Calculating Rhode Island's Pension Costs and Liabilities

By any measure, Rhode Island's pension plans face very significant challenges if they are to provide retirement security for our public employees. It is our hope that by offering all Rhode Islanders an opportunity to understand in detail the workings of our state pension plan, we will ignite a lively debate that will help us find a workable solution to these challenges. We realize many readers of this report may consider this subject matter to be technical and even boring, but a clear understanding of pension calculations is essential to finding a solution to Rhode Island's retirement security challenges.

In practice, the calculation of retirement plan costs and liabilities is very complicated. It requires the assistance of actuaries who are business professionals specializing in studying the likelihood of future events that financially impact pension and insurance programs. However, we will attempt to explain the basic calculations in a straightforward manner.

Normal Cost

If a pension plan is designed and operated perfectly, all you would need to know about is the so-called normal cost. The normal cost is the amount of annual contribution required to meet the cost of all pension benefits earned in the current and future years. To calculate the normal cost, the actuary first projects the amount of future pensions payable to members based on (i) the benefits provided by the plan and (ii) such actuarial factors as the members' predicted future service, salary increases, retirement date, job turnover, mortality and other factors. The actuary then determines a contribution rate that will meet the annual cost of providing future benefits. In Rhode Island, the normal cost is expressed as a percent of employee salary.[1]

Actuarial Gains and Losses

If the actuary correctly predicts the investment returns, salary increases, dates of retirement, life expectancies and all other actuarial assumptions, and the specified annual normal cost contributions are made, a plan will be fully funded and no other contributions would be required.

Unfortunately, human behavior and economic markets driven by human behavior wreak havoc with actuarial science. Actuarial assumptions are **never** correct. Investment returns go up and down, people live longer than expected, salary increases vary year to year, etc. If an actuarial assumption is wrong, for example if a plan has an investment return lower than the assumed investment return, there will be an actuarial "loss" which has to be made up by additional contributions in future years. We have seen this impact all too clearly with the recent financial losses from the 2008 Recession.

Conversely, if a plan has investment returns which exceed its assumed investment return, the plan will have an actuarial "gain" and will have a surplus which has the effect of reducing future contributions. These actuarial gains and losses are also created by real life experience that differs from every actuarial assumption used by a plan, such as when salary increases are higher or lower than expected, when people's life expectancies are longer or shorter than expected, when workers retire earlier or later than expected, etc.[2] To the extent that actuarial assumptions are wrong, they create either an actuarial loss or actuarial gain.

Actuarial losses and gains are also created when the benefits of a plan are changed if these new benefits apply to an employee's prior years of service. If benefit improvements are applied to prior years of service, these benefits would not have been calculated as part of the normal cost for those prior years.

Accordingly, such benefit improvements create actuarial losses which must be made up by additional contributions in future years. Conversely, if benefits are decreased for prior years of service, actuarial gains are produced which will decrease future costs.

Actuarial Cost Method

To deal with these variances caused by the clash between actuarial assumptions and real world experience, actuaries use a method, known as the actuarial cost method, to account for the variance and to make sure the plan makes mid-course adjustments to get back on track. In Rhode Island, the plan uses the actuarial cost method known as entry age normal (EAN) to make these adjustments.[3] This method is the preferred method for public plans and is required by Rhode Island statute.[4] The primary purpose of any actuarial cost method such as EAN is to design a funding program that calculates contributions for both the normal cost (the cost of future benefits) and the cost for prior service benefits not funded by the normal cost. This cost for past benefits not funded by the normal cost is known as the unfunded liability. Put another way, the unfunded liability is the accumulation of actuarial losses occurring in the plan over time.

Under the EAN method, the actuary first determines all future pension benefits to be paid to retired members and active members. For retired members, the actuary determines future benefits based on 3 main factors: (i) the amount of pension benefit paid to each retired member, (ii) any projected cost of living (COLA) increases, and (iii) the life expectancies of the retired members as determined by the actuary. For the active members, the calculation of future benefits is similar, but it also depends on calculations of predicted salary increases, predicted job turnover, expected retirement ages and many other factors.

Discount Rate / Investment Return

The actuary adds up the projected future benefits for retired members and active employees and applies a "discount rate" to determine the present value of all future benefits. In Rhode Island, the discount rate is 8.25 percent,[5] but will decrease to 7.5 percent effective July 1, 2012. For public pension plans, the terms "discount rate" and "investment return rate" have the same meaning and are interchangeable. However, since the purpose of this assumption in Rhode Island's plan is to determine the present value of future benefits, we use the term "discount rate" throughout this paper.

The actuary next takes the normal cost (which we already know is the cost of providing future benefits for active employees), projects all future normal costs, and then applies the discount rate to determine the present value of all future normal costs.[6]

A common example of how discount rates are used is a lottery game that promises to pay the winner $1 million each year for the rest of the winner's life. When the winner is chosen, the lottery projects all future annual payments based on life expectancy. The lottery then uses a discount rate to determine the amount of money that must be set aside to make sure future benefits will be paid. In the past, many lotteries have used a discount rate equal to the U.S. Treasury Rate. The present value is then invested in U.S. Treasuries as a secure investment that will deliver returns equal to the discount rate.

Actuarial Accrued Liability

The total liability for all past services rendered by retired and active plan members (known as the actuarial accrued liability) is determined by taking the present value of all future plan benefits and

subtracting the present value of all future normal costs.[7] Since the normal cost is designed to pick up all future costs of active members, the calculation of the actuarial accrued liability is for past services only.

Unfunded Liability

The unfunded liability is then determined by taking the actuarial accrued liability (which is the present value of the total liability for past services) and subtracting from it the value of the assets in the plan.[8] This calculation would be straightforward if pension plans simply used the actual market value of plan assets. They don't.

Asset Smoothing

Because the financial markets are turbulent and values can go up and down dramatically over short periods of time, most public plans use a methodology called "smoothing" to value their assets. In Rhode Island, our plans use a 5-year smoothing method that starts with the market value of assets but phases in the asset gains and losses above or below the assumed discount rate over a five-year period.[9] An important purpose of asset smoothing is that it dampens market volatility when budgeting future pension costs.

Amortization Period and Amortization Cost

In order to spread the cost of the unfunded liability over a period of time, the plan chooses an amortization period during which it will pay off its unfunded liability. In Rhode Island, an amortization period of 30 years was selected in 1999.[10] There are now 19 years left in the amortization period. The amortization cost is then calculated as the amount that will be sufficient to pay off the unfunded liability over the amortization period or over the next 19 years.

Annual Pension Cost

To determine the annual cost of the pension plan in Rhode Island, the actuaries simply add the normal cost plus the amortization cost.[11] The annual pension cost is also known as the annual required contribution (or ARC).

Recap

The annual cost (ARC) of a pension plan is equal to its normal cost plus amortization cost. The normal cost is the annual amount required to pay for all current and future pension service based on the actuarial assumptions. If benefits are not changed and actuarial assumptions are correct, payment of the normal cost should fully fund a pension program. If the actuarial assumptions are wrong, or changes are made to benefits which apply to past services, then an actuarial gain or actuarial loss can occur. Actuarial losses over time create an unfunded liability. The amortization cost is the annual amount needed to pay off the unfunded liability over the amortization period.

The unfunded liability can be calculated by the following formula:

All future pension payments reduced to present value (using discount rate)
minus
All future normal costs reduced to present value (using discount rate)
minus
Actuarial Value of Assets
equals
Unfunded Liability

The annual pension cost or ARC for ERSRI can be calculated as follows:

Annual normal cost
plus
Amortization cost (annual amount required to pay off the unfunded liability over the amortization period)
equals
Annual pension cost or ARC

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[1] ERSRI 2009 Actuarial Report, pgs 31,55
[2] ERSRI 2009 Actuarial Report, p.52

[3] ERSRI 2009 Actuarial Report, p.31

[4] Rhode Island General Laws Section

[5] ERSRI 2009 Actuarial Report, p. 31

[6] ERSRI 2009 Actuarial Report, p. 31

[7] ERSRI 2009 Actuarial Report, p. 31

[8] ERSRI 2009 Actuarial Report, pgs. 31-32

[9] ERSRI 2009 Actuarial Report, p. 32

[10] ERSRI 2009 Actuarial Report, Letter from Gabriel Roeder Smith & Company, p. 1 Report pgs. 53-54

[11] ERSRI 2009 Actuarial Report, p. 31