



Understanding Actuarial Information

BY RICHARD H. HARRIS

Annual required contributions for state and local government pension plans are based on plan data, plan provisions, and actuarial assumptions of the assets the pension fund will need to pay future liabilities. By making this required contribution each year, plan sponsors keep their plans fully funded over the long term, making allowances, as needed, for the accuracy of the actuary's projections, as well as occasional events such as financial downturns.

Given the vital role of actuarial information in keeping pension plans funded, it is crucial that finance officers fully understand the process, especially given the recent changes from the Governmental Accounting Standards Board, which remove the direct link between measurements for funding purposes and measurement of pension expense for accounting and financial reporting purposes. (See the GFOA's pension funding guidelines sidebar at the end of this article, as well as "Books, Budgets, and Bonds: What Do All Those Pension Number Mean?" by Keith Brainard, in this issue of *Government Finance Review*.)

There are three simple rules for pension system sustainability:

- Manage the investment assets of the system.
- Assure that the full actuarially required contribution is paid every year.
- Understand the pension system's actuarial liabilities.

The actuarial valuation report, which the actuary provides for the pension plan no less frequently than every two years, provides the funding guidelines for the plan. Government finance officers need to understand this document and help all relevant stakeholder groups understand its implications. The following is an example of how this actuarial information, which seems complex, can be boiled down into much simpler terms.

THE BASIC CONTRIBUTION MODEL

The next few exhibits illustrate a basic contribution model that shows, from a finance officer's point of view, how actuaries calculate the annually required contribution. We start with the basic building block of the annual required contribution, which is called normal cost (see Exhibit 1).¹

Normal cost is the present value of the future benefit, for one additional year of service. If a plan's design is to pay participants 2 percent of average annual salary (end-of-career average) per year of service, and an employee is going to retire making \$50,000 per year, then the plan is promising the employee, just for that current year of service, \$1,000 per year from the date of retirement through assumed mortality. If the

employee works 30 years, that calculates to a \$30,000 annual pension, but the portion that is attributable to a single year of service is \$1,000.

Now for the math, which is really algebra. It's a two-part process.

Part 1. How much does the pension plan need when an employee retires to pay the pension promised for the current year (first year) of service? The \$1,000 per year life annuity from retirement at age 65 to mortality at age 83 has a value at the date of retirement. Calculating it requires us to assume an investment earnings rate for those future years, and the most common assumption among state and local pension plans is 8 percent per year (although the *average* is 7.8 percent, according to the National Association of State Retirement Administrators). The present value (at age 65) of that \$1,000 per year annuity stream for 18 years, assuming annual earnings of 8 percent, is \$9,372. If a pension plan has \$9,372 invested when the employee turns 65, and the plan earns an average investment return of 8 percent annually on that money, it will be able to pay the retiree \$1,000 a year for 18 years until mortality. (The Microsoft Excel present value function makes it easy to calculate that number.)²

Part 2. The pension plan does not need that \$9,372 now — it will need it in 30 years, when the employee retires. That's another present value calculation: the present value of a future amount, or how much the pension plan needs now, when the employee is age 35, if it earns 8 percent per year on its investments, to accumulate that \$9,372 in 30 years. The answer is \$931. (Again, it's much easier to calculate this number using the present value function in Excel.)³ Invest \$931 and earn 8 percent (on average) for 30 years, and it grows to \$9,372.

To accumulate the total amount needed to pay the whole \$30,000 annual pension by the time the employee retires in 30 years, the process gets repeated every year. Of course, it gets a little more expensive for that particular employee each year because there is one less year to earn 8 percent on what has been collected and invested. In any time value of money scenario, the less time you have, the more money you need.

Exhibit 1: Building Blocks of the Annual Required Contribution



That is a simple explanation of normal cost. It gets calculated for every employee in the active workforce, aggregated, and then expressed as a percentage of payroll. Accountants should be able to appreciate the underlying “matching” concept, in that part of the cost of an employee’s current year total compensation is the current year cost of the employee’s future pension, which is “attributable” to the current year of service. That’s normal cost. In the perfect world, normal cost gets contributed every year, all other actuarial assumptions are met, and the amount needed to pay promised benefits from retirement to mortality is accumulated.

THE ASSET SIDE OF THE MODEL

Exhibit 2 shows how normal cost is added to the market value of assets, which are exposed to market volatility. To dampen the effect of that market volatility, actuaries use what is called a “smoothing method.” Smoothing methods consider an assumed rate of return (8 percent in our example). Smoothing removes some of the market volatility, and the resulting asset value is therefore termed the actuarial value of assets.

ACTUARIAL LIABILITIES

Now, we’ll add the liability side to the model (see Exhibit 3).⁴ Normal cost is calculated every year for the whole active employee population. It accumulates year after year into what is called the actuarially accrued liability. Remember also that normal cost was a discounted value. Therefore, to reflect the passage of time and the fact that each year, all liabilities

recorded in the prior year move one year closer to having to be paid out, interest on the liability has to be added to the actuarially accrued liability to reflect the passage of one more year. The interest rate used to calculate the annual liability growth is the same rate used for the investment return assumption. Therefore, assets and liabilities are assumed to grow at the same rate annually.

To complete the model, actuarial assets are compared to actuarial liabilities and the difference is the unfunded liability (assuming the liabilities are larger). (See Exhibit 4.) That amount is amortized, like a mortgage, and that amortization is added to normal cost, resulting in the total required contribution. That total required contribution includes contributions that need to be received from both employees and employers. The total required contribution has only two components: normal cost and the amortization of the unfunded actuarially accrued liability.

THE ROLE OF ASSET ALLOCATION

Before the 1990s, public-sector pensions were invested mostly in bonds (see Exhibit 5). But equity allocations rose to more than 50 percent in that decade and kept growing, and they remain at that level today. An increased allocation to equities often leads to higher investment returns when economic conditions are favorable, but it does increase a plan’s exposure to risk, making it more vulnerable to financial downturns. This volatility means that annual required contributions cannot remain stable, even with smoothing.

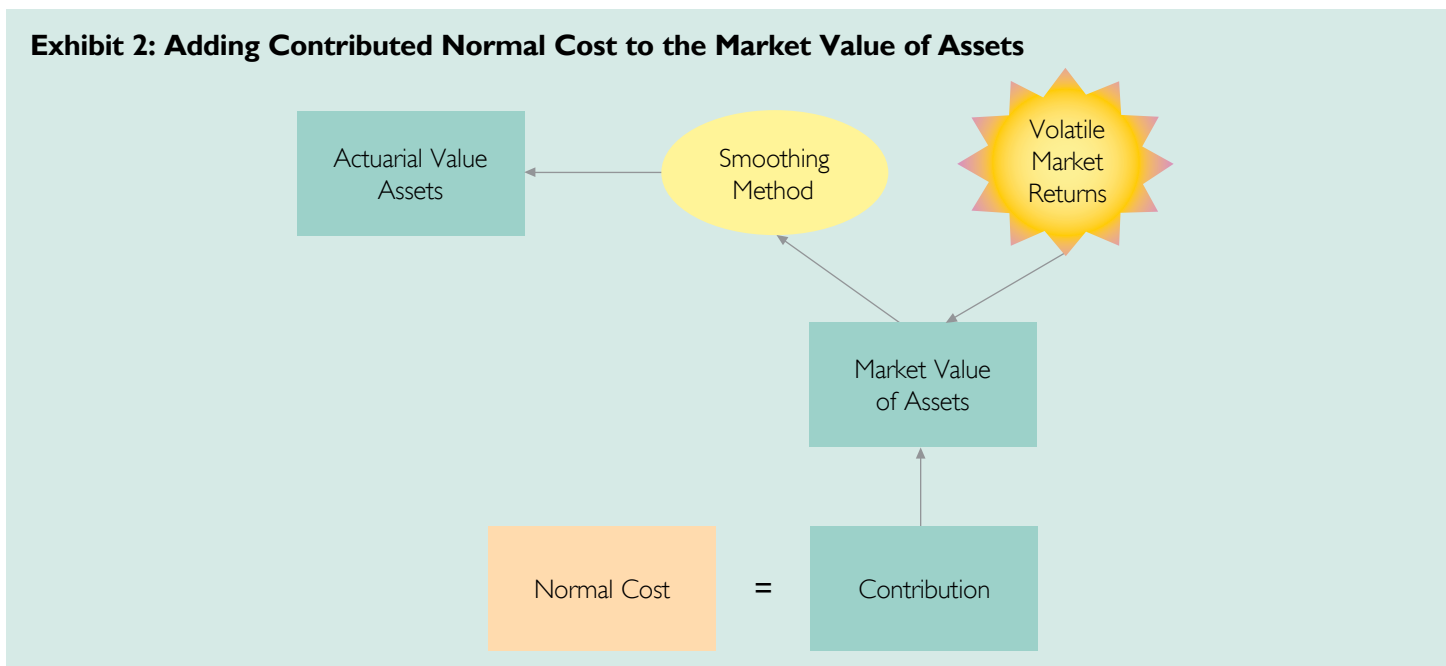


Exhibit 3: Adding Liability to the Market Value of Assets

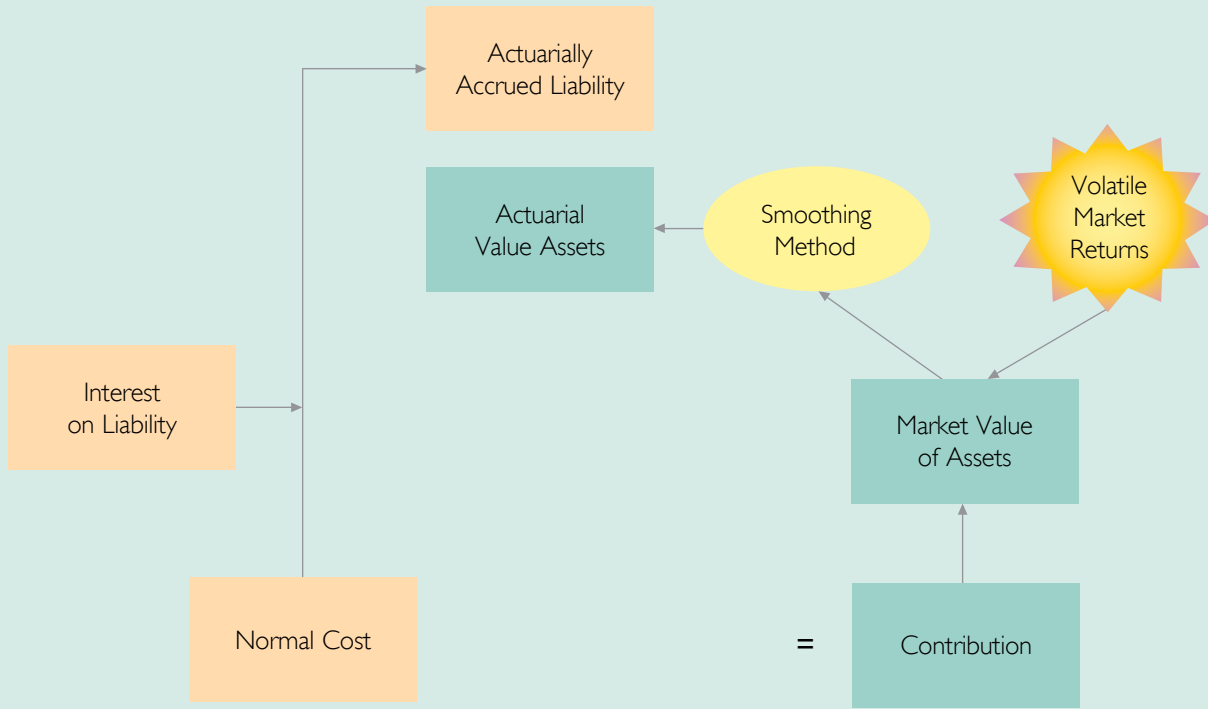


Exhibit 4: Comparing Actuarial Assets to Actuarial Liabilities to Determine Unfunded Liability

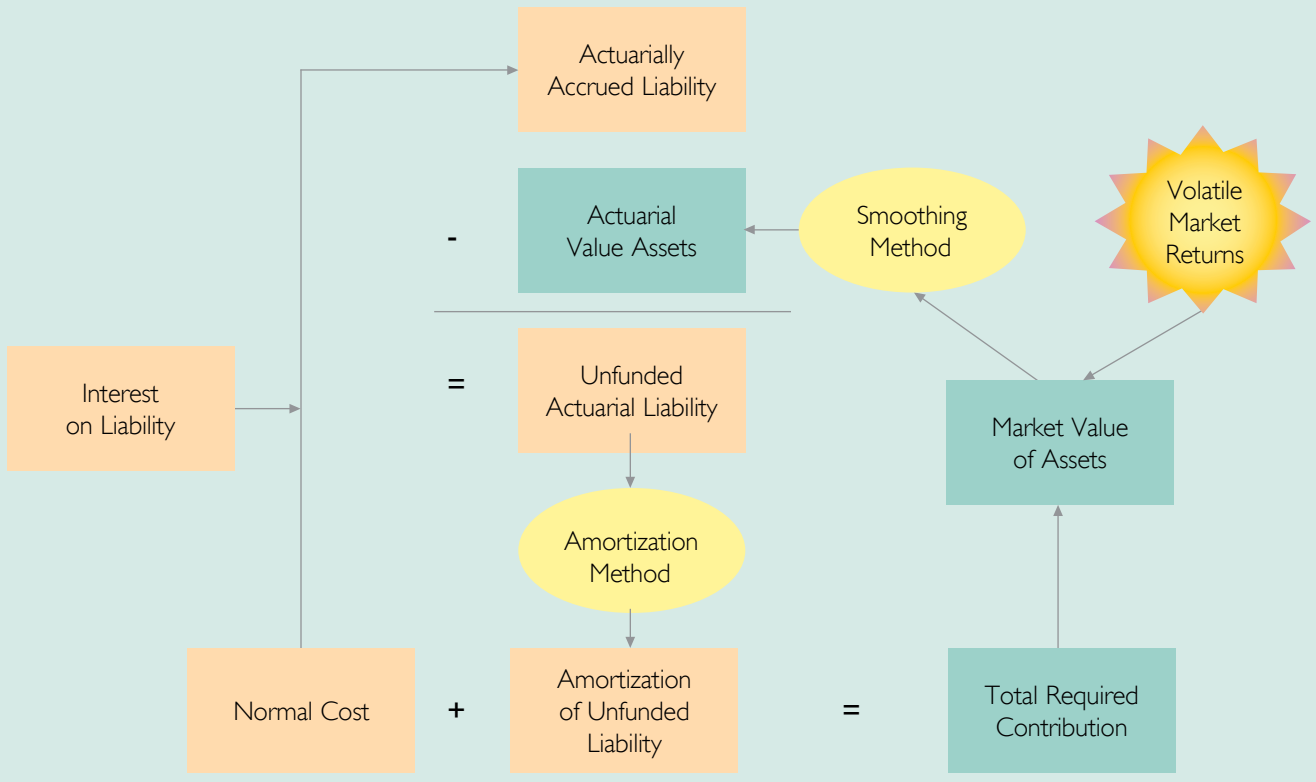
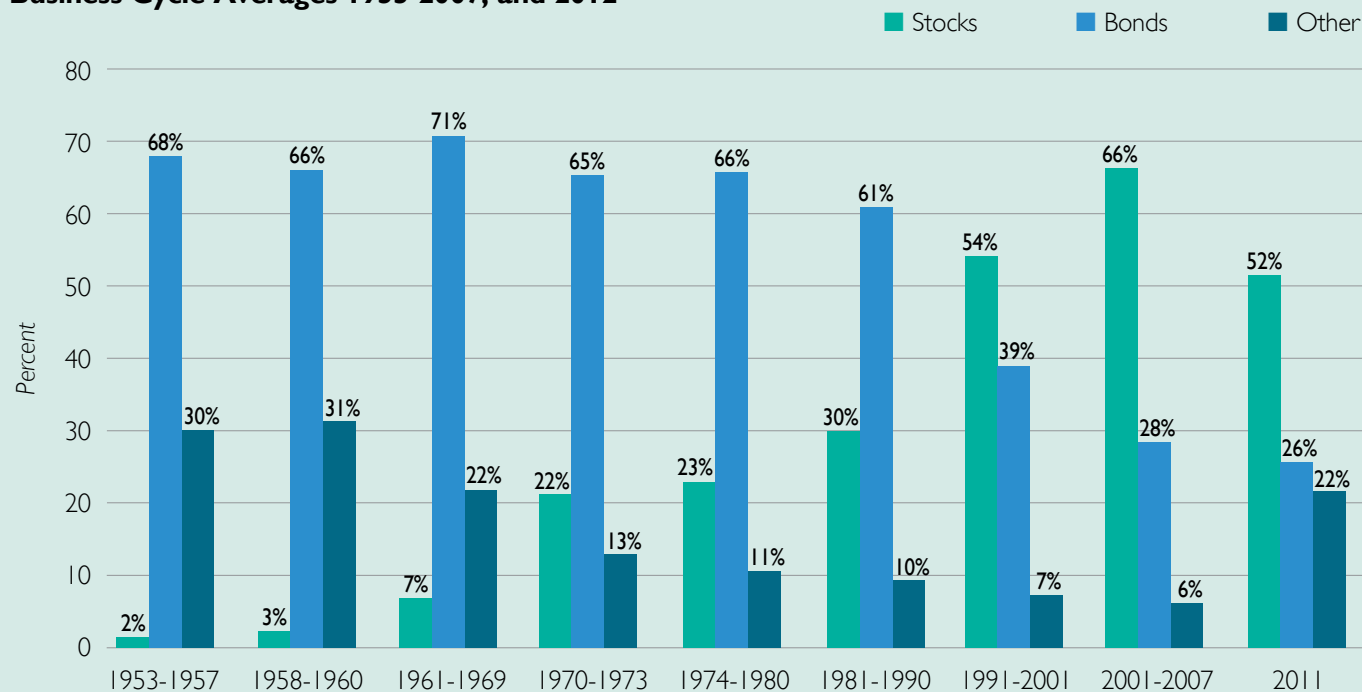


Exhibit 5: Asset Allocation of Public-Sector Pension Plans Business Cycle Averages 1953-2007, and 2012



Source: Political Economy Research, July 2008; NASRA Public Fund Survey, October 2012

Through the 1990s, that risk was mostly rewarded with higher investment returns — the average annual investment return from 1990 through the end of 1999 and the dot-com rally was more than 13 percent. And from 1990 through the end of 2011, the average annual return was approximately 8.5 percent. Therefore, even after actuarial smoothing, there will always be year-to-year fluctuations in the funded positions of pension plans. For example, the median funded position, based on actuarial values of assets and liabilities of the 126 plans reported in the National Association of State Retirement Association Public Fund Survey, was more than 100 percent at the end of fiscal 2000;⁵ it was 75.2 percent as of fiscal 2011.

GUIDING THE PROCESS

Understanding the role of actuarial information in funding the pension plan allows pension officers to avoid pitfalls that have befallen some plan sponsors. The finance officer can play a vital role in making sure that all stakeholders understand the funding process, and that all decisions about the level of benefits are informed by this information.

Disparate Stakeholders. Public pension systems are complicated. Each one has its own structural idiosyncrasies, but many have organizational structures that look something like

what is shown in Exhibit 6. There are numerous stakeholders — employees, employers, retirees, beneficiaries, pension plan administrators and their boards, plan sponsor budget/finance departments, state legislators, city councils, county commissioners — who might have a say in how the plan is managed. These stakeholders sometimes have different objectives. The data from the actuarial valuation report is what puts everyone on the same page so they can make well-informed decisions.

Adding Benefits. The contribution model outlined above shows the difference between the actuarial value of assets and the accrued actuarial liability as the unfunded liability. That can also work the other way. If a plan is overfunded, the result would be negative amortization that offsets normal cost, which, according to the model, would lead to lower total required contributions. When funding levels increase to more than 100 percent, stakeholders sometimes consider increasing benefits, and stakeholders sometimes argue for making those increases retroactive for years of service that have already been performed. In making decisions about new and retroactive benefits years, finance officers are in the perfect position to remind stakeholders about the effect of those changes on the actuarial cost and to make sure the changes are affordable and sustainable.

Exhibit 6: Typical Pension System Organizational Structure

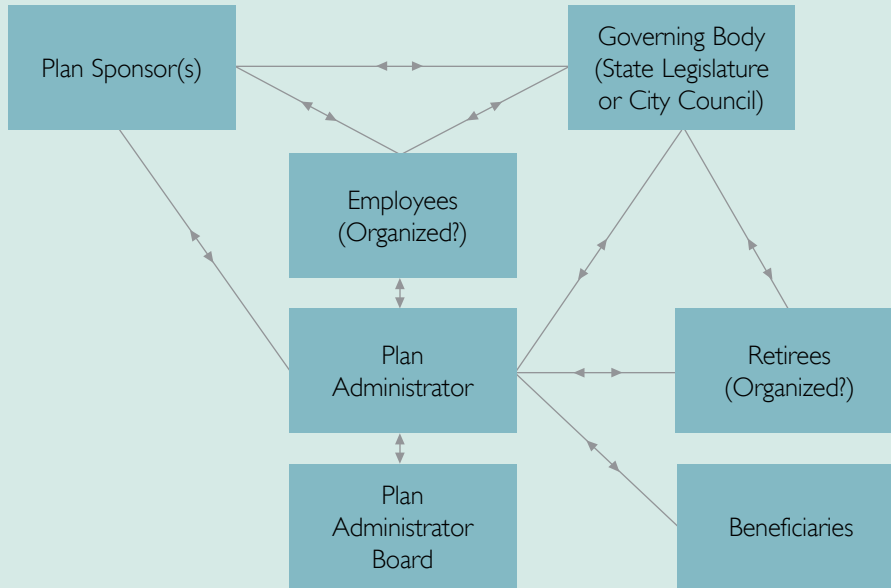
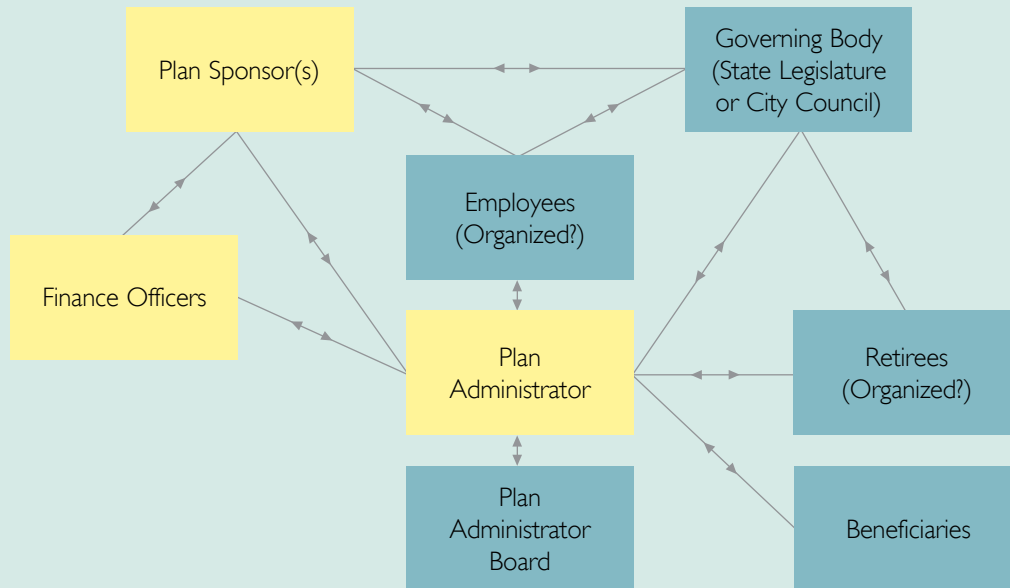


Exhibit 7: Revised Typical Pension System Organizational Structure



CONCLUSIONS

Take another look at all the stakeholder groups shown in Exhibit 6. It is unreasonable to expect the members of all of those stakeholder groups to understand the actuarial information found in actuarial valuation reports. Exhibit 7 shows the same chart, but it adds in finance officers (and the areas in which they are typically found in the pension system), who can explain this information and its implications, ensuring that the pension fund is sustainable. ■

Notes

1. The normal cost example here uses the projected unit credit method.
2. $=pv(.08,18,-\$1,000) = \$9,372$
3. $=pv(.08,30,-\$9,372) = \931
4. For the sake of simplicity, the contribution model diagrams omit certain components such as benefit payments, which come out of both sides equally, and actuarial gains and losses on the liability side, which are not typically large.
5. The Public Fund Survey represents approximately 85 percent of all the assets and liabilities of U.S. state and local retirement plans.

GFOA Best Practice: Guidelines for Funding Defined Benefit Pensions

Background. Governments that offer defined benefit pensions to their employees should fund the cost of those benefits in an equitable and sustainable manner. An actuarial valuation provides an employer with crucial information on the amount that needs to be contributed each period to fund the long-term cost of benefits promised to plan participants. Generally accepted accounting principles (GAAP) have required that this actuarially determined amount, known as the *actuarially required contribution* (ARC),¹ be calculated within standardized parameters and disclosed as part of an employer's annual financial report.

Recently, the Governmental Accounting Standards Board (GASB) changed its approach with regard to pension reporting and moved from one that served both the purposes of accounting/financial reporting and funding to one related solely to accounting/financial reporting. As a result, GAAP will no longer require that employers calculate and disclose an ARC in their financial reports starting with fiscal years ending on or after June 30, 2014. Likewise, the parameters (e.g., actuarial cost method, asset smoothing, and amortization) that have standardized how an ARC is calculated have been eliminated from GAAP. In the absence of ARC disclosures, it will be difficult for stakeholders, including policy-makers, employees and the public to determine whether obligations are being appropriately funded. Consequently, there is a pressing need for widely recognized, standardized guidelines as to what constitutes a sound funding plan for a state or local government employer that offers defined benefit pensions. The GFOA and ten other national associations² representing state and local governments and retirement systems developed a set of pension funding guidelines to meet this need.³ The following recommendation is a practical application of those guidelines.

Recommendation. The Government Finance Officers Association (GFOA) recommends that every state and local government that offers defined benefit pensions formally adopt a funding policy that provides reasonable assurance that the cost of those benefits will be funded in an equitable and sustainable manner. Such a funding policy should incorporate each of the following principles and objectives:

1. Every government employer that offers defined benefit pensions should continue to obtain no less than biennially an actuarially determined contribution (ADC) to serve as the basis for its contributions;
2. The ADC should be calculated in a manner that fully funds the long-term costs of promised benefits, while balancing the goals of 1) keeping contributions relatively stable and 2) equitably allocating the costs over the employees' period of active service;
3. Every government employer that offers defined benefit pensions should make a commitment to fund the full amount of the ADC each period. For some government employers, a reasonable transition period will be necessary before this objective can be accomplished;
4. Every government employer that offers defined benefit pensions should demonstrate accountability and transparency by communicating all of the information necessary for assessing the government's progress toward meeting its pension funding objectives.

The GFOA intends to develop additional best practices that will provide specific guidance on the practical application of these principles and objectives to each of the three core elements of a comprehensive pension funding policy: actuarial cost method, asset smoothing, and amortization.

Notes

1. The new GASB standards no longer use the term "annual required contribution," or (ARC). Instead, the new standards refer to the disclosure of an "actuarially determined contribution" (ADC).
2. The other ten national organizations include: National Governors Association, National Conference of State Legislatures, Council of State Governments, National Association of Counties, National League of Cities, U.S. Conference of Mayors, International City/County Management Association), the National Association of State Auditors, Comptrollers and Treasurers, the National Association of State Retirement Administrators, and the National Council on Teacher Retirement. The Center for State and Local Government Excellence is convening this task force.
3. The GFOA Executive Board passed a resolution expressing the GFOA's support for the pension funding guidelines developed by the GFOA and nine other national associations. The resolution can be found at: http://www.gfoa.org/index.php?option=com_content&task=view&id=2539

RICHARD H. HARRIS is finance and compliance officer for the Denver Employees Retirement Plan. He has full responsibility for the relationship with the plan's actuary and is charged with the task of promoting a higher level of understanding of the plan's actuarial

liabilities to relevant stakeholder groups, including the DERP board, the city administration, and the city council. Before joining DERP in 2004, Harris spent 18 years at Coors Brewing Company. He is also vice-chair of the GFOA's Committee on Retirement and Benefits Administration. He can be reached at rharris@derp.org.