



---

***Wilshire Consulting***

***2015 Report on  
State Retirement Systems:  
Funding Levels and Asset Allocation  
February 25, 2015***

*Julia K. Bonafede, CFA, President  
Steven J. Foresti, Managing Director  
Russell J. Walker, Vice President  
Wilshire Associates Incorporated  
1299 Ocean Avenue, Suite 700  
Santa Monica, CA 90401  
Phone: 310-451-3051  
[contactconsulting@wilshire.com](mailto:contactconsulting@wilshire.com)*

## Table of Contents

Summary of Findings.....	1
Financial Overview .....	2
<i>The Data</i> .....	2
<i>Assets versus Liabilities</i> .....	3
<i>Funding Ratios</i> .....	6
<i>Plan Net Pension Liability/Unfunded Actuarial Accrued Liability</i> .....	10
Asset Allocation.....	13
Appendix A: State Retirement Systems.....	19

## Summary of Findings

- The following study includes 131 state retirement systems. Of these 131 retirement systems, 92 systems reported actuarial values on or after June 30, 2014 and 39 systems last reported prior to that date.
- Wilshire Consulting estimates that the ratio of pension assets-to-liabilities, or *funding ratio*, for all 131 state pension plans was 80% in 2014, up from 74% in 2013. Global stock markets rallied strongly over the twelve months ended June 30, 2014, augmenting the positive performance of global fixed income and allowing pension asset growth to outdistance the growth in pension liabilities over fiscal 2014. (Exhibit 1)
- For the 92 state retirement systems that reported actuarial data for 2014, pension assets and liabilities were \$2,046.5 billion and \$2,672.0 billion, respectively. The funding ratio for these 92 state pension plans was 77% in 2014, up from 70% for the same plans in 2013. (Exhibit 2)
- For the 92 state retirement systems that reported actuarial data for 2014, pension assets grew by 13.7%, or \$247.0 billion, from \$1,799.5 billion in 2013 to \$2,046.5 billion in 2014 while liabilities grew 4.7%, or \$118.8 billion, from \$2,553.2 billion in 2013 to \$2,672.0 billion in 2014. These 92 plans saw their aggregate shortfall, or net pension liability, decrease \$128.2 billion over fiscal 2014 from -\$753.7 billion to -\$625.6 billion. (Exhibit 2)
- For the 131 state retirement systems that reported actuarial data for 2013, pension assets and liabilities in that year were \$2,726.8 billion and \$3,704.5 billion, respectively. The funding ratio for these 131 state pension plans was 74% in 2013. (Exhibit 1)
- Of the 92 state retirement systems that reported actuarial data for 2014, 87% have market value of assets less than pension liabilities, or are *underfunded*. The average underfunded plan has a ratio of assets-to-liabilities equal to 73%.
- Of the 131 state retirement systems that reported actuarial data for 2013, 93% were *underfunded*. The average underfunded plan in FY2013 had a ratio of assets-to-liabilities equal to 71%.
- State pension portfolios have, on average, a 66.1% allocation to equities – including real estate and private equity – and a 33.9% allocation to fixed income and other non-equity assets. The 66.1% equity allocation is somewhat lower than the 67.0% equity allocation in 2004; a more notable trend over the ten-year period has been the rotation out of U.S. equities into other growth assets such as non-U.S. equities, real estate and private equity. (Exhibit 13)
- Asset allocation varies by retirement system. Nineteen of 131 retirement systems have allocations to equity that equal or exceed 75%, and 11 systems have an equity allocation below 50%. The 25<sup>th</sup> and 75<sup>th</sup> percentile range for equity allocation is 61.4% to 72.0%.
- Wilshire forecasts a long-term median plan return equal to 5.99% per annum, which is 1.66 percentage points below the median actuarial interest rate assumption of 7.65%. One should note that Wilshire's assumptions range over a conservative 10+-year time horizon, while pension plan interest rate assumptions typically project over 20 to 30 years.

## **Financial Overview**

This is Wilshire Consulting's nineteenth report on the financial condition of state-sponsored defined benefit retirement systems and is based upon data gathered from the most recent financial and actuarial reports provided by 131 retirement systems sponsored by the 50 states and the District of Columbia. Appendix A lists the 131 retirement systems included in this year's study.

### *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. Ninety-two systems reported actuarial values on or after June 30, 2014 and the remaining 39 systems last reported prior to June 30, 2014.

The Governmental Accounting Standards Board (GASB) is the agency tasked with developing accounting and financial reporting standards for state and local governments<sup>1</sup>. 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 is scheduled to be applicable to employers' financial reporting starting in June 2015. Key policy requirements contained in GASB 67 and 68 include:

- Governmental employers and plan sponsors will have to show the Net Pension Liability (NPL) of their retirement systems on their balance sheets; the NPL of a given pension is defined as the excess of its accrued Total Pension Liability over the Plan Fiduciary Net Position, or the fair market value of assets available for payment of pension benefits. Additionally, the employers and plan sponsors must present a detailed reconciliation of the change in NPL (i.e., pension expense) over the preceding twelve months in the balance sheets. The reliance on the Plan Fiduciary Net Position (i.e., total assets available for pension benefits, priced at market) to calculate NPL is a key difference from previous reporting standards, which allowed plans to use a smoothed actuarial value of assets to calculate their total actuarial liability and unfunded actuarial liability. This will make

---

<sup>1</sup> GASB maintains a repository of its statements as well as analysis and guidance for their implementation on its website, <http://www.gasb.org>.

NPL potentially a more volatile measure of these pensions' financial health than the unfunded actuarial liability permitted by prior GASB rules.

- The only accepted actuarial cost method for calculating net pension liability will be individual level-percent-of-pay entry-age normal method.
- If current and expected future plan assets are projected to fully cover plan benefits, NPL can be computed using a discount rate equal to the expected long-term return on plan assets (see below for additional reporting requirements). If current and expected future assets are not projected to fully cover plan benefits, the unfunded-benefit portion of NPL must be computed using a discount rate derived from the yield or index rate for 20-year tax-exempt general obligation municipal bonds with an average rating of AA/Aa or higher. In our research for this year's funding report, we have found very few plans that utilized discount rates different from their assumed return on assets.
- The NPL must be reported using discount rates 1% higher and 1% lower than the discount rate (defined above) used in the primary disclosures.
- Disclosure of target asset allocation levels will now be required in the Notes to the Financial Statements included in pension plans' Comprehensive Annual Financial Reports (CAFRs).
- Pension plans are required to detail the asset classes used to calculate their long-term expected rate of return as well as the expected real rate of return for each.
- In the Required Supplementary Information section, pension plans will be required to provide a schedule of the last ten fiscal years' annual money-weighted rates of return on plan assets, net of investment expenses. Most plans were not able to supply this information, nor ten years of Net Pension Liability schedules, in their fiscal 2014 CAFRs.

Most plans for whom fiscal 2014 CAFRs are available have reported plan assets and liabilities conforming to GASB 67; a few agent multi-employer plans should see their net positions reported by participating employers in GASB 68-compliant annual reporting as of June 2015.

### *Assets versus Liabilities*

Exhibit 1 shows the market value of assets, actuarial value of assets, and pension liability values for all state retirement systems for which Wilshire has data. With the exception of the two rows identifying Wilshire's estimated funded ratios, the data presented in each column of Exhibit 1 are limited to only those systems that reported on or after June of that year. For example, all 131 retirement systems in our survey reported actuarial values for 2013, while only 92 systems reported actuarial values for 2014. Note that Exhibit 1 includes both market value and actuarial value of assets. Unless otherwise noted, "assets" will refer to market value of assets for the remainder of this report.

**Exhibit 1**  
**Financial Overview of State Retirement Systems<sup>2</sup> (\$ billions)**

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>Total Pension Assets:</b>											
Market Value	\$2,017.6	\$2,181.4	\$2,378.8	\$2,695.1	\$2,402.4	\$2,015.5	\$2,210.9	\$2,493.0	\$2,506.2	\$2,726.8	\$2,046.5
Actuarial Value	\$2,053.5	\$2,141.8	\$2,280.1	\$2,465.9	\$2,516.7	\$2,471.1	\$2,499.3	\$2,544.3	\$2,580.3	\$2,675.8	\$2,043.7
<b>Total Pension Liabilities:</b>	\$2,343.1	\$2,486.8	\$2,646.9	\$2,833.2	\$2,976.1	\$3,132.7	\$3,233.3	\$3,349.0	\$3,499.0	\$3,704.5	\$2,672.0
<b>Difference:</b>											
Market Value	-\$325.5	-\$305.4	-\$268.0	-\$138.1	-\$573.7	-\$1,117.2	-\$1,022.4	-\$856.0	-\$992.8	-\$977.8	-\$625.6
Actuarial Value	-\$289.5	-\$345.0	-\$366.7	-\$367.3	-\$459.4	-\$661.6	-\$734.1	-\$804.7	-\$918.7	-\$1,028.8	-\$628.3
<b>Market Value of Assets as a % of Liabilities:</b>											
All Plans (estimate)*	86%	88%	90%	95%	81%	64%	68%	74%	72%	74%	<b>80%</b>
Reported Plans (actual)	86%	88%	90%	95%	81%	64%	68%	74%	72%	74%	77%
<b>Actuarial Value of Assets as a % of Liabilities:</b>											
All Plans (estimate)*	88%	86%	86%	87%	85%	79%	77%	76%	74%	72%	<b>78%</b>
Reported Plans (actual)	88%	86%	86%	87%	85%	79%	77%	76%	74%	72%	76%
<b>Total No. of Retirement Systems:</b>	131	131	131	131	131	131	131	131	131	131	92

\*The estimation process is explained later in the report (exhibit 3 and its preceding text).

The aggregate pension asset and liability values in Exhibit 1 are not directly comparable across columns because of the different number of retirement systems included for each year. As such, in the case of the most recent year that does not yet include data for the complete set of plans, we include an estimate of the funding ratios across all 131 plans. By combining these estimates with the historical funding ratios for the complete set of plans we can better evaluate the financial health for these 131 retirement systems over the last ten years. Market value funding ratios rose steadily in tandem with global stock markets from 86% at fiscal year-end 2004 to the recent-period best 95% funded ratio as of fiscal year-end 2007. Over the next two years, funded ratios fell precipitously, reaching a nadir of 64% by fiscal year-end 2009. However, rebounding capital markets have allowed funding ratios to recover to an estimated 80% at fiscal year-end 2014. Asset growth has faced various headwinds over this period, including global economic and political turmoil in 2012 and rising U.S. interest rates in the first half of 2013. Pension liabilities have also steadily risen over the last ten years; many plans have lowered the assumed rate of return on assets used to value their liabilities, which may partially explain the overall increase in the accumulated pension liability. The median discount rate for the plans in our survey decreased from 8.0% to 7.75% in fiscal 2012, and fell to 7.65% for fiscal 2014.

Actuarial value funding ratios declined fairly steadily over the ten year period between fiscal year-end 2003 and fiscal year-end 2013, from 89% to an estimated 73%. Actuarial accounting practices incorporate smoothing procedures to mitigate asset valuation volatility in plan projections; one product of these accounting conventions is notably lower variability of actuarial value-based funding ratios. However, with the adoption of GASB 67 and 68, most plans have begun reporting their Fiduciary Net Position, which by definition is priced at market; statistics using this metric will increase in overall volatility in subsequent reporting periods.

<sup>2</sup> As disclosed in annual reports (most annual reports use a June 30 or December 31 fiscal year). Liabilities are the reported actuarial accrued liabilities and assets are the current market and actuarial values as of the same valuation date as liabilities.

Exhibit 2 shows asset and liability values for the 92 retirement systems which reported actuarial values for 2014 and compares them with the same totals from the previous ten fiscal years.

**Exhibit 2**  
**Financial Overview of 92 State Retirement Systems (\$ billions)**

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Annualized Growth %	
												2004-2014	2013-2014
<b>Total Pension Assets:</b>													
- Market Value	\$1,325.0	\$1,438.6	\$1,562.9	\$1,808.2	\$1,689.6	\$1,308.4	\$1,432.9	\$1,683.8	\$1,658.3	\$1,799.5	\$2,046.5	4.4%	13.7%
- Actuarial Value	\$1,351.8	\$1,409.0	\$1,496.2	\$1,620.8	\$1,673.3	\$1,642.5	\$1,661.1	\$1,698.5	\$1,730.4	\$1,797.7	\$2,043.7	4.2%	13.7%
<b>Total Pension Liabilities:</b>	\$1,571.1	\$1,667.0	\$1,775.1	\$1,904.0	\$2,005.3	\$2,120.0	\$2,181.3	\$2,265.0	\$2,382.8	\$2,553.2	\$2,672.0	5.5%	4.7%
<b>Difference:</b>													
- Market Value	-\$246.1	-\$228.4	-\$212.2	-\$95.8	-\$315.7	-\$811.6	-\$748.4	-\$581.2	-\$724.5	-\$753.7	-\$625.6		
- Actuarial Value	-\$219.3	-\$258.0	-\$278.9	-\$283.1	-\$332.0	-\$477.5	-\$520.2	-\$566.5	-\$652.4	-\$755.5	-\$628.3		
<b>Assets as a % of Liabilities:</b>													
- Market Value	84%	86%	88%	95%	84%	62%	66%	74%	70%	70%	77%		
- Actuarial Value	86%	85%	84%	85%	83%	77%	76%	75%	73%	70%	76%		
<b>Underfunded Plans as %</b>													
- Market Value	89%	88%	83%	67%	88%	100%	98%	90%	96%	96%	87%		
- Actuarial Value	79%	85%	85%	85%	87%	93%	93%	95%	97%	96%	88%		
<b>Total No. of Systems:</b>	92	92	92	92	92	92	92	92	92	92	92		

In 2013, pension liabilities for these 92 plans exceeded assets by \$753.7 billion and the funding ratio, or ratio of assets-to-liabilities, one measure of pension fund health, stood at 70%. One year later, assets have risen to \$2,046.5 billion, a change of 13.7%, while liabilities have grown to \$2672.0 billion, a change of 4.7%. The result has been a decrease in the shortfall between assets and liabilities from -\$753.7 billion to -\$625.6 billion, a \$128.2 billion<sup>3</sup> decrease, and a rise in the funding ratio for these 92 plans from 70% to 77%.

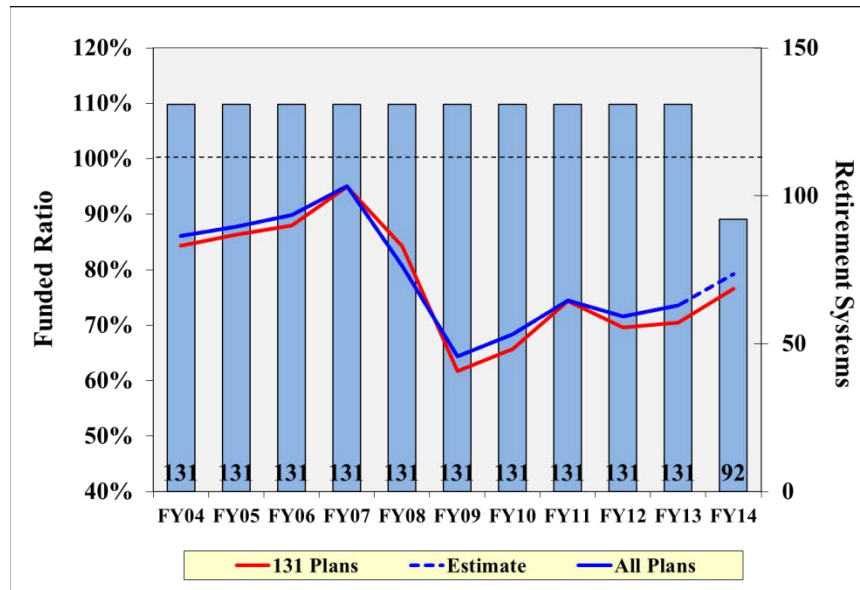
In 2004, after the equity market declines of 2000 through 2002 and subsequent recovery in 2003 and 2004, pension liabilities for these 92 plans exceeded assets by \$246.1 billion and the funding ratio stood at 84%. During the next three years, assets grew at an average annual rate of 10.9% while liabilities grew by an annualized 6.6%. This difference in growth rates is reflected in the increasing funding ratio of the market value of assets to liabilities through the year 2007. In 2008 however, the shortfall between assets and liabilities widened dramatically from -\$95.8 billion to -\$315.7 billion, leading to a fall in the funding ratio for these 92 plans from 95% to 84%. 2009, as mentioned above, extended this trend as the effects of the global market dislocations of 2007 and 2008 fully impacted fund performance. Funding ratios recovered from the 2009 low of 62% through fiscal year-end 2011's 74% level; after a pullback in fiscal 2012 to 70%, funding ratios jumped to an aggregate 77% as of fiscal 2014.

It is important to note, as with any sample, there exists some level of statistical error. Although the 92 funds with 2013 fiscal year data constitute a sizable majority of the state plans in our survey, one will find some transient variance in sample data from the entire plan cohort. Exhibit 3 provides a graphical comparison between the historical data of all plans versus the subset of 92 plans with more recently reported data. The dotted line represents Wilshire's estimated funding ratio for the complete set of 131 plans, which is derived from the historical relationship between

<sup>3</sup> Some statistics cited in this report may not add up to stated totals due to rounding.

the 92-plan sample and the complete set of 131 plans. Using this approach one can reasonably expect a fiscal 2014 funding ratio of approximately 80% once all plans have reported 2014 actuarial data. This estimation approach and graphical representation of estimated data will be used throughout the remainder of this report.

**Exhibit 3**  
**Funding Ratio Comparison of 92 Plan Sample vs. Complete Set of 131 Plans**



*Funding Ratios*

Expanding on Exhibit 3, Exhibit 4 shows the aggregate, average, median, 25<sup>th</sup>, and 75<sup>th</sup> percentile market value funding ratios for the 131 state pension systems over the last ten fiscal years. Historically, the market value funding ratios for our sample experienced a fairly steady improvement between fiscal 2004 and fiscal 2007. In fiscal 2008 and 2009 however, funding ratios broke trend and rapidly declined. Fiscal 2010 saw funding ratios reverse course and stage a moderate recovery that continued into fiscal 2011, reversed course in fiscal 2012, then resumed through fiscal 2014.



**Exhibit 4**  
**Market Value Funding Ratios by Fiscal Year for 131 Plans**

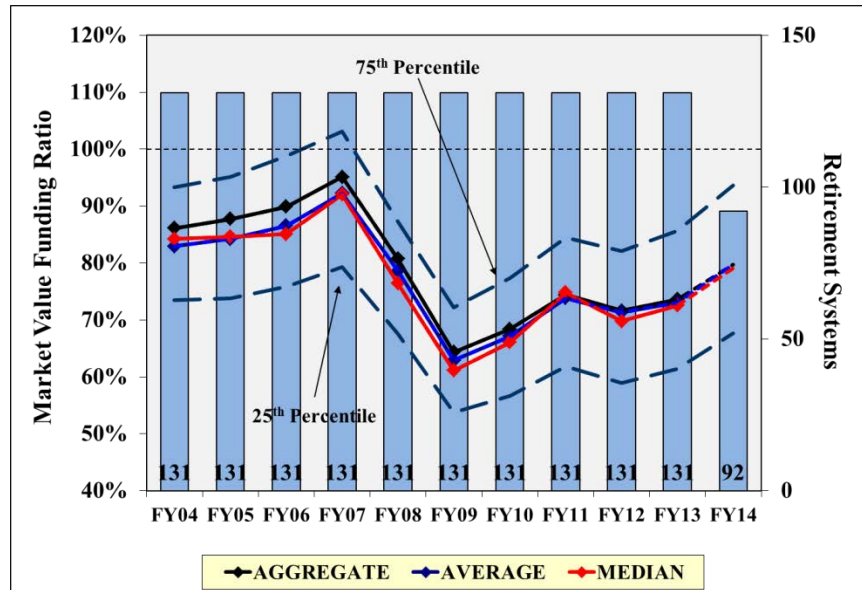


Exhibit 5 shows the same information as Exhibit 4, except it uses the actuarial value of assets and/or Plan Fiduciary Net Position to determine funding ratios. In contrast with Exhibit 4’s more volatile market value-based funding ratio time series, Exhibit 5 shows an essentially steady, gradual decline in funding ratios through fiscal 2013, then improves in fiscal 2014. As noted above, accounting conventions prior to fiscal 2014 reporting allow plan sponsors to smooth actuarial values of assets over forecast periods in order to reduce the volatility of projected sponsor contributions to the pension plan.

**Exhibit 5**  
**Actuarial Value Funding Ratios by Fiscal Year for 131 Plans**

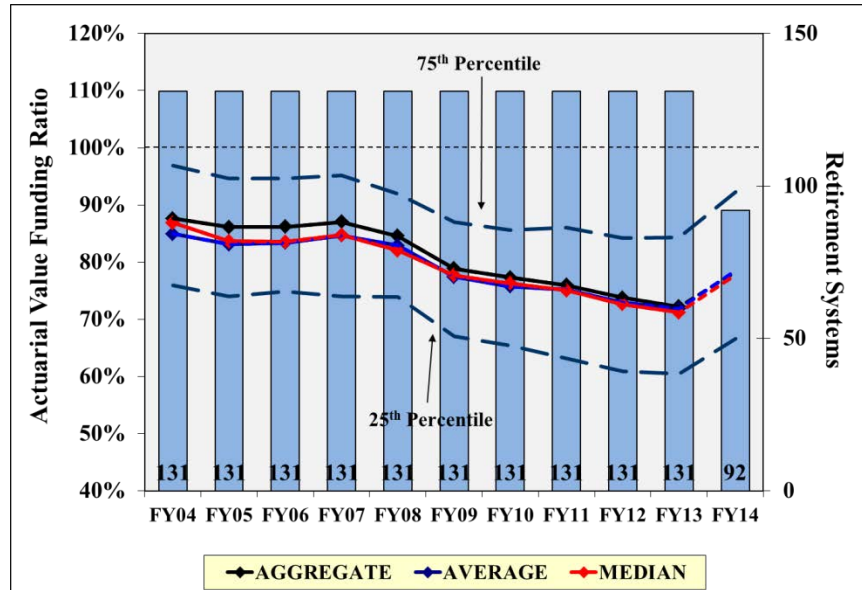
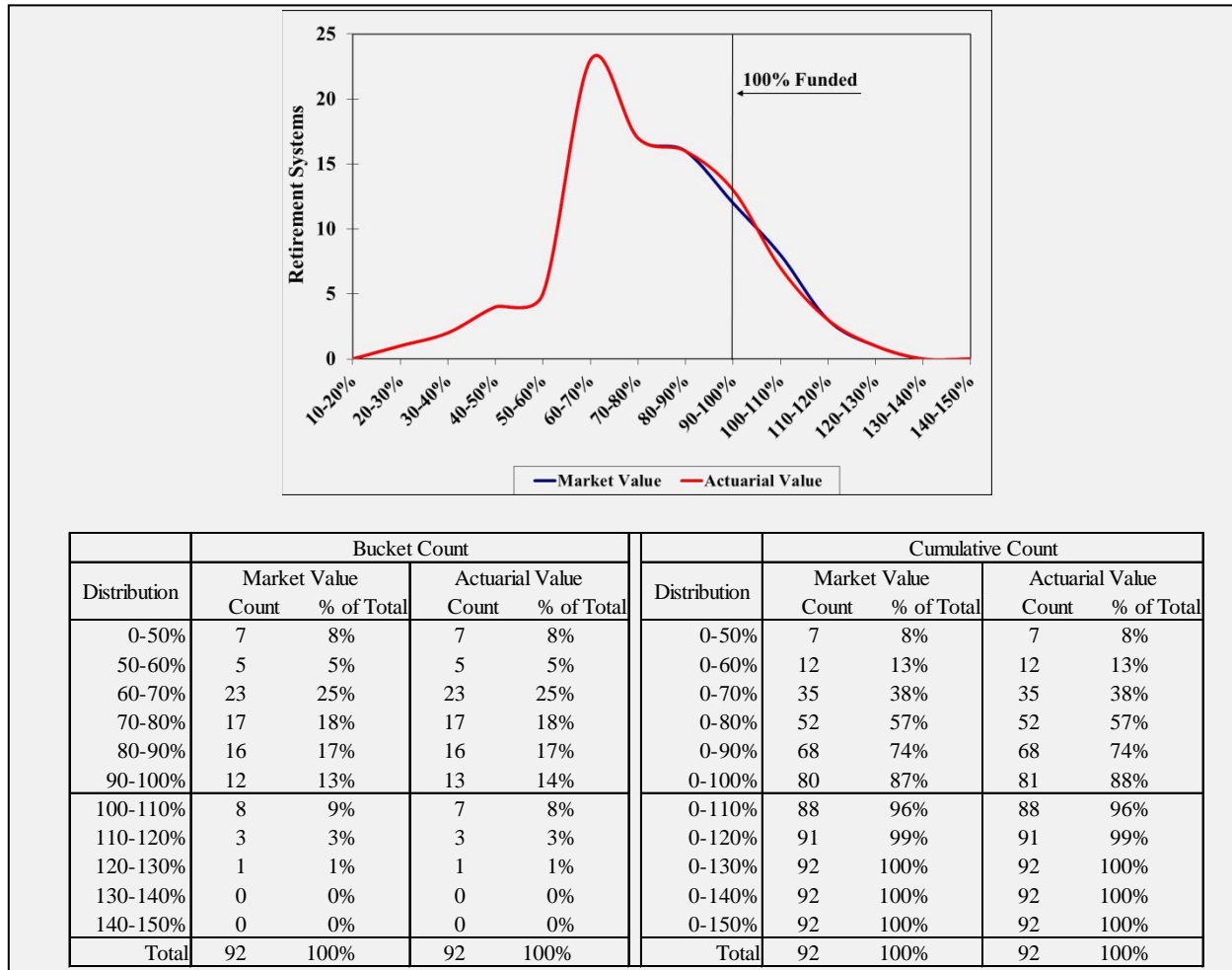


Exhibit 6 gives a more detailed picture of the fiscal condition for the 92 state retirement systems that reported actuarial values for 2014.

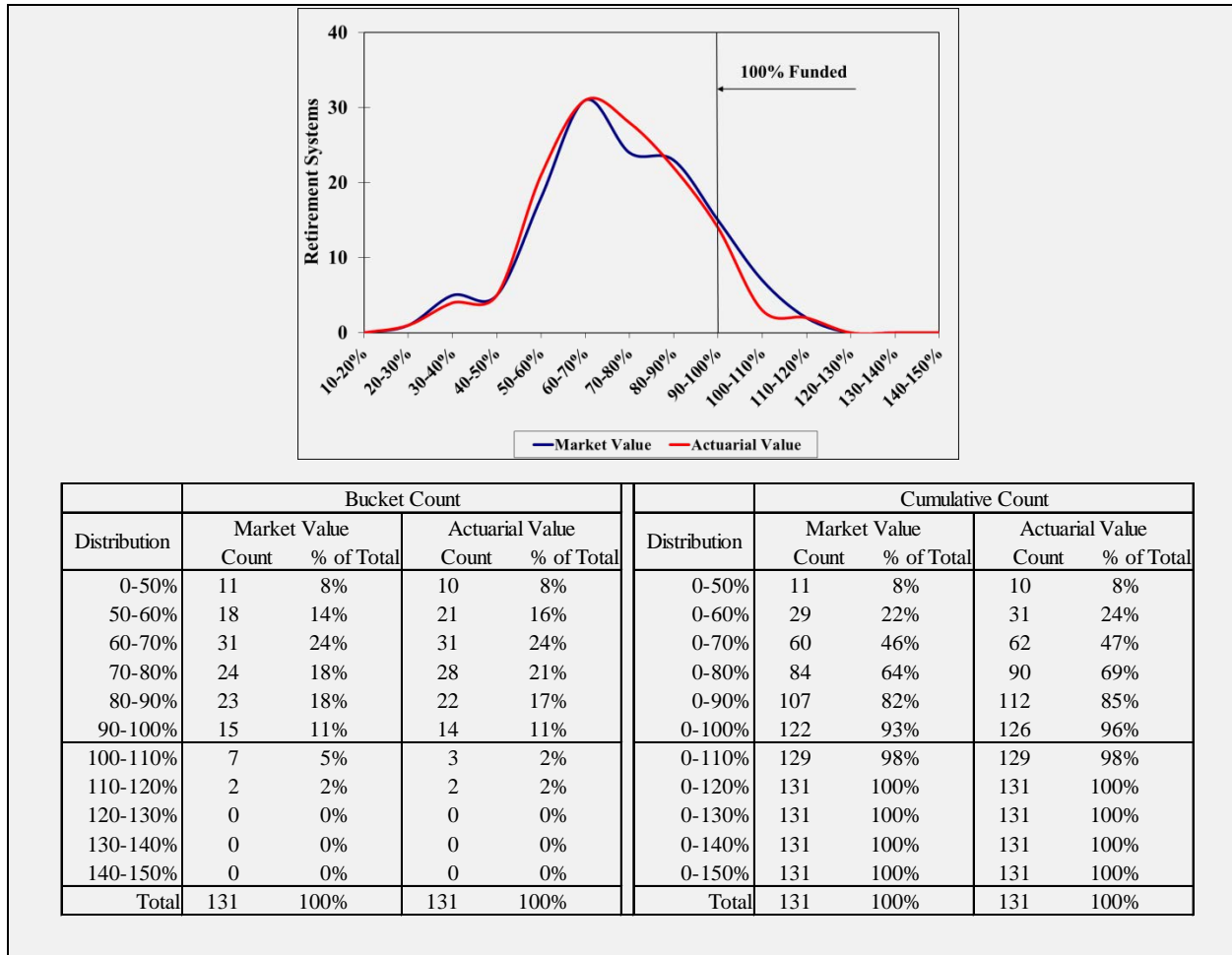
**Exhibit 6**  
**Distribution of 92 State Pension Systems by Fiscal Year 2014 Funding Ratio**



We have noted above that 87% of these 92 plans with 2014 actuarial data, or 80 plans, are underfunded; Exhibit 6 demonstrates the extent of the shortfall. Seven plans have assets less than 50% of liabilities; 35 plans have assets less than 70% of liabilities; and 52 plans have assets less than 80% of liabilities. Using the actuarial value of assets to determine funding ratios, 81 plans have assets below liabilities. Seven plans have assets less than 50% of liabilities; 35 plans have assets less than 70% of liabilities; and 76 plans have assets less than 80% of liabilities.

Similar to Exhibit 6, Exhibit 7 examines the fiscal condition of the 131 state retirement systems that reported actuarial values for 2013.

**Exhibit 7**  
**Distribution of 131 State Pension Systems by Fiscal Year 2013 Funding Ratio**



Distribution	Bucket Count				Distribution	Cumulative Count			
	Market Value		Actuarial Value			Market Value		Actuarial Value	
	Count	% of Total	Count	% of Total		Count	% of Total	Count	% of Total
0-50%	11	8%	10	8%	0-50%	11	8%	10	8%
50-60%	18	14%	21	16%	0-60%	29	22%	31	24%
60-70%	31	24%	31	24%	0-70%	60	46%	62	47%
70-80%	24	18%	28	21%	0-80%	84	64%	90	69%
80-90%	23	18%	22	17%	0-90%	107	82%	112	85%
90-100%	15	11%	14	11%	0-100%	122	93%	126	96%
100-110%	7	5%	3	2%	0-110%	129	98%	129	98%
110-120%	2	2%	2	2%	0-120%	131	100%	131	100%
120-130%	0	0%	0	0%	0-130%	131	100%	131	100%
130-140%	0	0%	0	0%	0-140%	131	100%	131	100%
140-150%	0	0%	0	0%	0-150%	131	100%	131	100%
<b>Total</b>	<b>131</b>	<b>100%</b>	<b>131</b>	<b>100%</b>	<b>Total</b>	<b>131</b>	<b>100%</b>	<b>131</b>	<b>100%</b>

Using the market value of assets to determine funding ratios, 122 of the 131 plans, or 93%, had assets less than liabilities. Eleven plans had assets less than 50% of liabilities; 60 plans had assets less than 70% of liabilities; and 84 plans had assets less than 80% of liabilities. Using the actuarial value of assets to determine funding ratios, 126 of the 131 plans, or 96%, had assets less than liabilities. Ten plans had assets less than 50% of liabilities; 62 plans had assets less than 70% of liabilities; and 90 plans had assets less than 80% of liabilities.

*Plan Net Pension Liability/Unfunded Actuarial Accrued Liability*

The financial health of retirement systems can also be measured by comparing the size of the Plan Net Pension Liability (NPL), or in pre-GASB 67/68 terms the unfunded actuarial accrued liability (UAAL), to relevant metrics. Since assets under Governmental Accounting Standards

Board (GASB) Statement No. 25<sup>4</sup> are based on actuarial values, this section calculates the UAAL using actuarial value of assets for periods prior to fiscal 2014, when GASB 67 takes effect.

Exhibit 8 shows the median size of the UAAL relative to the covered payroll during the last eleven fiscal years for the 131 retirement systems. Exhibit 8 also shows the 25<sup>th</sup> and 75<sup>th</sup> percentile for each year. UAAL has increased over the past decade, with an especially steep climb during the most recent recession. However, with the adoption of GASB 67 and the strong performance of global equities in fiscal 2014, the ratio of Net Pension Liability to Payroll fell markedly year-over-year:

**Exhibit 8**  
**NPL/UAAL as a % of Covered Payroll by Fiscal Year for 131 Plans**

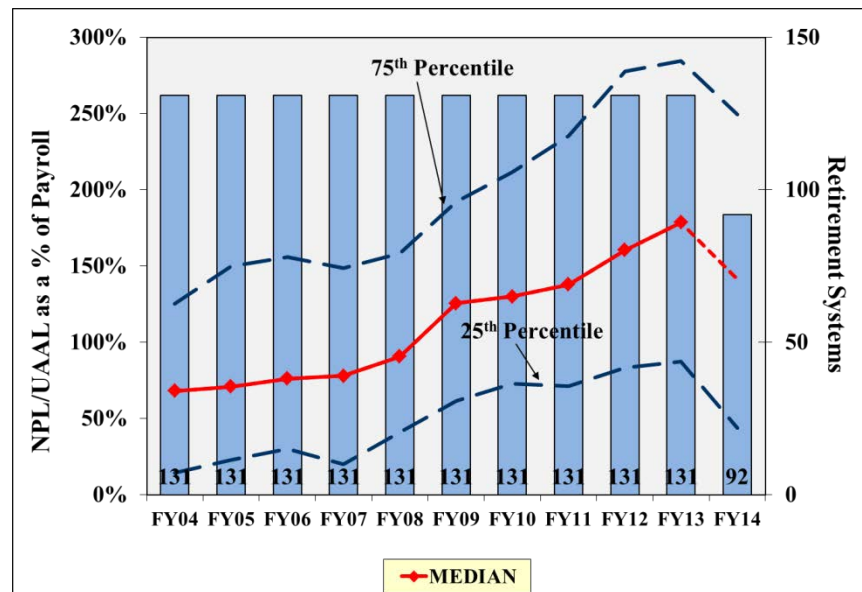


Exhibit 9 shows the median size of the UAAL through 2013 and the NPL for 2014 relative to the actuarial value of assets during the last eleven fiscal years for the 131 plans. Exhibit 9 also shows the 25<sup>th</sup> and 75<sup>th</sup> percentile for each year.

<sup>4</sup> GASB No. 25, “Financial Reporting for Defined Benefit Pension Plans and Note Disclosures for Defined Contribution Plans”.

**Exhibit 9**  
**NPL/UAAL as a % of Actuarial Value of Assets by Fiscal Year for 131 Plans**

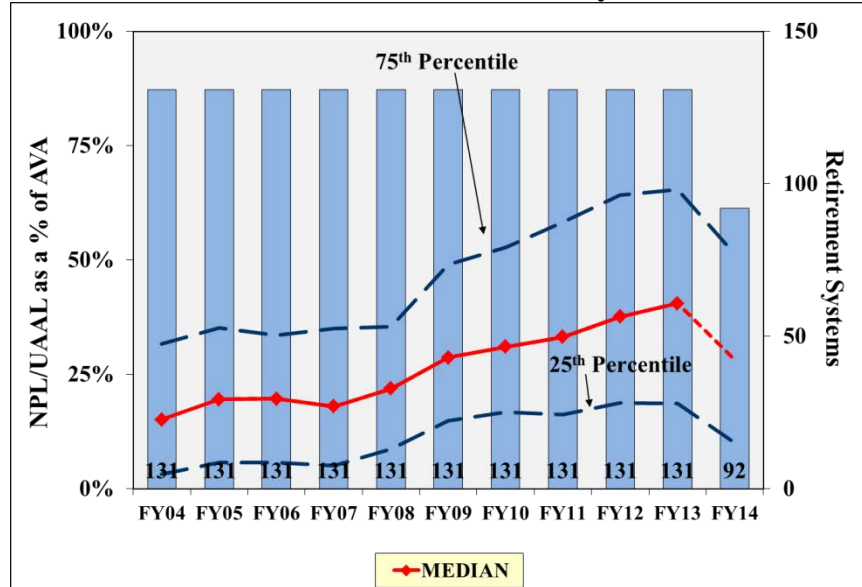
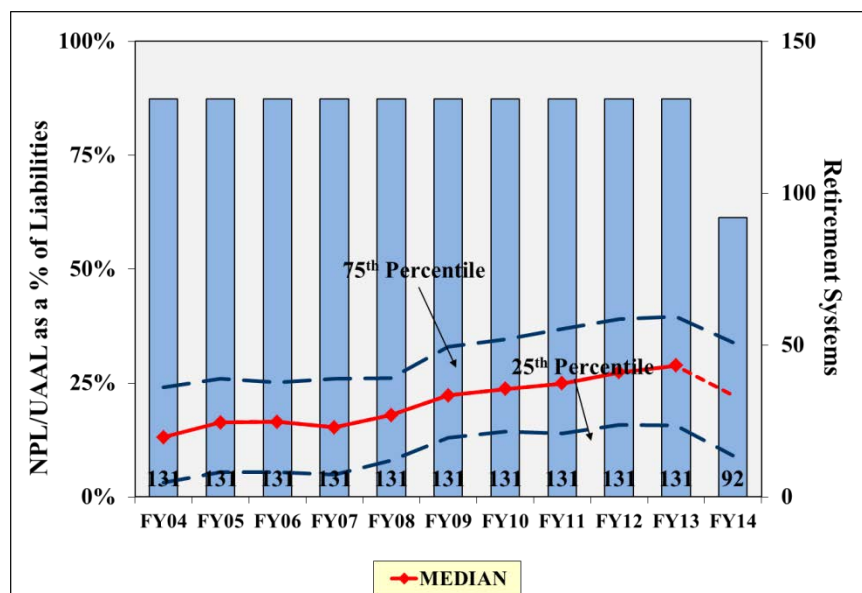


Exhibit 10 shows the median size of the UAAL through 2013 and the NPL for 2014 relative to the actuarial accrued liability during the last eleven years for all 131 retirement systems. Exhibit 10 also shows the 25<sup>th</sup> and 75<sup>th</sup> percentile for each year.

**Exhibit 10**  
**NPL/UAAL as a % of Accrued Liabilities by Fiscal Year for 131 Plans**



From 2005 to 2008, the UAAL had generally stabilized relative to all metrics. Over 2008 and 2009, however, poor market performance pushed the covered payroll ratio and the 25<sup>th</sup> and 75<sup>th</sup>

percentiles of the actuarial value of assets and accrued liability higher. It bears repeating that prior to June 2014 actuarial valuation methodology typically employs smoothing formulae in order to reduce the impact of market fluctuations when determining pension fund contributions. If the UAAL were calculated using the market value of assets (or if the NPL were calculated as per GASB 67 during that period), the negative market returns experienced during fiscal 2008 and 2009 would have led to a much larger increase in the UAAL relative to these metrics, indicating a more substantial deterioration in the financial health of most state retirement systems. Due to the strong markets experienced during fiscal 2010 and 2011, UAAL as a percent of asset market value fell sharply over those two years. Fiscal 2012 found UAAL growth outpacing asset market value growth, reversing the trend of the prior two years. However, asset market value growth again outpaced the growth in UAAL in fiscal 2013, and as noted above, the growth in these plans' Net Plan Fiduciary Position also surpassed that of the Net Pension Liability in fiscal 2014.

### Asset Allocation

In this section we examine the investment strategies employed by the state retirement systems. Exhibit 11 provides a snapshot of the average asset allocation as of the latest reported fiscal year-end across all 131 state retirement systems.

**Exhibit 11**  
**Average Asset Allocation for State Pension Plans**

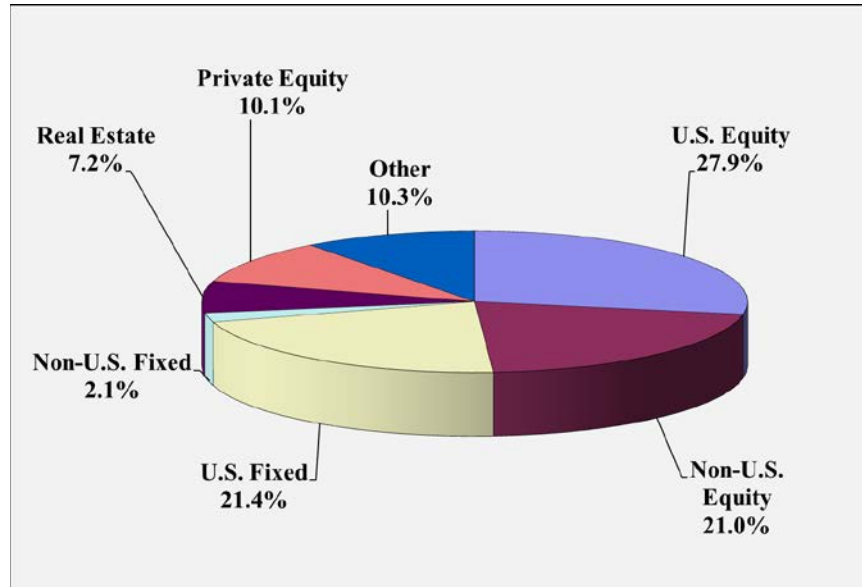


Exhibit 12 examines the change in average asset allocation over the last ten years. During this period, the average allocations to Non-U.S. equities increased from 14.4% to 21.0% while allocations to U.S. bonds decreased from 29.1% to 21.4%.

**Exhibit 12**  
**Change in Average Asset Allocation for State Pension Plans**

Equity	2004	2009	2014	Change in Exposure	
				04-14	09-14
U.S. Equity	44.5 %	34.7 %	27.9 %	-16.6 %	-6.8 %
Non-U.S. Equity	14.4	18.2	21.0	6.6	2.8
Real Estate	3.8	6.5	7.2	3.4	0.7
Private Equity	4.3	7.4	10.1	5.8	2.7
Equity Subtotal	67.0	66.7	66.1	-0.9	-0.6
<b>Debt</b>					
U.S. Fixed	29.1	27.1	21.4	-7.7	-5.7
Non-U.S. Fixed	1.3	1.2	2.1	0.8	0.9
Other	2.6	5.0	10.4	7.8	5.4
Debt Subtotal	33.0	33.3	33.9	0.9	0.6
Return *	5.7	5.9	6.0	0.3	0.1
Risk *	11.4	12.1	12.5	1.1	0.4

\* Return and Risk are based on Wilshire Consulting's current asset class assumptions (Exhibit 14).

Overall equity exposure, comprised of U.S. and non-U.S. public market equities along with real estate and private equity, decreased 0.9% over the past decade, while overall debt exposure, comprised of U.S. and non-U.S. fixed income and other non-equity assets (consisting of cash and cash equivalents as well as commodities, hedge funds and other absolute return/zero net-beta strategies), increased. However, it must be noted that plans' exposures to U.S. public market equity and U.S. fixed income over this period fell while allocations to non-U.S. assets, real estate, private market equity and other risk asset strategies (including hedge funds and commodities) increased. One can propose several possible explanations for these phenomena, alone or in combination:

- Rotation out of the relatively efficient U.S. stock and bond markets into less-efficient asset spaces;
- Plan sponsors reducing the home-market bias in their fund holdings;
- Plan sponsors increasing asset diversification in an attempt to de-risk the Total Fund;
- Plan sponsors increasing their exposures to more leveraged strategies, such as private market equity, in an effort to meet return targets.

Portfolio expected return and risk are calculated by combining Wilshire's assumptions for the major asset classes and each retirement system's actual asset allocation. Exhibit 12 calculates the expected return and risk based on the average asset allocations from 2004, 2009 and 2014 using Wilshire's current long-term return and risk assumptions illustrated in Exhibit 13. The redeployment of assets over the past decade out of U.S. public markets and into offshore and alternative assets has caused the average state pension plan to move towards a somewhat higher expected risk profile along the efficient frontier, with the expected return increasing a smaller



amount. This projected decrease in risk-adjusted performance suggests that these plans' allocations to return-enhancing asset strategies are not simultaneously delivering notable diversification benefits.

**Exhibit 13**  
**Wilshire's 2015 Capital Market Assumptions**

	<b>Expected Return</b>	<b>Risk</b>
U.S. Equity	6.25 %	17.0 %
Non-U.S. Equity	6.25	18.0
Private Equity	8.80	27.5
Real Estate	4.85	17.0
U.S. Bonds	3.35	5.0
Non-U.S Bonds	1.65	3.5

Exhibit 14 contains summary statistics on asset allocation for all state retirement systems. The median allocation<sup>5</sup> is 25.3% to U.S. equities and 20.0% to Non-U.S. equities. However, as the lowest and highest columns suggest, there is considerable variability in allocations among individual systems. Wilshire estimates that the median state pension fund has an expected return of 5.99%. This result is 1.66% less than the current median liability discount rate of 7.65%. It is important to note that Wilshire's long-term asset assumptions do not include any expectations from active management and are targeted at a 10-year time horizon. By contrast, the actuarial discount rate assumed by plans is typically geared at a longer-term horizon and includes all anticipated sources of return. As such, while we present these data for illustrative purposes, they are not directly comparable (i.e. Wilshire's assumptions are primarily derived to assist in conducting asset allocation studies and are not put forth as a metric to formulate an assumed actuarial rate of return).

---

<sup>5</sup> The "Median" column in Exhibit 14 represents the median for each asset class and therefore does not sum to 100%. The median expected return is based on the median fund return, not on the median asset mix.

**Exhibit 14**  
**Summary Asset Allocation Statistics for State Pension Plans**

	<u>Lowest (%)</u>	<u>Median (%)</u>	<u>Highest (%)</u>
U.S. Equity	0.0 %	25.3 %	77.2 %
Non-U.S. Equity	0.3	20.0	58.4
Private Equity	0.0	9.2	56.3
Real Estate	0.0	7.4	16.8
U.S. Bonds	1.7	21.2	50.6
Non-U.S Bonds	0.0	0.5	9.5
Hedge Funds	0.0	1.5	24.6
Other	0.0	5.0	24.5
<b>Expected Returns</b>	<b>5.0 %</b>	<b>6.0 %</b>	<b>7.5 %</b>

Exhibit 15 plots the expected return and risk for each of the 131 state retirement systems based upon their actual asset allocation. Systems that plot in the upper right employ more aggressive asset mixes while systems that plot in the lower left represent those with more conservative mixes. The dashed horizontal line, equal to 7.65%, represents the current median actuarial interest rate assumption employed by state pension plans.

Using Wilshire’s return forecasts, none of the 131 state retirement systems are expected to earn long-term asset returns that equal or exceed the median liability discount rate assumption. It is again important to note that Wilshire return assumptions represent beta only, with no projection of alpha from active management, and may differ in time horizon (10+ years) from the methodologies underlying actuarial interest rate assumptions (20 to 30+ years).

**Exhibit 15**  
**Projected Return & Risk Forecasts for State Pension Plans**

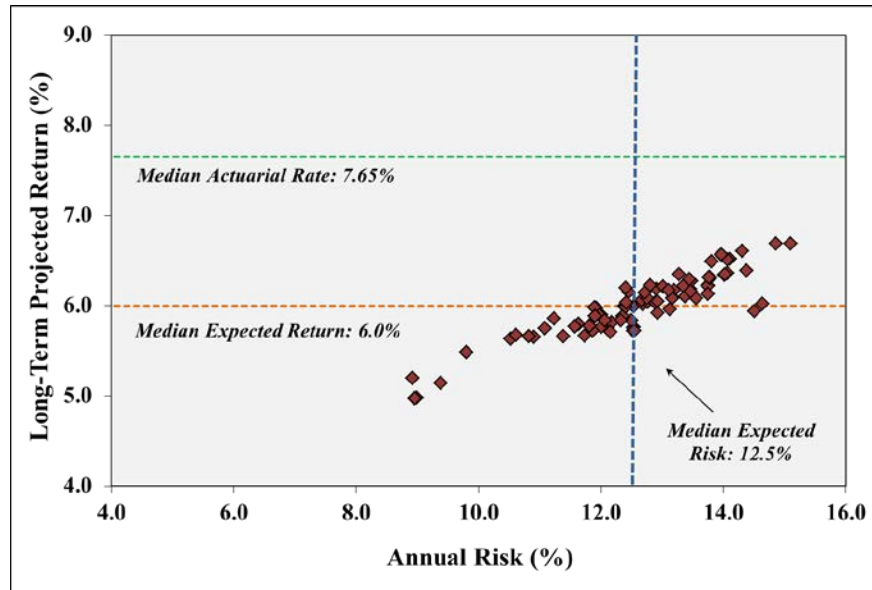
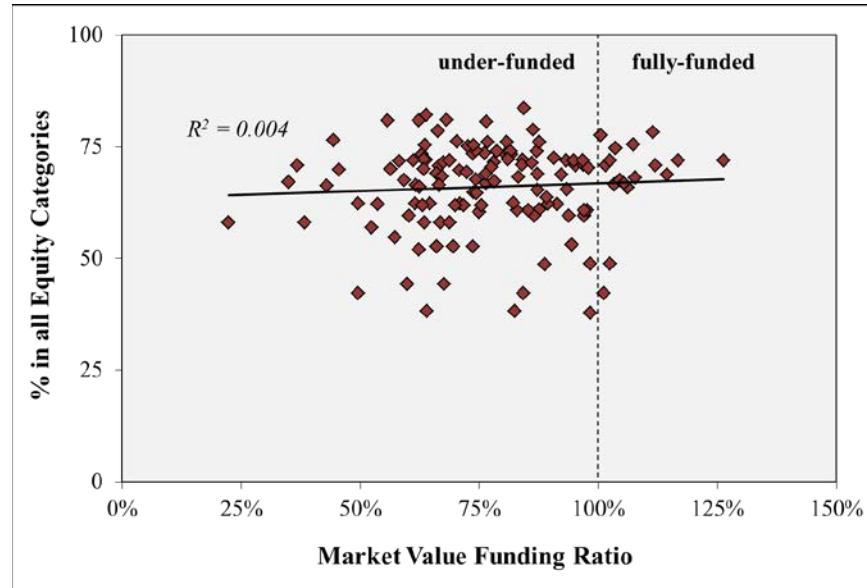


Exhibit 16 addresses the relationship between asset allocation and funding for all state systems. The allocation to equity asset classes, a proxy for investment aggressiveness, is plotted on the vertical scale. The market value funding ratio is on the horizontal scale.

**Exhibit 16**  
**Asset Allocation & Actuarial Funding Ratios for State Pension Plans**



The vertical line in Exhibit 16 separates overfunded plans from underfunded plans. Casual observation uncovers no pattern connecting funded ratio to equity exposure, and in fact the R-squared between the total equity exposures and funding ratios of these plans is basically zero. In other words, there is no discernible relationship between asset allocation and funding. State retirement systems show a broad spectrum of asset allocations that appear to be unrelated to the size of their unfunded liabilities.

## Appendix A: State Retirement Systems<sup>6</sup>

<u>Retirement System</u>	<u>Retirement System</u>	<u>Report Date</u>
Alabama ERS	Alabama Employees' Retirement System	9/30/2013
Alabama TRS	Alabama Teachers' Retirement System	9/30/2013
Alaska PERS	Alaska Public Employees' Retirement System	6/30/2014
Alaska TRS	Alaska Teachers' Retirement System	6/30/2014
Arizona PSPRS	Arizona Public Safety Personnel Retirement System	6/30/2013
Arizona SRS	Arizona State Retirement System	6/30/2014
Arkansas Highway ERS	Arkansas Highway Employees Retirement System	6/30/2014
Arkansas PERS	Arkansas Public Employees Retirement System	6/30/2014
Arkansas TRS	Arkansas Teachers Retirement System	6/30/2013
California PERS	California Public Employees' Retirement System	6/30/2014
California Regents	The Regents of the University of California	6/30/2014
California STRS	California State Teachers' Retirement System	6/30/2014
Colorado Fire & Police	Colorado Fire & Police Pension Association	12/31/2013
Colorado PERA: Municipal	Colorado PERA: Municipal Division Trust Fund	12/31/2013
Colorado PERA: State & School	Colorado PERA: State & School Division Trust Fund	12/31/2013
Connecticut SERS	Connecticut State Employees' Retirement System	6/30/2013
Connecticut TRS	Connecticut State Teacher's Retirement System	6/30/2013
DC Police & Fire	District of Columbia Police Officers & Fire Fighters' Retirement System	9/30/2013
DC TRS	District of Columbia Teachers Retirement System	9/30/2013
Delaware PERS	Delaware Public Employees' Retirement System	6/30/2014
Florida RS	Florida Retirement Systems	6/30/2013
Georgia ERS	Georgia Employees Retirement System	6/30/2014
Georgia TRS	Georgia Teachers Retirement System	6/30/2014
Hawaii ERS	Hawaii Employees' Retirement System	6/30/2014
Idaho FRF	Idaho Firefighters' Retirement Fund	6/30/2014
Idaho PERSI	Idaho Public Employee Retirement Fund Base Plan	6/30/2014
Illinois Muni Ret Fund	Illinois Municipal Retirement Fund	12/31/2013
Illinois SERS	Illinois State Employees' Retirement System	6/30/2014
Illinois SURS	Illinois State Universities Retirement System	6/30/2014
Illinois TRS	Illinois State Teachers' Retirement System	6/30/2014
Indiana PERF: Employees	Indiana Public Employees' Retirement Fund: Employees	6/30/2014
Indiana PERF: Police & Fire	Indiana PERF: Police Officers' & Firefighters' Pension & Disability Fund	6/30/2014
Indiana TRF	Indiana State Teachers Retirement Fund	6/30/2014
Iowa Fire & Police	Iowa Municipal Fire & Police Retirement System	6/30/2014
Iowa PERS	Iowa Public Employees Retirement System	6/30/2014
Kansas PERS	Kansas Public Employees Retirement System	6/30/2014
Kentucky RS: CERS Hazardous	Kentucky Employees Retirement System: County Hazardous Employees	6/30/2014
Kentucky RS: CERS Non-Hazardous	Kentucky Employees Retirement System: County Non-Hazardous Employees	6/30/2014
Kentucky RS: KERS Hazardous	Kentucky Employees Retirement System: State Hazardous Employees	6/30/2014
Kentucky RS: KERS Non-Hazardous	Kentucky Employees Retirement System: State Non-Hazardous Employees	6/30/2014
Kentucky RS: State Police	Kentucky Employees Retirement System: State Police Retirement System	6/30/2014
Kentucky TRS	Kentucky Teachers' Retirement System	6/30/2014
Louisiana School ERS	Louisiana School Employees' Retirement System	6/30/2014
Louisiana SERS	Louisiana State Employees' Retirement Systems	6/30/2014
Louisiana State Police	Louisiana State Police Pension & Retirement System	6/30/2014

<sup>6</sup> All state plan information is obtained from public information sources.

## Appendix A: (cont.)

<u>Retirement System</u>	<u>Retirement System</u>	<u>Report Date</u>
Louisiana TRS	Louisiana Teachers Retirement System	6/30/2014
Maine SRS	Maine State Retirement System	6/30/2014
Maryland SRPS: Employees	Maryland State Retirement & Pension System: Employees	6/30/2014
Maryland SRPS: State Police	Maryland State Retirement & Pension System: State Police	6/30/2014
Maryland SRPS: Teachers	Maryland State Retirement & Pension System: Teachers	6/30/2014
Massachusetts SRB	Massachusetts Public Employee Retirement Administration Commission: SRB	6/30/2014
Massachusetts Teachers	Massachusetts Public Employee Retirement Administration Commission: Teachers	6/30/2014
Michigan Municipal	Michigan Municipal Employees Retirement System	12/31/2013
Michigan Public School ERS	Michigan Public School Employees Retirement System	9/30/2013
Michigan SERS	Michigan State Employees Retirement System	9/30/2013
Michigan State Police	Michigan State Police Retirement System	9/30/2013
Minnesota PERA: Employees	Minnesota Public Employees Retirement Association: Employees	6/30/2014
Minnesota PERA: Police & Fire	Minnesota Public Employees Retirement Association: Police & Fire	6/30/2014
Minnesota SRS: Employees	Minnesota State Retirement System: Employees	6/30/2014
Minnesota SRS: State Patrol	Minnesota State Retirement System: State Patrol	6/30/2014
Minnesota TRA	Minnesota Teachers Retirement Association	6/30/2014
Mississippi PERS	Mississippi Public Employees' Retirement System	6/30/2014
Missouri ERS	Missouri State Employee Retirement System	6/30/2014
Missouri Highway ERS	Missouri Highway & Transportation Employees and Highway Patrol Retirement System	6/30/2014
Missouri PEERS	Missouri Public Education Employee Retirement System	6/30/2014
Missouri PSRS	Missouri Public School Retirement System	6/30/2014
Montana PERB	Montana Public Employees Retirement Board	6/30/2013
Montana TRS	Montana Teachers' Retirement System	6/30/2014
Nebraska RS	Nebraska Retirement System	6/30/2014
Nevada PERS	Nevada Public Employees' Retirement System	6/30/2014
New Hampshire Retirement System	New Hampshire Retirement System	6/30/2014
New Jersey PERS	New Jersey Public Employees Retirement System	6/30/2013
New Jersey Police & Fire	New Jersey Police & Firemen's Retirement System	6/30/2013
New Jersey State Police	New Jersey State Police Retirement System	6/30/2013
New Jersey TPAF	New Jersey Teachers' Pension & Annuity Fund	6/30/2013
New Mexico ERB	New Mexico Educational Retirement System	6/30/2013
New Mexico PERA	New Mexico Public Employees Retirement Association	6/30/2013
New York STRS	New York State Teachers Retirement System	6/30/2014
New York: ERS	New York State & Local Employees' Retirement System	3/31/2014
New York: Police & Fire	New York Police & Fire Retirement System	3/31/2014
North Carolina Local ERS	North Carolina Local Governmental Employees' Retirement System	6/30/2014
North Carolina TSERS	North Carolina Teachers' & State Employees' Retirement System	6/30/2014
North Dakota PERS	North Dakota Public Employees Retirement System	6/30/2014
North Dakota TFFR	North Dakota Teachers' Fund for Retirement	6/30/2014
Ohio PERS	Ohio Public Employees Retirement System	12/31/2013
Ohio Police & Fire	Ohio Police & Fire Pension Fund	12/31/2013
Ohio School Employees RS	Ohio School Employees Retirement System	6/30/2014
Ohio STRS	Ohio State Teachers Retirement System	6/30/2014
Oklahoma Firefighters	Oklahoma Firefighters Pension & Retirement System	6/30/2014
Oklahoma PERS	Oklahoma Public Employees Retirement System	6/30/2014

## Appendix A: (cont.)

<u>Retirement System</u>	<u>Retirement System</u>	<u>Report Date</u>
Oklahoma Police	Oklahoma Police Pension & Retirement System	6/30/2014
Oklahoma TRS	Oklahoma Teachers Retirement System	6/30/2014
Oregon PERS	Oregon Public Employees Retirement System	6/30/2014
Pennsylvania PSERS	Pennsylvania Public School Employees' Retirement System	6/30/2014
Pennsylvania SERS	Pennsylvania State Employees' Retirement System	12/31/2013
Rhode Island ERS	Rhode Island Employees Retirement System	6/30/2014
Rhode Island JRBT	Rhode Island Judicial Retirement Benefits Trust	6/30/2014
Rhode Island MERS	Rhode Island Municipal Employees Retirement System	6/30/2014
Rhode Island SPRBT	Rhode Island State Police Retirement Benefits Trust	6/30/2014
South Carolina Police	South Carolina Police Officers Retirement System	6/30/2014
South Carolina RS	South Carolina Retirement System	6/30/2014
South Dakota RS	South Dakota Retirement System	6/30/2014
Tennessee Consolidated RS	Tennessee Consolidated Retirement System	6/30/2014
Texas CDRS	Texas County & District Retirement System	12/31/2013
Texas ERS	Texas Employees Retirement System	8/31/2014
Texas LECOSRF	Texas Law Enforcement & Custodial Officers Supplemental Retirement Fund	8/31/2014
Texas Municipal	Texas Municipal Retirement System	12/31/2013
Texas TRS	Texas Teachers Retirement System	8/31/2014
Utah Contributory RS	Utah Contributory Retirement System	12/31/2013
Utah Firefighters RS	Utah Firefighters Retirement System	12/31/2013
Utah Noncontributory RS	Utah Noncontributory Retirement System	12/31/2013
Utah Public Safety RS	Utah Public Safety Retirement System	12/31/2013
Vermont MERS	Vermont Municipal Employees' Retirement System	6/30/2014
Vermont SERS	Vermont State Employees' Retirement System	6/30/2014
Vermont TRS	Vermont State Teacher's Retirement System	6/30/2014
Virginia JRS	Virginia Judicial Retirement System	6/30/2014
Virginia LORS	Virginia Law Officers' Retirement System	6/30/2014
Virginia RS	Virginia Retirement System	6/30/2014
Virginia SPORS	Virginia State Police Officers' Retirement System	6/30/2014
Washington LEOFF 1	Washington Law Enforcement Officers & Fire Fighters' Retirement System 1	6/30/2014
Washington LEOFF 2	Washington Law Enforcement Officers & Fire Fighters' Retirement System 2	6/30/2014
Washington PERS 1	Washington Public Employees' Retirement System Plan 1	6/30/2014
Washington PERS 2/3	Washington Public Employees' Retirement System Plan 2	6/30/2014
Washington SERS 2 & 3	Washington School Employees' Retirement System Plan 2 & 3	6/30/2014
Washington TRS 1	Washington Teachers' Retirement System Plan 1	6/30/2014
Washington TRS 2 & 3	Washington Teachers' Retirement System Plan 2 & 3	6/30/2014
Washington WSPRS 1 & 2	Washington State Patrol Retirement System	6/30/2014
West Virginia PERS	West Virginia Public Employees Retirement System	6/30/2013
West Virginia TRS	West Virginia Teachers Retirement System	6/30/2013
Wisconsin RS	Wisconsin Retirement System	12/31/2013
Wyoming RS	Wyoming Retirement System	12/31/2013

## **Important Information**

This material contains confidential and proprietary information of Wilshire Consulting, and is intended for the exclusive use of the person to whom it is provided. It may not be modified, sold or otherwise provided, in whole or in part, to any other person or entity without prior written permission from Wilshire Consulting.

This material is intended for informational purposes only and should not be construed as legal, accounting, tax, investment, or other professional advice. Past performance does not guarantee future returns. This material may include estimates, projections and other "forward-looking statements." Due to numerous factors, actual events may differ substantially from those presented.

Third party information contained herein has been obtained from sources believed to be reliable. Wilshire Consulting gives no representations or warranties as to the accuracy of such information, and accepts no responsibility or liability (including for indirect, consequential or incidental damages) for any error, omission or inaccuracy in such information and for results obtained from its use. Information and opinions are as of the date indicated, and are subject to change without notice.

Wilshire<sup>®</sup> is a registered service mark of Wilshire Associates Incorporated, Santa Monica, California. All other trade names, trademarks, and/or service marks are the property of their respective holders.

Copyright © 2015 Wilshire Associates Incorporated. All rights reserved. Information in this document is subject to change without notice. No part of this publication may be transmitted or reproduced in any way without the prior written permission of Wilshire Associates Incorporated, Santa Monica, CA U.S.A. [www.wilshire.com](http://www.wilshire.com)