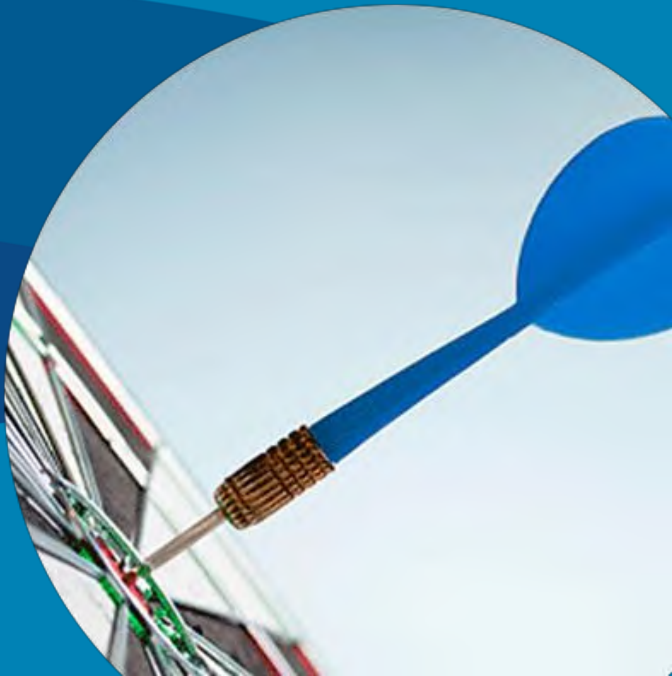
Ohio State Highway Patrol Retirement System

Actuarial Assumptions Review

February 12, 2019



Introduction

- Each year the actuarial liabilities of HPRS are calculated as part of the December 31st valuation
- In order to perform the valuation, we must make assumptions about the future experience of the System with regard to various risk areas
- The results of the liability calculations depend upon those assumptions

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Introduction

- Assumptions should be carefully chosen and continually monitored
  - Continued use of outdated assumptions can lead to ...

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Introduction

- Understated measurements resulting in:
  - An overly optimistic representation of the amortization period required to amortize the unfunded actuarial accrued liability
  - A misallocation of resources between the pension and retiree health plans
  - Benefit levels that need to be reduced and/or sharp increases in required contributions at some point in the future leading to a large burden on future taxpayers
  - In extreme cases, an inability to pay benefits when due

Introduction

- Overstated measurements resulting in:
  - An overly pessimistic representation of the amortization period required to amortize the unfunded actuarial accrued liability
  - A misallocation of resources between the pension and retiree health plans
  - Benefit levels that are kept below the level that could be supported by the employer and member contribution rates
  - An unnecessarily large burden on the current generation of members, employers and taxpayers

Economic Assumptions – ASOP No. 27

- Guidance regarding the selection of economic assumptions is governed by Actuarial Standard of Practice (ASOP) No. 27
- ASOP No. 27 requires that the selected economic assumptions be consistent with one another
- That is, the selection of the investment return assumption should be consistent with the selection of the wage inflation and price inflation assumptions

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Economic Assumptions – ASOP No. 27

- ASOP No. 27 defines a reasonable economic assumption as an assumption that has the following characteristics:
  - It is appropriate for the purpose of the measurement;
  - It reflects the actuary’s professional judgment;
  - It takes into account historical and current economic data that is relevant as of the valuation date;
  - It reflects the actuary’s estimate of future experience, the actuary’s observation of the estimates inherent in market data, or a combination thereof; and
  - It has no significant bias (i.e., it is not significantly optimistic or pessimistic), except when provisions for adverse deviation or plan provisions that are difficult to measure are included and disclosed under Section 3.5.1, or when alternative assumptions are used for the assessment of risk.

Introduction

- No single set of assumptions will be suitable indefinitely
- Things change, and our understanding of things (whether or not they are changing) also changes
- The suggested time period for reviewing assumptions is about every 4 or 5 years (called an Experience Study)
  - However, assumptions need to be reasonable for each annual valuation
  - With the decline in capital market expectations, we are recommending a reduction in the investment return assumption beginning with the December 31, 2018 valuations

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5-Year Experience Study

- Last 5-year Experience Study completed in 2016 and covered the period January 1, 2010 through December 31, 2014
  - Investment return assumption lowered from 8.00% to 7.75%
- An excerpt from that Study (emphasis added):
  - "**if capital market assumptions are lowered from current levels**, it may become necessary to lower the investment return assumption **yet further** prior to the next experience study."

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Capital Market Expectations

- Because GRS is a benefits consulting firm and does not develop or maintain its own capital market expectations, we monitor forward-looking expectations developed by several major investment consulting firms
  - For the last Experience Study the eight firms were:
    - Aon, BNY Mellon, JP Morgan, Mercer, NEPC, PCA, RV Kuhns and Towers Watson
  - For this analysis, the twelve firms are:
    - Aon, BNY Mellon, Callan, JP Morgan, Marquette, Mercer, NEPC, PCA, RV Kuhns, Summit Strategies, Voya and Wilshire

Capital Market Expectations

- For the seven investment consulting firms that were included in the Experience Study analysis and this year’s analysis, capital market expectations for the HPRS’ portfolio has declined by approximately 0.60% over the past 3 years.
  - Ranges anywhere from an increase in expectations of 0.05% to a decrease in expectations of 1.64%

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Economic Assumptions – Current

- Current economic assumptions for the System are as follows:
  - Investment Return 7.75%
  - Wage Inflation 3.50%
  - Price Inflation 2.75%
- We are not recommending any changes to the current wage inflation assumption

Economic Assumptions – Investment Return

- The investment return assumption is the actuarial assumption that has the largest effect on actuarial valuation results
- As more of the actuarial accrued liabilities are related to non-active members, the nominal (as opposed to real) investment return assumption becomes a more prominent factor
- Since one of HPRS' fundamental financial objectives is the receipt of level contributions from one year to the next, the discount rate assumption is set equal to the investment return assumption

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Current Target Asset Allocation

- Based upon HPRS' current target asset allocation, future expectations of various investment consultants were analyzed. The next few exhibits show the results of this analysis.
  - Results are based upon a price inflation assumption of 2.50%

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Projected Investment Returns

Investment Consultant	Investment Consultant Expected Nominal Return	Investment Consultant Inflation Assumption	Expected Real Return (2)–(3)	Actuary Inflation Assumption	Expected Nominal Return (4)+(5)	Investment Expenses	Expected Nominal Return Net of Expenses (6)-(7)	Standard Deviation of Expected Return (1-Year)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1	5.74%	2.20%	3.54%	2.50%	6.04%	0.00%	6.04%	11.91%
2	6.49%	2.26%	4.23%	2.50%	6.73%	0.00%	6.73%	11.49%
3	6.41%	2.00%	4.41%	2.50%	6.91%	0.00%	6.91%	11.35%
4	6.93%	2.50%	4.43%	2.50%	6.93%	0.00%	6.93%	14.04%
5	7.03%	2.50%	4.53%	2.50%	7.03%	0.00%	7.03%	13.44%
6	6.75%	2.21%	4.53%	2.50%	7.03%	0.00%	7.03%	13.76%
7	6.70%	2.00%	4.70%	2.50%	7.20%	0.00%	7.20%	12.59%
8	7.22%	2.31%	4.91%	2.50%	7.41%	0.00%	7.41%	12.76%
9	7.35%	2.26%	5.09%	2.50%	7.59%	0.00%	7.59%	15.26%
10	7.58%	2.25%	5.33%	2.50%	7.83%	0.00%	7.83%	16.03%
11	7.35%	1.95%	5.40%	2.50%	7.90%	0.00%	7.90%	13.25%
12	8.13%	2.00%	6.13%	2.50%	8.63%	0.00%	8.63%	11.29%
Average	**6.97%**	**2.20%**	**4.77%**	**2.50%**	**7.27%**	**0.00%**	**7.27%**	**13.10%**

Projected Investment Returns

Investment Consultant	Distribution of 20-Year Average Geometric Net Nominal Return 40th	50th	60th	Probability of exceeding 7.75%
(1)	(2)	(3)	(4)	(5)
1	4.71%	5.38%	6.05%	18.67%
2	5.47%	6.12%	6.76%	26.20%
3	5.67%	6.31%	6.95%	28.49%
4	5.24%	6.02%	6.81%	28.95%
5	5.45%	6.20%	6.95%	30.22%
6	5.39%	6.16%	6.93%	30.19%
7	5.76%	6.47%	7.17%	32.34%
8	5.95%	6.66%	7.38%	35.11%
9	5.68%	6.52%	7.38%	35.85%
10	5.77%	6.66%	7.56%	37.91%
11	6.35%	7.09%	7.84%	41.13%
12	7.42%	8.05%	8.68%	54.74%
Average	**5.74%**	**6.47%**	**7.21%**	**33.32%**

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Investment Return Assumption

- The preferred investment return assumption in the actuarial community is the forward-looking expected geometric return (i.e., 50th percentile).
  - Based upon the average of each of the investment consultants' expectations, this would lead to an investment return assumption of 6.47%.
- A less preferred investment return assumption, but still reasonable assumption, is the forward-looking expected arithmetic return (i.e., expected 1-year return).
  - Based on the average of each of the investment consultants' expectations, this would lead to an investment return assumption of 7.27%.
  - Note that there is approximately only a 40% chance of achieving at least 7.21% over a 20-year period, so there is a yet smaller chance of achieving at least 7.25% over the period.

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Investment Return Assumption

- Based upon the results of our analysis, our preferred investment return assumption would be 6.50%, based upon a price inflation assumption of 2.50%. However, given the current investment return assumption of 7.75% and the fact that a full Experience Study will be performed after the 2019 valuation, we could accept as reasonable an investment return assumption no higher than 7.25%.
  – If the Board selects 7.25% as the assumptions and capital market assumptions are lowered from current levels, it may become necessary to lower the investment return assumption yet further prior to the next experience study.

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Investment Return Assumption

- While not our preference, we could support an investment return assumption for the December 31, 2018 valuation up to 7.25%.
  - Remember however, the preferred investment return assumption is 6.50%
  - And that our analysis suggests that the probability of achieving at least a 7.25% return over the next 10 to 20 years is less than 40%.

Estimated Effect on Pension Valuation Results

- Presented on the next slide are the estimated effects on the December 31, 2017 pension amortization period based upon a 7.25% investment return assumption
  - Actual December 31, 2017 valuation results will be based upon current assumptions
  - Also included as an assumption change is the adoption of the MP-2018 mortality improvement scale. This change reduces the effect of the change in the investment return assumption.

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Estimated Effect on Pension Valuation Results

	December 31, 2017					
Investment Return	**7.75%**		**7.25%**			
Mortality Improvement	**MP 2015**				**MP 2018**	
Member rate	**12.5%**	**14%**	**12.5%**	**14%**	**12.5%**	**14%**
COLA	**1.25%**	**0%**	**1.25%**	**0%**	**1.25%**	**0%**
Amortization Years	27	17	38	22	34	21

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