



Wilshire Consulting

***2016 Report on
City & County Retirement Systems:
Funding Levels and Asset Allocation
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Summary of Findings

- The following study includes 109 city and county retirement systems. Of these 109 retirement systems, 99 systems reported actuarial values on or after June 30, 2015 and 10 systems last reported prior to that date.
- Wilshire Consulting estimates that the ratio of pension assets-to-liabilities, or *funding ratio*, for all 109 city and county pension plans was 70% in fiscal 2015, down from 74% in fiscal 2014. Despite relatively strong performance from U.S. stocks in the fiscal year ending June 30, 2015, an increase in U.S. interest rates in the second quarter of 2015 combined with a stronger U.S. dollar to dampen performance of fixed income and non-U.S. dollar investments for fiscal 2015, allowing pension liabilities to outgrow pension assets over the fiscal year. (Exhibit 1)
- For the 99 city and county retirement systems that reported actuarial data for 2015, pension assets and liabilities were \$453.0 billion and \$636.2 billion, respectively. The funding ratio for these 99 state pension plans was 71% in 2015, down from 75% for the same plans in 2014. (Exhibit 2)
- For the 99 city and county retirement systems that reported actuarial data for 2015, pension assets grew by 0.4%, or \$1.9 billion, from \$451.1 billion in 2014 to \$453.0 billion in 2015 while liabilities grew 5.9%, or \$35.7 billion, from \$600.5 billion in 2014 to \$636.2 billion in 2015. These 99 plans saw their aggregate shortfall, or net pension liability, increase \$33.7 billion over fiscal 2015 from -\$149.5 billion to -\$183.2 billion. (Exhibit 2)
- Of the 99 city and county retirement systems that reported actuarial data for 2015, 93% 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 72%. In comparison, of the 109 city and county retirement systems that reported actuarial data for 2014, 92% were *underfunded*. The average underfunded plan in FY2014 had a ratio of assets-to-liabilities equal to 75%.
- City and county pension portfolios have, on average, a 63.9% allocation to equities, including real estate and private equity, and a 36.1% allocation to fixed income and other non-equity assets. The 63.9% equity allocation is somewhat lower than the 67.0% equity allocation in 2005; 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 12)
- Asset allocation varies by retirement system. Thirty-three of 109 retirement systems have allocations to equity that equal or exceed 75%, and 9 systems have an equity allocation below 50%. The 25th and 75th percentile range for equity allocation is 58.8% to 70.6%.
- Wilshire forecasts a median plan return equal to 6.0% per annum, which is 1.5% below the median actuarial interest rate assumption of 7.5%. 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. Using Wilshire's 30-year long-term asset class assumptions, the median estimated return would be 7.3%.

Financial Overview

This is Wilshire Consulting's fourteenth report on the financial condition of city and county-sponsored defined benefit retirement systems and is based upon data gathered from the most recent financial and actuarial reports provided by 109 retirement systems. Appendix A lists the 109 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 conduct 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-nine systems reported actuarial values on or after June 30, 2015 and the remaining 10 systems last reported prior to June 30, 2015.

The Governmental Accounting Standards Board (GASB) is the agency tasked with developing accounting and financial reporting standards for state and local governments¹. 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. 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 NPL potentially a more volatile measure of these pensions' financial health than the unfunded actuarial liability permitted by prior GASB rules.

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

- 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 have not been able to supply this information, nor ten years of Net Pension Liability schedules, in their fiscal 2014 or 2015 CAFRs.

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 109 retirement systems in our survey reported actuarial values for fiscal 2014, while only 99 systems reported actuarial values for fiscal 2015. 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 City & County Retirement Systems² (\$ billions)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total Pension Assets:															
- Market Value	\$288.2	\$258.4	\$267.2	\$299.4	\$322.6	\$350.0	\$398.0	\$351.5	\$294.4	\$326.0	\$374.3	\$378.5	\$419.5	\$473.1	\$453.0
- Actuarial Value	\$303.1	\$306.1	\$304.6	\$309.2	\$321.3	\$335.6	\$359.1	\$370.8	\$371.2	\$376.4	\$378.0	\$387.5	\$418.5	\$473.1	\$453.1
Total Pension Liabilities:	\$302.5	\$321.0	\$335.2	\$348.2	\$366.8	\$380.4	\$399.5	\$417.1	\$433.4	\$454.1	\$473.6	\$577.7	\$616.9	\$641.4	\$636.2
Difference:															
- Market Value	-\$14.2	-\$62.7	-\$68.1	-\$48.8	-\$44.1	-\$30.4	-\$1.4	-\$65.5	-\$139.0	-\$128.1	-\$99.3	-\$199.2	-\$197.5	-\$168.3	-\$183.2
- Actuarial Value	\$0.7	-\$14.9	-\$30.7	-\$39.1	-\$45.5	-\$44.8	-\$40.4	-\$46.3	-\$62.2	-\$77.7	-\$95.5	-\$190.2	-\$198.5	-\$168.3	-\$183.0
Market Value of Assets as a % of Liabilities:															
All Plans (estimate)*	95%	80%	80%	86%	88%	92%	100%	84%	68%	72%	79%	66%	68%	74%	70%
Reported Plans (actual)	95%	80%	80%	86%	88%	92%	100%	84%	68%	72%	79%	66%	68%	74%	71%
Actuarial Value of Assets as a % of Liabilities:															
All Plans (estimate)*	100%	95%	91%	89%	88%	88%	90%	89%	86%	83%	80%	67%	68%	74%	70%
Reported Plans (actual)	100%	95%	91%	89%	88%	88%	90%	89%	86%	83%	80%	67%	68%	74%	71%
Number of Plans with Current Data:	109	109	109	109	109	109	109	109	109	109	109	109	109	109	99

*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 109 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 109 retirement systems over the past fifteen fiscal years. Market value funding ratios fell dramatically between 2001 and 2002, from 95 percent to 80 percent, stabilized between 2002 and 2003, and rebounded swiftly from 2003 to 2007, peaking at 100 percent (fully-funded status). The effects of the global market dislocation events of 2007 through early 2009 are readily observed in the fall in market value funding ratio between 2007 and 2009, from 100% to 68%. Between fiscal 2009 and fiscal 2015, these plans' aggregate funding ratio has had a volatile climb to just 70% as of fiscal year-end 2015. 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, unsurprisingly, have also steadily risen over the last ten years along with the age and covered payroll of plan participants. Many plans have lowered the assumed rate of return on assets used to value their liabilities, also contributing to 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 2011, then to 7.5% in fiscal 2014, where it remained for fiscal 2015.

Actuarial value funding ratios declined fairly steadily, with periodic upward blips, over the ten year period between fiscal year-end 2005 and fiscal year-end 2015, from 86% to an estimated 74%. Actuarial accounting standards historically permitted the use of smoothing procedures to mitigate asset valuation volatility in plan projections; one product of these accounting conventions was notably lower variability of actuarial value-based funding ratios while those standards were in place. However, with the adoption of GASB 67 and 68, most plans have

² 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.

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.

Exhibit 2 shows asset and liability values for the 99 retirement systems which reported actuarial values for 2015 and compares them with the same totals from the previous fourteen fiscal years.

Exhibit 2
Financial Overview of 99 City & County Retirement Systems (\$ billions)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Annualized Growth %	
															2005-2015	2014-2015	
Total Pension Assets:																	
- Market Value	\$271.7	\$243.7	\$250.7	\$281.4	\$303.4	\$328.9	\$375.9	\$336.2	\$276.0	\$306.1	\$355.6	\$358.4	\$397.4	\$451.1	\$453.0	4%	0%
- Actuarial Value	\$285.3	\$288.9	\$287.2	\$291.5	\$302.3	\$315.7	\$337.5	\$349.4	\$351.4	\$355.3	\$357.4	\$367.5	\$396.6	\$451.1	\$453.1	4%	0%
Total Pension Liabilities:	\$281.7	\$299.1	\$311.6	\$323.3	\$339.7	\$352.4	\$370.0	\$386.9	\$401.7	\$421.3	\$439.2	\$542.3	\$578.2	\$600.5	\$636.2	6%	6%
Difference:																	
- Market Value	-\$10.1	-\$55.4	-\$61.0	-\$41.9	-\$36.3	-\$23.5	\$5.9	-\$50.7	-\$125.6	-\$115.1	-\$83.6	-\$183.9	-\$180.8	-\$149.5	-\$183.2		
- Actuarial Value	\$3.5	-\$10.2	-\$24.4	-\$31.7	-\$37.4	-\$36.7	-\$32.6	-\$37.5	-\$50.2	-\$65.9	-\$81.8	-\$174.8	-\$181.7	-\$149.4	-\$183.0		
Assets as a % of Liabilities:																	
- Market Value	96%	81%	80%	87%	89%	93%	102%	87%	69%	73%	81%	66%	69%	75%	71%		
- Actuarial Value	101%	97%	92%	90%	89%	90%	91%	90%	87%	84%	81%	68%	69%	75%	71%		
Underfunded Plans as % of All Plans:																	
- Market Value	59%	86%	85%	77%	72%	69%	55%	83%	98%	96%	92%	97%	95%	91%	93%		
- Actuarial Value	51%	64%	80%	82%	85%	84%	80%	84%	90%	93%	92%	97%	95%	92%	94%		
Total No. of Systems:	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99		

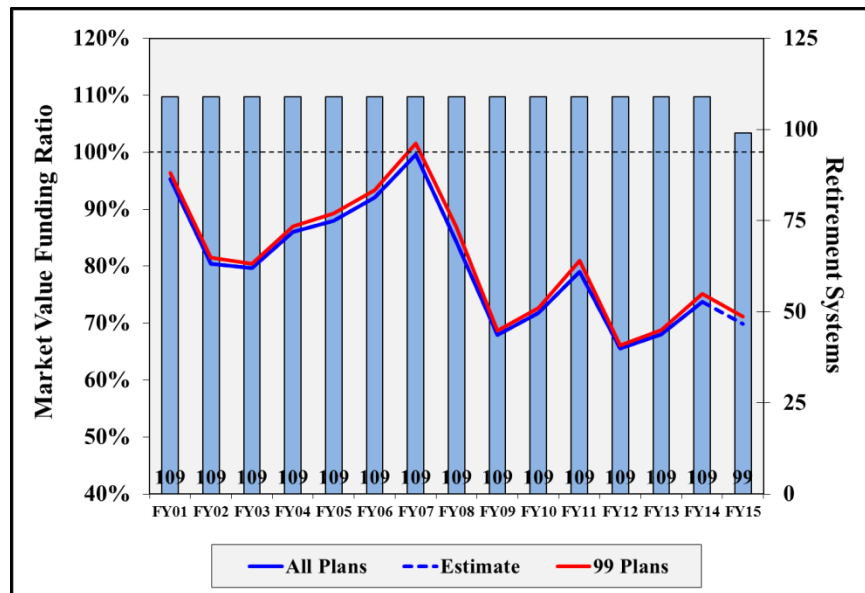
In fiscal 2014, pension liabilities for these 99 plans exceeded assets by \$149.5 billion and the funding ratio, or ratio of assets-to-liabilities, one measure of pension fund health, stood at 75%. One year later, assets have risen to \$453.0 billion, a change of 0.4%, while liabilities have grown to \$636.2 billion, a change of 5.9%. The result has been an increase in the shortfall between assets and liabilities from -\$149.5 billion to -\$183.2 billion, a \$35.7 billion increase, and a drop in the funding ratio for these 99 plans from 75% to 71%.

In fiscal 2005, after the equity market declines of 2000 through 2002 and subsequent recovery in 2003 through 2005, pension liabilities for these 99 plans exceeded assets by \$36.3 billion and the funding ratio stood at 89%. During the next two years, assets grew at an average annual rate of 11.3% while liabilities grew by an annualized 4.4%. This difference in growth rates is reflected in the increasing funding ratio of the market value of assets to liabilities through fiscal 2007. In fiscal 2008 however, the \$5.9 billion asset surplus of these plans fell to a -\$50.7 billion shortfall, leading to a fall in the funding ratio for these 99 plans from 102% to 87%. 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 2009's 69% through fiscal year-end 2011's 81% level; after a pullback in fiscal 2012 to 66%, funding ratios jumped to an aggregate 75% as of fiscal 2014 before pulling back to fiscal 2015's 71%.

It is important to note, as with any sample, there exists some level of statistical error. Although the 99 funds with 2015 fiscal year data constitute a sizable majority of the city and county 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 99 plans with more recently reported data. The dotted line represents Wilshire's estimated funding ratio for the complete set of 109 plans, which is derived from the historical relationship between the 99-plan sample and the complete set of 109 plans. Using this approach

one can reasonably expect a fiscal 2015 funding ratio of approximately 70% once all plans have reported 2015 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 99 Plan Sample vs. Complete Set of 109 Plans



Funding Ratios

Expanding on Exhibit 3, Exhibit 4 shows the aggregate, average, median, 25th, and 75th percentile market value funding ratios for the 109 city and county pension systems over the last ten fiscal years. Historically, the market value funding ratios for our sample experienced a fairly steady improvement between fiscal 2005 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. However, funding ratios dipped in fiscal 2015, despite relatively strong performance for U.S. stocks over that twelve-month period. Institutional investors found their total portfolio performance dampened by a stronger U.S. dollar, hampering the performance of their non-dollar assets, as well as interest rates that moved higher in three of the four quarters of fiscal 2015, especially in the quarter ending June 30. As a result, the growth in pension total liabilities outpaced pension plan asset growth in fiscal 2015.

Exhibit 4
Market Value Funding Ratios by Fiscal Year for 109 Plans

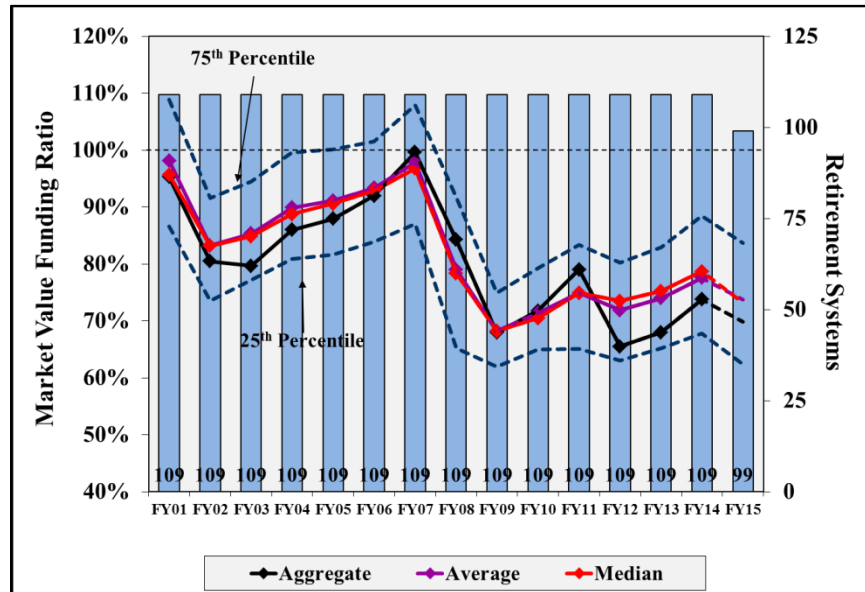


Exhibit 5 shows the same information as Exhibit 4, except it uses the actuarial value of assets and/or Plan Fiduciary Net Position to determine funding ratios. In contrast with Exhibit 4’s more volatile market value-based funding ratio time series, Exhibit 5 shows an essentially steady, gradual decline in funding ratios through fiscal 2013, then an improvement in funding in fiscal 2014, followed by the decline already described for fiscal 2015. 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 109 Plans

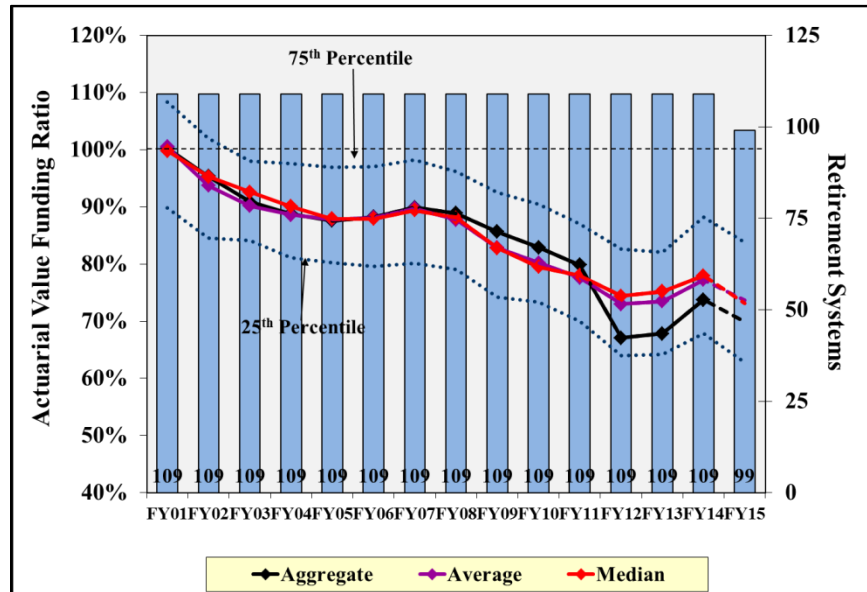
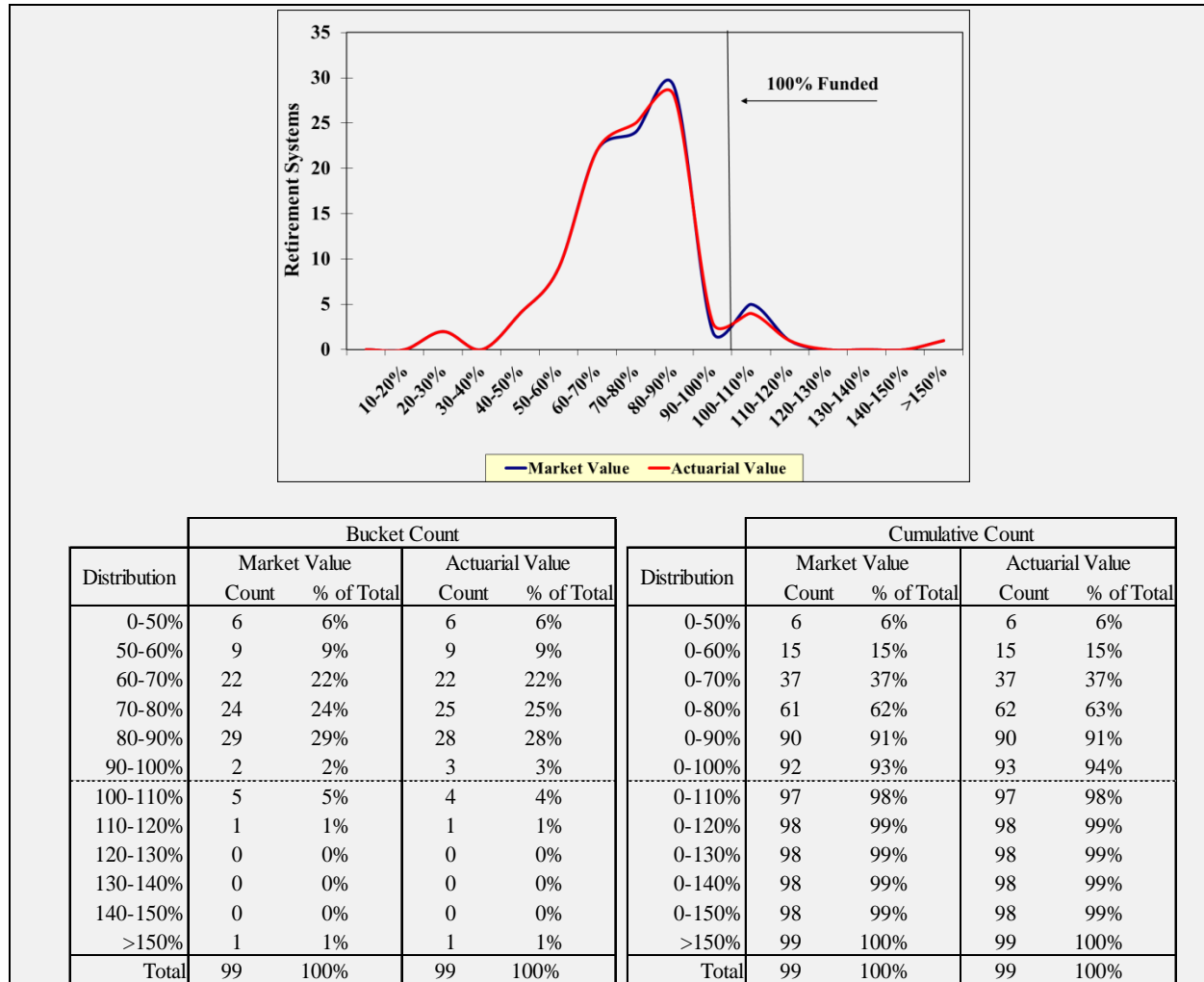


Exhibit 6 gives a more detailed picture of the fiscal condition for the 99 city and county retirement systems that reported actuarial values for 2015.

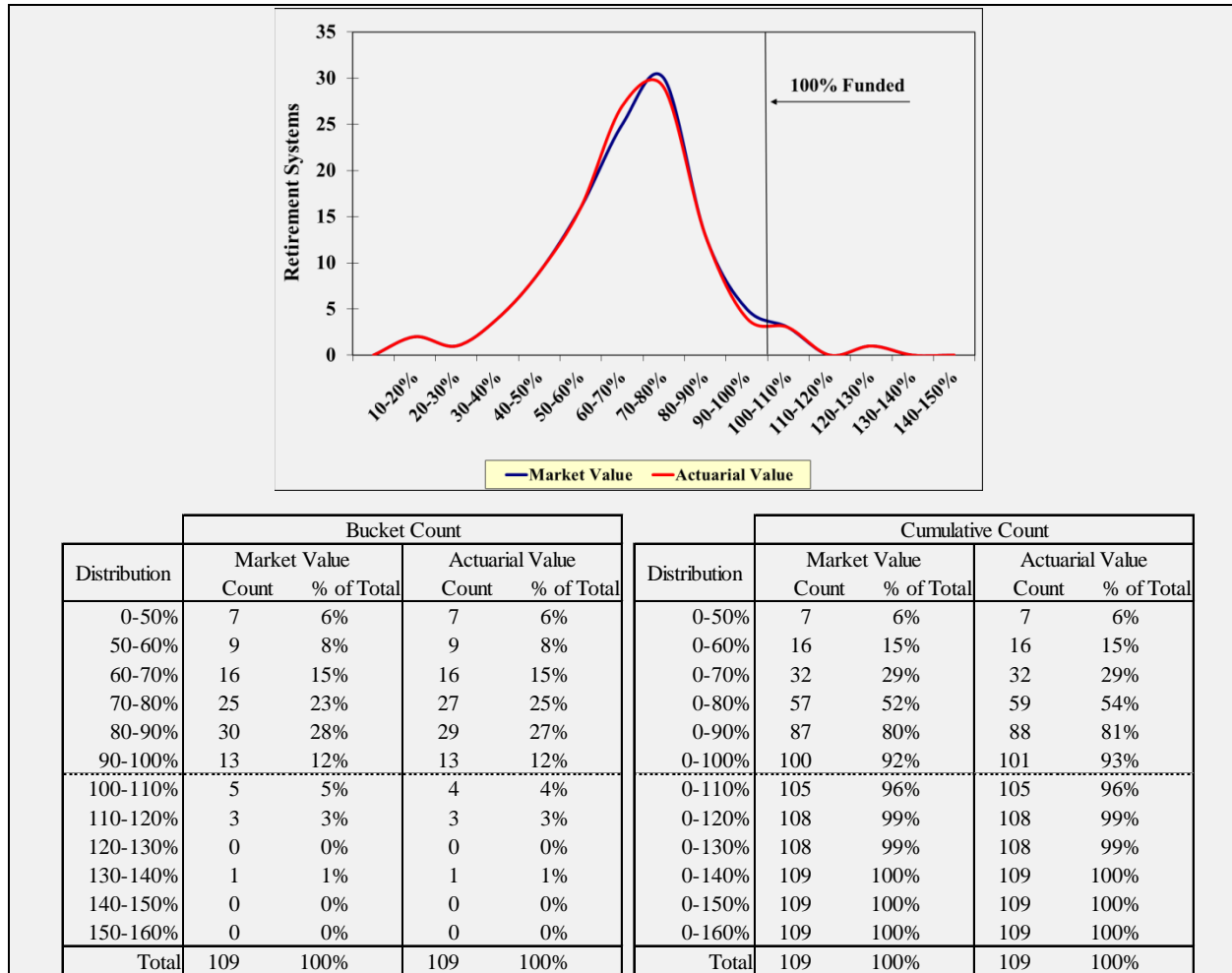
Exhibit 6
Distribution of 99 City & County Pension Systems by Fiscal Year 2015 Funding Ratio



We have noted above that 93% of these 99 plans with 2015 actuarial data, or 92 plans, are underfunded; Exhibit 6 demonstrates the extent of the shortfall. Six plans have assets less than 50% of liabilities; 37 plans have assets less than 70% of liabilities; and 61 plans have assets less than 80% of liabilities.

Similar to Exhibit 6, Exhibit 7 examines the fiscal condition of the 109 city and county retirement systems that reported actuarial values for 2014.

Exhibit 7
Distribution of 109 City & County Pension Systems by Fiscal Year 2014 Funding Ratio



Using the market value of assets to determine funding ratios, 100 of the 109 plans, or 92%, had assets less than liabilities. Seven plans had assets less than 50% of liabilities; 32 plans had assets less than 70% of liabilities; and 57 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. 25³ are based on actuarial values, this section calculates the

³ GASB No. 25, “Financial Reporting for Defined Benefit Pension Plans and Note Disclosures for Defined Contribution Plans”.

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 fifteen fiscal years for the 109 retirement systems. Exhibit 8 also shows the 25th and 75th percentile for each year. The steepest rises in this ratio, unsurprisingly, are seen subsequent to the recessions of 2001-2002 and 2008-2009. 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 that year. In fiscal 2015, however, growth in NPL outpaced growth in payroll:

Exhibit 8
NPL/UAAL as a % of Covered Payroll by Fiscal Year for 109 Plans

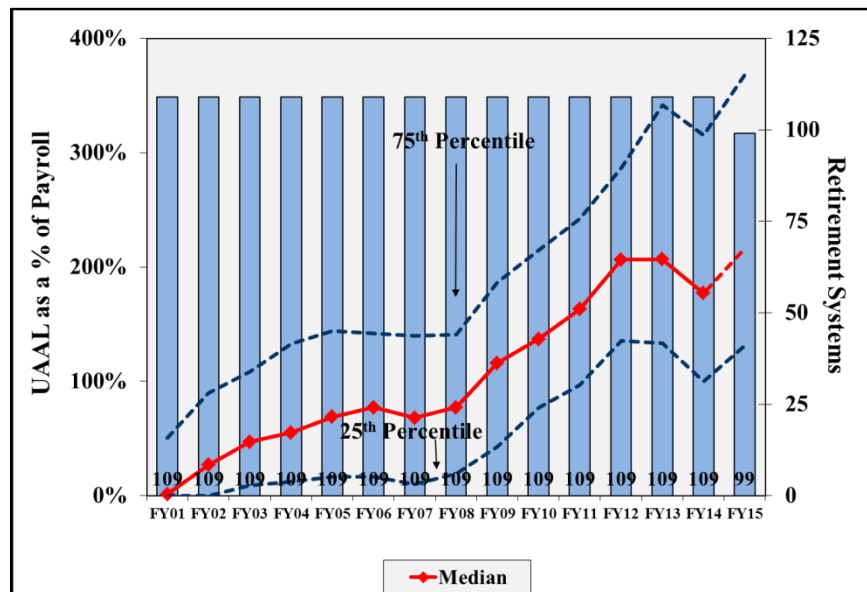


Exhibit 9 shows the median size of the UAAL through fiscal 2013 and the NPL for fiscal 2014 and 2015 relative to the actuarial value of assets during the last fifteen fiscal years for the 109 plans. Exhibit 9 also shows the 25th and 75th percentile for each year.

Exhibit 9
NPL/UAAL as a % of Actuarial Value of Assets by Fiscal Year for 109 Plans

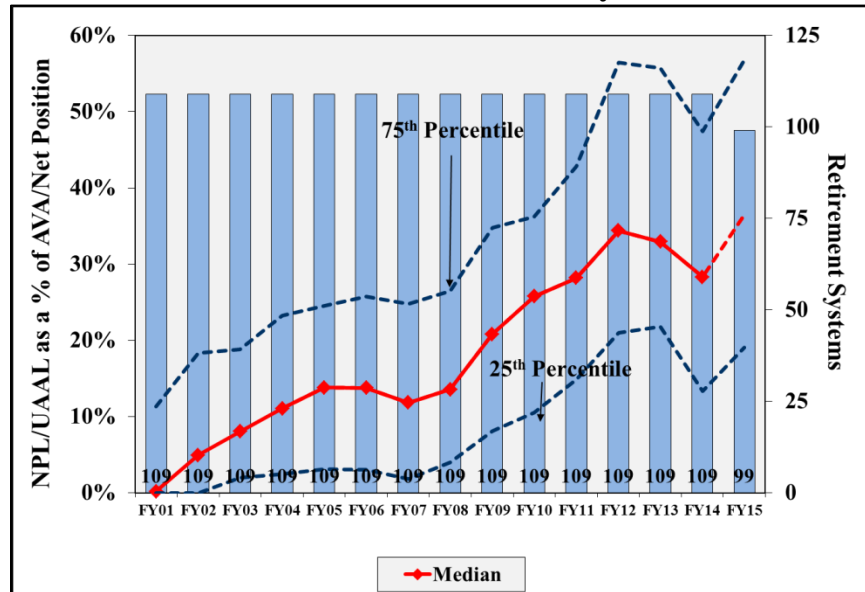
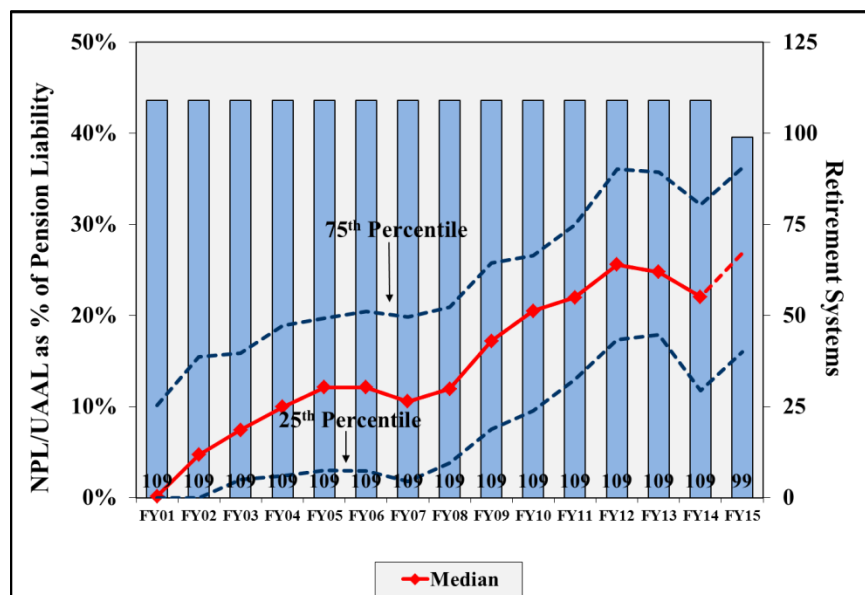


Exhibit 10 shows the median size of the UAAL through fiscal 2013 and the NPL for fiscal 2014 and 2015 relative to the actuarial accrued liability during the last fifteen fiscal years for all 109 retirement systems. Exhibit 10 also shows the 25th and 75th percentile for each year.

Exhibit 10
NPL/UAAL as a % of Accrued Liabilities by Fiscal Year for 109 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 25th and 75th 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 city and county retirement systems. Asset market value growth 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. Fiscal 2015 saw this trend reverse course, with NPL growth outpacing the growth in Net Plan Fiduciary Position.

Asset Allocation

In this section we examine the investment strategies employed by the city and county retirement systems. Exhibit 11 provides a snapshot of the average asset allocation as of the latest reported fiscal year-end across all 109 retirement systems.

Exhibit 11
Average Asset Allocation for City & County Pension Plans

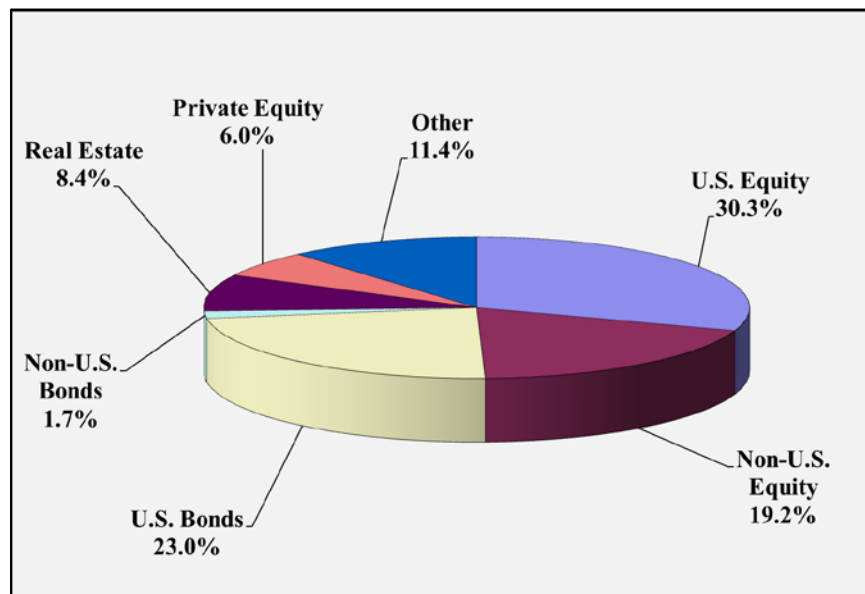


Exhibit 12 examines the change in average asset allocation over the last ten years. During this period, the average allocations to Non-U.S. equities increased from 14.0% to 19.2% while allocations to U.S. bonds decreased from 28.3% to 23.0%.

Exhibit 12
Change in Average Asset Allocation for City & County Pension Plans

	<u>2005</u>	<u>2010</u>	<u>2015</u>	<u>Change</u>
Equity				
U.S. Equity	46.5 %	35.2 %	30.3 %	-4.9 %
Non-U.S. Equity	14.0	17.3	19.2	1.9
Real Estate	4.9	5.5	8.4	2.9
Private Equity	1.6	3.3	6.0	2.7
Equity Subtotal	67.0	61.3	63.9	2.6
Debt				
U.S. Bonds	28.3	28.2	23.0	-5.2
Non-U.S. Bonds	1.0	1.7	1.7	0.0
Other	3.8	8.7	11.4	2.7
Debt Subtotal	33.0	38.7	36.1	-2.6

Overall equity exposure, comprised of U.S. and non-U.S. public market equities along with real estate and private equity, decreased 3.1% over the past decade, while overall non-equity exposure, comprised of U.S. and non-U.S. fixed income and other assets (consisting of cash and cash equivalents as well as commodities, hedge funds and other absolute return 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 2005, 2010 and 2015 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 city and county 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 2016 Capital Market Assumptions

	Expected	
	<u>Return</u>	<u>Risk</u>
U.S. Equity	6.50 %	17.00 %
Non-U.S. Equity	6.50	18.00
Private Equity	9.50	27.50
Real Estate	5.00	17.00
U.S. Bonds	3.50	5.00
Non-U.S Bonds	1.65	3.50

Exhibit 14 below contains summary statistics on asset allocation for all city and county retirement systems. The median allocation⁴ is 29.7% to U.S. equities and 20.8% 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 city and county pension fund has an expected return of 6.0%. This result is 1.5% less than the current median liability discount rate of 7.5%. 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).

Wilshire has also developed a set of asset class return assumptions with longer time horizons; these forecast returns assume a resumption of long-term equilibrium relationships between asset classes and inflation. Using 30-year long-term assumptions, the median city and county defined benefit pension is estimated to have an annualized return of 7.3% (again, with no assumption of alpha from active management).

⁴ 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 City & County Pension Plans

	<u>Lowest (%)</u>	<u>Median (%)</u>	<u>Highest (%)</u>
U.S. Equity	0.0 %	29.7 %	63.0 %
Non-U.S. Equity	0.0	20.8	34.0
Private Equity	0.0	5.3	54.6
Real Estate	0.0	8.0	40.1
U.S. Bonds	1.6	22.8	39.9
Non-U.S Bonds	0.0	0.0	22.0
Other	0.0	3.5	56.1
Expected Returns	5.2 %	6.0 %	8.2 %

Exhibit 15 plots the expected return and risk for each of the 109 city and county 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 7.50%, represents the current median actuarial interest rate assumption employed by city and county pension plans.

Using Wilshire’s 2016 capital market return forecasts, none of the 109 city and county retirement systems are expected to earn long-term asset returns that equal or exceed the median liability discount rate assumption, although one plan just misses that median rate with a projected 7.44% return. 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). Using Wilshire’s 30-year longer-term assumptions, 46 of the 109 plans’ assets, in their current allocation, would be projected to earn long-term returns above their current discount rates.

Exhibit 15
Projected Return & Risk Forecasts for City & County Pension Plans

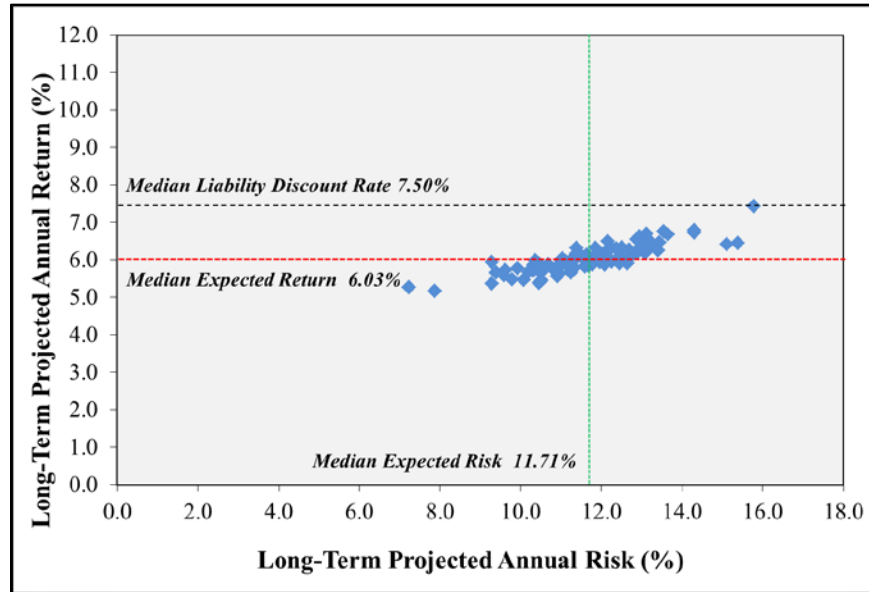
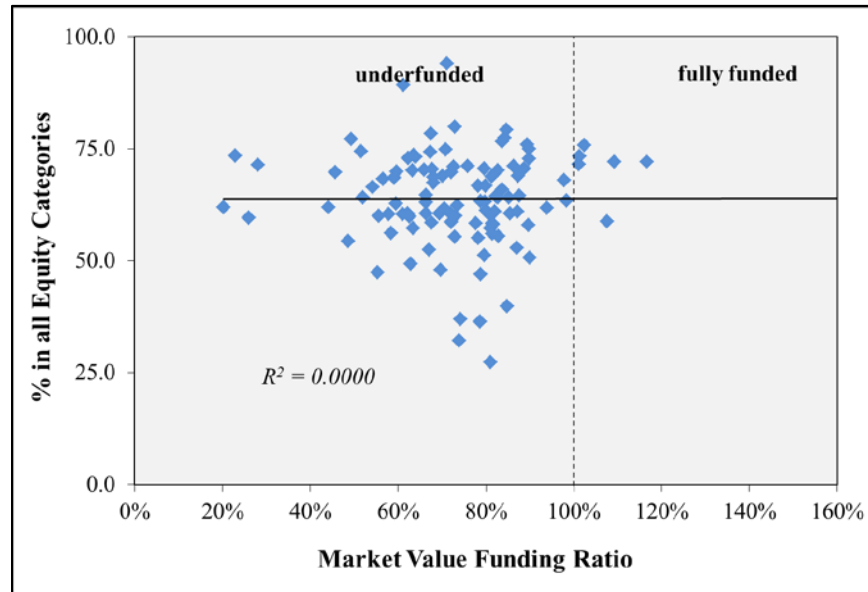


Exhibit 16 addresses the relationship between asset allocation and funding for all city and county systems in this study. The allocation to equity asset classes, a proxy for investment aggressiveness, is plotted on the vertical scale. The market value funding ratio is on the horizontal scale.

Exhibit 16
Asset Allocation & Actuarial Funding Ratios for City & County 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 zero. In other words, there is no discernable relationship between asset allocation and funding. City and county retirement systems show a broad spectrum of asset allocations that appear to be unrelated to the size of their unfunded liabilities⁵.

⁵ The authors would like to thank Alexander Berkeley-Hill, Nick Esquire, Jeffrey Kawabe, Jeff Marraccini, Alex Sims and David Wauchope for their assistance and diligence in the data collection for this year's survey.

Appendix A: City & County Retirement Systems⁶

<u>Retirement System</u>	<u>Report Date</u>
Alameda County Employees' Retirement Association (ACERA)	12/31/2015
Allegheny County Employees' Retirement System	12/31/2015
Anne Arundel County Detention Officers' & Deputy Sheriffs' Service Retirement Plan	12/31/2015
Anne Arundel County Employees' Retirement Plan	12/31/2015
Anne Arundel County Fire Service Retirement Plan	12/31/2015
Anne Arundel County Police Service Retirement Plan	12/31/2015
Arlington County Employees' Retirement System	6/30/2015
Charlotte Firefighters' Retirement System	6/30/2015
City & County Of San Francisco Retirement System (SFERS)	6/30/2015
City Of Austin Employees' Retirement System (COA ERS)	12/31/2015
City Of Baton Rouge & Parish Of East Baton Rouge Employees' Retirement System (CPERS)	12/31/2014
City Of Baton Rouge Police Guarantee Trust (PGT)	12/31/2014
City Of Birmingham Retirement & Relief System	6/30/2015
City Of Boston Retirement System	12/31/2014
City Of Cincinnati Retirement System	6/30/2015
City Of Fresno Employees Retirement System	6/30/2015
City Of Fresno Fire & Police Retirement System	6/30/2015
City Of Gainesville General Employees' Pension Plan	9/30/2015
City Of Gainesville Police Officers & Firefighters Consolidated Retirement Plan	9/30/2015
City Of Grand Rapids General Retirement System	6/30/2015
City Of Grand Rapids Police & Fire Retirement System	12/31/2015
City Of Jacksonville General Employees Pension Plan	9/30/2015
City Of Jacksonville Police & Fire Pension Plan	9/30/2015
City Of Los Angeles Water & Power Employees' Retirement Plan	6/30/2015
City Of Memphis Retirement System	6/30/2015
City Of Oakland Police & Fire Retirement System (PFRS)	6/30/2015
City Of Phoenix Employees' Retirement Plan (COPERS)	6/30/2015
City Of Richmond Retirement System	6/30/2015
City Of Sacramento Employees' Retirement System (SCERS)	6/30/2015
City Of San Jose Police & Fire Department Retirement Plan	6/30/2015
City Of Tallahassee Pension Plan	9/30/2015
City Pension Fund for Firefighters and Police Officers in the City of Miami Beach	9/30/2015
Contra Costa County Employee'S Retirement Association (CCCERA)	12/31/2015
Dallas Police & Fire Pension System	12/31/2015
Denver Employees Retirement Plan (DERP)	12/31/2015
El Paso City Employees Pension Fund (CEPF)	8/31/2015
El Paso City Firemen & Policemen's Pension Fund (FPPF)	12/31/2014
El Paso County Retirement Plan (CO)	12/31/2015
Elected Officials' Retirement System Of The City Of Baltimore	6/30/2015
Employees' Retirement Fund Of The City Of Dallas	12/31/2015
Employees' Retirement Fund Of The City Of Fort Worth	9/30/2015
Employees' Retirement System Of Baltimore County	6/30/2015
Employees' Retirement System Of The City Of Baltimore	6/30/2015
Employees' Retirement System Of The City Of Milwaukee (MERS)	12/31/2014
Employees' Retirement System Of The City Of Norfolk	6/30/2015
Employees' Retirement System Of The County Of Milwaukee	12/31/2014
Fairfax County Employees' Retirement System (ERS)	6/30/2015
Fairfax County Police Officers Retirement System (PORS)	6/30/2015
Fairfax County Uniformed Retirement System (URS)	6/30/2015
Federated City Employees' Retirement System Of San Jose (FCERS)	6/30/2015
Fire & Police Employees' Retirement System Of The City Of Baltimore	6/30/2015
Fire & Police Pension Fund, San Antonio	9/30/2015
Firemen's Annuity & Benefit Fund Of Chicago	12/31/2014
Fresno County Employees' Retirement Association (FCERA)	6/30/2015
Fulton County Employees Retirement System Pension Plan	12/31/2015
General Retirement System Of The City Of Detroit (DGRS)	6/30/2015

⁶ All city and county plan information is obtained from public information sources.

Appendix A: (cont.)

<u>Retirement System</u>	<u>Report Date</u>
Houston Firefighters' Relief & Retirement Fund (HFRRF)	6/30/2015
Houston Municipal Employees Pension System (HMEPS)	6/30/2015
Houston Police Officers' Pension System (HPOPS)	6/30/2015
Howard County Police & Fire Employees' Retirement Plan	6/30/2015
Howard County Retirement Plan	6/30/2015
Imperial County Employees' Retirement System (ICERS)	6/30/2015
Kansas City Police Employees' Retirement System (KCPERS)	4/30/2015
Kern County Employees' Retirement Association (KCERA)	6/30/2015
Knox County DB Plan	6/30/2015
Los Angeles City Employees' Retirement System (LACERS)	6/30/2015
Los Angeles County Employees Retirement Association (LACERA)	6/30/2015
Los Angeles County Metropolitan Transportation Authority	6/30/2015
Los Angeles Fire & Police Pension Systems	6/30/2015
Marin County Employees Retirement Association (MCERA)	6/30/2015
Merced County Employees' Retirement Association	6/30/2015
Miami Beach Employees' Retirement Plan	9/30/2015
Montgomery County Employees' Retirement System	6/30/2015
Montgomery County Public Schools Employees' Retirement & Pension System (MCPS)	6/30/2015
Municipal Employees' Annuity & Benefit Fund Of Chicago	12/31/2015
New York City Employees' Retirement System (NYCERS)	6/30/2015
New York City Fire Pension Funds (NYCFPF)	6/30/2015
New York City Police Pension Fund (NYCPPF)	6/30/2015
Oakland County Public Employees' Retirement System	9/30/2015
Orange County Employees Retirement System (OCERS)	12/31/2015
Orlando Firefighter Pension Fund	9/30/2015
Orlando General Employees' Pension Fund	9/30/2015
Orlando Police Pension Fund	9/30/2015
Police & Firemen Retirement System Of The City Of Detroit (PFRS)	6/30/2015
Policemen's Annuity & Benefit Fund Of Chicago	12/31/2014
Prince George's County, Maryland Pension Trust Fund	6/30/2015
Public School Retirement System Of The City Of St. Louis (PSRSSTL)	12/31/2015
Public School Teachers' Pension & Retirement Fund Of Chicago (CTPF)	6/30/2015
Retirement System For City Of Philadelphia	6/30/2015
Sacramento County Employees' Retirement System (SCERS)	6/30/2015
San Bernardino County Employees' Retirement Association (SBCERA)	6/30/2015
San Diego City Employees Retirement System (SDCERS)	6/30/2015
San Diego County Employees Retirement Association (SDCERA)	6/30/2015
San Joaquin County Employees' Retirement Association (SJCERA)	12/31/2015
San Luis Obispo County Pension Trust	12/31/2015
San Mateo County Employees' Retirement Association (SamCERA)	6/30/2015
Santa Barbara County Employees' Retirement System (SBCERS)	6/30/2015
Santa Clara Valley Transportation Authority Amalgamated Transit Union Pension Plan	6/30/2015
Seattle City Employees' Retirement System (SCERS)	12/31/2014
Shelby County Retirement System	6/30/2015
Sonoma County Employees' Retirement Association (SCERA)	12/31/2015
St. Louis County, Missouri County Employees' Retirement Plan	12/31/2015
St. Paul Teachers' Retirement Fund Association (SPTRFA)	6/30/2015
Tacoma Employees' Retirement System (TERS)	12/31/2015
Teachers' Retirement System Of The City Of New York (TRS)	6/30/2015
The Oklahoma City Employee Retirement System (OCERS)	6/30/2015
Tulare County Employees' Retirement Association (TCERA)	6/30/2015
Ventura County Employees' Retirement Association (VCERA)	6/30/2015
Wayne County Employees' Retirement System (MI)	9/30/2015

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