

# Actuarial Valuation Basics

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Public Employee Retirement Administration Commission

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***Commonwealth of Massachusetts***

**Public Employee Retirement Administration Commission**

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# Actuarial Valuation Basics

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An actuarial valuation of a retirement plan is an estimate of a plan's financial position at a specific point in time. During a valuation, an actuary takes a “snapshot” of the membership as of a given date to determine the plan’s liabilities and funded status.

An actuarial valuation projects the expected cash flow of plan members’ benefits. Actuarial projections are derived from a combination of judgement and science, based on assumptions about the likely occurrence of future events that affect the outcome and duration of pension benefits.

## ASSUMPTIONS

Two types of assumptions are used in valuations—economic and demographic. Of the two, economic assumptions usually have a greater impact on plan liabilities. Two key economic assumptions are investment return—used to determine the present value of future liabilities, and salary increases—used to project current pay until retirement. Demographic assumptions deal with the likelihood of termination of employment, retirement, disability, or death at each age.

Actuarial assumptions are primarily based on past experience or standard tables. Recent experience should be considered but it is not the main factor in setting assumptions. For example, even though salary increases and inflation have generally been low since the early 1990s, a much longer-term view should be considered. It is impor-

tant to understand that a long-term view, from an actuarial standpoint, is not ten years, but twenty or thirty years.

Assumptions can result in actuarial gains or losses. For example, if salaries increase by an amount greater than that which was assumed, an actuarial loss will result. If salaries increase by a lesser amount than expected, there will be an actuarial gain. It is important to note that how assumptions work together as a group is more important to the overall valuation results than the accuracy of an individual assumption. One assumption may somewhat overstate the actuarial liability and another may understate it, but taken together, they may balance each other out.

Actuarial valuations are affected by many variable factors, such as rates of retirement, termination, disability, death and general economic conditions. Actuaries must apply their best judgement when estimating how and when conditions are likely to change. Each valuation “trues-up” the estimates from prior valuations. Over time, adjustments are made to assumptions, as needed, based on plan experience.

## SCHEDULING VALUATIONS

Adherence to a schedule of regular valuations is likely to result in the early identification of trends and appropriate adjustments being made on a timely basis. Periodic valuations enable a retirement board to guard against an unexpected and sizable increase in a system’s funding

schedule and appropriation amount.

The Public Employee Retirement Administration Commission (PERAC) is required by Section 21(3) of Chapter 32 to oversee an actuarial valuation of each retirement system every three years. The Governmental Accounting Standards Board (GASB) requires valuations to be performed at least every two years for financial reporting purposes. PERAC believes that a schedule of annual valuations is a sound business practice and a hallmark of a well-managed pension system. At an absolute minimum, valuations should be performed every two years. If a retirement system performs a valuation only every two years, PERAC strongly recommends that an interim valuation be conducted during the off year. In an interim valuation, actual plan assets and an estimate of liabilities are used to estimate the funded status of a plan.

The financial condition of a retirement system has a significant impact on municipal finances, including the cost of borrowing. Rating agencies cite retirement issues as a determining factor in establishing bond ratings. If a valuation is not performed and/or the system's funding schedule is not updated at least every three years, PERAC must determine the appropriation level for the coming fiscal year on a conservative basis.

## **PRIVATE VALUATIONS**

The completion of annual or biennial valuations of all 106 contributory retirement systems requires the assistance and cooperation of the private actuarial community. PERAC encourages retirement systems to conduct RFPs (Request for Proposal) to select private actuaries with whom they can establish ongoing relationships. There

are a number of firms that provide actuarial services for pension plans. In fact, PERAC posts recently completed valuation studies (including those completed by PERAC in-house and those provided by private actuaries) on PERAC's Home Page on the Internet: [www.mass.gov/perac](http://www.mass.gov/perac). Retirement boards are encouraged to view these reports and to contrast and compare the various presentations.

PERAC accepts a private valuation as meeting the triennial requirement stipulated in Chapter 32, provided the Commission staff has the opportunity to work with the private actuarial firm throughout the valuation process and to review their draft report before the valuation is finalized.

## **ACTUARIAL FUNDING**

Actuarial funding determines the annual cost to fund a retirement system's cost of benefits that accrue during the current year (normal cost) as well as the costs associated with any past service liability (unfunded actuarial accrued liability). One of the main principles of advance or actuarial funding is the premise that the cost of retirement benefits for a current employee should be paid during the years of service of that employee—the period for which the taxpayers are receiving the benefits of the services of that employee. Under the pay-as-you-go method formerly in effect, annual appropriations were limited to the amount of benefits that were expected to be paid out to retirees. There were no provisions for advance funding for benefits to be paid in the future. Under the funding schedules now in effect, a series of payments is established to pay the annual normal cost as well as amortize the unfunded accrued liability (actuarial

liability less plan assets) over a period of years.

In accordance with Chapter 32, §22C or 22D, each retirement system's unfunded accrued liability must be amortized (fully paid off) by 2028. There are two approaches to amortizing the unfunded liability in a funding schedule: the level dollar approach and the increasing percent schedule approach.

Under the level dollar approach, during the life of the funding schedule, payments to amortize the unfunded liability remain level (the same) for each year, much like a mortgage. Under the increasing percent schedule approach, payments to amortize the unfunded liability increase by a set percentage (4.5% is the maximum allowed) each year. Under an increasing percentage schedule, the payment in the early years of the schedule is usually not large enough to even pay the

interest on the outstanding principal.

A level dollar schedule is generally more conservative and will fund a system's unfunded liability more quickly than an increasing percent schedule. The level dollar is the approach required of private sector plans under federal law.

Retirement systems should submit funding schedules to PERAC for approval at least once every three years. If valuations are being performed annually or biennially, schedules may be submitted to PERAC more frequently. ♦

# The Actuarial Valuation Cycle

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Generally, the actuarial valuation cycle may be classified into six phases:

- Preliminary Review
- Data Preparation
- Asset Preparation
- Valuation Specifications
- Valuation Run and Summary
- Final Report and Presentation

## PRELIMINARY REVIEW

A preliminary review is common to all actuarial valuations. The actuary begins this phase by familiarizing himself or herself with the most recent prior valuation report for the retirement system, any actuarial work papers related to that report and the retirement system's correspon-

dence file for the previous year. The actuarial work papers may have notes from the last valuation that would supply information on unusual aspects of the actuarial valuation. When reviewing last year's correspondence, the actuary will review any issues pertaining to the required annual appropriation.

## DATA PREPARATION

A retirement system that is being valued should submit active member and retiree data, in PERAC's required record layout to PERAC's Actuarial Unit, as soon as possible after the end of the calendar year. A January to mid-February submission of data, as of December 31 of the preceding year, is the most responsive. The goal

is to produce valuation reports as early as possible in the year. The later in the year a report is issued, the less meaningful it may be.

It is essential that the retirement system furnishes the valuation team with accurate, up-to-date membership data. The date of birth, date of hire, salary, and amount of creditable service are a few of the crucial data elements for each active member. The date of birth, amount of monthly benefit and benefit option are a few of the crucial data elements for each retiree.

If a database has a large number of inaccuracies, the results of the valuation may be unreliable and the validity of the study questioned. An actuary may have to make assumptions as to dates of birth and hire, pay, and other missing information in order to complete a valuation. However, it is highly problematic when an actuary is faced with making estimates for a large number of missing or incorrect data elements. For example, if there are 500 active members, it is acceptable for an actuary to make estimates of pay or creditable service for a handful of members. But if the records of 100 members lack accurate values for one or both of these elements, the retirement board should clean up the data before the valuation is carried out. Actuaries generally make estimates cautiously; if estimates are utilized extensively, it is more likely that the actuarial liability will be overstated. An actuary can best determine a retirement system's true liability with accurate data.

## **LISTINGS OF QUESTIONABLE DATA ITEMS**

When PERAC's Actuarial Unit reviews a retirement system's membership data, it prepares

listings of questionable data items. If data is erroneous, it is essential that corrections be made in the retirement board's database (not just in the copies of the files used by the actuarial team) so that the error(s) will not surface again in future data listings.

PERAC's actuarial software has been designed to provide warnings when certain data elements do not appear to match established criteria. The parameters that we use in our reasonableness tests do not change from year to year. For example, PERAC's system will flag the current payable amount for a retiree if the original amount of benefit plus COLAs does not equal the current amount payable. The warning may indeed be triggered by an erroneous entry for original amount of benefit. However, if the member has died and the beneficiary is receiving the benefit or a Section 90C benefit has been granted, the data provided may actually be correct. In such instances, the retirement board should simply annotate the data list and provide it to the actuary.

Retirement boards are encouraged to retain PERAC's data listings. Just as actuaries conduct a preliminary review of prior valuation reports before beginning a new valuation study, so should retirement boards conduct a review of prior year(s) data listing(s) before acting on data listings associated with a current valuation. Since PERAC may identify the same record or records as being questionable each year, retirement board staff can save time by referencing prior year's documentation. It may indeed tell the actuarial team that the same question(s) was raised about the same record(s) before and there is a valid explanation about why an entry that



appears to be wrong is actually right.

Data clean up is a time-consuming, labor-intensive task—for both retirement board staff and actuaries. It can often represent as much as 75% of the total time involved in a valuation. PERAC strongly encourages retirement boards to maintain up-to-date, accurate membership databases. Retirement boards should consider periodically auditing their databases to identify missing and/or erroneous entries. Data maintenance should be viewed as an on-going responsibility rather than an isolated, annual or biennial project.

## **ASSET PREPARATION**

This phase includes the following steps:

- Asset reconciliation
- Actuarial value of valuation assets development (if applicable)
- Determination of prior year asset gain or loss

The asset reconciliation phase consists of a review of the asset information presented in the Annual Statement. This phase includes a review of: the market value of assets by type of investment; allocations to the Annuity Savings Fund, the Annuity Reserve Fund, the Pension Fund, and the Pension Reserve Fund; benefit payments and appropriation amounts.

The assets of 25% of retirement systems are currently being appraised at market value in actuarial valuations. The other 75% of systems use an "asset smoothing" technique to determine the actuarial value of assets. Retirement boards should discuss both strategies with their actuaries. An actuarial value of assets smoothing methodology reduces the potential volatility in market value from year to year by recognizing

gains and losses over a five-year (or other) period. The market value of assets can be erratic from one year to the next, but an actuarial value approach provides a smoothing technique. The actuarial value of assets will not increase as much as the market value in a good year, or decrease as much as the market value in a bad year.

Asset gains and losses are determined by referring to the investment return assumption used in the most recent prior valuation. If, for the year currently being valued, the actual value of assets exceeds the expected value of assets, there is an asset gain. If the actual value is less than the expected value of assets, there is an asset loss.

## **VALUATION SPECIFICATIONS**

During the valuation process, the actuary should make recommendations to the retirement board about the assumptions to be used in the current valuation. The actuary may advise the board to make changes in the assumptions that were used for the preceding valuation. After consulting with the actuary, the retirement board should make the final determination about the assumptions to be used.

## **VALUATION RUN & SUMMARIZATION**

After the data has been "cleaned," the actuary will run a valuation program that calculates and projects liabilities. The principal valuation results are summarized and the following items are computed and analyzed.

- **Unfunded Accrued Liability:** The actuarial accrued liability is composed of several

items. For active members, this liability represents the present value of expected benefits at retirement (based on estimated pay and service and the retirement plan's benefit formula that is attributable to service rendered to date). For retirees, this liability includes the present value of payments that are expected to be made during the retiree's lifetime and that of his/her spouse, if applicable.

The actuarial accrued liability less the retirement plan assets produces the unfunded actuarial accrued liability.

- Amortization of past service liability
- Normal Cost: Normal cost or current cost is the present value of benefits that are expected to be earned during the current year.
- Comparison between current and prior valuations
- Gain and loss analysis

## **FINAL REPORT & PRESENTATION**

The Actuary issues a report upon completing a valuation. The contents of a typical report are as follows:

- Introduction and Actuarial Certificate
- Summary discussion
- Comparison of results with prior valuation
- Summary of valuation results
- Appropriation development for the current fiscal year
- Funding schedule(s)
- Information required by Auditors—GASB 25 (Governmental Accounting Standards Board)

- Assets
- Summary of system membership characteristics
- Actuarial methods and assumptions
- Summary of plan provisions
- Glossary of actuarial valuation terms

The actuary meets with the board to present the valuation results. Generally, an actuary will include the following elements in his/her presentation:

- Results of the actuarial valuation
- Actuarial assumptions and methods
- Discussion of terms used in the valuation
- Discussion of alternatives funding schedules and/or strategies.

Since the final report represents a completed stand-alone document until the next valuation is conducted, retirement board members should be sure that their questions about the valuation results are answered in a satisfactory manner. Retirement board members are more aware of their membership and system characteristics than either PERAC or any private actuary can be. It is incumbent upon them to raise questions about any aspect of the report that they find to be incorrect, confusing or vague.

## **POSTING VALUATION STUDIES ON PERAC'S HOME PAGE**

Our goal is to make comprehensive pension information available to the active and retired public employees of Massachusetts and to professionals involved with retirement issues via PERAC's Home Page: [www.mass.gov/perac](http://www.mass.gov/perac). As part of this initiative, PERAC's Communications Unit posts valuation studies, along with other information in the Board Profile section of our

Home Page.

Upon your receipt of a finalized, hard copy of any actuarial study completed by a private actuary, please ensure that an electronic copy of it is forwarded to PERAC's Actuary. It is important that the information is transmitted to PERAC in a timely fashion, since the more up-to-date the information is, the more valuable it will be to our Web visitors. ♦









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