2019 Trustee Educational Seminar (TEDS)

A Pension Trustee’s Guide to the Actuarial Valuation

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Today’s Agenda

• Introduction-Defined Benefit Plans
• Actuarial Valuation
• Actuarial Assumptions
• Data, Assets
• Normal Cost, Accrued Liability
• Policy Considerations
• Decision Making
• With Trustee Comments Throughout

• Now, let’s get back to the basics!
Introduction
The Defined Benefit Pension Plan

Defines a Benefit *(then determines contribution)*
*for reverse order, see a defined contribution plan*

- **Forecast**
  - Predict Benefits
  - Estimate assets

- **Fund**
  - Normal Cost
  - Unfunded Payment
  - Actuarially determined contribution

- **Pay**
  - Retirees
  - Terminated vested, ancillary benefits
Introduction

The Purpose of the Actuarial Valuation

- Predict Benefits
- Set assumptions

- Normal Cost
- Unfunded Payment

- Changes in the accrued liabilities
- How assumptions performed

Forecast Liabilities

ADC

Resolve
The Actuarially Determined Contribution

*Actuarial Assumptions - Inflation and the Rate of Return*

What portion of future benefits will be paid by assets?
The Actuarially Determined Contribution

Actuarial Assumptions-Inflation

- Inflation (price)
  - All experience inflation
  - CPI-U history
  - Bond market prediction
  - Social Security’s prediction
  - Fed policy

Look at lots of sources for the setting of this assumption.
The Actuarially Determined Contribution

Actuarial Assumptions-Inflation and CPI-U

• What is the CPI-U really?

England has gin; US has vodka in the basket of goods
The Actuarially Determined Contribution

*Actuarial Assumptions - Investment Return*

- Investment return assumption
  - Your history
  - Other’s history (survey)
  - Expenses paid from returns
  - Your asset allocation
  - Arithmetic return (a higher estimate)
  - Geometric return (incorporates volatility)
The Actuarially Determined Contribution

*Actuarial Assumptions-Arithmetic and Geometric returns*

- **Arithmetic vs. Geometric**

  *Arithmetic is add and divide.*
  
  *Geometric is compounding interest.*

  *Wait. I thought you said there’d be no math!*
The Actuarially Determined Contribution

Actuarial Assumptions-Volatility Cost

– The “volatility” cost – arithmetic vs. geometric
– The greater the volatility the greater the cost
– That is why we look at the geometric return
  • *These are volatile times*

This really means the greater the volatility the lower your actual rate of return. Then the higher the contributions.
Trustee Comments

• How does our inflation assumption, real and nominal rate of return compare to others?
• How do these items compare to what our investment consultant is reporting?
• How do we handle expenses in this assumption?
• In what ways do you (actuary) see risk in this assumption?
• Do you expect this assumption to change soon?
• How volatile is our portfolio and what do we do to manage its volatility?
The Actuarially Determined Contribution

Actuarial Assumptions-Salary Increases

• Salary increase assumptions—what happens to an individual’s pay?

Forecast Benefits

• Estimate each member’s future pay
• And service
The Actuarially Determined Contribution

Actuarial Assumptions - Salary Increases

- Pay increases at least equal inflation
- Plus a little more
- Early in career there were extra “bumps”
The Actuarially Determined Contribution

Actuarial Assumptions- Individual salary increase components

- Inflation
- Productivity
- Merit/Promotion
The Actuarially Determined Contribution
Payroll growth

- Total payroll
- “Engine” for contributions
- Budget usually as a percent of payroll
- Payroll changes with changing population
- Generally equal to the sum of inflation plus productivity
# The Actuarially Determined Contribution

*Payroll Growth Assumption and Affect on Amortization*

<table>
<thead>
<tr>
<th>Amortization Payments Example</th>
<th>“NO” Payroll Growth Assumed</th>
<th>Payroll Growth Assumed at 2.75%</th>
</tr>
</thead>
<tbody>
<tr>
<td>First year payment</td>
<td>$94,393</td>
<td>$76,147</td>
</tr>
<tr>
<td>Second year payment</td>
<td>$94,393</td>
<td>$78,241</td>
</tr>
</tbody>
</table>

You get the picture...
The Actuarially Determined Contribution

Payroll Growth

• What’s the real issue?
• The paying off of the unfunded accrued liability
  
  Watch for negative amortization

• This is all a balance between prudence and practicality.
Payroll Growth and the Annual Payments on the UAL

Amortization Payments
Differing rates of growth in total payroll

<table>
<thead>
<tr>
<th>Thousands</th>
<th>$100</th>
<th>$90</th>
<th>$80</th>
<th>$70</th>
<th>$60</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- 0.00%
- 1.00%
- 4.00%
Sample Negative Amortization

Outstanding Balances by year
Sample Amortization of $500,000

- $100,000
- $0
$100,000
$200,000
$300,000
$400,000
$500,000
$600,000

30 year payment
20 year payment
15 year payment
Trustee Comments

- How did the salary increases compare to the assumptions?
- Did you see anything unusual in the salary increases?
- How did payroll growth compare to the assumption?
- Did the plan experience negative amortization?
- How do our salary and payroll assumptions compare to others?
- Does our salary and payroll growth assumptions tie into our HR strategies?
The Actuarially Determined Contribution

*Actuarial Assumptions-Mortality and Life Expectancy*

- **Mortality Tables**
  - Two pieces
  - Predicts improvement in future generations

- **Piece #1**
  - Base table
  - A table with probabilities at each age

- **Piece #2**
  - Projection scale
  - A multiplier to be applied to the base table
  - “Improves” mortality rates for the future
The Actuarially Determined Contribution

*Mortality*

- How actuaries look at mortality rates
## The Actuarially Determined Contribution

### Mortality

- How actuaries look at mortality rates

<table>
<thead>
<tr>
<th>Age</th>
<th>Actual deaths</th>
<th>Expected deaths (from mortality table)</th>
<th>A/E ratio</th>
<th>Expected deaths (from new mortality table)</th>
<th>Actual Deaths to Expected Deaths (A/E ) ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 - 54</td>
<td>0</td>
<td>0.3</td>
<td>0.00%</td>
<td>0.3</td>
<td>0.00%</td>
</tr>
<tr>
<td>55 - 59</td>
<td>2</td>
<td>1.5</td>
<td>133.33%</td>
<td>1.4</td>
<td>142.86%</td>
</tr>
<tr>
<td>60 - 64</td>
<td>3</td>
<td>6</td>
<td>50.00%</td>
<td>5.5</td>
<td>54.55%</td>
</tr>
<tr>
<td>65 - 69</td>
<td>9</td>
<td>12.1</td>
<td>74.38%</td>
<td>6</td>
<td>150.00%</td>
</tr>
<tr>
<td>70 - 74</td>
<td>11</td>
<td>9.8</td>
<td>112.24%</td>
<td>9</td>
<td>122.22%</td>
</tr>
<tr>
<td>75 - 79</td>
<td>5</td>
<td>10.6</td>
<td>47.17%</td>
<td>7</td>
<td>71.43%</td>
</tr>
<tr>
<td>80 - 84</td>
<td>9</td>
<td>15.6</td>
<td>57.69%</td>
<td>8</td>
<td>112.50%</td>
</tr>
<tr>
<td>85 - 89</td>
<td>12</td>
<td>14.1</td>
<td>85.11%</td>
<td>10</td>
<td>120.00%</td>
</tr>
<tr>
<td>90 and over</td>
<td>8</td>
<td>11.6</td>
<td>68.97%</td>
<td>11</td>
<td>72.73%</td>
</tr>
<tr>
<td>Totals</td>
<td>59</td>
<td><strong>81.6</strong></td>
<td><strong>72.30%</strong></td>
<td><strong>58.2</strong></td>
<td><strong>101.37%</strong></td>
</tr>
</tbody>
</table>

*Assumed based on the same group of exposures and actual deaths*
Trustee Comments

• How did our population’s mortality compare to the assumptions?
• Are we on a most recent table?
• Do you expect changes in this assumption?
• How influential is this assumption in the development of the contribution rate?
• The news says life expectancy is declining in the U.S. Is it doing so in our plan?
The Actuarially Determined Contribution

*Participant Data*

- Look at data in its entirety

<table>
<thead>
<tr>
<th>Status</th>
<th>Actives</th>
<th>Terminated with deferred benefit</th>
<th>Retired (in pay status)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beginning of year</td>
<td>100</td>
<td>25</td>
<td>500</td>
<td>625</td>
</tr>
<tr>
<td>New hires</td>
<td>30</td>
<td></td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>Terminated with deferred benefit</td>
<td>-20</td>
<td>20</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Died</td>
<td>-10</td>
<td>-5</td>
<td>-25</td>
<td>-30</td>
</tr>
<tr>
<td>Retired</td>
<td>-10</td>
<td>-5</td>
<td>15</td>
<td>0</td>
</tr>
<tr>
<td>End of year</td>
<td>100</td>
<td>35</td>
<td>490</td>
<td>625</td>
</tr>
</tbody>
</table>
Trustee Comments

• Did you see anything unusual in the data?
• Were there abnormally large (or small) occurrences of any decrement?
• Does any item of data cause you concern?
• Did you have to make any assumptions about the data?
• Was there much missing data? If so, what assumptions were made about the missing data?
• Is the plan closed to new entrants?
  – If closed, can you see the “end date”?
  – If closed, has the funding and investment policy changed to reflect its closure?
The Actuarially Determined Contribution

*Asset Valuation*

- Balance sheet
- Income and expense
- And then, smoothing!
The Actuarially Determined Contribution

*Asset Valuation and Smoothing Returns*

- What is smoothing (of returns)?
- Don’t take the full bite of the apple
- Take 20% of the return
- And 20% in each of next four years
- For a “5-year smoothing” period
  - *These are volatile times*
The Actuarially Determined Contribution

Asset Valuation and Smoothing Returns

• Why smooth?
  – Basis of “true trend”
  – Acts like “noise cancelling headphones”
  – Truly done for “smooth” decision making
  – Most used period is a five-year period
Trustee Comments

• What is the difference between the market value and the actuarial value of assets?
• Are there mostly deferred gains or deferred losses coming into the future actuarial assets?
• What is the pressure on the contribution rate due to these asset return deferrals?
• What was the rate of return on an actuarial and a market value basis?
• Do you have any concerns about the way the assets are smoothed?
The Actuarially Determined Contribution

*Normal Cost*

- Active member only
- Cost of their one-year accrual
- Part of ADC
- Based on benefit and assumptions
  – (has nothing to do with assets)
**The Actuarially Determined Contribution**

*Normal Cost Example*

- Assume the plan formula is $120 per year of service
- The normal cost is the $120 payable at retirement age, for life
  - (which we estimate is $1,500)
- But you don’t have to contribute $1,500
  - *(investment earnings pay for some of this)*
The Actuarially Determined Contribution Normal Cost Example

• Assume the discount rate (earnings) is 7%
• If we are 25 years away from that member’s retirement, then we only need $276.37
• The 25 years at 7% will cause the $276.37 to grow to $1,500.
• Note: for this accrual, contributions pay for 18% of the benefit and investment earnings pay for 82% of the benefit
• Yeah investment earnings!
The Actuarially Determined Contribution
Accrued Liability

• Oft thought of as “the desired amount of assets”
• Unfunded emerge when assets are less than the accrued liability
• A payment on the UAL is the second part of the ADC
  – Many ways to calculate UAL
  – Should align with your policy
The Actuarially Determined Contribution

*Unfunded Accrued Liability*

- A UAL can arise from a number of sources:
  - Assumptions not met
  - Contributions less than the ADC
  - Retroactive plan amendments
The Actuarially Determined Contribution

*Unfunded Accrued Liability-Amortization Payments*

- How does one pay off the UAL?
- Factors:
  - Length of time
  - Growth in the amortization payment
  - The ultimate payoff
    - Open (never paid off)
    - Closed (paid off)
The Actuarially Determined Contribution

*Unfunded Accrued Liability—There’s More*

- Watch out for negative amortization
- Manage volatility when possible
- Watch for cliffs in the contribution rate
- Should you have one single UAL or set up a layer for each year—(there is always a layer related to assumptions not being exactly met...)
- Have a different policy for surplus
Trustee Comments

• Did the normal cost behave as expected?
• Is the tier structure decreasing the overall normal cost?
• Do employee contributions exceed normal cost?
• Has there been negative amortization?
• What progress have we made in paying off the unfunded accrued liability?
Valuation Results

The Policy Framework

- Valuation results are the expression of the funding policy
- Some of those policies could include:
  - The promised benefits will be here when an employee retires
  - The assumptions are built to last
  - The contribution rate is constructed to be as stable as possible
  - The plan is on a path to full funding (or not)
  - The valuation report creates transparency on the funding strategy for the plan
  - Are there others?
Valuation Results

The Policy Framework

- A healthy plan sponsor supports a healthy plan
- The objectives of the funding policy can support the health of all stakeholders
Trustee Comments

- Why did the contribution rates change?
- What were the biggest factors contributing to the changes in funded position?
- Are all aspects of the valuation in alignment with our funding policy?
Valuation Results

Assumption Performance

• “Loss” - accrued liability is **HIGHER** than expected
  – Expectations are built from assumptions
• “Gain” - accrued liability is **LESS** than expected
• The interesting part is to look at gains and losses by assumption
Valuation Results
Assumption Performance-By Key Assumption

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Salary Increases</strong></td>
<td>$6.70</td>
<td><em>A loss here means salary increases were higher than assumed; those higher salaries translate into higher benefits</em></td>
</tr>
<tr>
<td><strong>Retirement</strong></td>
<td>1.5</td>
<td><em>This may mean more members retired with an early retirement subsidy than assumed; subsidies cost the plan</em></td>
</tr>
<tr>
<td><strong>Mortality</strong></td>
<td>-2.6</td>
<td><em>Gains on mortality mean more members died than were assumed—more deaths is the same as not living as long as expected</em></td>
</tr>
<tr>
<td><strong>Termination</strong></td>
<td>4</td>
<td><em>Members were staying in employment and earning more retirement benefits than assumed (not withdrawing)</em></td>
</tr>
<tr>
<td><strong>Disability</strong></td>
<td>-0.6</td>
<td><em>A few more disability retirements than assumed and disability benefits less valuable than the retirement benefits</em></td>
</tr>
<tr>
<td><strong>New entrants</strong></td>
<td>2.8</td>
<td><em>This is a usual and customary amount</em></td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td>3.7</td>
<td><em>This is for all the items that are not in one of the major categories. The important point is to make sure it is NOT the largest item on the list</em></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$15.40</td>
<td><em>This says that the accrued liability increased from last year to this year, primarily due to salary increases higher than assumption and withdrawals slower than assumed!</em></td>
</tr>
</tbody>
</table>

**Annual Change in Accrued Liability due to actual experience differing from assumed**
*(Gain)-experience was favorable compared to assumptions (lowering the liability)*
Trustee Comments

• Why did [insert assumption] have a [gain/loss]?  
• What are some of the items in the “other” category?  
• Does the gain/loss by source show our assumptions are “close” or do they need adjusting?
### Looking into the Future

**Leading Indicators and Outcomes**

<table>
<thead>
<tr>
<th>Sample Leading Indicator</th>
<th>Sample Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>The ADC is always paid</td>
<td>Plan will have assets to cover benefit payments</td>
</tr>
<tr>
<td>The balance of the UAL is growing every year</td>
<td>Contributions will need to increase; run projections to see if assets are going to be depleted</td>
</tr>
<tr>
<td>The interest rate assumption has not been met over a long period</td>
<td>Assumptions need revising; liabilities and costs shown are not adequate to cover the true costs of the plan; required contributions will increase</td>
</tr>
<tr>
<td>The market value of assets is lower than the actuarial value of assets (or vice versa)</td>
<td>Indicates the directional pressure on the contribution rate; deferred asset losses means the rate will increase; deferred asset gains means the rate will decrease</td>
</tr>
</tbody>
</table>
Looking Into The Future

Understanding Where Your Plan Is Headed

• Prudent to look at a 30 year projection of your plan’s actuarial metrics
Looking Into The Future

Decision Making

We made up the following decision matrix:

- Important-Policy infraction
- Urgent-Cost (to waiting)
Looking Into The Future

Distinguishing The Important From The Urgent; Actuarial Metrics

**A Sample Decision Matrix**

<table>
<thead>
<tr>
<th>You set up your own definition of important and urgent</th>
<th>Not Important (meaning, no policy infraction)</th>
<th>Important (Policy Infraction)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Urgent (Cost to waiting)</td>
<td>Requires action-not a violation of policy but has a cost (not always monetary) if not handled</td>
<td>Requires Immediate Action</td>
<td></td>
</tr>
<tr>
<td>Not Urgent</td>
<td>Interesting facts not requiring action</td>
<td>Requires action in the future</td>
<td>Not Urgent</td>
</tr>
<tr>
<td></td>
<td>Not Important (meaning, no policy infraction)</td>
<td>Important (Policy Infraction)</td>
<td></td>
</tr>
</tbody>
</table>
## Looking Into The Future

*Distinguishing The Important From The Urgent; Actuarial Metrics*

### A Sample Decision Matrix

<table>
<thead>
<tr>
<th>Urgent (Cost to waiting)</th>
<th>Not Important (meaning, no Policy Infraction)</th>
<th>Important (Policy Infraction)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trustees want to get early bird rate on conference</td>
<td>Funded ratio declining; ARC not made for 10 years; plan expected to run out of money in 10 years</td>
<td>Urgent (Cost to waiting)</td>
</tr>
</tbody>
</table>

| Not Urgent | A lot of new retirees | Asset returns did not meet the assumed rate this year. Funded ratio dropped below 80%. The principal on the UAL grew. | Not Urgent |

<table>
<thead>
<tr>
<th></th>
<th>Not Important (meaning, no Policy Infraction)</th>
<th>Important (Policy Infraction)</th>
</tr>
</thead>
</table>
Trustee Comments

- What requires immediate action?
- What is the cost of waiting?
- What other risks haven’t we talked about?
- Where do the projections show us to be in 30 years?
## Contacts

<table>
<thead>
<tr>
<th>Leslie Thompson, FSA, FCA, EA, MAAA</th>
<th>Pam Feely, CPA, MBA, AF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gabriel, Roeder, Smith &amp; Company</td>
<td>Feely Consulting, LLC.</td>
</tr>
<tr>
<td><a href="mailto:leslie.thompson@grsconsulting.com">leslie.thompson@grsconsulting.com</a></td>
<td><a href="mailto:Pamfeely@aol.com">Pamfeely@aol.com</a></td>
</tr>
<tr>
<td>(720) 274-7271</td>
<td>(303) 200-0584</td>
</tr>
<tr>
<td>(720) 560-8988</td>
<td>(720) 201-3988</td>
</tr>
<tr>
<td>To order A Pechant for Pensions</td>
<td><a href="http://campaignfinanceguides.com/book/a-penchant-for-pensions/">http://campaignfinanceguides.com/book/a-penchant-for-pensions/</a></td>
</tr>
</tbody>
</table>
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