TEACHERS' AND STATE EMPLOYEES' RETIREMENT SYSTEM & LOCAL GOVERNMENTAL EMPLOYEES' RETIREMENT SYSTEM

BOARD OF TRUSTEES MEETING – April 2018

Investment Return Assumptions

North Carolina
Total Retirement Plans

Dale R. Folwell, CPA
State Treasurer of North Carolina

Agenda

- Background on Rate of Return Assumption
  - How assumption is used
  - Actuaries' professional guidance for setting assumption
  - Recent history
- Review of Current Information
  - 2016 asset allocation study
  - Historical performance
  - Survey information
  - Trends among other public plan sponsors
- Conclusion
  - Staff recommendation
  - Projected impact on actuarial measurements
- Comments from Systems' Consulting Actuary

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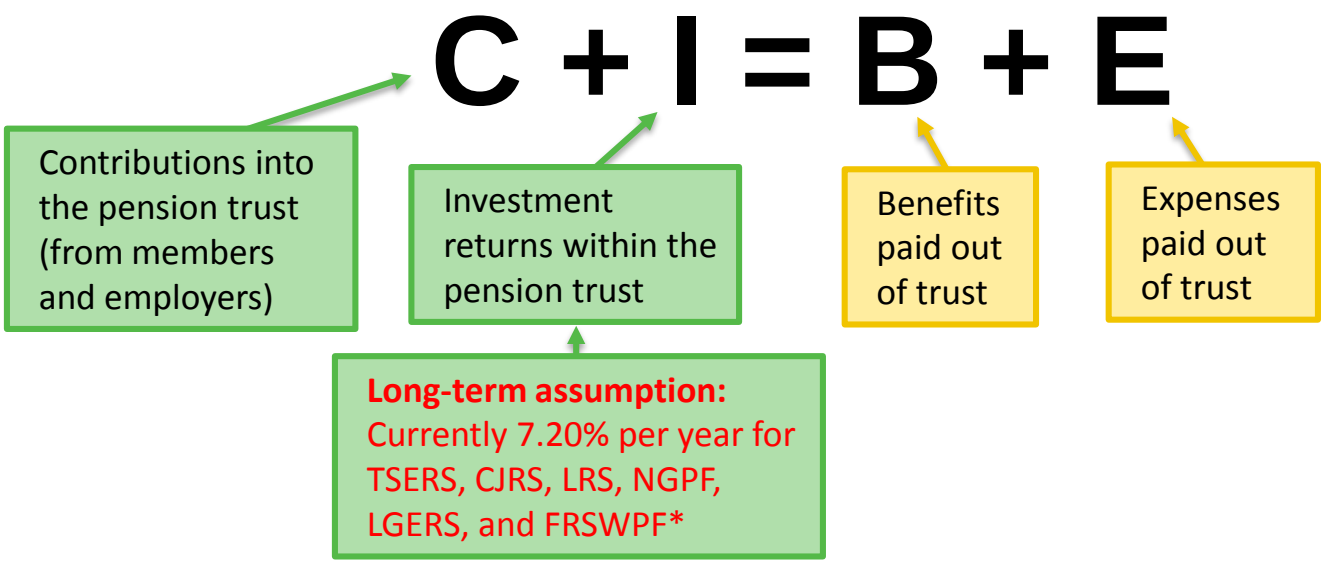
Background on the Rate of Return Assumption

Long-Term Pension Funding Equation



- **Higher levels of actual investment returns** over time will **reduce the required contributions**.
- **Lower levels of actual investment returns** over time will **increase the required contributions**.
- Since we do not know the actual rate of future investment returns, it is necessary to make an assumption.
- The assumption is used for determining required contributions as well as accounting / financial reporting.

* A different assumption, 3.75% per year, is used for the ROD Supplemental Pension Fund, Disability Income Plan of NC and Death Benefit Plans. This presentation addresses the plans that use the 7.20% assumption.

Importance of Investment Return Assumption

"A shortfall in long-term expected investment earnings must be made up by higher contributions or reduced benefits….

An investment return assumption that is set too low will overstate liabilities and costs, causing current taxpayers to be overcharged and future taxpayers to be undercharged. A rate set too high will understate liabilities, undercharging current taxpayers, at the expense of future taxpayers. An assumption that is significantly wrong in either direction will cause a misallocation of resources and unfairly distribute costs among generations of taxpayers….

The investment return assumption is the single-most consequential of all actuarial assumptions in terms of its effect on a pension plan's finances."

NASRA Issue Brief: Public Pension Plan Investment Return Assumptions, Feb. 2018

Actuaries' Professional Guidance for Setting Assumption

- Actuaries practicing in the U.S. follow Actuarial Standards of Practice (ASOPs).
- ASOP No. 27 describes factors to consider when setting economic assumptions such as rate of investment return (see Appendix).
- While historical performance data is informative, assumption is for future returns.
- Long time horizon (20+ years) because of long-term nature of the pension obligations.
- Actuary should select an assumption that is **"reasonable"**:
  - *Appropriate, reflects actuary's professional judgment, accounts for relevant data, reflects actuary's estimate of future experience, and is not significantly biased.*
- Actuary may view a range of assumptions as reasonable.
- Ideally, same assumption will be used for various purposes that rely on an assumed rate of return – including financial reporting (GASB) and plan administration.
  - GASB statements require conformity to ASOPs in setting assumptions.
  - Actuary may discuss with others to ensure agreement.
- For assumption set by another party, if actuary believes it significantly conflicts with what would be reasonable, or cannot evaluate reasonableness, actuary's report must disclose.

Recent History of TSERS/LGERS Investment Return Assumption

- Reviewed at least once every five years as part of the quinquennial experience study (last performed in 2015; next scheduled for 2020).
- 1998: Changed from 7.50% to 7.25%.
- Remained at 7.25% through several experience studies.
- In 2015 experience study, Systems' actuaries noted that over time horizons of 20+ years, there was at least a 60% probability of achieving at least 7.25% compound annual return, based on standard models not customized to the Investment Management Division's capital market views.
  - During this experience study, an assumption of 7% was presented as an alternative. At the time, the Boards were also considering the ECRSPs. The Boards elected to keep the assumption at 7.25% but adopt the ECRSP to ensure adequate prefunding.
- Investment return assumption has been revisited more frequently than once every five years, for reasons including its overall importance, a sustained low interest rate environment, and a trend of assumption updates by other public pension plan sponsors.
- In April 2017, based on data including IMD's 2016 asset allocation study (details later in this material), the Boards approved a reduction in the assumption to 7.20% per year.
- NC has generally maintained consistency between the assumptions / methods used for funding and accounting, although some differences exist because of different rules.

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Review of Current Information

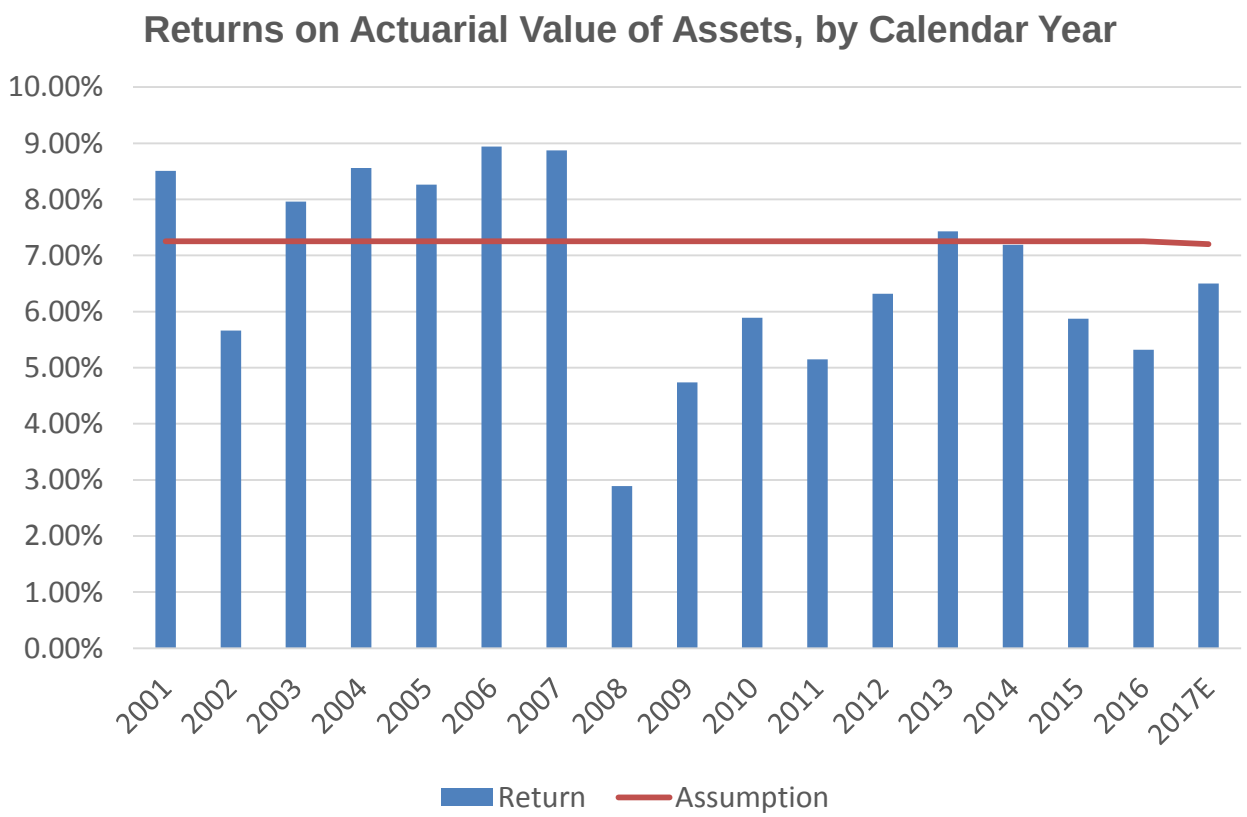
2016 IMD Asset Allocation Study

- Study performed in 2016
  - Based on market conditions and asset allocation as of year-end 2015
  - Incorporates Employer Contribution Rate Stabilization Policies adopted by Boards in 2016
- Expected range of annualized passive compound returns is summarized below
  - All returns are net of expenses
- Both 7.25% (pre-2017 assumption) and 7.20% (adopted in 2017) are somewhat greater than the median 20-year expected return, and close to (but greater than) median 30-year expected return
- At Feb. 2018 Investment Advisory Committee meeting, it was noted that there have been only modest changes in return expectations since the 2016 study, so that there is no urgent need for a new study

Horizon	5th Percentile	25th Percentile	50th Percentile	75th Percentile	95th Percentile
10 Years	0.2%	4.0%	5.9%	8.0%	11.5%
20 Years	2.2%	4.8%	6.7%	8.5%	11.8%
30 Years	3.1%	5.3%	7.1%	8.7%	12.0%

Source: North Carolina Department of State Treasurer and Buck Consulting

Historical TSERS/LGERS Investment Returns



Arithmetic average return over 2001-2017: 6.71%

Source: TSERS valuation reports; NC Dept. of State Treasurer estimate for 2017. Actuarial value generally recognizes gains and losses (relative to expected rate) gradually over five years.

Net NCRS Market Value Returns for Periods Ending 12/31/2017:

Time Period	Annualized Return
10 Years	5.4%
15 Years	7.3%
20 Years	6.5%

Source: "Performance Review," 2/15/2018 Investment Advisory Committee, Page 9. Includes all NC Retirement Systems.

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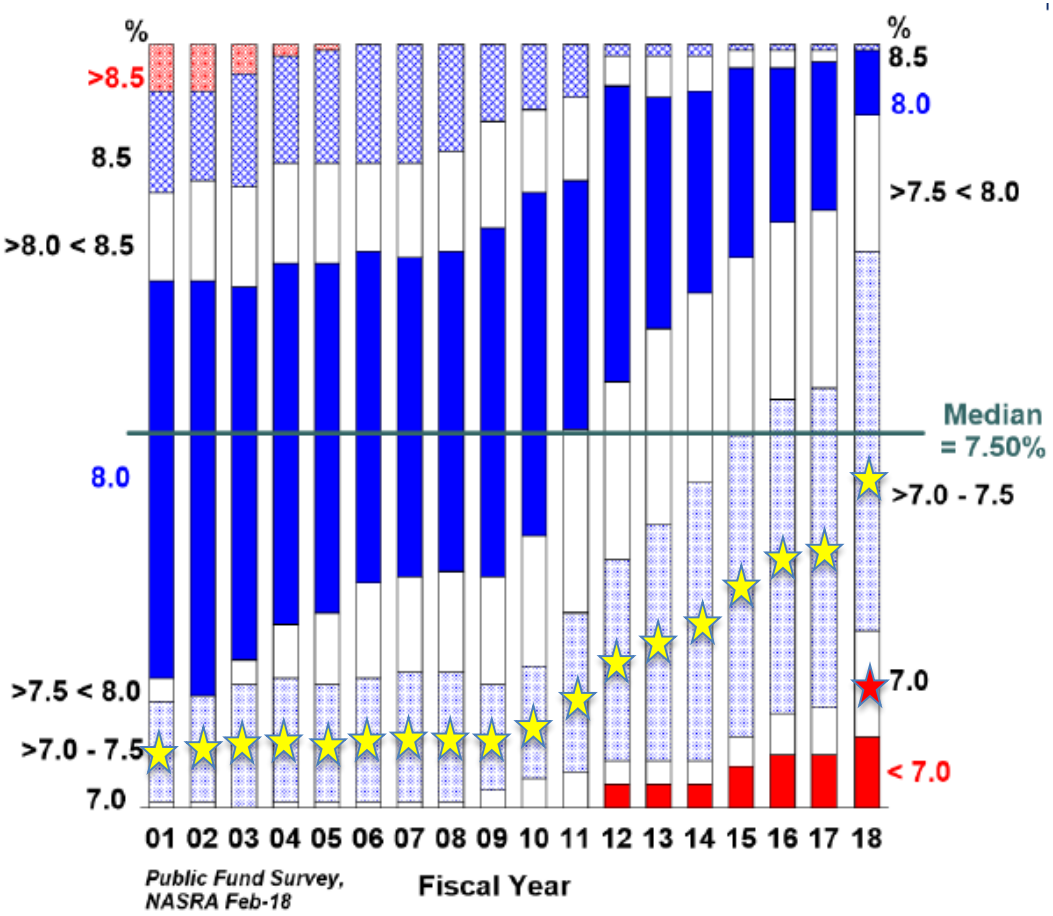
NASRA Public Fund Survey



- Data for 129 state-sponsored retirement systems as of Feb. 2018
- Lower on page represents a lower assumed return relative to others; higher on page is a higher assumption relative to others
- Assumptions may differ from state to state for many structural reasons (e.g. asset allocation, time horizon, treatment of expenses)
- Yellow stars are historical NC assumption, treating half the ">7.0%-7.5%" states as above 7.25% and half below
- **Since financial crisis, median assumption has decreased from 8.00% to 7.50%**
- **NC assumption has decreased from 7.25% to 7.20%, and is now closer to median**
- Red star = 7.0% assumption

Recent Trends in Setting Investment Return Assumption

- **Importance of time horizon**
  - Per ASOPs and GASB literature, the assumption should be a long-term assumption
  - Recently, the long-term compound rates of return predicted by many investment experts have exceeded near-term forecasts (< 10 years) by a large margin
  - In the face of lower near-term expectations, maintaining the long-term view may lead to year-over-year increases in unfunded liabilities
- **"Smoothing" the impact of assumption changes on contribution rates**
  - The assumption should be a reasonable current estimate
  - However, immediately lowering the assumption can cause jumps in contribution rates that are difficult to absorb, especially if there is not a policy like NC's ECRSPs
  - Scheduled explicit reduction may contradict the idea of a reasonable current estimate
  - Solution: Some have implemented an immediate change, but with phased-in recognition of the impact on contributions, sometimes called "direct rate smoothing"
  - There has been acceptance of direct rate smoothing in the actuarial community, under certain conditions (see Appendix)
    - Notably, the smoothing period should be no more than five years, ideally should be part of a regular experience review cycle, and gains/losses should be treated similarly

Some Recent Changes Announced by State Systems

- CalPERS: Reducing from 7.50% to 7.00% over three years
  - Will reduce more quickly if there are "excess returns" in a fiscal year
- CalSTRS: Reducing from 7.50% to 7.00% over two years
- Georgia ERS: Reducing from 7.40% to 7.00%, 0.10% in each year when there are "excess returns"
- Kentucky ERS: Reduced from 6.75% to 5.25%-6.25% (depending on system)
- Louisiana SERS and TRS: Reducing from 7.75% to 7.50% over five years
- Maryland PERS and TRS: Reducing from 7.50% to 7.45%
- Minnesota TRA: Legislature passed reduction from 8.50% to 8.00%, vetoed by governor
- New Jersey PERS, P&F, and Teachers: Reducing from 7.50% to 7.00% over five years
- Washington systems: Reducing from 7.70% to 7.50% (from 7.50% to 7.40% for one plan)

Source: "Latest Investment Return Assumptions," NASRA, as of March 2018
https://www.nasra.org/latestreturnassumptions

Conclusion

Staff Recommendation, Part 1: Assumption / Timing

- Recommendation applies only to TSERS, CJRS, LRS, and NGPF (for TSERS Board) and LGERS and FRSWPF (for LGERS Board)
- Change investment return assumption from 7.20% to 7.00% per year
  - **Effective date:** Actuarial valuations as of December 31, 2017
  - **Funded percentage:** Change to use 7.00% effective December 31, 2017
  - **Contribution rates:** Apply direct rate smoothing, phasing in the impact of the assumption change over three years; will first affect contribution rates for the fiscal year ending June 30, 2020 (more on next page)
  - **Financial reporting:** Change to measuring obligations using 7.00% for FY ending June 30, 2018
    - Financial Operations Division has reviewed this recommendation and agrees that it meets GASB requirements, while noting that the “smoothing” of the contribution-rate impact introduces a new area of divergence between methods used for funding and GASB reporting
  - **Plan administration:** Use actuarial factors at 7.00% for service purchases, optional annuity calculations, and related purposes, effective January 1, 2019
  - **Other economic assumptions in valuation:** Inflation, national average wage growth, and salary increase assumptions will not be adjusted at this time.
- Boards will re-evaluate as part of experience study to be conducted in 2020

Staff Recommendation, Part 2: Direct Rate Smoothing

- Effect of the assumption change on FY 2020 contribution rates (valuation performed in 2018) will be subject to direct rate smoothing over a period of three years
- The increase in employer contribution rate / amount for each system will be measured as of December 31, 2017
  - This increase will be measured on the ADEC before applying any ECRSP or SCRSP
  - Separate LGERS increases for Law Enforcement Officers vs. General Employees / Firefighters
- ADEC, prior to applying any ECRSP or SCRSP, will recognize this change one-third as of 12/31/2017, two-thirds as of 12/31/2018, and 100% as of 12/31/2019
- The ADEC in each year, after this smoothing adjustment, will be subject to conditions of any ECRSP or SCRSP
- In the 2020 experience study, Boards may select new assumption, subject to direct rate smoothing over five years beginning 12/31/2020
- The reason for smoothing the current change over three years, rather than five, is that we are already in the third year of a five-year experience review cycle
- Also in 2020, Boards may consider applying direct rate smoothing to other assumption changes (beside investment return) that may arise from the experience study

Hypothetical Example of Direct Rate Smoothing

Please note: This is a hypothetical example, not a projection for TSERS or LGERS. The example assumes an immediate change from 7.20% to 7.00% would have increased the "pure" ADEC (before applying ECRSP, SCRSP, or direct rate smoothing) by 2.10% of covered pay (=12.10%-10.00% below).

Date of Valuation	Contrib. Year	"Pure" ADEC at 7.20% (old assump.)	"Pure" ADEC at 7.00% (new assump.)	ADEC Prior to ECRSP	Comment
12/31/2017	FY 2020	10.00%	12.10%	10.70%	Impact of assumption change is 2.10% of pay. One-third (0.70%) is recognized in this valuation and two-thirds (1.40%) remains to be recognized.
12/31/2018	FY 2021	Not calculated	12.50%	11.80%	One-third of change (0.70%) remains to be recognized; therefore, subtract 0.70% from the "pure" ADEC.
12/31/2019	FY 2022	Not calculated	11.54%	11.54%	The change made for the 12/31/2017 valuation is fully recognized.

- In this hypothetical example, the "ADEC Prior to ECRSP" column would be subject to further adjustment based on any ECRSP or SCRSP.
- If the Boards were to select a new assumption in the 2020 experience study, the effect of that assumption change would be recognized gradually into contribution rates over five years. This would affect the 12/31/2020 valuation (FY 2023 contribution rate) by 20% of the impact of that change.

Anticipated Effects of Recommendation

1. Obligations and Funded Status
   - Will increase plan obligations by 2% to 3% (both funding and financial reporting)
   - Will generally translate to a reduction in the funded status of 2 to 3 percentage points (e.g., as a hypothetical example, from 92% to 89%-90% funded)
   - Due to more accurate measurement of existing benefits based on the Board's outlook
2. TSERS/LGERS Employer Contribution Rates
   - Based on Conduent projections from January Board meeting, the **fully-phased in** effect the change is an increase in the employer contribution rate of **approximately 2.0%-2.5% of payroll** for TSERS, LGERS (General Employees & Firefighters), and LGERS (Law Enforcement Officers)
   - This change would be recognized gradually in the ADEC over three years
   - Because of the ECRSPs, **actual impact on employer contribution rates may be somewhat less (or even zero) during FY 2020-2022**, if scheduled rate under the ECRSP exceeds ADEC
3. Plan Administration
   - Will increase cost of "full actuarial cost" service purchases
   - Will not affect life annuity, but will decrease amount of certain optional annuities
   - Return assumption is also used for other purposes, such as fund transfer amounts

Summary of Recommendation and Rationale

1. Reduce assumption to 7.00% effective for 12/31/2017 valuations of applicable systems
   - 7.20% exceeds median expected return over 20- and 30-year horizons from latest asset allocation study
   - 7.00% is above the 20-year median expected return, but below the 30-year return
   - Historical 20-year returns have been less than 7%, including some years when interest rates were higher (although historical returns are not the primary rationale)
   - Based on recent NASRA survey of state-sponsored systems, 7.00% assumption would be consistent with taking less investment risk relative to peers
2. Implement direct rate smoothing of the change over three years, then plan for direct rate smoothing of any future changes (aligned with experience studies) over five years
   - Reduces near-term contribution rate impact for employers
   - For all other purposes, including financial reporting, allows obligation to be measured immediately using Boards' best estimate of return
   - Establishing this policy will give future Boards flexibility to select best estimate, with less concern over immediate contribution impact

Comments from Systems' Consulting Actuary

Comment on Proposed Investment Return Assumption

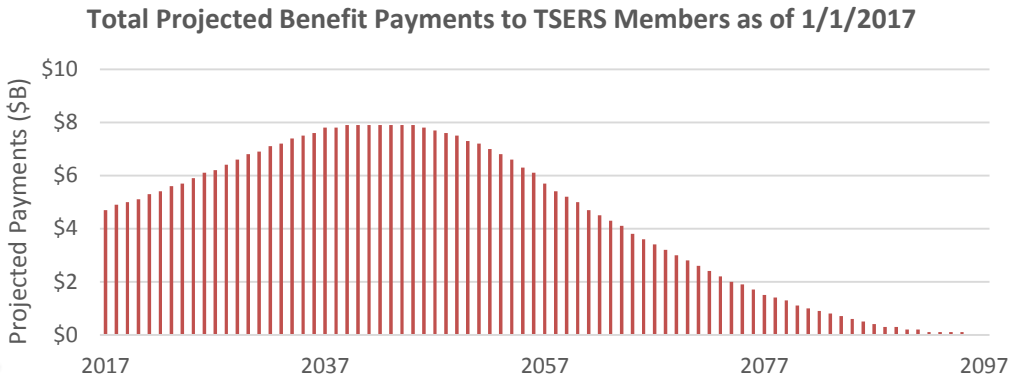
- Based on the 50th percentile expected returns in the 2016 IMD asset allocation study, we support a reduction in the investment return assumption and discount rate to 7.0%
- Increased contributions resulting from the change in the investment return assumption will help secure the benefit promise made to members

Questions

Appendix

How Actuaries Use the Assumed Rate of Return: TSERS 12/31/2016 Valuation as Example (See Step #2)

1. Actuary estimates the benefit amounts payable to each member in each year in the future, based on many assumptions: Pay increases, likelihood of leaving or retiring, life expectancy, and more. (In NC's valuations, this projection includes only members as of the valuation date, not future members.)



2. Actuary determines "present value of all future benefits."

Discounted at 7.20% per year

$86.1 Billion Present Value

3. Actuary applies "cost method" to assign the value of benefits to past/future periods.

Past (Accrued)	$74.5B
Future – Member-Paid	$6.7B
Future – Employer-Paid	$4.9B
Total	**$86.1B**

4. Actuary uses this information, together with plan assets and other information, to develop the actuarially determined employer contribution (ADEC).

ASOP Guidance for Setting Assumption: Factors to Consider

- ASOP No. 27 describes factors to consider when setting economic assumptions such as the future rate of investment return. These include:

Type of Factor	Examples (for Setting Rate of Return)
Context	Purpose of valuation; Time horizon
Components	Inflation; Credit risk; Equity premiums
Data	Current fixed income yields; Forecast returns by asset class; Historical performance
Measurement-Specific	Investment policy; Investment expenses; Volatility
Other Factors	Changes in circumstances; Expert views; Surveys

Actuarial Community's Comments on Direct Rate Smoothing

- "Actuarial Funding Policies and Practices for Public Pension Plans," Conference of Consulting Actuaries Public Plans Community, Oct. 2014
  - Direct rate smoothing may be part of an actuarial funding policy, as a form of smoothing in addition to asset smoothing and amortization of unfunded liabilities
  - "Acceptable practice" for systems with regular experience reviews to phase in the cost impact of an assumption change over the time until the next scheduled review (not longer than five years)
  - If smoothing is applied to cost increases, it should also be applied to cost decreases
  - Not recommended to phase in assumption changes over a period longer than five years, or to phase in the cost impact of actual plan experience or plan changes
- "Report of the Blue Ribbon Panel on Public Pension Plan Funding," independent panel commissioned by Society of Actuaries, Feb. 2014
  - "The Panel encourages the consideration of direct rate smoothing and other asset and liability cash flow modeling techniques. Such approaches can provide greater transparency into the current financial position of the trust, the level of risk in funding assumptions, and enhanced flexibility to sponsors in the development of sustainable funding programs."
  - Potential acceptance of smoothing in situations that the later CCA report would not recommend, such as smoothing cost impact of actual plan experience, or smoothing over long periods of time, with caveat that direct rate smoothing requires high levels of funding discipline and transparency

Actuarial Community's Comments on Direct Rate Smoothing (Cont.)

- "Report of the Pension Task Force of the Actuarial Standards Board," Feb. 2016
  - Recommends that ASOPs No. 27 and 35 be clarified to state "that phase-in of assumptions is only allowed if the assumption actually used is itself reasonable…. This is the PTF's understanding of the original intent of these standards. Anecdotal evidence indicates that some practitioners may be phasing in assumption changes over a period of years and PTF believes that [further] guidance is needed in this situation."
- "Objectives and Principles for Funding Public Sector Pension Plans," American Academy of Actuaries, Feb. 2014, and "Core Elements of a Funding Policy," Government Finance Officers Association, Mar. 2013, did not address direct rate smoothing specifically