



# **Economic Assumptions & Actuarial Methods**

## **OREGON PUBLIC EMPLOYEES RETIREMENT SYSTEM**

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**May 26, 2017**

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# Agenda

- Review of non-investment economic assumptions
- Long-term investment return assumption
- Actuarial methods
  - Cost allocation method
  - UAL/shortfall amortization technique
  - Rate collaring

# Two-Year Rate-Setting Cycle

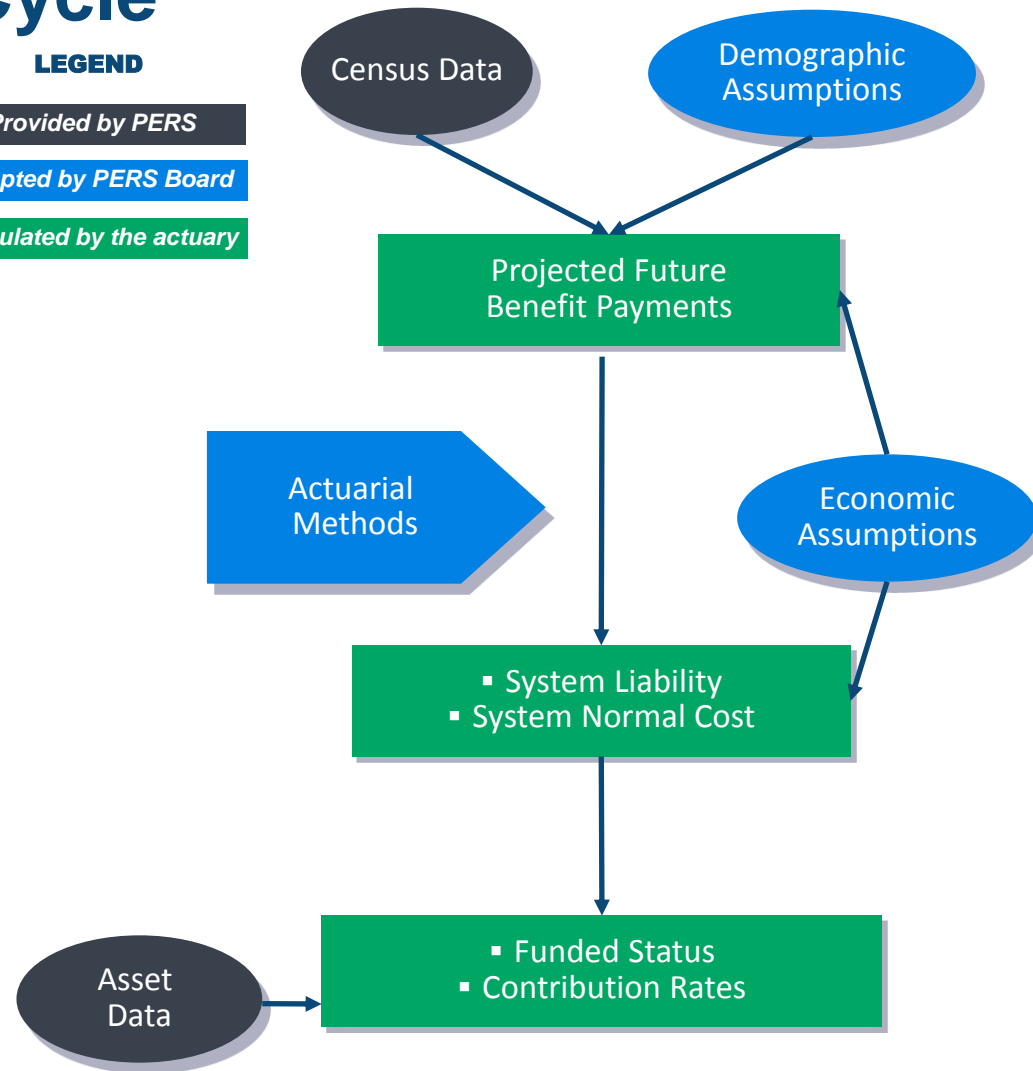
- July 2017: Assumptions & methods adopted by Board in consultation with the actuary
- September 2017: System-wide 12/31/16 “advisory” actuarial valuation results
- November 2017: Advisory 2019-2021 employer-specific contribution rates
- July 2018: System-wide 12/31/17 “rate-setting” actuarial valuation results
- September 2018: Disclosure & adoption of employer-specific **2019-2021** contribution rates

## LEGEND

*Provided by PERS*

*Adopted by PERS Board*

*Calculated by the actuary*



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# Board Objectives - Methods & Assumptions

- Transparent
- Predictable and stable rates
- Protect funded status
- Equitable across generations
- Actuarially sound
- GASB compliant

Some of the objectives can conflict, particularly in periods with significant volatility in investment return or projected benefit levels. Overall system funding policies should seek an appropriate balance between conflicting objectives.

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# The Fundamental Cost Equation

- Long-term program costs are the contributions, which are governed by the “fundamental cost equation”:

$$\mathbf{BENEFITS = EARNINGS + CONTRIBUTIONS}$$

# Governance Structure

- Benefits:
  - Plan design set by Oregon Legislature
  - Subject to judicial review
- Earnings:
  - Asset allocation set by OIC
  - Actual returns determined by market
- Contributions:
  - Funding, including methods & assumptions, set by PERS Board
  - Since contributions are the balancing item in the fundamental cost equation, PERS Board policies primarily affect the **timing** of contributions
  - Different actuarial methods and assumptions produce different projected future contribution patterns



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# **Review of Non-Investment Economic Assumptions**

# Assumptions to Be Reviewed

	12/31/2015 Valuation “Current” Assumptions
Inflation	2.5%
Real Wage Growth	<u>1.0%</u>
Payroll Growth	3.5%
<u>Administrative Expenses:</u>	
- OPSRP	\$5.5 million
- Tier 1/ Tier 2	\$33.0 million



# Economic Assumptions

## Inflation

- The inflation assumption affects other assumptions, including payroll growth, investment return, and health care inflation
- Inflation can vary significantly over time
- One estimate of future inflation can be derived from yields of Treasury securities and Treasury Inflation Protected Securities (TIPS)
- Social Security’s current “intermediate cost” 30-year average inflation assumption is 2.61%
- In our opinion, the current assumption of 2.5% is reasonable

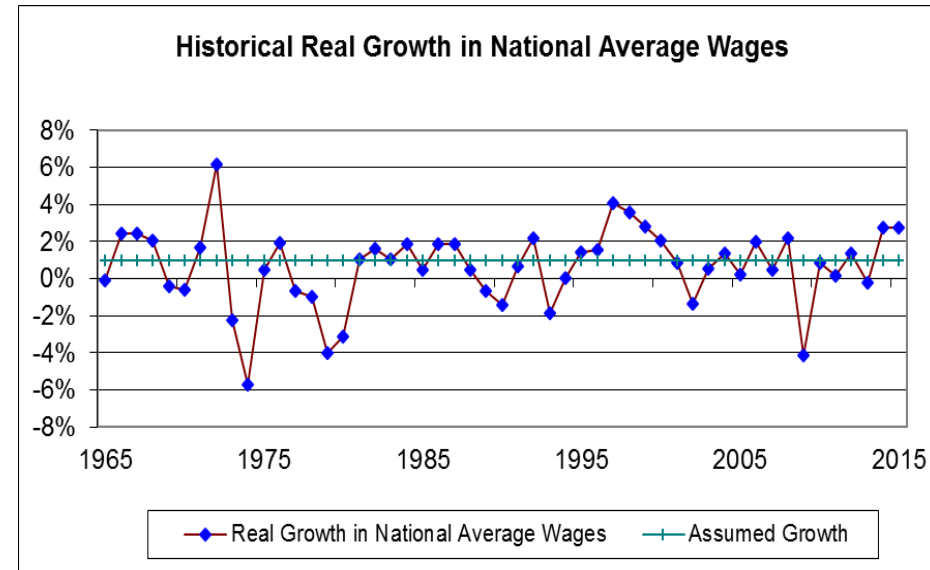
Period Ending 12/31/2016	Average Inflation
10 years	1.81%
20 years	2.12%
30 years	2.64%
40 years	3.62%

As of 12/31/2016	10 Year	30 Year
Treasury Yield	2.45%	3.06%
TIPS Yield	<u>0.50%</u>	<u>0.99%</u>
<b>“Breakeven” Inflation</b>	<b>1.95%</b>	<b>2.07%</b>

# Economic Assumptions

## Real Wage Growth

- An individual member's assumed annual salary increase is composed of:
  - Inflation
  - Real wage growth
  - Individual merit/longevity component
- Real wage growth represents the increase in wages in excess of inflation for the entire group due to improvements in productivity and competitive market pressures
- Social Security's long-term "intermediate cost" real wage growth assumption is 1.2%
- In our opinion, the current assumption of 1.0% is reasonable



Most Recently Available	Average Real Wage Growth
10 Years	0.80%
20 Years	1.18%
30 Years	0.93%
40 Years	0.67%

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# Economic Assumptions

## Payroll Growth

- Overall system payroll growth is assumed to equal the sum of:
  - Inflation
  - Real wage growth
- The system payroll growth assumption determines the shape of the curve of payments to amortize the unfunded liability
- Given that in our opinion both an inflation assumption of 2.5% and a real wage growth assumption of 1.0% are reasonable, the current payroll growth assumption of 3.5% is also reasonable in our opinion
  - Over the past ten years, average annualized system valuation payroll growth has been approximately 3.5%

# Economic Assumptions

## Administrative Expenses

- Actual administrative expenses for recent years are shown below

(\$ millions)	Tier 1/Tier 2		OPSRP	
	Actual Expenses	% of Beginning of Year Assets	Actual Expenses	% of Beginning of Year Assets
2012	\$26.4	0.06%	\$5.3	0.63%
2013	\$29.6	0.06%	\$4.5	0.38%
2014	\$30.1	0.06%	\$5.0	0.30%
2015	\$31.5	0.06%	\$5.7	0.28%
2016	\$35.8	0.07%	\$5.9	0.25%

- Overall, 2016 admin expenses were 0.08% of total assets
- Proposed assumed annual expenses for 2017 and 2018:

Tier 1/Tier 2: \$37.5 million  
 OPSRP: \$6.5 million

# Assumptions to Be Reviewed

	12/31/2015 Valuation Assumptions	12/31/2016 Valuation Proposed* Assumptions
Inflation	2.5%	2.5%
Real Wage Growth	<u>1.0%</u>	<u>1.0%</u>
Payroll Growth	3.5%	3.5%
<u>Administrative Expenses:</u>		
- OPSRP	\$5.5 million	\$6.5 million
- Tier 1/Tier 2	\$33.0 million	\$37.5 million

No explicit assumption is made for investment-related expenses, which are accounted for implicitly in the analysis of the long-term investment return assumption.

\*No action is needed on “proposed” assumptions today, since all assumptions and methods will be adopted at the July 2017 Board meeting

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# Long-Term Investment Return Assumption

# Long-Term Investment Return Assumption

- Uses of the investment return assumption
  - As a “discount rate” for establishing the:
    - Actuarial accrued liability, which is a net present value
    - Associated unfunded actuarial liability, also called the UAL or actuarial shortfall
  - Guaranteed crediting level for regular Tier 1 active member account balances
  - Annuitization rate for converting member account balances to lifetime money match monthly benefits



Reflecting expectations for both investment earnings and benefit levels for certain members, the assumption helps set a reasonable and appropriate budgeting glide path for projected employer contribution rates

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# Investment Return Estimates

- To assist the Board, we developed return estimates based on capital market outlook assumptions from four sources and an industry standard mean/variance model
  - Milliman
  - Callan – Consultant to OIC
  - Pension Consulting Alliance (PCA) – Consultant to OIC
  - 2016 Horizon survey of capital market assumptions (survey of 35 advisors)
- Estimates do not reflect any possible “alpha” due to selected managers potentially outperforming market benchmarks over the long term, net of fees
- Today’s speakers are not credentialed investment advisors
  - We are presenting Milliman capital market outlook model results based on assumptions developed by Milliman’s credentialed investment professionals

Details on each set of capital market outlook assumptions are in the Appendix



# Investment Return Estimates

- Capital market outlooks change over time
  - Milliman outlook updated every six months
  - Recent changes and key factors shown below for Milliman model of PERS asset allocation

Milliman 20-year outlook	May 2015	Nov 2016	May 2017
<b>Median Annualized Return</b>	<b>6.99%</b>	<b>6.84%</b>	<b>6.70%</b>
US Public Equity	6.74%	6.38%	6.36%
Private Equity	7.97%	7.68%	7.82%
US Core Fixed Income	4.00%	4.08%	3.49%
US Short-term Bonds	3.61%	3.55%	3.38%
Real Estate	5.84%	5.68%	5.51%

Asset category returns shown above are 20-year annualized geometric mean returns

# Investment Return Estimates

- Estimates are based on OIC’s target long-term asset allocation
  - Current actual allocation differs somewhat from the target allocation
- Callan, PCA, and Horizon estimates are calibrated over a shorter investment timeframe than Milliman’s estimates
  - Also reflect lower level of assumed inflation

	Milliman	Callan	PCA	Horizon
<b>Median Annualized Return</b>	<b>6.70%</b>	<b>7.05%</b>	<b>7.40%</b>	<b>7.24%</b>
Assumed Inflation	2.50%	2.25%	2.25%	2.16%
Timeframe Modeled	20 years	10 years	10 years	10 years

The median returns shown above are geometric annualized average returns over the timeframes indicated above for each provided set of capital market assumptions

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# Effects of Lowering the Assumed Return

- A lower investment return assumption would produce higher calculated liabilities and contribution rates
- Liabilities are net present values, as of the valuation date, of a benefit payment projection that stretches far into the future
  - Changing the assumption modifies the projected balance of the fundamental cost equation between future investment earnings and future contributions
    - The actual balance will depend on actual investment earnings, not on the assumed return adopted by the PERS Board
  - The effect of lowering the assumed return to 7.00% is estimated as a 3.5% of payroll increase (or 1.8% of payroll increase at a 7.25% assumption) in the uncollared system average base employer contribution rate
- For PERS, such an assumption change would also lower benefits for future retirements calculated under Money Match
  - From “PERS by the Numbers”, in 2016 the Money Match formula determined benefits for 34% of retirees (typically long-service General Service members)
  - Illustration for a hypothetical Tier 1 member shown in Appendix

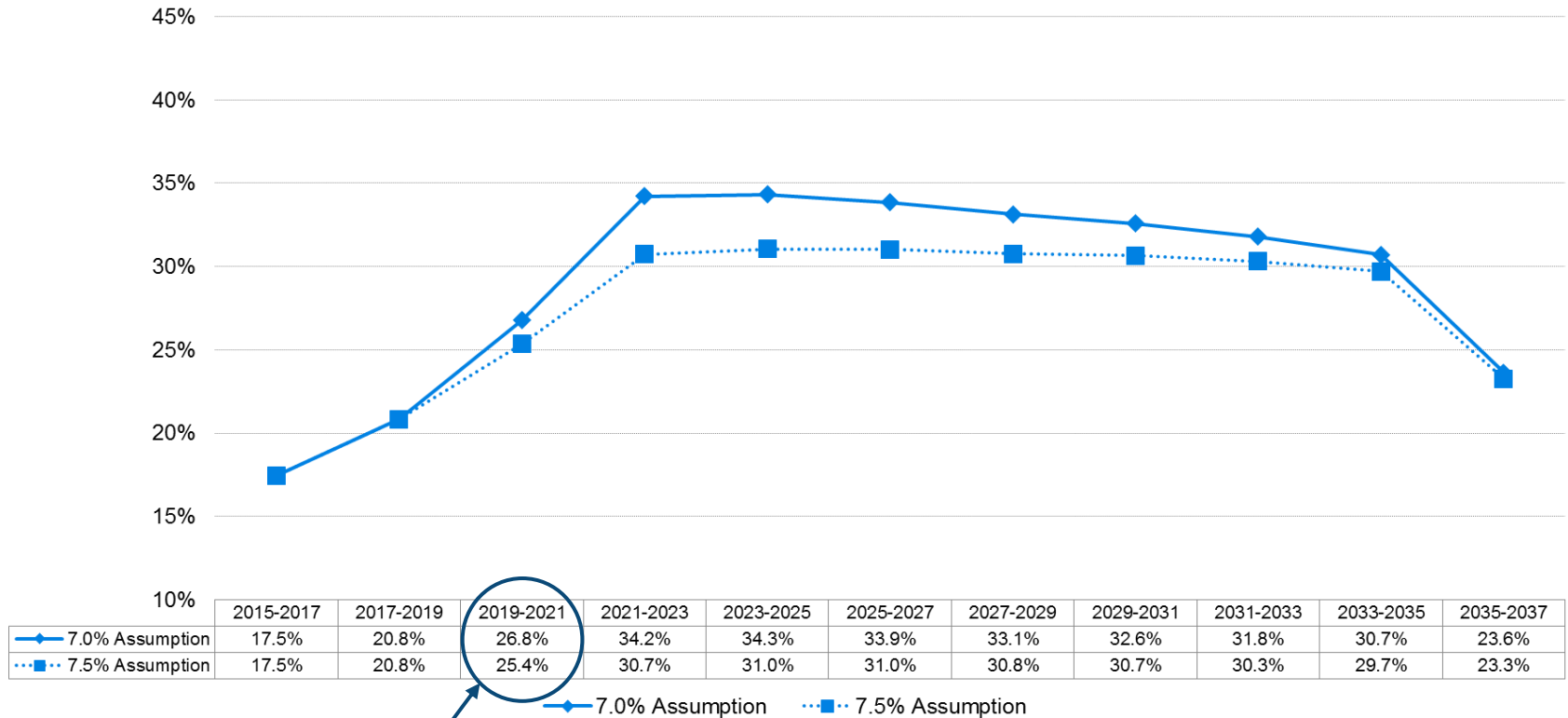
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# Financial Modeling & The Return Assumption

- Milliman prepared additional financial modeling projections, building on work from the November 2016 Board meeting
- Includes projections under both:
  - 7.5% investment return assumption (as presented in November 2016)
  - 7.0% investment return assumption (as requested for subsequent analysis)
- Results are illustrative, not presuming a specific Board decision on investment return assumption
- See November 2016 Board materials for discussion of modeling basis and assumptions

# Actual Return 7.0%; Assumption either 7.0% or 7.5% Employer Contribution Rates

System Average Employer Collared Base Pension Rates

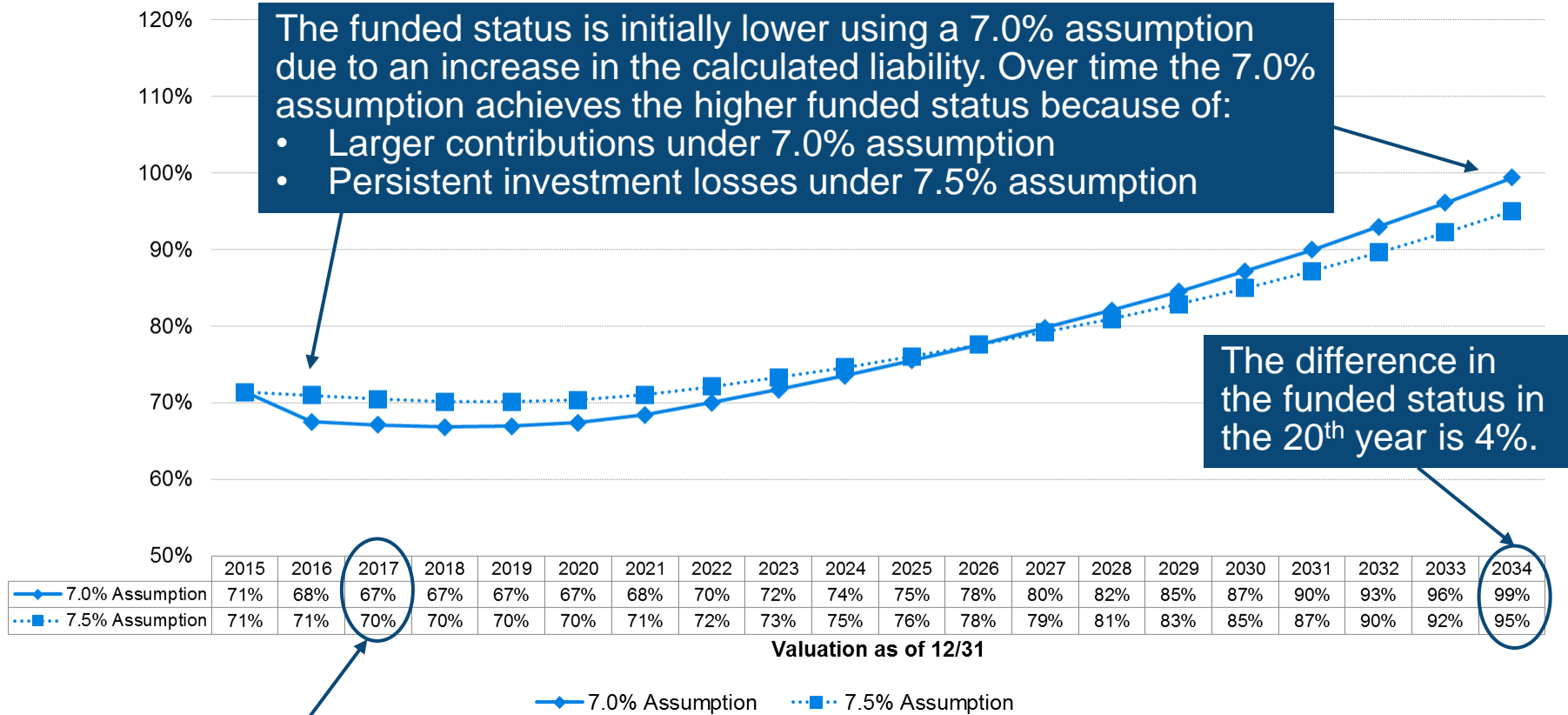


Contribution rates for 2019-2021 will be calculated in the rate-setting actuarial valuation as of year-end 2017, summary results of which will be presented to the Board in July 2018.

# Actual Return 7.0%; Assumption either 7.0% or 7.5%

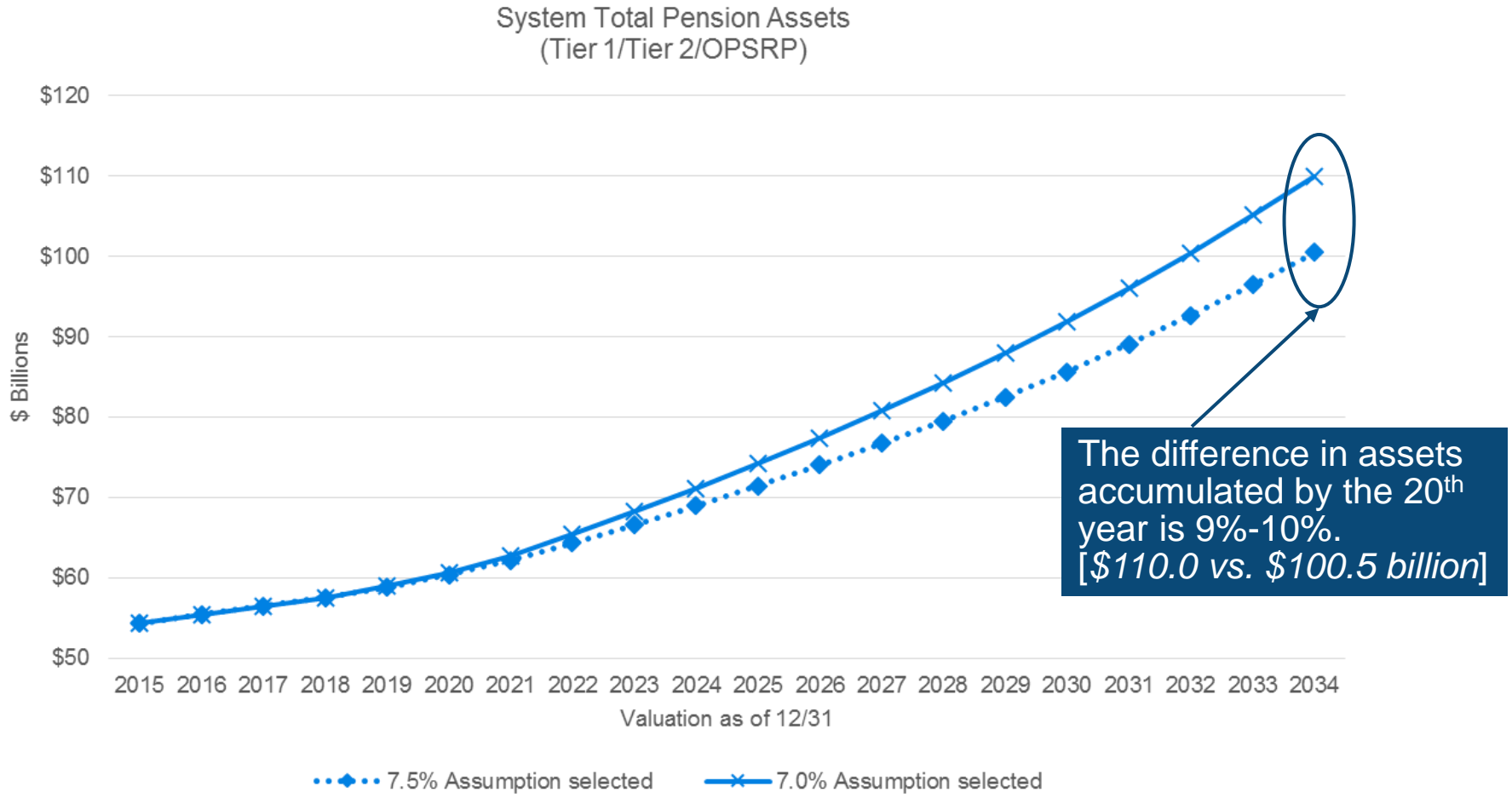
## Year-End Funded Status

System Average Funded Status (Excluding Side Accounts)



The year-end 2017 valuation will calculate 2019-2021 rates. The largest potential variability source from the above projections is likely to be actual investment returns through year-end 2017. For example, actual 2017 return differing from assumption by +/-5% would modify funded status by 3%-4%.

# Actual Return 7.0%; Assumption either 7.0% or 7.5% Valuation Assets (Excluding Side Accounts)



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# GASB and Actuarial Assumptions

- GASB Statements 67 & 68 require financial reporting actuarial assumptions to follow Actuarial Standards of Practice (ASOPs)
- Under ASOPs, if a selected assumption “*significantly conflicts*” with what the actuary considers reasonable, the actuary must make a statement to this effect in the report
- GASB recently published Statement 82 amending (or clarifying) how GASB 67 & 68 apply in such a situation
  - Per GASB 82, employer financial reporting produced using a disclaimed assumption might not be considered GAAP-compliant
- Assumptions requiring disclaimer language could lead to:
  - Need for second set of results on different assumption basis, or
  - Potential for modified audit opinions



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# Wrap-up & Next Steps on the Return Assumption

- In our opinion, the long-term future investment return assumption should be lowered based on the current data from the capital market outlook models, review of the guiding principles, and our perspective regarding Actuarial Standards of Practice
- At the July meeting, we will ask the Board to adopt an assumption for use in the upcoming valuation

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# Actuarial Methods

# Key Actuarial Methods

	12/31/2015 Valuation Methods	12/31/2016 Valuation Proposed* Methods
Cost Allocation Method	Entry Age Normal	No change
Shortfall Amortization Method	Level percent of pay, layered fixed periods:  Tier 1/Tier 2: 20 years OPSRP: 16 years RHIA/RHIPA: 10 Years	No change
Rate Collar	Limits change in based contribution rate to larger of 20% of current rate or 3.00% of payroll; Collar widens incrementally when funded status below 70%	No change

\*No action is needed on “proposed” methods today, since all assumptions and methods will be adopted at the July 2017 Board meeting

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# Cost Allocation Method

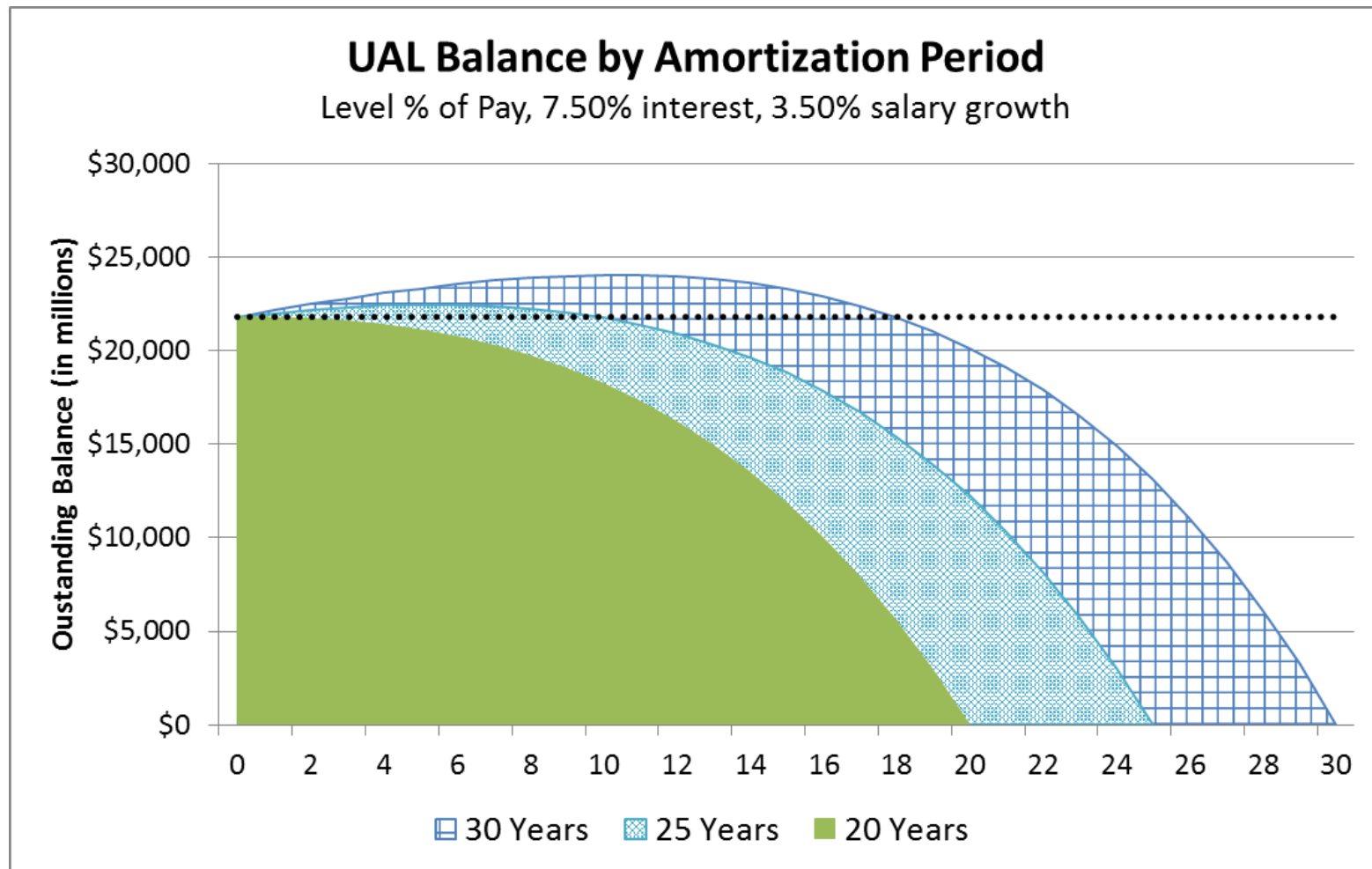
- Rates are calculated to pre-fund retirement benefits during a member's working career if all assumptions are met
- The present day value of projected future benefits allocated to a particular working year is the Normal Cost
- The present day value of projected future benefits allocated to prior years is the Accrued Liability
- The division between past, current & future service is done through use of an actuarial cost allocation method
- PERS currently uses GASB-compliant cost allocation method of Entry Age Normal (EAN)
  - We recommend no change to the cost allocation method

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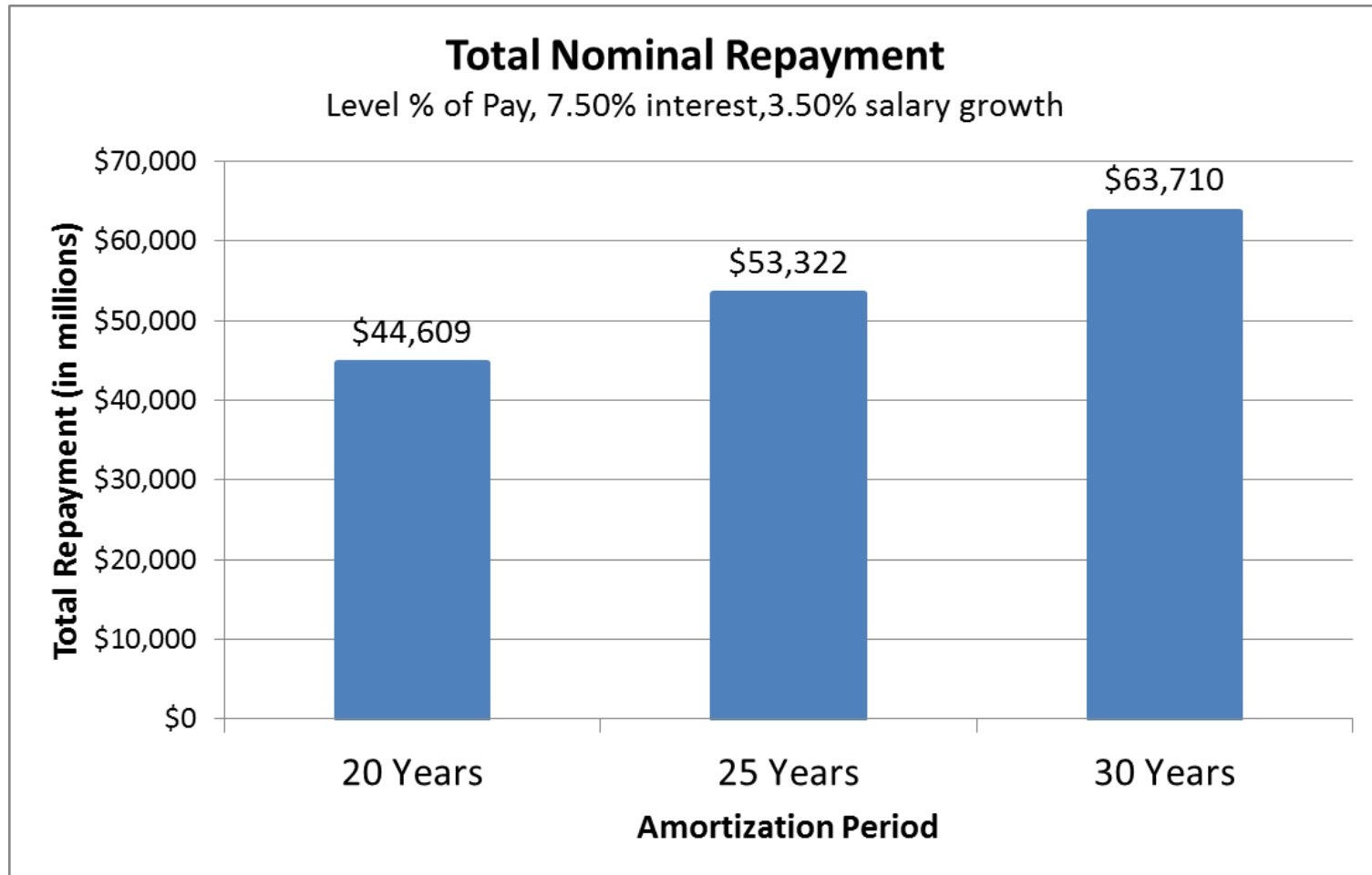
# Shortfall Amortization Periods

- A key part of contribution rate calculations is amortization of Tier 1 / Tier 2 shortfalls over twenty years as a level percentage of payroll
  - As part of changes made in a prior experience study, UAL as of December 31, 2013 was re-amortized over twenty years
  - Subsequent gains or losses, including loss as of December 31, 2015, amortized over twenty years from the rate-setting valuations in which they are recognized
- Twenty years avoids significant negative amortization, where shortfall actually increases in the initial “pay down” years even if assumptions are met and contributions are made
  - The following slide illustrates pay down of a \$22 billion shortfall over periods of 20, 25 or 30 years at current assumptions

# Shortfall Amortization Periods



# Shortfall Amortization Periods



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# The Rate Collar

- In 2005, the Board adopted an employer contribution rate smoothing method called the “rate collar”
- After a major change in unfunded actuarial liability (UAL), the difference between the current contribution rate and the updated actuarially calculated rate can be large
  - The rate collar is a formulaic approach that spreads large employer contribution rate changes systematically across several biennia
- It allows employers to see both:
  - An advanced estimate of the maximum base rate change per biennium
  - The currently estimated long-term (20-year) contribution rate on a current market value of assets basis



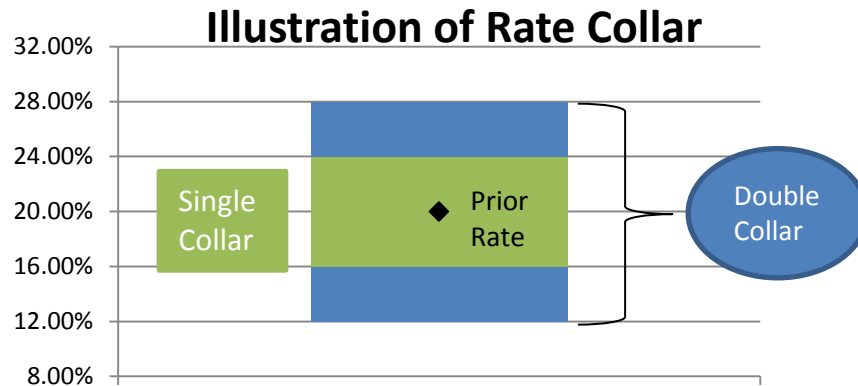
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# Rate Collaring

- The rate collar approach has three steps:
  - Calculate shortfall based on fair market asset values (excluding side accounts)
  - Calculate the actuarially determined UAL Rate based on shortfall amortization period and other key assumptions
  - Check the calculated overall rate (Normal Cost Rate plus UAL Rate) against the contribution rate currently in effect
    - If the actuarial rate change is too large, part of the calculated increase is “collared” and deferred to subsequent periods
    - The UAL Rate actually charged to employers is adjusted downward to reflect the rate collar’s effects

# The Rate Collar's Current Design

- The maximum change typically permitted by the collar is:
  - 20% of the rate currently in effect (3% of payroll minimum collar width)
- If funded status is 60% or lower, the width of the collar doubles
  - 40% of rate currently in effect (6% of payroll minimum collar width)
- If the funded status is between 60% and 70%, the collar size is pro-rated between the initial collar and double collar level



- Collars are calculated at a rate pool level and limit the biennium to biennium increase in the UAL Rate for a given rate pool

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# Agenda for July Meeting

- Review demographic assumptions
- Adopt all methods and assumptions for use in:
  - December 31, 2016 “advisory” actuarial valuation that estimates 2019-2021 contribution rates
  - December 31, 2017 “rate-setting” actuarial valuation that sets recommended 2019-2021 contribution rates for PERS Board adoption

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# Caveats and Disclaimers

This presentation discusses actuarial methods and assumptions for use in the valuation of the Oregon Public Employees Retirement System (“PERS” or “the System”). For the most recent complete actuarial valuation results, including cautions regarding the limitations of use of valuation calculations, please refer to our formal Actuarial Valuation Report as of December 31, 2015 (“the Valuation Report”) published on September 27, 2016. The Valuation Report, including all supporting information regarding data, assumptions, methods, and provisions, is incorporated by reference into this presentation. The statements of reliance and limitations on the use of this material is reflected in the actuarial report and still apply to this presentation.

In preparing this presentation, we relied, without audit, on information (some oral and some in writing) supplied by the System’s staff, as well as capital market expectations provided by Callan and information presented to the Oregon Investment Council. This information includes, but is not limited to, statutory provisions, employee data, and financial information. We found this information to be reasonably consistent and comparable with information used for other purposes. The results depend on the integrity of this information. If any of this information is inaccurate or incomplete our results may be different and our calculations may need to be revised.

Milliman’s work product was prepared exclusively for Oregon PERS for a specific and limited purpose. It is a complex, technical analysis that assumes a high level of knowledge concerning PERS’ operations, and uses PERS’ data, which Milliman has not audited. It is not for the use or benefit of any third party for any purpose. To the extent that Milliman's work is not subject to disclosure under applicable public records laws, Milliman’s work may not be provided to third parties without Milliman's prior written consent. Milliman does not intend to benefit or create a legal duty to any third party recipient of its work product. Any third party recipient of Milliman’s work product who desires professional guidance should not rely upon Milliman’s work product, but should engage qualified professionals for advice appropriate to its own specific needs.

The consultants who worked on this assignment are pension actuaries. Milliman’s advice is not intended to be a substitute for qualified legal or accounting counsel. The signing actuaries are independent of the plan sponsors. We are not aware of any relationship that would impair the objectivity of our work.

On the basis of the foregoing, we hereby certify that, to the best of our knowledge and belief, this report is complete and accurate and has been prepared in accordance with generally recognized and accepted actuarial principles and practices. We are members of the American Academy of Actuaries and meet the Qualification Standards to render the actuarial opinion contained herein.

# Effects of Lowering the Assumed Return

- Lowering the assumption to either 7.00% or 7.25% would affect the Money Match calculation for a member age 59½ with a \$135,000 member account balance as of 6/30/2017 as shown:

Benefit Commencement	Starting Benefit Under Assumed Rate		
	7.50%	7.25%	7.00%
7/1/2017	\$1,971		
12/1/2017	\$2,040		
1/1/2018		\$2,010	\$1,965
3/1/2018		\$2,039	\$1,993
6/1/2018		\$2,081	\$2,033

- At a 7.00% assumption, it would take about six months without retirement for the December 2017 initial benefit level to be reached
  - At a 7.25% assumed return, it would take about three months
  - Illustration ignores Full Formula “floor”, which may mitigate any benefit decrease

# Appendix

## Actuarial Basis

### Capital Market Assumptions - Milliman

For assessing the expected portfolio return under Milliman's capital market assumptions, we considered the Oregon PERS Fund to be allocated among the model's asset classes as shown below. This allocation is based on the Oregon Investment Council's Statement of Investment Objectives and Policy Framework for the Oregon PERS Fund, as revised December 3, 2014, and changes adopted in June 2015.

	Annual Arithmetic Mean	20-Year Annualized Geometric Mean	Annual Standard Deviation	Policy Allocation
US Large/Mid-Cap Equity	7.45%	6.30%	16.25%	15.75%
US Small Cap Equity	8.49%	6.69%	20.55%	1.31%
US Micro-Cap Equity	9.01%	6.80%	22.90%	1.31%
Non-US Developed Equity	8.21%	6.71%	18.70%	13.13%
Emerging Markets Equity	10.53%	7.45%	27.35%	4.13%
Non-US Small Cap Equity	8.67%	7.01%	19.75%	1.88%
Private Equity	11.45%	7.82%	30.00%	17.50%
US Core Fixed Income	3.59%	3.49%	4.55%	8.00%
US Short-Term Bonds	3.42%	3.38%	2.70%	8.00%
US Bank/Leveraged Loans	5.34%	5.09%	7.50%	3.00%
High Yield Bonds	6.90%	6.45%	10.00%	1.00%
Real Estate	6.15%	5.51%	12.00%	10.00%
Global REITs	8.26%	6.37%	21.00%	2.50%
Timber	6.37%	5.62%	13.00%	1.88%
Farmland	6.90%	6.15%	13.00%	1.88%
Infrastructure	7.54%	6.60%	14.65%	3.75%
Commodities	5.43%	3.84%	18.95%	1.88%
Hedge Fund of Funds - Diversified	4.36%	4.09%	7.80%	2.50%
Hedge Fund Event-Driven	6.21%	5.86%	8.90%	0.63%
US Inflation (CPI-U)		2.50%	1.85%	N/A
<b>Fund Total (reflecting asset class correlations)</b>	<b>7.48%</b>	<b>6.74%*</b>	<b>12.97%</b>	<b>100.00%</b>

\* Reflects 0.10% average reduction to model passive investment expenses. The model does not try to assess the actual investment expenses for active management. The model's 20-year annualized geometric median is **6.70%**.

# Appendix

## Actuarial Basis

### Capital Market Assumptions - Callan

For assessing the expected portfolio return under Callan's capital market assumptions, we applied the assumptions shown below provided by Callan.

	<b>10-Year Annualized Geometric Mean</b>	<b>Annual Standard Deviation</b>	<b>Policy Allocation</b>
Large Cap Equity	6.68%	17.40%	<b>15.38%</b>
Small/Mid Cap Equity	7.04%	22.60%	<b>3.00%</b>
Emerging Markets Equity	7.24%	27.45%	<b>4.50%</b>
Global ex-US Equity	6.98%	21.00%	<b>12.75%</b>
International Small Cap Equity	7.00%	24.30%	<b>1.88%</b>
OIC Private Equity	9.50%	26.30%	<b>17.50%</b>
US Fixed Income	2.98%	3.75%	<b>20.00%</b>
Diversifying Strategies	6.25%	11.00%	<b>5.00%</b>
OIC Real Assets	6.60%	15.00%	<b>20.00%</b>
Inflation	2.25%	1.50%	<b>N/A</b>
<b>Fund Total (reflecting asset class correlations)</b>	<b>7.15%*</b>	<b>14.11%</b>	<b>100.00%</b>

\* 10-year annualized geometric median is **7.05%**.

# Appendix

## Actuarial Basis

### Capital Market Assumptions - PCA

For assessing the expected portfolio return under PCA's capital market assumptions, we applied the assumptions shown below provided by PCA in their April 26 presentation to OIC.

	<b>10-Year Annualized Geometric Mean</b>	<b>Annual Standard Deviation</b>	<b>Policy Allocation</b>
Global Equity	7.15%	20.00%	<b>37.50%</b>
Private Equity	8.50%	27.00%	<b>17.50%</b>
OIC Real Estate	7.90%	21.00%	<b>12.50%</b>
OIC Fixed Income	2.90%	7.70%	<b>20.00%</b>
OIC Liquid Alternatives	6.10%	14.00%	<b>6.00%</b>
OIC Illiquid Alternatives	6.80%	14.90%	<b>6.50%</b>
Inflation	2.25%	1.50%	<b>N/A</b>
<b>Fund Total (reflecting asset class correlations)</b>	<b>7.49%*</b>	<b>13.51%</b>	<b>100.00%</b>

\* 10-year annualized geometric median is 7.40%.



# Appendix

## Actuarial Basis

### Capital Market Assumptions - Horizon

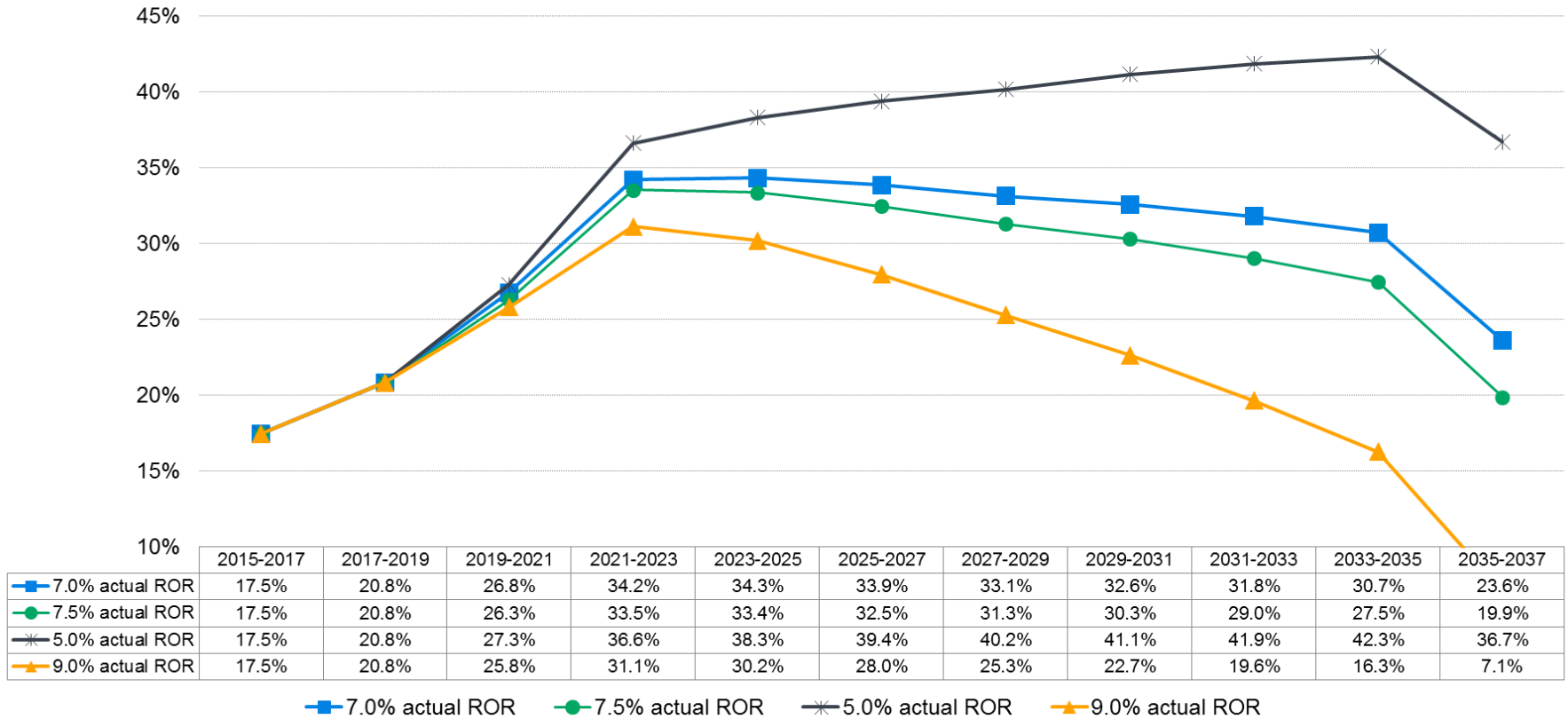
For assessing the expected portfolio return under an additional set of capital market assumptions, we applied the assumptions from the 2016 Survey of Capital Market Assumptions published by Horizon Actuarial Services, LLC. According to the survey report, the 10-year return assumptions shown below represent an average of the expectations for 35 investment advisors responding to the survey.

	<b>10-Year Annualized Geometric Mean</b>	<b>Annual Standard Deviation</b>	<b>Policy Allocation</b>
US Equity – Large Cap	6.64%	16.92%	<b>15.75%</b>
US Equity – Small/Mid Cap	7.00%	21.01%	<b>5.13%</b>
Non-US Equity – Developed	7.12%	19.50%	<b>15.00%</b>
Non-US Equity – Emerging	8.48%	26.35%	<b>4.13%</b>
US Corporate Bonds – Core	3.41%	5.96%	<b>12.00%</b>
US Corporate Bonds – High Yield	5.90%	11.01%	<b>4.00%</b>
US Treasuries (Cash Equivalents)	2.14%	2.79%	<b>4.00%</b>
Real Estate	6.36%	14.74%	<b>13.75%</b>
Hedge Funds	5.41%	8.39%	<b>3.13%</b>
Commodities	3.98%	18.50%	<b>1.88%</b>
Infrastructure	6.59%	13.78%	<b>3.75%</b>
Private Equity	9.22%	23.12%	<b>17.50%</b>
Inflation	2.16%	1.78%	<b>N/A</b>
<b>Fund Total (reflecting asset class correlations)</b>	<b>7.31%*</b>		<b>100.00%</b>

\* 10-year annualized geometric median is **7.24%**.

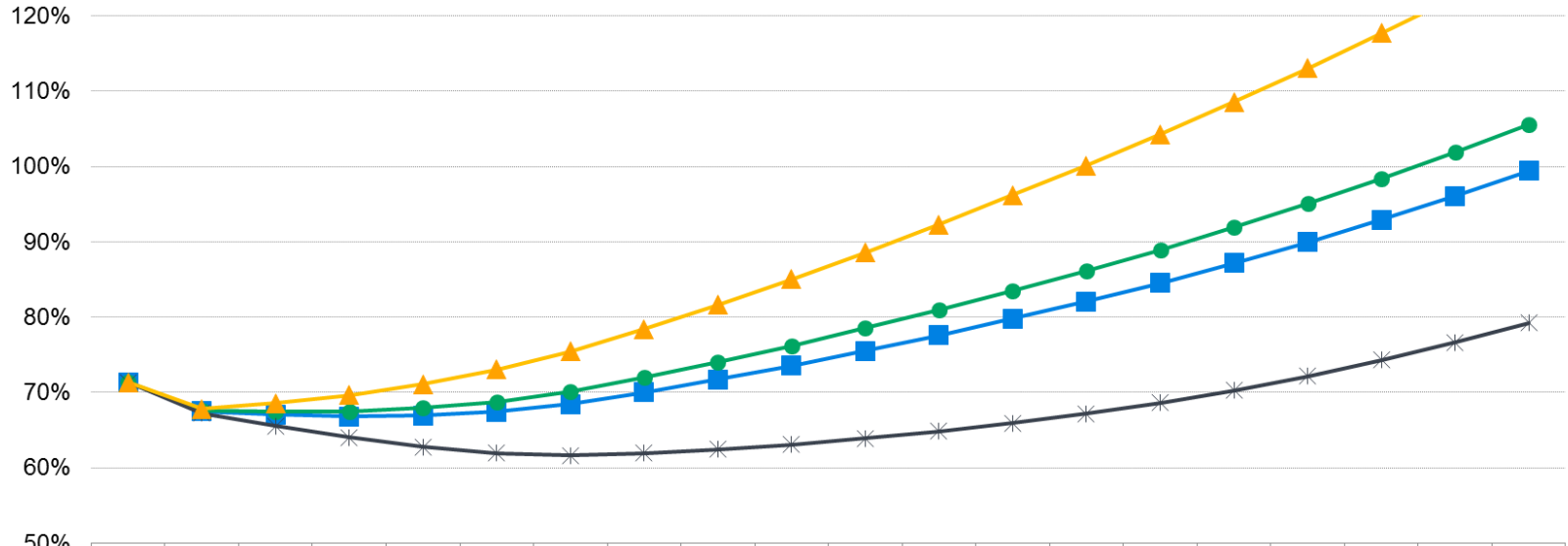
# Financial Modeling: 7.0% Return Assumption

## System Average Employer Collared Base Pension Rates



# Financial Modeling: 7.0% Return Assumption

## System Average Funded Status (Excluding Side Accounts)



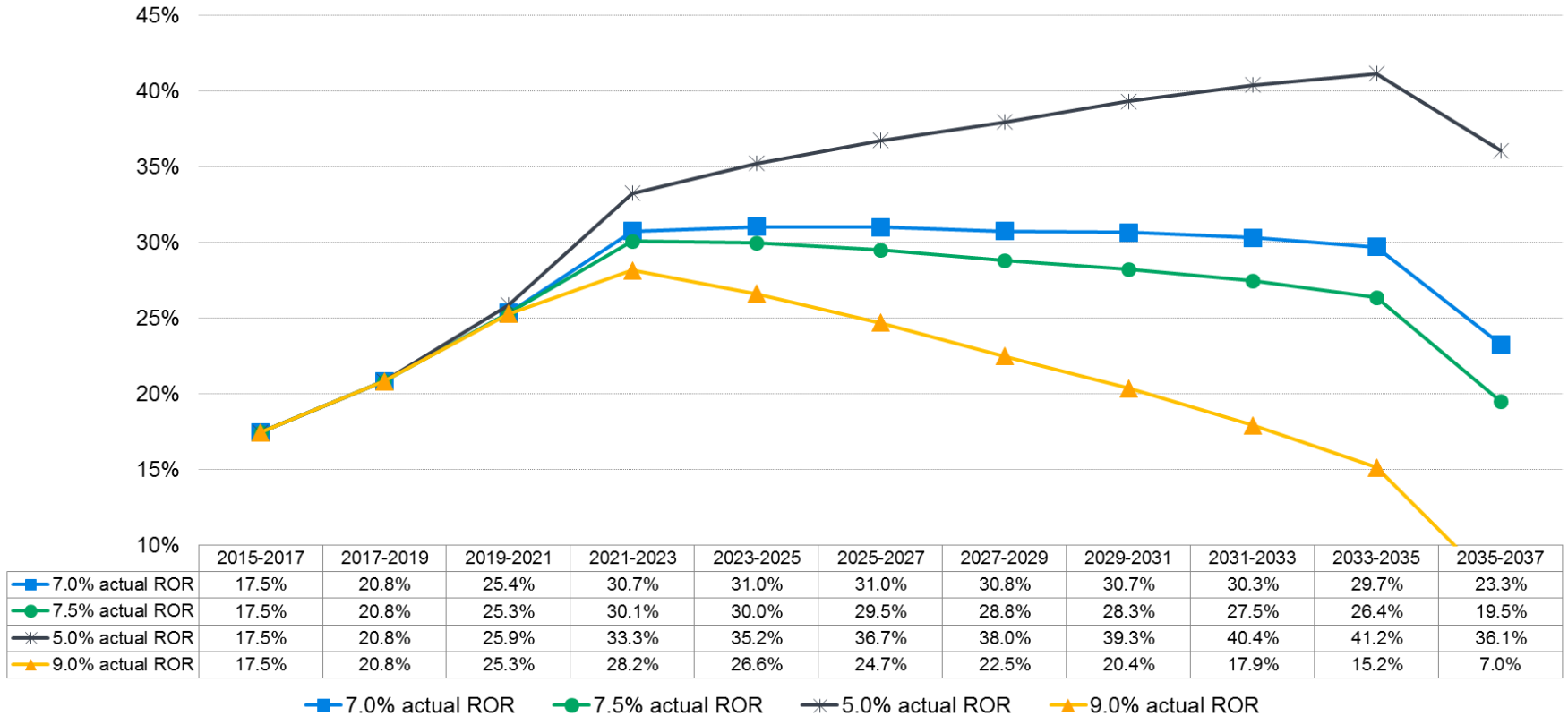
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
7.0% actual ROR	71%	68%	67%	67%	67%	67%	68%	70%	72%	74%	75%	78%	80%	82%	85%	87%	90%	93%	96%	99%
7.5% actual ROR	71%	68%	67%	68%	68%	69%	70%	72%	74%	76%	79%	81%	84%	86%	89%	92%	95%	98%	102%	105%
5.0% actual ROR	71%	67%	66%	64%	63%	62%	62%	62%	62%	63%	64%	65%	66%	67%	69%	70%	72%	74%	77%	79%
9.0% actual ROR	71%	68%	69%	70%	71%	73%	75%	78%	82%	85%	89%	92%	96%	100%	104%	109%	113%	118%	122%	127%

Valuation as of 12/31

■ 7.0% actual ROR    
 ● 7.5% actual ROR    
 ✱ 5.0% actual ROR    
 ▲ 9.0% actual ROR

# Financial Modeling: 7.5% Return Assumption

## System Average Employer Collared Base Pension Rates



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# Financial Modeling: 7.5% Return Assumption

## System Average Funded Status (Excluding Side Accounts)

