

Municipal Employees' Annuity And Benefit Fund of Chicago

Actuarial Valuation as of December 31, 2018

May 23, 2019

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Discussion Topics

- Summary of Valuation Results
- 50-Year Projection
- Pension Risk
- Membership, Assets, and GASB 67
- Appendix

Purposes of the Actuarial Valuation

- Report the Fund's actuarial assets
- Calculate the Fund's liabilities
- Calculate the Actuarially Determined Contribution (ADC) for the upcoming year and compare to the statutorily required contribution
- Explore the reasons why the current valuation differs from the prior valuation
- Determine the net pension liability and pension expense under Governmental Accounting Standards Board (GASB) Statements 67 and 68
- Provide other information for annual financial statements

Summary of Valuation Highlights

- **The risk of insolvency for MEABF has increased due to the 2018 investment return performance combined with fixed-dollar contributions through 2022, which do not change when the Fund experiences unfavorable investment performance.**
- Market value of assets returned -4.9% (Segal estimate) for year ended 12/31/2018
 - Gradual recognition of deferred gains resulted in 4.3% return on actuarial value of assets.
- The funded ratio declined from last year due to contributions being less than the cost of benefits accrued during the year and interest on the unfunded liability, as well as unfavorable investment experience.
 - Market value basis decreased from 28.0% (as of 12/31/2017) to 23.3% (as of 12/31/2018)
 - Actuarial value basis decreased from 27.4% to 25.0%
- Employer contributions booked for 2019 and to be received in 2020 are expected to be \$421 million.
- The actuarially determined contribution for 2019 is \$1,117 million.
 - Shortfall of approximately \$696 million
- **We strongly recommend an actuarial funding method that targets 100% funding where payments at least cover interest on the unfunded actuarial liability and a portion of the principal balance. If the Fund becomes insolvent, the employer will be required to make contributions on a “pay as you go” basis, which means the employer would have to pay all benefits as they become due.**

Valuation Results (\$ in millions)

	December 31, 2018	December 31, 2017
Actuarial Accrued Liability:		
• Active Members	\$5,954	\$5,872
• Inactive Members	546	505
• Retirees and Beneficiaries	<u>10,309</u>	<u>9,905</u>
Total	\$16,809	\$16,282
Actuarial Assets	<u>4,196</u>	<u>4,457</u>
Unfunded Accrued Liability	\$12,613	\$11,826
Funded Ratio	25.0%	27.4%

Numbers may not sum due to rounding

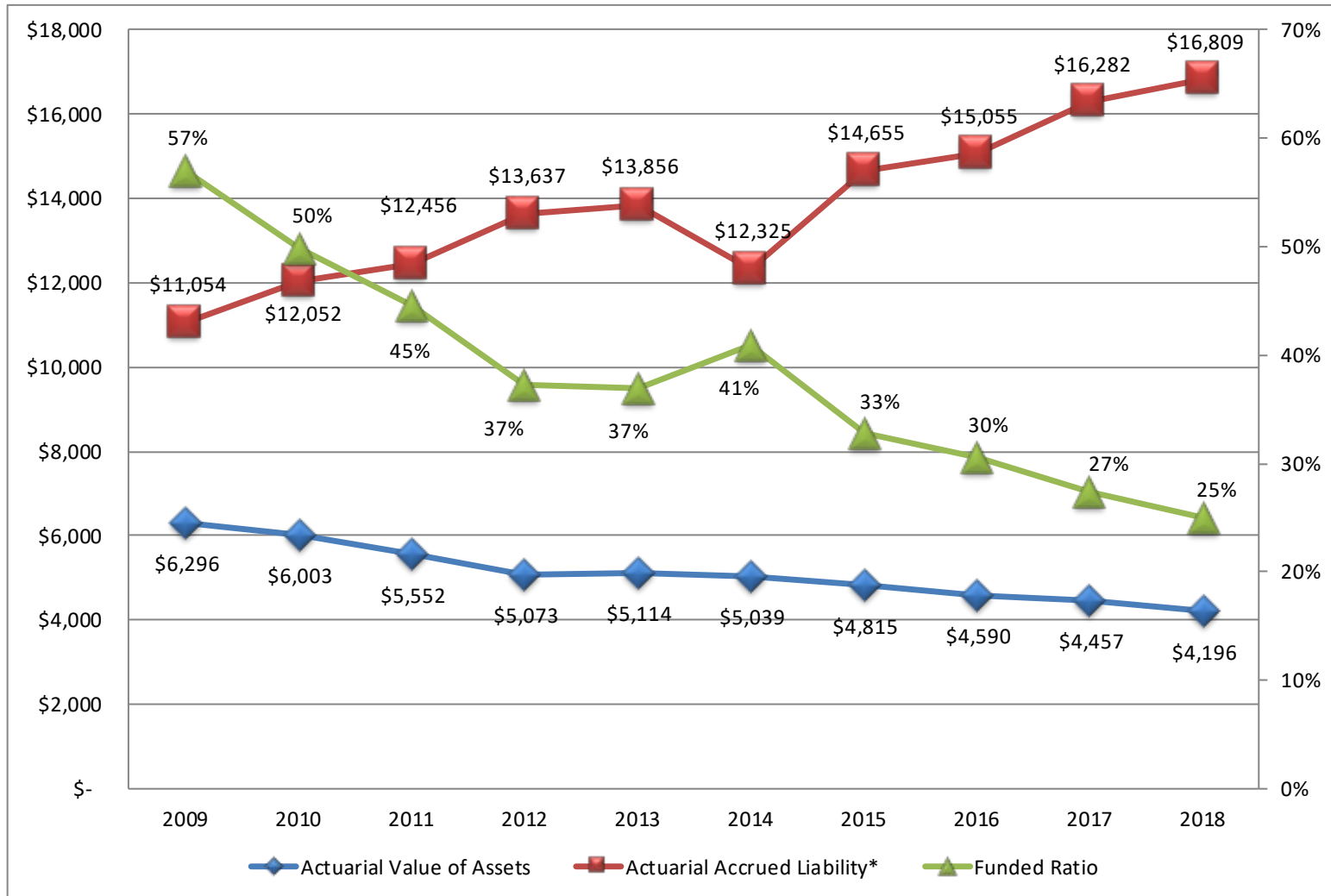
Reconciliation of Unfunded Liability

Reconciliation of Unfunded Actuarial Accrued Liability (\$ Millions)	
Unfunded Liability as of 12/31/2017	\$11,826
Effect of Contributions Less than Normal Cost and Interest on Unfunded Liability	<u>581</u>
Expected Unfunded Liability as of 12/31/2018	12,407
Changes Due to (Gain)/Loss from:	
• Investments	111
• Demographics	<u>96</u>
• Total	<u>206</u>
Unfunded Liability as of 12/31/2018	\$12,613

Numbers may not sum due to rounding

Actuarial Accrued Liability Vs. Actuarial Assets

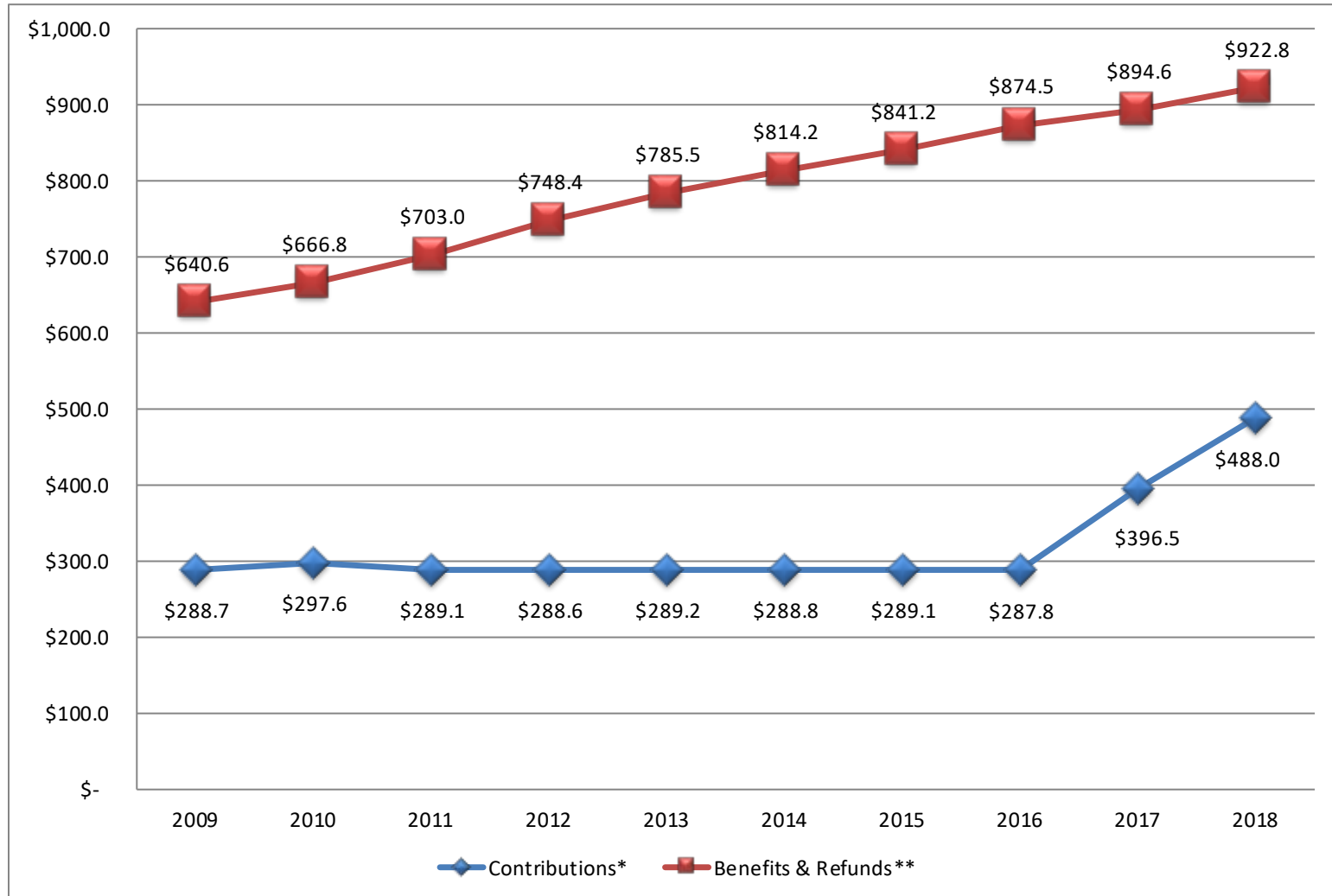
\$ Millions



* Includes OPEB for years prior to 2016

Contributions vs. Benefits and Refunds

\$ Millions



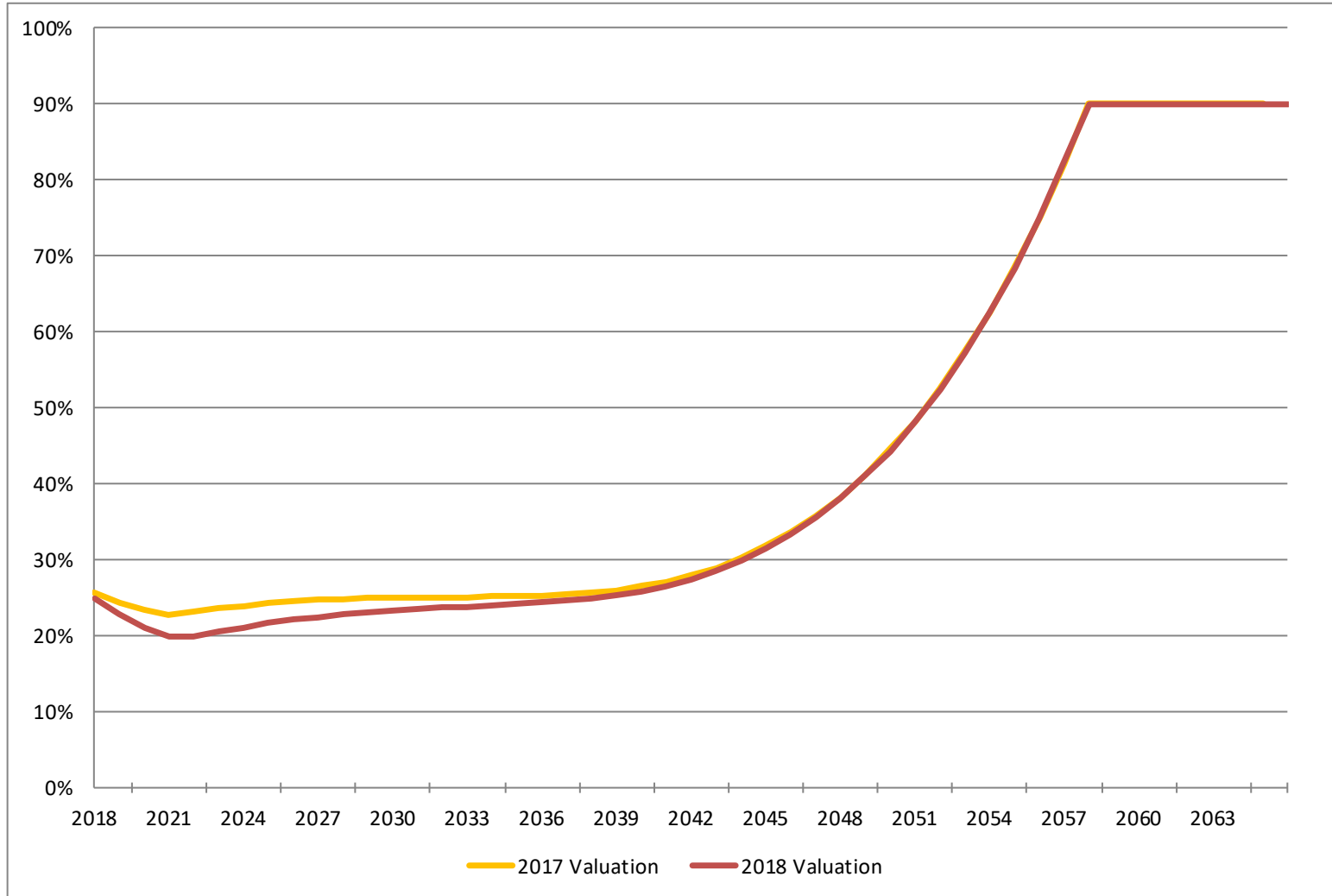
* Includes member and employer contributions

** Includes OPEB benefits for years prior to 2017 and administrative expenses

50-Year Projection

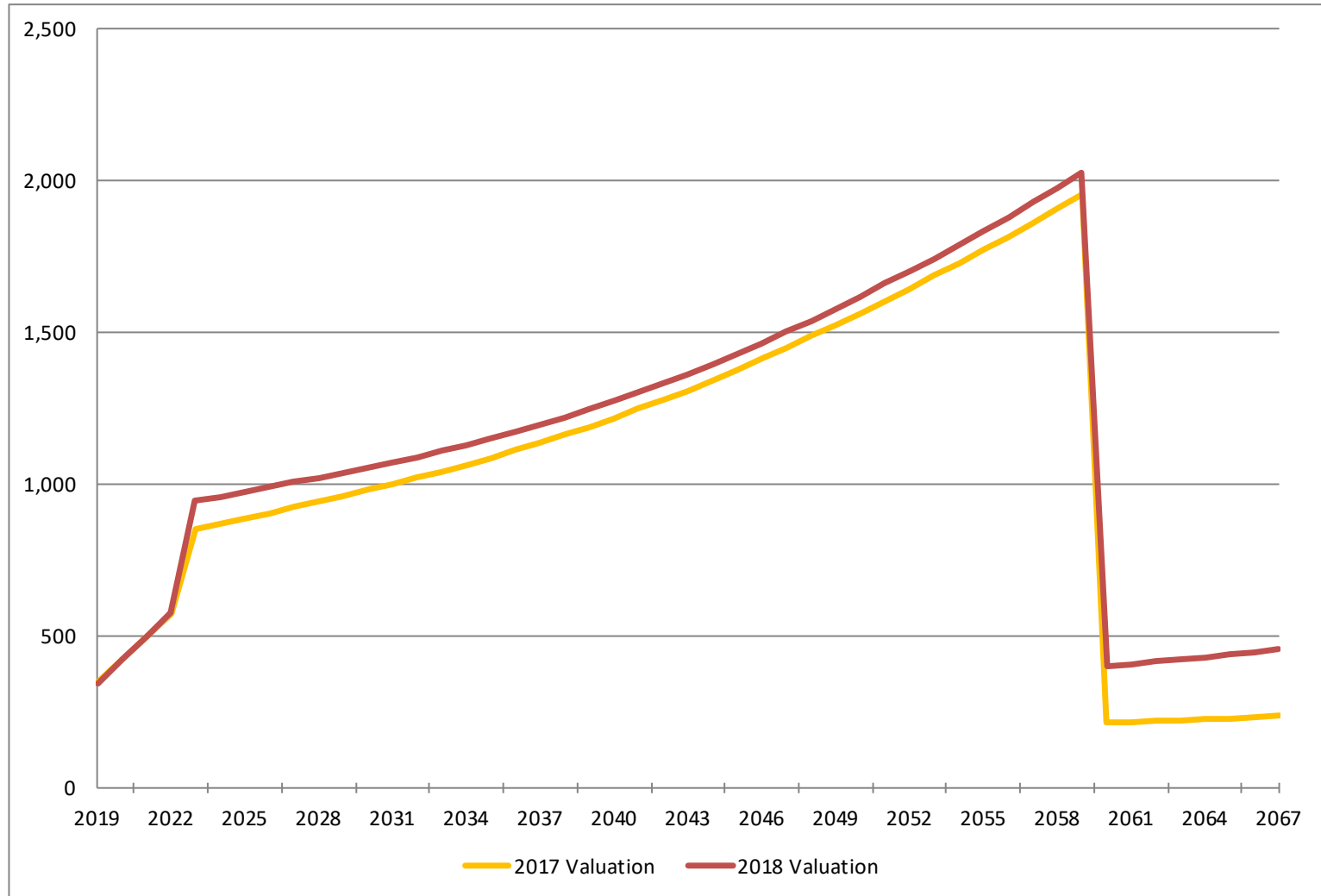
- Based on the results of the December 31, 2018 actuarial valuation
- Future member and employer contributions are made in accordance with Public Act 100-0023
- Assets are assumed to earn 7.0% per year
- The active population is assumed to remain level and future members are assumed to have similar characteristics to new members hired within the past 10 years

Projected Funded Ratio (AVA Basis)



Projected Employer Contributions

\$ Millions



Actuarial Standard of Practice (ASOP) 51

Understanding Pension Risk

- Important for stakeholders to understand risk
 - Considerations when Plans mature, populations change and investments are volatile
 - Considerations when looking at plan design changes
- Actuarial valuation reports use a single set of assumptions, and have limited usefulness for risk analysis
- Risk evaluation requires an analysis of potential future outcomes under different scenarios
- ASOP 51 requires that actuaries help users of our actuarial reports gain a better understanding of the risks inherent in the measurement of pension plan obligations (i.e., perform a risk evaluation)

Examples of Pension Plan Risks

➤ Investment Return Risk

- Risk that investment returns will fall short of assumption

➤ Plan Maturity Risk

- Asset size as a percentage of payroll

➤ Contribution Risk

- Risk that contribution amounts will be unaffordable

➤ Longevity (or Mortality) Risk

- Retirees and beneficiaries living longer than assumed

➤ Retirement Risk

- Members retiring earlier than assumed

➤ Legislative Risk

Measures of Investment Risk

Sensitivity Tests

- *Example:* Effect of lowering the investment return assumption on the funded status and ADC

Stress Tests

- *Example:* Solve for an investment return where any return lower will ultimately increase the contribution amount above a set threshold

Scenario Tests

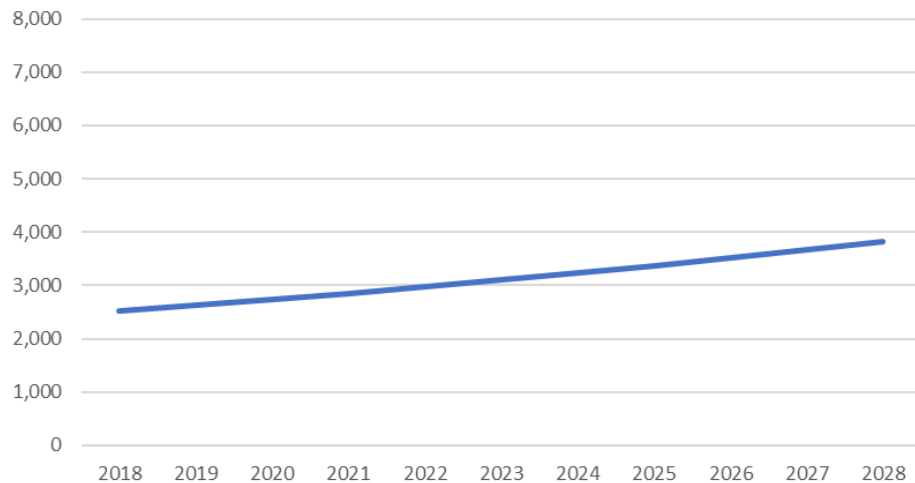
- *Example:* Projections based on a single set of assumptions, e.g., using the current investment return assumption and other scenarios varying the market return

Stochastic Projections

- *Example:* Projections using a defined asset allocation mix to produce a distribution of possible returns and determine, for example, the probability of required employer contribution exceeding a set threshold in 10 years

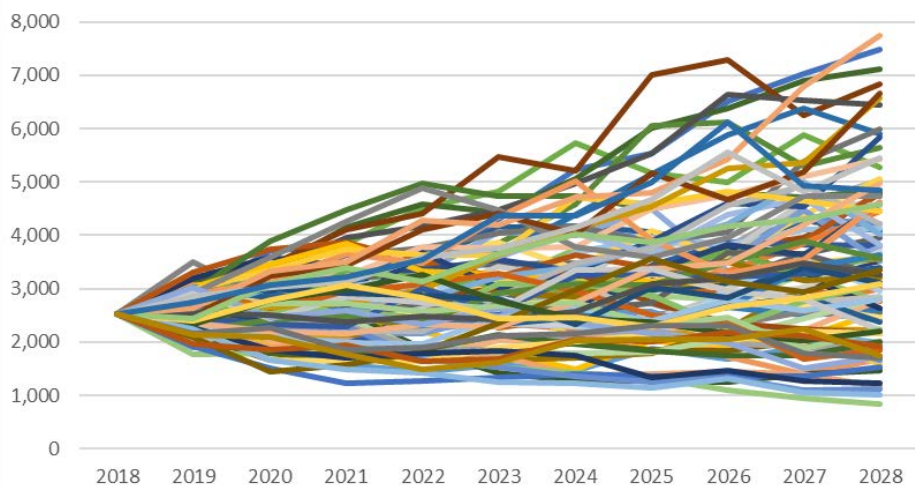
Explanation of Deterministic vs. Stochastic

Deterministic Assets



- Deterministic projections convey **expectation** and directional trend, but give no sense of the possible volatility of results
- They are **simpler and easier** to understand but are difficult to use in assessing alternative and do not measure risk/reward trade-offs

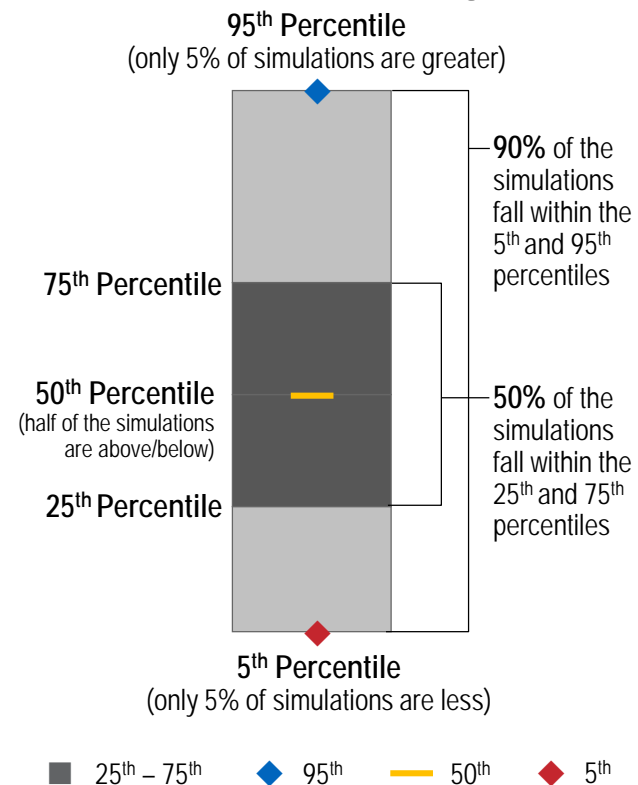
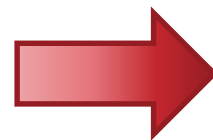
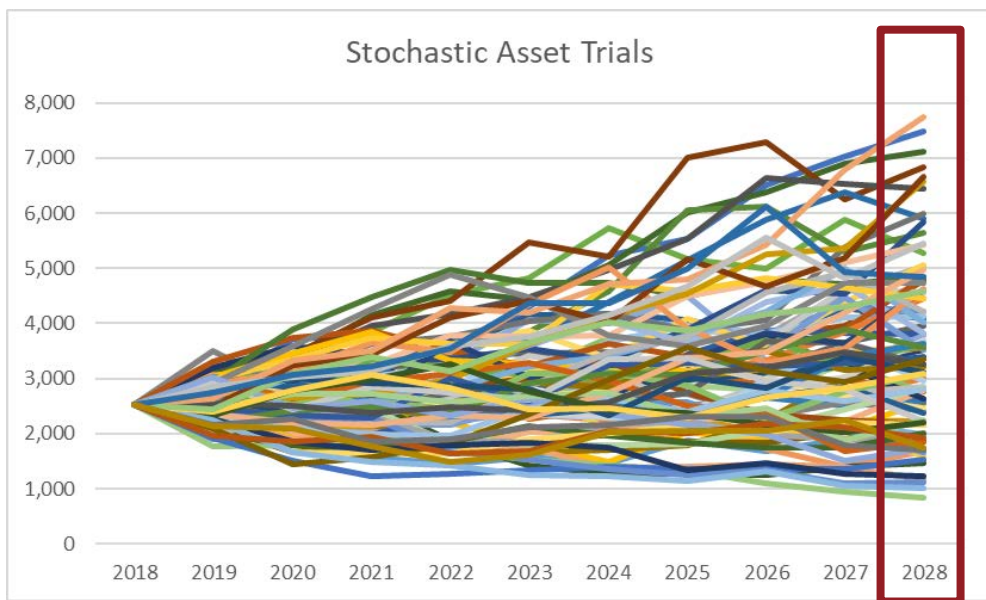
Stochastic Asset Trials



- Stochastic projections produce a distribution of results so expectation and **volatility** around expected results can be calculated
- They are **complex** and require many assumptions but are superior in terms of aiding decisions that require the weighing of **risk/reward** trade-offs
- Typically 2,500 to 5,000 trials are run

Explanation of Deterministic vs. Stochastic

The data is grouped into percentiles and summarized as a range



- The median is represented by the yellow line at the center of the distribution
- The dark gray shaded rectangle represents 50% of all outcomes around the median
- The large, light gray rectangle (inclusive of the dark gray area) represents 90% of all outcomes around the median
- Other percentile results/probabilities are calculated as well

Stochastic Modeling

➤ **Given a certain set of assumptions:**

- What is the range of possible results?
- What is the probability of achieving certain metrics (e.g., funded percentage, stable ADC, etc.)?
- What are the chances of a declining funded percentage over time?
- Alternatively, what is the likelihood of long-term “success?”

➤ **What are metrics for success?**

- Probability of reaching a 100% funding level?
- Probability of “affordable” employer contribution levels?
- Probability of being able to improve benefits or reduce member contributions?
- Probability of avoiding insolvency?
- Other?

➤ **More than one metric can be modeled**

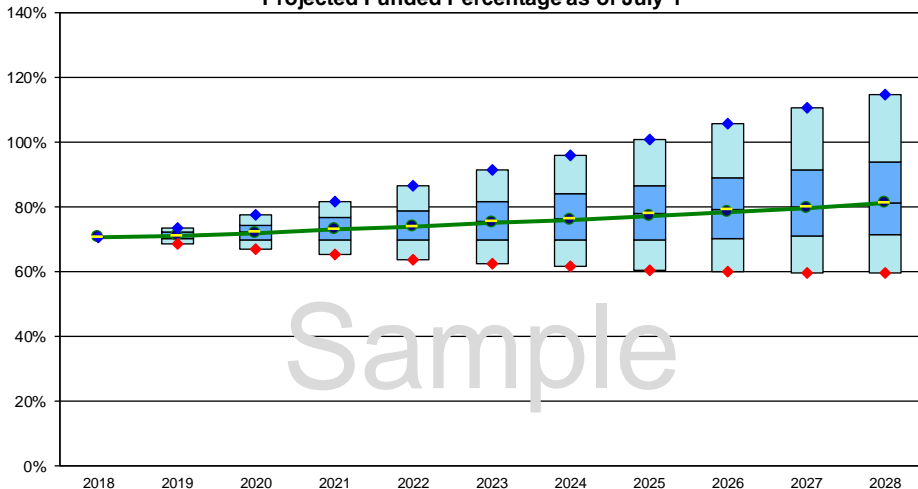
- Stochastically model investment returns and overlay the results on various payroll growth or decline assumptions

Stochastic Projections

- Below are two graphs that show the funded ratio and employer contribution for a sample pension plan

FUNDED RATIO

Projected Funded Percentage as of July 1

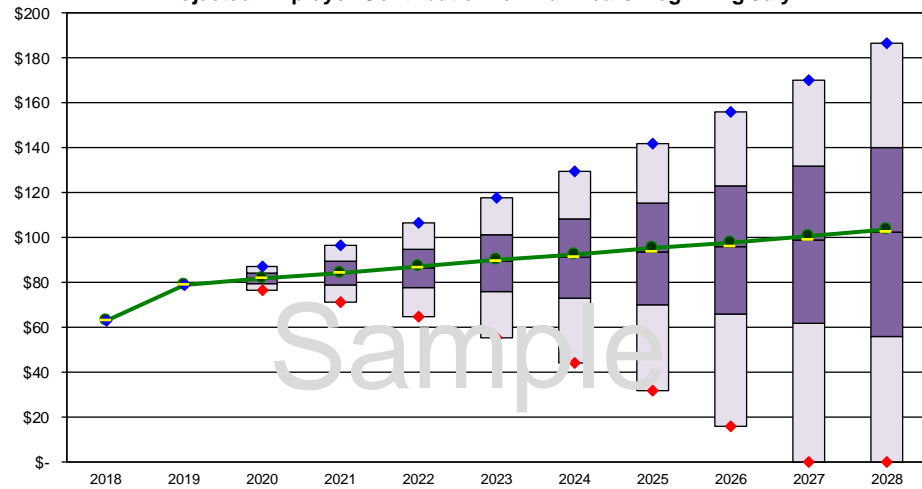


	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
◆ 95th	71%	74%	78%	82%	87%	91%	96%	101%	106%	111%	115%
▬ 75th	71%	72%	74%	77%	79%	82%	84%	87%	89%	91%	94%
■ 50th	71%	71%	72%	73%	74%	76%	77%	78%	79%	80%	81%
▬ 25th	71%	70%	70%	70%	70%	70%	70%	70%	70%	71%	72%
◆ 5th	71%	69%	67%	65%	64%	63%	62%	61%	60%	60%	60%
●	71%	71%	72%	73%	74%	75%	76%	77%	79%	80%	81%

● Baseline deterministic projection using current 7.5% investment return assumption

EMPLOYER CONTRIBUTION

Projected Employer Contribution for Plan Years Beginning July 1



	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
◆ 95th	63.0	78.9	87.3	96.5	106.7	118.0	129.5	141.8	155.8	170.3	186.7
▬ 75th	63.0	78.9	84.0	89.3	95.0	101.4	108.2	115.5	123.2	131.9	140.3
■ 50th	63.0	78.9	81.7	83.9	86.6	89.3	91.0	93.8	96.1	98.7	102.2
▬ 25th	63.0	78.9	79.5	78.9	77.6	76.0	73.3	70.2	66.2	61.6	55.9
◆ 5th	63.0	78.9	76.4	71.3	64.5	55.6	44.3	31.9	16.0	-	-
●	63.0	78.9	81.9	84.4	87.1	89.8	92.5	95.3	97.9	100.8	103.7

● Baseline deterministic projection using current 7.5% investment return assumption

- For example, the sample tables above illustrate that by 2028, there is a 50% probability of a funded percentage between 72% and 94% and 25% probability of the required employer contribution being more than \$140.3 million

Stochastic modeling can be used to establish and assess parameters for monitoring the health and direction of a System

Membership

	2018	2017	Change
Active:			
• Number	31,285	30,922	+1.2%
• Pensionable Salary	\$1,735 mil	\$1,687 mil	+2.8%
• Average Age	46.2 years	46.4 years	-0.2 years
• Average Service	11.2 years	11.4 years	-0.2 years
Retirees and Beneficiaries			
• Number	25,577	25,383	+0.8%
• Total Annual Benefits	\$908.3 mil	\$871.6 mil	+4.2%
• Average Monthly Benefit	\$2,959	\$2,862	+3.4%

Assets

- The market value of assets decreased from \$4.554 billion (as of December 31, 2017) to \$3.914 billion (as of December 31, 2018)
 - Investment return of -5.7%, net of investment expenses, reported by Investment Consultant
- The actuarial value of assets – which smoothes investment gains and losses over five years – decreased from \$ 4.457 billion to \$4.196 billion
 - Effective return of 4.3%, net of investment expenses
 - Actuarial value is 107% of market
 - There is a total of \$281 million of deferred net investment losses that will be recognized in future years
- The average annual return on assets:

	Market	Actuarial
5-year	4.4%	7.3%
10-year	8.3%	4.7%

GASB 67 Net Pension Liability (\$ in millions)

	December 31, 2018	December 31, 2017
Single Equivalent Discount Rate	7.00%	7.00%
Total Pension Liability	\$16,809	\$16,282
Plan Fiduciary Net Position	3,914	4,554
Net Pension Liability	12,894	11,728
Sensitivity of Net Pension Liability to changes in discount rate		
• 1% decrease (6.00%)	\$15,019	\$13,808
• Current discount rate (7.00%)	12,894	11,728
• 1% increase (8.00%)	11,133	10,006

Numbers may not sum due to rounding

Questions?

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Appendix

- Overview of valuation process
- Calculation of the actuarial value of assets
- Historical asset values and returns

How is an Actuarial Valuation Performed?

- Gather data as of the valuation date
 - Participant data
 - Financial data
- Project a benefit for each member, for each possible benefit
- Apply assumptions:
 - Economic (investment return, inflation, salary raises)
 - Demographic (death, disability, retirement, turnover)
- Apply assumptions to benefits to determine a total liability and assign liabilities to service
- Apply the funding policy to determine the Actuarially Determined Contribution
 - Based on actuarial cost method and asset valuation method

Actuarial Methods

➤ Asset valuation method (actuarial value of assets)

- Smoothing of investment gains or losses
- MEABF uses a five-year smoothing method
 - Investment returns above or below the expected return are recognized over five years

➤ Cost method

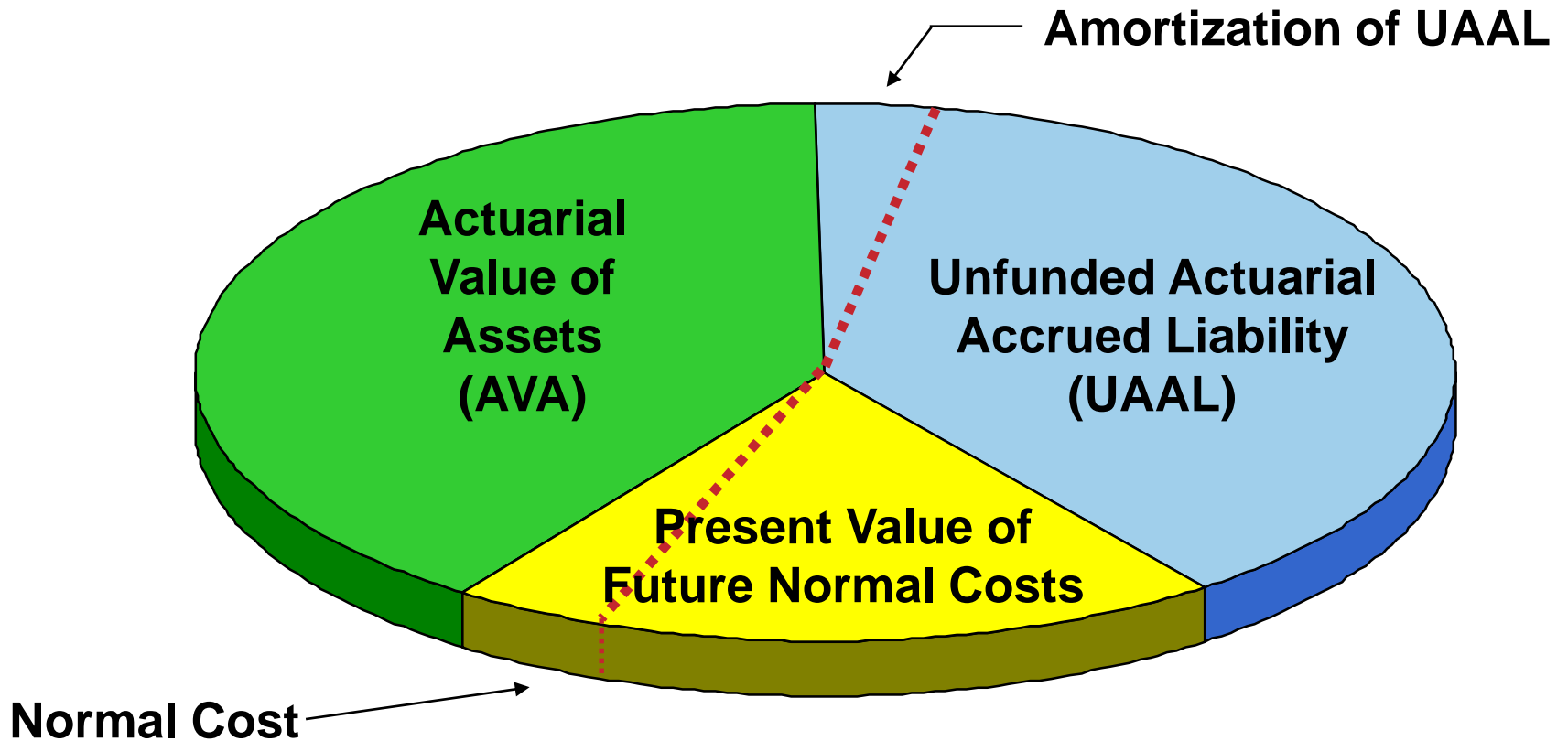
- Allocation of liability between past service and future service
 - MEABF uses the entry age normal cost method
 - Same method used by most public sector retirement systems and is the cost method required by GASB for accounting purposes

➤ Amortization method

- 30-year “open” period to pay off unfunded actuarial accrued liability
- Based on level dollar amortization

Actuarially Determined Contribution

Present Value of Future Benefits



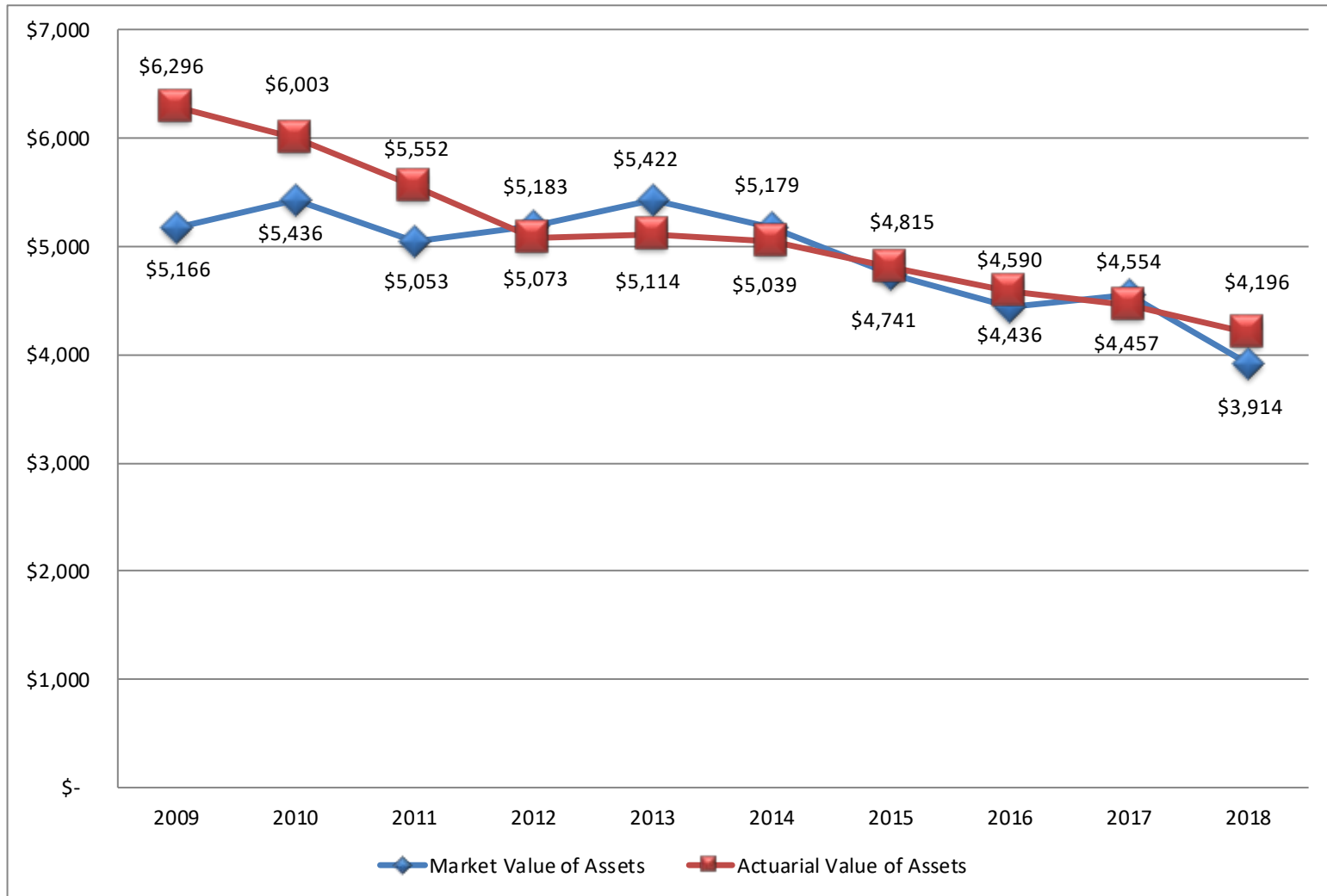
Actuarial Value of Assets (\$ in millions)

1. Market Value of Assets as of December 31, 2017				\$4,554
2. Contributions and Benefits for FYE December 31, 2018				(435)
3. Expected Return				<u>291</u>
4. Expected Market Value of Assets (1) + (2) + (3)				\$4,410
5. Actual Market Value of Assets on December 31, 2018				3,914
6. Excess/(Shortfall) for FYE December 31, 2018 (5) – (4)				(496)
Excess/(Shortfall) Returns:				
Year	Initial Amount	Deferral %	Unrecognized Amount	
2018	-\$496	80%	-397	
2017	306	60%	184	
2016	-46	40%	-19	
2015	-248	20%	-50	
2014	-104	0%	<u>0</u>	
7. Total				\$281
8. Actuarial Value of Assets as of December 31, 2018 (5) - (7)				\$4,196
9. Actuarial Value of Assets as a % of Market Value of Assets				107.2%

Numbers may not sum due to rounding

Market and Actuarial Values of Assets

\$ Millions



Asset Returns

