed COLAs for service credits earned after the date of the reform.

Relevant court decisions marked with ** are from a given state's highest court.

Source: Moody's Investors Service, actuarial valuations, legal opinions, National Association of State Retirement Administrators, Boston College Center for Retirement Research

Exhibit 3

Public pension legal summary matrix

Massachusetts - Nevada

State	State constitution explicitly mentions benefit protections?	Prospective changes to current employee benefits (other than COLAs) and/or contributions allowable?	Flexibility to alter retiree COLAs?	Prospective changes to COLA accruals allowable?	Relevant court case(s)?	Discussion
MA	No	Yes	Yes, ad hoc COLA awards	Likely yes	Madden v. Contributory Retirement Appeal Bd. (Supreme Judicial Court of MA, 2000)**	The state's Supreme Court ruled that "reasonable modifications" may be made to the pension system and are not precluded by vested contractual rights.
MI	Yes	Yes	No	Yes	AFT Michigan v State of Michigan (State of MI Court of Appeals, 2016)	Reforms provided choices to employees to (1) increase contributions for members in the DB with no benefit reduction, (2) continue old contribution levels but receive benefit reduction or (3) elect to move to a DC plan.
MN	No	Yes	Yes	Yes	Swanson v. State of Minnesota, (Minnesota District Court, 2011)	Reforms changed contribution for current employees and COLAs for current and future retirees but other benefit changes applied to new hires only.
MS	No	Uncertain	No	Uncertain	Public Employees' Retirement System v Porter (Supreme Court of MS, 2000)**	Reforms have increased contribution rates for actives but other benefit changes (for example, COLAs) applied to new hires only. "Porter" case ruled that a member's right to name a beneficiary was protected, but no ruling has been made on other benefits.
MO	No	Yes, but limited	Yes, but limited	Yes, but limited	No	Benefits and COLAs can be changed prospectively for employees hired on or after January 1 2011; ability to make prospective changes for employees hired previously is uncertain.
MT	No	Yes, but limited	Uncertain	Uncertain	Association of Montana Retired Public Employees (AMRPE) v. State of Montana (MT First Judicial District Court, 2015)	Benefits protected for employees eligible to retire. A lower court ruled that reduction of COLA benefits was a contract violation but ultimately the parties settled and no definitive ruling exists.
NE	No	Yes, but not unilaterally.	Yes, but not unilaterally.	Yes, but not unilaterally.	Calabro v. City of Omaha (Nebraska Supreme Court, 1995)**	The state's highest court ruled that pension benefit changes must be agreed to through the collective bargaining process. For unilateral changes, the state's highest court essentially adopted the "California Rule" in the "Calabro" case.
NV	No	No	No	No	Public Employees' Retirement Board v. Washoe County (Supreme Court of Nevada, 1980)**	Nevada's Supreme Court has essentially adopted the "California Rule," because even though it found employees not yet retired have only a limited vested right to a pension, the only permissible modifications pertain to maintaining the actuarial soundness of the pension plan and require a comparable offsetting advantage in order to be changed.

Relevant court decisions marked with ** are from a given state's highest court.

Source: Moody's Investors Service, actuarial valuations, legal opinions, National Association of State Retirement Administrators, Boston College Center for Retirement Research

XIXXX

Exhibit 4

Public pension legal summary matrix

New Hampshire - Oklahoma

State	State constitution explicitly mentions benefit protections?	Prospective changes to current employee benefits (other than COLAs) and/or contributions allowable?	Flexibility to alter retiree COLAs?	Prospective changes to COLA accruals allowable?	Relevant court case(s)?	Discussion
NH	No	Yes	Yes	Yes	Professional Firefighters v. State of NH ; American Federation of Teachers v. State of NH ; Professional Firefighters (II) v State of NH (Supreme Court of New Hampshire, 2014, 2015 and 2016)**	The states' constitution does not explicitly protect benefits, but does require actuarial contributions set by the state retirement system. In the first "Firefighters" case, New Hampshire's highest court allowed contribution increases for current employees. In "Teachers," the court found that changes to COLAs were also permissible. In the second firefighters case, the court allowed a number of other prospective benefit changes.
NJ	No	Yes	Yes	Yes	Berg v Christie (Supreme Court of New Jersey, 2016)**	COLA suspensions were deemed allowable by the state's highest court, and increases to employee contribution rates on a prospective basis were successfully implemented as part of Chapter 78 legislative changes in 2011.
NM	No	Yes	Yes	Yes	Barlett v Cameron, et al (New Mexico Supreme Court, 2013)**	The state successfully increased NMERB employee contributions on a prospective basis in 2013. The state Supreme Court has also drawn a distinction between COLA benefits and core pension benefits, finding prospective flexibility to modify COLAs, even for current retirees.
NY	Yes	No	No	No	Birnbaum v. New York State Teachers' Retirement System (Court of Appeals of the State of New York 1958)**	The state's constitution prohibits pension benefits for members in the state systems or its civil divisions from being diminished or impaired. The prohibition extends to the finding that diversions of required employer pension contributions are unconstitutional.
NC	No	Yes, for non-vested employees.	Yes, ad hoc COLA awards.	Yes, ad hoc COLA awards.	Simpson v. North Carolina Local Government Employees Retirement System (Supreme Court of NC 1988)**	North Carolina's Supreme Court ruled that once an employee vests in a pension, benefit terms at the time of vesting become a contractual right and may not be reduced.
ND	No	Yes	Ad hoc COLAs in the state teacher plan. No COLAs for Public Employees Retirement System.	Ad hoc COLAs in the state teacher plan. No COLAs for Public Employees Retirement System.	No	Prospective changes have been successfully implemented. The state increased teacher contributions and changed eligibility requirements for an unreduced retirement, even for certain active Tier 1 employees. COLAs are either entirely ad hoc or are simply not provided.
OH	No	Yes	Yes	Yes	No	Ohio has the ability to amend pension benefits for current employees until retirement. After retirement, COLAs can also be suspended by the state retirement systems in order to remain in compliance with a statutory funding target.
OK	No	Yes.	Yes, HB 2132 (2011) requires COLAs to be funded when granted.	Yes, HB 2132 (2011) requires COLAs to be funded when granted.	Stevens v. Fox (covering a procedural dispute only) (Supreme Court of the State of OK 2016)**	Employee contribution rates have been increased prospectively, but other benefit changes have typically applied to new employees.

Relevant court decisions marked with ** are from a given state's highest court.

Source: Moody's Investors Service, actuarial valuations, legal opinions, National Association of State Retirement Administrators, Boston College Center for Retirement Research

XL

Exhibit 5

Public pension legal summary matrix

Oregon - Vermont

State	State constitution explicitly mentions benefit protections?	Prospective changes to current employee benefits (other than COLAs) and/or contributions allowable?	Flexibility to alter retiree COLAs?	Prospective changes to COLA accruals allowable?	Relevant court case(s)?	Discussion
OR	No	Yes	No	Yes	Moro v State of Oregon (Supreme Court of the State of Oregon 2016)**	Oregon's highest court ruled that benefits (including COLAs) cannot be altered for accrued service. Changes applied to future years of service are allowable.
PA	No	No	Yes, ad hoc COLA awards.	Yes, ad hoc COLA awards.	Numerous cases, most recent: Assoc of PA State College and Univ Faculties v State System of Higher Ed (Supreme Court of Pennsylvania 1984)**	Benefits in place as of an initial employment date are protected. However, the state grants COLAs on an ad hoc basis only.
RI	No	Yes	Yes	Yes, but not unilaterally.	No	Rhode Island's pension reform moved current employees into a new hybrid system (with exceptions for older workers), among other changes, but was not tested in court pursuant to a settlement with retirees and union members.
SC	No	Yes, but most benefit changes have been applied to new employees.	Likely yes.	Likely yes.	No	The state recently increased employee contribution requirements prospectively. A legislative committee on statewide pension funding determined it does not intend to seek COLA reductions, but has studied the financial impact. Thus, it appears that COLA changes for current retirees are legally an option.
SD	No	Uncertain	Yes.	Yes	Tice v. State of South Dakota (Circuit Court of SD 2012)	COLA changes, even applied to retirees, have been deemed legal by a lower court.
TN	No	Yes, for non-vested employees.	Yes, if no evidence of legislative intent to provide a contractual right.	Yes, if no evidence of legislative intent to provide a contractual right.	Blackwell v. Quarterly County Court of Shelby County (Supreme Court of TN 1981)**	The state's highest court prohibited prospective changes for current employees, once they have vested in a pension. A state appellate court found greater flexibility pertaining to COLA benefits, allowing changes that affected retirees because it found no evidence of an intent to create a contractual right to a specific COLA formula.
TX	Yes, for most local retirement systems.	Yes	Yes	Yes	Dallas v. Trammell (Supreme Court of Texas, 1937)**	State employee benefits are considered gratuities and may be impaired. With the exception of a handful of cities that opted out, core benefits already accrued in local systems may not be impaired. Changes implemented by the City of Dallas demonstrate that COLAs may altered.
UT	No	Yes, for those not yet eligible to retire	No	Uncertain	Johnson v. Utah State Retirement Bd. (Utah Supreme Court 1988)**	Benefits are protected for employees eligible to retire. Reforms (creation of hybrid plan & DC plan) applied to new hires only; employee contribution rates are not considered a protected benefit.
VT	No	Yes, but not unilaterally.	Likely no.	Yes, but not unilaterally.	Burlington Fire Fighters v Burlington (Supreme Court of VT 1988)**	The "Burlington Fire Fighters" case suggests a requirement for an offsetting "comparable new advantage" if benefits are changed. However, Vermont local governments have implemented prospective contribution increases for current employees, and through collective bargaining have altered COLA provisions for employees that have not yet retired.

Relevant court decisions marked with ** are from a given state's highest court.

Source: Moody's Investors Service, actuarial valuations, legal opinions, National Association of State Retirement Administrators, Boston College Center for Retirement Research

Exhibit 6

Public pension legal summary matrix

Virginia - Wyoming

State	State constitution explicitly mentions benefit protections?	Prospective changes to current employee benefits (other than COLAs) and/or contributions allowable?	Flexibility to alter retiree COLAs?	Prospective changes to COLA accruals allowable?	Relevant court case(s)?	Discussion
VA	No	Yes, for non-vested employees.	Likely no.	Only for non-vested employees.	Pitts v. City of Richmond (Supreme Court of VA 1988)**	Virginia's Supreme Court has ruled that benefits are protected for fully vested employees. In practice, reforms that required employee contribution increases were implemented, but offset by salary increases (a comparable new advantage). Benefit changes to COLAs have been applied to only new hires and non-vested employees.
WA	No	Yes	Yes	Yes	Leonard v City of Seattle (Supreme Court of WA 1972)**	Employee contribution rate increases have been enacted, and the definition of pensionable compensation has been changed for current employees on a prospective basis. COLAs have been altered on a prospective basis for current retirees.
WV	No	No	No	No	Booth v. Sims (WV Supreme Court 1994)**; Myers v West Virginia Consol. Public Retirement Board (WV Supreme Court 2010)..	West Virginia's Supreme Court has come close to adopting the "California Rule." However, West Virginia's highest court found that 10 years of service were required to establish "detrimental reliance" for strict benefit protections, rather than the date of hire.
WI	No	Yes	Yes	N/A	Wisconsin Professional Police Ass'n., Inc. v. Lightbourn (Wisconsin Supreme Court 2001)**	The state has enacted benefit changes for future service of both current and future employees of the Wisconsin Retirement System. The Wisconsin Retirement System only provides annuity adjustments based on investment returns, not cost of living.
WY	No	Uncertain, but likely no.	Yes, for most plans, COLAs are granted only on an ad hoc basis.	Yes, for most plans, COLAs are granted only on an ad hoc basis.	Peterson v Sweetwater County Schools (Supreme Court of WY 1996)**	Wyoming's key court decision required the inclusion of certain types of salary (a performance bonus) in pensionable compensation.

Relevant court decisions marked with ** are from a given state's highest court.

Source: Moody's Investors Service, actuarial valuations, legal opinions, National Association of State Retirement Administrators, Boston College Center for Retirement Research

Appendix - About this report

This report presents summary findings related to the key elements of public pension reform flexibility across the 50 states, as of the date of publication. We focus on the following:

» the flexibility to reform prospective benefits and/or contributions for current employees;

» the flexibility to alter COLA formulas associated with future work;

» and the ability to suspend or reduce COLA formulas for current retirees.

We focus on these three areas because many relevant judicial decisions with government credit ramifications center on these issues, and they are a source of variation in the pension benefit protection legal framework across states.

Our summaries do not express a legal opinion, but rather, reflect our analysis of the rules clarified by relevant judicial decisions and/or the benefit changes governments have implemented that at least to date, have not been overturned. The answers to these key legal questions are far clearer in states with directly relevant and relatively recent decisions by the highest state courts, such as Illinois (most stringent protections) and Oregon (prospective flexibility related to core annuities and COLAs). The answers are less clear in states such as Rhode Island, where settlements have been reached and prevented adjudication of key legal questions pertaining to pension benefit protections, or even Oklahoma, where a key state Supreme Court decision focused on questions surrounding legislative procedure rather than the extent of benefit protections.

This overview may not capture distinctions in benefit protections that have emerged in some states. For example, a state that is able to require increased contributions from active employees may not be able to make any other benefit changes for that group.

While we have focused on several key legal questions that tend to relate to more significant changes, the credit ramifications of reform flexibility can differ by government and by pension plan, because factors such as plan demographics and benefit provisions vary.

Moody's Related Research

Sector In-Depth

» Court Decisions Define Important Pension Risk Differences Across States, July 2015

NASRA Issue Brief:
Employee Contributions to Public Pension Plans

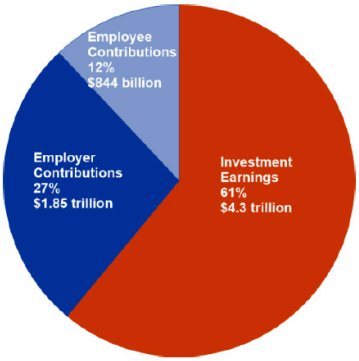
September 2017

Unlike in the private sector, nearly all employees of state and local government are required to share in the cost of their retirement benefit. Employee contributions typically are set as a percentage of salary by statute or by the retirement board. Although investment earnings and employer contributions account for a larger portion of total public pension fund revenues (see Figure 1), by providing a consistent and predictable stream of revenue to public pension funds, contributions from employees fill a vital role in financing pension benefits.[i] Reforms made in the wake of the 2008-09 market decline included higher employee contribution rates in many states. This issue brief examines employee contribution plan designs, policies and recent trends.

Mandatory Participation & Shared Financing

For the vast majority of employees of state and local government, both participation in a public pension plan and contributing toward the cost of the pension are mandatory terms of employment. Requiring employees to contribute distributes some of the risk of the plan between employers and employees. The primary types of risk in a pension plan pertain to investment, longevity, and inflation. Employees who are required to contribute toward the cost of their pension assume a portion of one or more of these risks, depending on the design of the plan.[ii]

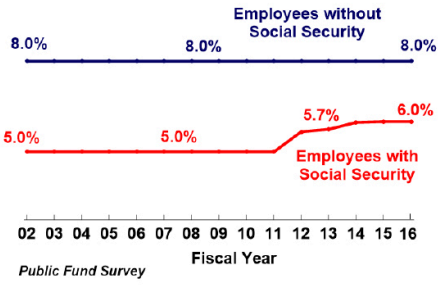
Figure 1: Public pension sources of revenue, 1987-2016



Source: Compiled by NASRA based on U.S. Census Bureau data

The prevailing model for employees to contribute to their pension plan is for state and local governments to collect contributions as a deduction from employee pay. This amount usually is established as a percentage of an employee's salary and is collected each pay period. As shown in Appendix A, employee contribution rates to pension benefits typically are between four and eight percent of pay, and are outside these levels for some plans. In some cases, required employee contributions are subject to change depending on the condition of the plan, the fund's investment performance, or other factors. In some plans, the employee contribution is actually paid by the employer in lieu of a negotiated salary increase or other fiscal offset.

Figure 2: Median employee contribution rate by Social Security eligibility, FY 02 to FY 16 (non-public safety)



Some 25 to 30 percent of employees of state and local government do not participate in Social Security. In most cases, the pension benefit—and required contribution—for those outside of Social Security is greater both than the typical benefit and the required contribution for those who do participate in Social Security[iii]. Appendix A identifies whether or not most plan members participate in Social Security.

Trends in Employee Contributions

Many states in recent years made changes requiring employees to contribute more toward their retirement benefits: since 2009, more than 35 states increased required employee contribution rates (see Figure 3). As a result of these changes, the median contribution rate paid by employees has increased. Figure 2 shows that the median

contribution rate has risen, to 6.0 percent of pay, for employees who also participate in Social Security, and has remained steady at 8.0 percent for those who do not participate in Social Security.

New Contributions

Contribution requirements for certain employee groups in some states, such as **Missouri** and **Florida,** which previously did not require some employees to make pension contributions, were established in recent years for newly hired employees, existing workers, or both. Employees hired in **Utah** since July 1, 2011 must contribute toward the cost of their plan if that cost exceeds 10 percent of pay (12 percent for public safety workers). Because the cost of the plan remains below those thresholds, the Utah Retirement System remains non-contributory for most plan participants.

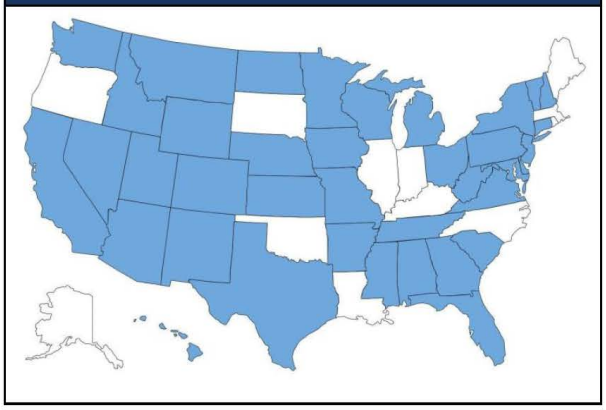
Variable Contributions

Some states, such as **Arizona, Iowa, Kansas, Nevada, and Pennsylvania** maintain an employee contribution rate that varies depending on the pension plan's actuarial condition. Because of the effect investment returns have on a pension plan's actuarial condition, the cost of a pension plan generally will rise following periods of sub-par investment returns and fall when investment returns exceed expectations. Changes approved in recent years in **Arizona, California, and Michigan** require some workers to pay at least one-half of the normal cost of the benefit, which can result in a variable contribution rate. And, as described previously, the **Utah** plan affecting new hires since July 2011could become variable.

Increased Contributions for Current Plan Participants

Most employee contribution rate increases approved in recent years affected all workers-current and future. In some states, such as **Virginia** and **Wisconsin**, new and existing employees are now required to pay the contributions that previously were made by employers in lieu of a salary increase.

Figure 3: States that increased employee contributions in at least one public pension plan since 2009



Hybrid Plans

A growing number of public employees now participate in hybrid retirement plans, which combine elements of defined benefit and defined contribution plans, and that transfer some risk from the employer to the employee. In one type of hybrid plan, known as a combination defined benefit-defined contribution plan, employees in most cases are responsible for contributing all or most of the cost of the defined contribution portion of the plan.

Contribution requirements to the DB component of combination plans vary: some are funded solely by employer contributions, while others require contributions from both employees and employers. In most of these cases, employees are also required to contribute toward the cost of the defined contribution portion of their hybrid plan benefit.[iv]

Collective Bargaining

Employee contributions in some cases are set by collective bargaining, and can be changed when labor agreements are negotiated. For example, required employee contribution rates for employee groups in **California** and **Connecticut** increased in recent years as a result of labor agreements in those states.

Legal Landscape

The legality of increasing contributions for current plan participants varies. Some states prohibit an increase in contributions for existing plan participants. For example, a 2012 ruling in **Arizona** found that legislative efforts to increase contributions for existing workers violated a state constitutional protection against impairment of benefits. In other states, however, such as in **Minnesota** and **Mississippi**, higher employee contributions either did not produce a legal challenge, or withstood legal challenges (such as in **New Hampshire** and **New Mexico**).

Conclusion

Employee contributions are a key component of public pension funding policies. The vast majority of employees of state and local government are required to contribute to the cost of their pension benefit, and this number has grown in recent years as most states that previously administered non-contributory plans now require worker contributions.

Many employees also are being required to contribute more toward the cost of their retirement benefit. In some cases, this requirement applies to both current and new workers; in other cases, only to new hires.

A growing number of states are exposing employee contributions to risk – either by tying the rate directly to the plan's investment return, or by requiring hybrid or 401k-type plans as a larger component of the employee's retirement benefit.

See Also

Information is available on public pension contributions at

- Contributions @NASRA.org
- Significant Reforms to State Retirement Systems, NASRA, June 2016
- Contribution Rates and Funding Issues @NASRA.org
- Public Fund Survey Summary of Findings, NASRA

Contact:

Keith Brainard, Research Director, keith@nasra.org
Alex Brown, Research Manager, alex@nasra.org
National Association of State Retirement Administrators, www.nasra.org

---

[i] NASRA Issue Brief: Public Pension Plan Investment Return Assumptions
http://www.nasra.org/returnassumptionsbrief
[ii] NASRA Issue Brief: Shared Risk in Public Retirement Systems
http://www.nasra.org/sharedriskbrief
[iii] Social Security@NASRA.org
[iv] NASRA Issue Brief: State Hybrid Retirement Plans
http://www.nasra.org/hybridbrief

Appendix S | PERS COLA Check Rate History

Dates	Rates
7/1/2011 – Present [7]	3% for each full fiscal year of retirement, compounded after age 60 for those hired on/after July 1, 2011
7/1/1999 – Present [6]	3% for each full fiscal year of retirement, compounded after age 55 (annual adjustment will not be less than 4% for each full fiscal year in retirement through fiscal year 1998)
7/1/1998 – 6/30/1999	4% (2.50% + 1.50%) for all full state fiscal years through June 30, 1997 + 3.80% (2.30% + 1.50%) for fiscal year 1998
7/1/1997 – 6/30/1998	4% (2.50% + 1.50%) for all full state fiscal years through June 30, 1997
7/1/1996 – 6/30/1997	4% (2.50% + 1.50%) for all full state fiscal years through June 30, 1996
7/1/1995 – 6/30/1996	4% (2.50% + 1.50%) for all full state fiscal years through June 30, 1995
7/1/1994 – 6/30/1995 [5]	2.50% for all full state fiscal years through June 30, 1994
12/15/1993	3% (2.50% + 0.50%) for all full state fiscal years through June 30, 1993
12/15/1992	2.75% (2.50% + 0.25%) for all full state fiscal years through June 30, 1992
12/15/1991	2.75% (2.50% + 0.25%) for all full state fiscal years through June 30, 1991
12/15/1990 [4]	2.50% for all full state fiscal years through June 30, 1990
12/15/1989	2.50% for all full state fiscal years through June 30, 1989
12/15/1988	2.50% for all full state fiscal years through June 30, 1988
12/15/1987	3.25% (2.50% + 0.75%) for all full state fiscal years through June 30, 1987
12/15/1986	3.25% (2.50% + 0.75%) for all full state fiscal years through June 30, 1986
12/15/1985 [3]	3.25% (2.50% + 0.75%) for all full state fiscal years through June 30, 1985
12/15/1984 [2]	2.50% for all full state fiscal years through June 30, 1984
12/15/1983	2.50% for all full state fiscal years through June 30, 1982 + 1.20% for fiscal year 1983
12/15/1982	2.50% for all full state fiscal years through June 30, 1982
12/15/1981	1.50% for all full state fiscal years through June 30, 1979 + 2.50% for fiscal years 1980 and 1981
12/15/1980	1.50% for all full state fiscal years through June 30, 1979 + 2.50% for fiscal year 1980
12/15/1966 [1] - 12/15/1979	1.50% for all full state fiscal years

[1] First COLA Check for PERS issued 12/15/1966
[2] Provided COLA payment at 2.5%, subsequent years would be 100% of change in CPI up to maximum of 2.5%
[3] Provided additional payment in excess of 2.5% in increments of .25% to a maximum of 1.5% based on actuarial gains
[4] Provided COLA would be cumulative percentage
[5] 12-Month Payment Option first available 07/01/1994
[6] COLA changed to 3% simple to age 55, compounded after age 55
[7] COLA changed to 3% simple to age 60, compounded after age 60 for those hired on/after July 1, 2011

Appendix T | Changes in PERS Retirement COLA Law

1966

1. 20% increase in benefit formula (1.25% to 1.5% for each year of service). (Applied to future retirees only)

2. Annual payment of COLA to those who retired **before** July 1, 1966 (1.5% X no. of years retired X annual benefit). (Those who retired after July 1, 1966, received higher benefits under item 1)

1968

1. Extended COLA to those who retired between July 1, 1966, and June 30, 1968.

1973

1. COLA to apply to all retirants rather than those retired prior to July 1, 1968.

1980

1. Provided for the payment of the COLA payment on December 15 on an actuarial basis as all other costs in the System and to increase the COLA allowance as follows: 1.5% of the annual retirement allowance for each full fiscal year of retirement prior to July 1, 1979, and to allow subsequent to July 1, 1979, an amount equal to one-half of the annual percentage change in each fiscal year of the consumer price index set by the U.S. Government not to exceed 2.5% for any fiscal year.

1982

1. To increase the extra payment to retirees from 1.5% to 2.5% for each full fiscal year of retirement prior to July 1, 1979. The extra payment shall be an amount equal to 1/2 of the annual percentage change of the consumer price index set by the U.S. Government in each fiscal year, not to exceed 2.5% of the annual retirement allowance for each full fiscal year of retirement. (H.B. 925-ch 382-Eff 7-1-82)

1984

1. Provided the COLA payment on December 15 for all years prior to July 1, 1984, will be increased to 2.5% and provided for subsequent years the annual percentage change will be 100% of the CPI up to a maximum of 2.5%. (1983 fiscal year retirees received l.2% increase-1/2 of CPI).(S.B. 2460-ch 310-Eff 7-1-84)

1985

1. Provided additional annual payment, in excess of 2.5%, in increments of .25% to a maximum of 1.5% of the annual retirement allowance for each full year of retirement, as long as there are sufficient actuarial gains in reserves for retired members and beneficiaries. (7-1-85)

2. Provided any person eligible to receive the COLA (both 2.5% and additional payment) may elect by irrevocable agreement to receive such payments in monthly installments not to exceed six months during current fiscal year. In event of death of a person or beneficiary receiving monthly benefits, any remaining amounts shall be paid in a lump sum to designated beneficiary. (7-1-85)

1990

1. Amended 25-11-112 to make the COLA a cumulative percentage. (effective 7-1-90)

1994

1. Section 25-11-112(1) amended to provide an irrevocable option to retirees to have the cumulative portion of COLA payment paid in 12 equal installments beginning July 1 of the fiscal year.

1999

1. Changes the calculation of the annual benefit adjustment (better known as the COLA) for PERS to provide for an annual adjustment equal to (a) 3% of the annual retirement allowance for each full fiscal year of retirement prior to the year in which the member reaches age 55, plus (b) 3% compounded for each year thereafter beginning with the fiscal year in which the member turns age 55; ***provided, however, that the annual adjustment will not be less than 4% of the annual retirement allowance for each full fiscal year in retirement through 6/30/98.***

2. Allows a reemployed retiree will be able to count all fiscal years in retirement, not just the fiscal years in retirement since the last retirement.

3. Provides that a beneficiary's additional benefit under the new calculation will be based on the member's age and full fiscal years in retirement as if the member had lived.

4. Provides that a prorated portion of the annual adjustment will be paid to the beneficiary or estate of any member or beneficiary who is receiving the annual adjustment in a lump sum, but who dies between July 1 and December 1, in those cases where no more monthly benefits will be paid after the member's or beneficiary's death. This prorated portion will be equal to the amount that such recipient would have received had he or she elected to receive the annual adjustment for the year on a monthly basis.

5. Because the **entire annual adjustment** under the **new law** will be paid in monthly installments for those who have elected such method of payment, retirees and beneficiaries will be allowed a one-time opportunity to change the method of payment and revert back to a lump sum payment of the entire amount in December of each year. This one-time election must be made before June 1, 2000, and will be effective for the fiscal year beginning July 1, 2000.

6. Amends § 25-11-112(7) to provide that beginning July 1, 1999, the option to have the annual adjustment paid over two to six months beginning in January of each year will no longer be available. However, those having already selected that option prior to July 1, 1999, will be allowed to continue with that option.

2002

1. Amends § 25-11-112 to provide that a pro-rated share of the lump-sum COLA will be paid if a benefit terminates before December 1 of the fiscal year. Also, allows the Board to grant a change in the manner the COLA is paid if a hardship is shown. **(H. B. 1148, effective 7/1/02)**

2. Amends § 25-11-112 to provide that upon re-retirement of a member who has previously received a COLA, the member's additional benefit shall be re-instated immediately at re-retirement. **(H. B. 1148, effective 7/1/02)**

2010

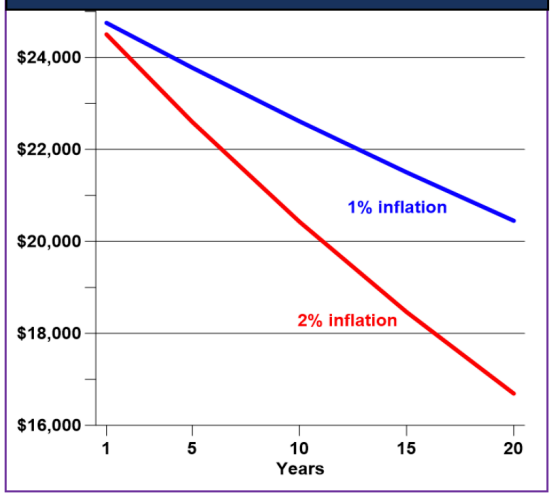
1. Changes the calculation of the annual benefit adjustment (COLA) for PERS to provide for an annual adjustment equal to (a) 3% of the annual retirement allowance for each full fiscal year of retirement prior to the year in which the member reaches age 60, plus (b) 3% compounded for each year thereafter beginning with the fiscal year in which the member turns age 60.

NASRA Issue Brief:
Cost-of-Living Adjustments

November 2017

Periodic cost-of-living adjustments (COLAs) in some form are provided on most state and local government pensions. The purpose of a COLA is to offset or reduce the effects of inflation on retirement income. Considerable variation exists in the way COLAs are designed, and in many cases they are determined or affected by other factors, such as inflation or the financial condition of the plan. COLAs add both value and cost to a pension benefit. Public pension COLAs have received increased attention as many states look to make adjustments to the cost of benefits amid challenging fiscal conditions and the current low-inflationary environment. This brief presents a discussion about the purpose of COLAs, the different types of COLAs provided by government pension plans, and an overview of recent state changes to COLA provisions.

Figure 1: Impact of 20 Years of Inflation on Purchasing Power of $25,000



COLA Purpose

A COLA is provided to offset or reduce the effects of inflation, which erodes the purchasing power[1] of retirement income, as illustrated in Figure 1. Using two hypothetical inflation rates, after 20 years, the real (inflation-adjusted) pension benefit in this example of $25,000 falls to $20,488 (82 percent of its original value) or $16,690 (67 percent of its original value), depending upon the actual rate of inflation.

Such depreciation can affect the sufficiency of retirement benefits, particularly for those who are unable to supplement their income due to disability or advanced age. As Social Security beneficiaries receive an annual COLA to maintain recipients' purchasing power, tied to a measure of inflation,[2] many state and local governments also provide an adjustment to their retirees' pension benefit that is intended to offset the effects of inflation. This adjustment is particularly important for those public employees – including nearly half of public school teachers and most public safety workers – who do not participate in Social Security. Unlike Social Security, however, state and local retirement systems typically pre-fund the cost of a COLA over the working life of an employee to be distributed annually over the course of his or her retired lifetime.

Common COLA Types and Features

The way in which public pension COLAs are calculated and approved varies considerably. Appendix A presents a listing of COLA provisions for many state retirement plans, illustrating the variety that exists in COLA plan designs. In general, COLA types and features are differentiated in the following ways:

Automatic vs. Ad hoc

An overarching distinction among COLAs is whether they are provided automatically or on an ad hoc basis. An ad hoc COLA requires a governing body to actively approve a postretirement benefit increase. By contrast, an automatic COLA occurs without action, and is typically predetermined by a set rate or formula. In some cases, ad hoc COLAs are

[1] Purchasing power refers to the effect of inflation on the value of currency over time, calculated for the purpose of determining the amount of goods or services a unit of currency can buy at different points in time

[2] Social Security Administration, Latest Cost-of-Living Adjustment, https://www.ssa.gov/OACT/COLA/latestCOLA.html

contingent on other factors, such as a maximum unfunded liability amortization period (e.g., the Texas Legislature may approve a COLA for plans covering state employees and teachers if the plans' amortization period is less than 31 years).

Simple vs. Compound

Another distinction between COLA types is whether the increase is applied in a simple or compound manner. Under a simple COLA arrangement, each year's benefit increase is calculated based upon the employee's original benefit at the time of his or her retirement. Under a compound COLA arrangement the annual benefit increase is calculated based upon the original benefit as well as any prior benefit increases. Some COLAs contain both features, i.e., they may be "simple" until the retiree reaches a certain age or year retired, at which point COLA benefits are calculated using a compound method.

Inflation-based

Many state and local governments provide a post-retirement COLA based on a consumer price index (CPI), which is a measure of inflation. Most provisions like this restrict the size of the adjustment, such as by "one-half of the CPI" and/or "not to exceed three percent." The most recognized CPI measures are calculated and published by the U.S. Bureau of Labor Statistics (BLS), and the CPI measures used by most public pension plans are either the CPI-U (based on all urban consumers) and the CPI-W (urban wage earners and clerical workers). Some states use state- or region-specific inflation measures to determine the amount of the COLA.

Table 1: Select Public Plans by COLA Type

	Linked to inflation	Linked to investment or funding condition	Fixed percentage or other factor	Total
Automatic	50	12	10	72
Ad-hoc	5	0	23	28
Total	55	12	33	100

Note: COLAs for some employees of local governments who participate in statewide systems are discretionary based on the decision of individual local government. See Appendix A for more details.

Performance-based

Some public pension plans tie their COLA to the plan's funding level or investment performance. In one statewide system, for example, the COLA falls within a range and is tied to CPI, based on the funding level of the plan. Annuitants with another state system receive a permanent benefit increase tied to their length of service, when the fund's actuarial investment return exceeds the assumed rate of investment return.

Delayed-onset or Minimum Age

Another characteristic contained in some automatic COLAs is to delay its onset, either by a given number of years or until attainment of a designated age. A COLA with this feature may also take on any of the characteristics stated above and will become available to a retiree once he or she meets the designated waiting period or age requirement.

Limited Benefit Basis

Some retirement systems award a COLA calculated on a portion of a retiree's annual benefit, rather than the entire amount. For example, one system provides a COLA of up to three percent applied to only the first $13,000 of benefit. In such cases, the COLA can also be tied to an external indicator, such as CPI, and other factors, such as delayed onset, may also be in place.

Self-funded Annuity Option

Some state retirement plans offer post-retirement benefit increases through an elective process known as a self-funded annuity account. Under this design a member effectively self-funds his or her COLA by choosing to receive a lower monthly benefit in exchange for a fixed rate COLA to be paid annually upon retirement.

Reserve Account

Other public retirement systems pay COLAs from a pre-funded reserve account. This is a variation on the COLA tied to investment performance since the reserve account is funded with excess investment earnings. Under this scenario a COLA is provided from the funds set aside in the reserve account. Sometimes there is a stipulation attached that the fund itself must reach a certain size for any COLA to be granted in a given year.

COLA Costs

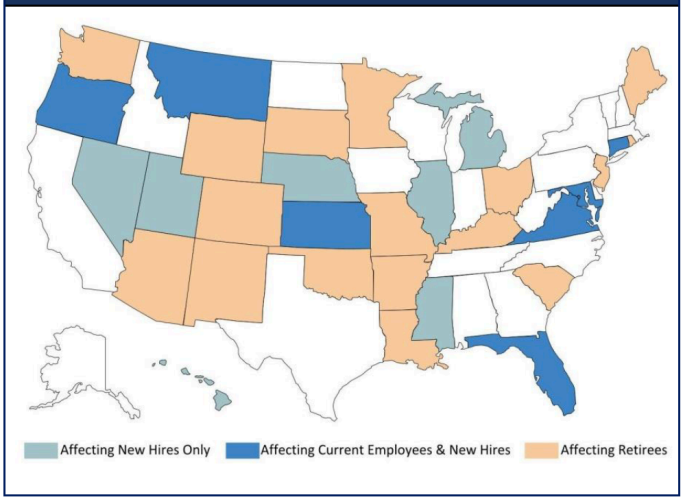
The cost of a COLA predictably depends on the characteristics of the COLA benefit. Such factors as its size; the portion of the benefit to which the COLA applies; whether or not the COLA is paid annually or sporadically; whether the adjustment is simple or compounded, and other features, all affect its cost. It is estimated that an automatic COLA of one-half of an assumed CPI of three percent, compounded, will add 11 percent to the cost of the retirement benefit. An automatic COLA of three percent, compounded, is estimated to add 26 percent to the cost of the benefit.[3]

The Governmental Accounting Standards Board (GASB) requires public pension plans to disclose assumptions regarding COLAs, including whether the COLA is automatic or ad hoc, and to include the cost of COLAs in projections of pension benefit payments. GASB considers an ad hoc COLA to be "substantively automatic" when a historical pattern exists of granting ad hoc COLAs or when there is consistency in the amount of changes to a benefit relative to an inflation index.[4]

Recent Changes to COLAs

In effort to reduce costs and to promote cost predictability, and in response to the recent period of historically low inflation, many states have made changes to COLA provisions by adjusting one or more of the elements mentioned above[5] (see Figure 2). As described in Appendix A, since 2009, seventeen states changed COLAs affecting current retirees, seven states addressed current employees' benefits, and seven states changed the COLA structure only for future employees. The legality of these modifications in several states has been challenged in court, as noted in Appendix A.

Figure 2: State Retirement Systems Undergoing COLA Legislative Changes, 2009-2017



In most cases, changes to COLA provisions require an act of the legislature and approval of the governor. However, in some cases retirement boards have been vested with the authority to enact COLA reforms; this authority has been exercised in two states – Missouri and Ohio – since 2016. As noted above, most COLA changes affecting retirees were subjected to legal challenge. Legal rulings issued in recent years upheld COLA reductions passed in New Jersey, and fully or partially rejected COLA reductions passed in Illinois, Montana, and Oregon. A 2015 legal settlement approved material changes to COLA provisions for public employees in Rhode Island.

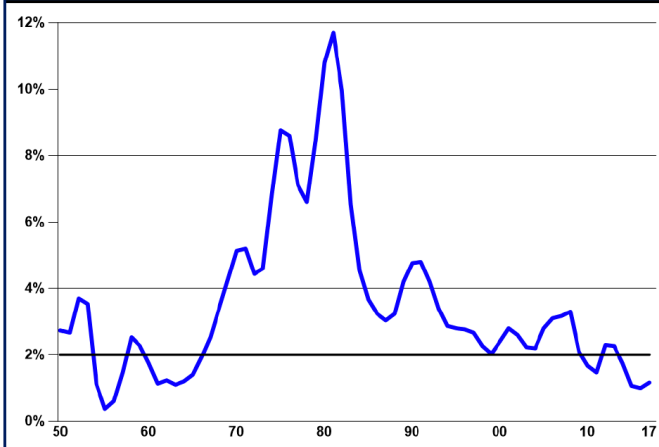
Impact of Inflation on COLA Changes

The impact of changes to COLA provisions for retirees and pension plans is largely determined by actual measured levels of price inflation. Since 2012, the average of the prior three years' increase in CPI-U has been at or below 2 percent. This represents a significant decline from prior periods of inflation (see Figure 3). At present levels, inflation remains lower than the automatic COLA caps for most public pension plans that have a cap, even in cases where the cap was recently lowered. If inflation remains low, retirees will not be seriously impacted by these changes. However, if inflation rises to levels observed in prior years, retirees will experience a decline in the purchasing power of their retirement benefit.

Actuaries typically make assumptions about COLA increases, based on the plan's COLA provisions. Such assumptions include a rate of inflation, if inflation is a factor in the plan's determination of COLA increases. All else equal, a reduction in a plan's COLA assumption will cause the plan's liabilities and cost, to decline.

[3] Gabriel, Roeder, Smith & Company, "Postemployment Cost-of-Living Adjustments: Concepts and Recent Trends," April 2011
[4] Governmental Accounting Standards Board Statement No. 67, Financial Reporting for Pension Plans
[5] National Conference of State Legislatures

Figure 3: Three-year rolling average change in CPI-U, 1950-2017



Conclusion

The effects of a COLA can be consequential both in protecting purchasing power and in adding costs to a plan. As states consider measures to stabilize long-term pension costs for both those currently retired or still employed, and for future generations of workers, policymakers are reexamining all aspects of benefit design and financing, including the way COLAs are determined and funded. Just as high periods of inflation in the past placed pressure on states to add or adjust COLAs upward, the recent low rates of inflation, combined with rising pension plan costs, have spurred action to reduce COLA levels. Some states have included provisions that would enable COLAs to increase should inflation grow or should funding status or fiscal conditions improve.

See also

1. Gary Findlay, "Addressing Inflation in the Design of Defined Benefit Pension Plans"
2. Gabriel, Roeder, Smith & Company, "Postemployment Cost-of-Living Adjustments: Concepts and Recent Trends," April 2011
3. Cost-of-Living Adjustments @NASRA.org

Contact

Keith Brainard, Research Director, keith@nasra.org I Alex Brown, Research Manager, alex@nasra.org
National Association of State Retirement Administrators, www.nasra.org

Appendix V | Additional Resources and Reading

The following resources and readings are listed and made available on the PERS website for consideration and insight.

- State of Mississippi Retirement Systems Experience Investigation for the Four-Year Period Ending June 30, 2016
- The Public Employees' Retirement System of Mississippi: A Review of Selected Issues Related to Financial Soundness, PEER, 2012

This page left blank intentionally.

Public Employees' Retirement System of Mississippi
429 Mississippi Street, Jackson, MS 39201-1005
www.pers.ms.gov