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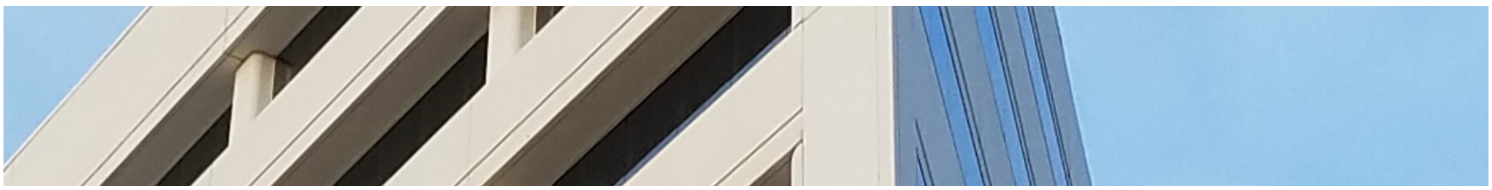

2018 Wilshire Consulting Report on State Retirement Systems: Funding Levels and Asset Allocation

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FINANCIAL OVERVIEW

This is Wilshire's twenty-second annual Report on State Retirement Systems: Funding Levels and Asset Allocation, which reports the aggregate funded status of over 100 U.S. state-sponsored defined benefit retirement systems.

The Data

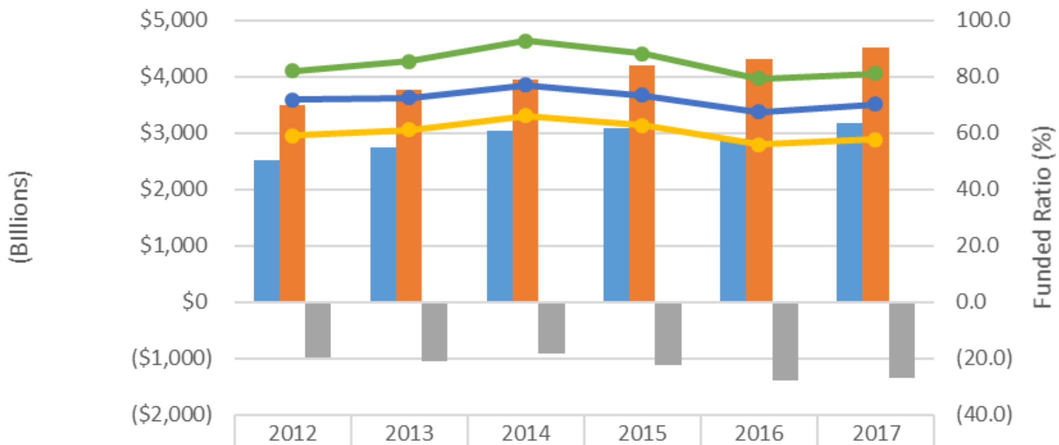
Financial data on public retirement systems historically have lacked the timeliness and uniform disclosure governing pension plans sponsored by publicly traded companies, making it difficult to conclude a study with data that are both current and consistent across systems. For this reason, our study methodology involves collecting data during the first one and a half months of each calendar year with the objective of acquiring as many reports as possible with a June 30 valuation date from the previous year. Even for systems with the desire to report in a timely manner, it often takes six months to a year for actuaries to determine liability values. Seventy-one of the 130 systems surveyed reported actuarial values on or after June 30, 2017.

This study reports on the aggregate Total Pension Liability (TPL) values used for financial reporting under the accounting and financial reporting standards for state and local governments: Governmental Accounting Standards Board Statements No. 67 and 68 (GASB 67/68). Through these Statements, GASB and the financial industry have taken major steps to increase transparency and comparability of pension plan accounting. GASB's Statement 67, "Financial Reporting for Pension Plans", impacts the annual pension reporting for plans as of June 2014; Statement 68, "Accounting and Financial Reporting for Pensions", impacts the annual pension reporting for the employers contributing into government agency-sponsored pensions, and applies to employers' financial reporting starting in June 2015.

Funded Ratio

This year's report is based on the financial statements reported by these state plan sponsors as of their last fiscal year ends – June 30, 2017 is the most frequent measurement date for plans in this year's report. Wilshire estimates that the aggregate funded ratio was 70.2% at fiscal year-end 2017, which represents an increase of 2.8% from the end of FY 2016 and reverses two consecutive years of aggregate funded ratio declines. A primary driver of the improvement was the increase in global equity values for the twelve-month period ending June 30, 2017 (MSCI AC World ex U.S. Index +24.45%). Exhibit 1 shows the aggregate reported funded status, asset, liability and surplus/deficit values over the past six fiscal years.

Exhibit 1: Funded Ratio History



	2012	2013	2014	2015	2016	2017
Assets	2,507	2,731	3,041	3,075	2,902	3,170
Liability	3,496	3,775	3,951	4,188	4,304	4,518
Deficit	(989)	(1,044)	(910)	(1,113)	(1,402)	(1,348)
25th Percentile	59.0	61.1	66.0	62.7	55.8	57.8
Aggregate	71.7	72.4	77.0	73.4	67.4	70.2
75th Percentile	82.1	85.3	92.6	88.1	79.2	81.0

Wilshire estimates that the aggregate Total Pension Liability (TPL) increased to $4,518 billion as of fiscal year 2017, up from $4,304 as of fiscal year end 2016. Despite the increase in aggregate TPL, the aggregate shortfall is estimated to have decreased by $54 billion to $1,348 billion from $1,402. This decline in the aggregate shortfall is the result of the significant increase in aggregate assets to $3,170 billion from $2,902 billion. The estimated aggregate value is the highest since Wilshire began reporting on state retirement system funding levels.

Attribution of Changes in Funding

Exhibit 2: Changes in Asset and Liability Values

		($, Billions)	% of BoY
Total Pension Liability, BoY	$	4,304.4	
Service Cost		83.8	1.95%
Interest Cost		307.7	7.15%
Benefit Payments		(244.1)	-5.67%
Actuarial (Gains)/Losses		3.1	0.07%
Other		63.6	1.48%
Total Pension Liability, EoY	$	4,518.4	4.97%
Plan Fiduciary Net Position, BoY	$	2,901.7	
Total Contributions		134.5	4.63%
Actual Return on Assets		380.2	13.10%
Benefit Payments		(244.1)	-8.41%
Other		(2.2)	-0.08%
Plan Fiduciary Net Position, EoY	$	3,170.0	9.24%

Exhibit 2 shows the components of aggregate annual change in TPL and Plan Fiduciary Net Position ($, Billions).

Liabilities

Wilshire estimates that the aggregate Total Pension Liability (TPL) increased to $4,518 billion as of fiscal year end 2017 up nearly 5% from $4,304 as of fiscal year end 2016. The three largest factors of the annual increase in aggregate TPL were interest cost, changes in the assumptions used to determine the TPL (Other) and continued annual benefit accruals, i.e. service cost.

- Service Cost, or continued annual benefit accruals, is estimated to have increased the TPL by 1.95%.
- Interest cost is similar to time value of money and is approximately equal to the discount rate as a percentage of the beginning of year TPL. The increase due to interest cost is estimated to be 7.15% for fiscal year-end 2017.
- Benefit payments are estimated to have decreased the TPL by -5.67%.
- Actuarial losses were marginal and are estimated to have increased the TLP by just 0.07%.
- “Other” was primarily driven by reductions in the expected rate of return on invested plan assets and changes in benefit terms. For state retirement systems, the discount rate is equivalent to the expected rate of return for all but severely underfunded plans. The median expected rate of return is estimated to have declined by 25 basis points from 7.50% to 7.25%. The increase due to changes in assumptions is estimated to be 2.10%. Changes in benefit terms decreased the liability by approximately -0.6%.

Assets

Wilshire estimates that the aggregate assets increased to $3,170.0 billion as of fiscal year end 2017, an increase of over 9% from $2,901.7 billion as of fiscal year end 2016. Robust investment returns and contributions drove asset values higher for the year.

- Contributions increased the asset value by 4.63% for the year with nearly 31% coming from plan participants.
- Investment income increased the asset value by over 13% for the year.
- Benefit payments are estimated to have decreased the asset value by -8.41%.
- “Other” items are expected to have marginally decreased the asset value by -0.08%.

Exhibit 3: Changes in Annual Funded Ratio

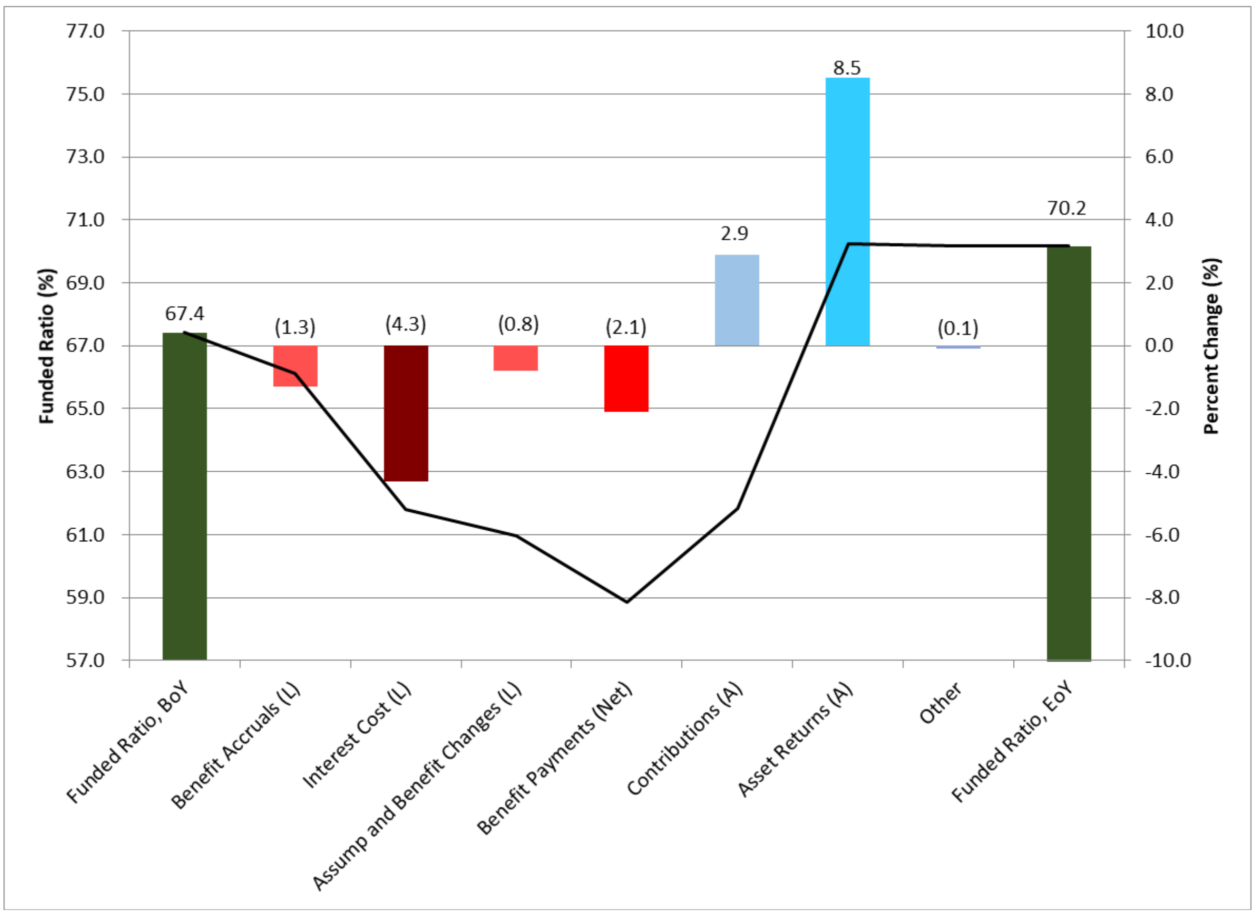


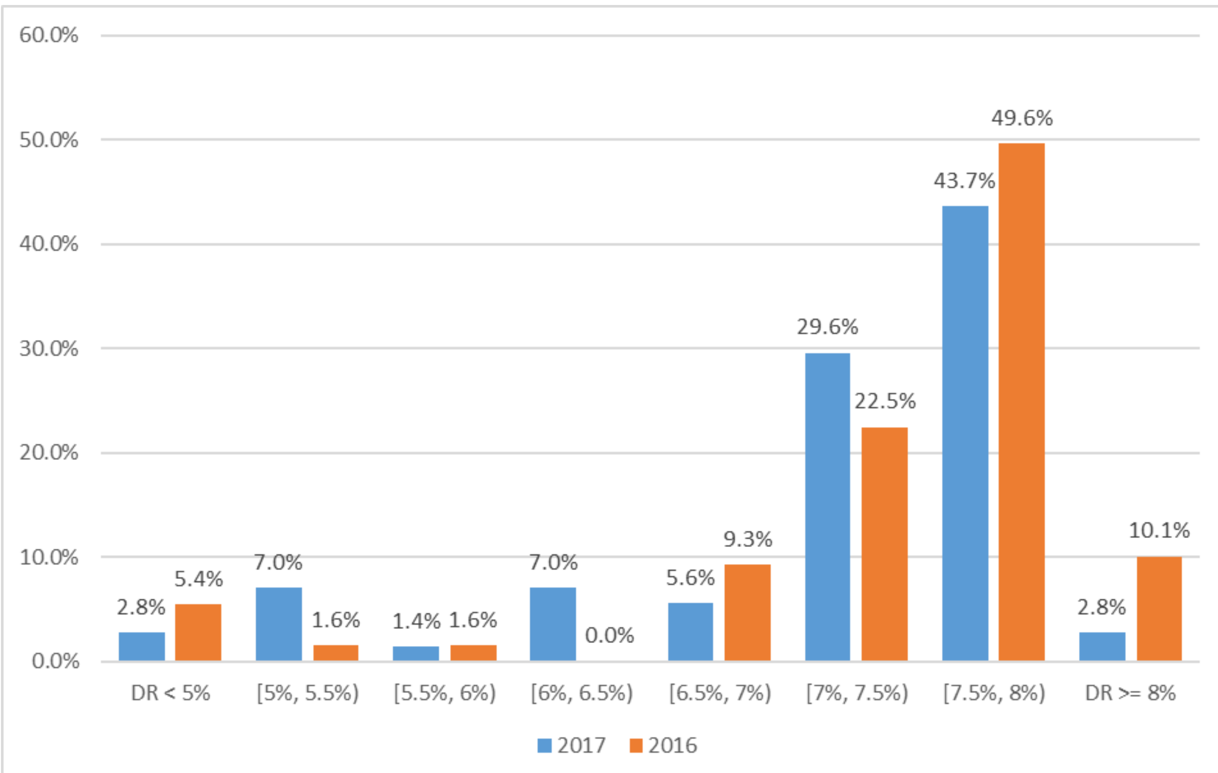
Exhibit 3 provides a combined accounting of State Retirement Systems for the 2017 fiscal year:

Discount Rates

The discount rate represents the expected long-term rate of return on invested plan assets used to calculate the liability value (present value of a stream of projected benefit payments). Discount rates have trended lower over the past several years. This trend continued for this year's study as nearly half of the plans lowered their discount rate. The range for discount rates this year is 4.21% to 8.00% with a median of 7.25%, which is down 25 basis points from last year. For plans projected to run out of assets, GASB 67/68 requires a downward adjustment to the discount rate based on the mandated projection methodology.

Exhibit 4 shows the distribution of discount rates used to calculate the TPL.

Exhibit 4: Distribution of Discount Rates



Pension Plan Asset Allocation

Exhibit 5 shows the aggregate asset allocation for State Pension Plans

Exhibit 5: Aggregate Asset Allocation

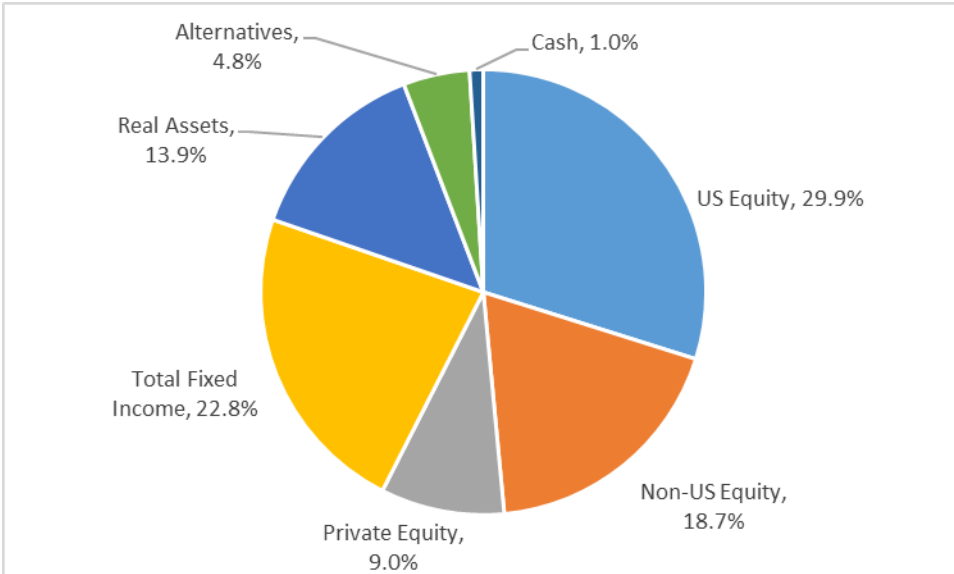


Exhibit 6 examines the change in average asset allocation over the last ten years.

Exhibit 6: Change in Average Asset Allocation for State Pension Plans

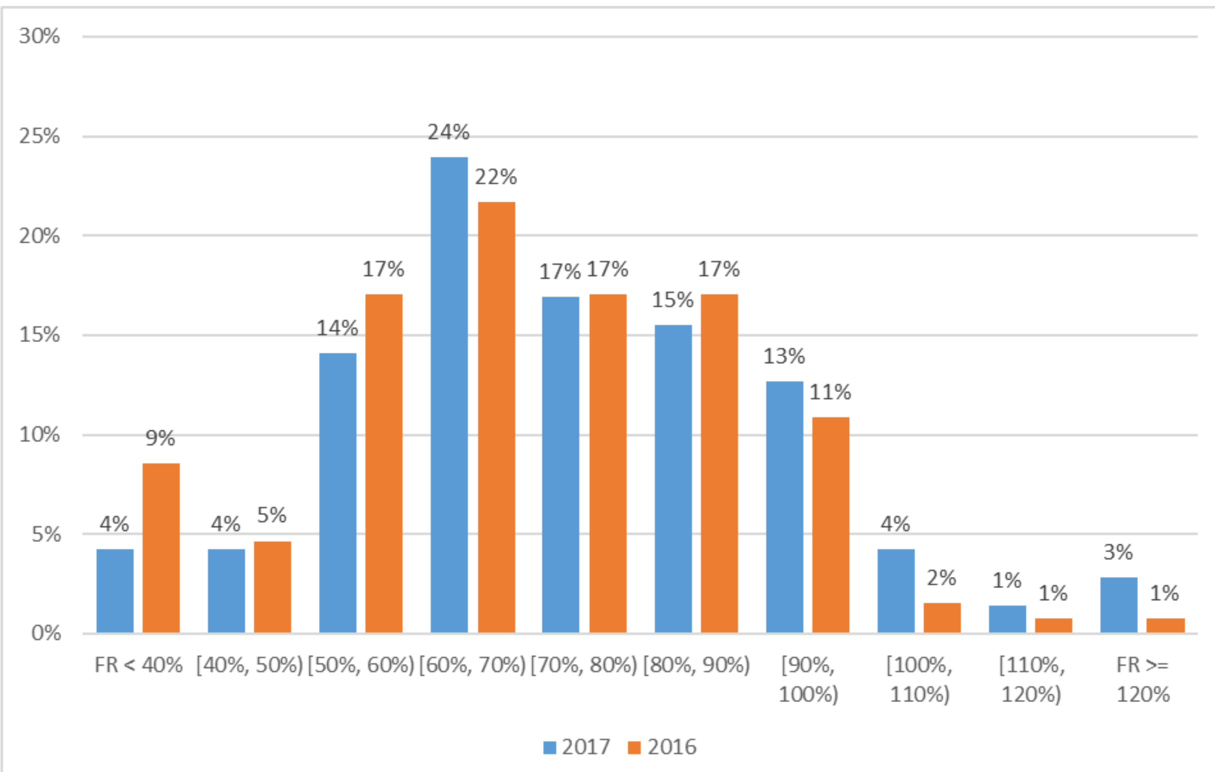
				Change in Exposure	
Equity	2007	2012	2017	07-12	12-17
U.S. Equity	41.0 %	28.0 %	29.9 %	-11.1 %	1.8 %
Non-U.S. Equity	18.2	19.8	18.7	0.5	-1.1
Real Estate	5.2	7.3	13.9	8.7	6.6
Private Equity	4.6	9.8	9.0	4.4	-0.8
Equity Subtotal	69.0	64.8	71.4	2.4	6.6
Total Fixed Income	27.3	26.0	22.8	-4.5	-3.2
Other	3.7	9.2	5.8	2.1	-3.4
Return *	5.9	6.1	6.4	0.5	0.3
Risk *	11.8	11.5	12.0	0.2	0.5

Exhibit 6 includes the expected return and risk based on the average asset allocations from 2007, 2012 and 2017 using Wilshire's current long-term return and risk assumptions illustrated in Exhibit 7.

Exhibit 7: Wilshire's December 2017 Capital Market Assumptions

	Expected Return		Risk
	10-Year	30-Year	
U.S. Equity	6.25 %	7.45 %	17.00 %
Non-U.S. Equity	6.45	7.65	18.75
Real Estate	6.90	7.65	14.00
Private Equity	8.75	10.20	28.00
U.S. Bonds	3.55	4.70	5.15
Non-U.S Bonds	1.30	3.90	3.50

Exhibit 8: Distribution of Funded Ratios



IMPORTANT INFORMATION