

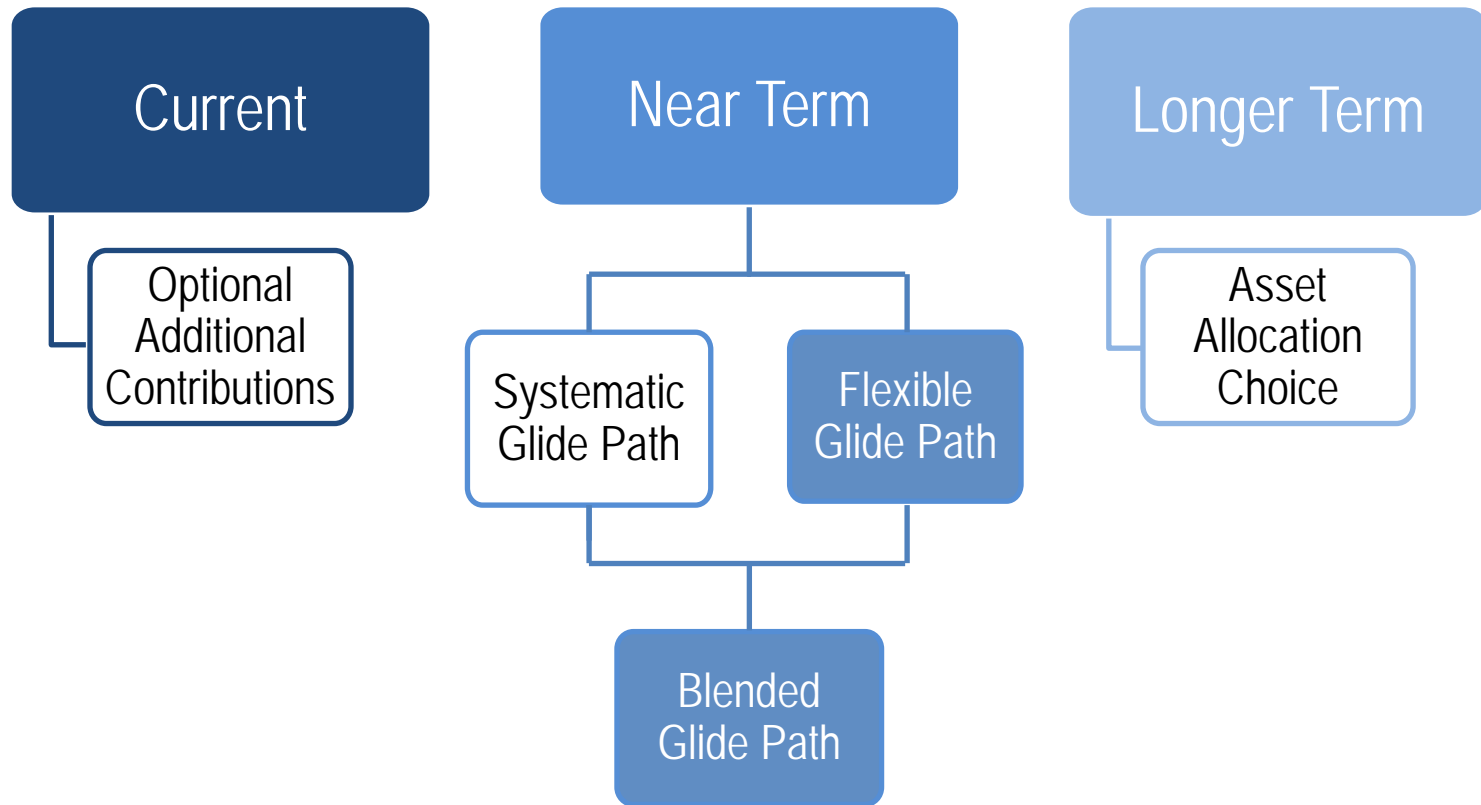
Funding Risk and Risk Mitigation Workshop

CalPERS Board of Administration

May 20, 2015

Recap From February Workshop

Risk Mitigation Strategies



Today's Objective

- Update on Optional Additional Contributions and Asset Allocation Choice.
- Explore in more details the two risk mitigation strategies identified at the February workshop.
 - Flexible Glide Path
 - Blended Glide Path
- Determine next steps.

Agenda

Part I: Funding Risk

Part II: Risk Mitigation Strategies

Part III: Illustrations and Results of Modeling

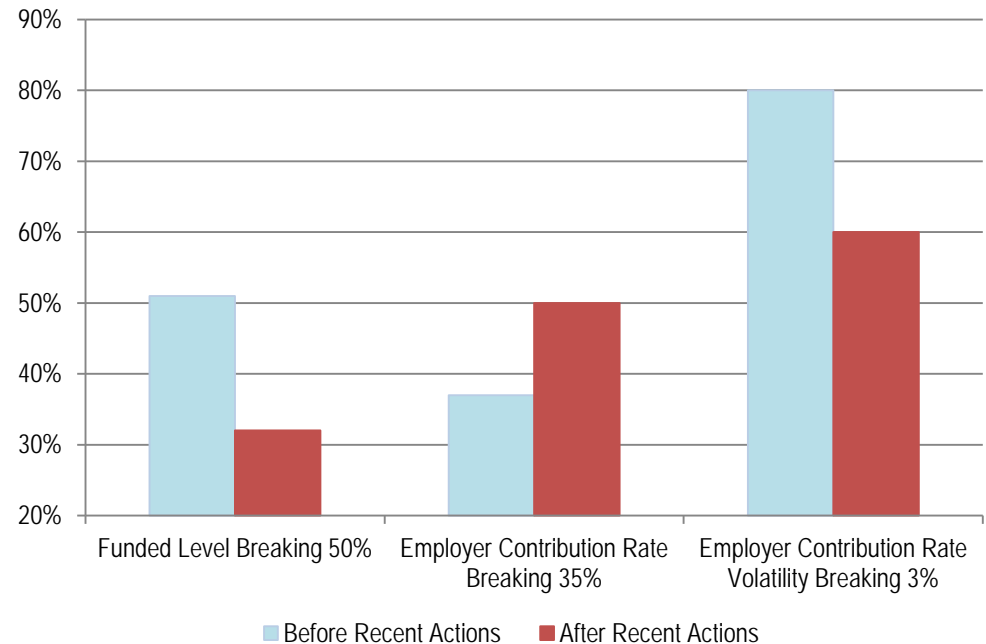
Part IV: Costs and Benefits

Part V: Administrative Considerations and Next Steps

Funding Risk

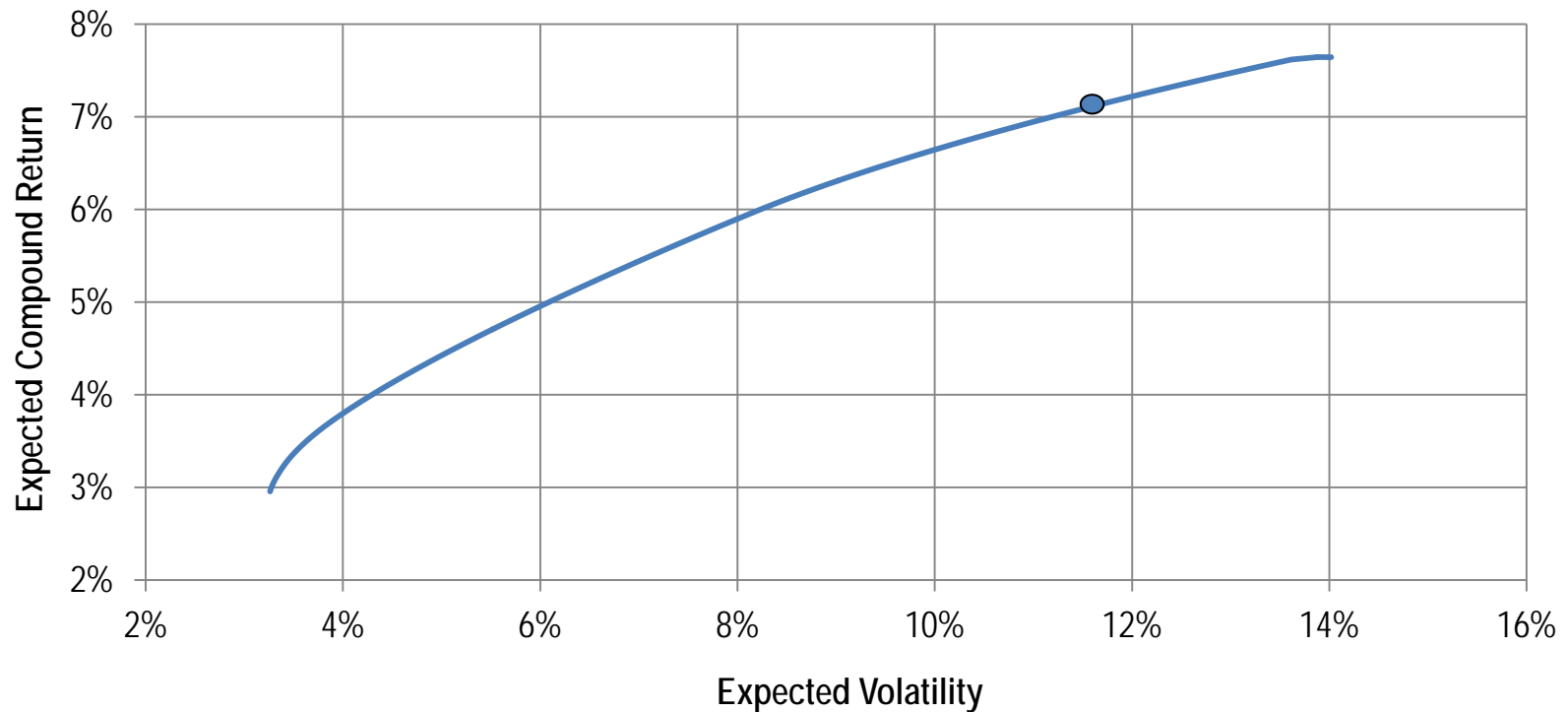
- Recent actions taken by the Board have already lowered risk:
 - New asset allocation
 - New actuarial assumptions
 - New smoothing policies

**State Miscellaneous
Probability of Breaking Thresholds**



Funding Risk

Efficient Frontier

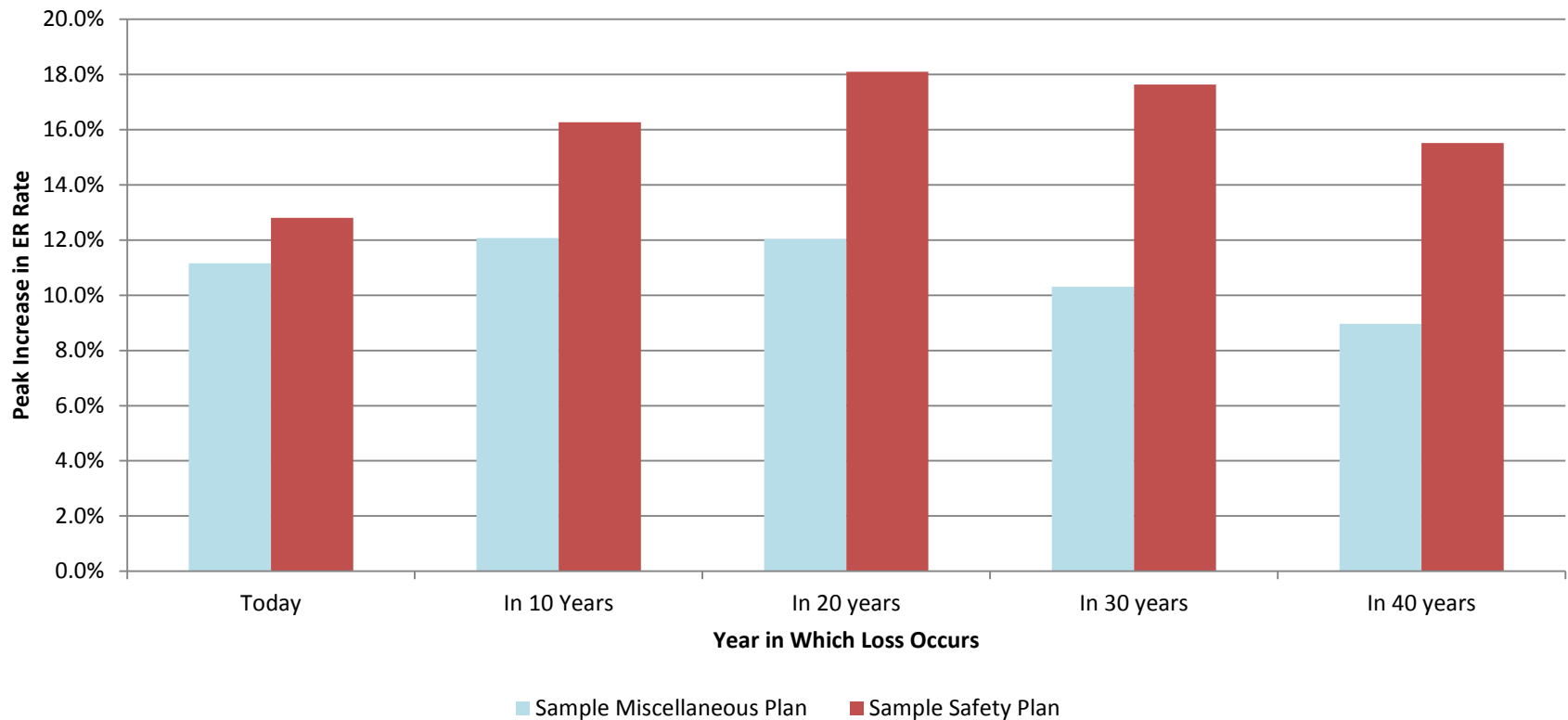


Funding Risk

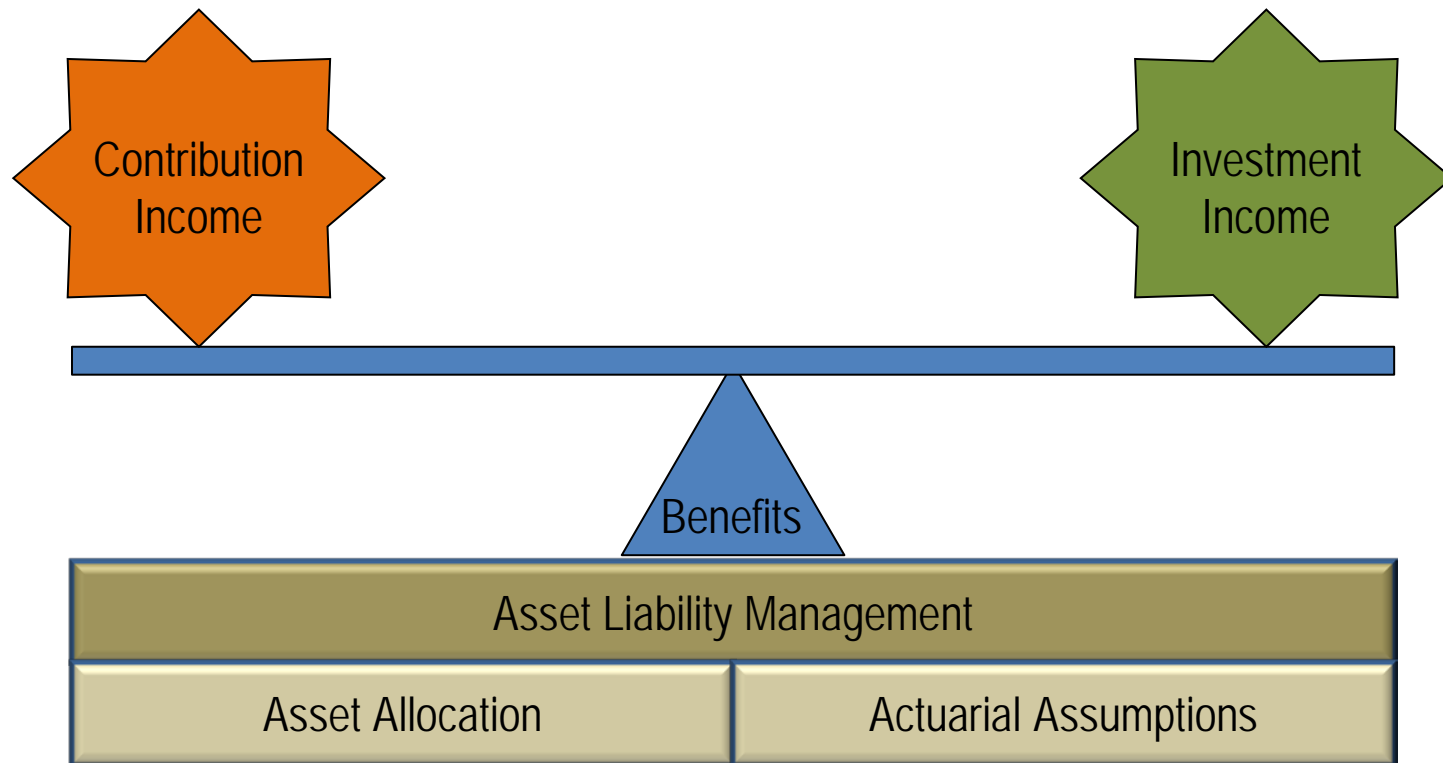
- Maturity levels are at their highest levels
 - Levels are expected to continue to increase.
 - Contribution rate volatility will continue to increase over the next 20 to 30 years.
 - A poor investment return will impact contribution rates more in 20 years than it will if it happened today.

Impact on Employer Contributions of a -16% Investment Return

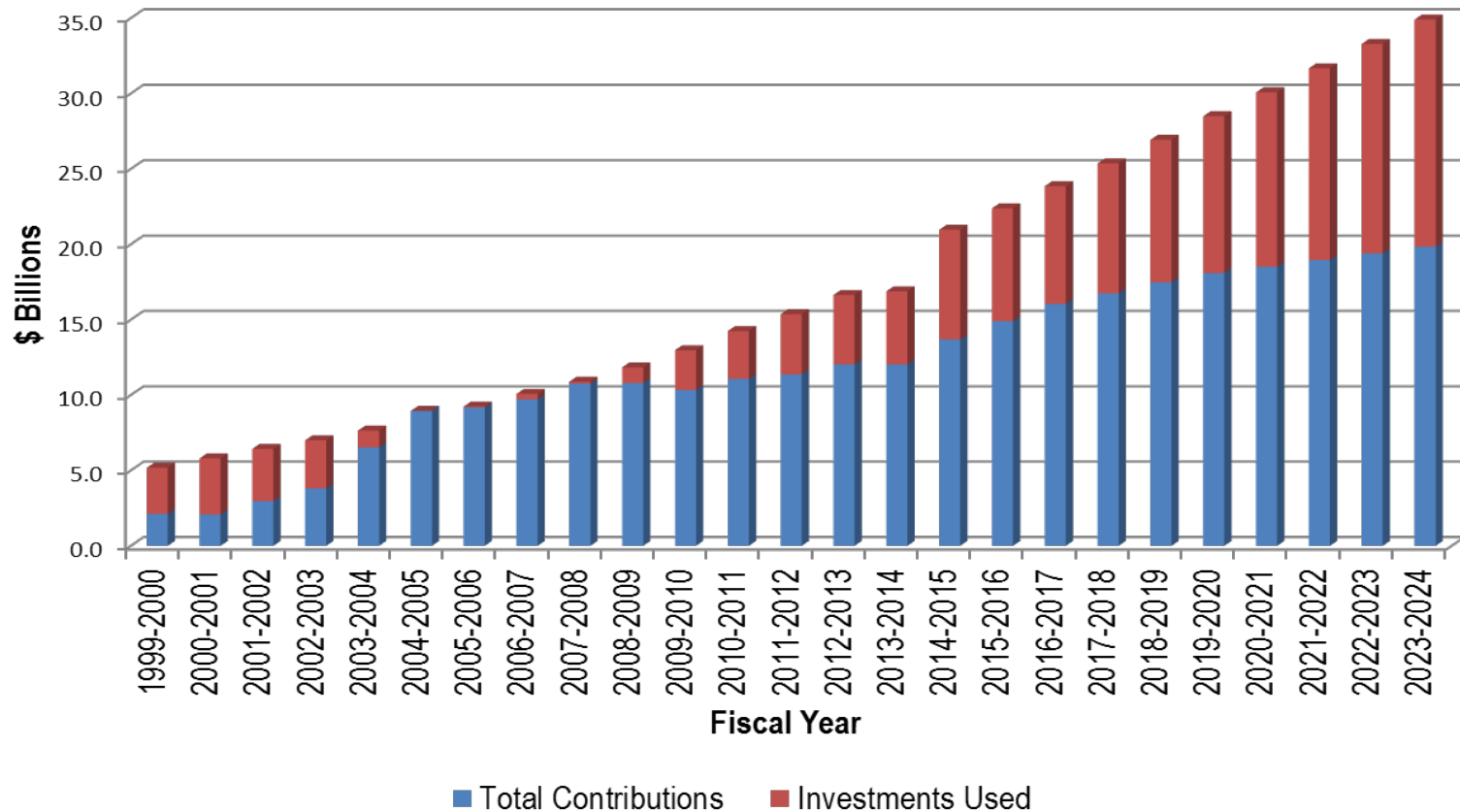
Peak Employer Contribution Rate Increase



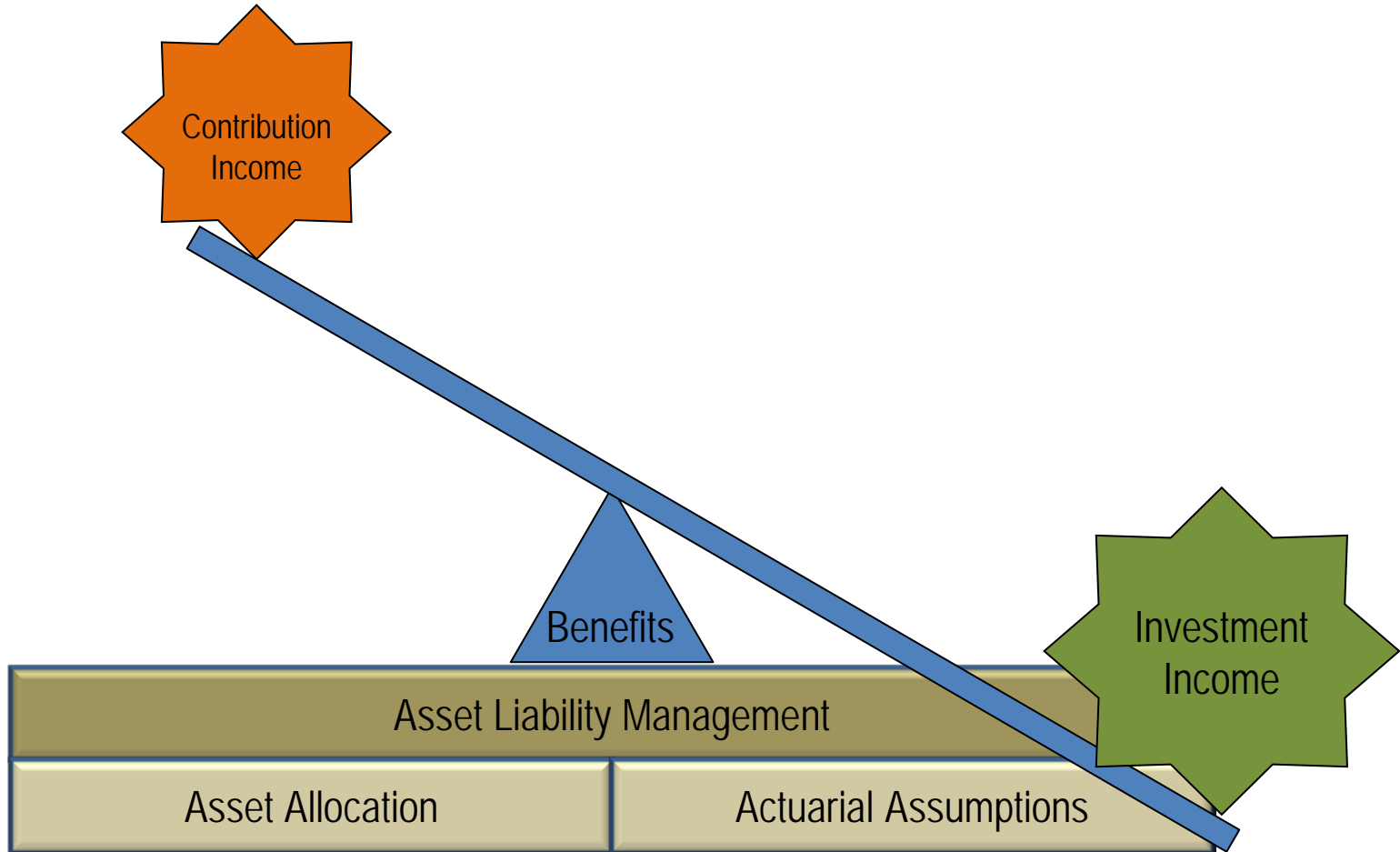
Balancing the Equation



Historic & Projected PERF Contributions & Investments for Benefit Payments



Asymmetric – In the Future



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Considerations

- Focus of risk mitigation should be a desired risk level, not a discount rate.
- Current risk level
 - Asset volatility of 11.7%
- Possible risk goals
 - Asset volatility of 10% or 8%

Flexible Glide Path

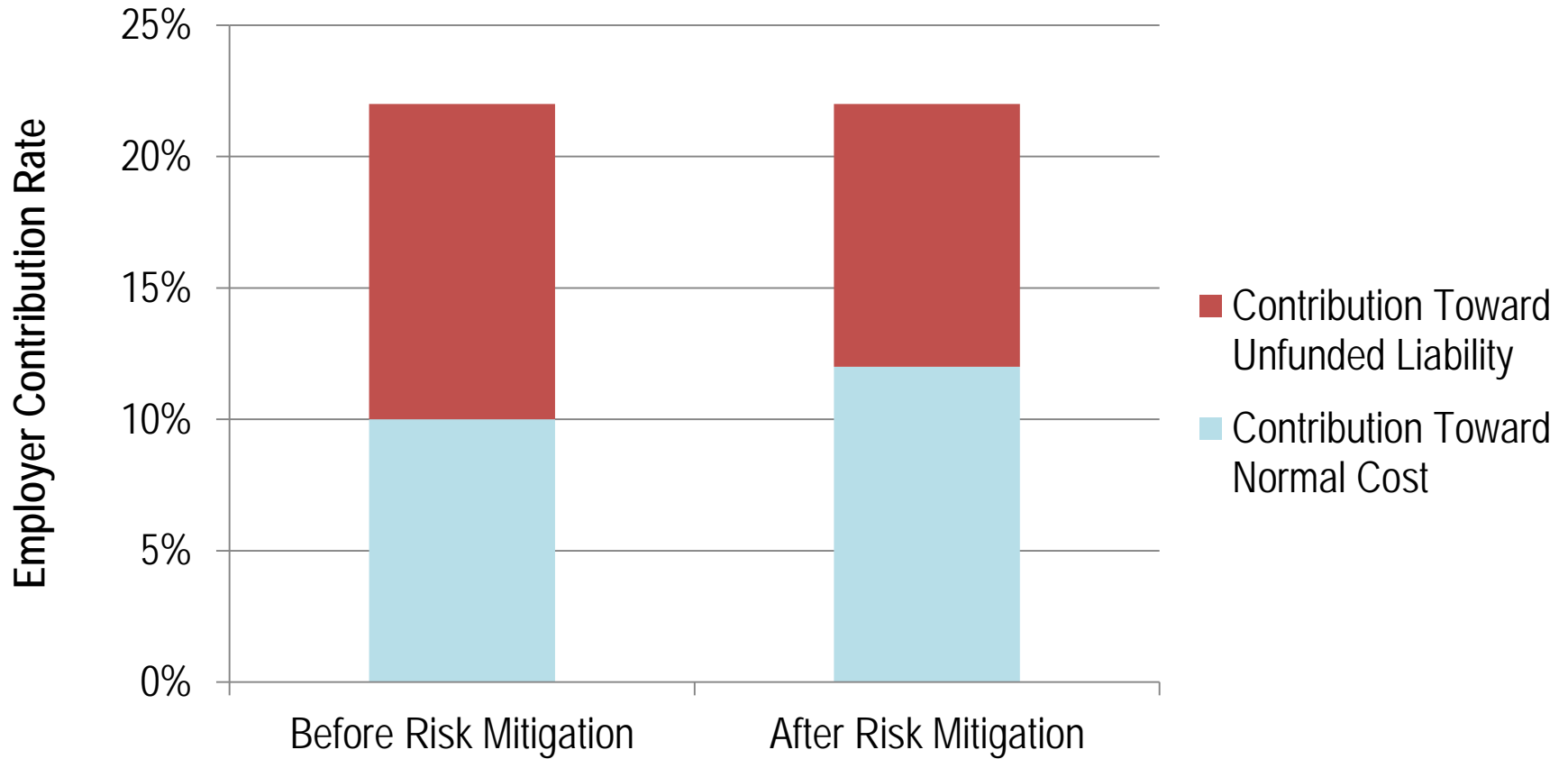
Concept

- Reduce funding risk when great investment years occur without immediately increasing contribution rates.
- Do not increase risk after poor investment years.

How it works

- After a great return, instead of reducing contribution rates, reduce the discount rate.
- Then gradually modify the asset allocation to reduce the volatility and expected return.
- Reduced volatility will lower the probability of investment changes that can jeopardize the funding of the system.

Illustrations of Flexible Glide Path



Flexible Glide Path – Pros and Cons



Pros:

- Potential to reduce funding risk quickly
- Has minimal immediate impact on employer rates
- Lower employer contribution rate volatility over time

Cons:

- Not guaranteed to reduce risk if returns are not great enough
- Will result in higher member and employer contribution rates over the long term
- All plans are different – some plans may experience immediate increased rates after risk mitigation

Blended Glide Path

Concept

- Combine the concepts of a systematic glide path and flexible glide path.
- Discount rate decreases gradually over time either after a good investment return or at identified check points.

How it works

- As with a systematic glide path define a risk target and construct a time-frame and schedule.
- Make larger reductions in risk in years with great investment returns using the mechanism of flexible glide path.
- For example: a glide path might show that we reduce our discount rate and expected return by at least 15 basis points every four years. Following a great investment return we could reduce our discount rate and expected return by more than 15 basis points.
- The four year check points and triggers would ensure risk mitigation over time if investment markets do not provide good enough return.

Blended Glide Path – Pros and Cons



Pros:

- Guaranteed to reduce funding risk over the specified period
- Lower employer contribution rate volatility over time

Cons:

- Will compound the increase in employer rates if risk mitigation follows a poor investment return
- Will result in higher member and employer contribution rates over the long term

Additional Considerations for Blended Glide Path

- For blended glide path risk mitigation, the following must be considered as part of the method:
 - Ultimate volatility goal
 - Frequency of “check points”
 - Trigger i.e. minimum discount rate reduction at check points
 - Time period to get to the desired volatility

Risk Mitigation Refinements

- Looking at “small steps” of risk mitigation
 - Minimum discount rate adjustments of 5 basis point increments instead of 25 basis points
 - Maximum discount rate change of 25 basis points in years where we have exceptional returns
- Using part of a good return investment year for risk mitigation and part to provide rate relief for employers.

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Thresholds

- Thresholds are defined as the return in excess of the discount rate required to trigger a risk mitigation event.
- Thresholds are different for each plan.
- Not possible to find a threshold that will work for all
 - The PERF is comprised of more than 3000 plans with diverse characteristics
 - Plans that are overfunded will see a rate increase

Sample Plans

- In order to enhance the analysis provided for risk mitigation, four sample plans were chosen which represent a broad spectrum of PERF plans. Their plan characteristics are listed in the table below.

Plan	6/30/14 Estimated Funded Status	2014-15 Employer Rate	Projected Peak Rate	Volatility Index
Miscellaneous Plan A	73.1%	25.7%	28.0%	6.6
Miscellaneous Plan B	83.4%	14.0%	15.5%	5.3
Safety Plan A	65.0%	45.6%	50.0%	8.8
Safety Plan B	71.7%	37.2%	39.4%	8.8

Thresholds Needed to Lower Discount Rate by 5 Basis Points

Plan	Additional Investment Return Required	Total Investment Return Required (Currently)
Miscellaneous Plan A	3.5%	11.0%
Miscellaneous Plan B	2.0%	9.5%
Safety Plan A	4.0%	11.5%
Safety Plan B	3.0%	10.5%

Thresholds

For the remainder of the analysis, we have chosen Safety Plan A's thresholds since a risk mitigation event for Safety Plan A will mean *most* plans will not experience an immediate rate increase. The table below displays the investment return required above the expected return for discount rate reductions from 5 to 25 basis points.

Discount Rate Reduction	Additional Investment Return Required	Total Investment Return Required (Currently)
0.05%	4.0%	11.5%
0.10%	7.0%	14.5%
0.15%	10.0%	17.5%
0.20%	13.0%	20.5%
0.25%	17.0%	24.5%

Flexible Glide Path: High Threshold

- Table below shows the likelihood of lowering risk to a certain volatility level over the next 20 and 30 years.

Volatility Level	Discount Rate	Probability of Reaching Volatility Level Over Next 20 Years	Probability of Reaching Volatility Level Over Next 30 Years
10%	7.0%	97%	100%
8%	6.5%	47%	98.4%

Blended Approach: High Threshold

- The blended approach forces the discount rate downward 15 basis points every 4 years even without favorable investment return. When this occurs it will cause an immediate increase to future employer rates. The following table lists the probability of a single 5, 10, and 15 basis point jump in a single 4 year period for a sample plan.

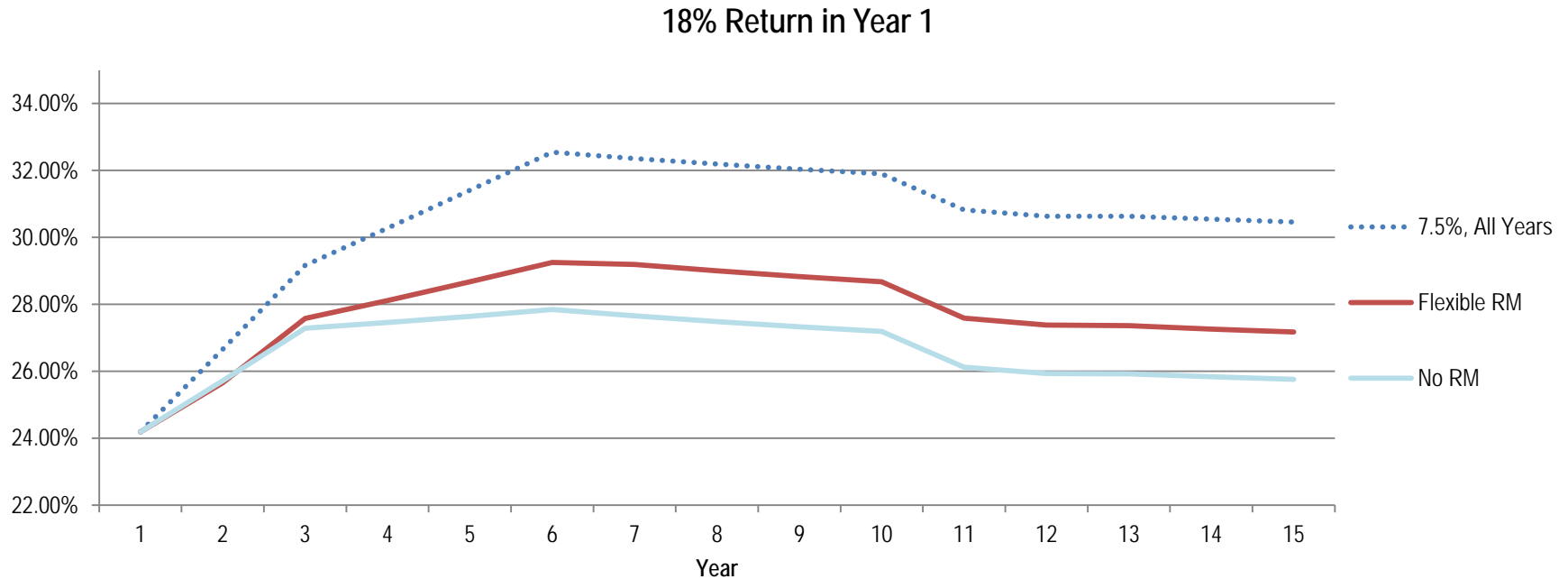
	15 basis point jump	10 basis point jump	5 basis point jump	No event
Miscellaneous Plan A	1.9%	1.4%	1.8%	94.9%

Sample Miscellaneous Plan A

- Let's look at an example of what would happen with flexible glide path if we had an 18% return, followed by a 0% return.
- For that plan, an 18% return would allow a reduction in risk and a lowering of the discount rate
 - 18% is 10.5% higher than the expected 7.5%
 - Would trigger a reduction in discount rate 0.15%

Miscellaneous Plan A Example

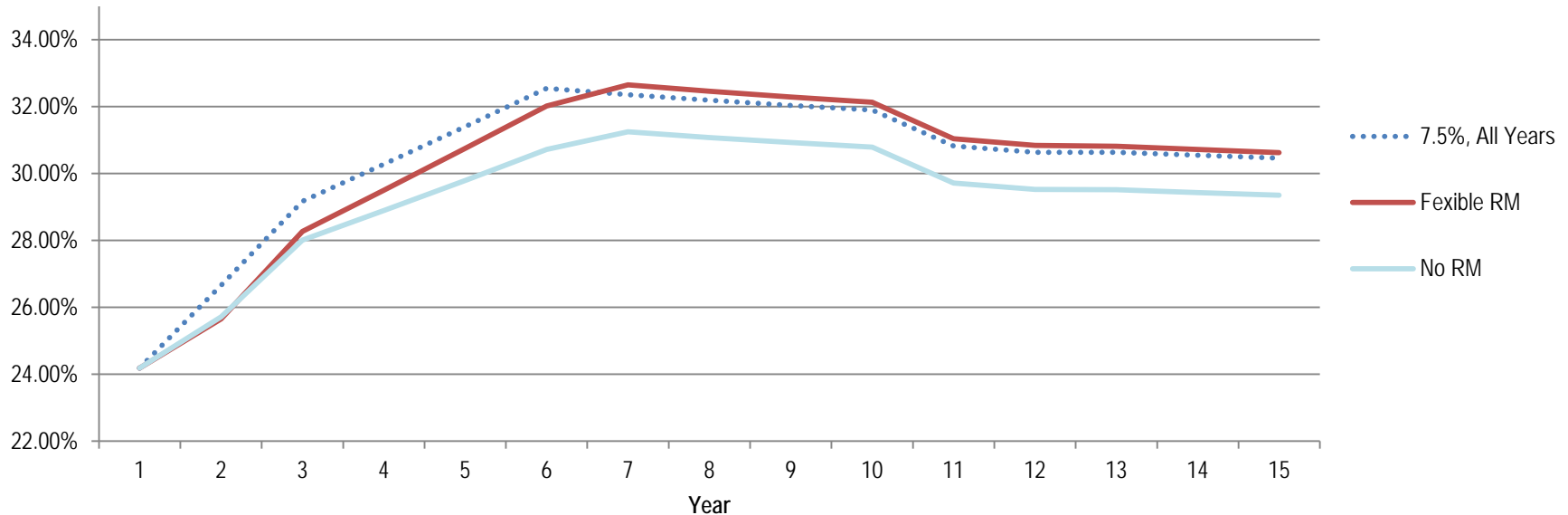
- Using present day as an example for contribution rates



Miscellaneous Plan A Example

- Incorporating an expected return of 0% for the following year

18% Return in Year 1 Followed by 0% Return in Year 2



Modeling

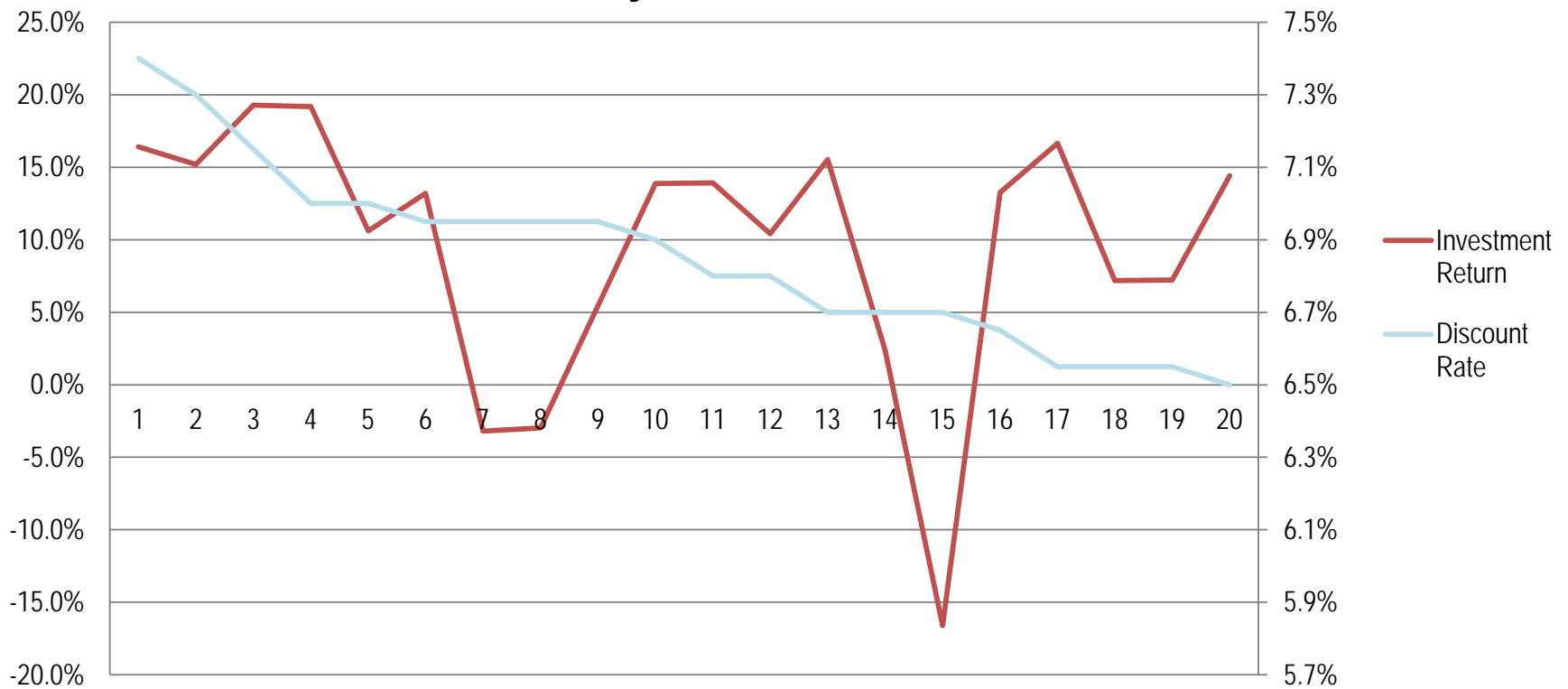
- Previous examples are simple illustrations.
- Flexible and blended glide path risk mitigation were modeled for the four selected plans
 - 5,000 simulations
 - 50 year projections each

Modeling Parameters

- Discount rate is reduced in 5 basis points increments, but never more than 25 basis points at a time.
- Risk mitigation stops once the volatility reaches 8% based on today's capital market assumptions.

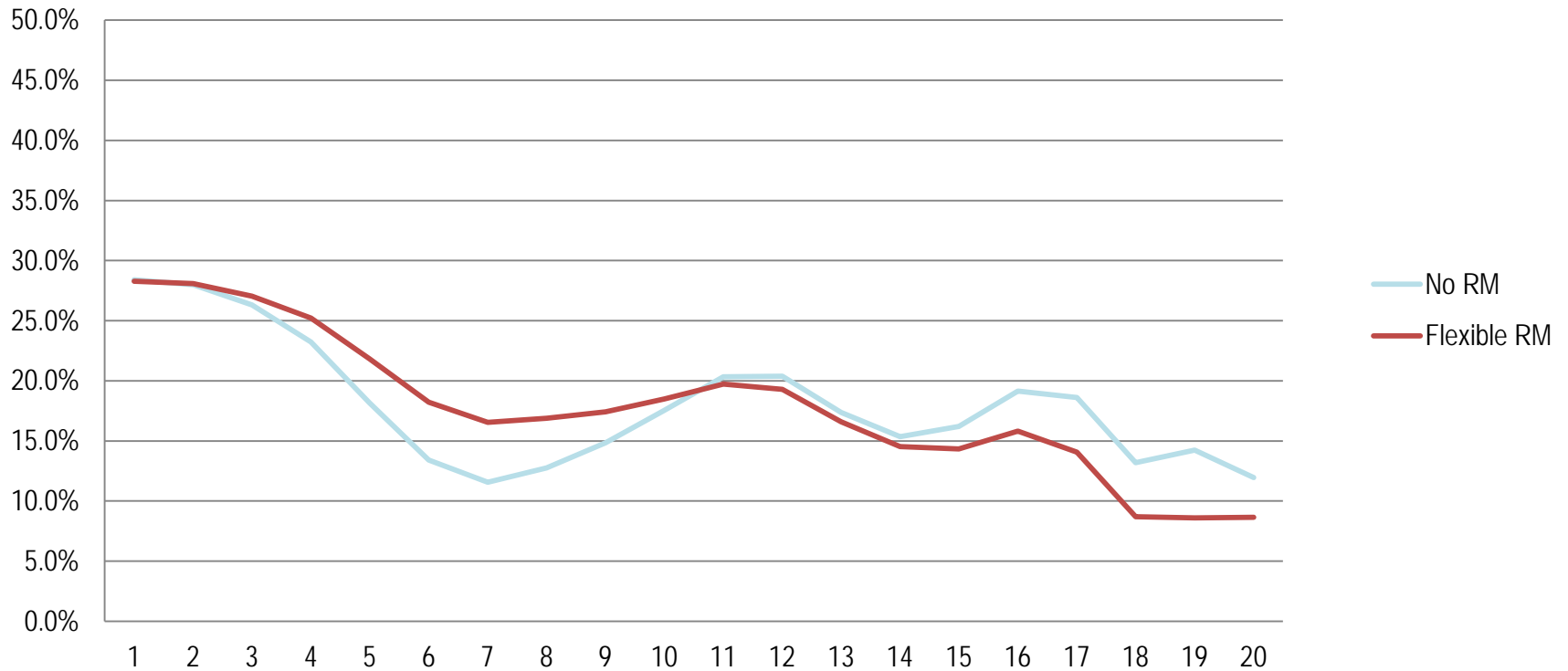
Example of Modeling: Flexible Glide Path

Miscellaneous A: Discount Rate vs Investment Return
(20 year Historical)



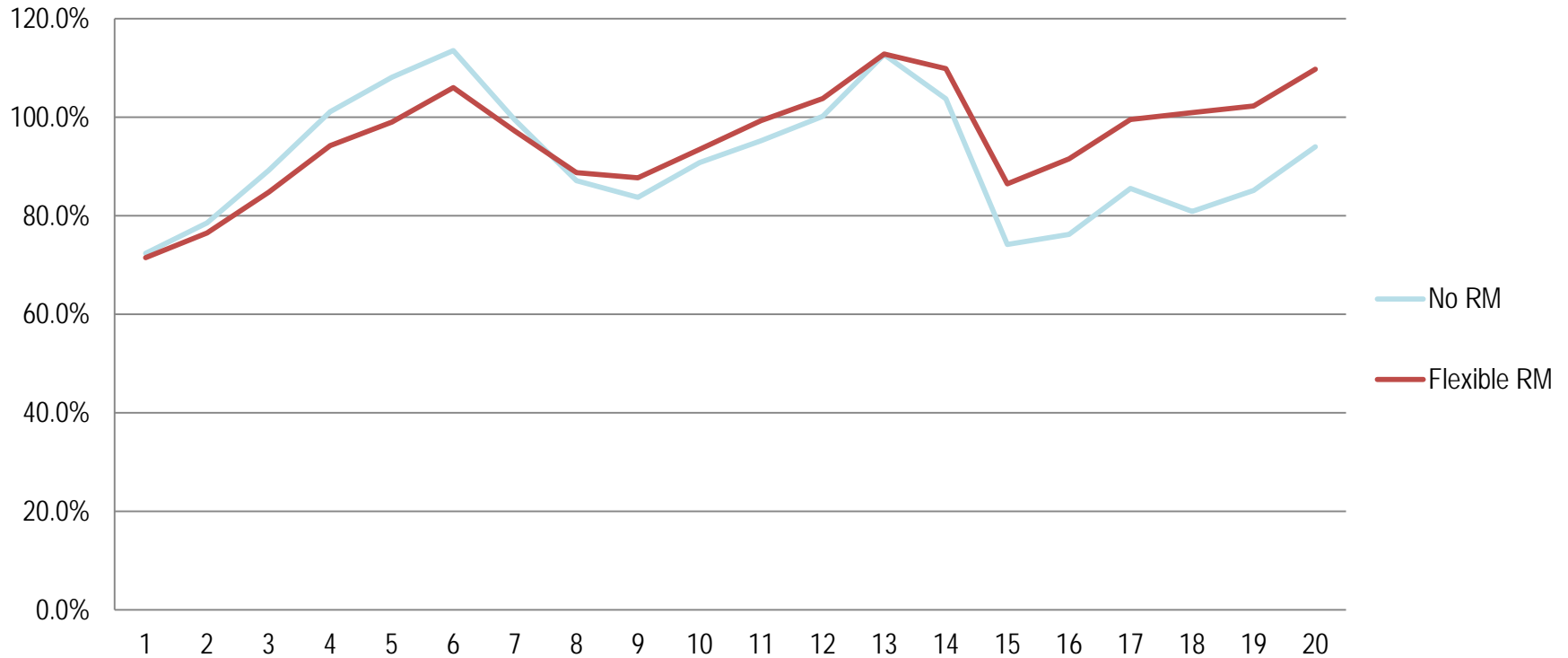
Example of Modeling: Flexible Glide Path

Miscellaneous A: Contribution Rates
(20 year Historical)



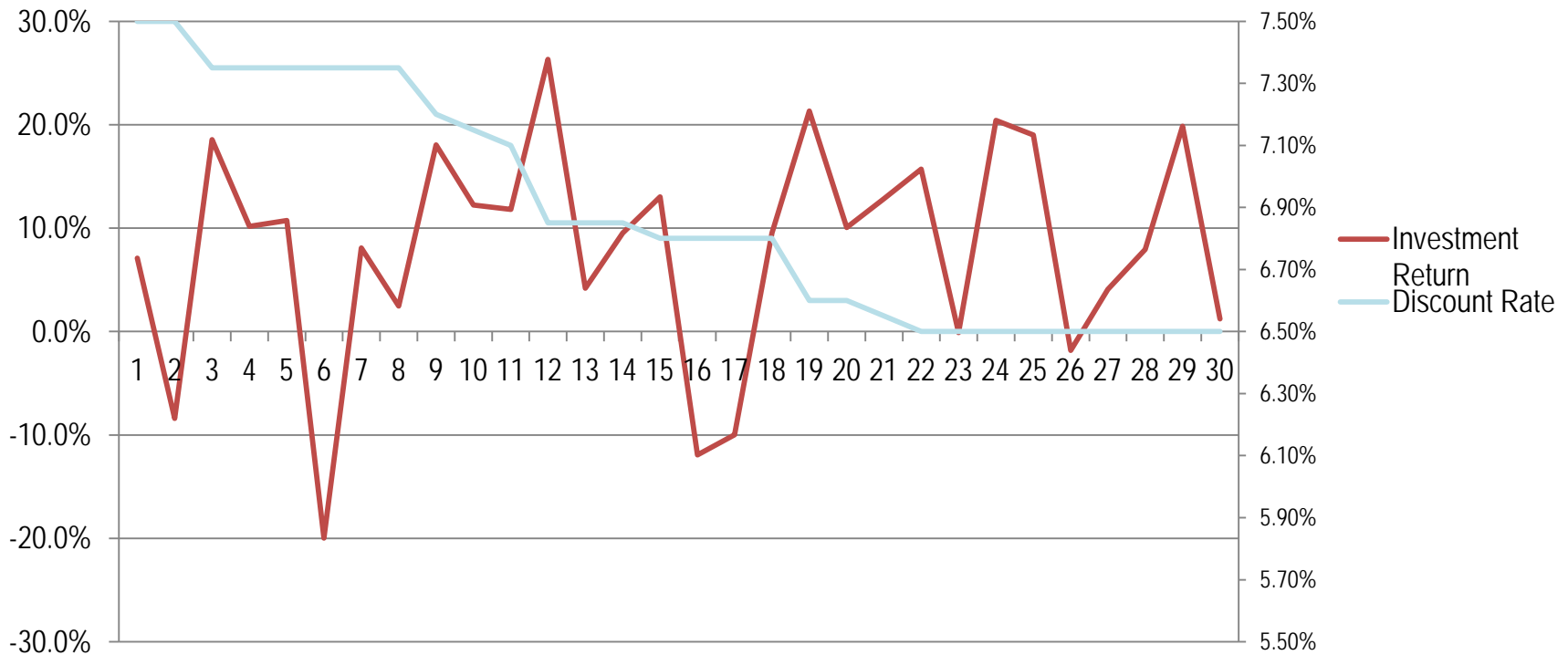
Example of Modeling: Flexible Glide Path

Miscellaneous A: Funded Ratio
(20 year Historical)



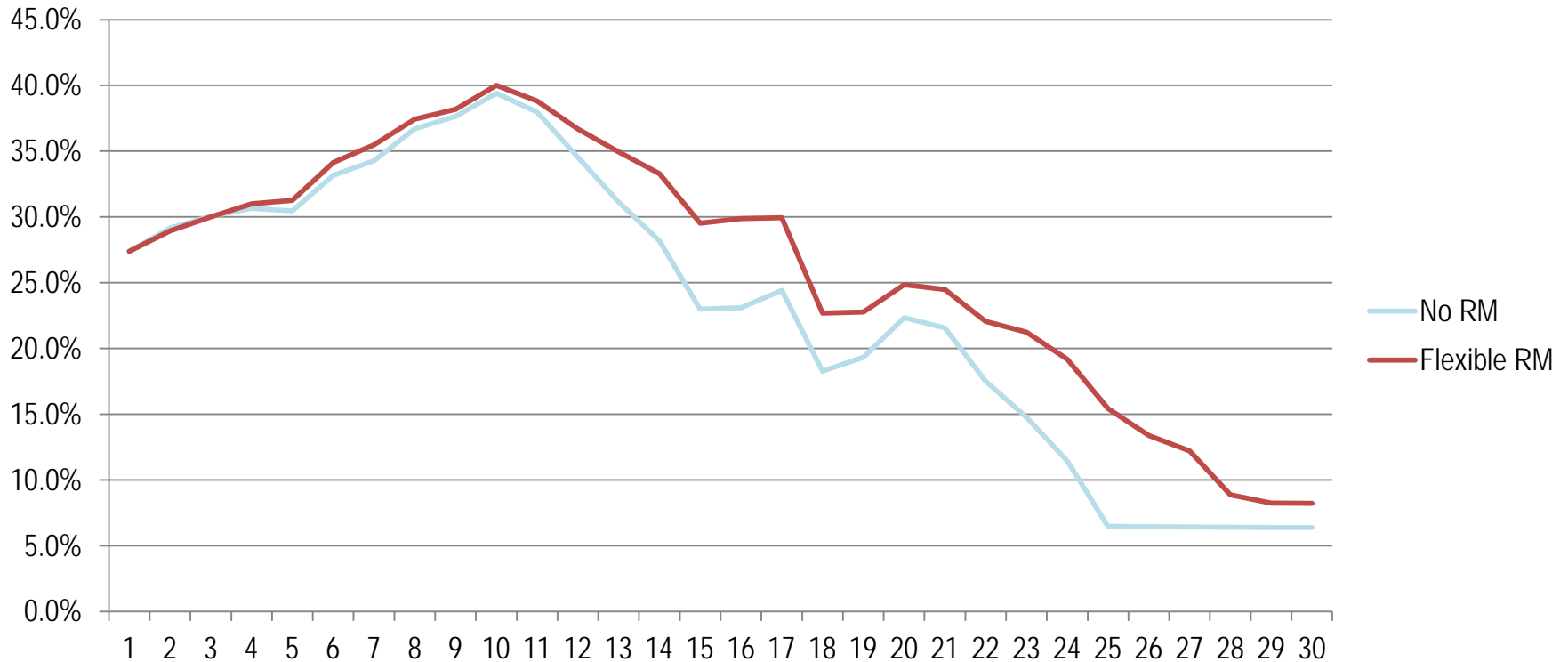
Example of Modeling: Flexible Glide Path

Miscellaneous Plan A: Discount Rate vs. Investment Return (Good Return Scenario)



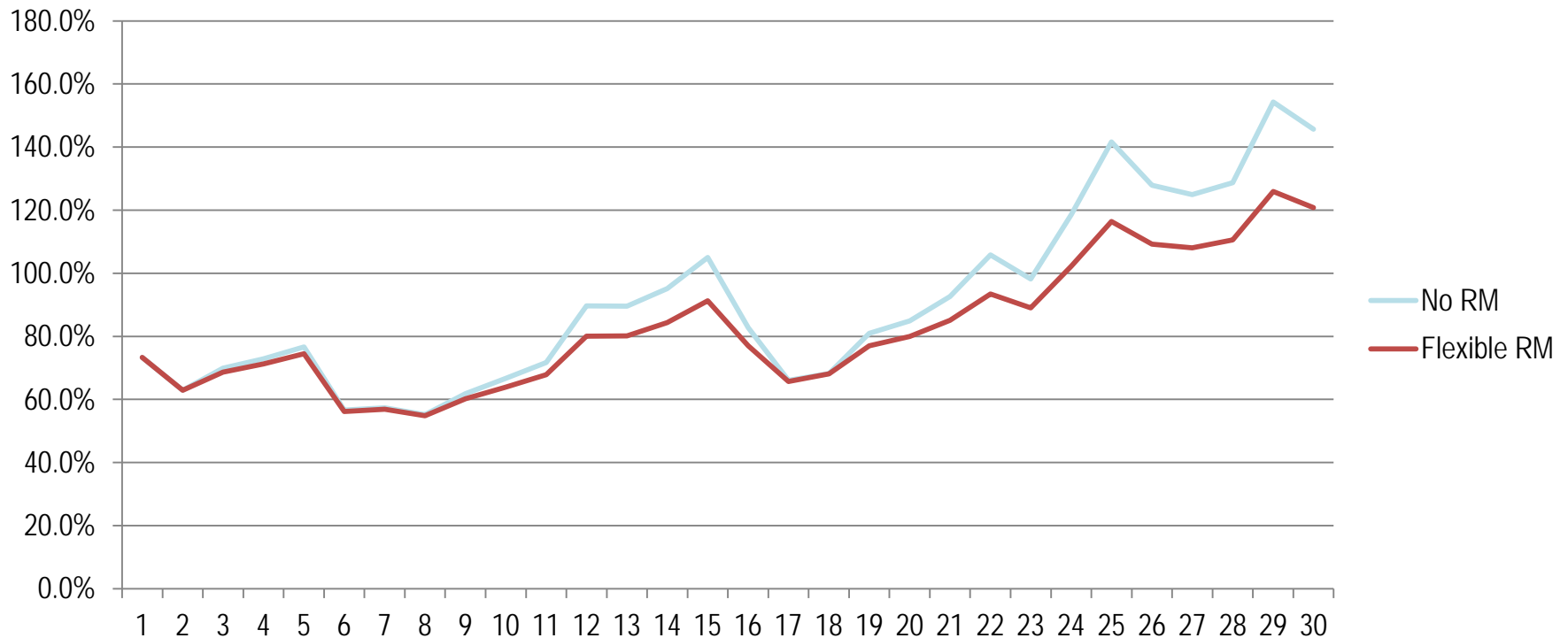
Example of Modeling: Flexible Glide Path

Miscellaneous Plan A: Contribution Rates (Good Return Scenario)



Example of Modeling: Flexible Glide Path

Miscellaneous Plan A: Funded Ratios (Good Return Scenario)



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Cost of Risk Mitigation

- There is a cost to reduce risk.
- Risk mitigation cannot be done without resulting in higher costs long term
 - Costs will affect both employers and employees
- These cost increases vary by plan type (miscellaneous vs safety)

Average Employer Contribution Rate

- Projected over the next 50 years

Plan	No Risk Mitigation	Flexible Glide Path	Blended Glide Path
Miscellaneous A	17.8%	19.9%	20.0%
Miscellaneous B	13.3%	14.1%	14.2%
Safety A	31.9%	38.4%	38.7%
Safety B	28.1%	31.6%	31.9%

PEPRA Miscellaneous Normal Cost Comparison

- Lowering the discount rate increases normal cost, which will increase member contributions under PEPRA. Below are two sample miscellaneous plans.

Miscellaneous Plan A	Current Plan	10% Volatility	8% Volatility
Employer	6.32%	7.39%	8.14%
Employee	6.50%	7.00%	8.00%
Total	12.82%	14.39%	16.14%

Miscellaneous Plan B	Current Plan	10% Volatility	8% Volatility
Employer	6.84%	7.83%	8.49%
Employee	6.75%	7.25%	8.25%
Total	13.59%	15.08%	16.74%

PEPRA Safety Normal Cost Comparison

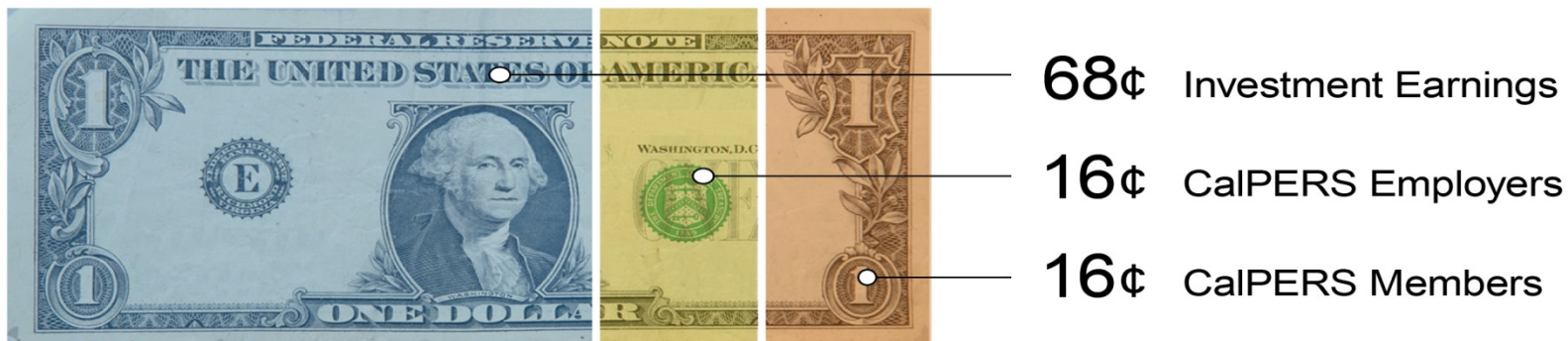
- Lowering the discount rate increases normal cost, which will increase member contributions under PEPRA. Below are two sample safety plans.

Safety Plan A	Current Plan	10% Volatility	8% Volatility
Employer	10.81%	12.47%	14.01%
Employee	10.75%	12.00%	13.75%
Total	21.56%	24.47%	27.76%

Safety Plan B	Current Plan	10% Volatility	8% Volatility
Employer	11.48%	13.01%	14.37%
Employee	11.25%	12.50%	14.25%
Total	22.73%	25.51%	28.62%

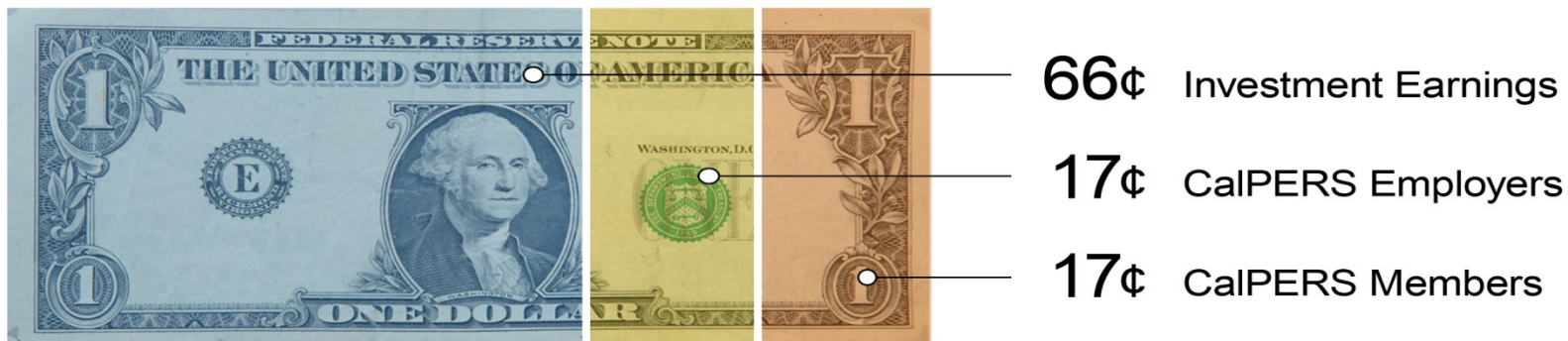
Pension Buck Comparison: 7.5%

- Working lifetime of a PEPRA member



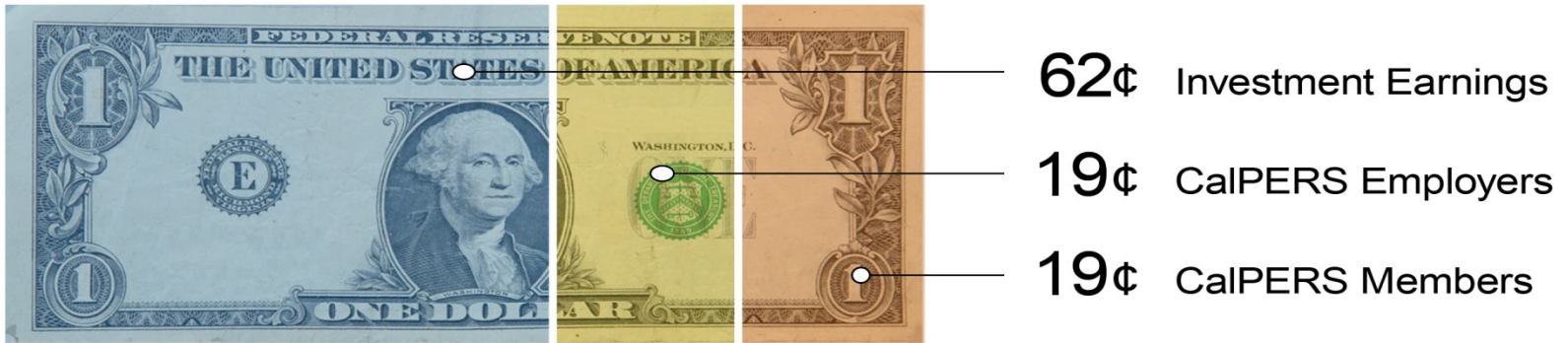
Pension Buck Comparison: 7.0%

- Working lifetime of a PEPRA member



Pension Buck Comparison: 6.5%

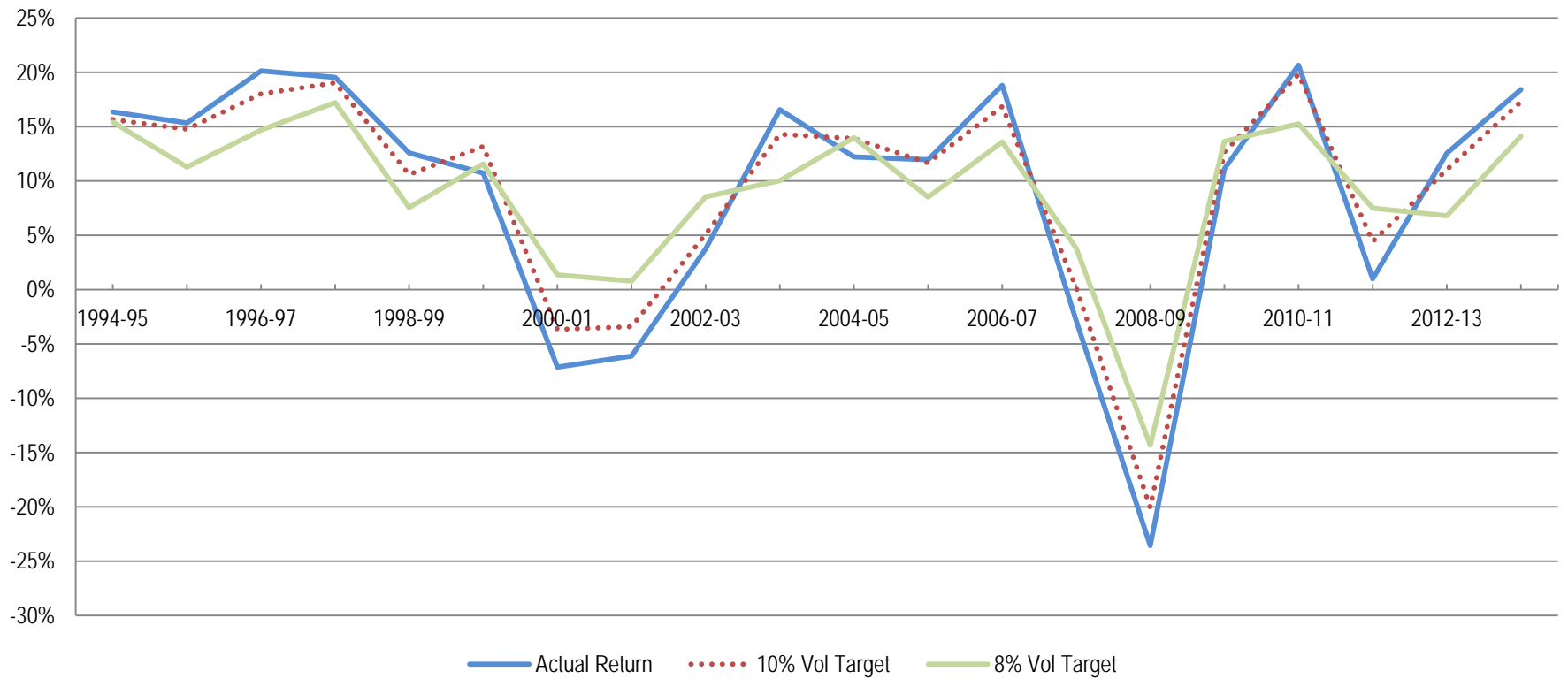
- Working lifetime of a PEPRA member



Benefits of Risk Mitigation

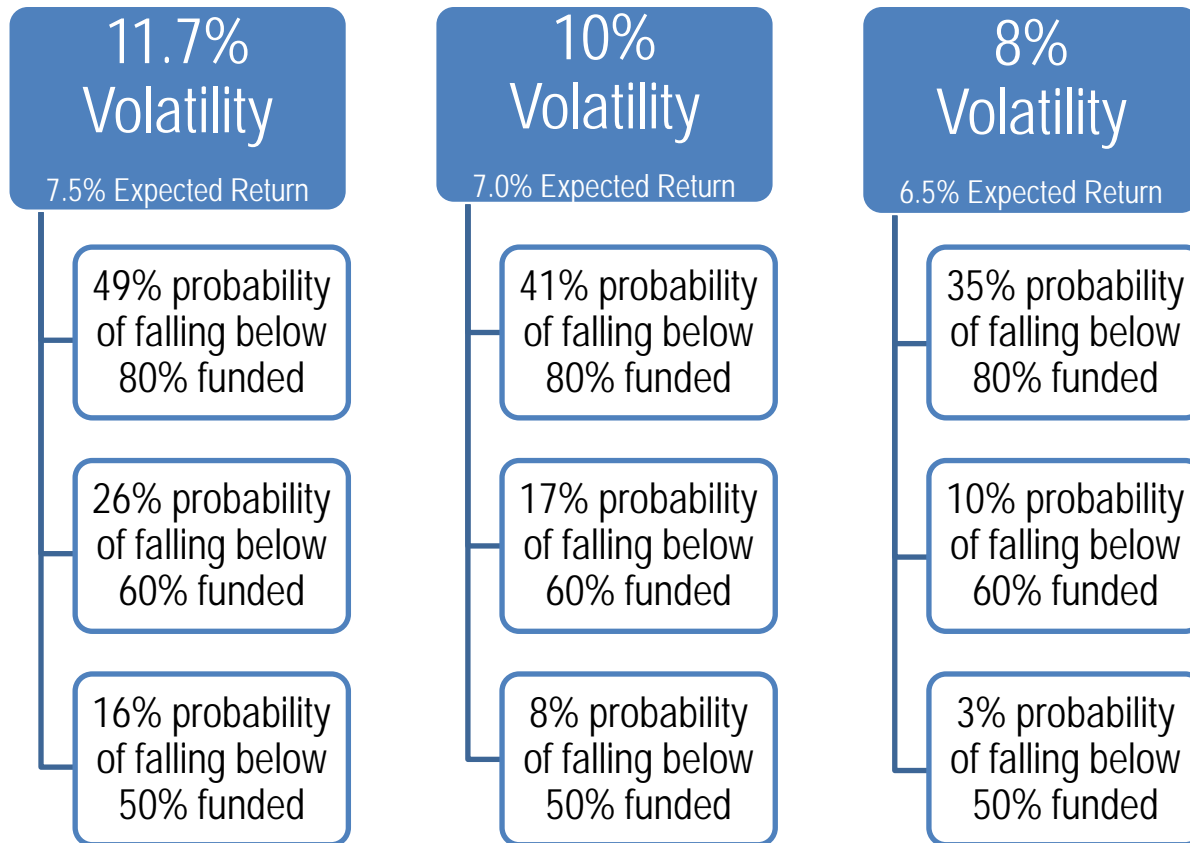
- Sustainable fund
- Less volatile investment returns
- More stable contribution rates
- Less likely to have a drastic loss like 2008-09

Historical Investment Performance Last Twenty Years



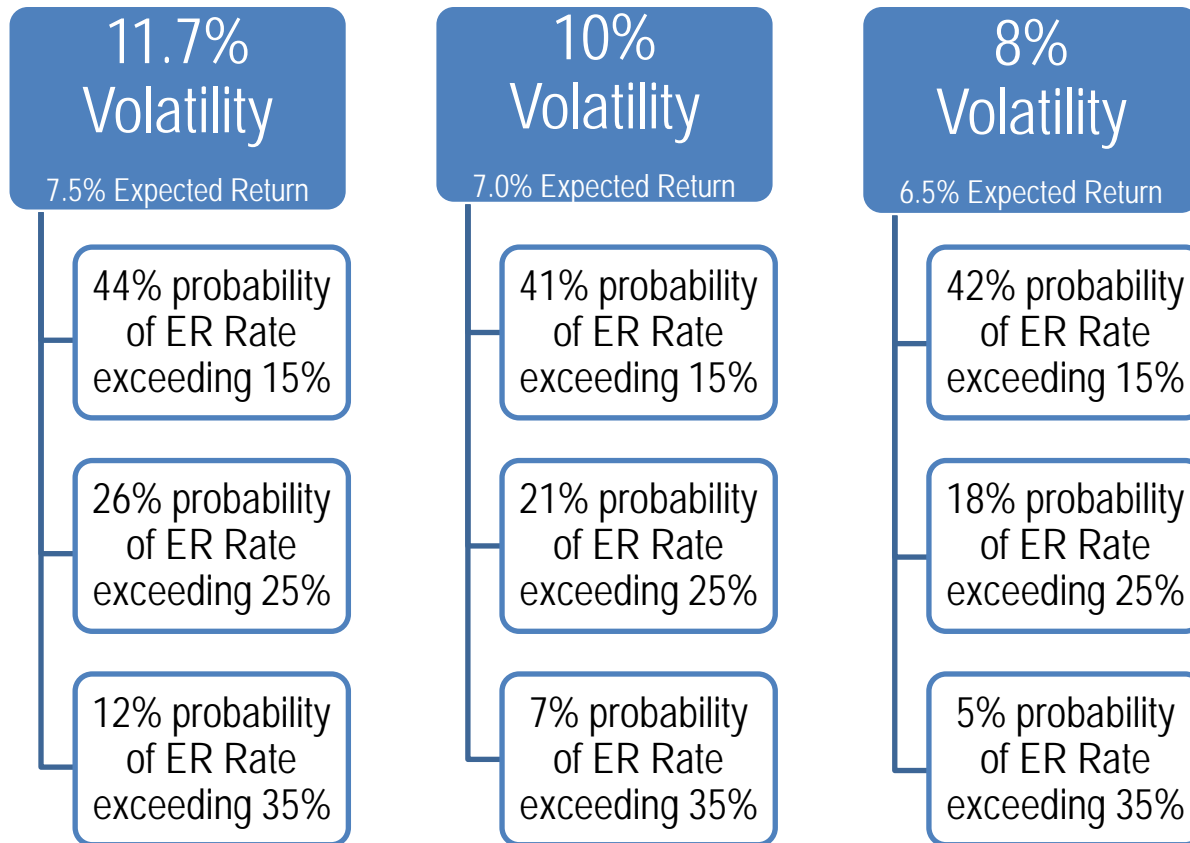
Impact of Investment Volatility on Funding Status – 30 year Horizon

If our Sample Miscellaneous Plan is 100% funded today with:



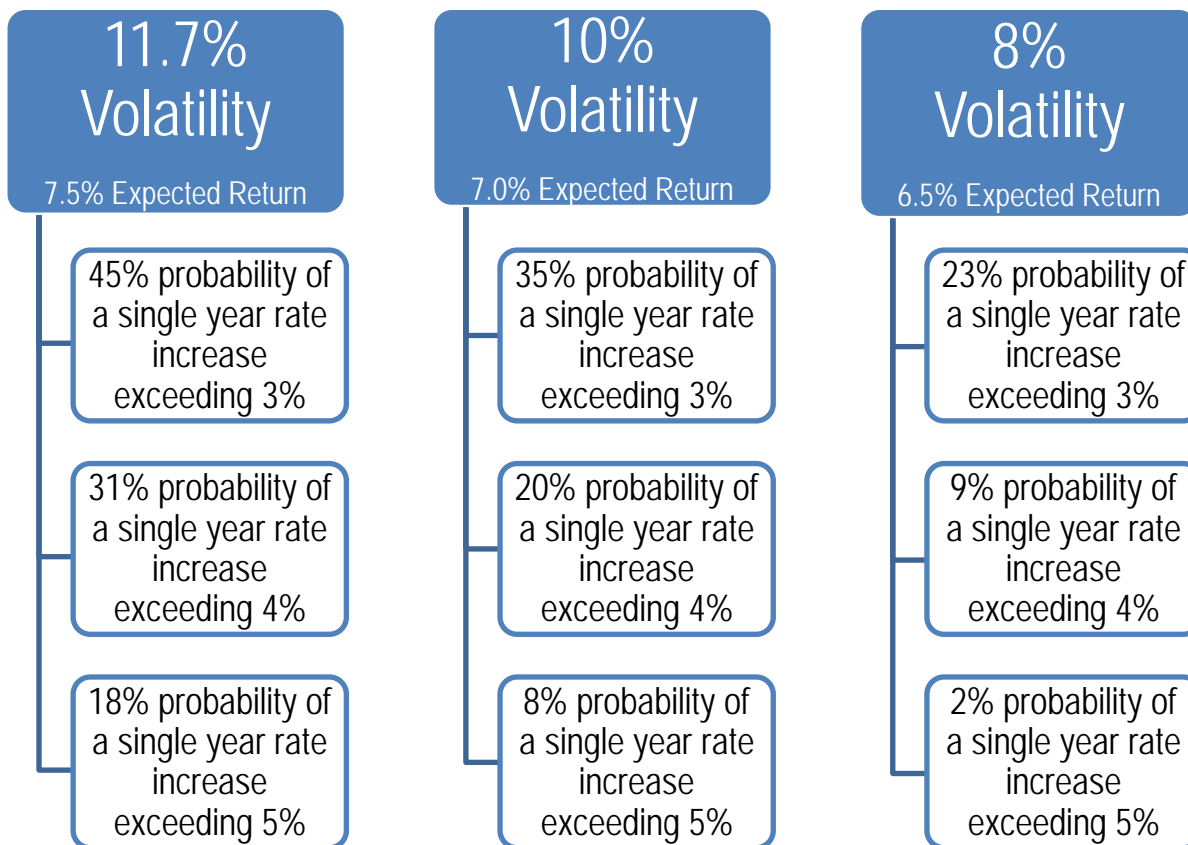
Impact on Employer Contribution Rates – 30 year Horizon

If our Sample Miscellaneous Plan is 100% funded today with:



Impact on Single Year Increase on Employer Contribution Rates – 30 year Horizon

If our Sample Miscellaneous Plan is 100% funded today with:



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Administrative Considerations

- Asset transition costs
 - Shift assets how often?
- Timing of application of assumption changes to annual valuations
- Constant shifting of member calculations
 - Currently assume constant long term discount rate
- Transparency and communication

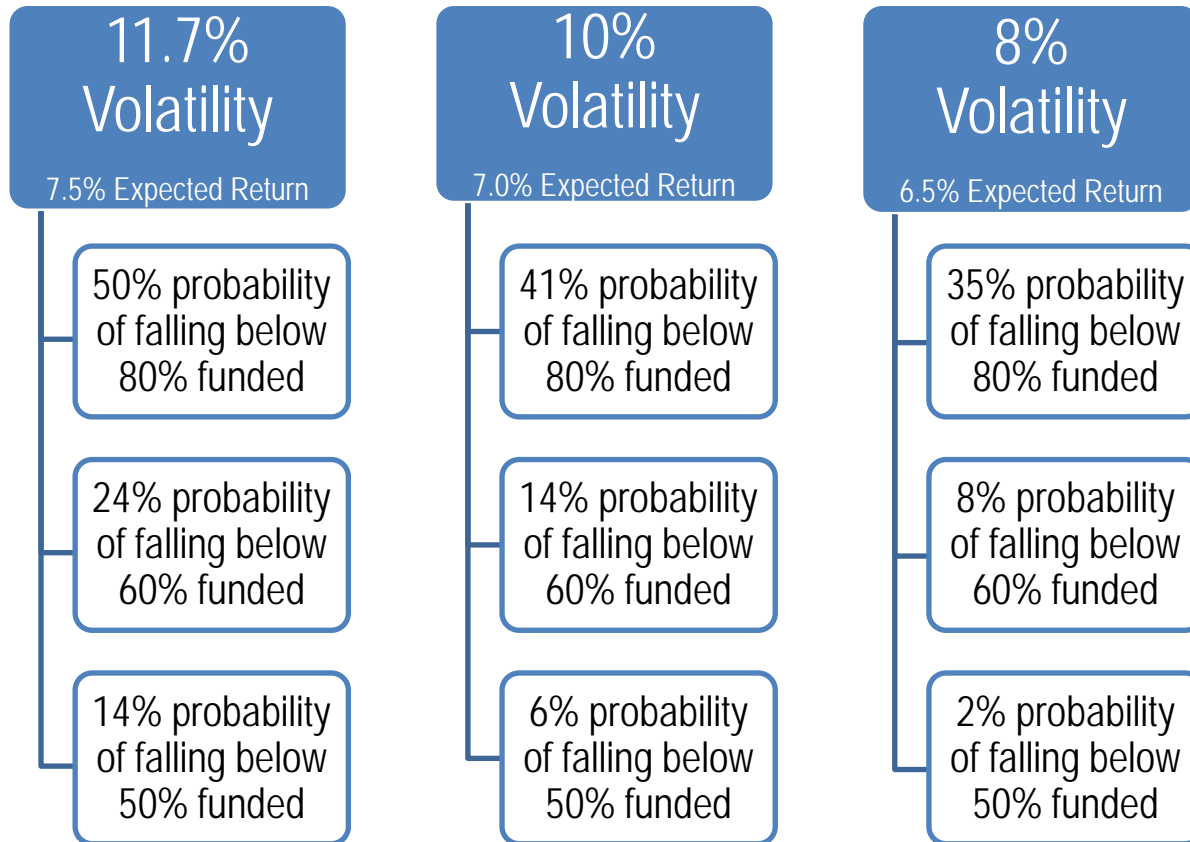
Discussion and Next Steps

- Discuss and obtain direction from the Board
 - Flexible Glide Path
 - Blended Glide Path
- September 2015 Board
 - CalPERS staff will present an update to pension funding risk mitigation strategy
- October 2015 Board
 - Possible CalPERS Board action on the pension funding risk mitigation strategy
 - Policy development based on Board direction

APPENDIX SLIDES

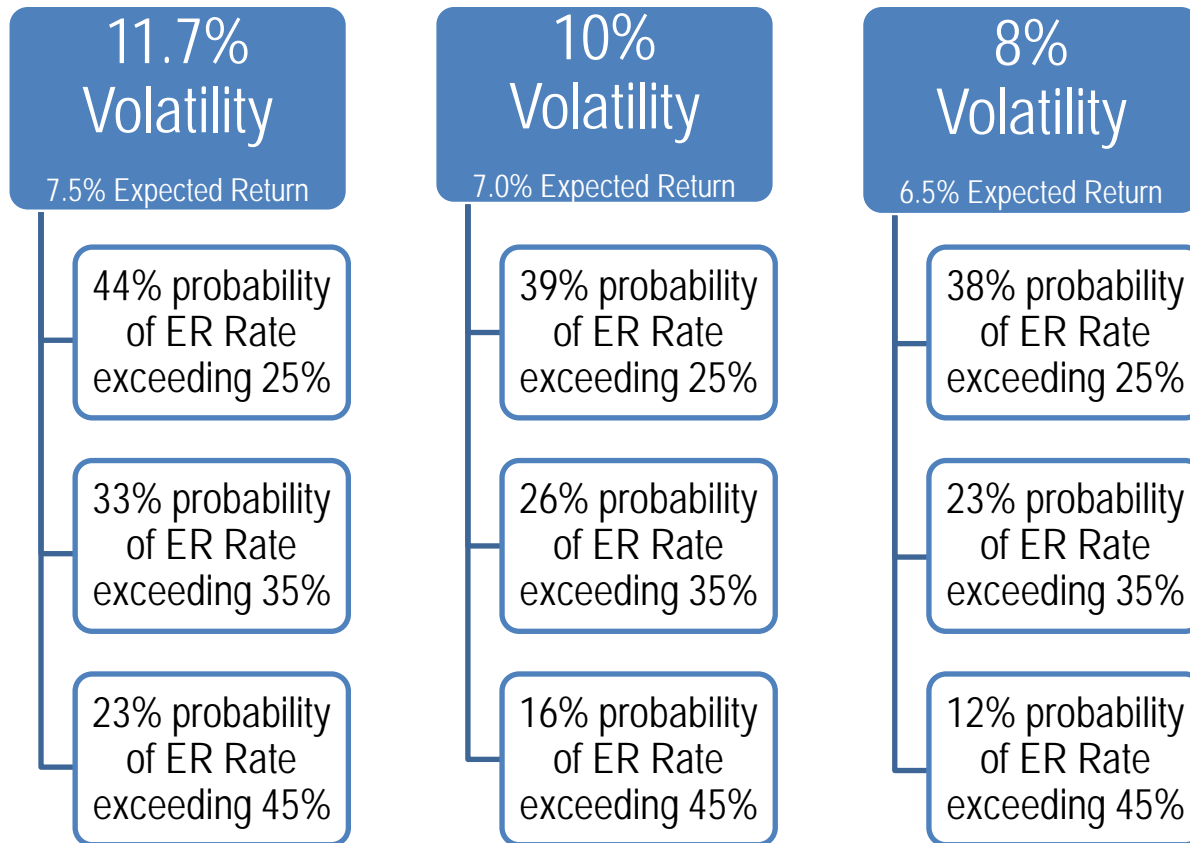
Impact of Investment Volatility on Funding Status – 30 year Horizon

If our Sample Safety Plan is 100% funded today with:



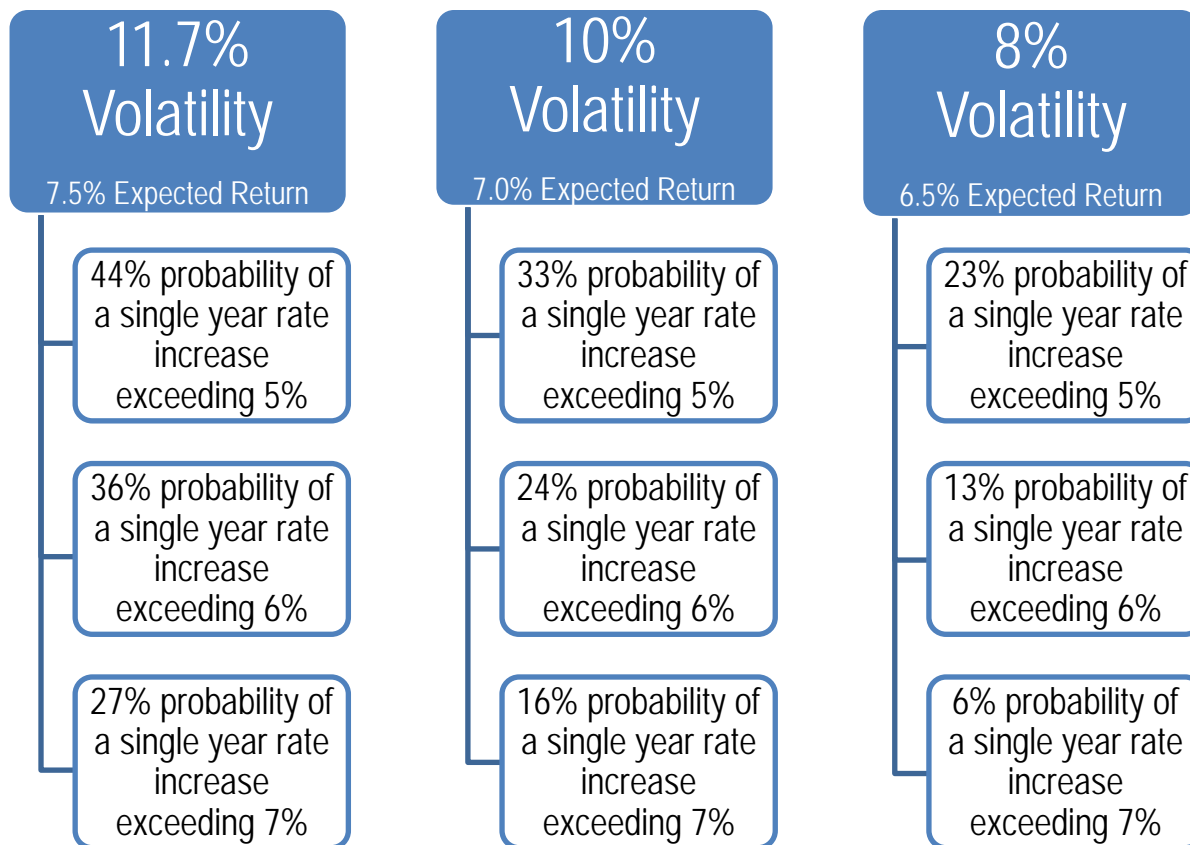
Impact on Employer Contribution Rates – 30 year Horizon

If our Sample Safety Plan is 100% funded today with:



Impact on Single Year Increase on Employer Contribution Rates – 30 year Horizon

If our Sample Safety Plan is 100% funded today with:



Thresholds: Miscellaneous Plan A

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0.10%	5.5%	13.0%
0.15%	7.5%	15.0%
0.20%	10.5%	18.0%
0.25%	12.5%	20.0%

Thresholds: Miscellaneous Plan B

Discount Rate Reduction	Additional Investment Return Required	Total Investment Return Required (Currently)
0.05%	2.0%	9.5%
0.10%	4.0%	11.5%
0.15%	6.0%	13.5%
0.20%	8.0%	15.5%
0.25%	10.0%	17.5%

Thresholds: Safety Plan B

Discount Rate Reduction	Additional Investment Return Required	Total Investment Return Required (Currently)
0.05%	3.0%	10.5%
0.10%	6.0%	13.5%
0.15%	9.0%	16.5%
0.20%	11.0%	18.5%
0.25%	14.0%	21.5%