Actuarial Aspects of Investment Policy

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Agenda

- General Investing vs Funding Liabilities
- Cash Flow
- Impact of Volatility
- Investment Return Assumption

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General Investing vs Funding Liabilities

- Investing against a liability may lead to different decisions than investing just to generate returns
- Several factors impact the overall risk tolerance and sustainability of the plan
- The size of the accumulated asset values (which will depend on benefit levels, retirement eligibilities, and funded levels) compared to the size of the budget of the plan sponsor will impact risk tolerance
- Cash flow needs may impact terminal cash value in volatile environments

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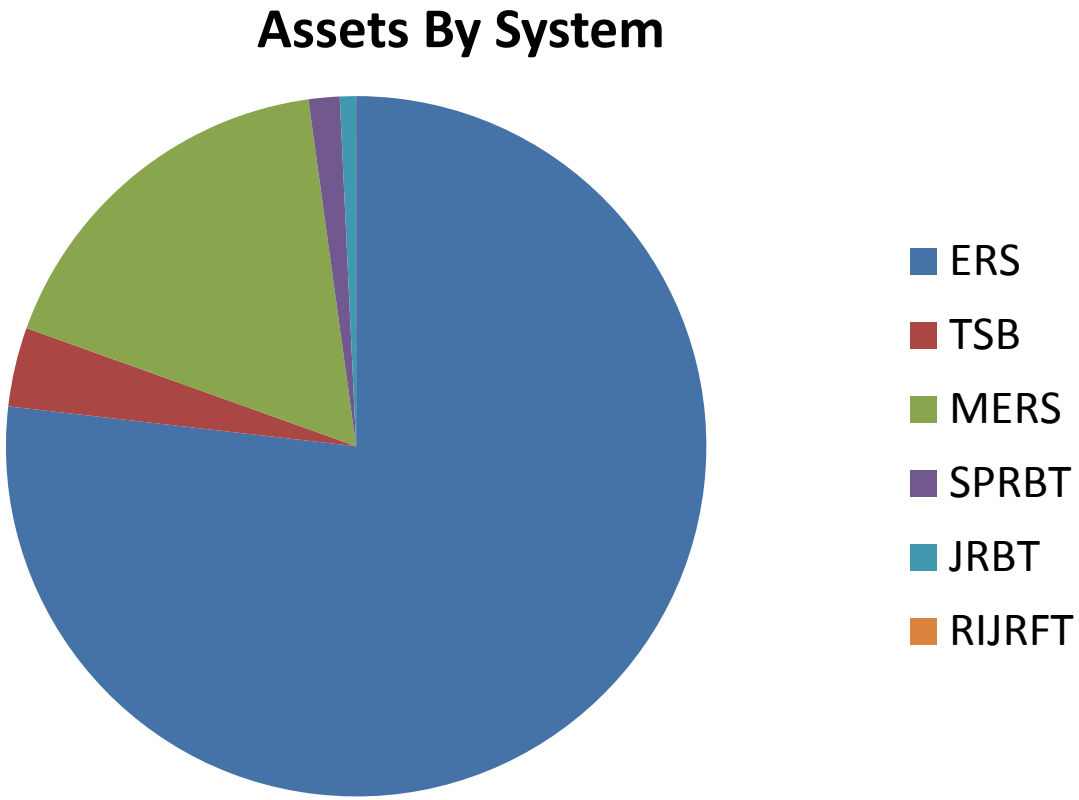
Multiple Systems



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Benefit Provisions

	ERSRI	MERS PF
Retirement Eligibilities	SS NRA	Age 50 with 25 years of service
Benefit multiplier	1% per year of service	2% per year of service
Current Funded Levels	56%	80%
Current Active to Retiree Ratio	1:1	2:1

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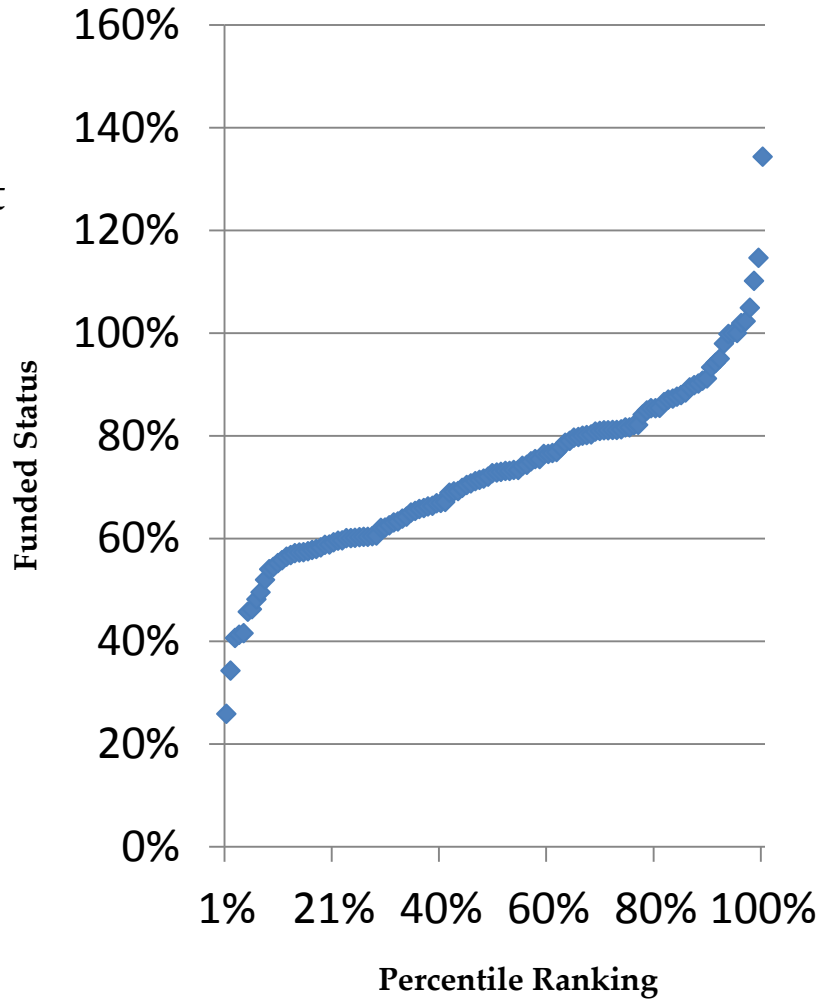
Benchmarking - Funded Ratio

- The funded ratio of ERSRI ranks in the 11th percentile of a comparison with other large public employee retirement systems
  - ERSRI – 56.6%
  - 75th percentile – 81.6%
  - 50th percentile – 72.7%
  - 25th percentile – 60.2%



Source: Public Funds Survey

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Sustainability Checklist

	Answer	Stars
Do you have a legally required contribution amount based on accepted actuarial practices?	Yes	*****
Does the contribution amount automatically adjust if certain minimums are not met?	Yes	*****
Have you met the required contribution each year over the past 10 years?	Yes	*****
What is the amortization period for the current UAAL based on the required contribution?	22 Years	****
What is the amortization period for new losses?	20 Years	*****
What is the sum of your amortization period and asset smoothing period?	25 Years	*****
What is your investment return assumption?	7.50%	****
Does your current investment policy and target asset allocation support the current assumption?	Yes	****
What is your payroll (revenue) growth assumption?	3.00%-3.25%	***
Are there any benefits, that are likely to be paid, not reflected in the liabilities and contributions?	No	*****
Are any of the liabilities contingent on future experience?	Yes	*****
What is your short – intermediate term negative cash flow as a % of assets?	-5-6%	**
What is your longer term negative cash flow as a % of assets?	-3.6%	*****
What is your current active to retiree ratio?	1.1	**
What is your longer term active to retiree ratio?	1.3	***
What is your ratio of accrued liability to payroll?	6.5	**
What is your longer term ratio of accrued liability to payroll?	2.7	*****

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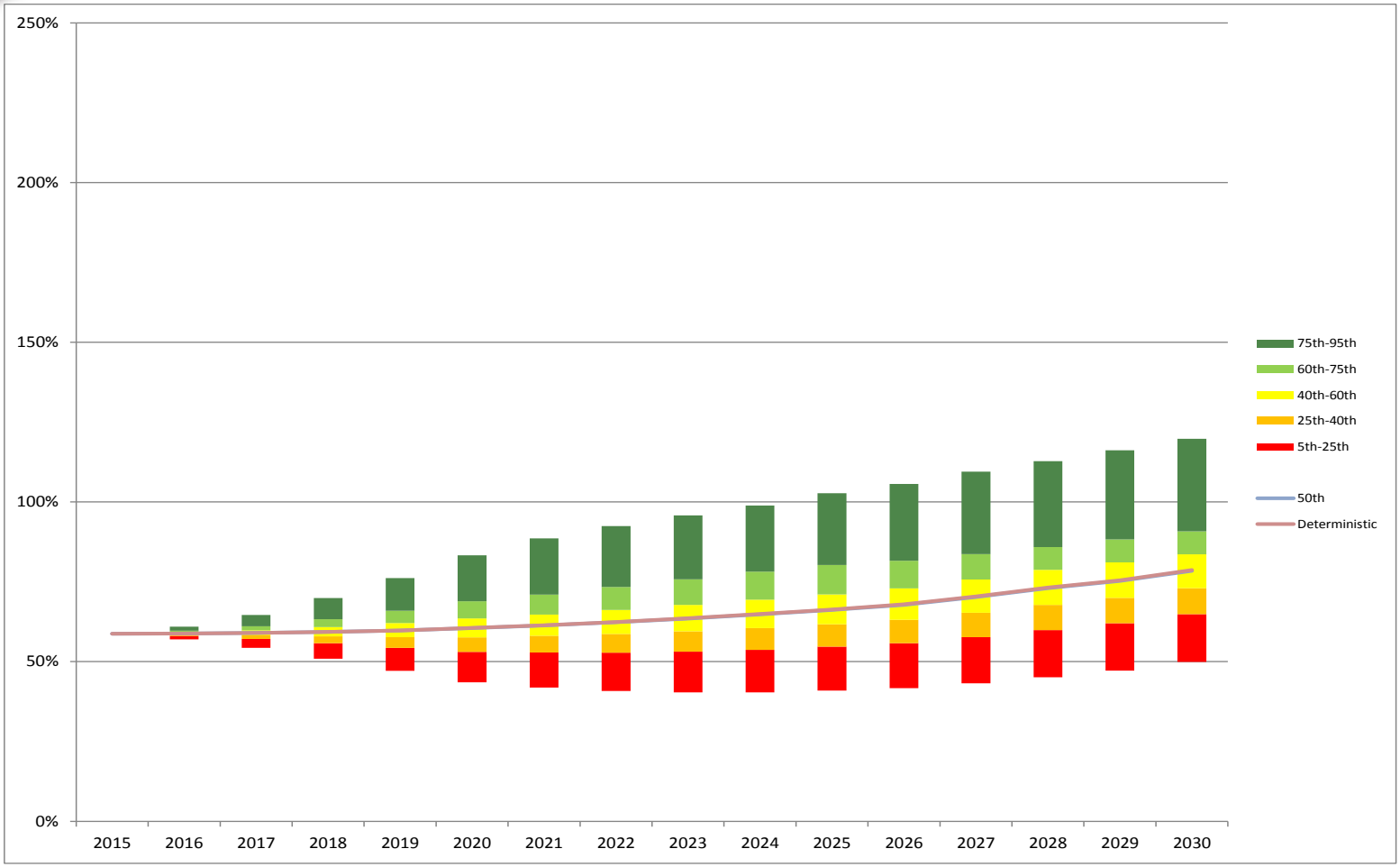
Volatility Management

Projected Funded Ratio: Current 20-Year Closed Funding Policy



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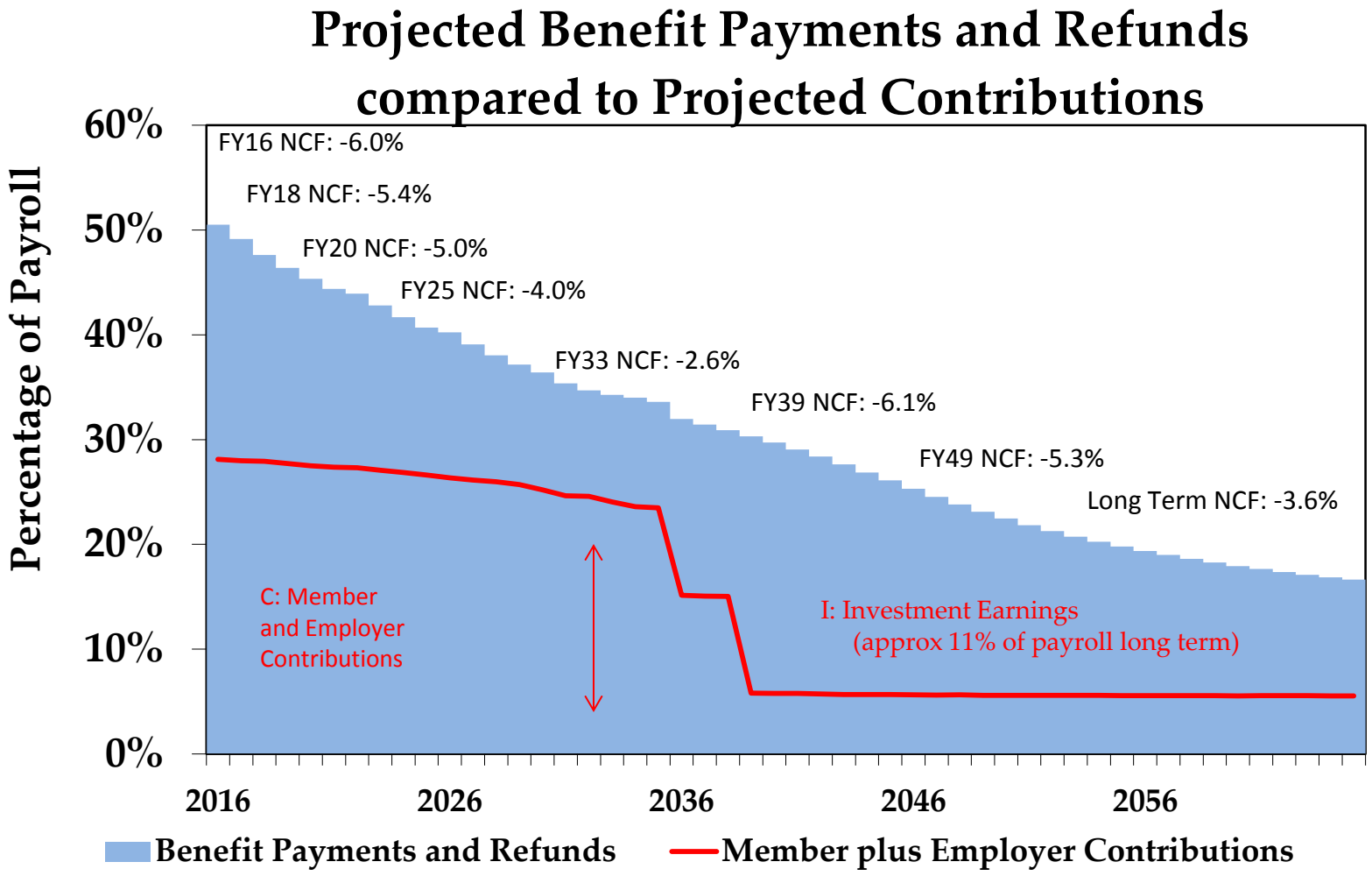
ERSRI

- ERSRI grades out very well on the checklist
  - Statutory contribution requirements
  - Committed plan sponsor
  - Reasonable, closed funding period
  - No missing liabilities
  - Material contingent liabilities
  - Management long term leverage and cash flows
- Items to pay attention to
  - Short term cash flow

Cash Flow

Projected Negative Cash Flow (ERSRI Teachers)



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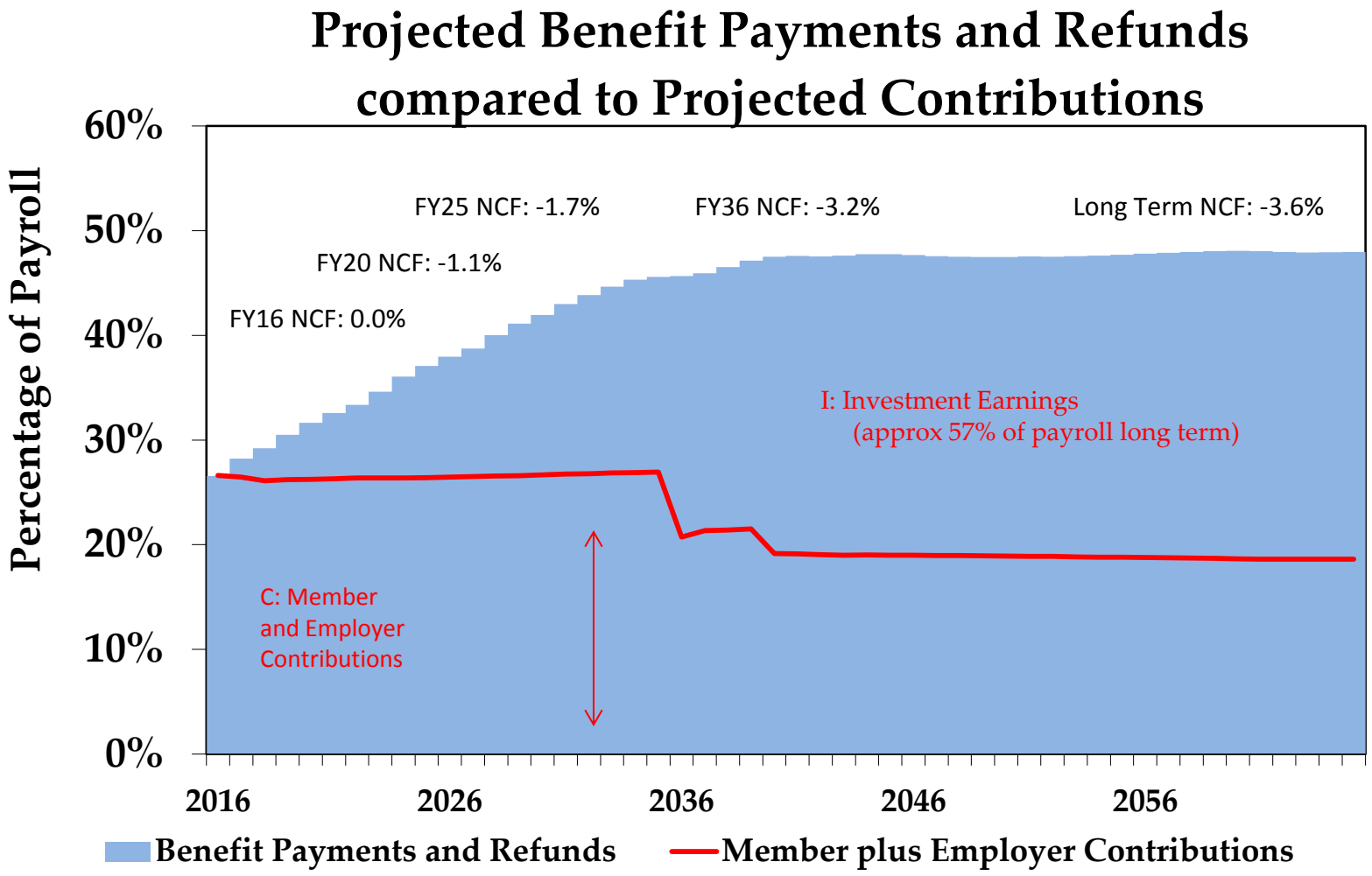
Cash Flow

Projected Negative Cash Flow (ERSRI MERS PF)



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Total Projected Cash Flow in Millions

	Negative Cash Flow	Market Assets
FY2016	$403	$7,550
FY2017	393	7,698
FY2018	386	7,868
FY2019	385	8,058
FY2020	389	8,263
FY2021	389	8,480
FY2022	397	8,712
FY2023	392	9,219
FY2024	387	9,509

Combination of State Employees, Teachers, MERS General, and MERS Police and Fire which represent 95% of assets

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Impact of Volatility and Negative Cash Flow on Trust Assets

- The combination of a large negative cash flow will put a drag on the ultimate asset value through volatile scenarios
- The negative cash flow decreases the amount of assets available to follow through on the rebound

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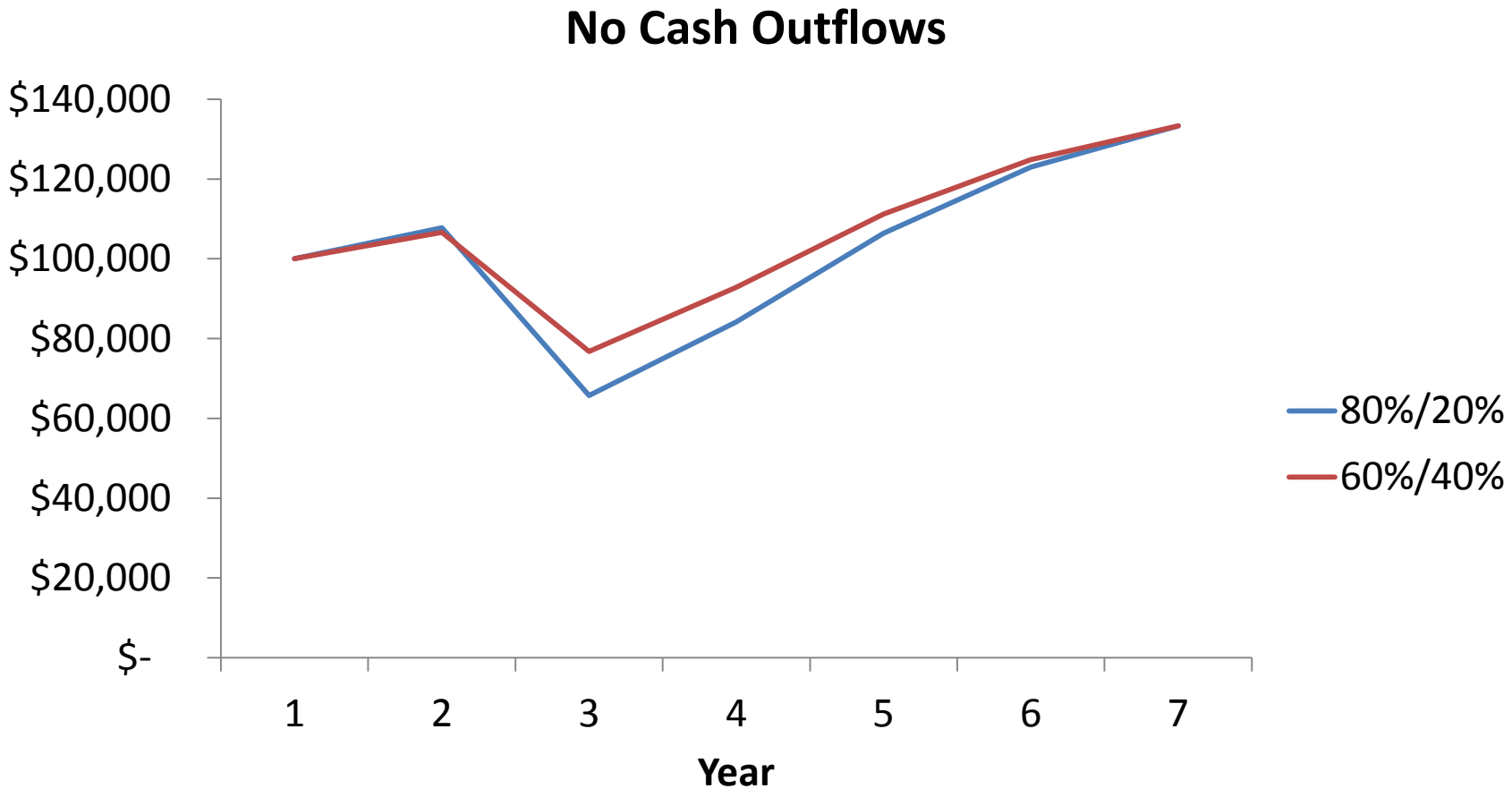
Impact of Volatility and Negative Cash Flow on Trust Assets

- Example: $100,000 trust fund and the following investment return scenario occurs

Year	Stocks	Bonds	80%/20%	60%/40%
1	9%	3%	7.8%	6.6%
2	-50%	5%	-39.0%	-28.0%
3	35%	0%	28.0%	21.0%
4	33%	0%	26.4%	19.8%
5	19%	2%	15.6%	12.2%
6	10%	2%	8.4%	6.8%
Average Compound Return	4.2%	2.0%	4.9%	4.9%

Impact of Volatility and Negative Cash Flow on Trust Assets



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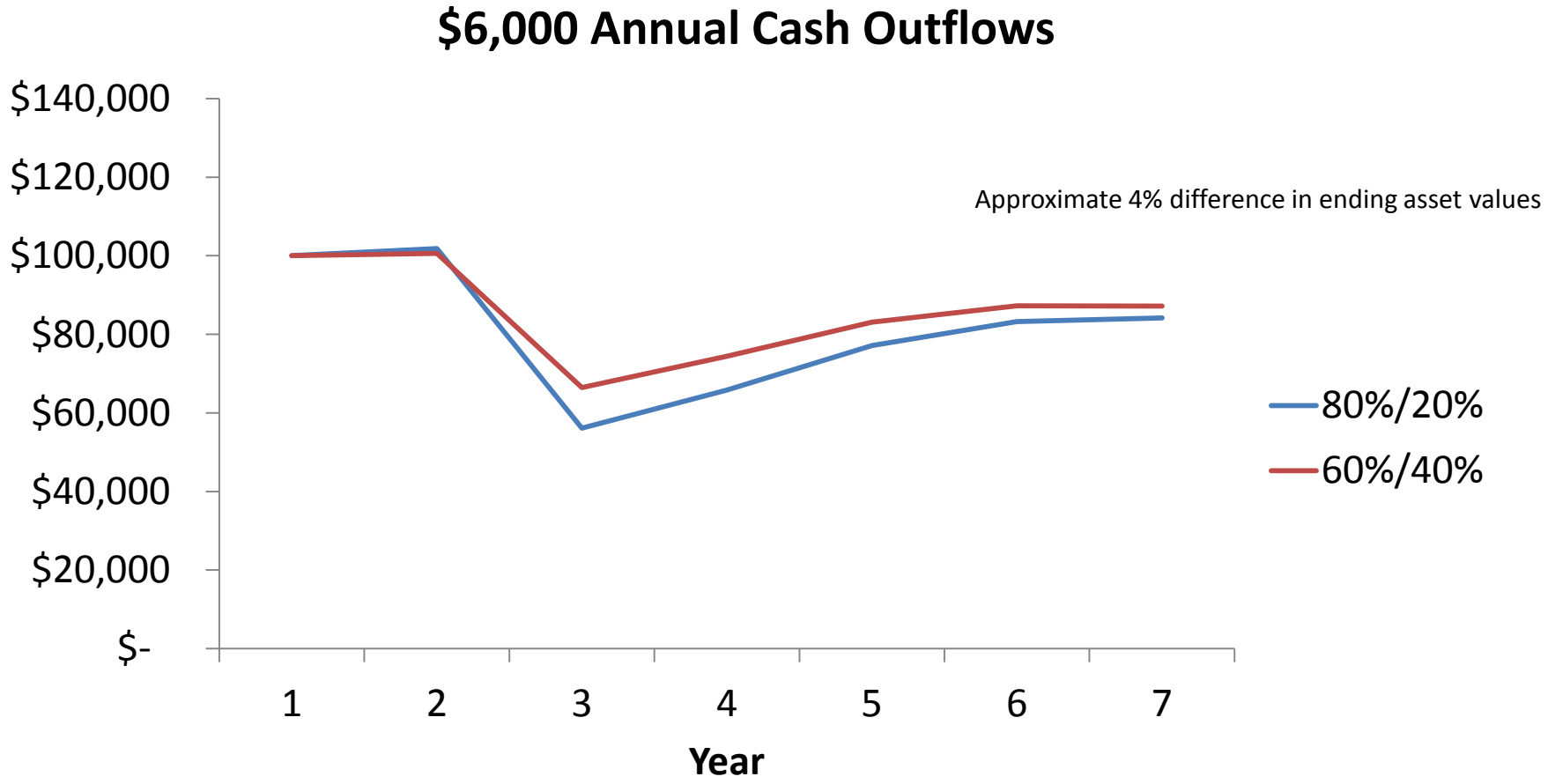
Impact of Volatility and Negative Cash Flow on Trust Assets



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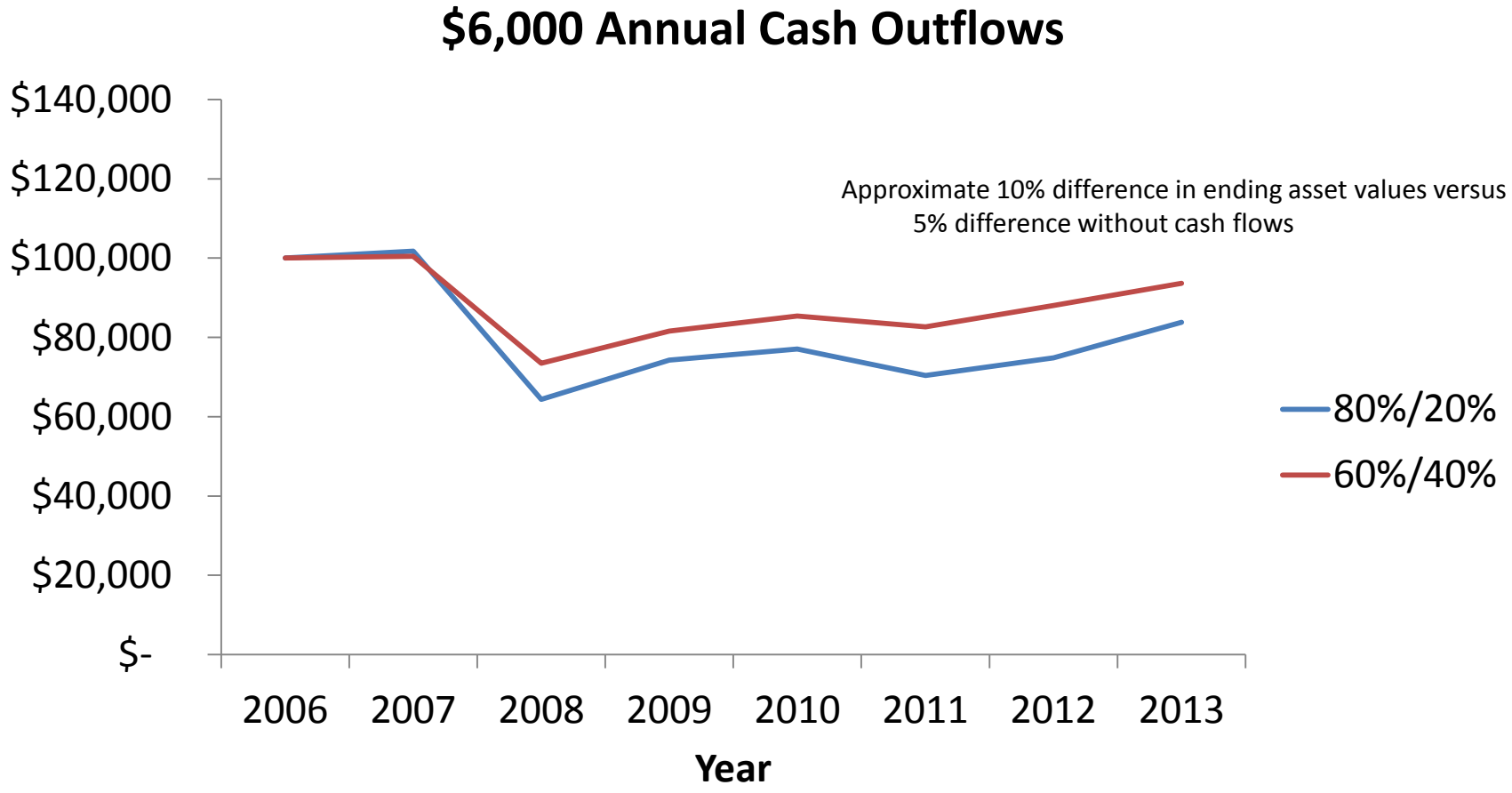
Less Volatile Scenario with same Overall Return



This scenario uses actual returns from 2007 – 2013.
Stocks returned 3.8% during the period, Bonds 6.6%, the 80/20 would have returned 5.1%, and the 60/40 6.0%.

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Inflation Risk

- Building block for several economic variables
  - Salary increases and overall wage inflation
  - Investment return
  - Cost-of-Living increases, if applicable
- If inflation moves up or down, all three likely to move up or down in tandem (in theory at least)
- The risk is that the spread between the items does not hold true
  - Example: High inflation with low investment returns. Of course, even here this might impact price inflation but not wage inflation.

Typical Investment Return Example

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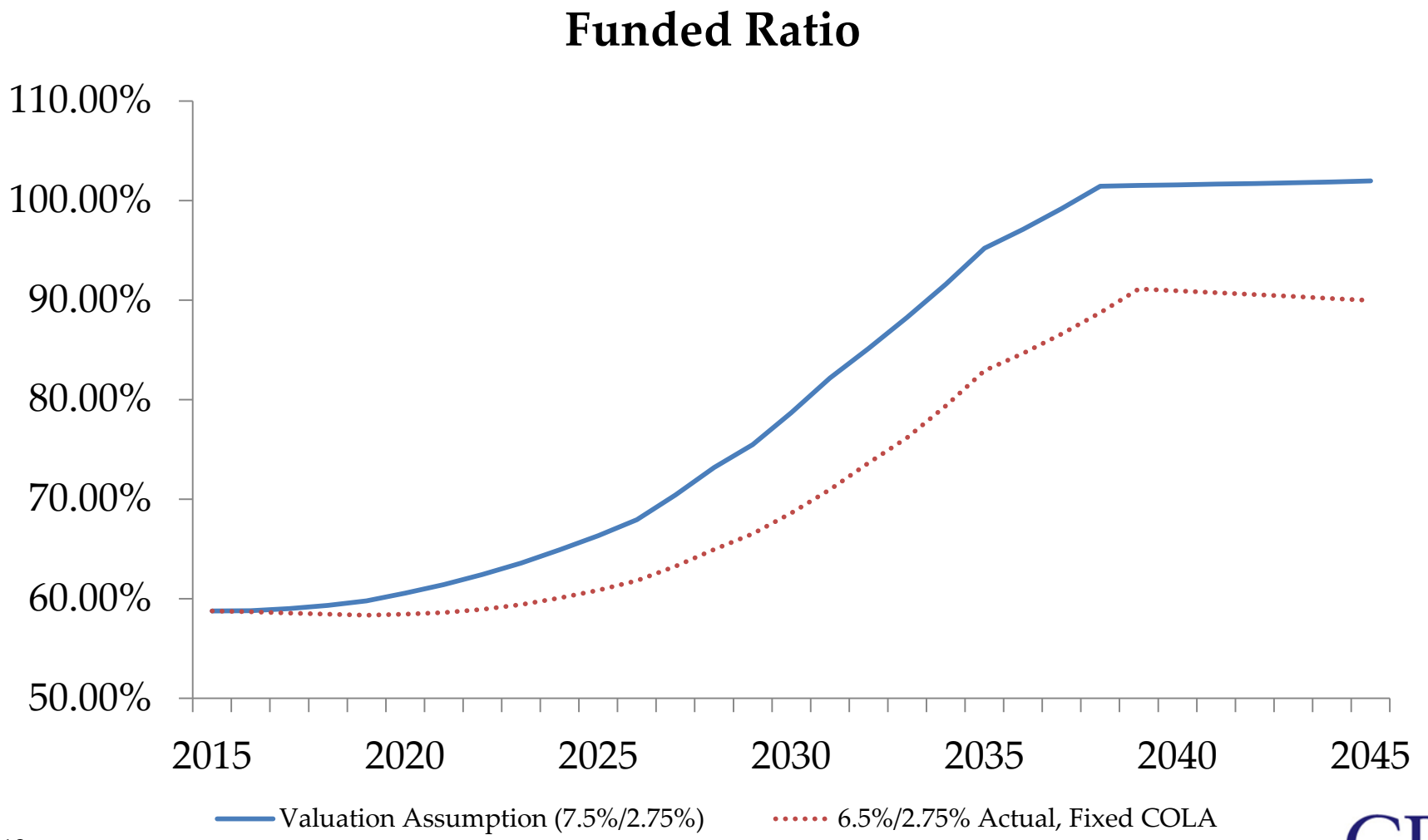

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Inflation/Contingent Risk Examples

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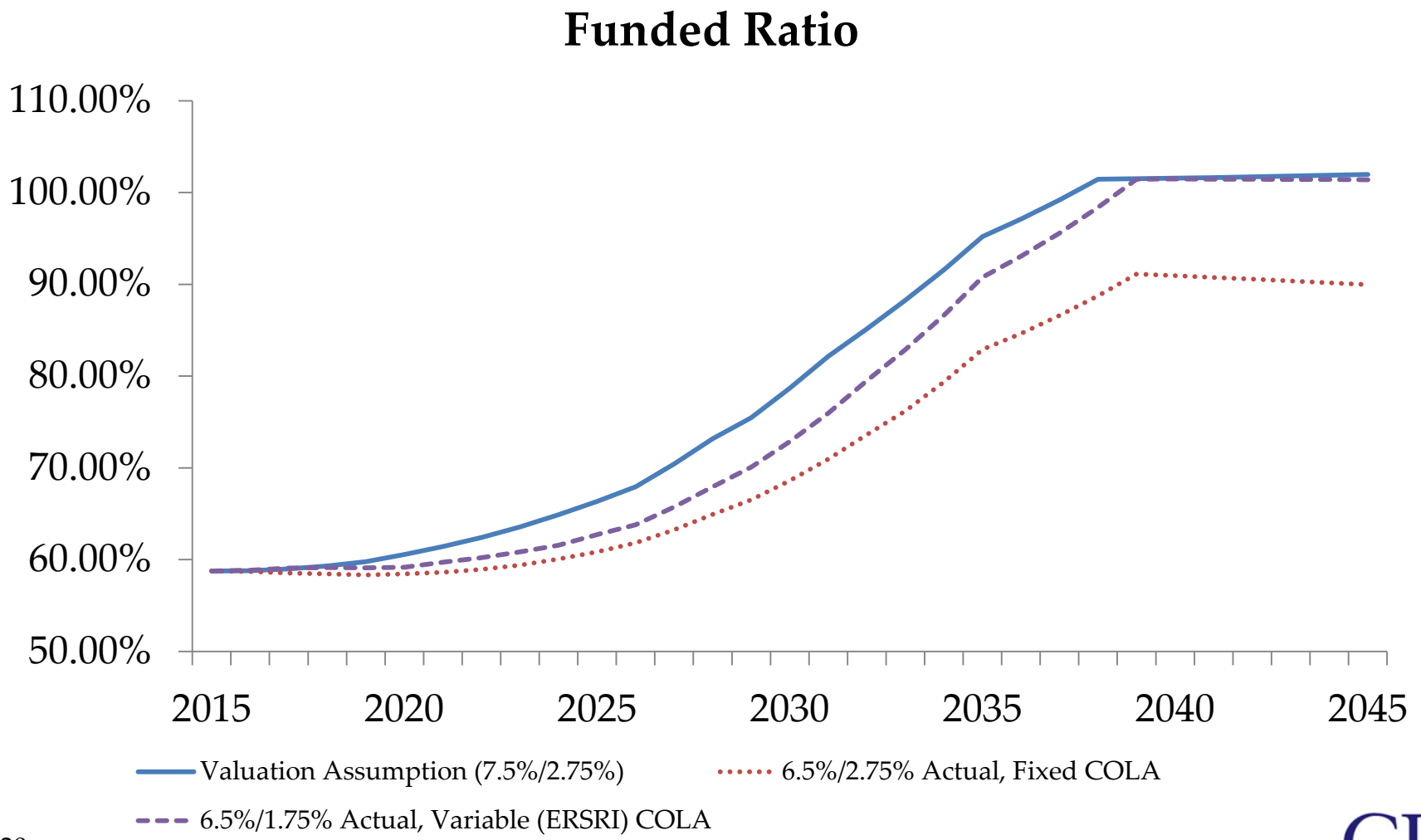

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Inflation/Contingent Risk Examples

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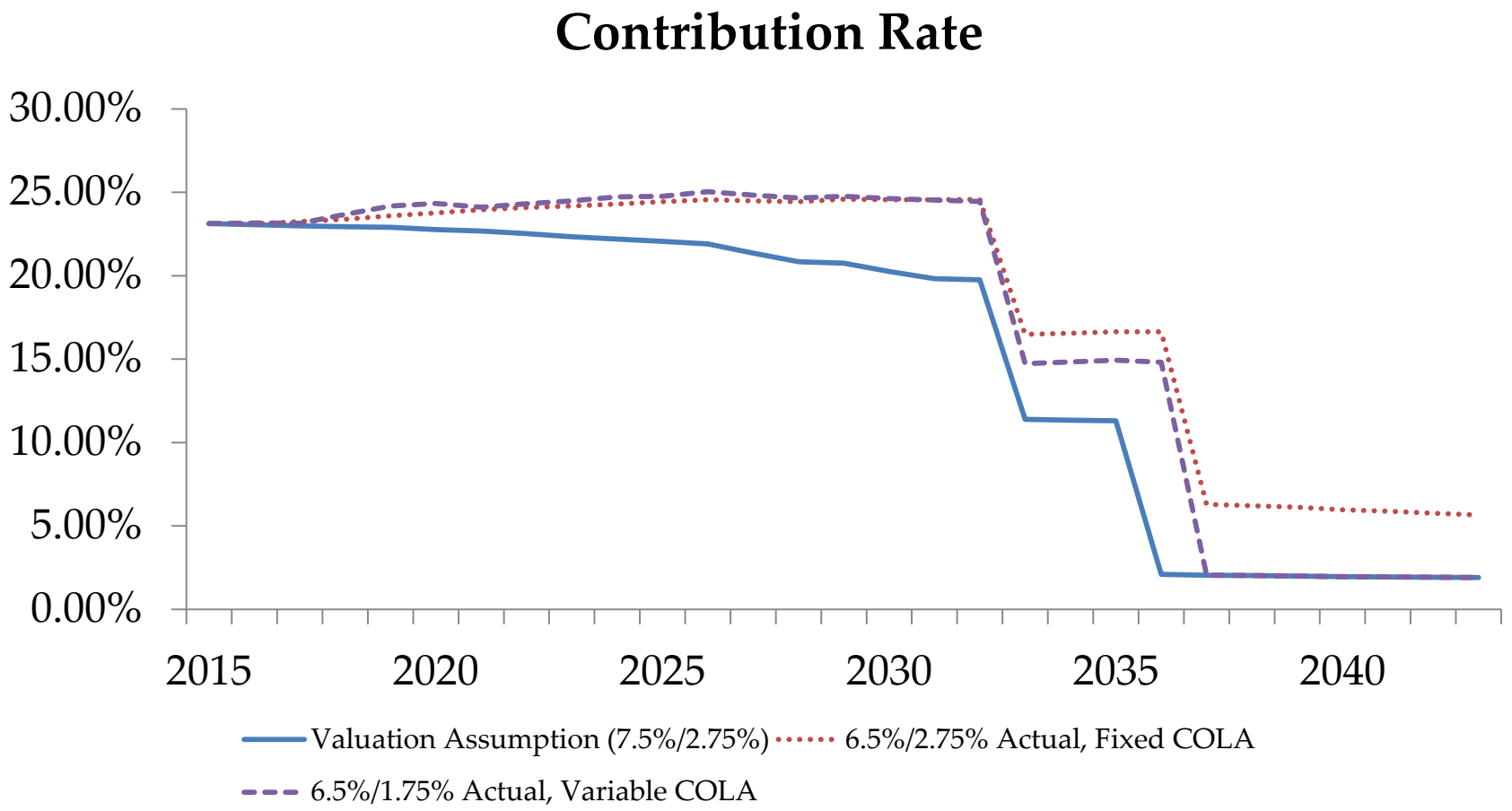

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Inflation/Contingent Risk Examples

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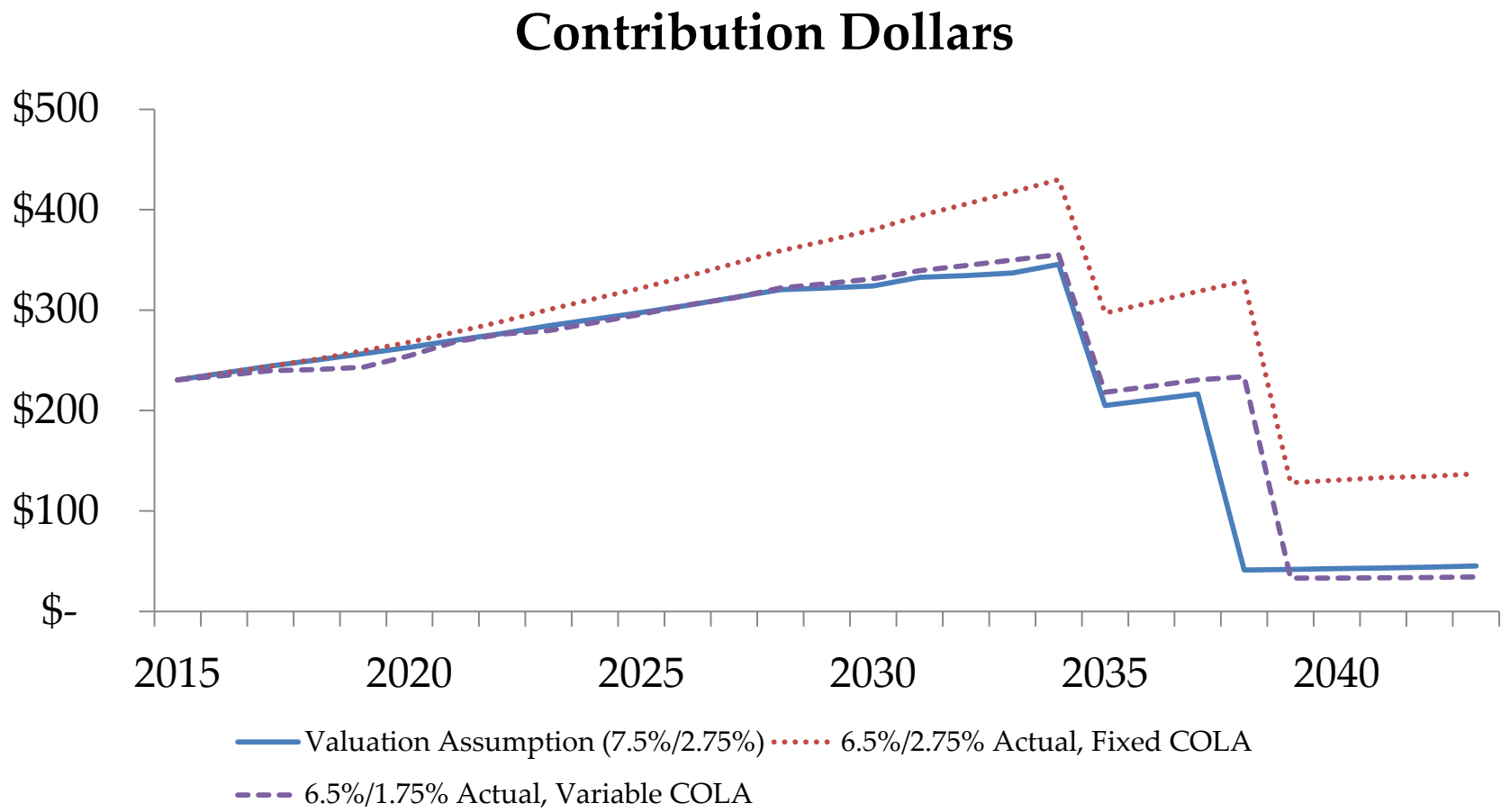

$in millions

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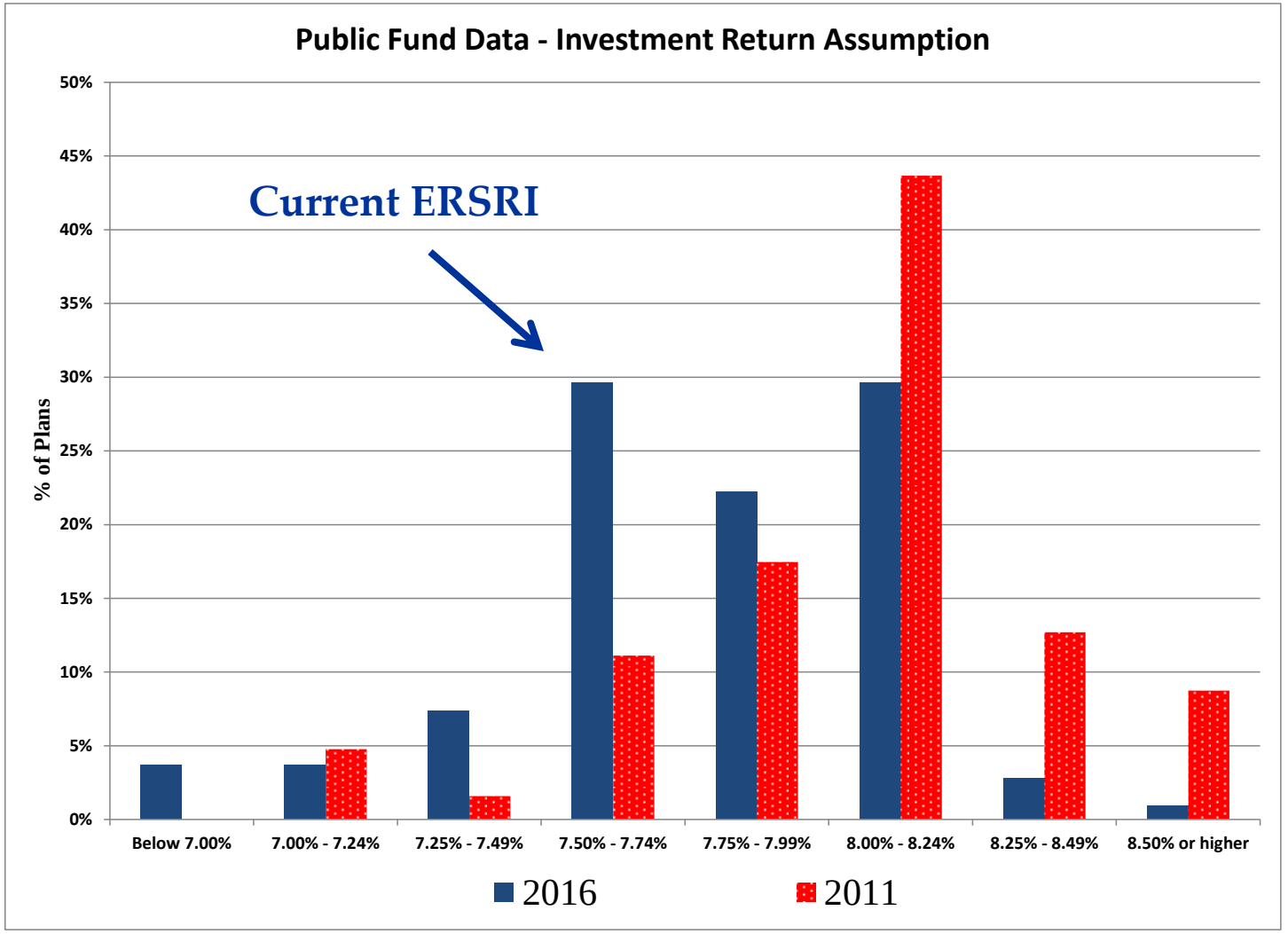
Investment Return Assumption

- By far the most important assumption in the valuation/budgeting process
- Also the most subjective
- There has been a heavy trend of decreasing this assumption
- The current 7.50% assumption is close to the current average assumption used by peer retirement systems
- In the experience study next summer, this will be one of the most impactful decisions for the Retirement Board

Investment Return Risk

Comparison to Peers



Source: Public Plans Database

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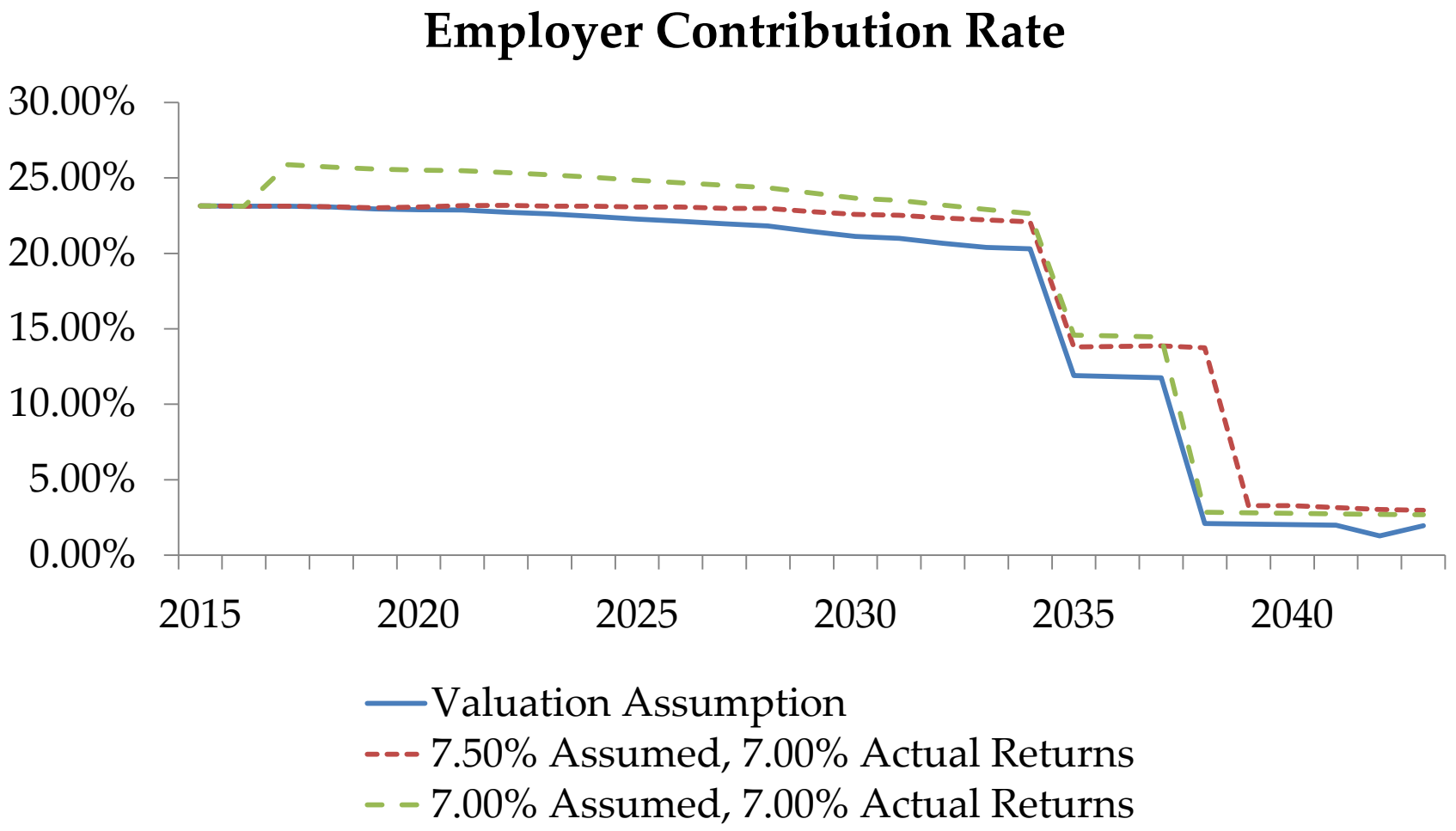
Capital Market Assumptions

- Our analysis will be based on the target asset allocation at the time of the experience study and a universe of capital market assumptions, with emphasis on PCA's expectations
- One source we use is a survey done by Horizon Actuarial Services which aggregates information from 23 independent sources, including longer term expectations
- Using the current ERSRI target allocation and the results from the 2015 survey would create real return expectations of 4.18% over a 7-10 year horizon and 4.91% over a 20+ year time horizon
- Adding the 2.75% current inflation assumption yields a nominal expectation of 6.93% and 7.66%, respectively

Investment Return Risk

Assumption vs Actual Experience



These projections do not take into account any variances in inflation

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Questions

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