REPORT OF THE BLUE RIBBON PANEL ON PUBLIC PENSION PLAN FUNDING

AN INDEPENDENT PANEL COMMISSIONED BY THE SOCIETY OF ACTUARIES FEBRUARY 2014

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Letter From The Panel Chair

To the Society of Actuaries' (SOA's) Board of Directors and Members:

On behalf of the Blue Ribbon Panel on Public Pension Plan Funding ("the Panel"), I am pleased to submit the attached report of our findings and recommendations. Consistent with our charter, the Panel focused on the development of recommendations for strengthening public plan funding. From my perspective, the Panel's principal objective was to identify effective and practical recommendations for enhancing the ability of plan sponsors to keep the contractual benefit promises that they negotiated with plan participants.

The timing of this undertaking was appropriate as the information considered by the Panel suggests that the financial condition of public pension trusts has weakened during the last 15 years, while its exposure to future financial and other risks has increased, possibly materially. Self-reported funded ratios, the history of sponsors' payment of recommended contributions, greater levels of investment risk taking, and funding analyses that may not have adequately captured the changing economic outlook support this view and have been noted in the Panel's report. The Panel's deliberations were also informed by the challenges facing selected pension systems and the fiscal pressures facing many sponsors. These challenges are significant and if not resolved will impact not only the strength of public pension trusts, but will affect sponsors' ability to provide the broad range of public services that citizens are expecting. In this context, I believe that the failure to adopt these or other recommendations for improving plan funding will exacerbate an already fragile situation. I am optimistic that the Panel's recommendations will be seriously considered by the actuarial profession and other parties interested in assuring the future health of public pension programs.

I would like to thank the many people that responded to our survey and to those that took the time to discuss their views with the Panel. Your input was greatly appreciated. Panel members, I have immense respect for your expertise and energy and I would like to thank each of you for your true passion and commitment to this effort, your hard work, and the spirited debate that shaped our recommendations. I believe that, together, we have made an important contribution to the public dialogue over how to strengthen the public pension plan system.

Bob Stein, FSA, MAAA, CPA

Summary Of Recommendations

The funding of U.S. public sector pension plans has received heightened attention in recent years as states and local government entities have responded to the effects of the 2008 financial crisis and several cities have faced high-profile financial challenges. Some observers react with alarm to the current situation, noting the downward trend of reported funded ratios, the increased propensity of sponsors to not pay all of the recommended contribution, growing risk levels in asset portfolios, and the increased risk that funding assumptions will not be achieved. Others note that today's funded levels are similar to funded levels in 1990 and that sponsors and trustees have taken action to respond to the recent turmoil. Nonetheless, these trends raise a fundamental question: What changes in plan funding practices, governance and other matters help ensure that public plans can deliver on the benefit promises their sponsors have made to public employees?

In April 2013, the Society of Actuaries commissioned the SOA Blue Ribbon Panel ("the Panel") to address these questions. This paper reports on the results of the Panel's work.

Plan trustees and those responsible for funding pension plans (funding entities) face many challenges in managing the current and future financial health of pension plans. This report provides a set of principles to help guide sponsors and trustees in their plan funding decisions and to ensure that other stakeholders are informed of those decisions and how they have been made. The report does not address the appropriateness of current financial reporting for public plans nor whether those requirements should be re-examined. The report does not address the most appropriate means of assessing the economic value of pension benefits. The report recommends actions to strengthen financial and risk management practices by providing new information to trustees, funding entities and their elected officials, employees and their unions, taxpayers and other stakeholders. This information will help stakeholders better understand the risks being taken and borne by plans and how best to develop a long-term funding program. In addition, the Panel makes recommendations about the actuary's role in developing funding recommendations and calls for improvements in plan governance, both of which can foster more effective decision making.

Funding Principles

The Panel believes that pension obligations should be pre-funded in a rational and sustainable manner by funding benefits for employees over their public service career. An effective funding program should follow three principles:

- **Adequacy.** Funding entities and plan trustees should strive to fund 100 percent of the obligation for benefits using assumptions that are consistent with median expectations about future economic conditions, i.e., the assumptions are estimated to be realizable 50 percent of the time. Financial resources, including both current assets and future contributions, should be adequate to fund benefits over a broad range of expected future economic outcomes. Programs should be funded at levels that will enable them to respond to changing conditions and maintain a high degree of resilience in order to cope with uncertain future conditions. The stress testing recommended herein will provide information that will help to develop the requisite financial flexibility.

- **Intergenerational equity.** Intergenerational equity refers to the desire for the full cost of public services, including pensions earned by public employees, to be paid by those receiving the benefits of those services. The Panel believes that fully funding pension benefits over the average future service period of public employees reasonably aligns the cost of today's public services with the taxpayers who benefit from those services.

- **Cost stability and predictability.** The Panel believes that cost stability (i.e., level or nearly level costs over an intermediate period) is often at odds with the goals of adequacy and intergenerational equity. The Panel also recognizes that predictability of costs in the short-term is important for public budgeting processes. Allocating a significant portion of investments to higher-risk, more volatile assets will tend to undermine the goal of cost stability, especially for plans with a rising retiree population compared to active employees. To support the objective of "keeping the pension promise," the Panel believes that adequacy and intergenerational equity should take precedence over the goal of cost stability and predictability.

Recommended Risk Measures, Analyses And Disclosures

The Panel believes that the risk management practices of public pension plans should be strengthened to provide stakeholders with the information they need to make more informed and effective decisions about plan funding, including more comprehensive information about the current and expected future financial position of the trust and of the nature and extent of risks facing public pension plans. The Panel recommends that the following information be disclosed:

- **Trends in financial and demographic measures.** To support an assessment of the implications of trends in the plan's financial position and participant profile, actuarial funding reports should contain, for the past 10 years, information presenting the relationship of benefit payments, funding liabilities, and assets to payroll; the relationship between the recommended contribution to payroll and to the sponsor's budget or revenue source; and the ratio of contributions made to the recommended contribution.

- **Measures of risk to the plan's financial position.** To understand current risk levels, three benchmarks should be disclosed: 1) the expected standard deviation of investment returns of the asset portfolio on the report date; 2) the plan liability and normal cost calculated at the risk-free rate, which estimates the investment risk being taken in the investment earnings assumption; and 3) a standardized plan contribution for assessing the aggregate risks to the adequacy of the recommended contribution.

- **Stress testing.** Stress tests of future financial positions should be disclosed in an effort to measure investment and contribution risks. Such tests, constituting 30-year financial projections, should be conducted using the following assumptions: 1) returns at a standardized baseline and at returns of 3 percentage points more and less than the baseline assumption and 2) funding entities making 80 percent of recommended contributions.

- **Undiscounted cash flows.** Users of plans' and funding entities' financial statements should be able to develop their own calculation of plan obligations. Therefore, the Panel recommends that two sets of benefit payment projections be provided for current employees, one on an accrued (earned-to-date) basis and one on a projected benefits basis.

Recommendations Regarding The Role Of The Actuary

The Panel urges the Actuarial Standards Board (ASB) to require the financial and risk measures outlined above be disclosed in actuarial reports. It also urges the ASB to require actuaries to include in their actuarial reports an opinion on the reasonableness of funding methods and assumptions. Finally, the Panel makes specific recommendations on methods and assumptions used by plans for the purposes of funding calculations; specifically, discount rates, amortization periods, asset smoothing, and the use of direct rate smoothing or alternative funding methods:

- **Discount rates.** The Panel recognizes that historical returns, adjusted for expected changes in future conditions, are a common reference point. However, the Panel believes that the rate of return assumption should be based primarily on the current risk-free rate plus explicit risk premia or on other similar forward-looking techniques.

- **Amortization periods.** Amortization of gains/losses should be completed over a period of no more than 15 to 20 years.

- **Asset smoothing.** Asset smoothing periods should be limited to five years or less

- **Direct rate smoothing methods.** The Panel encourages the consideration of direct rate smoothing and other asset and liability cash flow modeling techniques. Such approaches can provide greater transparency into the current financial position of the trust, the level of risk in funding assumptions, and enhanced flexibility to sponsors in the development of sustainable funding programs. The Panel notes that care must be exercised in the use of such approaches to avoid deferring contributions that would reduce the ability of the funding program to meet adequacy and intergenerational equity goals.

Recommendations Regarding Plan Governance

The Panel considered governance in its broadest definition: how stakeholders responsible for plan funding make and implement funding decisions. Each pension system structure is unique and the Panel makes no specific recommendations on the best governance structure. However, several characteristics of good governance that all systems should adopt are recommended, including:

- Maximizing the likelihood that funding objectives outlined by the Panel will be achieved. This includes ensuring that recommended contributions are paid, disclosing complete information about the plan's finances to all stakeholders, and not using funding instruments and other financial instruments that delay cash contributions.

Summary Of Recommendations

- Ensuring trustees have sufficient information and institutional structures to analyze risk, including establishing guidelines for the amount of risk that can be appropriately assumed.

- Providing proper and timely training of trustees.

- Carefully considering of plan changes, such as requiring that consideration and adoption of plan changes be completed over two legislative sessions (or their equivalent), adopting a formal process for evaluating the emerging cost and participant implications of adopted plan changes and avoiding certain high-risk plan features while actively considering plan features that enhance plans' flexibility for responding to unexpected experience.

The Panel's recommendations were developed following an extensive information gathering and analysis process. The Panel's recommendations are those of the Panel and are consensus recommendations, with the exception of Mr. Musuraca. Mr. Musuraca was an active and valuable participant in the Panel's discussions and deliberations, but concluded that he could not fully support this report's findings and recommendations.

Panel Charter

In April 2013 the Society of Actuaries chartered the Blue Ribbon Panel on Public Pension Plan Funding. The Panel's charter was to:

- Develop recommendations for plan trustees, legislators and plan advisors on how to improve plan financial management and strengthen plan funding going forward
- Assess the principal factors influencing the changing **funding status** of plans.

The Panel includes actuaries, economists, former plan trustees, and government and financial experts. A complete list of panel members is included on page 65.

One fundamental principle guided the Panel's work: Plans should keep the pension promises[1] made to participants. While terms such as **"funded status,"** "plans' financial position" and "strengthening plan funding" can mean different things to different observers, the Panel's objective has been to develop recommendations that will enhance stakeholders' understanding of the financial position and risk profile of the trust, support decisions to make plans financially stronger, and improve the ability of **funding entities** to respond to adverse conditions.

In this context, the Panel's recommendations focus on the plan funding process, not on the measurement of plan obligations for financial reporting purposes or for assessing the economic value of the benefits provided. The Panel recognizes the debate surrounding these issues and has elected to focus on the plan funding process in an effort to offer recommendations that may improve plan funding in the near term.

To ensure that its recommendations were informed by recent plan experience, the Panel sought to identify those factors that have left some plans facing significant financial challenges while many others are in reasonable financial condition.

The report does not address the following issues:

- The level of plan benefits
- The affordability of benefit plans to plan sponsors, although the Panel is aware of the links between pension costs and other uses of revenues
- The costs and funding issues related to other post-employment benefits (e.g., post-retirement medical benefits).

When discussing contributions to a pension plan the report refers exclusively to the employer portion of the contribution. Almost all public sector pension plans have employee contributions. When illustrating the effects of changes in contribution levels, the illustrations in the report measure the change in the employer contribution.

The Panel's recommendations are designed to be relevant to all public sector pension plans. However, the Panel recognizes that there are many small public sector plans. Actuaries and trustees working with small plans may need to make practical decisions in order to implement the Panel's recommendations without incurring unreasonable costs.

The Panel obtained extensive input from public plan trustees, administrators, actuaries and other key constituencies. Much of this input was generated by a widely distributed survey and through discussions with selected individuals working in or providing advice to public pension systems. The Panel received approximately 170 responses to the

survey; the survey is included in Appendix I. The individuals with whom the Panel met are listed in Appendix I. The Panel's deliberations were conducted primarily through a series of face-to-face meetings held between May 2013 and January 2014.

The Panel greatly appreciates the time and effort of all survey respondents and found the information provided extremely useful in its discussions. Similarly, it would like to thank those who took the time to meet with the Panel. The Panel's discussions addressed the nature of the current situation, the factors that have led us here, and what could be done to strengthen plan funding going forward. These face-to-face interactions were highly informative and helpful.

While the input received from parties involved in the pension system was broad and informative, the recommendations herein are entirely those of the Panel; they are not intended to and do not represent a consensus or summary of the input received. The recommendations reflect a consensus among Panel members, with the exception of Mr. Musuraca. Mr. Musuraca was an active and valuable participant in the Panel's discussions and deliberations, but concluded that he could not fully support this report's findings and recommendations.

This report is the work of the Panel and does not reflect the views of the Society of Actuaries, its board of directors, members or staff.

Background

The Panel believes plan financial measures and their trend over time can aid in the evaluation of the financial soundness of plans. In the discussion that follows, the report relies on relevant historical data showing how common financial and risk measures have changed over time.[2]

The Panel relied on plans' self-reported financial information, including plan **funding liability** measurements and contributions (**Annual Required Contributions, or ARCs**). The Panel recognizes that these and other plan-specific financial measures must be used with caution.

Two plans can have the same reported funded ratio but the overall "health" or financial strength of these plans may differ. Aggregate measures and their long-term trends include the effects of changes within individual plans, such as assumptions and methods used to calculate obligations and contributions, plan changes, and changes in market interest rates.[3] While two plans may have comparable contribution levels, one plan's contributions may provide more adequate funding than another, stemming from such factors as different characteristics of the plan population, nature of the plan benefit, plan investments, and the ability of funding entities to provide additional contributions. Similarly, consideration of the adequacy of funded status and contributions is dependent on the extent to which funding assumptions can be met in the future, which varies across plans and over time within a plan.

Most of these results are reported averages for a selection of large plans and the trends discussed do not necessarily reflect the results for any individual plan. Most importantly, a plan's financial health will be heavily influenced by the strength of **plan governance** processes and the commitment of the sponsoring entities to plan funding.

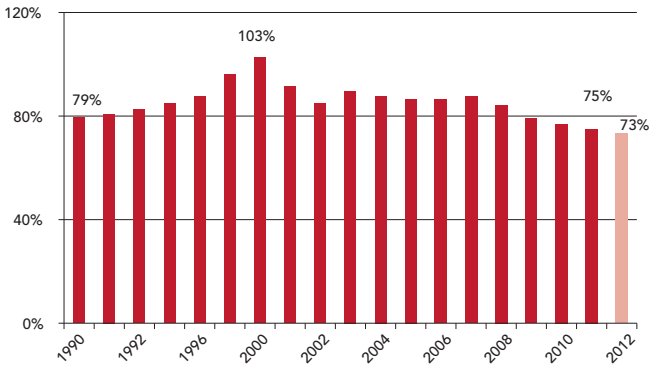
Responses to the survey questions, coupled with the Panel's discussions with professionals involved in public pension systems and other public analyses and reports, suggest widespread agreement that many plans are in weaker financial condition today than in the 1990s. However, opinions vary widely about the severity of the situation and the implications of plans' current situations, both for public plans as a whole and for individual plans.

The Panel's view is reasonably consistent with these views: In the aggregate, pension funding deficits have widened, especially over the past decade. The Panel recognizes that not all plans—including some of those whose deficits have widened—are facing financial stress. Nonetheless, while some funding entities have been able to meet higher funding requirements, a substantial number of funding entities are not making their expected contribution.

Funded Status: Levels And Pervasiveness

Average reported funded ratios have, after rising from 79 percent in 1990 to a peak of 103 percent in 2000, declined to 73 percent in 2012 (Figure 1).[4]

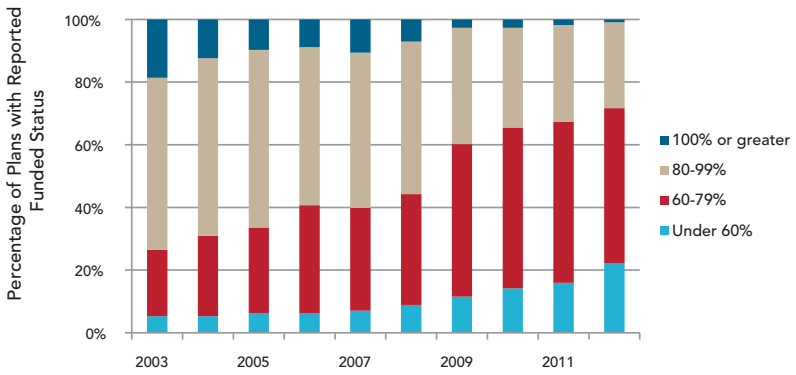
Figure 1
State and Local Pension Funded Ratios, 1990-2012



Source: Munnell 2012(b); 2012 is estimated

Public Fund Survey data from 2003 through 2012 shows how funded status has changed over that period (Figure 2). In 2003, 18 percent of plans were 100 percent funded or better while only 27 percent of plans were funded at less than 80 percent (and 5 percent of plans were funded at less than 60 percent). By 2012, only one plan was 100 percent funded or better and a majority of plans (71 percent) were funded at less than 80 percent; 22 percent of plans were less than 60 percent funded.[5] Between 2003 and 2012, 86 percent of plans in this group experienced a funded status decline, with a median decline of 19.5 percent; the remaining 14 percent improved, with a median improvement of 2.8 percent.

Figure 2
Funded Status for Selected Large State & Municipal Public Sector Plans



Source: Public Fund Survey, n = 113 plans (subset)
Excludes plans on Aggregate method or with missing data

Payment Of Contributions

There is no single required standard for contributions to public sector plans. The most comparable contribution measure is the ARC under **Government Accounting Standards Board (GASB)** 25/GASB 27.[6] Plans' current financial position and their ability to maintain or improve their financial strength are heavily influenced by the consistency with which the contribution is paid.

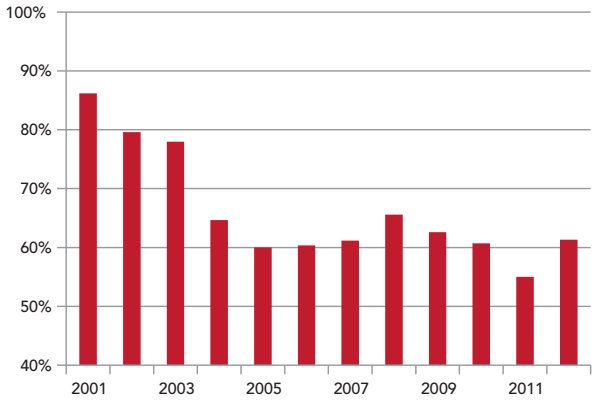
Sponsors' payment of the recommended ARC has declined during the last 10 years. Average payments for all plans have fallen from 100 percent of the ARC in 2001 to 80 percent in 2012 (Figure 3). In 2011, only 19 states paid at least 100 percent of their ARC; from 2007 to 2011, governments underpaid actuarially required contributions to major plans by $62 billion.[7]

Figure 3
Percent of Annual Required Contributions Paid (2001-2012)

Source: Munnell (2012b); 2012 is estimated

About 75 percent of sponsors paid at least 80 percent of their ARCs between 2005 and 2009 while 11 percent of all sponsors paid less than 60 percent of the ARC.[8] Moreover, the proportion of plans that have paid more than 90 percent of their ARCs has steadily declined, falling from 88 percent in 2001 to about 61 percent in 2012 (Figure 4).

Figure 4
Percentage of Plans Receiving at least 90% of ARC

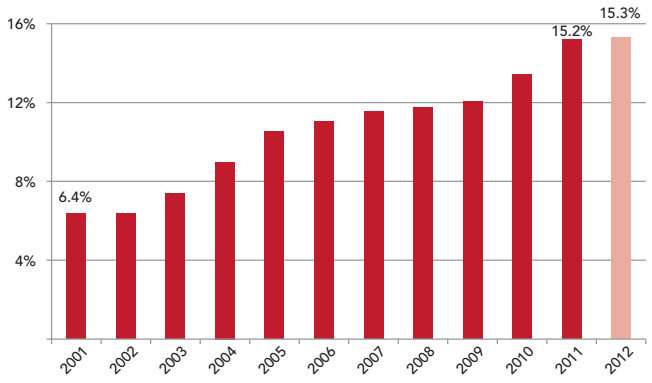


Source: Brainard (2013)

Sponsor Pressures

One factor likely influencing the declining payment of the full ARC is that the ARC has been growing as a percentage of payroll. ARCs as a percentage of payroll have more than doubled between 2001 and 2012, jumping from 6.4 percent to 15.3 percent, no doubt in part due to the 2009 investment losses (Figure 5). Other analyses have shown that pension costs remain a small part of overall state and local expenditures and today represent a smaller part of overall spending at the state and local government level, falling from levels of 4 percent of spending in the 1980s to about 2.8 percent of spending today.[9]

Figure 5
Annual Required Contribution (ARC) as Percent of Payroll, 2001-2012

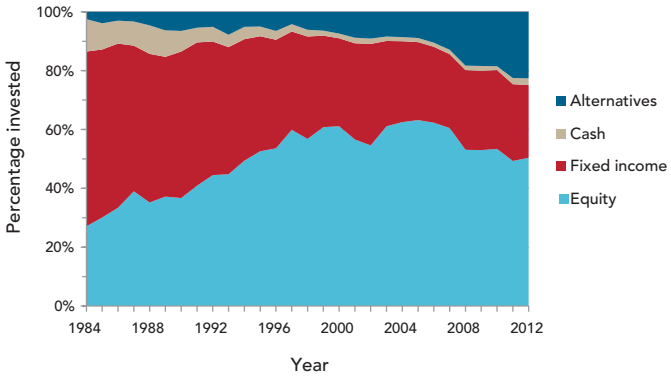


Source: Munnell (2013); 2012 is estimated

Investment In Risky Assets

On average, plans have increased investment risk taking. The portion of assets consisting of equities and alternative investments grew steadily from about 30 percent in 1984 to 73 percent in 2012 (Figure 6). Other data shows **risky asset** allocations in U.S. public sector pension funds rose from 57 percent in 1993 to about 73 percent in 2010.[10]

Figure 6
Investment by Asset Class

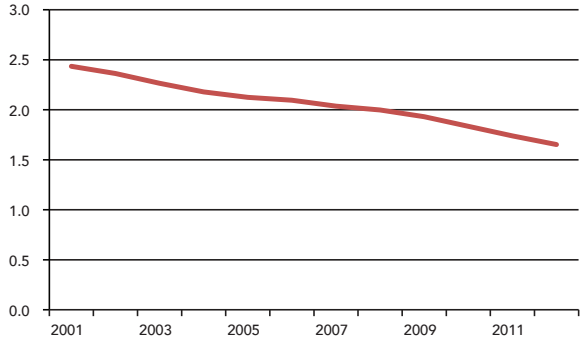


Source: Pension & Investments; Alternatives include real estate

Plan Maturity

Often defined as the ratio of retirees to active employees, average **plan maturity** levels have risen in the last 15 to 20 years. The percentage of participants who were retired increased from 28 percent to 39 percent from 1993 to 2010.[11] Public Fund Survey data shows a decline in the ratio of active to retired members over the last decade, from 2.43 active members per annuitant in 2001 to only 1.65 active members per annuitant in 2012 (Figure 7).

Figure 7
Change in Ratio of Actives to Annuitants



Source: Author graph from data provided in Brainard (2013)

Increased plan maturity means more retirees per active worker. In that case, the salary pool will be relatively smaller compared to benefits and the plan will have a high ratio of assets to salary. This situation exacerbates the impact of investment losses on contributions, as losses will be disproportionately high compared to the salary pool commonly used for establishing contributions.[12]

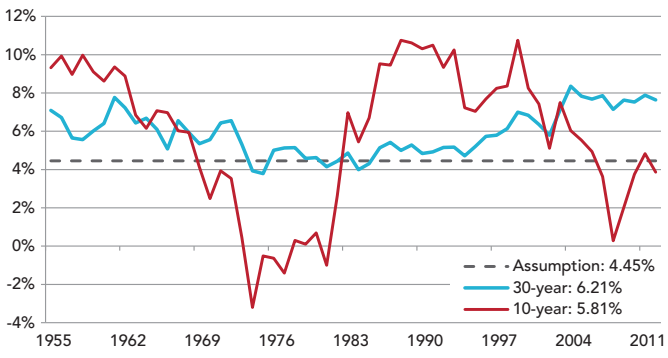
As private and public sector funds in the United States, Canada and Europe matured from 1993 to 2010, the U.S. public sector funds allocated substantially more of their portfolios to risky assets than the other funds.[13] While risky assets increase *expected* investment returns, they also add volatility to returns and can depress returns. Thus the combination of risky assets and a more mature population creates more potential risk for those responsible for funding the plans due to the greater volatility of returns and the relatively lower salary base over which costs are commonly borne.

Funding Assumptions And Methods

Critical funding assumptions and methods include the investment return assumption (which forms the basis for the **discount rate**), **asset smoothing** and **amortization methods.** The panel's review of investment assumptions, asset smoothing and amortization methodologies suggests that assumptions and methods may have been slow to respond to the changing economic environment.

Return experience does not readily suggest that return assumptions currently in use have been inconsistent with prior experience. Trailing 10-year real returns for a 65 percent/35 percent equity/bond portfolio fell precipitously beginning in 2001 (Figure 8). Returns have remained below the assumed real return assumption ever since. Yet 30-year real returns remain above plans' average assumed rate of return.

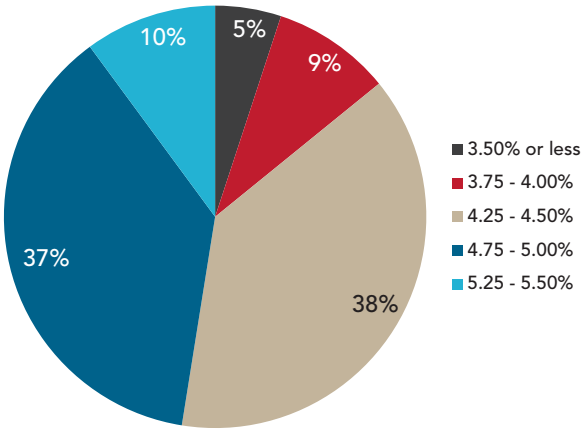
Figure 8
10-Year and 30-Year Geometric Real Returns for Hypothetical Portfolios of 65 Percent Stocks and 35 Percent Bonds, 1955-2012



Source: Munnell (2013)

Seventy-five percent of plans in the Public Plan Database have an implied real return between 4.25 percent and 5.00 percent (Figure 9). While these implied real rates of return are consistent with real returns for bonds (4.3 percent) and equities (5.2 percent) in the United States over the last 40 years, they are significantly above real returns in U.S. bonds over longer periods.[14] Also, given current bond yields, bond portfolios are not expected to produce such high real returns in the future.[15]

Figure 9
Implied Real Return over Inflation

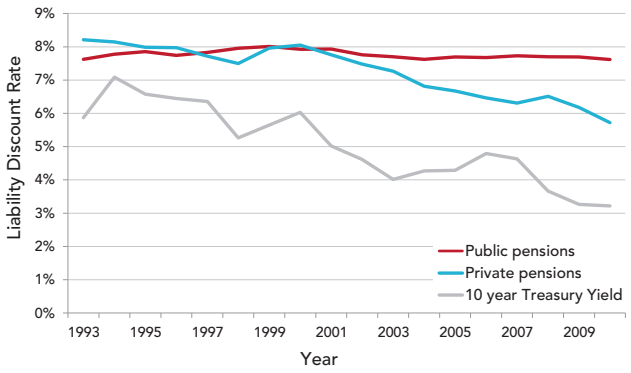


Source: Public Plan Database(2013); Author calculations
Implied real return equal to assumed discount rate less assumed inflation

The average discount rate for private sector and public sector plans in the United States diverged during the period from 1993 to 2010 (Figure 10), as private sector plans have dropped discount rates (driven in part or in whole by regulation).[16] In contrast, public sector plans have continued to use an assumed rate in the 7.5 to 8 percent range. Public plan discount rate assumptions are also very different from the behavior of both public and private sector funds in Canada and Europe (where bond rates and discount rates for pensions both fell, partly driven by regulatory requirements).

In the last 20 years, an 8 percent assumed rate of return reflected a return over U.S. Treasuries that

Figure 10
U.S. Funds: Liability Discount Rates (LDR) and 10-year Treasury Yield

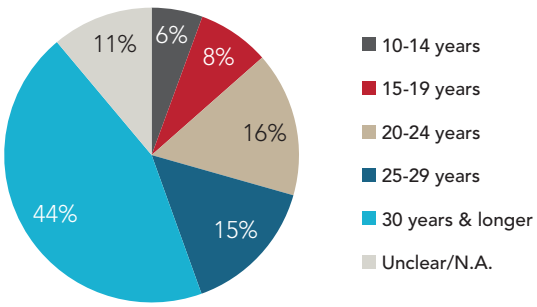


Source: Andonov (2013)

increased from 50 bps to 400 bps.[17] This indicates the level of risk taking that supports recommended contributions increased significantly during this period.

While asset smoothing techniques have been a key part of actuarial methods for decades, Andonov found that an increased proportion of plans began to smooth assets between 2001 and 2010; the proportion grew from 63 percent in 2001 to 82 percent in 2010.[18] While the Panel does not know how amortization methods have changed during this period, 44 percent of plans use the maximum amortization period permitted by current GASB accounting standards for the ARC (30 years) or longer (Figure 11). Some consider this a response to sponsor budget pressures created by the recent market and economic downturn.

Figure 11
Amortization Periods



Source: Public Plan Database,
126 plans, FY 2011 or 2012

The Impact Of Return Volatility

Funding methods themselves can have negative effects on funded levels due to the inclusion of investment gains/losses in amortization schedules. Plans that take investment risk and experience volatile investment returns cannot achieve the goal of 100 percent funding, even if the full contribution is paid, if losses are amortized over lengthy periods. Munnell (2013) used Monte Carlo simulations to stochastically test various funding methods against variable real returns. Results show that if the plan earned its expected real return, it could not achieve full funding over 30 years if using a 30-year, percentage of payroll, open period amortization method; at the median return, funded levels only improved from 73 percent to 87 percent. Better results were achieved if plans used 30-year, level dollar amortization with an open period (95 percent at the end of 30 years)[19] or if they used 15-year, level percent of pay open amortization (100 percent at the end of 30 years). An alternative to improving funded levels would be to consider the adverse impact on cumulative investment experience when establishing the assumed earned rate.

Funding Principles

While there is no requirement to pre-fund plan benefits, the Panel wholeheartedly believes that "keeping pension promises to employees" means that plans should be pre-funded in a rational and sustainable manner. Rational and sustainable funding methods seek to ensure that intergenerational equity is preserved, i.e., that the costs of today's public services are borne by current taxpayers. The Panel believes that intergenerational equity can be enhanced by fully funding pension benefits of public employees over their period of public service, which also strengthens the discipline of funding programs.

While the Panel recognizes that many states and localities have been striving to meet these goals, its recommendations are designed to encourage the commitment of funding entities to funding. The Panel has adopted these principles to frame its recommendations:

- Adequacy
- Maintenance of intergenerational equity
- Cost stability and predictability.

The Panel recognizes that there is an inherent trade-off between these principles, and in some respects they are mutually exclusive. The Panel believes that the principle of adequacy is most important, followed by maintenance of intergenerational equity. The Panel acknowledges that some predictability of costs is necessary, but observes that an excessive emphasis on the goals of stability and predictability often undermines the achievement of the goals of adequacy and maintenance of intergenerational equity. Near-term decisions to restrain current funding may lead to higher costs or lower benefits to future employees, taxpayers and service recipients. The Panel's recommendations are partly intended to ensure that those making funding decisions understand the consequences, and benefits, of today's decisions.

Adequacy

The Panel believes that the adequacy of funding should be the primary goal of a funding program. In this context, the Panel defines adequacy as being achieved when future annual contributions, together with existing assets, are sufficient to pay promised benefits over a wide range of future economic outcomes and employee salary and service experience. As noted below, this may require that plans maintain an appropriate level of flexibility for addressing the occurrence of unexpected events.

In practice, this means that funding should at a minimum provide for benefits if the **median** expected future investment conditions occur. By focusing on the median expected outcomes, the adequacy concept considers both return volatility and those scenarios in which investment return assumptions are not realized. An important foundation of the Panel's recommendations is that a plan's funding goal should always be 100 percent of the plan liability calculated assuming median expected future investment returns.[20]

Adequacy also means that the sponsor should have the resilience and flexibility to respond to conditions significantly more or less favorable than expected. The funding program should consider how jurisdictional revenues might change during periods of favorable and unfavorable returns, and it should move the plan toward full funding over a reasonable period of time. The Panel's recommendations for improved risk management require that downside scenarios are understood and that the plan has in place strategies for responding to such conditions.

Another foundation for the Panel's recommendations is that funding adequacy should be benchmarked against the results of the "standardized contribution" calculation discussed later. This recommendation reflects the Panel's opinion that the standardized contribution is based on assumptions and methods, including an investment return assumption, that are consistent with the Panel's funding principles.

The Panel recognizes that pensions are generally long-term programs and that circumstances will arise that prevent plans from always being fully funded. In such cases, it is essential that trustees and funding entities have a reasonable plan in place that, while recognizing short-term pressures on plan funding, moves the plan to a fully funded status over a reasonable period of

time. This approach will also support meeting the intergenerational equity objective discussed below.

Intergenerational Equity

Intergenerational equity aligns the costs of public services with current taxpayers and creates an expectation that current employee costs, including pension benefits, will not be borne by future generations of taxpayers. In practice, the goal of intergenerational equity may be furthered by paying the costs of pension benefits over the employees' working lifetime.

Economic theory suggests that achieving full intergenerational equity means that current taxpayers should pay the "risk-free" cost of services so as not to burden future taxpayers with the cost of investment risk being taken by current taxpayers. The Panel recognizes that most plans prefer the lower current cost achieved by assuming higher expected investment returns (and therefore higher risk taking and a possible shift of costs to future generations), as opposed to preserving pure intergenerational equity. The Panel believes each trustee/funding entity must determine how to allocate investment risk and that funding programs should explicitly consider the extent to which investment risks and costs are shifted to future generations.

Striving to achieve intergenerational equity can help impose discipline on a funding process. The Panel debated the merits of whether it was most appropriate to fund plans over an employee's future working lifetime or over the (longer) expected lifetime of the taxpayer. Overall, the Panel concluded that shorter funding periods instilled better discipline and that intergenerational equity would be improved by limiting the time horizon of funding methods, especially the amortization of gains/losses, to the remaining working life of the covered employees.

In some cases, current conditions will make this objective difficult or impossible to achieve. Trustees/funding entities for plans with large legacy liabilities (unfunded amounts for retirees no longer in public service) will have to determine on a plan-by-plan basis how current and future generations of taxpayers will pay for those costs. In such cases, it is essential that a plan be developed and adopted to move the plan toward a fully funded status.

Cost Stability And Predictability

Plan sponsors understandably desire contributions that are both stable and predictable from year to year as this is more manageable within the larger budget-setting process. However, there is an inherent conflict between achieving stable contribution levels and plans' decisions to significantly invest in risky assets because asset gains and losses will impact future contribution levels. This conflict becomes more apparent when the plan is mature as amortized investment gains and losses will be larger relative to the payroll of the funding entity. The volatile contribution rates that result may make the sponsor's budgeting process more challenging.

Trustees and funding entities should develop an understanding of the limited degree to which risky investments can be combined with the goal of stable contributions. Even with the use of amortization and smoothing techniques, risky investments and/or volatile markets will inevitably lead to greater variability in future contributions.

The Panel also believes that funding entities can develop a reasonable understanding of the path of expected contributions only over a short time frame. Over very short periods—e.g., three to five years—the recognition of rising and falling costs in sponsor budgets can be managed to provide some degree of cost predictability, but not necessarily stability.

Recommendations

The Panel's recommendations are made in three broad areas: risk measures, analyses and disclosures; the role of the actuary; and governance.

Risk Measures, Analyses And Disclosures

Responsible financial management of plans depends on providing plan managers with information on the trust's current financial position, investment and other risks the plan faces, and how those risks can impact future contribution levels and the funded position of the plan in the future. Pension obligations are forward looking: They represent the expected net cost of future benefit payments assuming certain assumptions are met, including the expected rate of future trust earnings and other **economic** and **demographic assumptions**. As neither the rates of return earned on invested assets nor the volatility of returns are estimable with absolute certainty, the Panel believes trustees, funding entities, taxpayers/service recipients, plan members, union officials and other stakeholders need more information about the potential risks facing these plans. This information will help support more informed decision making.

For the purposes of this report, risk management refers to understanding, planning for, and managing the possible financial implications of future experience that varies from assumptions, including how that variation affects plan contributions and funding measures. Stakeholders should analyze and understand how adverse investment experience can impact the adequacy of current plan contributions, future contribution levels and future estimates of plan funding. This analysis can then be used to establish investment strategies and contribution programs that enhance the likelihood of meeting plan financial objectives.

With any risk measures, both downside and upside exposures should be considered. Decisions made when plans are in surplus (e.g., contribution holidays, benefit improvements with plan surplus) may reduce the system's ability to manage and respond to a subsequent economic or market downturn. Such decisions should be taken with an understanding of these implications. Downside risks can be challenging because these risks may intensify during times of economic stress. The effect can be to increase demands on funding entities' budgets and reduce their ability to meet their plan contribution commitments. Proper risk management can help to manage favorable experience prudently and to plan for and respond effectively to adverse experience.

The Panel's recommendations in this area are focused on improving plans' risk management practices and decision making by making more information available. The Panel believes this information would be best developed by the actuary, utilizing information supplied by the investment manager, funding entities and others. While the actuary's report is typically for trustees, the Panel believes the recommended risk measures, analyses and other risk management information should be shared with others responsible for funding decisions: elected and civil service officials as well as other parties of interest, including taxpayers/service recipients, plan members and union officials, other stakeholders, and the media. This report refers to all of these audiences as "users" of this information.

Some of the Panel's recommendations for historic information also are required by GASB 67 and GASB 68 disclosures. To avoid the need for users to search for all relevant information, the Panel believes that all of the following disclosures should be included in the actuary's funding

report. This will help ensure that all disclosures will be available to all users when funding, benefit and other decisions that affect a plan's current or expected future financial position are being considered.

Trends in financial and demographic measures

Trends in measures of the plan's financial position, demographics and experience compared to assumptions provide users with important information: trends in risk levels, the degree to which assumptions are reacting to changing conditions, and a plan's ability to respond to market volatility and other unpredictable events. As these measures are principally for developing an understanding of the changing profile and risk position of the individual plan and not for cross-plan comparisons, consistently defining the required information will help to ensure that trends in results can be reasonably interpreted.

The Panel recommends that plans present the following information for a 10-year period.

Plan maturity measures

Plan maturity measures assess the changing maturity profile of the plan and provide information about the level of reliance on active employees to absorb adverse experience.

- Ratio of active employees to retirees: a broad measure of plan maturity.
- Ratio of benefit payments to payroll:[21] a broad measure of plan maturity.
- Ratio of funding liabilities to payroll: a measure that helps assess how a change in unfunded liabilities may impact contributions (expressed as a percentage of payroll).
- Ratio of market value of assets to payroll: a measure of the level of market risk and the impact on contributions if such risks occur. This measure should be considered in conjunction with an understanding of the plan's asset allocation and the price volatility of the portfolio.

Plan cost measures

Plan cost measures assess the relationship of contributions to payroll and to sponsor budget or other revenues.

- Ratio of Annual Required or Actuarially Determined Contribution **(ADC)**[22] (employer portion) to payroll: a measure of the relative magnitude of current pension costs to payroll.
- Ratio of Annual Required or ADC (employer portion) to sponsor budget or revenues (e.g., net taxes collected): a measure of the relative magnitude of current pension costs to sponsor financial resources.
- Ratio of the contribution made to the plan to the Annual Required or Actuarially Determined Contribution: a measure of the extent to which the sponsor has made the contribution required to ensure funding goals are achieved under the plan funding assumptions and methods.

Achievement of economic and demographic assumptions

The Panel believes that trends in experience compared to assumptions are useful indicators of the reasonableness of assumptions and whether they have had an inherent bias (i.e., consistently more or less favorable than experience). As such, the Panel believes that information should be presented that enables users to compare key economic and demographic assumptions with realized experience.

With respect to demographic assumptions, the Panel is not suggesting that annual experience studies be performed, but rather that plans should regularly review their demographic assumptions, analyze experience, and understand trends. The results of the most recent analysis should be included in the actuarial report.

Many of these measures also will provide useful insight into the impact of potential changes to plan benefits, investment strategies, or other matters. The Panel recommends that the impact of proposed plan changes be used to re-estimate these measures as a means of evaluating the effect of such changes before they are adopted.

These suggested disclosures are shown in the sample disclosure in Appendix II.

Measures of risks to plans' financial position

Investment risk measure

Plans should disclose the estimated standard deviation of the return on assets held in the portfolio on the reporting date. This measure assesses the volatility risk inherent in the current asset portfolio and provides a measure of possible gains and losses.

Plan liability at a risk-free rate

The Panel recommends that plan trustees obtain a direct estimate of the degree to which the plan anticipates it will achieve its funding goals by realizing a premium earned on risky assets. The Panel believes an effective means of quantifying this risk is to compare: 1) the plan liability and **normal cost** calculated using its **actuarial funding method** and assumed earnings rate, to 2) the plan liability and normal cost calculated using a risk-free rate (e.g., the U.S. Treasury yield curve), based on the plan's actuarial funding method and demographic assumptions.[23]

The Panel believes this disclosure provides reasonable estimates of the value of the expected risk premium derived from investing in risky assets. This disclosure is illustrated in Appendix II.

Standardized plan contribution

Each plan calculates its contributions using plan-specific assumptions (primarily the assumed investment earnings rate) and actuarial funding methods (including the amortization method). Stakeholders are often unable to evaluate the reasonableness of individual assumptions or the implications of the selected cost methods. Stakeholders have no other means of assessing the risks embedded within the funding recommendation. The Panel believes that information should be available to users to help them assess these aggregate funding risks.

Therefore, the Panel recommends the disclosure of a "standardized plan contribution"[24] that would be compared to the recommended contribution to help users assess the adequacy and reasonableness of the plan's contribution. The "standardized plan contribution" would be calculated by all plans using the same discount rate and funding methodology (but their own demographic assumptions). This common metric is meant solely as a benchmark for those setting contributions; the Panel recognizes that many plans will choose to fund at a different amount. A detailed description of the methodology is found in Appendix III.

The recommended standardized plan contribution would be calculated by using:

- A stipulated assumed long-term rate of return. This rate of return would be based on current long-term risk-free rates plus a margin representing risk premia earned over risk-free rates. This rate reflects a typical asset allocation and would not be adjusted for the plan's own portfolio to maximize the consistency of the calculation across plans. Various methods for developing this rate are possible; one such method is illustrated in Appendix III. At the time this report is being issued, that rate is estimated at 6.4 percent. The Panel recommends that one rate of return be used for all plans with similar measurement dates.[25]
- Other economic assumptions (e.g., inflation, salary growth) would be set to be consistent with the underlying inflation rate embedded in the long-term rate of return.
- Individual entry age normal funding method.
- Five-year asset smoothing (recognizing equal portions of gains or losses in each year).
- Fifteen-year amortization of the unfunded, with amortization amounts set as a level percentage of payroll and using a rolling base.

Stress testing

Stress testing is a means to analyze potential management strategies, with the objective of helping users assess how well the trust stands up to "stress," i.e., a period of market returns significantly above or below a baseline assumed return. These tests can show how sensitive future contribution amounts are to periods in which key assumptions are not achieved. Stress tests provide important information both for trustees and for funding entities. The Panel recommends that the stress testing outlined below be completed and included in the information made available to all interested parties.

Each stress test described below is a 30-year, forward-looking projection. These tests consider the effects of long-term patterns of behavior and investment market conditions. The Panel recommends for each projection that a baseline calculation be completed using the discount rate for the "standardized plan calculation." This baseline information will then be compared to the results of the stress tests. The Panel recommends testing stresses over a long period as plans are long-term entities and most plans can survive short-term market volatility or a few years of underpaid contributions. In a 30-year projection, the Panel recommends that the "stress" occur each of the first 20 years, with another 10 years of the projection to show the effect on financial measures that may be due to the forward spreading of effects related to the funding method in use, e.g., asset smoothing and amortization methods. The Panel recommends these projections be completed using an **open group** methodology. Appendix IV illustrates the results of the stress tests for a hypothetical plan.

In the stress testing, the plan would compare the baseline financial measures shown below to those of each stressed situation, and would do so for each year in the projection.

- Expected contributions (in dollars).
- Expected contributions as a percentage of payroll.
- Funded ratios.
- Ratio of benefit payments to payroll.
- Ratio of funding liability to payroll.
- Ratio of the market value of assets to payroll.

Using the information obtained from the stress tests, trustees and funding entities should consider whether the current contribution policy will remain viable throughout the projection period. The trend in the funded ratio, contribution levels and the ratio of contributions to payroll are important indicators of the trust's financial health. The Panel recommends that this information be used to develop an alternative funding program that will meet, over the term of the projection, the funding principles of adequacy and intergenerational equity to the greatest extent possible in the circumstances. The development of such a program will not only prepare the plan for severely adverse conditions, but will also inform all parties about the potential effects of investment and other risks. The Panel believes this information will support effective decision making even in the absence of a stress scenario.

The recommended stress tests are as follows:

- **Effect of paying only 80 percent of the recommended contribution each year for 20 years.** While this is an extreme scenario, it demonstrates the effects of repeatedly failing to make the recommended contribution. This stress test can be used to measure the sensitivity of the system to even a small change in funding over a long period.

- **Effect of investment returns over a 20-year period that are 3 percentage points above and below those used in calculating standardized plan contribution.**[26] At the time this report is being issued, the "standardized plan contribution" assumes a 6.4 percent return; the other two scenarios would show returns at 3.4 percent and 9.4 percent.

The Panel believes that +/- 3 percentage points represents "plausible stresses" based on its review of prior market returns. Table I provides 20-year rolling stock market returns showing actual return volatility over long periods. Returns in the 2nd decile (4.9 percent) are slightly less than 3 percent below 5th decile returns (6.8 percent). Similarly, returns in the 8th decile (10.4 percent) are slightly more than 3 percent above 5th decile returns.[27]

Table I
Twenty-Year Rolling U.S. Stock Returns, S&P 500
Periods Ending 1919 to 2013 (95 periods)

Decile	S&P 500 Decile Average
1st (lowest return)	3.2%
2nd	4.9%
3rd	5.3
4th	5.6
5th	6.8
6th	8.8
7th	9.4
8th	10.4
9th	11.7
10th (highest return)	13.4
Source: Crestmont Research (2014)	

Undiscounted cash flows

The Panel recommends that the plan disclose future expected "cash flows," specifically, expected annual future benefit payments. The purpose of these disclosures is to allow others who wish to evaluate plan finances to make their own calculations of plan obligations.

These cash flows can be combined with other information in this report, particularly the stress

tests described in the prior section, to evaluate the financial condition of pension trusts and/or plan sponsors. One important metric used to evaluate the finances of state and local authorities is whether the plan is expected to have positive cash flows, meaning expected contributions exceeding expected benefit payments plus expenses.[28] In addition, the stressed investment return assumptions can be used to analyze how those cash flows might vary in different economic scenarios.

The Panel recommends the following disclosures:

- **Closed group benefit payments.** Expected future benefit payments, including the effects of future pay and service and any future cost-of-living increases, for current plan participants only. These payments would allow users to calculate the **actuarial accrued liability** for terminated and retired participants and the present value of projected benefits[29] for active employees.

- **Accrued benefit closed group benefit payments.** Expected future benefit payments, based ONLY on pay and service through the valuation date for active employees, and all future benefit payments for terminated and retired plan participants. These payments would be identical to the closed group payments for terminated and retired plan participants. They can be used to develop a unit credit liability.[30]

Role Of The Actuary

Different assumptions and methods can be applied to support a wide range of funding programs. For this reason, the Panel believes it is important for the actuary to provide all the information recommended herein to all parties and that trustees and funding entities utilize the full range of available information when making funding and other financial decisions.

In addition, because there may be differences of opinion regarding the appropriateness of funding assumptions and methods, the Panel believes that the actuary should opine on the reasonableness of the selected assumptions and methods in his/her actuarial funding report. This extends the actuary's duty to opine beyond today's standards (that assumptions and methods meet **Actuarial Standards of Practice (ASOPs)**).

The Panel also believes that the current range of funding assumptions and methods in use is overly broad and recommends narrowing the range of practices with respect to various funding assumptions and methods.

The Panel requests that the Actuarial Standards Board (ASB) actively consider the recommendations made herein and take steps to incorporate them into ASOPs if needed to achieve the objectives of the Panel's recommendations.[31]

Disclosure

The Panel believes that the actuary's client (frequently the trustees) should require the actuary to develop all the analyses and information discussed herein and to share this information with all stakeholders in a timely manner. This would ensure that stakeholders both inside and outside the system are aware of the risks inherent in pension investments and of how plan finances may evolve under different investment return outcomes and contribution policies. The Panel believes it is in the public interest for these results to be disclosed, as the information will help drive better decision making by all stakeholders. To ensure that such disclosure occurs, it recommends that ASOPs be changed to

require these disclosures in actuarial reports on plan funding.

Reasonableness of funding assumptions

The Panel recommends that the actuary opine on the reasonableness of all funding assumptions and methods. The current responsibility of the actuary is limited to addressing the reasonableness of assumptions only if they are deemed to be inappropriate or do not meet ASOPs. The Panel recognizes that actuaries do not have a fiduciary role, but believes that they should state their professional opinion as to whether funding assumptions and methods are reasonable and will support the achievement of the goals of adequacy and intergenerational equity.

Discount rates

Funding calculations and analysis of plans' financial condition require making assumptions about rates of return on plan investments that will be earned over long periods in the future. There are two primary methods of establishing this assumption:

- **Forward looking:** Return assumptions can be based on the current structure of risk-free interest rates by building in expected premiums for credit risk and equity risk (that is, rates of return for corporate bonds or equities over government bonds). Because risk-free rates include the effects of future inflation, these calculations tend to focus on estimating nominal returns. This is the methodology used to construct the discount rate for the standardized plan contribution discussed in Appendix III.

- **Historical:** Return assumptions may also consider historical performance, i.e., what the plan's portfolio or what broad equity, fixed income and other markets have earned over a particular past period, as a means of estimating future performance. This approach is common among public sector plans, which frequently consider what the plan or these indices have earned over the previous 25 to 30 or more years as a basis for setting the assumed future return assumption. This approach focuses on the nominal rate actually achieved and implicitly incorporates the past rate of underlying inflation and risk-free returns.

When utilizing either method, it is important to consider the extent to which future economic and market conditions may differ from those of today or of the past. The clearest example of the need to consider changing economic and market conditions is in conjunction with the estimation of future returns from fixed income investments. In this case, the long-term secular decline in interest rates (spanning a period of more than 20 years) strongly suggests that the robust fixed income performance of the past is not likely to be repeated in the future. As a result, adjustments to past experience are necessary when establishing fixed income return expectations going forward.

Other, similar conditions are encountered when using risk premia to set future return assumptions. Both methods of estimating future returns have flaws and both have been shown to be relatively poor predictors of actual returns in future years.

The Panel had extensive discussions about the most appropriate approach for setting this critical assumption, with some members favoring each of the methods described above. In the end, the Panel reached a consensus that while "adjusted past returns" offer a common and useful reference point,[32] the rate-of-return assumption should be

more heavily based on use of the current risk-free rate plus explicit risk premia, or other forward-looking methods.[33]

The Panel believes the assumed rate of return should be set at the median expected return, which should be based on the geometric mean return. A simple arithmetic mean return, which has a less than 50 percent chance of being realized in future years, should not be used. Plans should be using rates of return that they believe can be achieved over the next 20- to 30-year period with a 50 percent probability. The Panel does not believe the rate should be aggressively conservative, as doing so may lead to a surplus.

Other economic assumptions, including inflation, cost-of-living adjustments (COLAs) (if based on inflation), and salary scale should be established so as to be consistent with the assumed investment return.

Amortization periods

Amortization is a way of spreading gains and losses to future plan participants and/or future taxpayers and thus impairs the plan's ability to maintain strict intergenerational equity. To improve intergenerational equity and strengthen control over funding risks, the Panel recommends that amortization of unrecognized amounts should be limited to a period of 15 to 20 years. In addition, the amortizations of gains or losses should be symmetrical, meaning the same treatment for gains and losses.

The Panel had considerable discussion of the theoretical foundation for selecting an amortization period, mostly around the implications of seeking to maintain broad intergenerational equity. Some believe this can best be achieved by amortizing gains/losses over a period that approximates the remaining working life of the participants, generally less than 15 years for most plans today. This enables all compensation costs for current workers to be borne during their working life. Others believed that intergenerational equity should consider the period in which current taxpayers bear the costs of workers' pensions, which may extend beyond the remaining working life of current workers and might be considerably longer. Gains/losses that might be attributable to current retirees were also considered, as was the impact of retroactive benefit increases.

The Panel believes that plans' risk management practices and their ability to respond to changing economic and market conditions would be enhanced through the use of amortization periods shorter than the 30-year period commonly used today. The Panel also believes that shorter amortization periods would tend to improve intergenerational equity. Furthermore, to avoid the undesirable accumulation of unamortized principal, amortization schedules should cover interest on unfunded amounts in full and amortize principal.

Asset smoothing

Many on the Panel were uncomfortable with asset smoothing approaches, which reduce transparency regarding the actual value of assets supporting the plan. The Panel also notes that smoothing of asset values for use in funding calculations does not mitigate the effects of risk taking in investments; rather, it merely delays the recognition of gains or losses associated with that risk taking. Nonetheless, the Panel recognizes that smoothing for funding purposes helps to manage the recognition of the effects (positive or negative) of risk taking, which may aid funding entities in budgeting. For example, if investments generate a large gain or loss, funding entities can use asset smoothing to

"step up" or "step down" the contribution over a limited, but more manageable, period of years. For small movements in investment returns around an expected return, asset smoothing can help keep costs stable over short periods. But smoothing cannot eliminate the necessity of stepping up to a higher cost (or down to the lower cost) if the plan has a large investment loss (or gain).

The Panel believes that the asset smoothing period should be limited to five years, recognizing equal portions of gains or losses in each year.

Direct rate smoothing methods

Current actuarial funding practice is based on the use of traditional methods: **actuarial cost methods, actuarial value of assets**, and amortization of prior unrecognized amounts. The Panel understands that this basis of funding has been in place for many years and many actuaries, trustees and funding entities understand well how these mechanisms work.

Nonetheless, the Panel is concerned that amortization and asset smoothing methodologies provide a false sense of control over the outcomes of risk taking. For example, a naïve observer could assume that asset smoothing creates a perpetually smooth series of asset values, allowing the plan to take increasing risks in investments, seeking higher yields because the asset method can "control" volatility. But as many plans experienced post-2008, asset smoothing could only slightly moderate the cost increase due to asset losses, not eliminate them (even as assets regained much of the 2008 losses).

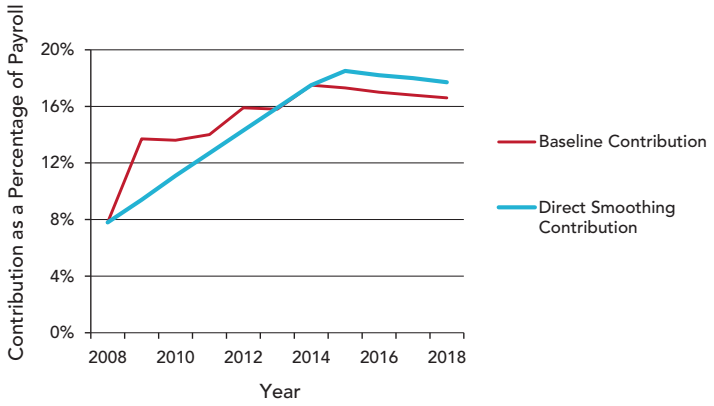
The Panel believes that the actuarial profession and those who make funding decisions should consider the use of more transparent direct rate smoothing methods and other more sophisticated asset and liability cash flow modeling techniques in common use within the financial services sector. For example, plan trustees and funding entities could compare the total present value of future benefits, including for future service and salary increases, directly to the market value of assets. Based on this information, they could develop a budgeted pattern of contributions that achieves full funding in a reasonable period of years while simultaneously recognizing possible near term limitation of funding entities. The Panel believes that transparency about the value of benefit obligations and assets can help create the conditions for establishing a long-term funding plan that meets the competing pressures facing funding entities.

This approach requires considerable discipline among all parties to retain a commitment to funding the system. Such a system could be subject to great abuse, and could make it more difficult for taxpayers, service recipients, the media, and other stakeholders to recognize when plan trustees or funding entities have chosen to defer funding. For that reason, the Panel recognizes that the use of actuarial methodology, while less transparent to these stakeholders, may provide discipline in a system wherein all stakeholders agree to smooth assets over five years and amortize losses/gains over 20 years.

Direct Rate Smoothing – An Example

Consider a plan[34] that was fully funded at the beginning of 2008 and suffered an asset loss of 28 percent that year, which is comparable to what many plans experienced with the market downturn. Prior to the asset loss, the employer's portion of the contribution was 7.8 percent of payroll (equal to the normal cost less the value of the employee contributions). Following the plan's funding method, the contribution would almost double, from 7.8 percent to 13.7 percent of payroll. It would climb upward from there, as the remaining loss was amortized; the contribution would peak at 17.5 percent of payroll in 2014 (Figure 12).

Figure 12
Example of Direct Rate Smoothing



Instead of adhering to the mechanics of the actuarial cost method, or arbitrarily changing assumptions or amortization periods, the direct rate smoothing method would enable a sustainable contribution program that met the many constraints facing the funding entity. Instead of using its normal methods, the funding entity may decide that it could afford to increase the contribution by 1.5 percent of payroll each year, until such time as it was paying enough to pay for the loss by 2038 (30 years after the loss was incurred). This would enable the plan to be funded over the same time frame, but the pattern of payments over the short term would be smoothed to allow the funding entity to budget for the increasing contribution.

With direct rate smoothing, the contribution rises in even increments of 1.5 percent of payroll from 2009 through 2015. Because the funding entity pays less upfront to cover the loss, it must pay more later (about 1 percent of payroll), but this creates a funding pattern for which funding entities may be better able to budget.

Plan Governance

For purposes of this report, governance is considered in its broadest sense: The Panel is focused on how plans (through their trustees) and the entities responsible for funding them make and implement decisions with respect to plan funding, including decisions on investments. Good governance requires cooperation on the part of both trustees and funding entities to ensure the plan is able to meet its obligations to beneficiaries. Such cooperation must be strong enough to overcome pressures to minimize the stated level of necessary contributions.

Collectively, the governance structure must ensure that funding is sustainable. If any party acts irresponsibly, such as by raising benefit levels without proper consideration of cost, failing to fund required contributions, understating benefit costs and risk through the choice of contribution assumptions and methodology, then the plan can face significant underfunding.

It is often pointed out that no party is responsible for protecting the interests of *future* generations, including future taxpayers, service recipients and public employees. These parties could see service reductions, increased taxes, reduced compensation or increased required contributions if current generations do not fund plans adequately. Pensions are long-term obligations. Decisions today that lead to underfunding could shift costs to future taxpayers and service recipients and may in extreme cases lead to reduced benefits for future workers. Exacerbating this problem is the fact that the effects of decisions made today are often not felt within the term of office of trustees or public officials. Public officials facing significant other demands for resources may not prioritize a potential funding problem that only becomes severe in 10 years.

While many different governance structures exist for public pension systems, there are no clear "best practices" across the industry.[35] The following principles should be followed to ensure strong governance.

Governance structures should maximize the likelihood that the funding objectives stated in this report are achieved

To meet the goals of adequacy and intergenerational equity, funding recommendations, contribution decisions and plan design changes should follow these principles:

- **Support the payment of the recommended contribution.**[36] Exceptions should be made only in times of serious financial distress to the sponsoring entity and when a clear and understandable funding plan has been developed to move the plan toward full funding over a reasonable period of time.

- **Ensure all funding meets the precepts of intergenerational equity.** Each generation of taxpayers should pay what they owe when they owe it, and not push costs to future taxpayers.

- **Use of funding instruments that bear risk or delay cash funding—e.g., bonds, including pension obligation bonds or promissory notes from the funding entity—should not be used.** Plans are not funded in a broad budgetary sense when debt is issued by the plan sponsor to fund the plan, whether inside or outside the plan.

- **Assure all stakeholders have timely access to comprehensive information concerning plans' current and possible future financial**

position and the risks they face. The Panel recommends that governance processes fully support the distribution of financial information and analyses discussed within this report to all stakeholders. For example, this might take the form of utilizing trusts' annual communications with participants to summarize the plan's funded status, as well as recommended and received contributions.

Boards of trustees should support risk analysis

Given the complexity of pension plans, their investment strategies, funding programs, and range of risk taking, boards need enhanced risk analysis structures to make more well-informed decisions. These structures can include the establishment of risk committees or advisory panels with this type of experience. Boards may also contract for risk analysis and/or delegate the risk analysis function. The objective of these structures is to ensure that adequate analysis of a trust's current and possible future financial situation is studied when making plan financial and benefit decisions. To support this decision making, the risk management process should establish a framework for monitoring risk taking, drawing on this report's recommended disclosures, and establish the level of risk that the plan is willing and capable of bearing. Sometimes referred to as "defining the plan's risk appetite," risk-taking guidelines could include the lowest funded ratio that the plan would accept in a severe financial crisis or the acceptable level of increase in contributions in moderate or severely adverse conditions. While many plans have risk committees already, the Panel urges these committees to expand their roles to include consideration of the risk analyses illustrated in this report.

Boards of trustees should have opportunities to access education and training

In support of their areas of responsibility, trustees should receive timely and appropriate actuarial, financial and investment education and training that relate to their funding and investment decisions. This education and training should focus on how investment results affect the funding (actuarial) report and how the actuary's work can drive the current and future financial position of the trust. Training also should include information on investment decision making and performance analysis, identification and analysis of risks to the trust, financial forecasting and planning in support of contribution policy decisions, and basic pension system operations.

Consideration of plan changes

All plan changes should be carefully considered. Benefits are part of an employee's deferred compensation; when a plan is changed, particularly when it is improved, employees expect that their contributions will help to provide that promised benefit. Given that these are long-term promises, with contractual and legal guarantees, legislators, plan sponsors and trustees should be deliberate when they make plan changes.

In this context, plan surpluses should not automatically lead to benefit improvements, as these surpluses may well need to be utilized when adverse experience occurs in the future. As benefit improvements typically may not be reversed, a full understanding of the risks and expected costs associated with plan improvements should be made prior to their adoption. Some jurisdictions have successfully used a system of post-implementation review to examine emerging experience, often associated with new benefit features, and to re-examine cost estimates made

at the time of adoption. This process can lead to a continuation of the subject provisions or modification if experience suggests the benefit's cost exceeds or falls below expected levels.

In addition, some believe that greater risk sharing through the use of variable benefit provisions would improve the structural soundness of pension plans. The Panel urges plans to consider these benefit designs.

Some plan changes may be more appropriately adopted as a temporary improvement, subject to "sunset" provisions, to avoid long-term and irreversible financial commitments.

Experience shows that some benefit improvements can introduce unexpectedly high structural costs, e.g., past service improvements or creating new guarantees, such as a rate of guaranteed return on deferred benefits or minimum COLA when the fund previously did not make those guarantees. Plan risk and funding analyses of such plan features should be thorough and should be completed and disclosed prior to their consideration for adoption so the full extent of any costs and potential funding requirements can be understood.

The Panel strongly recommends that proposed plan changes be considered over two consecutive legislative sessions (or their equivalent). The Panel believes experience has shown that this will improve the degree to which changes are thoroughly evaluated, in part by improving public awareness and discussions prior to the irreversible adoption of changes.

Endnotes

[1] For this report, the "promise" includes all constitutional, contractual and/or legal protections on benefits afforded to plan participants; these protections vary based on state law.

[2] Most data sets only reference data from 2001 on.

[3] For example, it has been noted that plans have used discount rates which are inconsistent with the returns on risk-free rates, which some believe is more appropriate for measuring the plan liability. Estimates of June 2009 obligations for 116 state plans increased from $3.1 to $4.4 trillion when measured with risk-free interest rates (Novy-Marx and Rauh (2011)).

[4] Calculations of pension liabilities from the National Income and Product Accounts are based on market rates as of date of measurement. Those calculations show aggregate funding levels are approximately 70 percent today. This is similar to funding levels in 1980.

[5] Of the 25 plans that were less than 60 percent funded, 23 were between 40 and 59 percent funded and only two were less than 40 percent funded.

[6] Trustees were able, within certain limitations, to set their desired contribution level under GASB 25/27. While the ARC no longer exists going forward, it is the best historical data available.

[7] Boyd and Kiernan (2014). Underpayments were heavily concentrated in a few states, namely California, New Jersey, Illinois and Pennsylvania.

[8] Munnell (2012).

[9] NASRA (2013); total expenditures, including capital payments. We understand this includes expenditures funded in whole or part by federal transfer payments, e.g. Medicaid.

[10] Andonov (2013); risky assets include public equity, alternative asset classes (including real estate, private equity, and hedge funds) and risky fixed income.

[11] Andonov (2013).

[12] Changes in ratios of assets to payroll are a reasonable proxy to understand how small changes over time can affect a plan maturity and payroll is reasonably easy to consistently measure. But, payroll will not necessarily track changes in the underlying revenue of the funding entity.

[13] Andonov (2013). "For all funds except U.S. public funds, a 10 percent increase in the percentage of retired members is associated with a 1.16 percent lower allocation to risky assets. However, for U.S. public pension funds, a 10 percent increase in the percentage of retired members is associated with a 2.05 percent increase in the allocation to risky assets."

[14] Dimson et al. (2013); from 1900 to 2012 the real return for bonds was 1.8 percent; real equity returns over that period were 5.0 percent. Real returns for non-U.S. equities showed slightly lower real returns (4.4 percent) from 1900 to 2012.

[15] Dimson et al. (2013).

[16] Andonov (2013).

[17] The market yield for 30-year U.S. Treasuries in December 1992 was 7.44 percent (6.25 percent in December 1993 and 7.87 percent in December 1994), versus the average monthly rate of 3.89 percent in December 2013.

[18] Andonov (2013).

[19] An amortization payment calculated using a 30-year percentage of payroll open period amortization method will be less than interest on the unfunded amount. This allows the principal (unfunded amount or surplus) to continue to grow. A 30-year level dollar amortization payment will always include a full interest payment, plus some small principal payment, so the principal will eventually decline. A 15-year percentage of payroll open period amortization payment will typically include payment of interest and a small principal payment.

[20] The Panel considered whether funding should be at a more conservative basis, including the risk-free rate. While some Panel members believed this was a better option, if the plans are investing in risky assets, funding at a basis other than the median may lead to large surpluses unless the plans move investments into less risky asset classes. The Panel recognizes that use of expected future portfolio returns for setting contributions reduces current contributions, which passes risks to future taxpayers. Others argue that not recognizing expected returns sets higher costs for today's taxpayers to the benefit of future taxpayers; see, for example, NCPERS (2008).

Endnotes

[21] For each measure in this section, the Panel suggests payroll on which benefits are determined (or other suitable measures for plans where benefits are not related to pay). This value may not match payroll reported in other venues.

[22]Annual Required Contribution is defined in GASB 25/27. Actuarially Determined Contribution is defined in GASB 67/68.

[23]The liability measure recommended is different than the market value of liability measures cited by some economists (e.g., Novy-Marx and Rauh (2011)) in that it relies on the plan's current actuarial funding method. Some Panel members believe that this other market value liability measure would also provide important information to users.

[24]The Panel recognizes that GASB requires plan sponsors to show the plan's contribution compared to the ADC. The actuarial assumptions and methodology used to calculate the ADC are determined by the plan and thus differ from plan to plan. This standardized measure would be the same across plans.

[25]The rate would be set based on a typical or average portfolio, composed of equity and fixed income investments.

[26]The Panel does not mean to discourage other stress testing—for example, the effect of a one-time return equal to two standard deviations greater or less than the portfolio expected return. Also, some plans may want to consider the completion of more sophisticated stochastic calculations.

[27]An alternative method of assessing the range of plausible returns relies on a typical asset portfolio with an expected return of 8 percent and standard deviation of annual returns of 13 percent. In this case, the standard deviation of average annualized returns over a 20-year period would equal 2.9 percentage points. This portfolio would have about a 1-in-10 chance of receiving a return 3 percentage points or more below the assumed mean and a similar chance of an average 20-year return 3 percentage points or more above the assumed mean.

[28]Investment earnings can be included although for this measure realized returns may be the most appropriate measure.

[29]But not the actuarial accrued liability.

[30]The unit credit liability is used in the calculation of the accrued benefit obligation for private sector plans under FAS 87. These payments would be based on freezing benefit service and pay but projecting eligibility service.

[31]The Panel suggests the ASB consider developing a separate standard for public sector pension plans to incorporate the recommendations in this report.

[32]Past returns are best understood if adjusted for possible changes in economic and market conditions.

[33]For example, Rizzo and Krekora (2013) present a forward-looking method based on expected price inflation and forward-looking real returns, adjusted for volatility.

[34]In this example, for the baseline contribution, the plan uses a 7 percent discount rate, smoothes asset gains/losses over five years, and amortizes gains/losses over a 30-year period using level dollar amortization.

[35]The Panel recognizes there are many reports on good governance practices for pension systems themselves. But there isn't, to the Panel's knowledge, a definitive consensus of what constitutes best practice in terms of interaction of the parties with different responsibilities for the plan (trustees, funding entities, etc.).

[36]Recommendation echoed in numerous other reports, e.g., Boyd and Kiernan (2014); Pew (2012); Little Hoover Commission (2011); and Peng and Boivie (2011).

References

Andonov, Aleksandar, Rob Bauer, and Martijn Cremers. 2013 (September). "Pension Fund Asset Allocation and Liability Discount Rates: Camouflage and Reckless Risk Taking by U.S. Public Plans?" Presented at the Federal Reserve Bank of Cleveland Conference, *Public Pension Underfunding: Closing the Gaps*. Available at *http://www.clevelandfed.org/events/2013/pensions/presentation-cremers-andonov-bauer-and-cremers-asset-allocation-and-liability-discount-rates-2013-09-27.pdf*.

Board of Governors of the Federal Reserve. Selected Interest Rates (Daily)—H.15. Historical Data. Available at *http://www.federalreserve.gov/releases/h15/data.htm*.

Boyd, Donald J., and Peter J. Kiernan. 2014. "The Blinken Report: Strengthening the Security of Public Sector Defined Benefit Plans." The Nelson A. Rockefeller Institute of Government, State University of New York. Available at *http://www.rockinst.org/pdf/government_finance/2014-01-Blinken_Report_One.pdf*.

Brainard, Keith. 2013. "Public Fund Survey: Summary of Findings for FY 2012." National Association of State Retirement Administrators and National Council on Teacher Retirement. Available at *http://www.publicfundsurvey.org*.

———. 2012. "Public Fund Survey: Summary of Findings for FY 2011." National Association of State Retirement Administrators and National Council on Teacher Retirement.

———. 2011. "Public Fund Survey: Summary of Findings for FY 2010." National Association of State Retirement Administrators.

———. 2010. "Public Fund Survey: Summary of Findings for FY 2009." National Association of State Retirement Administrators.

———. 2009. "Public Fund Survey: Summary of Findings for FY 2008." National Association of State Retirement Administrators.

———. 2008. "Public Fund Survey: Summary of Findings for FY 2007." National Association of State Retirement Administrators.

———. 2007. "Public Fund Survey: Summary of Findings for FY 2006." National Association of State Retirement Administrators.

———. 2006. "Public Fund Survey: Summary of Findings for FY 2005." National Association of State Retirement Administrators.

———. 2005. "Public Fund Survey: Summary of Findings for FY 2004." National Association of State Retirement Administrators.

———. 2004. "Public Fund Survey: Summary of Findings for FY 2003." National Association of State Retirement Administrators.

Crestmont Research. 2014. "Generation Returns." Available at *http://www.crestmontresearch.com/docs/Stock-20-Yr-Returns.pdf*.

Damodaran, Aswath. 2014. "Annual Returns on Stock, T.Bonds and T.Bills: 1928 – Current." New York University Stern School of Business. Available at *http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/histretSP.html*.

References

Damodaran, Aswath. 2013. "Equity Risk Premiums (ERP) and Stocks: Bullish or Bearish Indicator." *Musing on Markets Blog*. Available at *http://aswathdamodaran.blogspot.com/2013/05/equity-risk-premiums-erp-and-stocks.html*.

Dimson, Elroy, Paul Marsh, and Mike Staunton. 2013. *Credit Suisse Global Investment Returns Yearbook 2013*. Zurich: Credit Suisse AG.

Ibbotson, Roger G., and Peng Chen. 2003. "Long-Run Stock Returns: Participating in the Real Economy." *Financial Analysts Journal*, January/February 2003. Available at *http://corporate.morningstar.com/ib/documents/MethodologyDocuments/IBBAssociates/StockMarketReturns.pdf*.

Little Hoover Commission. 2011. "Public Pensions for Retirement Security." State of California.

Munnell, Alicia H. 2012. *State and Local Pensions: What Now?* Washington, D.C.: The Brookings Institution.

Munnell, Alicia H., Jean-Pierre Aubry, and Josh Hurwitz. 2013. "How Sensitive is Public Pension Funding to Investment Returns?" *State and Local Pension Plans Issue Brief 34*. Chestnut Hill, Mass.: Center for Retirement Research at Boston College.

Munnell, Alicia H., Jean-Pierre Aubry, Josh Hurwitz, and Madeline Medenica. 2013. "The Funding of State and Local Pensions: 2012–2016." *State and Local Pension Plans Issue Brief 32*. Chestnut Hill, Mass.: Center for Retirement Research at Boston College.

National Association of State Retirement Administrators (NASRA). 2013. "NASRA Issue Brief: State and Local Government Spending on Public Employee Retirement Systems." National Association of State Retirement Administrators. Available at *http://www.nasra.org/files/Issue%20Briefs/NASRACostsBrief.pdf*.

National Conference on Public Employee Retirement Systems (NCPERS). 2008. "The Advantages of Using Conventional Actuarial Approaches for Valuing Public Pension Plans." Available at *http://www.ncpers.org/files/ResearchSeriesIII.pdf*.

Novy-Marx, Robert, and Joshua D. Rauh. 2011. "Public Pension Promises: How Big Are They and What Are They Worth?" *Journal of Finance* 66(4): 1207–1245.

Peng, Jun, and Ilana Boivie. 2011. "Lessons from Well-Funded Public Pensions: An Analysis of Six Plans that Weathered the Financial Storm." National Institute on Retirement Security. Available at *http://www.nirsonline.org/storage/nirs/documents/Lessons%20Learned/final_june_29_report_lessonsfromwellfundedpublicpensions1.pdf*.

Pensions & Investments. 2012. "Asset Allocations: Past, Present and Future." Available at *http://www.pionline.com/gallery/20121129/SLIDESHOW/112909999/3*.

Pew Center on the States. 2012. "The Widening Gap Update." Available at *http://www.pewstates.org/uploadedFiles/PCS_Assets/2012/Pew_Pensions_Update.pdf*.

References

Public Plans Database. 2001–2012. Center for Retirement Research at Boston College and Center for State and Local Government Excellence.

Rizzo, James J., and Piotr Krekora. 2013. "The Goldilocks Principle & Investment Return Assumptions." Presentation made at the Florida Government Finance Officers Association 2013 Annual Conference. Available at *http://www.fgfoa.org/Assets/Files/Jim_Rizzo_Presentation_PDF.pdf*.

Warusawitharana, Missaka. 2012 "The Expected Real Return to Equity." Presented at the 2012 System Committee on Business and Financial Analysis, Sept. 20–21, 2012, Federal Reserve Bank of Atlanta. Available at *http://research.stlouisfed.org/conferences/scbfa/Warusawitharana.pdf*.

Appendix I—Overview Of Panel Process

The Blue Ribbon Panel on Public Pension Plan Funding ("the Panel") convened formally for its first meeting in May 2013, and met face to face six times thereafter. The Panel used a survey and individual interviews to gather information during the months of June, July and August. The Panel deliberated on its recommendations in September, October and November 2013. The first draft of a report was produced in December, and the Panel's final face-to-face meeting in January 2014 was to discuss the draft report.

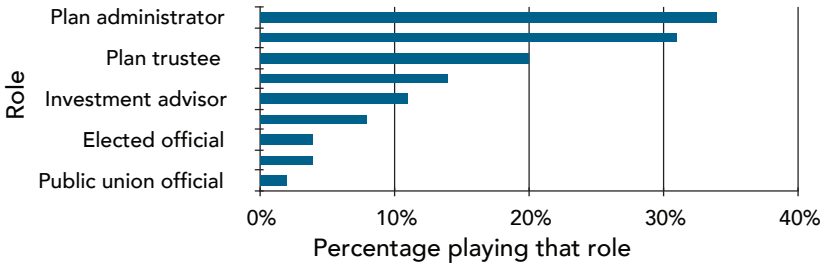
Survey

The survey was distributed by the Panel in June 2013. The survey was distributed to selected public sector plan actuaries and organizations representing public plans. Survey recipients were asked to distribute the survey onwards to others interested in the topic. In total, 169 responses were received. The survey had 30 questions covering whether a challenge (in general) existed with public plan funding, funding practices, disclosure, risk management (including investments) and governance; all but three questions were open-ended response. The full survey is shown in Appendix I.A.

Most survey results (78 percent) had experience with public sector pension plans. Figure 13 shows the roles these respondents had or currently play with public sector plans (respondents could choose more than one role.)

For the 37 respondents without public sector plan expertise, 19 percent were civil service employees, 14 percent were public union staffers, and 14 percent were actuaries. Thirty-eight percent self-classified as "other."[1]

Figure 13
Survey Respondents with Public Plan Experience: Role(s) played



Interviews

The Panel was able to meet with—in person or on phone—22 individuals in the month of July.[2] The Panel met with actuaries, the Actuarial Standards Board, economists, an investment advisor, plan administrators, public sector pension plan organizations, a rating agency, trustees and unions. The full listing of interviewees is in Appendix I.B. Individuals meeting with the Panel were asked to prepare background reading for the Panel and were offered time for a short presentation. Most of the time was spent in dialogue with the Panel.

[1] From their responses, they appear to have civil service jobs.

[2] Two individuals were interviewed in October.

Appendix I.A
Overview Of Panel Process—Survey

A. Background Information

1. Do you currently work or have you worked with public sector pension plans as an advisor, administrator or trustee?
   - Yes
   - No

1a. (If answered "yes" to question 1) Please describe the role(s) you've played with public sector plans. (Select all that apply.)
   - Actuary (consultant)
   - Actuary (employed by the plan or government agency)
   - Attorney (consultant)
   - Attorney (employed by the plan or government agency)
   - Civil service employee NOT employed by the plan with direct or indirect responsibilities for design, funding and/or investing (e.g., comptroller, city manager, etc.)
   - Elected official with direct or indirect responsibilities for design, funding and/or investing
   - Investment advisor (consultant)
   - Investment advisor (employee)
   - Public union official/staffer
   - Plan administrator or other employee of the plan
   - Plan trustee
   - Other (please describe)

1b. (If answered "yes" to question 1) How many years have you worked/did you work for or with public sector plans?
   - Less than 5 years
   - 5–10 years
   - 10–20 years
   - 20–30 years
   - More than 30 years

2. Please describe your current occupation/profession. (Select all that apply.)
   - Academic
   - Actuary
   - Attorney
   - Civil service employee
   - Economist
   - Elected official
   - Investment advisor
   - Public union official/staffer
   - Regulator/Rating agency
   - Other (please describe)

3. Are you currently a member of a public sector pension plan (accruing or receiving benefits)?
   – Yes
   – No

B. General Questions

We would like you to think and respond broadly to various issues affecting the public sector funding, as well as related issues, i.e., disclosure of financial information, governance and risk management. In your responses, consider only public sector defined-benefit pension plans that operate in the United States for employees of state or local governments.

4. Do you believe that there is currently an issue or challenge with respect to the underfunding of U.S. public sector pension plans?
   – Yes
   – No

4a. If you answered "no" to Question 4, why do you believe there is not an issue with underfunding in public sector defined-benefit plans today?

4b. If you answered "yes" to Question 4, what (in general) are the causes of plan underfunding in public sector defined-benefit plans?

4c. If you answered "yes" to Question 4, what (in general) are the potential solutions to alleviate underfunding in public sector defined-benefit plans?

5. In your experience, what are the characteristics of plans that are better funded than others? What key lessons can be learned from these experiences that may benefit the management of plans in the future?

6. In your experience, what are the characteristics of plans that have weathered the recent financial crisis better than others? What key lessons can be learned from these experiences that may benefit the management of plans in the future?

7. To your knowledge, what changes in practice have plans and/or plan sponsors made in recent years to improve plan funding? Consider changes to funding, investing, benefit design, risk management and governance.

C. Funding Practices

8. If you were starting a public sector defined-benefit pension plan today, what principles or objectives would guide your decisions on plan funding?

9. For an existing plan, regardless of the funded status, what recommendations would you make to ensure appropriate funding of the plan? Please be specific.

10. Do you believe the use of a long-term rate of return on the assets is an appropriate discount rate to use for funding? Why or why not?

D. Disclosure Of Financial Information

11. What financial information do you believe should be provided by the actuary, or others, to the plan trustees that would be helpful to the trustees in making decisions on plan funding?

12. What financial information do you believe should be provided to plan sponsors (organizations responsible for making plan contributions) that would be helpful for decision making on plan funding? (Question assumes plan trustees and plan sponsors are different groups.)

13. What financial information do you believe should be provided to non-participant stakeholders (e.g., elected officials, taxpayers, general public)?

14. Please provide your opinion on the usefulness of the disclosures required by the plan and plan sponsor under GASB 67 and 68 for the users of financial information.

15. Do you believe the use of a long-term rate of return on assets is an appropriate discount rate to use for financial disclosures? Why or why not?

16. In reports that cover **plan funding**, do you believe providing information that communicates the sensitivity of funding to changes in assumptions would substantially improve the information available to stakeholders (e.g., taxpayers, elected officials, bondholders)? Why or why not? (Note: Assumptions can include, but would not be limited to, discount rate, salary scale, cost of living adjustments, mortality rates, and other demographic assumptions.)

17. In reports that cover **plan funding**, do you believe disclosing pension obligations on a "market value" basis—measured considering only accrued (earned) benefits and using a discount rate consistent with a portfolio of securities whose amount, timing and probability of payment are similar—improves or diminishes the quality of information available to stakeholders? Why or why not?

E. Governance

For purposes of the next four questions, governance is defined as the oversight and decision-making process of the body or bodies responsible for reviewing or making decisions about plan benefit levels, contributions and risk management (including investment strategy). In other words, who is responsible for making decisions and how those decisions are made.

18. Please provide several examples of strong governance practice in public sector plans with regard to the funding of defined-benefit plans.

19. Please provide several examples of weak governance practices in public sector plans with regard to the funding of defined-benefit plans.

20. How can governance be changed to improve plan funding?

21. Do you believe the use of a long-term rate of return on assets is an appropriate discount rate to use for determining the value of benefits (including a change in benefits) when evaluating total compensation? Why or why not?

22. Is there a role for third parties in setting standards for appropriate plan funding and reporting? Who should set these standards and what behaviors should they seek to influence?

23. Are the interests of future taxpayers appropriately considered in plan governance? Why or why not? If they aren't appropriately considered, what improvements could be made?

F. Risk Management

24. What are the more important financial risks to be managed for public sector defined-benefit plans?

25. What are the principles and objectives a public sector defined-benefit plan should consider when deciding how to structure the investment portfolio?

26. What risk management processes and considerations should be incorporated into decisions on investments?

27. What risk management processes and considerations should be incorporated into decisions on funding?

28. Who benefits from taking investment risk? Who bears the cost of risk taking for investments?

29. What is the best way to manage the impact of contribution volatility?

30. In setting contributions, should consideration be given to the ability of the plan sponsor to pay? Why or why not? If sponsor ability to pay should be considered, how do you assess a sponsor's short- and long-term ability to pay?

Please provide your name (optional). This will be useful to the panel if we have follow-up questions on your responses. Please note that we will not quote any responses in the survey.

- Name
- Email Address

Appendix I.B.
Persons Interviewed by the Panel

John Adler
Service Employees International Union

Paul Angelo
Segal Consulting

David Blitzstein
Board of Trustees, Maryland State Retirement and Pension System

Don Boyd
Rockefeller Institute

Keith Brainard
National Association of State Retirement Administrators

Jeremy Gold
Jeremy Gold Pensions

Bill Hallmark
Cheiron

Dick Ingram
Teachers' Retirement System (Illinois)

Beth Kellar
Center for State & Local Government Excellence

Steve Kreisberg
AFSCME

Gordon Latter
Ryan Labs

Tom Lowman
Bolton Partners

Bob Meilander and Tom Levy
Actuarial Standards Board

Alan Milligan
CalPERS

Maryann Motza
Board of Trustees, Colorado PERA

Ranji Nagaswami
Former Investment Advisor to Mayor Bloomberg, New York City

Jim Rizzo
Gabriel Roeder Smith

Ron Saathoff
International Association of Firefighters

Dan Slack
Fire & Police Pension Association of Colorado

Matt Smith
Office of the State Actuary (Washington)

Marcia van Wagner
Moody's Investors Service

Appendix II—Sample Historical Disclosures

Table II
Sample City Employee Pension Plan
Historical Disclosures (2003 to 2013)
Note: Illustrative only
Sheet 1 of 2

All $ in Millions	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Plan maturity measures											
Ratio of active employees to retirees	2.52	2.61	2.51	2.59	2.48	2.53	2.49	2.52	2.43	2.50	2.44
Ratio of actuarial accrued liability (AAL) to payroll	3.21	3.28	3.36	3.44	3.52	3.60	3.68	3.76	3.84	3.92	4.01
Ratio of fair value of assets to payroll	2.93	3.39	3.62	3.79	4.15	4.32	2.93	3.10	3.29	3.15	3.40
Benefit payments as percent of payroll	18.8%	19.1%	19.3%	19.6%	19.8%	20.1%	20.3%	20.6%	20.8%	21.1%	21.4%
Plan cost measures											
Employer contribution (planned) as a percentage of payroll	5.4%	5.2%	5.7%	6.0%	5.3%	5.0%	8.9%	7.9%	9.5%	11.4%	11.1%
Employer contribution (planned) as a percentage of revenue	2.2	2.1	2.3	2.4	2.1	2.0	3.6	3.4	4.4	5.7	5.6
Percentage of planned contribution paid	100	100	100	100	100	100	100	100	100	100	
Achievement of economic and demographic assumptions											
Expected rate of return	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%
Actual rate of return (fair value)	22.3	12.4	10.1	14.7	9.2	-28.8	11.1	11.6	0.1	12.3	
Active count	1,107	1,119	1,107	1,120	1,110	1,114	1,108	1,118	1,103	1,113	1,109
Retiree count	439	429	441	433	447	440	445	444	454	446	454
Benefit payments	$ 13.0	$ 13.5	$ 14.0	$ 14.5	$ 15.1	$ 15.7	$ 16.2	$ 16.9	$ 17.5	$ 18.2	$ 18.9
Employee contributions	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	$ 4.3	$ 4.4
Employer contributions (paid)	3.7	3.7	4.1	4.5	4.0	3.9	7.1	6.5	8.0	$ 9.8	$ 9.8
Employer contributions (planned)	3.7	3.7	4.1	4.5	4.0	3.9	7.1	6.5	8.0	$ 9.8	$ 9.8
Payroll	68.9	70.6	72.4	74.2	76.1	78.0	79.9	81.9	84.0	86.1	88.2
Actuarial accrued liability (AAL)	221.0	231.9	243.3	255.1	267.5	280.4	293.8	307.8	322.5	337.7	353.6
Fair value of assets	201.6	239.4	262.0	281.5	315.5	336.6	234.2	254.2	276.5	271.4	299.6
Revenue	172.3	176.6	181.0	185.6	190.2	195.0	199.8	189.8	180.3	171.0	175.0

Notes:

- Payroll is payroll as reported for pension benefits .
- Planned contribution refers to the Actuarial Required Contribution under GASB 25/27 and the ADC under GASB 67/68.
- Revenue amounts are estimates for 2012 and 2013; payroll is estimated for 2013.
- All revenue figures and 2013 estimated payroll were provided by the city manager.
- Employer contributions exclude employee contributions (employees contribute 5 percent of pay to the plan).

Table III Sample City Employee Pension Plan Disclosure of Plan Obligation at Risk-Free Rates Note: Illustrative only		
	Plan Funding Calculation	Risk-Free Rate
Discount rate	7.0%	3.9%
Salary scale	4.0	4.0
Cost of living/inflation	3.0	3.0
Actuarial accrued liability (AAL)	$353.6	$502.4
Market value of assets	(299.6)	(299.6)
Unfunded (surplus) AAL	$54.0	$202.8
Normal cost	11.4	18.6
Standard deviation (expected)		12.2%

Note: The 30-year Treasury rate at Dec. 31 was chosen as the risk-free rate. All other assumptions were assumed to be the same to see the effect of solely changing the discount rate.

Appendix III: Standardized Contribution Benchmark

Description of Method

Actuarial value of assets (AVA): Five-year market smoothing with no corridor.[1] This produces the most "smoothness" in assets, even though it can more likely diverge from the market following great gains or losses.

Actuarial accrued liability (AAL): The actuarial accrued liability calculated using the prescribed funding method (individual entry age normal) and prescribed long-term rate of return.

Amortization period: Fifteen-year rolling, percent-of-payroll amortization. Under this methodology, the unfunded liability is amortized anew at each calculation. The calculation is done such that, were there no future gains or losses, and payroll increased as expected each year, the plan would pay an equal amount, as a percentage of payroll, each year for the next 15 years to fully amortize the unfunded amount.

Please note: A rolling amortization method was chosen for the standardized calculation purely for convenience in calculation. To use a method that establishes a history of amortization bases would require significant recordkeeping on the part of the actuary, and would require a "reconciliation" between the plan's actual contribution and the contribution under the standardized method.

Funding target: 100 percent of the standardized contribution actuarial accrued liability, measured using the actuarial value of assets.

Funding method: Individual entry age normal cost method.

Long-term rate of return: A long-term rate representing expected future returns, based on forward-looking information about interest rates and risk premia. While expectations about credit risk premium and equity premium will likely be built on historical experience, the base rate of return should reflect current risk-free rates of return. The Panel recommends that the same return be used for all plans, regardless of portfolio allocation, to ensure consistency.[2]

Example: *Note: This example illustrates the Panel's recommended process for constructing a return assumption.* This example uses a model portfolio of two-thirds equities, one-third corporate bonds.

Construct equity return

Determine equity risk premia

Returns of the S&P 500 index over 10-year U.S. Treasuries have been estimated as follows:

[1] While a corridor is typically recommended, the Panel does not use one in the standardized contribution because it is assuming no restart (resetting actuarial to market value of assets) and NO changes in amortization schedules for extraordinary gains or losses. This provides the most smoothness of assets.

[2] The standardized return should represent some portion of equity investments; the Panel's example assumes two-thirds of the portfolio is invested in equities. The Panel also recommends the Society of Actuaries or another actuarial professional body calculate the rate for actuaries to use.

- 4.62 percent, for the period 1928 to 2013, based on respective geometric returns[3]
- 4.02 percent, for the period 1961 to 2012, based on respective geometric returns, "Musings on Markets" blog[4]
- 3.33 percent, for the period 1964 to 2013, based on geometric returns[5]
- 3.07 percent, for the period 2004 to 2013, based on geometric returns.[6]

Using the long history that includes complete business cycles, a forward risk premium of between 3.5 percent and 4.5 percent could be chosen.[7] Premia for the periods 1964 to 2013 and 2004 to 2013 were not considered representative of long-term conditions and were not used in establishing the premia. **For the purposes of this illustration, a premium of 4.00 percent was selected.**

Establish 10-Year Treasury return rate:

- A review of equity risk premia and underlying 10-year U.S. Treasury rates does not indicate a clear pattern of variation of the equity risk premium with the underlying Treasury rates. For this illustration, the selected equity risk premium will be used without adjustment for today's U.S. Treasury rate.
- As of this writing, 10-year U.S. Treasuries are yielding about 2.7 percent; the yield curve suggests that the corresponding five-year forward rates are about 3.78 percent.

To establish equity returns expected over the long-term future, **a base 10-year U.S. Treasury rate of 3.78 percent has been selected**.

Establish assumed equity return rate

Combining the 4 percent equity risk premium with the forward 10-year rate of 3.78 percent results in an equity return assumption of 7.78 percent. While this rate is effective in about five years and current measures might grade to that rate over the period, for the purposes of this illustration, **a level 7.78 percent equity return assumption** has been used.

Construct bond return

Corporate bond spreads over similar term Treasuries have averaged about 145 basis points over the period 1990 to 2013 (Barclays). Deducting 20 basis points for default costs results in spreads estimated at 125 basis points over long Treasuries. Adding this spread to the underlying U.S. long Treasury rate results in **estimated bond returns of 4.74 percent**.

[3] Damodaran (2014).

[4] Damodaran (2014).

[5] Damodaran (2014).

[6] Damodaran (2014).

[7] Others have estimated lower future equity premiums. Using different methodology, Warusawitharana (2012) estimates real equity returns were 4.9 percent over inflation for the 1966 to 2009 period and notes a statistically significant downward trend in equity return premiums (from 6.6 percent for 1966 to 1987, to 3.7 percent from 1988 to 2009). Dimson et al. (2013) noted long-run equity returns of 4.4 percent over inflation outside the United States.

Expected portfolio return

Adjusting for asset mix and deducting for expenses (35 basis points) for a portfolio with two-thirds equities and one-third bonds the expected return would be:

2/3 * 7.78% + 1/3 * 4.74% – 0.35% = 6.42%, rounded to 6.40%.[8]

The primary difference between this long-term rate of return and the rate used by many plans is that many plans use a historical average return for their discount rate. Other plans assume forward-looking rates, but based on historical average nominal returns, which factor in many different interest rate and inflation environments. This rate is intended to be a forward-looking rate that considers current risk-free rates (which imbed assumptions as to current inflation rates) and expected risk premia.

Other economic assumptions: Normally, the standardized contribution would be calculated using the assumptions as the plan uses for its funding calculation. Other economic assumptions typically include salary scale, cost of living and inflation, which should be established in a manner consistent with return assumptions and fully disclosed.[9] Given that this rate is based on forward inflation expectations, the actuary may wish to adjust other economic assumptions (e.g., inflation, cost-of-living adjustments, salary scales) to better align all economic assumptions.

The standardized contribution would be calculated using the plan's demographic assumptions, typically including mortality rates, mortality improvement, turnover (withdrawal), disability and retirement.

Table IV
Standardized Contribution Benchmark Calculation—Assumptions and Methods

	Plan Funding Calculation	Standardized Contribution Benchmark
Funding method	Plan's	Individual entry age normal
Asset smoothing method	Plan's	Five-year smoothing, no corridor
Amortization period	Plan's	15-year level percentage of payroll (rolling)
Discount rate	Plan's	Risk-free rates with margin for expected equity and corporate bond premia
Other assumptions	Plan's	Plan's, with adjustment to salary and inflation as needed to achieve consistency with return assumption

[8] Others using forward returns methodology building from expected inflation rates have developed results rates in the range of 5.28 percent to 6.90 percent (Rizzo and Krekora (2013))

[9] To be consistent with the standardized discount rate, a standardized inflation assumption should be set using current market rates. For example, at the time of the writing of this report, the difference between the 30-year Treasury yield and the real 30-year Treasury yield is about 2.3 percent. The salary scale was similarly adjusted.

Appendix III: Standardized Contribution Benchmark

Table V Sample City Employee Pension Plan Standardized Contribution Benchmark Calculation Note: Illustrative only $ In Millions		
	Plan Funding Calculation	Standardized Contribution Benchmark
Funding method	Individual entry age normal	Individual entry age normal
Asset smoothing method	Five-year smoothing with corridor	Five-year smoothing without corridor
Amortization period	30-year, level dollar amortization	15-year rolling, percentage of payroll
Discount rate	7.0%	6.4%
Salary scale	4.0	3.3
Cost of living/inflation	3.0	2.3
Actuarial accrued liability (AAL)	$353.6	$365.8
Actuarial value of assets	(316.7)	(316.7)
Unfunded (surplus) AAL	$36.9	$49.1
Normal cost	11.4	11.9
Amortization	2.8	4.2
Total cost	$14.2	$16.1
Employee contributions	(4.4)	(4.4)
Employer contribution	$9.8	$11.7
Employer cost as % of payroll	11.1%	13.3%

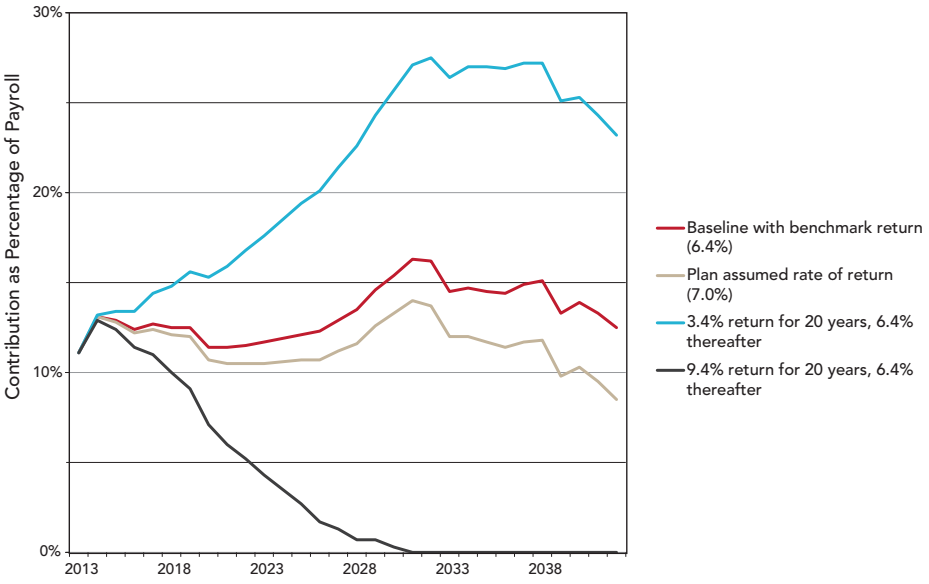
Note: While this contribution would appear in the actuary's report, it would not be the Actuarially Determined Contribution (as defined in GASB 67 and GASB 68) unless the plan and funding entities chose to adopt this method as their funding method.

Appendix IV—Sample Stress Testing Disclosure

The graphs below show the effects of investment and contribution stress tests on the employer contribution (shown as a percentage of payroll) and the funded status, represented in terms of the fair (market) value of assets. Figures 14 and 15 show the results for the investment stress tests; Figure 14 shows expected contribution results as a percentage of payroll. Figure 15 shows the funded status (fair value of assets as a percentage of actuarial accrued liability). Similarly, Figures 16 and 17 show the results of the contribution stress tests; Figure 16 shows expected contribution results and Figure 17 shows funded status. Each of these scenarios assumes the obligations are measured at the current basis, including a 7 percent discount rate, and that employee contributions continue at their current rate of 5 percent of payroll for each year. The table on the next page provides full disclosure of all results of the stress testing.

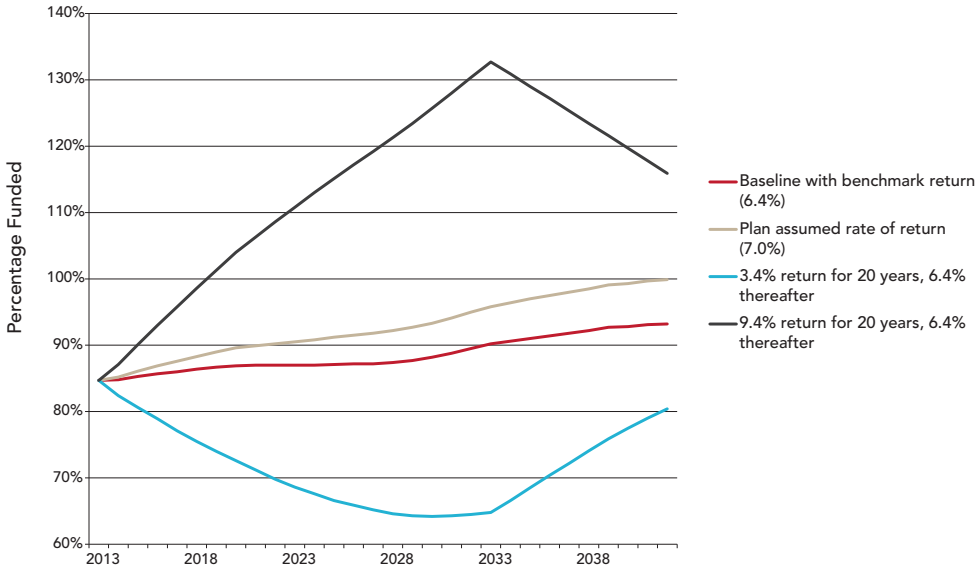
Investment Stress Tests (Figures 14 and 15)

Figure 14
Sample Plan: Projected Employer Contributions,
With Investment Return Stress Tests



Appendix IV—Sample Stress Testing Disclosure

Figure 15
Sample Plan: Projected Funded Status (Fair Value),
With Investment Return Stress Tests



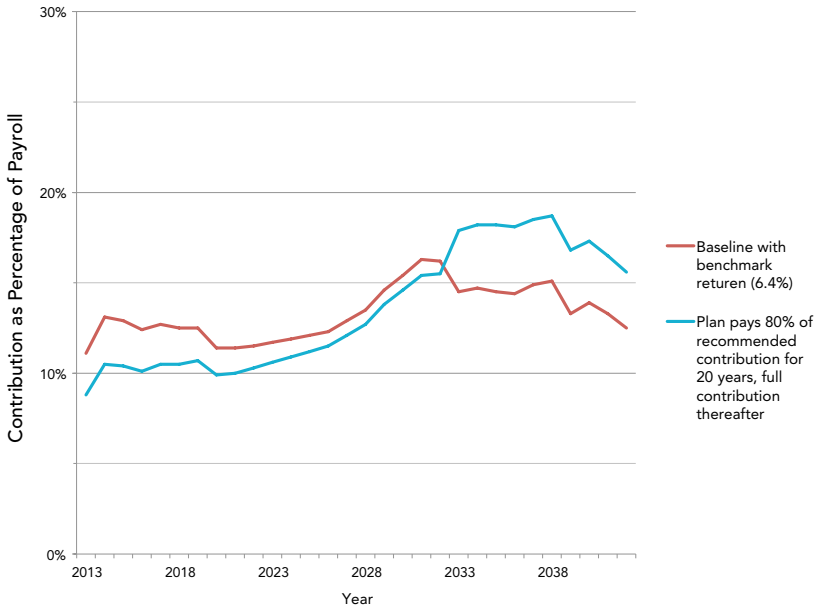
- **The red line is the baseline.** In this instance, the assets earn 6.4 percent each year (the standard contribution benchmark return) over the full 30-year period. Under this scenario, the plan starts at 85 percent funded and grows slowly to 93 percent funded (it doesn't reach 100 percent because the rate of return is less than the discount rate). Contributions remain stable, dip and rise slightly to about 16 percent of pay and then fall back down to about 13 percent of pay. The dip and fall is due to the recognition of prior gains and losses. The contribution rate remains above normal cost because the plan is slowly building losses as the actual rate of return (6.4 percent) exceeds the discount rate (7.0 percent).
- **The tan line shows the plan's assumed rate of return.** In this case, the plan earns 7 percent, which is its assumed discount rate. Funded status rises gradually over the period, and the contribution mirrors the shape in the baseline: dipping, then rising, peaking at 14 percent of pay before declining to about 8 percent of pay (the employer share of normal cost).
- **The turquoise line shows what happens if the plan returns 3.4 percent per annum for the first 20 years, and 6.4 percent thereafter.** In this case, plan contributions rise sharply over the period from 11 percent to 27 percent of pay, and then start to fall to about 23 percent of pay. At the same time that contributions are rising, funded status falls—from 85 percent to about 65 percent at the end of the 20-year period of lower investment returns; once returns rise again to 6.4 percent, the funded status rises to 80 percent.
- **The gray line shows what happens if the plan returns 9.4 percent per annum for the first 20 years, and 6.4 percent thereafter.** Because the plan is only about 85 percent funded, it still requires contributions until about 2030, and then employer contribution goes to zero (employee contributions are still being made). Funded status rises during the period to just over 130 percent, and then starts to decline once the investment returns fall back to 6.4 percent (and employer contributions fall to zero).

Contribution Stress Test (Figures 16 and 17)

The red line is the baseline. In this instance, the assets earn 6.4 percent each year (the standard contribution benchmark return) over the full 30-year period. The baselines in Figures 16 and 17 are the same baselines shown on Figures 14 and 15 and described on page 53.

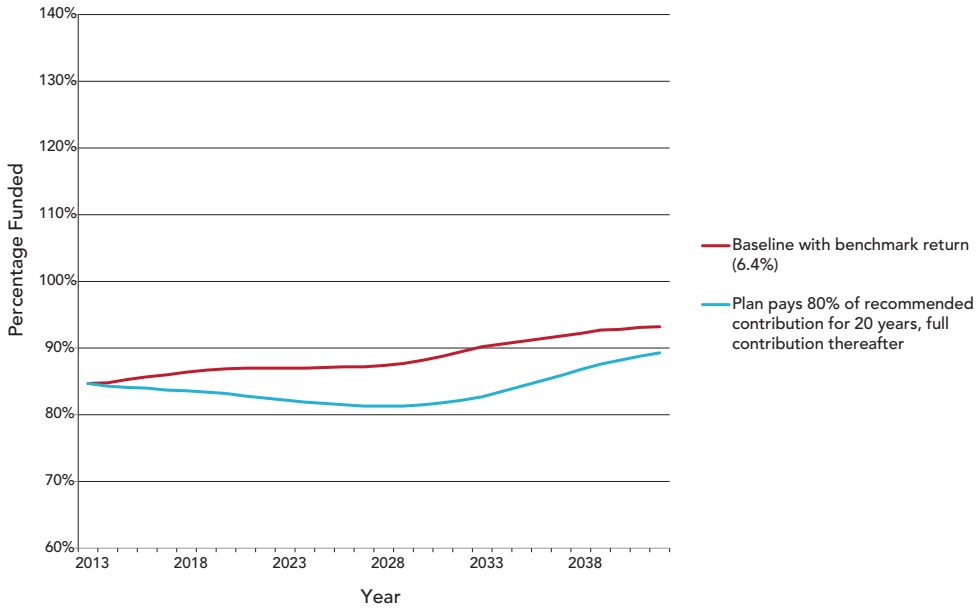
The turquoise line shows the effect of paying 80 percent of the recommended contribution over 20 years, and the full contribution thereafter. The contribution immediately drops from 11 percent to 9 percent of payroll, and then follows the same course as the baseline, but closing the gap over the 20-year period as the losses from unpaid contributions start to build. By 2032, when the funding entities are assumed to resume making the full contribution, it rises to 18 percent of payroll and remains about 3 percent of pay higher than the baseline for the remainder of the forecast period. Funded status only declines to about 80 percent during the forecast period, before slowly starting to rise to 90 percent once the full contribution is paid.

Figure 16
Sample Plan: Projected Employer Contributions, with 80% of Contribution Stress Test



Appendix IV—Sample Stress

Figure 17
Sample Plan: Projected Funded Status (Fair Value), with 80% of Recommended Contribution Stress Test



Stress testing provides the opportunity for trustees and plan funders to have a conversation about what might happen during the what-if scenarios. For example, in the Panel's 3.4 percent return scenario, contributions increase to 27 percent of pay for a few years during the course of the 30-year forecast period. What if the trustees knew the plan funders were not able to pay costs greater than 20 percent of pay? The actuary and the trustees with the plan funders could then test what would happen if contributions were limited to 20 percent of pay, and discuss potential contingency plans.

Similarly, in the scenario where the plan earns 9.4 percent returns for 20 years, the plan eventually ends up in a surplus situation. The employer could enjoy a contribution holiday, or the trustees and funding entities could discuss today strategies they'd like to consider if such a surplus should arise.

Appendix IV—Sample Stress

Table VI Sample City Employee Pension Plan: Stress Test Projections—2013 to 2043 Note: Illustrative only Sheet 1 of 4 (2013 to 2021)									
All $ in Millions	2013	2014	2015	2016	2017	2018	2019	2020	2021
Across all projections									
Benefit payments	$ 18.9	$ 19.6	$ 20.3	$ 21.1	$ 21.9	$ 22.7	$ 23.6	$ 24.5	$ 25.4
Actuarial accrued liability	353.6	370.2	387.4	405.4	424.2	443.7	464.1	485.3	507.4
Payroll	88.2	90.4	92.7	95	97.4	99.8	102.3	104.9	107.5
Benefit payments as % of payroll	21%	22%	22%	22%	22%	23%	23%	23%	24%
Actuarial accrued liability as % of payroll	401	409	418	427	436	445	454	463	472
Baseline—Investments earn benchmark rate (6.4%)									
Employer contribution (dollars)	$ 9.8	$ 11.8	$ 12.0	$ 11.8	$ 12.5	$ 12.6	$ 12.9	$ 12.1	$ 12.4
Fair value of assets (dollars)	299.6	313.5	329.8	346.5	363.5	381.5	400.0	419.4	438.3
Employer contribution as % of payroll	11.1%	13.1%	12.9%	12.5%	12.8%	12.6%	12.6%	11.6%	11.5%
Funded ratio	85	85	85	85	86	86	86	86	86
Fair value of assets as % of payroll	340	347	356	365	373	382	391	400	408
Investments earn assumed rate of return (7.0%)									
Employer contribution (dollars)	$ 9.8	$ 11.8	$ 11.9	$ 11.6	$ 12.1	$ 12.1	$ 12.3	$ 11.3	$ 11.3
Fair value of assets (dollars)	299.6	315.3	333.4	352.3	371.5	391.8	412.8	434.7	456.3
Employer contribution as % of payroll	11.1%	13.1%	12.8%	12.2%	12.4%	12.1%	12.0%	10.7%	10.5%
Funded ratio	85	85	86	87	88	88	89	90	90
Fair value of assets as % of payroll	340	349	360	371	381	393	403	414	424
Investments earn 3.4% for 20 years, 6.4% thereafter									
Employer contribution (dollars)	$ 9.8	$ 12.0	$ 12.4	$ 12.8	$ 14.1	$ 14.9	$ 16.1	$ 16.1	$ 17.3
Fair value of assets (dollars)	299.6	304.8	311.8	318.8	325.7	333.5	341.5	350.4	358.8
Employer contribution as % of payroll	11.1%	13.2%	13.4%	13.5%	14.5%	14.9%	15.7%	15.4%	16.1%
Funded ratio	85	82	80	79	77	75	74	72	71
Fair value of assets as % of payroll	340	337	336	336	334	334	334	334	334
Investments earn 9.4% for 20 years, 6.4% thereafter									
Employer contribution (dollars)	$ 9.8	$ 11.7	$ 11.5	$ 10.8	$ 10.7	$ 10.1	$ 9.4	$ 7.6	$ 6.7
Fair value of assets (dollars)	299.6	322.3	348.3	375.9	404.8	435.5	467.7	501.6	535.9
Employer contribution as % of payroll	11.1%	12.9%	12.4%	11.4%	11.0%	10.1%	9.2%	7.2%	6.2%
Funded ratio	85	87	90	93	95	98	101	103	106
Fair value of assets as % of payroll	340	356	376	396	416	436	457	478	499
Pays 80% of recommended contribution for 20 years, full contribution thereafter									
Employer contribution (dollars)	$7.8	$ 9.5	$ 9.7	$ 9.7	$ 10.3	$ 10.5	$ 11.0	$ 10.5	$ 10.9
Fair value of assets (dollars)	299.6	311.6	325.3	339.5	353.9	369.1	384.8	401.2	417.4
Employer contribution as % of payroll	8.8%	10.5%	10.4%	10.2%	10.6%	10.5%	10.7%	10.0%	10.2%
Funded ratio	85	84	84	84	83	83	83	83	82
Fair value of assets as % of payroll	340	345	351	357	363	370	376	383	388

Appendix IV—Sample Stress

Table VI Sample City Employee Pension Plan: Stress Test Projections—2013 to 2043 Note: Illustrative only Sheet 2 of 4 (2022 to 2030)									
All $ in Millions	2022	2023	2024	2025	2026	2027	2028	2029	2030
Across all projections									
Benefit payments	$ 26.4	$ 27.4	$ 28.4	$ 29.5	$ 30.6	$ 31.8	$33.0	$ 34.3	$ 35.6
Actuarial accrued liability	530.4	554.4	579.4	605.4	632.5	660.7	690.1	720.6	752.5
Payroll	110.2	112.9	115.8	118.7	121.6	124.7	127.8	131	134.3
Benefit payments as % of payroll	24%	24%	25%	25%	25%	26%	26%	26%	26%
Actuarial accrued liability as % of payroll	481	491	500	510	520	530	540	550	560
Baseline—Investments earn benchmark rate (6.4%)									
Employer contribution (dollars)	$ 12.9	$ 13.4	$ 14.1	$ 14.7	$ 15.3	$ 16.5	$ 17.7	$ 19.6	$ 21.3
Fair value of assets (dollars)	457.9	478.4	499.8	522.4	546.0	570.7	597.1	625.3	656.2
Employer contribution as % of payroll	11.7%	11.9%	12.2%	12.4%	12.6%	13.2%	13.8%	15.0%	15.8%
Funded ratio	86	86	86	86	86	86	87	87	87
Fair value of assets as % of payroll	416	424	432	440	449	458	467	477	489
Investments earn assumed rate of return (7.0%)									
Employer contribution (dollars)	$ 11.6	$ 11.9	$ 12.3	$ 12.7	$ 13.0	$ 14.0	$ 14.9	$ 16.5	$ 17.9
Fair value of assets (dollars)	478.6	502.0	526.3	551.9	578.6	606.5	636.3	667.9	702.3
Employer contribution as % of payroll	10.5%	10.5%	10.6%	10.7%	10.7%	11.2%	11.6%	12.6%	13.3%
Funded ratio	90	91	91	91	91	92	92	93	93
Fair value of assets as % of payroll	434	444	455	465	476	487	498	510	523
Investments earn 3.4% for 20 years, 6.4% thereafter									
Employer contribution (dollars)	$ 18.6	$ 20.1	$ 21.7	$ 23.2	$ 24.7	$ 26.9	$ 29.1	$ 32.1	$ 34.8
Fair value of assets (dollars)	367.8	377.6	388.3	400.0	412.8	426.5	441.8	458.8	478.3
Employer contribution as % of payroll	16.9%	17.8%	18.7%	19.6%	20.3%	21.6%	22.8%	24.5%	26.0%
Funded ratio	69	68	67	66	65	65	64	64	64
Fair value of assets as % of payroll	334	334	335	337	339	342	346	350	356
Investments earn 9.4% for 20 years, 6.4% thereafter									
Employer contribution (dollars)	$ 5.9	$ 5.2	$ 4.4	$ 3.6	$ 2.6	$ 2.1	$ 1.5	$ 1.6	$ 1.2
Fair value of assets (dollars)	571.8	609.4	648.8	690.3	733.9	779.5	827.8	879.0	934.0
Employer contribution as % of payroll	5.4%	4.6%	3.8%	3.0%	2.1%	1.7%	1.2%	1.2%	0.9%
Funded ratio	108	110	112	114	116	118	120	122	124
Fair value of assets as % of payroll	519	540	560	582	603	625	648	671	696
Pays 80% of recommended contribution for 20 years, full contribution thereafter									
Employer contribution (dollars)	$ 11.5	$ 12.1	$ 12.9	$ 13.6	$ 14.2	$ 15.4	$ 16.6	$ 18.4	$ 20.0
Fair value of assets (dollars)	434.2	451.8	470.2	489.6	510.0	531.4	554.3	578.7	605.4
Employer contribution as % of payroll	10.4%	10.7%	11.1%	11.4%	11.7%	12.4%	13.0%	14.1%	14.9%
Funded ratio	82	81	81	81	81	80	80	80	80
Fair value of assets as % of payroll	394	400	406	413	419	426	434	442	451

Appendix IV—Sample Stress

Table VI Sample City Employee Pension Plan: Stress Test Projections—2013 to 2043 Note: Illustrative only Sheet 3 of 4 (2031 to 2039)									
All $ in Millions	2031	2032	2033	2034	2035	2036	2037	2038	2039
Across all projections									
Benefit payments	$ 36.9	$ 38.3	$ 39.8	$ 41.3	$ 42.9	$ 44.5	$ 46.2	$ 47.9	$ 49.7
Actuarial accrued liability	785.6	820.1	856	893.3	932.1	972.6	1014.6	1058.4	1103.9
Payroll	137.6	141	144.6	148.2	151.9	155.7	159.6	163.6	167.7
Benefit payments as % of payroll	27%	27%	28%	28%	28%	29%	29%	29%	30%
Actuarial accrued liability as % of payroll	571	581	592	603	614	625	636	647	658
Baseline—Investments earn benchmark rate (6.4%)									
Employer contribution (dollars)	$ 23.0	$ 23.4	$ 21.7	$ 22.5	$ 22.9	$ 23.4	$ 24.8	$ 25.8	$ 23.5
Fair value of assets (dollars)	689.5	725.5	762.9	799.6	838.1	878.1	919.6	963.5	1,009.7
Employer contribution as % of payroll	16.7%	16.6%	15.0%	15.2%	15.1%	15.0%	15.5%	15.8%	14.0%
Funded ratio	88	88	89	90	90	90	91	91	91
Fair value of assets as % of payroll	501	514	528	540	552	564	576	589	602
Investments earn assumed rate of return (7.0%)									
Employer contribution (dollars)	$ 19.3	$ 19.4	$ 17.3	$ 17.7	$ 17.7	$ 17.8	$ 18.7	$ 19.3	$ 16.5
Fair value of assets (dollars)	739.3	779.0	820.3	861.1	903.9	948.1	994.1	1,042.6	1,093.5
Employer contribution as % of payroll	14.0%	13.7%	12.0%	12.0%	11.7%	11.4%	11.7%	11.8%	9.8%
Funded ratio	94	95	96	96	97	97	98	99	99
Fair value of assets as % of payroll	537	552	567	581	595	609	623	637	652
Investments earn 3.4% for 20 years, 6.4% thereafter									
Employer contribution (dollars)	$ 37.7	$ 39.2	$ 38.7	$ 40.5	$ 41.6	$ 42.5	$ 44.0	$ 45.2	$ 42.7
Fair value of assets (dollars)	499.9	523.9	549.1	589.1	632.2	677.6	725.3	776.1	829.7
Employer contribution as % of payroll	27.4%	27.8%	26.8%	27.3%	27.4%	27.3%	27.6%	27.6%	25.5%
Funded ratio	64	64	64	66	68	70	71	73	75
Fair value of assets as % of payroll	363	371	380	398	416	435	454	474	495
Investments earn 9.4% for 20 years, 6.4% thereafter									
Employer contribution (dollars)	$ 0.9	-	-	-	-	-	-	-	-
Fair value of assets (dollars)	992.5	$1,055.0	$ 1,120.2	$ 1,153.0	$ 1,185.3	$ 1,217.3	$ 1,249.4	$ 1,282.7	$ 1,317.1
Employer contribution as % of payroll	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Funded ratio	126	129	131	129	127	125	123	121	119
Fair value of assets as % of payroll	721	748	775	778	780	782	783	784	786
Pays 80% of recommended contribution for 20 years, full contribution thereafter									
Employer contribution (dollars)	$ 21.7	$ 22.4	$ 26.6	$ 27.8	$ 28.5	$ 29.1	$ 30.5	$ 31.7	$ 29.3
Fair value of assets (dollars)	634.2	665.3	697.7	735.2	775.0	816.4	859.7	905.6	954.0
Employer contribution as % of payroll	15.8%	15.9%	18.4%	18.8%	18.7%	18.7%	19.1%	19.3%	17.5%
Funded ratio	81	81	82	82	83	84	85	86	86
Fair value of assets as % of payroll	461	472	483	496	510	524	539	554	569

Appendix IV—Sample Stress

Table VI Sample City Employee Pension Plan: Stress Test Projections—2013 to 2043 Note: Illustrative only Sheet 4 of 4 (2040 to 2043)				
All $ in Millions	2040	2041	2042	2043
Across all projections				
Benefit payments	$ 51.6	$ 53.6	$ 55.6	$ 57.7
Actuarial accrued liability	1151.3	1,200.5	1,251.7	1,305
Payroll	171.9	176.2	180.6	185.1
Benefit payments as % of payroll	30%	30%	31%	31%
Actuarial accrued liability as % of payroll	670	682	693	705
Baseline—Investments earn benchmark rate (6.4%)				
Employer contribution (dollars)	$ 25.1	$ 24.6	$ 23.9	$ 25.0
Fair value of assets (dollars)	1,054.9	1,102.8	1,151.6	1,200.8
Employer contribution as % of payroll	14.6%	14.0%	13.2%	13.5%
Funded ratio	92	92	92	92
Fair value of assets as % of payroll	614	626	638	649
Investments earn assumed rate of return (7.0%)				
Employer contribution (dollars)	$ 17.6	$ 16.7	$ 15.3	$ 15.9
Fair value of assets (dollars)	1,143.5	1,196.4	1,250.1	1,304.5
Employer contribution as % of payroll	10.3%	9.5%	8.5%	8.6%
Funded ratio	99	100	100	100
Fair value of assets as % of payroll	665	679	692	705
Investments earn 3.4% for 20 years, 6.4% thereafter				
Employer contribution (dollars)	$ 44.3	$43.7	$ 42.8	$ 43.9
Fair value of assets (dollars)	882.6	938.6	995.9	1,054.1
Employer contribution as % of payroll	25.8%	24.8%	23.7%	23.7%
Funded ratio	77	78	80	81
Fair value of assets as % of payroll	514	533	552	570
Investments earn 9.4% for 20 years, 6.4% thereafter				
Employer contribution (dollars)	-	-	-	-
Fair value of assets (dollars)	$ 1,350.3	$ 1,385.3	$ 1,420.5	$ 1,455.6
Employer contribution as % of payroll	0.0%	0.0%	0.0%	0.0%
Funded ratio	117	115	113	112
Fair value of assets as % of payroll	786	786	787	787
Pays 80% of recommended contribution for 20 years, full contribution thereafter				
Employer contribution (dollars)	$ 30.9	$30.4	$ 29.6	$ 30.7
Fair value of assets (dollars)	1,001.4	1,051.7	1,102.9	1,154.7
Employer contribution as % of payroll	18.0%	17.3%	16.4%	16.6%
Funded ratio	87	88	88	88
Fair value of assets as % of payroll	583	597	611	624

Appendix V: Glossary

Actuarial accrued liability (AAL): A measure of the current (or present) value of future benefit obligations to be paid out of a pension plan that are considered to be earned or based on service to date. In technical terms, the *actuarial accrued liability* (also known sometimes as simply the actuarial liability) is dependent on the *actuarial cost method* chosen and represents the portion of the *actuarial present value of projected benefits* that is not provided by current or future *normal costs*.

Actuarial cost method: A procedure for allocating or dividing the *actuarial present value of projected benefits* between time periods—typically resulting in an *actuarial liability, a normal cost* and a *present value of future normal costs*. The *entry age normal* method and *projected unit credit* method are two common actuarial cost methods.

Actuarial funding method: Refers to the combination of choices made about the *actuarial cost method, asset smoothing* and *amortization policy* that form the overall approach for calculating the recommended contribution, financial reporting numbers or other key actuarial results for a pension plan.

Actuarial present value of projected benefits: The current (or present) value of benefits expected to be paid in the future, taking into account various assumptions about the effect of future service, anticipated salary increases, expectations regarding length of employment, mortality patterns and more, and discounted to the measurement date using a *discount rate* to reflect the time value of money.

Actuarial Standard of Practice (ASOP): A statement adopted by the Actuarial Standards Board that defines acceptable practices in actuarial work. ASOPs identify what the actuary should consider, document and disclose when performing an actuarial assignment. Standards of practice serve to assure the public that actuaries are professionally accountable. At the same time, standards provide practicing actuaries with a basis for assuring that their work will conform to appropriate practices. The statements, are binding on actuaries who are members of the U.S.-based actuarial organizations and are intended to represent appropriate or acceptable practice, but are not intended to necessarily represent best practice.

Actuarial value of assets (AVA): A value of the assets that may be set equal to the fair market value of the assets or may be an asset value that gradually recognizes unexpected asset gains/losses over a period of time (see *asset smoothing*).

Actuarially Determined Contribution (ADC): In the context of this report, ADC refers to the GASB 67/68 defined terminology as follows, "a target or recommended contribution to a defined benefit pension plan for the reporting period, determined in conformity with *Actuarial Standards of Practice* based on the most recent measurement available when the contribution for the reporting period was adopted." *Editorial note: The ASOPs do not define what is an acceptable actuarially determined contribution.*

Appendix V: Glossary

Amortization methods/policy: The approach chosen to spread or allocate any *unfunded actuarial accrued liability* over future periods for purposes of developing a recommended contribution or calculating financial statement expense. In the public sector, amortization methods are typically either set as a level dollar amount or as a level percent of expected salary and are assumed to be repaid over a set number of years. Amortization periods also may be open (rolling) or closed (fixed), where open amortizations are re-amortized over a new period each year and closed amortizations are generally maintained until the original unfunded liability amount is fully repaid.

Annual Required Contribution (ARC): In the context of this report, ARC refers to the GASB 25/27 defined terminology as follows, "the employer's periodic required contributions to a defined benefit pension plan, calculated in accordance with the parameters." GASB 25 stipulated various accepted methodologies for the *amortization policy. Editorial note: The ARC under GASB 25/27 became a de facto funding standard but has been removed from the new GASB 67/68 standards due to GASB's stated intention that GASB's purpose is financial statement reporting, not pension funding.*

Arithmetic return/average: The average of a series of returns taken by adding the returns and dividing by the total number of returns in the series.

Asset smoothing: A technique used to calculate an *actuarial value of assets* that spreads asset gains/losses that vary from the "expected return" over some period in the future (mostly commonly five years in the public sector).

Cash flows: The future benefit payments expected to be paid from a pension plan. Cash flows can be done on a number of bases, including on *closed group* or *open group* methods and may reflect only currently earned benefits or anticipated future benefits.

Closed group: The currently covered population group for a pension plan, including active participants and participants currently receiving a benefit or due to receive a benefit in the future. A *closed group* projection requires *demographic assumptions* about how current participants are expected to withdraw, retire, become disabled and die.

Demographic assumptions: Assumptions that an actuary uses to calculate the expected *cash flows* and *actuarial present value of projected benefits*, *actuarial accrued liability*, and *normal cost* that are primarily driven by participant behavior and plan design. These include expectations about length of employment, retirement patterns, disability incidence, mortality experience and more.

Appendix V: Glossary

Direct rate smoothing methods: Techniques that are used to smooth the final output results (e.g., recommended contribution amount) versus current actuarial practice that focuses more on smoothing the initial values through use of various actuarial cost methods, asset smoothing methods and amortization approaches. Direct rate smoothing is a somewhat loosely defined term, but can take different forms such as phasing-in changes from a current contribution level to a desired contribution level over a series of years or putting a collar around a contribution amount so that it can change by no more than a predetermined percentage in any one year.

Discount rate: The interest rate used to calculate or discount the cash flows when calculating the *actuarial present value of projected benefits, actuarial accrued liability* and *normal cost*.

Economic assumptions: Assumptions that an actuary uses to calculate the expected *cash flows and actuarial present value of projected benefits, actuarial accrued liability* and *normal cost* that are needed for various future economic conditions, including future inflation, expected asset returns, salary increases, cost of living adjustments, and so on.

Funding entities: In the context of this report, the organization responsible for providing contributions for a public plan; this may be the employer, such as a city or school district, or it could be another entity that doesn't directly employ the participants but is responsible for funding, such as a state that covers contributions for local school districts.

Funding liability: Another term generally used interchangeably with *actuarial accrued liability*, but with the specific intent of being the obligation or liability used for measuring funding requirements for the plan (versus financial reporting measurements).

Funding status/ratio: The ratio of assets to plan liability; note that there are multiple ways to calculate a funding ratio comparing market values of assets or *actuarial value of assets* values to various liability measures, but it would typically use the *actuarial accrued liability*.

Geometric return/average: Also referred to as the compound return, it is calculated by multiplying all the "n" returns: (1 + returns), taking the n-th root and subtracting 1 (the initial capital). The result is the same as compounding the returns across the years.

Government Accounting Standards Board (GASB): The GASB is the independent organization that establishes and improves standards of accounting and financial reporting for U.S. state and local government.

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GASB Statements 25/27/67/68: GASB standards that prescribe defined-benefit pension plan accounting and reporting for *public pension plans* and *funding entities*. Statements 25 and 27 are being superseded by Statements 67 and 68. GASB 67 covers financial reporting for pension plans and is effective for plan fiscal years beginning after June 15, 2013. GASB 68 covers financial reporting for employers (*funding entities*) and is effective for employers' fiscal years beginning after June 15, 2014. The GASB website (*www.gasb.org*) provides significant detail on these statements, and many other service providers in the public sector pension arena have helpful guides and articles on this topic.

Normal cost: The cost of the benefits being earned that is assigned to the current year based on the *actuarial cost method* used.

Open group: An approach that includes not only the currently covered population group for a pension plan (as defined in *closed group*), but also including future anticipated new entrants (i.e., new employees) to a system. In addition to the *demographic assumptions* required for a *closed group projection*, an *open group* projection requires assumptions about the age, service and salary profile of new entrants and whether an employee population is expected to grow, stay in a steady state, or decline.

Pension obligation bonds (POBs): A mechanism by which a government entity raises funds on the open market through a bond offering and then contributes the proceeds of the bond sale to the pension fund. The government entity then repays investors over time out of other revenues (not out of the pension fund).

Pension obligations: A general term referring to the expected cost of paying future pension benefits; generally used analogously to *actuarial accrued liability* although *actuarial accrued liability* generally has a more precise meaning (as defined previously).

Plan governance: How a pension plan (through its trustees) and the entities responsible for funding it behave with respect to decisions governing plan funding (including decisions on investments). Governance also includes plan design, administration and related activities and can include many different *stakeholders*.

Plan maturity: In the context of this report, a relative term that describes where a pension plan fits in its overall life cycle. An "immature" plan has many active participants but few retirees receiving benefits while a more "mature" plan has a larger number of retirees relative to active participants and significant portions of the *actuarial accrued liability* associated with participants who are receiving benefits.

Appendix V: Glossary

Public pension plan: A pension plan sponsored by a government (or quasi-government entity) covering workers employed in the public sector—typically municipal employees, state employees, teachers, public safety, etc. *Public pension plans* typically are financed through employee contributions and tax revenues. *Public pension plans* do not include social insurance systems (like Social Security), which broadly cover all workers.

Risky assets/investments: Refers to investable asset classes that include public equity, alternative asset classes (including real estate, private equity and hedge funds) and risky fixed income classes.

Stakeholders: Persons, groups or organizations that have interest or are affected by a particular organization. In the context of a public pension plan, *stakeholders* include trustees, funding entities, plan members, union officials, taxpayers/service recipients and more.

Stress testing: Generally it is a simulation technique used to determine the stability of a given system or entity to shocks or stresses. It involves testing beyond expected normal or ideal conditions, in order to observe the results. In the context of this report, it provides a means for users to test potential management strategies to help them assess how well the pension trust stands up to particular stresses placed on it.

Unfunded actuarial accrued liability (UAAL): In general, the difference between the *actuarial accrued liability* and the *actuarial value of assets*; also referred to as the unfunded liability (UL) or unfunded actuarial liability (UAL).

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