

Municipal Employees' Retirement Fund

**Board of Trustees Actuarial Education
August 25, 2010**

**Gary S. Curran, F.C.A., M.A.A.A., A.S.A.
CONSULTING ACTUARY**

**G. S. Curran & Company, LTD.
10555 N. Glenstone Place
Baton Rouge, LA 70810**

(225) 769-4825

What Influences the Actuarial Process?

I. Assumptions - what we estimate about the future

- Forecast of asset and liability performance
- Affect short-term costs

II. Experience - what really occurs

- Actual asset and liability performance
- Governs the long-term costs

III. Reconciliation

- Differences between estimates and reality give rise to “Gains and Losses”

Assumptions

- **Set initial cost baseline**
- **Asset assumptions based on long-term earnings forecasts**
- **Liability assumptions based on estimates of:**
 - **population decrements**
 - **compensation levels**
 - **demographic attributes of the group**

Experience

- **Determines the ultimate cost**
- **Determined by actual asset performance**
- **Determined by actual:**
 - **population decrements**
 - **compensation levels**
 - **demographic attributes of the group**

Reconciliation

- **Part of the self-correcting valuation process**
- **Incrementally adds to or subtracts from baseline costs**
- **Differences between assumptions and experience referred to as “Gains/Losses”**
- **May reflect random fluctuation or errors in assumptions**
- **Effect on assets and liabilities recognized immediately**
- **Effect on Cost spread over future years through implicit or explicit amortization**

How Important are the Actuarial Assumptions

- I. Set the cost level of the plan in the short-run**
- II. Determine future cost pattern**
- III. Incorrect assumptions can lead to**
 - **Plan insolvency**
 - **Escalating costs**
 - **Unnecessarily high current costs**
 - **Erratic Costs**
 - **Hidden Liabilities**
- IV. Leverage of Various Assumptions**
 - **Valuation Interest Rate**
 - **Salary Scale**
 - **Retirement Rates**
 - **Withdrawal Rates**
 - **Mortality Rates**

Factors Used to Set Actuarial Asset Assumptions

- **Asset Allocation**
- **Expected Return on Asset Classes**
- **Inflation**
- **Managers' Alpha**
- **Investment Expenses**
- **Frictional Cash**
- **Actual Past Fund Performance**
- **General Economic and Capital Market Expectations**
- **Risk Tolerance of Trustees**
- **Liquidity Needs**
- **Reinvestment Risk**
- **Prospective Changes to all of the above**

Examples of Liability Assumptions Used in Pension Plan Valuations

Investment Earnings Rate

Rate of Salary Increase

Mortality Rate

Disability Rate

Withdrawal Rates

Retirement Rates

Benefit Usage Rate

Disability Mortality Rates

Age Differences between Husbands and Wives

Percentage of Members who are Married

Percentage of Members with Children

In the real world
assumptions are set by
looking to both the past
and the future

Setting Assumptions

Past Experience

- Is information available about the group?
- How reliable is the data?
- Has the group changed over time?
- Have changes in benefits affected results?
- Is there a practical way to assemble and sort the data?
- What are the time constraints?
- What are the financial constraints?
- How credible is the data?

Looking to the future

- Are benefit changes on the horizon?
- What are the secular trends, if any?
- What are expectations for growth in the active population?
- How will demographic changes in new entrants change the group?
- How may general economic conditions impact assumptions?
- Is the economic model used for the asset assumptions consistent with the liability assumptions?
- What are the prospective changes in regulatory constraints?

In addition to past experience and expectation of the future, what is available?

Standard Tables:

- **Mortality**
- **Disability**
- **Termination**

Actuarial Studies:

- **Society of Actuaries**
- **Social Security System**
- **Railroad Retirement System**
- **Other large pension plans**

Why are standard tables and studies used? **Lack of credible experience**

When is experience not credible?

- Not enough history available to perform a complete experience study
- System is too small to draw statistically significant conclusions
- Changes in benefits make the past a poor predictor of the future

Impact of Assumption Selection on Costs

In the long run None

In the long run the cost of the plan is independent of the assumptions selected. Only the timing of contributions is affected.

In the short run Significant

In the short run various assumptions will produce different funding patterns.

Collateral Effects of Assumptions

- **Funding pattern has an effect on investment earnings**
- **Funding levels affect benefit changes**

Getting it wrong - the impact

Assumed Investment Earnings Rate

- If the rate is set too high, near term costs will be lower, but they will continue to rise as earnings shortfalls evolve.
- If the rate is set too low, near term costs will be higher, but costs will decrease as gains develop.

Sample Valuation

Present Value of Benefits: \$420 Million

Increase Assumed Earnings Rate by 10%

(i.e. from 8.0% to 8.8%)

Present Value of Benefits: \$374 Million

Getting it wrong - the impact

Assumed Mortality Rates

- If the rates are set too high, near term costs will be lower, but they will continue to rise as mortality losses accrue.
- If the rates are set too low, near term costs will be higher, but costs will decrease as gains develop.

Sample Valuation

Present Value of Benefits: \$420 Million

Increase Assumed Mortality Rates by 10%

Present Value of Benefits: \$413 Million

Getting it wrong - the impact

Assumed Termination Rates

- If the rates are set too high, near term costs will be lower, but they will continue to rise as termination losses occur.
- If the rates are set too low, near term costs will be higher, but costs will decrease as gains develop.

Sample Valuation

Present Value of Benefits: \$420 Million

Increase Assumed Withdrawal Rates by 10%

Present Value of Benefits: \$416 Million

Getting it wrong - the impact

Assumed Retirement Rates

- If the rates are set too low, near term costs will be lower, but they will continue to rise as retirement losses occur.
- If the rates are set too high, near term costs will be higher, but costs will decrease as gains develop.

Sample Valuation

Present Value of Benefits: \$420 Million

Increase Assumed Retirement Rates by 10%

Present Value of Benefits: \$417 Million

Getting it wrong - the impact

Assumed Rates of Salary Increase

- If the rates are set too low, near term costs will be lower, but they will continue to rise as salary losses accrue.
- If the rates are set too high, near term costs will be higher, but costs will decrease as gains develop.

Sample Valuation

Present Value of Benefits: \$420 Million

Increase Assumed Salary Scale by 10%
(i.e. from 6.0% to 6.6%)

Present Value of Benefits: \$436 Million

Employer Cost Shift Based on 1% Shift

MERS Sensitivity to Asset Earnings: Plan A – 0.61%
Plan B – 0.29%

MERS Sensitivity to Change in Ad Valorem Tax: Plan A – 0.03%
Plan B – 0.03%

MERS Sensitivity to Valuation Interest Rate: Plan A – 8.70%
Plan B – 4.40%

MERS Sensitivity to Change in Salary Scale (1 yr): Plan A – 0.32%
Plan B – 0.15%

Employer Cost Shift Based on Plan Provision Changes

MERS Change to 5 Year FAC: Plan A – 2.29%
Plan B – 1.20%

MERS Prospective ½% Cut in Accrual Rate: Plan A – 2.52%
Plan B – 2.32%

MERS 1% Increase in Employee Contribution Rate: Plan A – 0.78%
Plan B – 0.80%

Employer Cost Shift Due to Plan Provision Changes

Plan A New Hires – retirement eligibility 7&65, 12&60, 25&55, 30&Out

Cost Reduction: 2 years = 0.11% Long term = 0.45%

Plan B New Hires – retirement eligibility 7&65, 12&60, 30&55

Cost Reduction: 2 years = 0.02% Long term = 0.07%

Employer Cost Shift Due to Plan Provision Changes

Plan A New Hires – retirement eligibility 10&60, 25&55, 30&Out

Cost Reduction: 2 years = 0.18% Long term = 0.68%

Plan B New Hires – retirement eligibility 10&60, 30&Out

Cost Reduction: 2 years = 0.05% Long term = 0.17%

The End

True or False:

If the actuarial present value of benefits for a retirement plan is \$1,000,000, this means the plan expects to pay out \$1,000,000 in benefits in future years

True or False:

If a plan becomes 100% funded, then no further contributions will be required

True or False:

If a plan eliminates its unfunded accrued liability, then no further amortization payments will be required

True or False:

Payroll growth reduces the amortization payments for the unfunded accrued liability as a percentage of payroll

True or False:

Benefits paid out of state and local retirement plans are limited by federal law

True or False:

An increase in the rate at which members retire will increase the cost of the plan

True or False:

The assumed investment earnings rate affects the cost of the plan

True or False:

If the plan assets equal the actuarial accrued liability, and the plan is shut down, there will be sufficient assets to pay benefits

True or False:

The valuation interest rate affects the cost for purchases of service credit

True or False:

Smoothing asset gains and losses
increases investment efficiency

True or False:

Increases in withdrawal rates for the plan
increases plan costs

True or False:

Decreases in mortality rates increase
plan costs

True or False:

GASB (The Governmental Accounting Standards Board) sets standards by which pension plans are funded

True or False:

Investment returns below the assumed rate of return will increase a plan's unfunded accrued liability

True or False:

Salary increases for active members lead to liability losses

True or False:

Different actuarial funding methods produce different funding patterns for retirement systems

True or False:

The more well funded a plan is, the greater the volatility in its contributions

True or False:

If a plan enhances its benefit structure, and the additional liability generated is offset by asset gains, no additional future payments will be required

True or False:

Level amortization payments generally lead to a decreasing pattern of payments measured as a percentage of payroll

True or False:

If average life expectancy is 80 and a member is 60, then on average he can expect to live 20 more years

True or False:

Latest mortality experience indicates the gap between male and female life expectancy is closing

True or False:

A decrease in the assumed interest rate results in a reduction in option equivalence factors

True or False:

The actuarial present value of benefits is always greater than the actuarial accrued liability for a retirement system

True or False:

If the actuarially required contribution rate for a system is 10% of pay; then a contribution of 10% of pay is sufficient to fund each individual's benefit

True or False:

Insufficient employee and employer contributions to cover the cost of benefits paid should be viewed as a danger sign for a retirement system

True or False:

Lengthening amortization schedules increases the cost of a pension plan

True or False:

Actuarially equivalent benefits are different payment streams with equal actuarial values

True or False:

If retirement options are actuarially equivalent, there is no cost to the retirement system to provide such options to members

True or False:

Current COLA payment policies favor members who select options other than the maximum

True or False:

Changes in workforce demographics
impact pension costs

True or False:

Two retirement systems have the same assets at the beginning of a five year period as well as the same benefits, expenses, and contribution rates. If the average rates of return for the two systems are the same over the five year period, they will have the same assets at the end of the period.

True or False:

Generally, employee and employer contributions for a member are determined such that when they are combined with investment earnings, sufficient assets are accumulated at retirement to pay for the members' benefits.

True or False:

Federal law limits benefits payable to non-spousal beneficiaries

True or False:

Cutting pension benefits for new hires will not reduce a plan's unfunded accrued liability

True or False:

If asset smoothing allocated \$10 million of a \$50 million asset gain to a particular year, then the next year's contributions will be reduced by \$10 million

True or False:

Once a member terminates employment and receives a refund of contributions, he has no further effect on the liability of the system

True or False:

Former members of a system who repay refunds of contributions for the purpose of transferring out of that system can generate significant liability losses

True or False:

The value of a retiree's benefit can be determined by multiplying the benefit by his remaining life expectancy

True or False:

A reduction in a plan's valuation interest rate will lead to an immediate increase in actuarially required contributions