

# Notes

## Public Pension Plan Asset Allocations, p. 2

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### EXECUTIVE SUMMARY

This article reviews actual public pension plan contribution behavior from 2001 to 2006, pension asset allocations from 2003 to 2007, and the effect that investment performance has on employer contribution volatility.

**INVESTMENT EARNINGS AND FUNDED STATUS :** Since public pension funding depends largely on investment earnings, market volatility can significantly affect the funded status of plans: the funded status generally rises in bull markets and declines in bear markets. Investment gains and losses are usually smoothed over five years, which serves to dampen the effect of market swings on both funded status and required contributions.

**INVESTMENT REVIEWS ARE ONGOING :** Plan sponsors review investment policy on an ongoing basis, but generally do not change it significantly in response to short term swings in the market. Thus, at least in the short run, plan sponsors are not likely to change to policies yielding significantly lower expected investment returns in exchange for reduced volatility in employer contributions for the following reasons:

First, higher-return-higher-risk asset allocations are expected to add investment income that would not be earned under the more conservative strategies.

Second, a high expected rate of return can be used as a discount rate to evaluate pension liabilities.

Third, since pension plan investment professionals tend to follow peer group investment policies, as is encouraged by the “prudent person” fiduciary standards.

### IMPACT OF LOWERING EXPECTED INVESTMENT RETURNS :

If economic changes suggest that future expected returns of asset classes will also change permanently, then the current investment policies may be adjusted to either raise or lower the level of expected return. This adjustment would lead to a higher or lower discount rate, and, in turn, would either decrease or increase the unfunded pension liability and therefore require either reduced or additional contributions.

# Public Pension Plan Asset Allocations

By Youngkyun Park, EBRI

## Introduction

During the recent financial crisis, public-sector pension plans have seen large declines in the value of their investment portfolios.<sup>1,2</sup> This has affected entities from school districts, to local governments, to state governments. Among the most deeply affected in dollar terms was the California Public Employees' Retirement System (CalPERS), whose pension fund value declined more than \$81 billion in 2008, down 31 percent.<sup>3</sup>

The declines in the value of pension assets have brought attention to several issues, such as funding status, the rates of return used to discount plan liabilities (known as the "discount rate"), and investment strategies.<sup>4</sup> And, given public-sector plan sponsors' limited ability to increase worker contributions increasing deficits in pension plans has raised the probability that higher than expected employer contributions will have to be made to make up for the larger than previously projected shortfall, if any. Not surprisingly, many public plan sponsors are considering how to stabilize their contributions to the plans.<sup>5</sup>

This article reviews actual public pension plan contribution behavior from 2001 to 2006, pension asset allocations from 2003 to 2007, and the effect that investment performance has on employer contribution volatility. This analysis examines the volatility in employer contribution rates caused by the higher-return-seeking/higher-risk investment portfolios adopted by many pension plans, and whether plan sponsors will increase fixed-income investments in order to reduce volatility. It appears that, in the short run, a significant shift toward a lower-return investment policy in exchange for reduced volatility in employer contributions is unlikely to occur because of plan sponsors' expected high returns from current asset allocations based upon historical rates of return, their ability to use the assumed investment rate of return as the discount rate in calculating liabilities, and the understandable tendency of investment managers to not deviate from peer group investments, as fiduciary standards stress acting like other 'prudent experts' would in like circumstances.

## Public Pension Benefit Funding

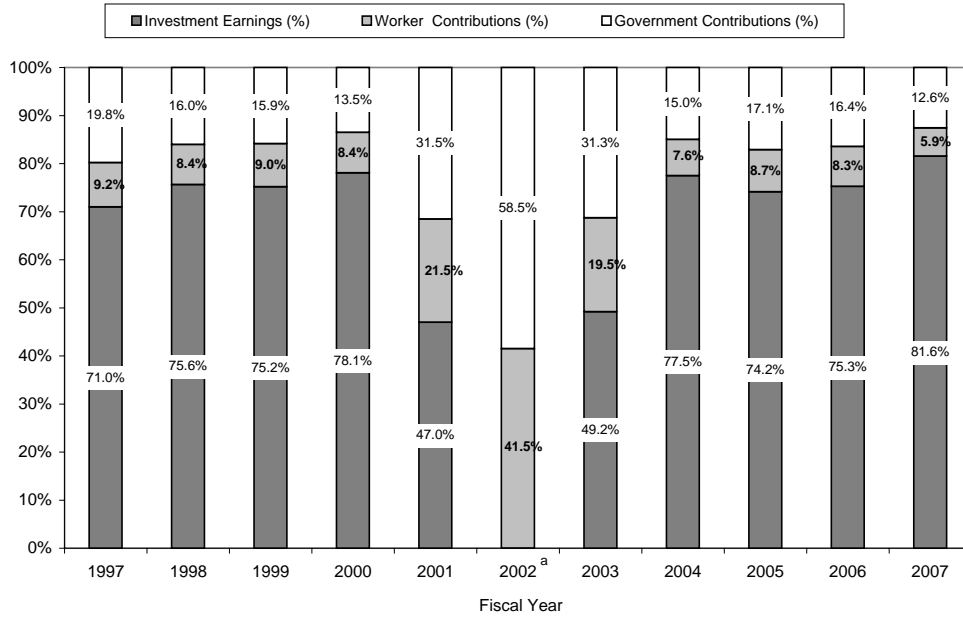
Unlike private-sector defined benefit plans, public pension plans are not funded almost *entirely* by employers;<sup>6</sup> they are financed by workers *as well as* employers. Public pension revenue relies on three sources: earnings from investments, government (employer) contributions, and worker contributions. Among these sources of income, investment earnings typically have accounted for the largest portion of plan funding, because public pension plans are generally financed on a funded basis rather than a pay-as-you-go basis (Figure 1). From 1997 to 2007, except for fiscal years 2001–2003, investment earnings made up 71–82 percent of public pension funding, employer contributions accounted for 13–20 percent of the funding, and worker contributions for 6–9 percent.<sup>7</sup>

Since public pension funding depends largely on investment earnings, negative returns on investments decrease the funding status of pension plans. Sharp improvements or reductions in funding status are gradually recognized in financial statements because of the use of a "smoothing" period (usually five years), which is applied as a way to minimize sharp swings in annual funding requirements and stabilize plan sponsors' contributions over time.<sup>8</sup> For example, in fiscal years 2001 and 2002, median annual public pension fund investment returns declined by 5.4 percent and 5.5 percent, respectively. However, actuarial funding levels gradually declined from 101.8 percent in FY2001 to 85.7 percent in FY2006 (Figure 2).<sup>9</sup> Another negative return was recognized in fiscal year 2008, but the recognition of its full impact on funding status will be delayed because of the smoothing period.<sup>10</sup>

## Volatility in Employer Contribution Rates

Public plan sponsors have not always contributed the amounts to pension plans that their actuaries recommended.<sup>11</sup> Facing the decline in funding status, public plan sponsors are restrained from raising additional funding from current workers by state statute and court rulings. State laws and labor agreements define employees' contributions to their

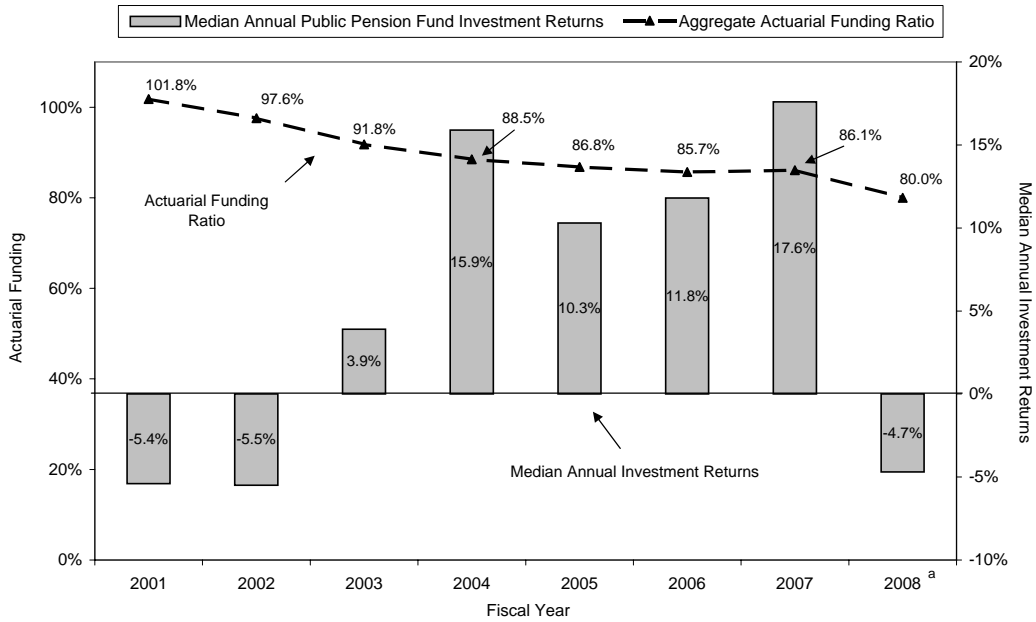
**Figure 1**  
**Public Pension Benefit Funding Sources**



Source: U.S. Census Bureau.

<sup>a</sup> In FY2002, pension benefit funding relied only on government contributions and worker contributions because investment earnings were negative.

**Figure 2**  
**Funding Status and Investment Returns of Public Pension Plans, 2001–2008**



Source: National Association of State Retirement Administrators, Public Fund Survey Summary of Findings for FY2007.

<sup>a</sup> Pension funding status in 2008 uses an estimate by Munnell, Aubry, and Muldoon (2008).

pension plans as determined by reference to the governing constitutional provision, statute, regulation, or contract. Several court rulings have also prohibited or limited public plan sponsors from modifying pension plan funding formulas.<sup>12</sup> Given this limited ability to increase current worker contributions, plan sponsors could increase funding by requiring higher contributions from new employees.<sup>13</sup> Thus, public plan sponsors faced with a sharp decline in funding status may eventually have to resort to higher taxes or other public revenue to cover public pension obligations.<sup>14</sup>

Volatility in employer contributions tends to follow the volatility in investment earnings.<sup>15</sup> Figure 3 presents public pension fund investment returns and the percentage change in plan sponsor (employer) contributions for each year from 1998 and 2008 (the change in employer contributions is derived by dividing the employer contribution rate in the current year by the previous year's rate). The employer contribution rate is defined as employer contributions as a percentage of state and local government payroll. Employer contribution rates declined for five consecutive years from 1998 to 2002 when taxpayers of state and local government paid less each year for pension contributions. This period included the economic downturn of 2000 to 2002. Despite negative investment returns in 2001 and 2002, employer contribution rates continued to decline until 2002. The delayed recognition of investment losses in employer contribution rates was primarily the result of slow reporting and the active methods in place to moderate such swings: it generally takes at least one or two years after gains or losses are experienced to be reflected in the employer contribution rates.<sup>16</sup> In 2003 and 2004, employer contributions to pension plans significantly increased by 14.7 percent and 29.5 percent, respectively, which was mainly caused by large increases in some states.<sup>17</sup> According to National Association of State Retirement Administrators (NASRA), significant increases in employer contributions for fiscal years 2003 and 2004 were caused mainly by large increases in four states: California, Illinois, New York, and Oregon. Although these four states together constituted approximately one-fourth of the active membership in public pensions, they accounted for a disproportionate share of the contribution rate volatility: more than 84 percent of the increase in employer contributions from FY 2002 to FY 2004.

## **Plan Asset Allocations and Volatility in Employer Contribution Rates**

By using actuarial smoothing methodologies, employer contributions are designed to remain level as a percentage of payroll. To calculate a contribution rate, most public pension plans are currently valued using the "entry-age normal actuarial cost method." This method is designed to maintain a level contribution as a percentage of payroll over time, and aims to help governments plan and budget their contributions to pension plans.<sup>18</sup>

Despite this contribution methodology, the recent trend in employer contribution rates suggests considerable volatility will continue, based on unusually sharp changes in investment earnings. The volatility in employer contributions is closely related to that of investment returns, and may also result from the increase over time in equity-oriented public-sector pension portfolios.

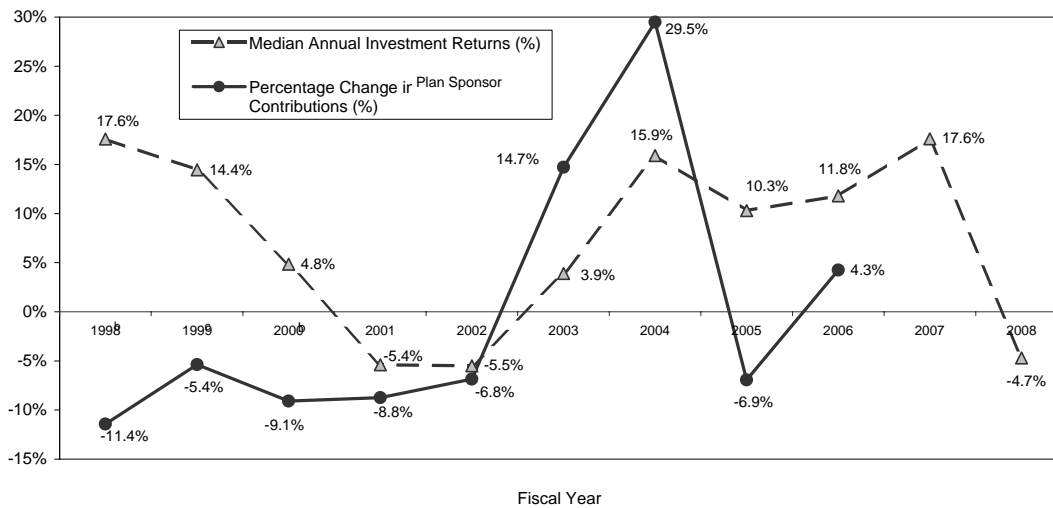
For example, equities as a percentage of total assets were estimated to have risen from about 39 percent in 1990 to about 63 percent in 2007.<sup>19</sup> Figure 4 presents average asset allocations for the public retirement systems surveyed by the National Association of State Retirement Administrators from 2003 to 2007. The portion of higher expected return assets, including equities, real estate, and alternative investments (such as private equities and hedge funds), increased from 65.0 percent in 2003 to 70.4 percent in 2007. In particular, the portions of real estate and alternative investments increased from 4.0 percent in 2003 to 5.4 and 5.3 percent, respectively, in 2007.

The increasing portion of higher risk assets in the portfolios compares with a decreasing portion of fixed-income investment instruments, such as bonds (down from 32.0 percent in 2003 to 26.6 percent in 2007). Thus, the volatility in employer contribution rates is closely related to increasing higher risk asset allocations, including real estate and alternative investments, as high risk-adjusted returns are sought.

## **Plan Asset Allocations and Discount Rates**

Plan sponsors aiming to reduce the volatility in their contribution rates achieve that goal with investment strategies that match pension assets and liabilities, such as duration-matching fixed-income strategies.<sup>20</sup> However, fixed-income investments have lower historical return rates than do equity-based investments. In the short run, it is unlikely that

**Figure 3**  
**Public Pension Fund Investment Returns and**  
**Percentage Change in Plan Sponsor**  
**Contributions<sup>a</sup> From Prior Year, 1998–2008**



Source: Public Pension Coordinating Council, *2001 Survey of State and Local Government Employee Retirement Systems: Survey Report*, Chicago, IL: Government Finance Officers Association; National Association of State Retirement Administrators, *Public Fund Survey Summary of Findings, 2003–2007*; and U.S. Census Bureau.

<sup>a</sup> Plan sponsor contributions represent employer contributions as a percent of state and government payroll.

<sup>b</sup> Investment returns in the fiscal years 1998 and 2000 are dollar-weighted annual rate of returns.

<sup>c</sup> Investment return in the fiscal year 1999 uses dollar-weighted three-year annual rate of return.

**Figure 4**  
**Average Asset Allocations, 2003–2007**

Fiscal Year	Equities (I)	Real Estate (II)	Alternatives <sup>a</sup> (III)	Total (I + II + III)	Fixed Income	Cash & Other	Number of Public Retirement Systems in Sample
2003 <sup>b</sup>	57.0%	4.0%	4.0%	65.0%	32.0%	2.8%	96
2004	60.6	4.1	4.2	68.9	28.9	2.2	94
2005	60.3	4.5	3.8	68.6	29.2	2.2	90
2006	59.5	5.1	4.5	69.1	28.6	2.3	90
2007	59.7	5.4	5.3	70.4	26.6	3.0	97

Source: National Association of State Retirement Administrators, *Public Fund Survey Summary of Findings (2003–2007)*.

<sup>a</sup> Alternatives include private equities and hedge funds.

<sup>b</sup> Figures in 2003 do not add to 100 percent due to rounding.

state and local governments will want to switch to asset-liability matching investment strategies and the significantly lower investment return policy (based upon historical returns) in exchange for reduced volatility in employer contributions. Instead, public-sector pension plan sponsors with under-funded plans are likely to maintain their current asset allocation strategies. There are three reasons why this is so:

First, higher risk asset allocations are expected to add investment income based upon historical rates of return that would not be earned under lower risk investment strategies.<sup>21</sup> Without this expected income, plan sponsors with underfunded plans would be required to make higher contributions to fund their plans' deficits. Boards of trustees determining a funding method hesitate to invest largely in fixed-income investment instruments while giving up the potentially higher returns they expect to earn on higher risk asset classes.<sup>22</sup> When a plan is less than fully funded, a switch to a lower investment-return policy would lock in the plan's underfunding or require higher contributions to the plan.

Second, plan sponsors that want to use a high discount rate in evaluating pension liabilities (meaning that they adopt low-end estimates of their future pension obligations) may want to maintain the current investment allocations to higher risk assets. Under Government Accounting Standards Board (GASB) Statement No. 27, the discount rate for the evaluation of pension liability is based on the long-term expected rate of return on assets in the pension trust.<sup>23, 24</sup> Thus, higher-expected-return/higher-risk asset allocations provide a historical return justification for the selection of a discount rate that is normally above the bond rate allowed for private defined benefit plans.<sup>25</sup>

A high discount rate usually decreases the pension liability and therefore increases the funding ratio.<sup>26</sup> To examine whether plan sponsors with underfunded plans are likely to select a high expected rate of return as a discount rate, 104 state pension plans were reviewed using data from the Public Fund Survey: 2006–2007.<sup>27</sup> Figure 5 (and the Appendix) present a summary of state plans that were less than 80 percent funded in 2006 and 2007 and had a greater than 8 percent discount rate.<sup>28</sup> Since many experts and government officials prior to the current financial crisis considered an 80 percent funding level to be acceptable for public plans, the 80 percent funding ratio is used in the study as a threshold to identify severely underfunded plans.<sup>29</sup>

- *Funding levels:* Of the 50 states, the public pension plans of 20 states had less than 80 percent funding levels in *either* 2006 or 2007. The public plans of 19 states had less than 80 percent funding in *both* years.
- *Discount rate:* Of the 50 states, 14 used a discount rate greater than 8 percent.<sup>30</sup> For a state plan less than 80 percent funded in 2006, the probability that it used a discount rate greater than 8 percent was 45 percent. However, when a state plan was funded at 80 percent or more, the probability that it used a discount rate greater than 8 percent dropped to 16.7 percent.

Overall, public pension plans that were less than 80 percent funded in 2006 were more than 2.5 times as likely to use a discount rate greater than 8 percent than those plans that were 80 percent or more funded.

Selecting a high discount rate for the evaluation of pension liabilities (e.g., greater than 8 percent) may be justified by higher-expected-return/higher-risk asset allocations. To find whether a plan sponsor using a discount rate greater than 8 percent invests more in higher risk assets, 96 state retirement systems were reviewed using the information from *Public Fund Survey: 2007*.<sup>31</sup> Figure 6 presents pension plan asset allocations according to whether or not a plan sponsor used a discount rate greater than 8 percent. Sample public plan sponsors are divided into high or low groups by using an 8 percent discount rate as the threshold.

The results from this sample show that public plan sponsors using high discount rates were 3.6 percentage points more likely to invest in higher risk assets than those using low discount rates. While equities as a percentage of total assets are similar between the two groups, plan sponsors using high discount rates invested more in real estate by 1.1 percentage point, and alternatives (including private equities and hedge funds) by 3.2 percentage points than those using low discount rates. In contrast, plan sponsors using high discount rates invested less in fixed-income instruments (e.g., bonds) than those using low discount rates.

**Figure 5**  
**State Pension Plans Less Than 80 Percent Funded (2006–2007)**  
**and Having a Discount Rate Greater Than 8 Percent (2007)<sup>a</sup>**

Funding Ratio	Number of States	States
Actuarial funding ratio <sup>b</sup> is less than 80 percent in 2006	20	Alaska, Colorado, Connecticut, Hawaii, Illinois, Indiana, Kansas, Kentucky, Louisiana, Massachusetts, Maine, Michigan, Mississippi, New Hampshire, New Jersey, Nevada, Oklahoma, Rhode Island, South Carolina, West Virginia
Actuarial funding ratio <sup>b</sup> is less than 80 percent in 2007	20	Alaska, Colorado, Connecticut, Hawaii, Illinois, Indiana, Kansas, Kentucky, Louisiana, Massachusetts, Maryland, Maine, Mississippi, New Hampshire, New Jersey, Nevada, Oklahoma, Rhode Island, South Carolina, West Virginia
Actuarial funding ratio <sup>b</sup> is less than 80 percent in both 2006 and 2007	19	Alaska, Colorado, Connecticut, Hawaii, Illinois, Indiana, Kansas, Kentucky, Louisiana, Massachusetts, Maine, Mississippi, New Hampshire, New Jersey, Nevada, Oklahoma, Rhode Island, South Carolina, West Virginia
Average discount rate <sup>c</sup> is greater than 8 percent in 2007	14	Alaska, Arizona, Colorado, Connecticut, Illinois, Louisiana, Massachusetts, Missouri, New Hampshire, New Jersey, Ohio, Pennsylvania, Rhode Island, Vermont

Source: National Association of State Retirement Administrators, *Public Fund Survey Summary of Findings* (2006–2007).

<sup>a</sup> See Appendix figure (page 11) for more details on state pension plan funding ratios and discount rates.

<sup>b</sup> Actuarial funding ratio is derived by dividing the actuarial value of plan assets by the value of its liabilities.

<sup>c</sup> If a State has multiple plans, discount rates of the plans are averaged.

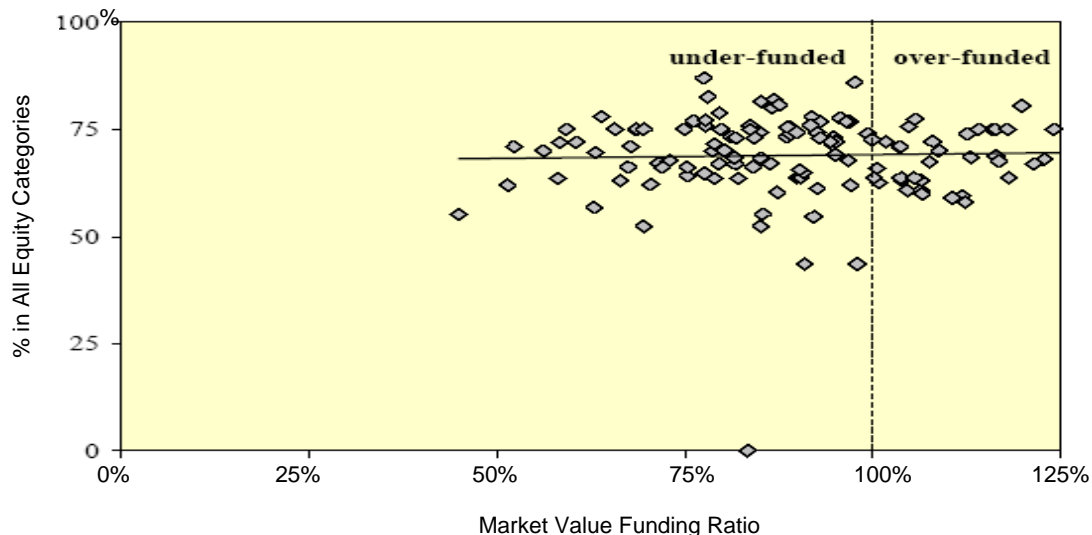
**Figure 6**  
**Public Pension Plan Asset Allocations, by Discount Rates, 2007**

	Equities (I)	Real Estate (II)	Alternatives <sup>a</sup> (III)	Total (I + II + III)	Fixed Income	Cash & Other
Plan Sponsors Using a <u>High</u> Discount Rate (greater than 8%)	59.0%	6.2%	7.6%	72.8%	23.9%	3.3%
Plan Sponsors Using a <u>Low</u> Discount Rate (8% or less)	59.7	5.1	4.4	69.2	27.8	2.9

Source: National Association of State Retirement Administrators, *Public Fund Survey: 2007*.

<sup>a</sup> Alternatives include private equities and hedge funds.

**Figure 7**  
**Asset Allocations and Market Value Funding Ratio, 2007**



Source: Wilshire Report on State Retirement Systems: Funding Levels and Asset Allocation (Wilshire Consulting, March 2008).

Third (and last), pension plan investment professionals (such as trustees, chief investment officers, and investment boards) may watch peer group investments and imitate asset allocation behavior of peer groups.<sup>32</sup> For example, a Wilshire study (2008), using the information of 125 state retirement systems in 2007, shows that the asset allocation to all equity asset classes hovers around 64–75 percent, regardless of funding status (Figure 7).<sup>33</sup> This result may indicate that public pension plans' equity holdings are not necessarily sensitive to plan funding status and that pension fund managers may want to have investment portfolios that are similar to those of other public pension plans. Pension fund managers, like other fund managers having career concerns, tend not to deviate from peer group investments by holding conventional portfolios.<sup>34</sup> Therefore, pension fund managers are less likely to make a significant change toward a lower investment return policy in the short run.

## Conclusion

Public pension funding relies on three sources: earnings from investments, employer (taxpayer) contributions, and worker contributions. Since public pension funding depends largely on investment earnings, investment losses in 2008 are likely to sharply lower the funding status of many public pension plans. However, the impact on the funding status reported in the financial statements will be delayed because of the use of a smoothing period, which is used to determine the actuarial value of pension assets and control the annual volatility of contributions.

Plan sponsors review investment policy on an ongoing basis, but generally do not change it significantly in response to short-term swings in the market. Thus, plan sponsors are not likely to change to policies yielding significantly lower expected investment returns in exchange for reduced volatility in employer contributions for the following reasons:

- First, higher-return/higher-risk asset allocations are expected to add investment income that would not be earned under the more conservative strategies.
- Second, a high expected rate of return can be used as a discount rate to evaluate pension liabilities.
- Third, pension plan investment professionals tend to follow peer group investment policies, as is encouraged by the "prudent person" fiduciary standards.

If economic changes suggest that future expected returns of asset classes will also change permanently, then the current investment policies may be adjusted to either raise or lower level of expected return. This adjustment would lead to a higher or lower discount rate, and, in turn, would either decrease or increase the unfunded pension liability and therefore require either lower or additional contributions.

## Endnotes

<sup>1</sup> In this article, *public-sector pension plans* indicate public defined benefit (DB) pension plans.

<sup>2</sup> Munnell, Aubry, and Muldoon (2008) estimated that the value of equities in public pension plans would decrease by about \$1.0 trillion between October 9, 2007 and October 9, 2008. For more details, see Alicia H. Munnell, Jean-Pierre Aubry, and Dan Muldoon, "The Financial Crisis and State/Local Defined Benefit Plans," *Brief*, no. 8-19 (Chestnut Hill, MA: Center for Retirement Research at Boston College, November 2008).

<sup>3</sup> See *HR Executive Online*, "Underfunded Public Pensions?" December 17, 2008 ([www.hronline.com/HRE/story.jsp?storyId=156523274](http://www.hronline.com/HRE/story.jsp?storyId=156523274))

<sup>4</sup> For a complete discussion, see Barry Kozak, "The Funding of Public Sector Pension Plans: Are They Truly in Crisis Mode?" *Benefits Law Journal*, 21(2008): 23–40.

<sup>5</sup> Parry Young, "Public Pensions and State and Local Budgets: Can Contribution Rate Cyclicity Be Better Managed?" *Pension Research Council Working Paper* (October 2008).

<sup>6</sup> Private defined benefit plans are financed primarily by employers. According to *Abstract of 2006 Form 5500 Annual Reports* (Department of Labor), employer contributions accounted for about 24 percent of private DB plan funding in 2006, and employee contributions for about 0.2 percent.

<sup>7</sup> Figure 1 does not include investment earnings in 2002, because in that fiscal year public pension plans experienced an investment loss of more than \$72 billion.

<sup>8</sup> Smoothing periods are used to determine the actuarial value of pension assets. The impact of both gains and losses is smoothed by averaging the market value of assets over a period of years, with most public plans using a five- period. See *Public Fund Survey Summary of Findings* (National Association of State Retirement Administrators), available at [www.publicfundsurvey.org/publicfundsurvey/scorecard.asp](http://www.publicfundsurvey.org/publicfundsurvey/scorecard.asp)

<sup>9</sup> The actuarial funding ratio is derived by dividing the actuarial value of plan assets by the value of its liabilities.

<sup>10</sup> For example, the funding level has been estimated to be about 80 percent in 2008. See Alicia H. Munnell, Kelly Haverstick, and Jean-Pierre Aubry, "Why Does Funding Status Vary among State and Local Plans?" *Brief*, no. 6 (Chestnut Hill, MA: Center for Retirement Research at Boston College, May 2008).

<sup>11</sup> According to National Association of State Retirement Administrators (NASRA), for many public pension plans in 2000-2002 (recession years), employer contribution rates declined to the low levels that plan administrators and policymakers were concerned about.

<sup>12</sup> See Karen Steffen, "State Employee Pension Plans," in eds. Olivia S. Mitchell and Edwin C. Hustead, ed., *Pensions in the Public Sector* (Philadelphia, PA: University of Pennsylvania Press, 2001).

<sup>13</sup> Karen Steffen (2001), op. cit.

<sup>14</sup> Novy-Marx and Rauh (2008) estimated that the cost of future taxpayers to cover potential underfunding in state pension plans on a 15 year horizon would be almost \$2 trillion in 2005 dollars. For more details, see Robert Novy-Marx and Joshua D. Rauh, *NBER Working Paper Series*, "The Intergenerational Transfer of Public Pension Promises," National Bureau of Economic Research, September 2008 ([www.nber.org/papers/w14343.pdf](http://www.nber.org/papers/w14343.pdf)).

<sup>15</sup> According to NASRA, the volatility in employer contributions in recent years has been caused by the volatility in investment earnings over the past decade, combined with the institutional environment on public pension plans, such as the lengthy cycle of public retirement system financial reporting and the state and local government political process.

<sup>16</sup> Parry Young (2008), op. cit.

<sup>17</sup> According to NASRA, although employer contributions have been volatile in recent years, current levels are not out of line with historic levels and long-term trends.

<sup>18</sup> National Conference on Public Employee Retirement System. "The Advantages of Using Conventional Actuarial Approaches for Valuing Public Pension Plans." *NCPERS Research Series* (November 2008).

<sup>19</sup> U.S. Board of Governors of the Federal Reserve System, *Flow of Funds Accounts of the United States: Annual Flows and Outstanding: 1990-2007* (Washington, DC, December 11, 2008).

<sup>20</sup> Some financial economists argue that in order to stabilize plan funding under the market value liability approach, the plan would have to "immunize" the liabilities using matching securities of the same amount and duration (see *NCPERS Research Series* (November 2008), op. cit.).

<sup>21</sup> See Parry Young (2008), op. cit.

<sup>22</sup> Public-sector plans generally have boards of trustees, of varying size and composition, overseeing all aspects of funding, such as adopting actuarial assumptions, establishing procedures for financial control and reporting, and setting investment strategy. For more details on the composition of boards of trustees, see U.S. Government Accountability Office, *US Senate, State and Local Government Retiree Benefits: Current Status of Benefit Structures, Protections, and Fiscal Outlook for Funding Future Costs*, GAO-07-1156 (September 2007, as revised November 15, 2007).

<sup>23</sup> Government Accounting Standards Board Statement No. 27, *Accounting for Pensions by State and Local Governmental Employers* (Effective date: June 15, 1997).

<sup>24</sup> Most public plan sponsors follow GASB standards, because many state laws require that public plans comply with GASB standards, and bond raters generally consider whether GASB standards are being followed. For more details, see U.S. Government Accountability Office, *State and Local Government Retiree Benefits: Current Funded Status of Pension and Health Benefits*, GAO-08-223 (January 2008).

<sup>25</sup> For example, the median discount rate of S&P 500 Index companies was about 6.2 percent in 2007 (see Julia K. Bonafede, Steven J. Foresti, and Alexander Browning, *2009 Wilshire Consulting Report on Corporate Pension Funding Levels* (Wilshire Consulting, April 2009), available at [http://www.wilshire.com/BusinessUnits/Consulting/Investment/2009\\_Corporate\\_Funding\\_Report.pdf](http://www.wilshire.com/BusinessUnits/Consulting/Investment/2009_Corporate_Funding_Report.pdf))

<sup>26</sup> A study of Watson Wyatt (2007) describes the impact of an increase in discount rate on the value of pension liabilities. When the average discount rate for private defined benefit plans decreased from 5.85 percent at the end of 2006 to 6.48 percent at the end of 2007, the 63 basis-point increase alone decreased pension liabilities by roughly 9 percent (assuming a typical plan with 15-year duration). For more details, see *Watson Wyatt Insider*, "Pension Funding Improves Again in 2007" (2008), available at [www.watsonwyatt.com/us/pubs/insider/showarticle.asp?ArticleID=18621](http://www.watsonwyatt.com/us/pubs/insider/showarticle.asp?ArticleID=18621)

<sup>27</sup> The information on actuarial funding ratios and the expected rate of returns is from *Public Fund Survey: 2006 and 2007* (National Association of State Retirement Administrators).

<sup>28</sup> See Appendix to the NASRA *Public Fund Survey: 2006–2007* for more details on state pension plan funding ratio (2006–2007) and discount rate (2007).

<sup>29</sup> See U.S. Government Accountability Office, GAO-08-223 (January 2008), op. cit.

<sup>30</sup> The median and modal assumption about investment returns (equivalent to discount rates which evaluate pension liabilities) is 8 percent. For more details, see National Association of State Retirement Administrators, *Public Fund Survey Summary of Findings: 2003–2007*, available at [www.publicfundsurvey.org/publicfundsurvey/scorecard.asp](http://www.publicfundsurvey.org/publicfundsurvey/scorecard.asp)

<sup>31</sup> The information on asset allocations for 96 state retirement systems is from *Public Fund Survey: 2007* (National Association of State Retirement Administrators).

<sup>32</sup> Most investors tend to imitate each other's behavior, given that information is naturally limited. See Narasimhan Jegadeesh and Sheridan Titman, "Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency," *Journal of Finance*, Vol. 48 (1993): 65–91.

<sup>33</sup> In Figure 7, the y-axis indicates equities as a percentage of total assets and the x-axis shows the market value funding ratio. The 25<sup>th</sup> and 75<sup>th</sup> percentile range for equity allocation is 64 to 75 percent. For more details, see Julia K. Bonafede, Steven J. Foresti, and Alexander Browning, *Wilshire Report on State Retirement Systems: Funding Levels and Asset Allocation* (Wilshire Consulting, March 2008), available at [www.wilshire.com/BusinessUnits/Consulting/Investment/2008\\_State\\_Retirement\\_Funding\\_Report.pdf](http://www.wilshire.com/BusinessUnits/Consulting/Investment/2008_State_Retirement_Funding_Report.pdf)

<sup>34</sup> Judith Chevalier and Glenn Ellison, "Career Concerns of Mutual Fund Managers," *Quarterly Journal of Economics*, Vol. 114, no. 2 (1999): 389–432.

**Appendix  
State Pension Plan Funding Ratio (2006–2007) and Discount Rate (2007)**

State	2006		2007	
	Actuarial funding ratio (%)	Actuarial funding ratio (%)	Average Discount rate (%) <sup>a</sup>	Number of Plans in Sample
Alaska	63.9%	74.3%	8.3%	2
Alabama	83.7	82.2	8.0	2
Arkansas	81.3	86.6	8.0	2
Arizona	83.4	80.6	8.3	2
California	87.2	87.4	7.9	2
Colorado	74.1	75.1	8.5	3
Connecticut	58.5	58.5	8.5	2
Delaware	101.7	103.7	8.0	1
Florida	105.6	105.6	7.8	1
Georgia	97.8	96.1	7.5	2
Hawaii	65.0	67.5	8.0	1
Iowa	88.4	90.2	7.5	1
Idaho	95.2	105.5	7.8	1
Illinois	67.0	68.8	8.3	4
Indiana	64.3	64.9	7.4	2
Kansas	68.8	69.4	8.0	1
Kentucky	71.9	70.3	7.7	3
Louisiana	66.3	69.8	8.3	2
Massachusetts	75.5	76.9	8.3	2
Maryland	82.8	77.0	7.8	2
Maine	75.1	76.2	7.8	2
Michigan	79.1	85.9	8.0	3
Minneapolis	86.7	83.6	7.9	4
Missouri	83.0	84.1	8.2	3
Mississippi	73.5	73.7	8.0	1
Montana	82.4	85.5	7.9	2
North Carolina	104.8	104.5	7.3	2
North Dakota	81.0	85.2	8.0	2
Nebraska	87.2	90.5	8.0	1
New Hampshire	61.4	67.0	8.5	1
New Jersey	78.1	76.0	8.3	3
New Mexico	81.8	82.0	8.0	2
Nevada	74.9	77.2	8.0	2
New York	99.6	103.6	8.0	3
Ohio	80.7	85.8	8.1	4
Oklahoma	56.9	59.5	7.8	2
Oregon	104.2	110.5	8.0	1
Pennsylvania	86.6	86.4	8.5	2
Rhode Island	58.7	56.6	8.3	2
South Carolina	73.1	71.1	7.3	2
South Dakota	96.7	97.1	7.8	1
Tennessee	99.8	96.2	7.5	1
Texas	89.9	90.2	7.8	5
Utah	96.4	100.8	8.0	1
Virginia	81.3	80.8	7.5	1
Vermont	90.8	91.6	8.3	2
Washington	88.4	90.1	8.0	7
Wisconsin	99.4	99.5	7.8	1
West Virginia	52.7	68.8	7.5	2
Wyoming	94.4	94.0	8.0	1

Source: National Association of State Retirement Administrators, *Public Fund Survey Summary of Findings, 2006–2007*.

<sup>a</sup> If a state has multiple plans, discount rates of the plans are averaged.



# Notes

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