



Pennsylvania Association of Public Employee Retirement Systems

PAPERS NEW TRUSTEE WORKSHOP

WHAT DID MY ACTUARY SAY?

May 24, 2017, Harrisburg, Pennsylvania

1:30 p.m.—2:20 p.m.

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Agenda

- What is an Actuary?
- Actuarial Concepts and Terminology
- Actuarial Assumptions and Methods
- Other Actuarial Issues

WHAT IS AN ACTUARY?

What is an Actuary?

A. King of the Nerds?



B. Wizard of Arcane Arts?



C. Fortune Teller?



What is an Actuary?

- A business professional who calculates financial values associated with uncertain events subject to risk, such as insurance premiums or pension contributions. (wiktionary.org)
- An expert on pension liabilities, life expectancy, time value of money and probabilities - actuaries determine the annual amount of money need to be paid into a pension plan so that the Plan is able to pay the benefits when they are due.
- Usually employed in either the insurance industry or by consulting firms to help employers with their pension or health plans

What is an Actuary?

- Typically with a math or business college degree
- Completes a series of exams (usually after college) on specific actuarial topics in order to be credentialed (ASA, FSA, EA)
 - F.S.A. = Fellow of the Society of Actuaries
 - A.S.A. = Associate of the Society of Actuaries
 - E.A. = Enrolled Actuary (ERISA Practice)
 - FCA = Fellow of Conference of Consulting Actuaries
 - M.A.A.A. = Member of the American Academy of Actuaries
 - Various Others - CFA, ERM, JD

What is the Role of Actuary?

- The actuary is the strategic advisor to the Board
 - Performs actuarial valuations to determine contribution rates or funding period
 - Performs experience studies and makes assumption recommendations to the Board
 - Assists the Board with setting its Funding Policy
 - Informs the Board of possible future outcomes (good or bad)
- Other services
 - Determines GASB 67/68 disclosure information
 - Assists the Board with plan administration
 - Benefit calculations, actuarial factors, etc.
- The actuary does not make investment decisions and is not a fiduciary of the Plan
- Municipal Pension Plan Funding Standard and Recovery Act which relates to municipal pension plans:
 - **“Approved actuary,”** a person who has at least five years of actuarial experience with public pension plans and who is either enrolled as a MAAA or an EA under ERISA.

What is the Board's role?

- The Board members are fiduciaries of the Plan
- The Board sets the assumptions used in the actuarial valuation
 - The actuary must tell the Board if assumptions are not reasonable
- The Board sets the funding policy for the Plan
 - Potentially, in coordination with the employer
- The Board hires the actuary (and other advisors)
- The Board administers the Plan (or designates the Plan Administrator)

Present Value of Benefits - A Simplified Illustration

| | | (1) | (2) | (3) | (4) |
|------|-----|----------|--------------|-------------|----------|
| | | Project | Probability | Reflect | Present |
| | | Benefit | of Living to | Interest | Value of |
| Year | Age | Payments | Beginning of | Discounting | Benefits |
| | | | Year | | |
| 2022 | 60 | \$30,000 | 0.99 | 0.69 | \$20,418 |
| 2027 | 65 | \$30,000 | 0.95 | 0.49 | \$14,065 |
| 2032 | 70 | \$30,000 | 0.90 | 0.35 | \$9,478 |
| 2037 | 75 | \$30,000 | 0.82 | 0.25 | \$6,173 |
| 2042 | 80 | \$30,000 | 0.71 | 0.18 | \$3,801 |
| 2047 | 85 | \$30,000 | 0.56 | 0.13 | \$2,117 |
| 2052 | 90 | \$30,000 | 0.35 | 0.09 | \$952 |
| 2057 | 95 | \$30,000 | 0.16 | 0.06 | \$304 |
| 2062 | 100 | \$30,000 | 0.05 | 0.05 | \$68 |
| 2067 | 105 | \$30,000 | 0.01 | 0.03 | \$11 |
| 2072 | 110 | \$30,000 | 0.00 | 0.02 | \$1 |

If the participant passes away at the end of age 110, then the plan will have paid \$1,530,000 in benefits while at January 1, 2017 the PVB was only \$243,140.

Key Points

- Age 55 today and assumed to retire at age 60
- The PVB can be thought of as the dollar amount needed today to pay current and future benefits.
- The PVB is less than the total annual benefit payments because it reflects the probability of death and interest discounting.
- The PVB is heavily dependent on the actuarial assumptions.

Life Expectancy - A Simplified Illustration

| <u>Age</u> | <u>Probability of Living to Beginning of the Year</u> | <u>Probability of Dying at End of the Year</u> | <u>Incremental Life Expectancy</u> |
|------------|-------------------------------------------------------------------|------------------------------------------------------------|--------------------------------------------|
| 70 | 1.00 | 0.01 | 1.00 |
| 75 | 0.91 | 0.02 | 0.91 |
| 80 | 0.79 | 0.04 | 0.79 |
| 85 | 0.62 | 0.07 | 0.62 |
| 90 | 0.39 | 0.12 | 0.39 |
| 95 | 0.17 | 0.19 | 0.17 |
| 100 | 0.05 | 0.23 | 0.05 |
| 105 | 0.01 | 0.29 | 0.01 |
| 110 | 0.00 | 0.36 | 0.00 |

Based on our mortality assumption actuaries say that a 70 year-old has a life expectancy of 13.41 years. Notice though, that we expect some people to die before 83 and some to die after 83. Actuarial valuations reflect probabilities of death at each age and not a specific age of death.

What is in an actuarial report?

An actuarial report may be issued to document:

- Plan contribution requirements
- Plan or plan sponsor accounting requirements
- The findings of a special project

Typical actuarial reports can be broken into these sections:

- I. Introduction
- II. Discussion of Results
- III. Result Exhibits
- IV. Plan Membership Information
- V. Summary of Plan Provisions
- VI. Actuarial Assumptions & Methods

Understanding an Actuarial Report

I. Introduction

This report documents the results of the actuarial valuation for the of the General Employees' Pension Plan for the City of Dreams for the plan sponsor and for the Board of the General Employees' Pension Plan. The results presented are for fiscal year ending September 30, 2015 for accounting and fiscal year ending September 30, 2016 for funding. The plan is a single-employer plan and does not issue a separate financial statement. As a result, all reporting requirements are included in the employer's financial statement. These results are based on a Measurement Date of January 1, 2015. The information provided in this report is intended strictly for documenting information relating to City and plan disclosure and reporting requirements and plan funding.

Determinations for purposes other than the financial accounting requirements may be significantly different from the results in this report. Thus, the use of this report for purposes other than those expressed here may not be appropriate.

II. Discussion of Results

Required Contribution

The City minimum required contribution is developed on pages 5 and 6. The required contribution decreased from \$17,546,573 to \$13,254,983, i.e., a decrease of \$4,291,590. These figures are net of Past Excess Contributions, i.e., contributions actually made for prior years above the required levels.

| | Plan Year Ended | | |
|-------------------------------------------------|-----------------|--------------|--------------|
| | 09/30/2014 | 09/30/2015 | 09/30/2016 |
| City Minimum Required Contribution ¹ | \$26,270,308 | \$17,546,573 | \$13,254,983 |
| Percent of Participants' Compensation | 19.5% | 13.8% | 10.3% |

One component of change each year in the minimum required contribution is the reimbursement of plan expenses. The actual expenses for the year ended September 30, 2014, were \$3.553 million. This becomes the estimated expense provision for the 2015-2016 year. The make-up provision was an additional \$0.468 million. Thus the total provision for expenses is \$4.021 million, more than 2014-2015.

Understanding an Actuarial Report

III. Result Exhibits

History of Unfunded Frozen Initial and Supplemental Liabilities

| | Initial Date | Initial Amount to be Amortized | Beginning Amortization Period | Original Amortization Period (Years) | Years Remaining | Plan Year Beginning Annual Amortization Amount | Unamortized Balance at Valuation Date |
|----------------------------------|--------------|--------------------------------|-------------------------------|--------------------------------------|-----------------|------------------------------------------------|---------------------------------------|
| Benefit Improvement ¹ | 01/01/04 | \$ 577,178 | 10/01/04 | 15.0000 | 4.7500 | \$ 66,146 | \$ 280,055 |
| Benefit Improvement ² | 01/01/05 | 4,908,273 | 10/01/05 | 17.1566 | 7.1566 | 525,506 | 3,269,975 |
| Benefit Improvement ³ | 01/01/06 | 5,365,251 | 10/01/06 | 17.5000 | 9.2500 | <u>569,025</u> | 3,934,801 |
| | | | | | | \$ 1,160,677 | |

1. Unamortized Balance as of 01/01/15 \$ 7,484,831
2. Past Excess Contributions Account 1,412,202
3. Remaining Unfunded Liabilities = (1) – (2) \$ 6,072,629

IV. Plan Membership Information

The actuarial valuation was based on personnel information from City of Dreams records as of January 1, 2015. Following are some of the pertinent characteristics from the personnel data as of that date. Prior year characteristics are also provided for comparison purposes. Both age and service have been determined using years and months as of the valuation date.

| | January 1, 2014 | January 1, 2015 |
|-----------------------------|-----------------|-----------------|
| Actives Participants | | |
| Number | 2,359 | 2,353 |
| Average Current Age | 46.7 | 46.8 |
| Average Years of Service | 14.2 | 13.2 |
| Average Compensation | \$ 50,486 | \$ 51,645 |

Understanding an Actuarial Report

V. Summary of Plan Provisions

Retirement and Death Benefits—Division B

- a. Eligibility (Normal Retirement Date) Completion of at least 6 years of Service and the attainment of age 62.
- b. Normal Retirement Benefit A monthly pension commencing on or after Normal Retirement Date payable for life equal to 1.20% of Average Monthly Compensation multiplied by years of Service. (The minimum benefit under Section 8(B)(2) for participants who elected to be in Division B is presumed to be no longer controlling.)
- c. Early Retirement Benefit After the completion of at least 6 years of Service and the attainment of age 55, an active participant may elect to retire and receive a reduced benefit. The reduced benefit is the Accrued Pension reduced 5/12 of one percent for each month by which the benefit commencement date precedes the Normal Retirement Date.

VI. Actuarial Assumptions & Methods

Withdrawal Rates

Sample Rates

| Age | Years of Service | | | |
|-----|------------------|-------|-------|-------|
| | 1 | 2 | 3 | 4+ |
| 20 | 38.6% | 38.6% | 38.6% | 19.3% |
| 30 | 19.4% | 19.4% | 19.4% | 9.7% |
| 40 | 9.0% | 9.0% | 9.0% | 4.5% |
| 50 | 10.0% | 10.0% | 10.0% | 5.0% |
| 60 | 10.0% | 10.0% | 10.0% | 5.0% |

Disability Rates

Sample Rates

| Age | Rate |
|-----|-------|
| 20 | .09% |
| 30 | .11% |
| 40 | .15% |
| 50 | .33% |
| 60 | 1.18% |

Quiz Question

Which One Doesn't Belong?

1. PVFB
 - Present Value Future Benefits
2. PVFS
 - Present Value Future Salaries
3. WTF
 - NO!
4. PVFNC
 - Present Value Future Normal Costs



ACTUARIAL CONCEPTS AND TERMINOLOGY

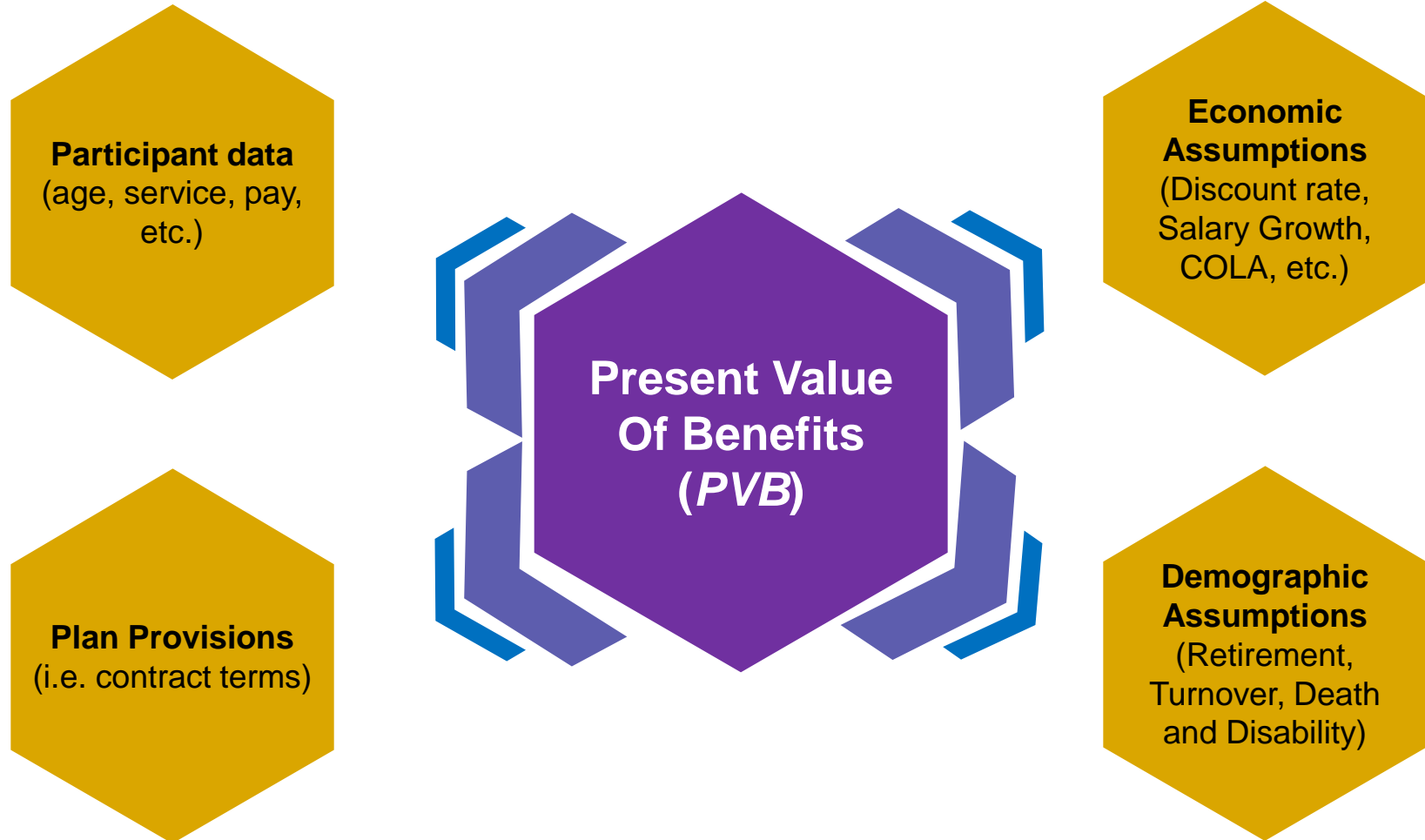
Fundamental Equation Pension Plan Funding

$$C + I = B + E$$

- Contributions (C) + Investments (I) = Benefits (B) + Expenses (E)
- If Investment Return goes down, Contributions must go up to provide the same level of Benefits

Present Value of Benefits (*PVB*)

The **Present Value of Benefits (*PVB*)** is the total projected liability or “promise” for all participants, assuming all assumptions are met.

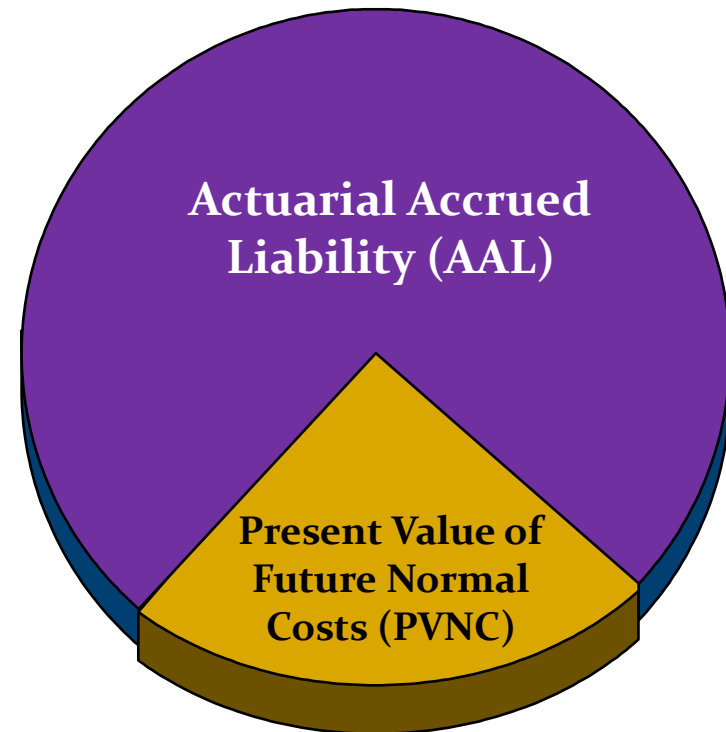


Actuarial Cost Method

The **Actuarial Cost Method** is a mechanism to allocate the present value of benefits (PVB) to time periods (i.e. benefits related to past service vs. future service).

- The **Present Value of Future Normal Cost (PVNC)** is the portion of the PVB *attributable to future service*.
- The **Actuarial Accrued Liability (AAL)** is the portion of the PVB *attributable to past service*.

$$\text{PVB} = \text{AAL} + \text{PVNC}$$



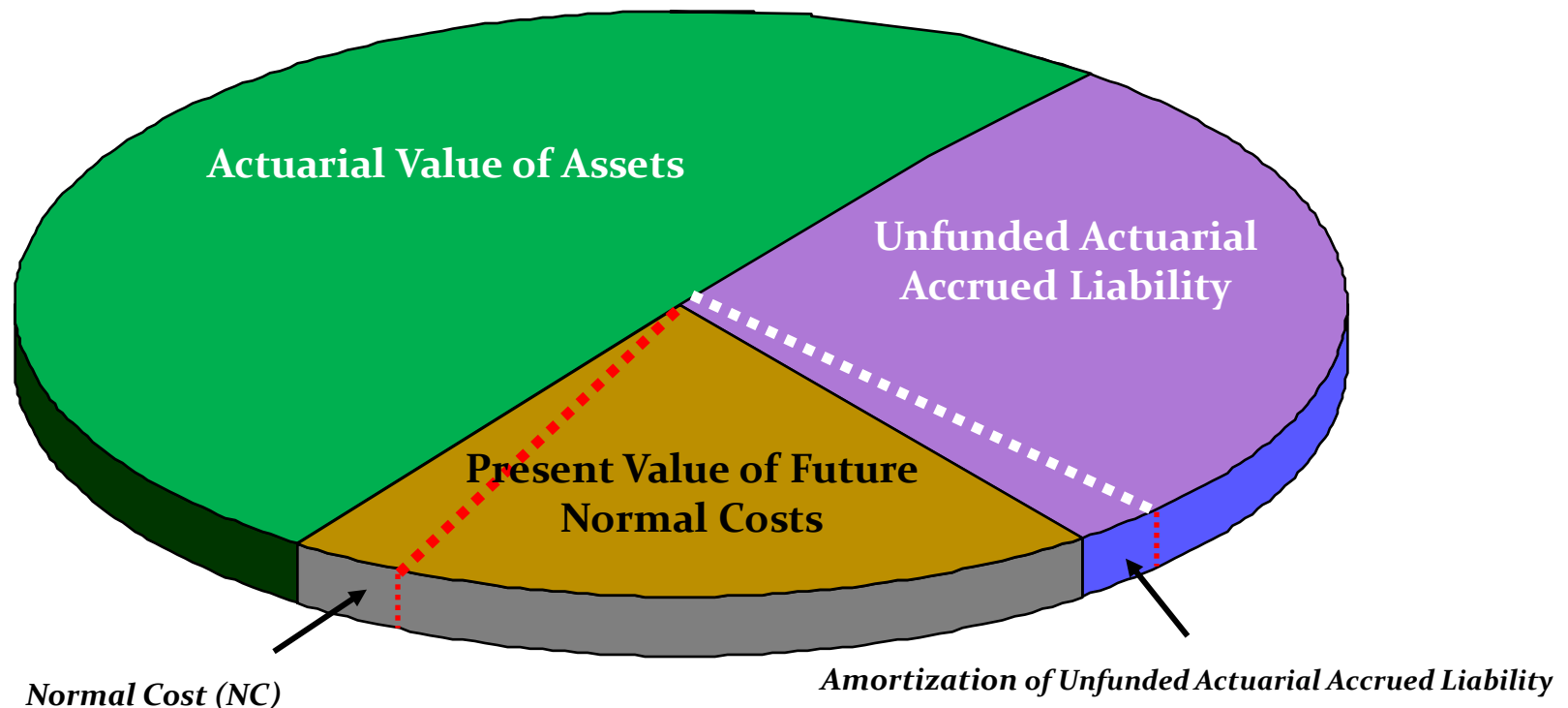
Actuarial Cost Method

- There are several different actuarial cost methods including
 - Entry Age Normal
 - Attained Age Normal
 - Projected Unit Credit
 - Aggregate
- Entry Age Normal actuarial cost method is Used by large majority of public pension plans (Act 205 requires this for municipalities)
 - Goal is level normal cost contribution (as % of salary) from hire (entry age) to retirement (exit)
 - Now required for accounting and disclosures (GASB 67 and 68)
- Features of Entry Age Normal actuarial cost method
 - It allocates PVB over each member's working lifetime (from entry age to exit) on level basis
 - Portion allocated to each year is called the normal cost

Actuarially Determined Contribution

Actuarially Determined Contribution (ADC) = Normal Cost (NC) + Amortization (i.e., payment toward Unfunded Actuarial Accrued Liability (UAAL))

- Normal Cost (NC) = Cost attributable to benefits accruing during upcoming year
- Unfunded Actuarial Accrued Liability (UAAL) = Assets – Actuarial Accrued Liability (AAL)



Quiz Question

Which One Doesn't Belong?

1. AAL

2. UAAL

3. LMAO

4. AVA

- Actuarial Accrued Liability

- Unfunded Actuarial
Accrued Liability

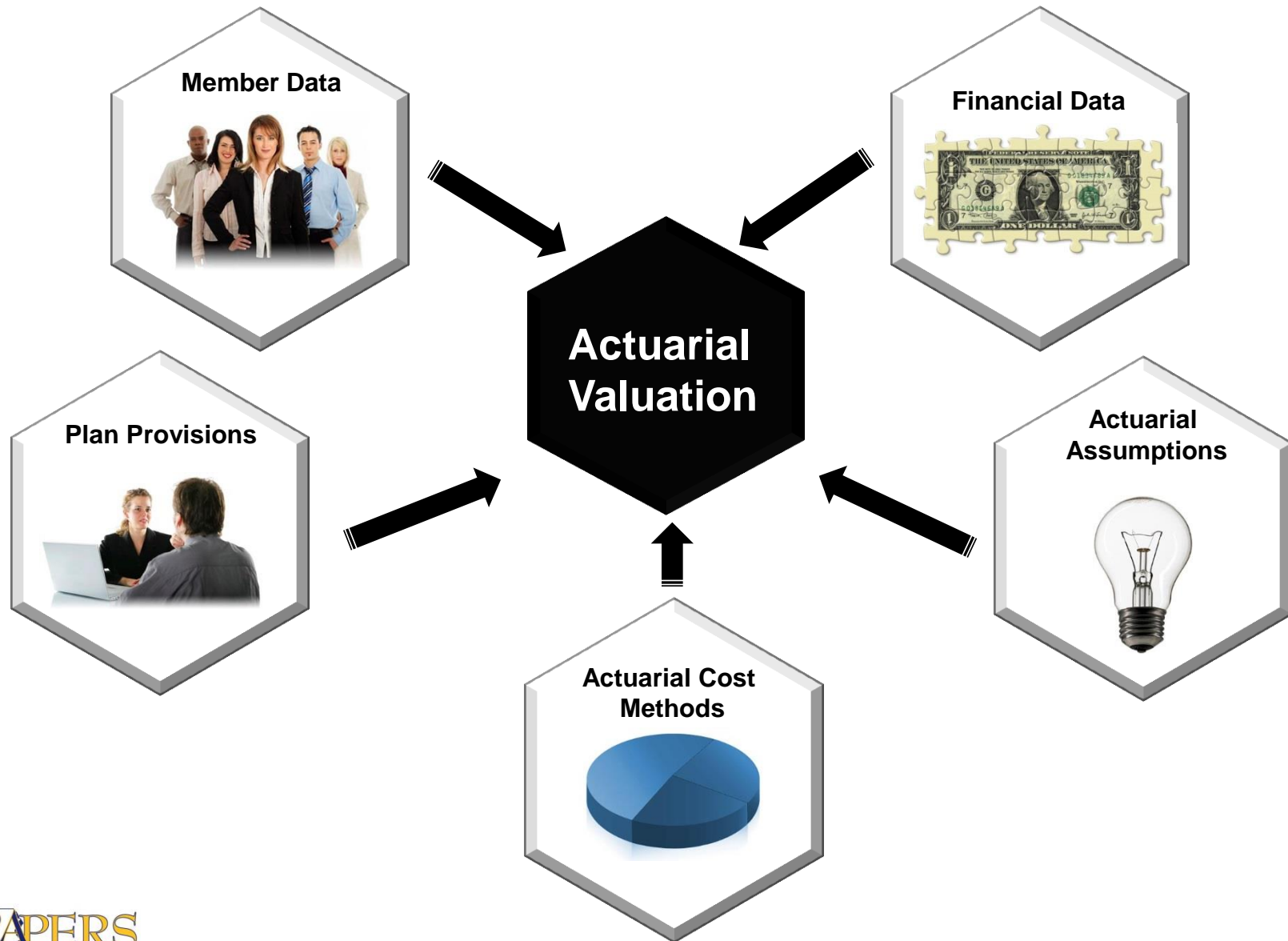
- NO!

- Actuarial Value of Assets



ACTUARIAL ASSUMPTIONS AND METHODS

Actuarial Valuation Process



Types of Actuarial Assumptions

Two types:

- **Demographic Assumptions** - When will benefits be payable? Who will be there to receive benefits? What amount will be payable?
- **Economic Assumptions** - How much will assets grow? How will salaries increase? What is the expectation for long-term inflation?

Economic

- Discount rate (Investment rate of return)
- Salary increases
- Inflation
- Payroll growth rate
- Administrative expenses
- Cost-of-Living Adjustment (COLA)

Demographic

- Retirement
- Withdrawal
- Disability
- Death in active service
- Death after retirement
- Percent married
- Percentage electing refund of contributions
- Percentage electing lump sums

Considerations in Setting Actuarial Assumptions

- Actuary has actuarial standards of practice to follow in selecting, reviewing, or adjusting actuarial assumptions
- Demographic assumptions are harder for non-actuaries to understand
- Economic assumptions are more understandable by non-actuaries
- Board should not try to talk actuary into using more aggressive (optimistic) assumptions to get a more favorable result
- Board is jointly responsible with the actuary for the actuarial assumptions

Actuarial Value of Assets (AVA) Method

- General Methodology
 - Starts with market value of assets (MVA)
 - Mathematical formula is used to adjust MVA
 - Smooths the volatility of MVA over time
 - Asset gains and losses recognized over a period of years (5 most common)
 - $AVA = MVA + \text{deferred losses} - \text{deferred gains}$
 - May be subject to corridor around MVA
- Methodology For Funding
 - Method set by Pennsylvania State Law, Act 44
 - Greater of MVA as of valuation date or the prior valuation's AVA adjusted for benefit payments, contributions, expenses, other cash inflow/outflows, and expected earnings (1% less than the plan's assumption)

Funded Status (Funded Ratio)

$$\text{Funded Status} = \text{Assets} / \text{AAL}$$

- Contributions (C) + Investments (I) = Benefits (B) + Expenses (E)
- If Investment Return goes down, Contributions must go up to provide the same level of Benefits

Where Does the Unfunded (UAAL) Come From?

- If contributions were less than the normal cost
- Start up plan with credit for prior service
- Changes in the actual experience of the plan and participants compared to what was assumed to happen, called actuarial gain or loss
- Changes in actuarial assumptions
- Benefit increases

What is to be done about the UAAL?

- Has to be “paid off” or “amortized”
- Requires consistently earning an investment return above the assumed rate of return or contributions above the normal cost to “pay off” UAAL

Amortization Methodology

- Actuarially Determined Contribution Rate Plan
 - Period in years selected for amortizing UAAL
 - Level percent of payroll (most common) or level dollar amount
 - Closed period or open period
 - UAAL contribution rate actuarially determined in each actuarial valuation

- Fixed Employer Contribution Rate Plan (Assumed to be Fixed)
 - Level percent of payroll (most common) or level dollar amount
 - UAAL contribution rate = total assumed fixed rate (employer + employee) – normal cost contribution rate (actuarially determined)
 - UAAL amortization period in years actuarially determined
 - Open period since recalculated in each actuarial valuation

Quiz Question

Which One Doesn't Belong?

1. Probability of withdrawal
2. Probability of disability
3. Probability of electing a lump sum
- ~~4. Probability of working from home~~



OTHER ACTUARIAL ISSUES

Considerations for the Funding Policy from GASB 68 Accounting Requirements

- Divorce of pension accounting from pension funding
 - GASB 68 addresses only accounting and reporting
 - No GASB funding standard exists (no ARC)

- Pension expense for accounting for employer
 - Driven by accounting theory
 - Distinctly different from funding calculations

- Shorter amortization periods required for pension expense determination
 - Most changes in liability for actives to be amortized over average remaining service of all employees and inactives (retirees and vested terminated members)
 - Ad hoc COLAs to be recognized all at once in year granted

Words Your Actuary Shouldn't Say

- Open amortization
- Negative amortization
- Investment consultant expectations are not reasonable
- Don't worry about your funding level
- Don't worry about making the contributions this year
- My assumptions are always right

Considerations for the Funding Policy from GASB 68 Accounting Requirements

- Balance sheet inclusion of “net pension liability” (for employer)
 - Similar to UAAL except based on MVA
 - More volatile over time than UAAL
- Consequences
 - Change in focus from employer’s long-term responsibility to adequately finance the plan to a short-term emphasis on the plan’s unfunded status
 - **Motivation for establishing or strengthening written funding policy**
 - **Motivation for shorter UAAL amortization period for funding**

Pension Debt is now Real Balance Sheet Debt

Quiz Question

Which One Doesn't Belong?

1. PDA

2. ARS

3. NPL

4. GASB

- NO!
- Average Remaining Service
- Net Pension Liability
- Governmental Accounting Standards Board

Other Resources

- PA COUNTY GUIDE TO Pension Plan Best Practices
(<http://www.pacounties.org/Insurance/services/Documents/20160718PensionBestPracticesFinal.pdf>)
 - AAA Issue Brief: The 80% Pension Funding Standard Myth
(www.actuary.org/files/80_Percent_Funding_IB_071912.pdf)
 - Texas PRB white paper, “Understanding the Basics of Actuarial Methods”
<http://www.prb.state.tx.us/files/education/research/finalbasicsofactmethod.pdf>

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