



SOCIETY OF  
ACTUARIES®

2019 **ANNUAL  
MEETING**  
& EXHIBIT

October 27-30  
Toronto, Canada

## Session 161: Discount Rates for Pension Funding

[SOA Antitrust Compliance Guidelines](#)

[SOA Presentation Disclaimer](#)

# Discount Rates for Pension Funding

## **SESSION 161: DISCOUNT RATES FOR PENSION FUNDING**

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# SOCIETY OF ACTUARIES

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- **Do** alert SOA staff and/or legal counsel to any concerning discussions
- **Do** consult with legal counsel before raising any matter or making a statement that may involve competitively sensitive information.

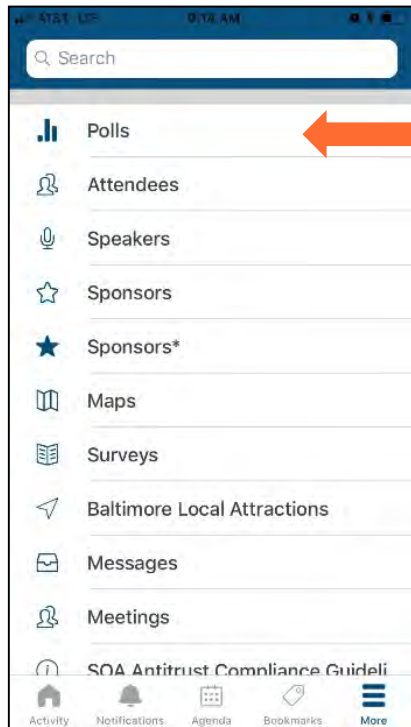
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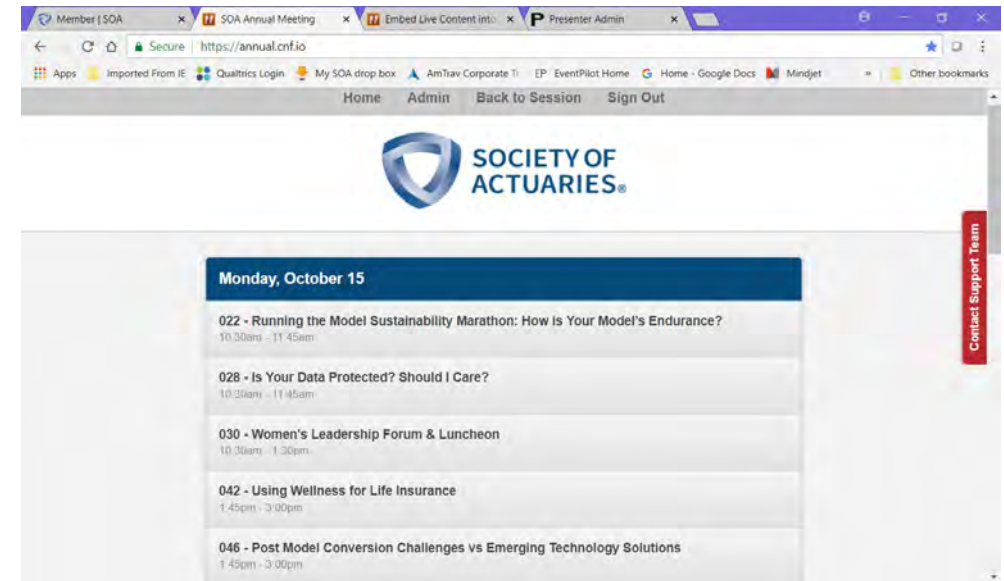
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# Polling Question

What digit is in the 263<sup>rd</sup> decimal place of  $\pi$  (3.14159...)?

- a) 1
- b) 4
- c) 6
- d) 7

## *Live Content Slide*

*When playing as a slideshow, this slide will display live content*

**Poll: What digit is in the 263rd decimal place of  $\pi$   
(3.14159...)?**

# Today's Topics

Canadian Discount Rates

U.S. Discount Rates

What ASOPs Say

Q&A



# Polling Question

Which of the following is your **best estimate for the long-term expected rate of return** (*not the actuarial assumed rate of return*), rounded to the nearest whole percentage, on a pension fund invested in 60% equities (domestic and global mix) and 40% long bonds?

- a) 4%
- b) 5%
- c) 6%
- d) 7%
- e) Other

## *Live Content Slide*

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**Poll: Which of the following is your best estimate for the long-term expected rate of return (not the actuarial assumed rate of return), rounded to the nearest whole percentage, on a pension fund invested in 60% equities (domestic and global mix) and 40% I**

# Polling Question

Which of the following is your **most reasonable range** for a discount rate for ongoing funding of an open, public sector pension fund invested in 60% equities (domestic and global mix) and 40% long bonds?

- a) 4%–8%
- b) 5%–7%
- c) 5%–8%
- d) 6%–9%
- e) Other

## *Live Content Slide*

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**Poll: Which of the following is your most reasonable range for a discount rate for ongoing funding of an open, public sector pension fund invested in 60% equities (domestic and global mix) and 40% long bonds?**

# Canadian Discount Rates

Doug Chandler, FSA, FCIA

# Different Perspectives

## Obligation

Settlement cost or fulfilment value of benefits already earned

Market yields, annuity prices and commuted values

*Benefit security for plan members,  
Economic value to owners*

## Funding Target

Funding projected benefits over members' working careers

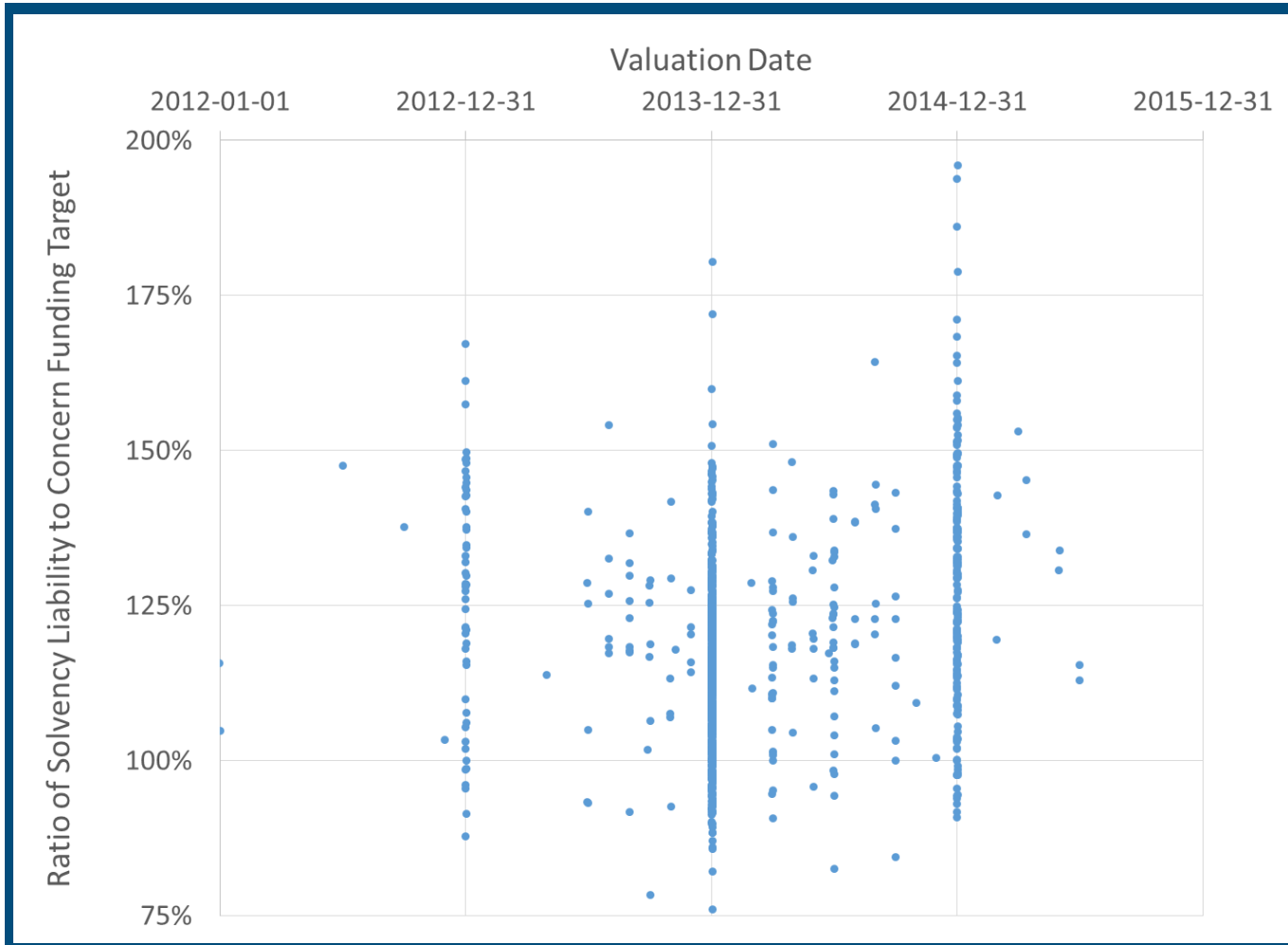
Expected return from plan's investment policy

*Contributions*

# Different discount rates



# Different Results





# Pension Funding Advice

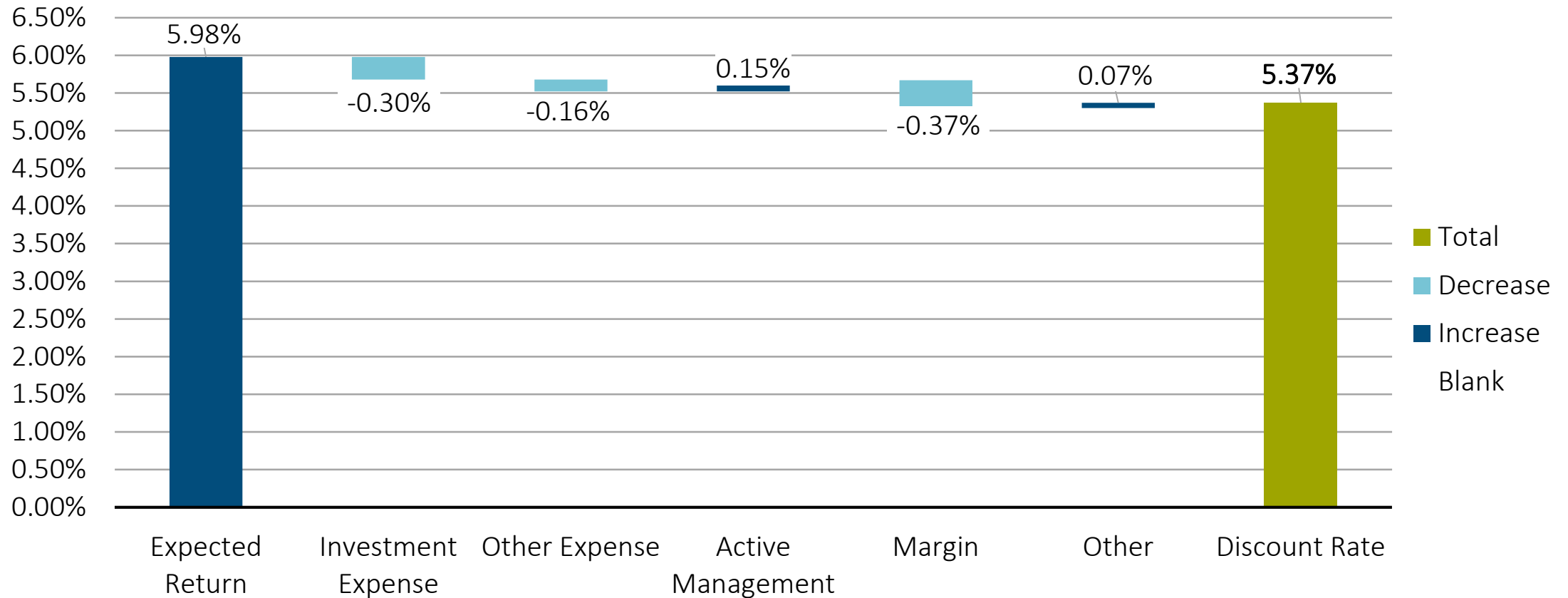
## CSOP 3230

- Best estimates
- Margins if required
- Either expected return or fixed income yield
- Premium for active management requires evidence

## Educational Note (2015)

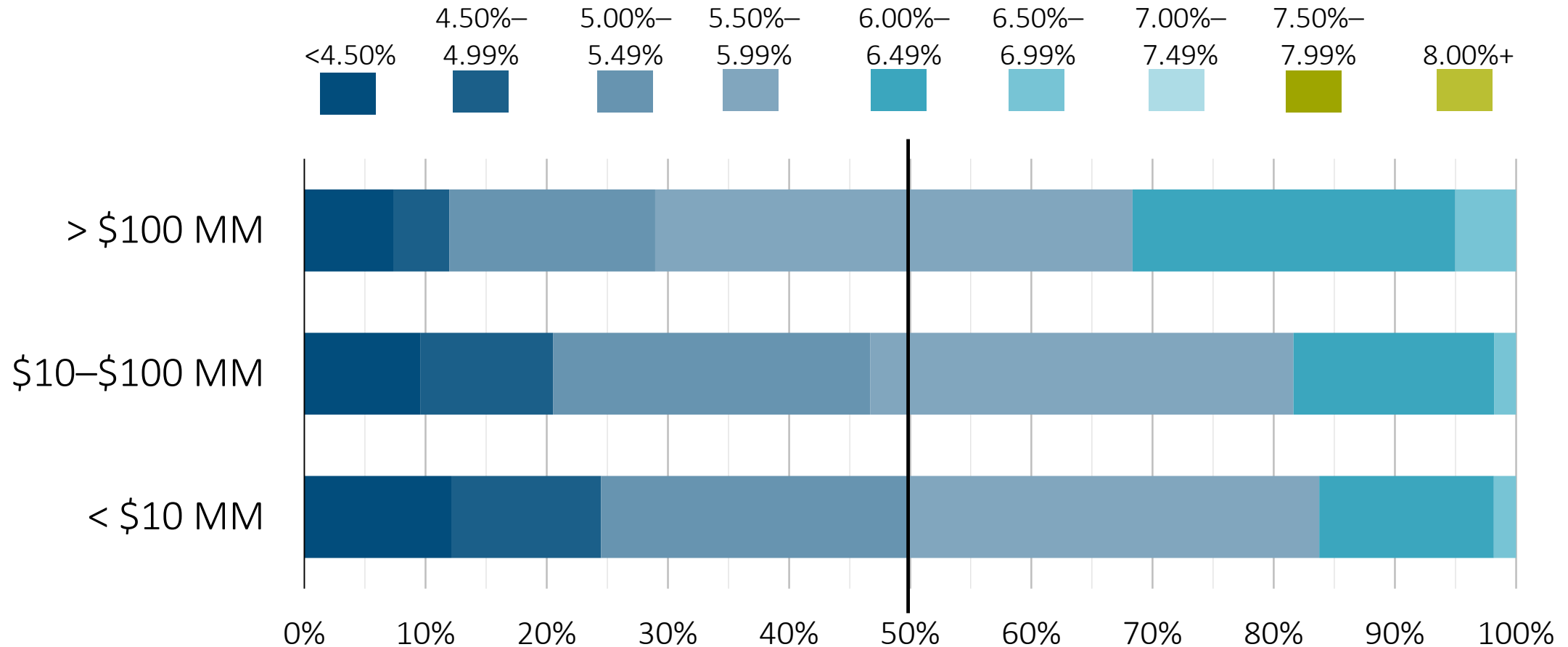
- Building block approach
  - Market yield for fixed income
  - Risk premium added to long bond yield for equities
  - Rebalancing premium
- Stochastic approach
  - Median

# Going Concern Discount Rate Components



*Averages of assumptions used in December 2013 valuations submitted to the British Columbia Financial Services Commission*

# Discount Rates by Plan Size - Ontario

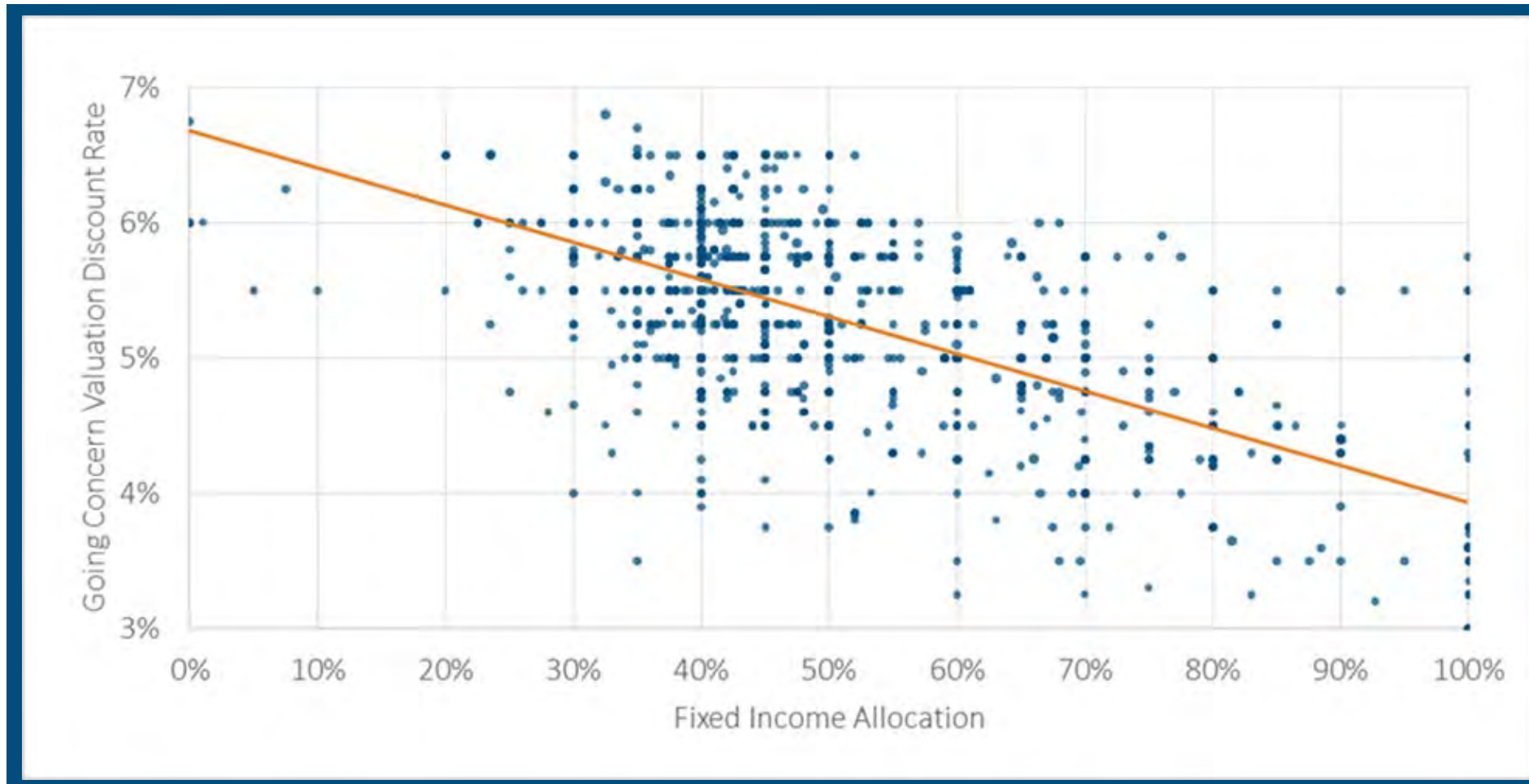


Assumptions used in 2014 valuations submitted to the Financial Services Commission of Ontario  
 Numbers of plans as a percentage of the total number of plans in each size band

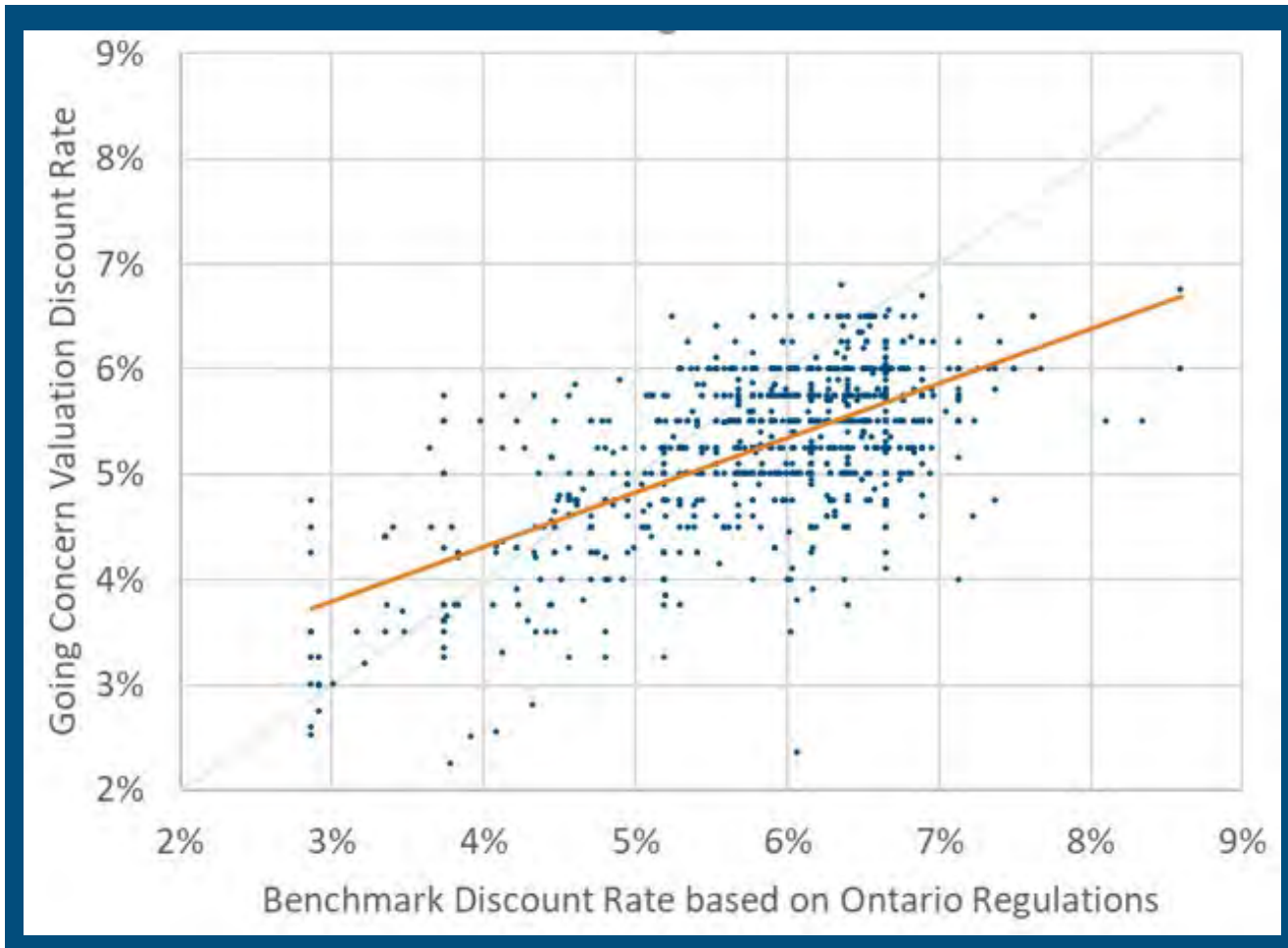
# Ontario Defined Benefit Pension Plans

	Single Employer	Multi-Employer	Jointly Sponsored	All Plans
Liability-weighted average discount rate	5.45%	6.02%	5.43%	5.47%
Liability-weighted average funded ratio	104%	99%	92%	96%
Total liabilities (C\$ billions)	153	26	345	525
Total of unfunded liabilities (C\$ billions)	7	2	43	52
Number of participants (millions)	0.99	0.90	1.28	3.17
Number of plans with 2014 valuations	1,092	64	9	1,165

# Going Concern Discount Rates Reflect Asset Mix

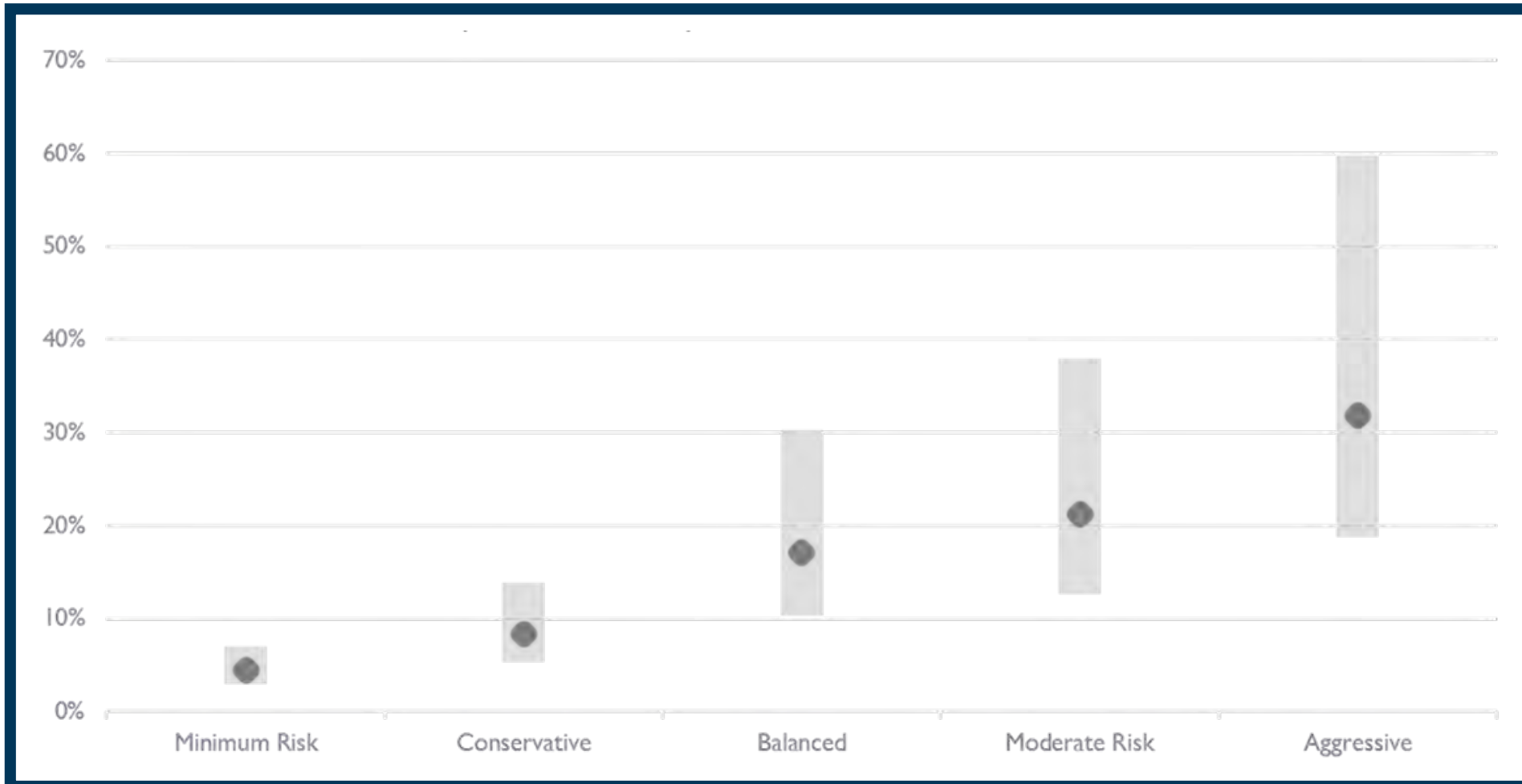


# Comparison to Ontario Benchmark Discount Rate

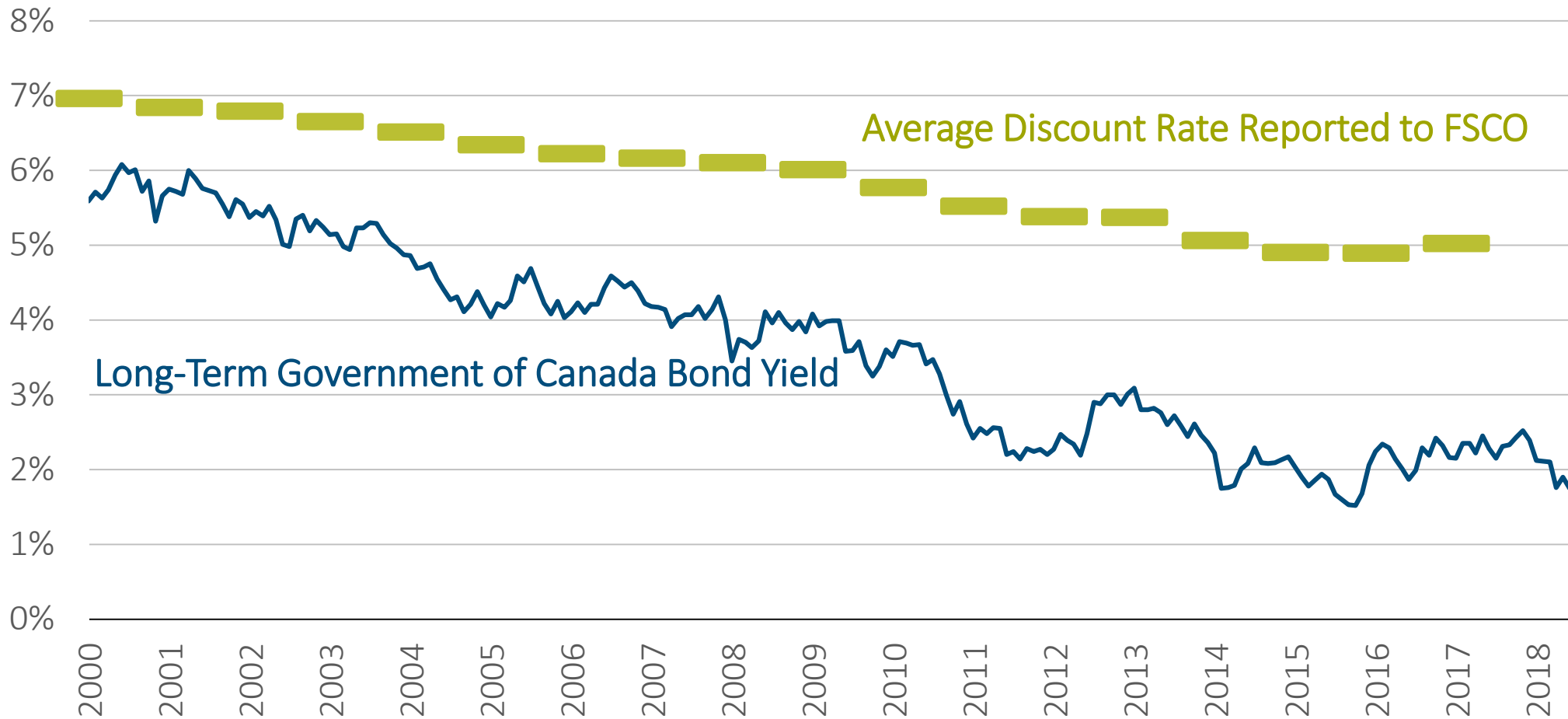


# Provisions for Adverse Deviations

required to achieve pre-determined confidence levels

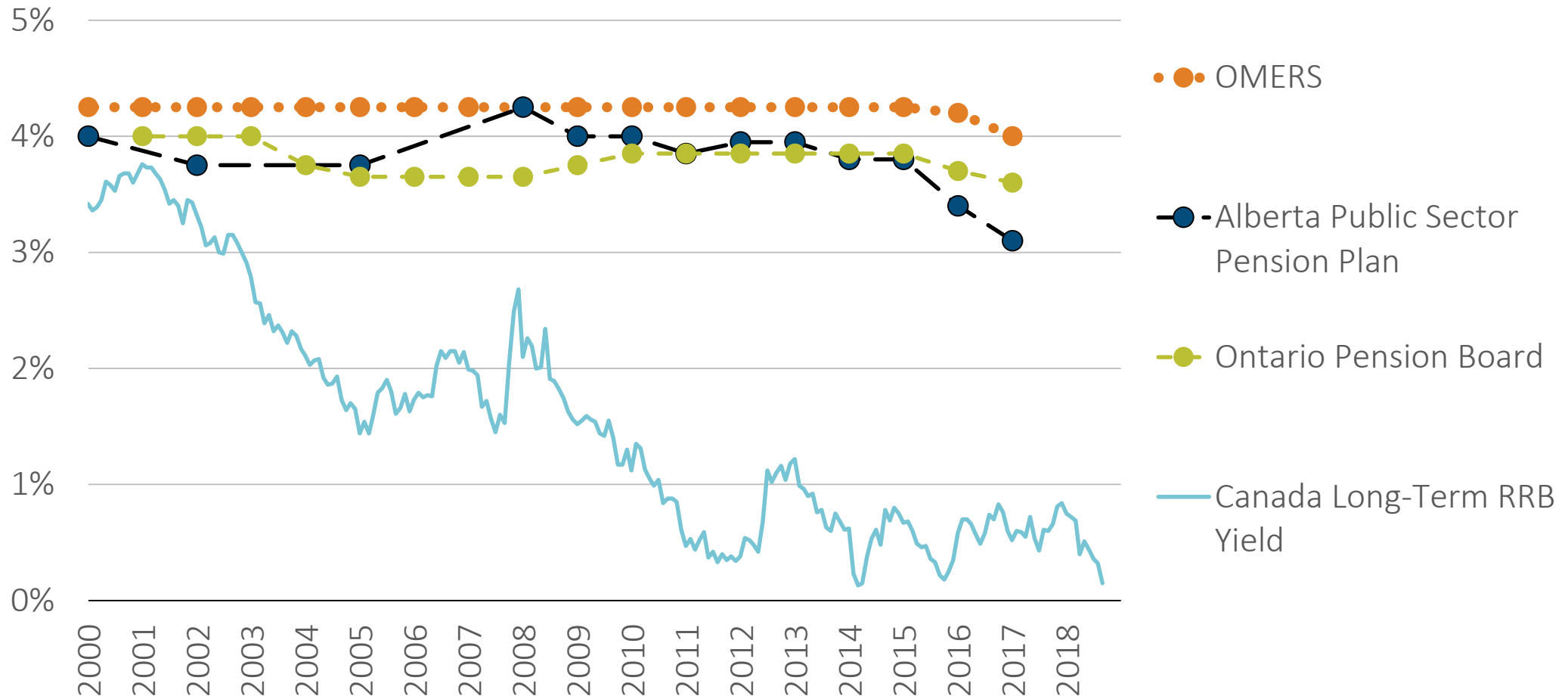


# Trends in Nominal Rates

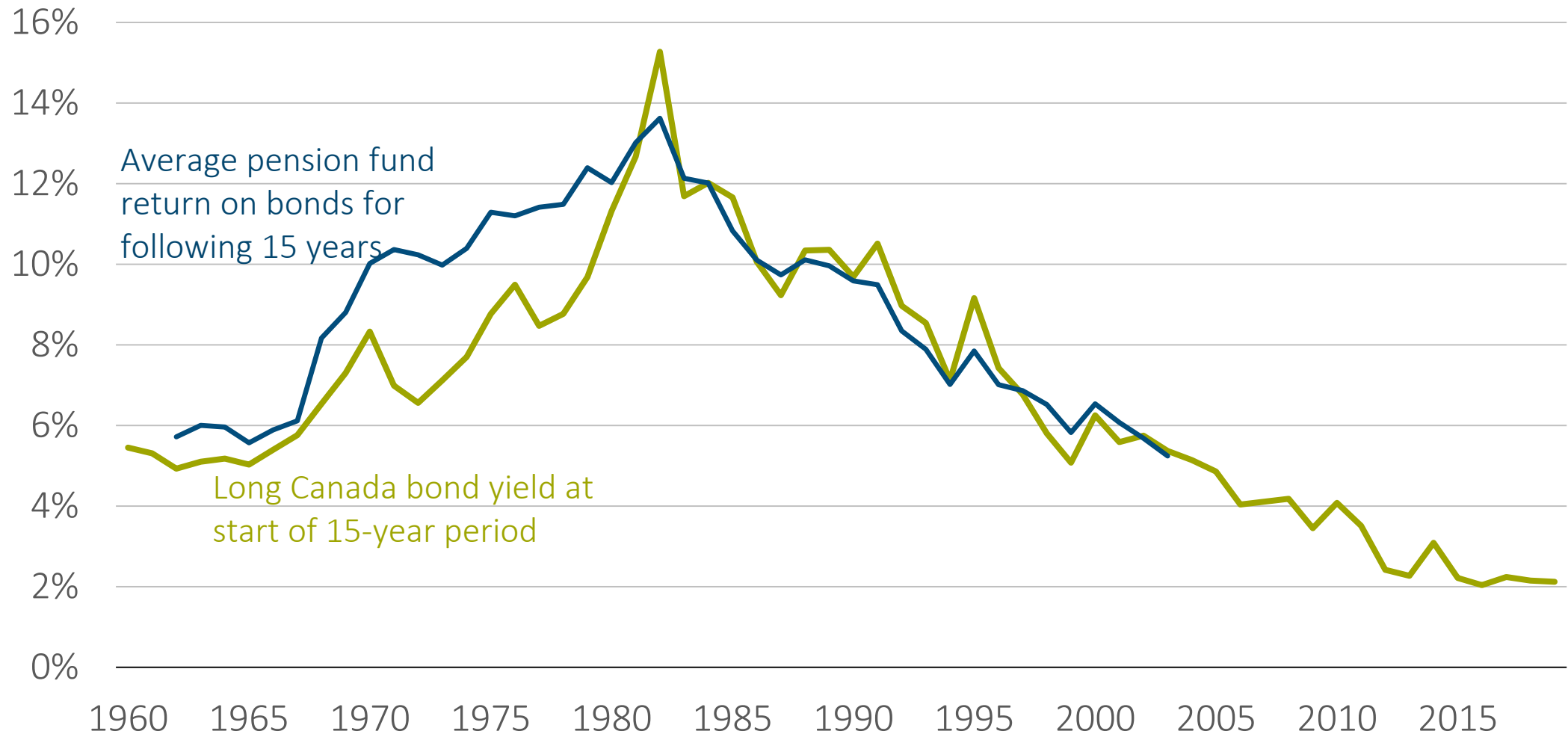




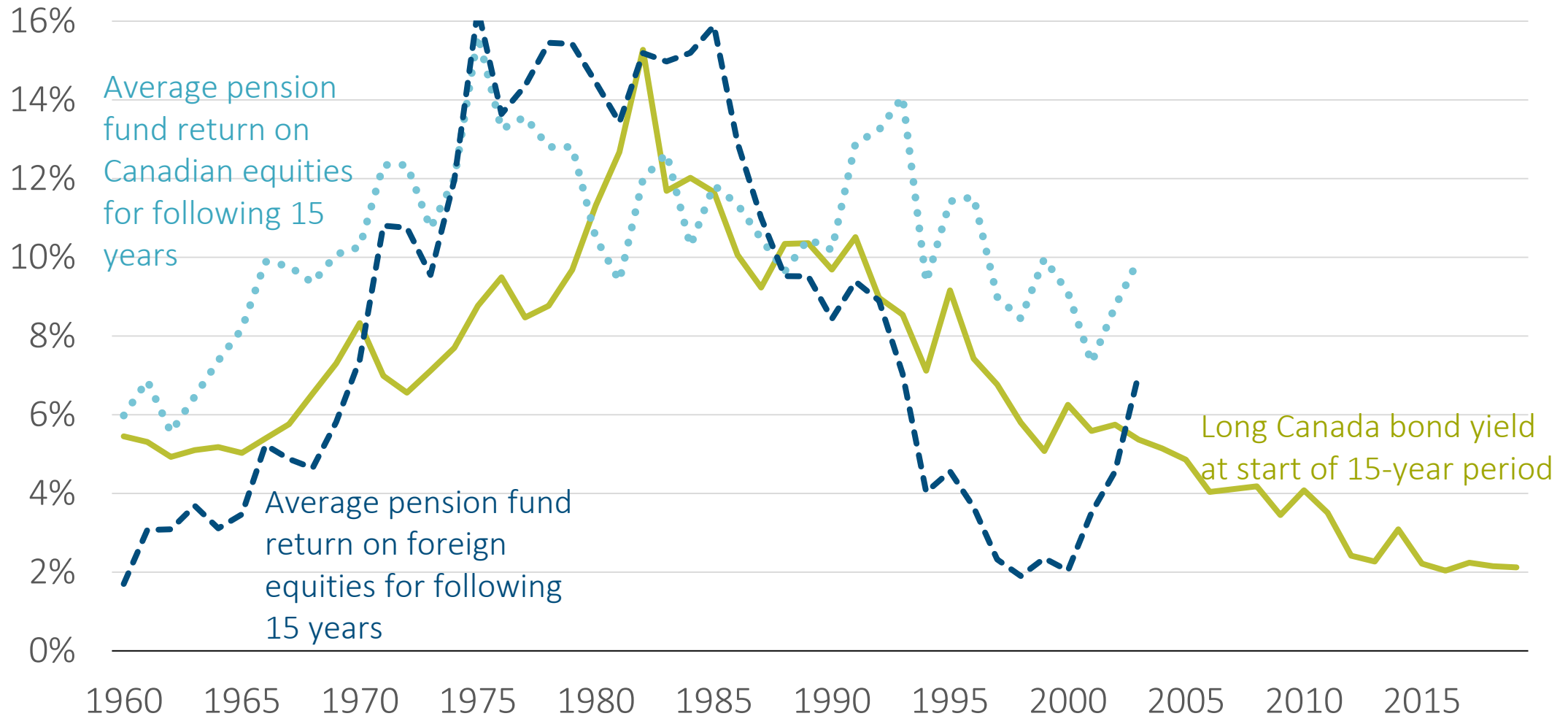
# Real Discount Rates for Public Sector Plans



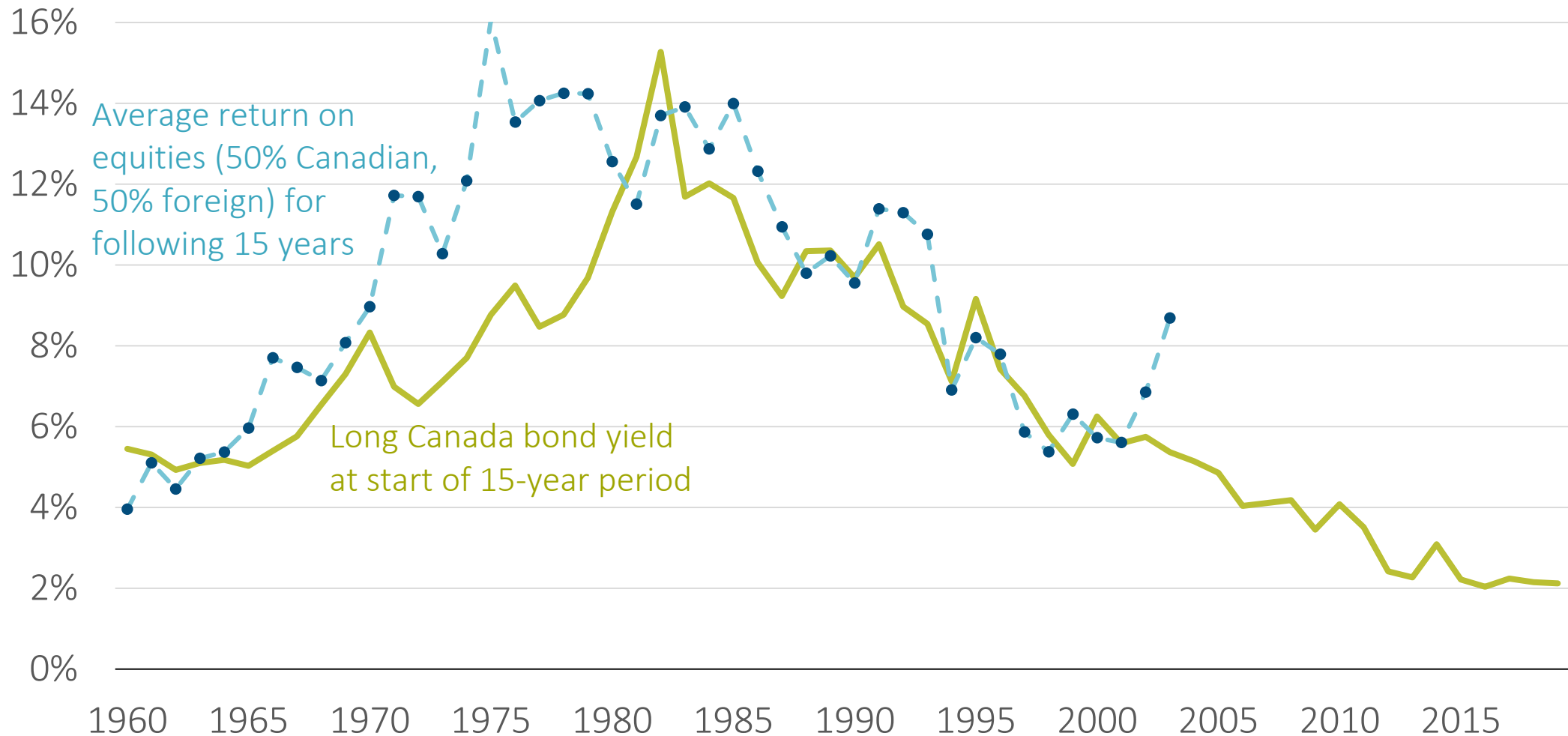
# Are actual bond returns linked to yields?



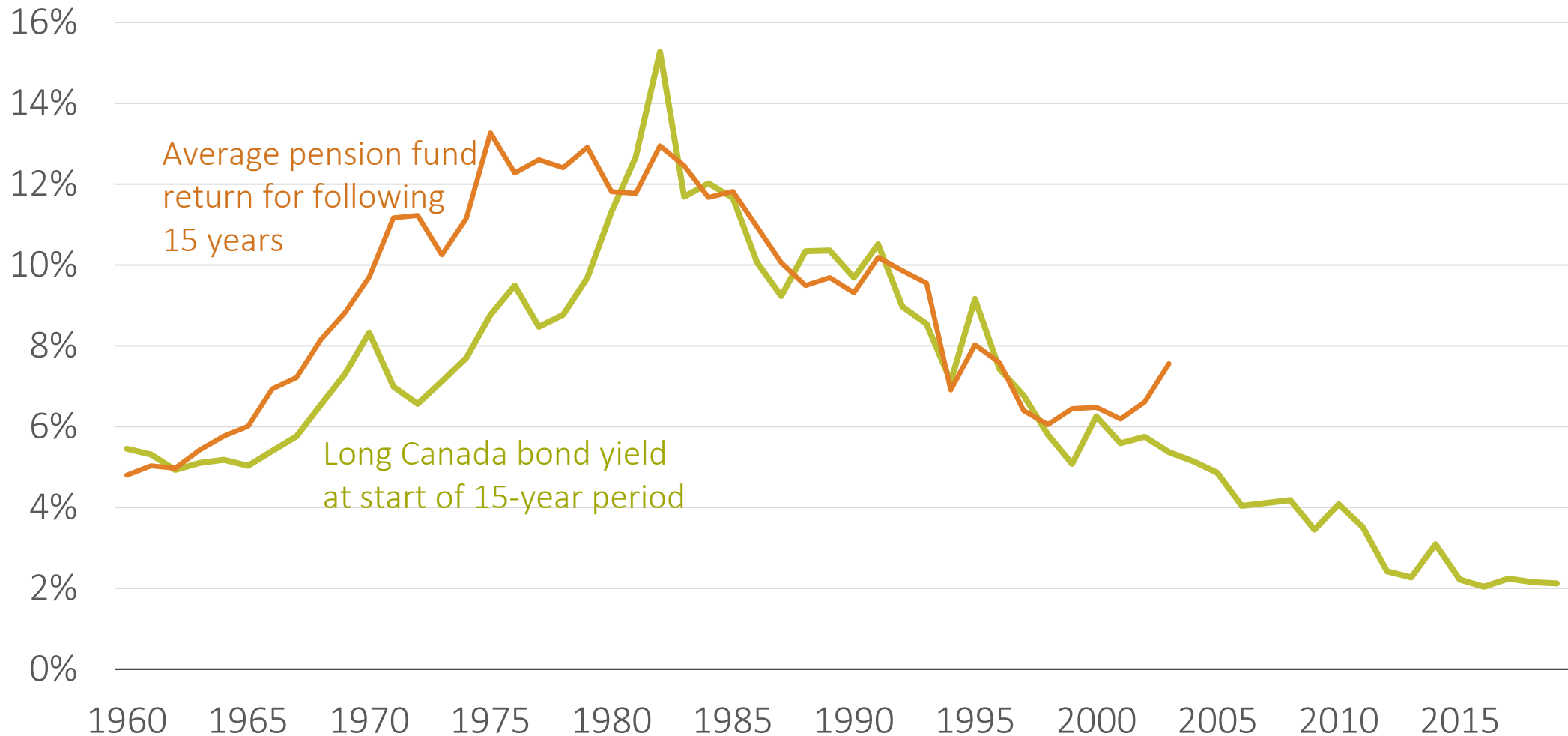
# Are actual equity returns linked to yields?



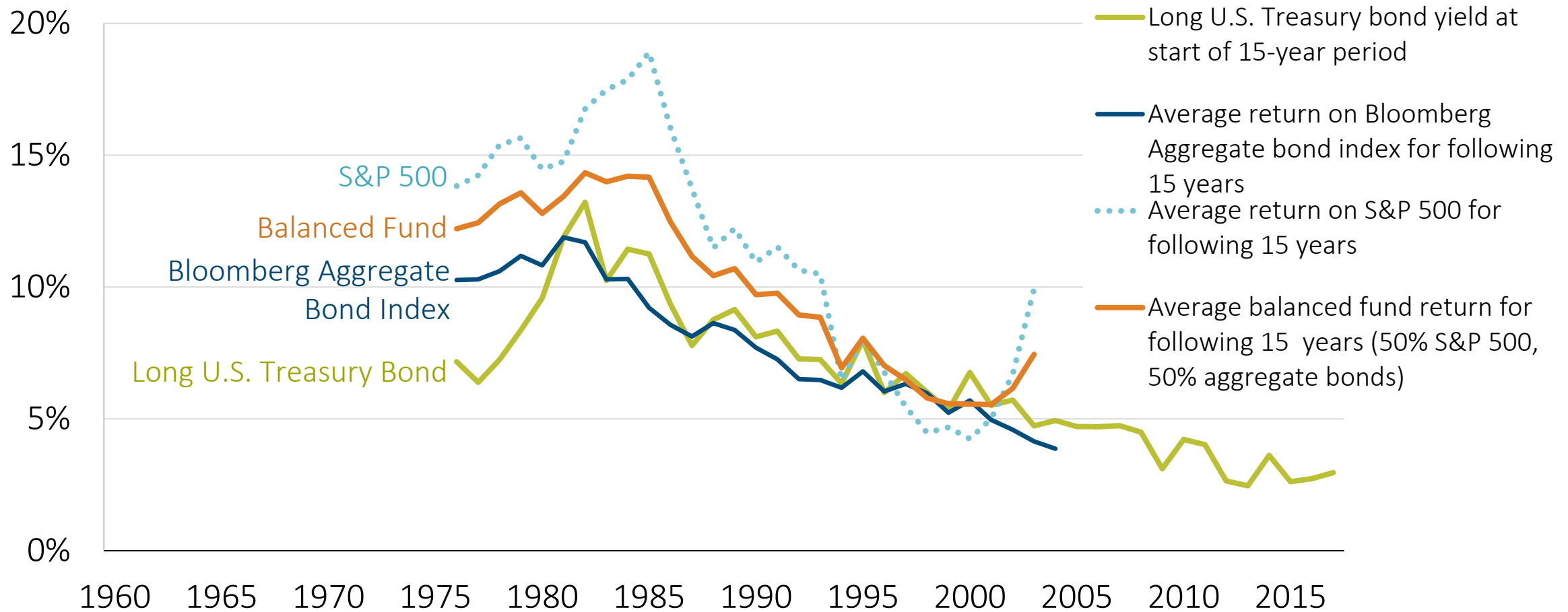
# Are actual equity returns linked to yields?



# What about aggregate pension fund returns?



# Same story for U.S. Markets



# Patterns of Going Concern Discount Rates

## Get the Paper

<https://www.soa.org/resources/research-reports/2019/patterns-going-concern-discount-rates/>

<https://www.soa.org/resources/research-reports/2018/settlement-cost/>

## Contact the Author

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## Data Sources

Ontario & BC valuation assumptions: from FSCO & FICOM (see the paper)

Public sector discount rates: [annual reports from pension plan websites](#)

S&P500 & Canadian returns Canada yields: [CIA Report on Economic Statistics](#)

Bloomberg-Barclays U.S. Aggregate Bond Index: [bogleheads.org](http://bogleheads.org)

U.S. treasury yields: [fred.stlouisfed.org](http://fred.stlouisfed.org)

# U.S. Discount Rates

Lisa Schilling, FSA, EA, FCA, MAAA

Retirement Research Actuary

[LSchilling@soa.org](mailto:LSchilling@soa.org)



# Polling Question

During 2008–2018, U.S. government bond yields went down by 2%. What do you think has happened to average assumed discount rates based on expected returns for **U.S. public plans**?

- a) Less than 0.25% decrease
- b) 0.25%–1% decrease
- c) 1%–2% decrease
- d) 2%– 3% decrease

## *Live Content Slide*

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**Poll: During 2008–2018, U.S. government bond yields went down by 2%. What do you think has happened to average assumed discount rates based on expected returns for U.S. public plans?**

# Polling Question

During 2008–2018, U.S. government bond yields went down by 2%. What do you think has happened to average assumed discount rates based on expected returns for **U.S. multiemployer pension plans**?

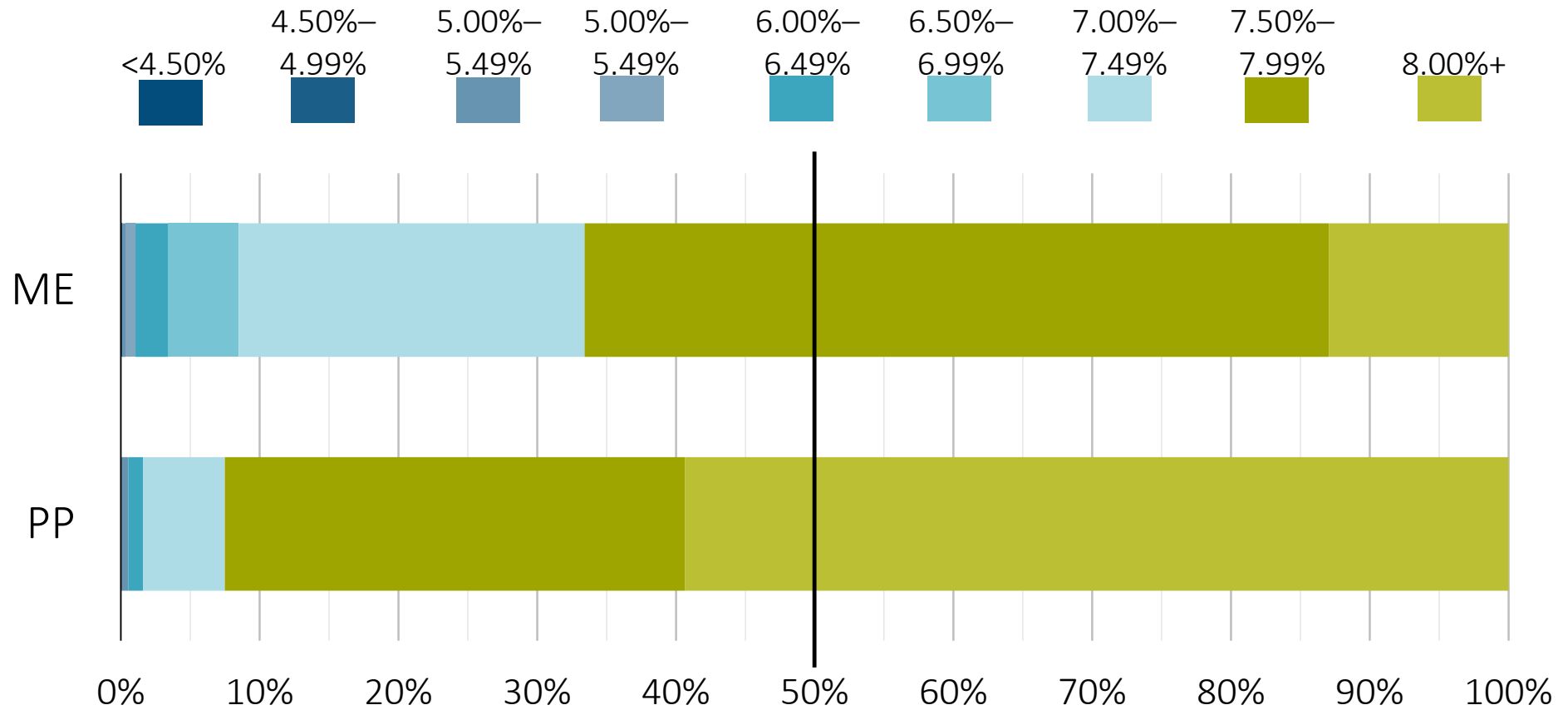
- a) Less than 0.25% decrease
- b) 0.25%–1% decrease
- c) 1%–2% decrease
- d) 2%– 3% decrease

## *Live Content Slide*

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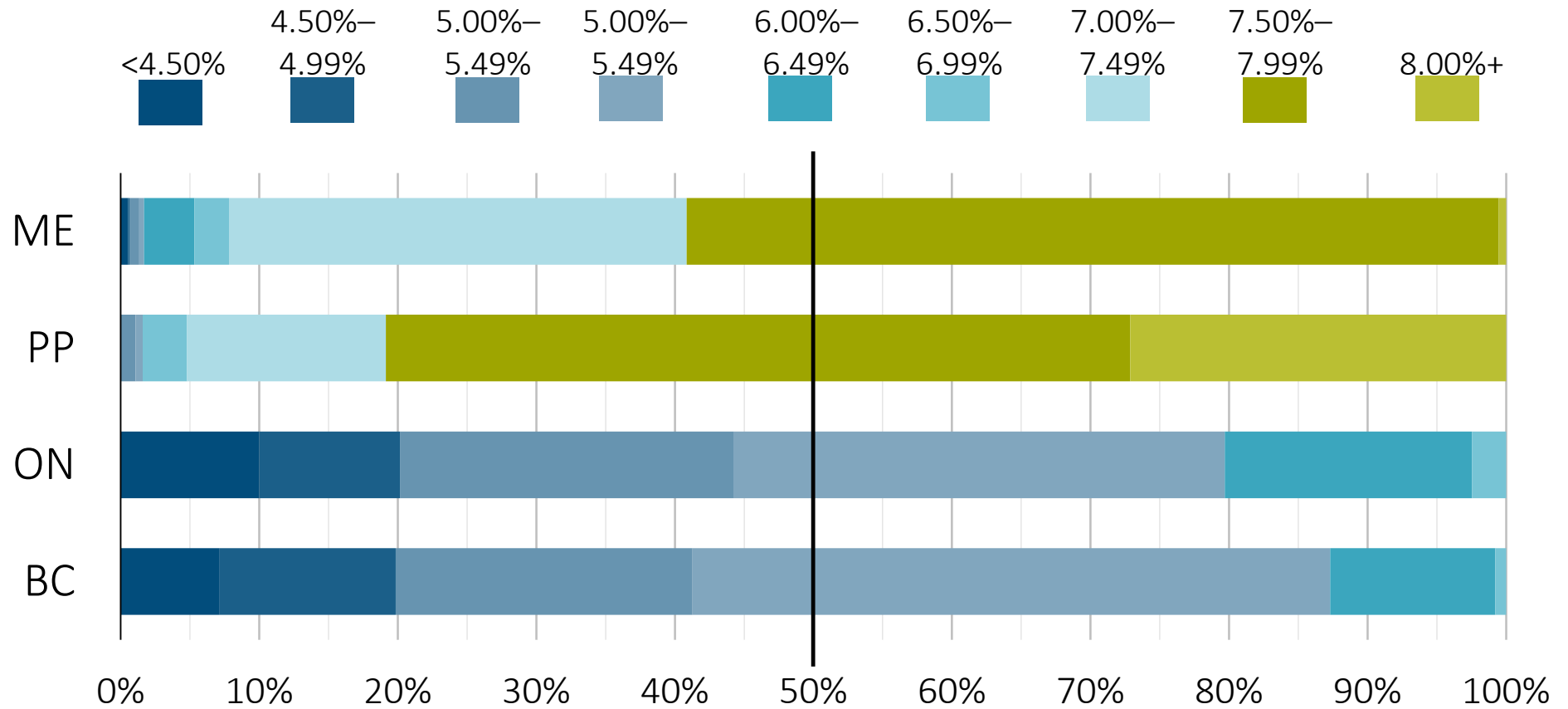
**Poll: During 2008–2018, U.S. government bond yields went down by 2%. What do you think has happened to average assumed discount rates based on expected returns for U.S. multiemployer pension plans?**

# U.S. Funding Discount Rates for 2009



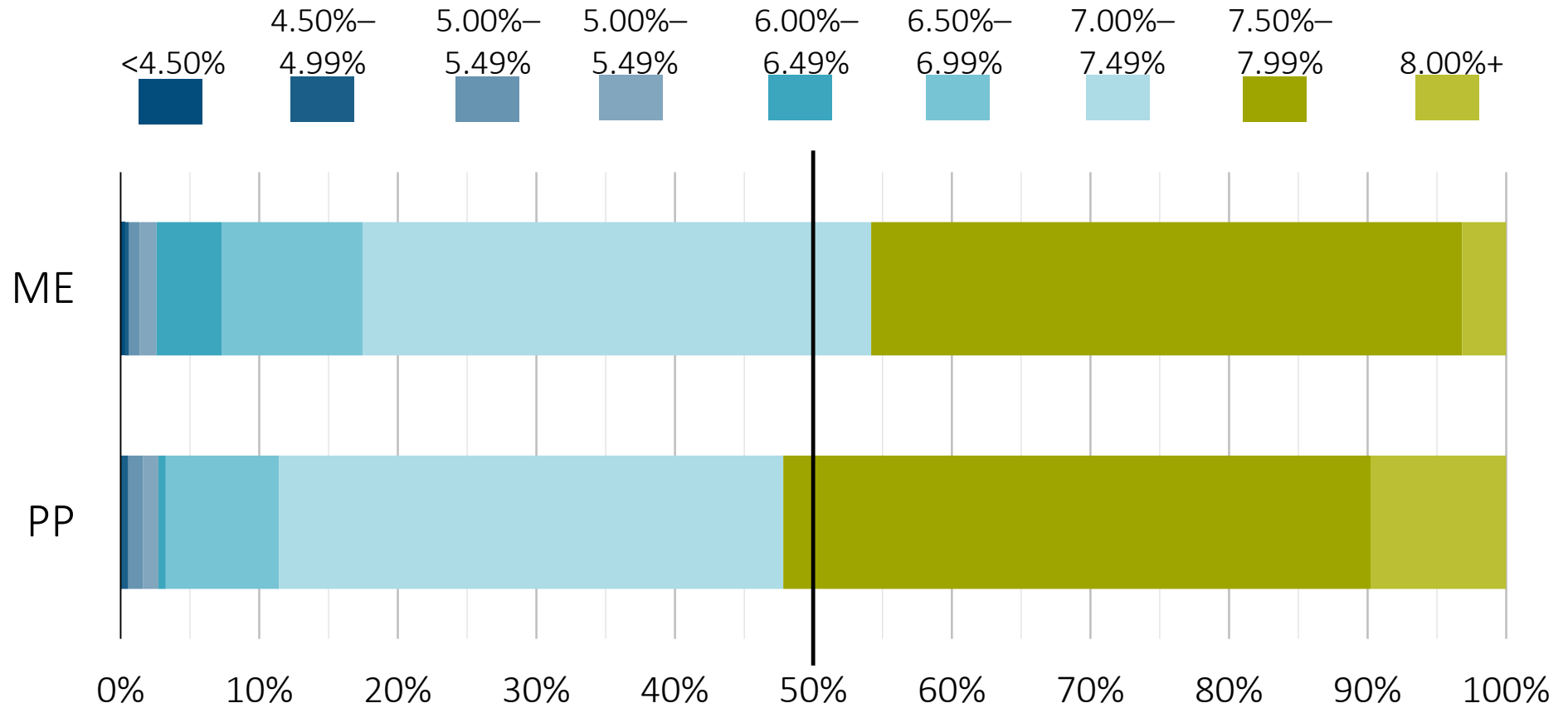
Source: Forms 5500 Schedules SB and MB, July 2016; Public Plan Data, July 2019

# US and CN Funding Discount Rates for 2014



Source: Forms 5500 Schedules SB and MB, July 2016; Public Plan Data, July 2019; FSCO

# U.S. Funding Discount Rates for 2017



Source: Forms 5500 Schedules SB and MB, July 2016; Public Plan Data, July 2019

# U.S. Pension Plan Discount Rate Comparison

Get the Paper

<https://www.soa.org/resources/research-reports/2016/2016-us-pension-plan-discount-rate-comparison/>

Contact the Author

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Data Sources

Multiemployer plans: U.S. Department of Labor Form 5500 database  
Public plans: [PublicPlansData.org](http://PublicPlansData.org)



# Actuarial Standards of Practice

Mitch Serota, FSA, EA, MAAA



# Polling Question

Which professional actuarial standards of practice do you use?


- a) United States (AAA ASOPs)
- b) Canada (CIA SOPs)
- c) Other country
- d) Multiple countries
- e) None—not applicable to my work

## *Live Content Slide*

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**Poll: Which professional actuarial standards of practice do you use?**

# ASB Standards for Pension Actuaries



ALL STANDARDS PENSION LIFE HEALTH GENERAL ERM CASUALTY

*These are standards developed by the Pension Committee, but not the only standards that may apply to a pension practitioner. It is up to the individual actuary to review the standards and determine which ones apply to their work.*

<b>ASOP 4</b> Measuring Pension Obligations and Determining Pension Plan Costs or Contributions Category: Pension Date: December 2013 Status: Adopted <a href="#">View</a>   <a href="#">Download PDF</a>	<b>ASOP 6</b> Measuring Retiree Group Benefits Obligations and Determining Retiree Group Benefits Program Periodic Costs or Actuarially Determined Contributions Category: Pension Date: May 2014 Status: Adopted <a href="#">View</a>   <a href="#">Download PDF</a>	<b>ASOP 27</b> Selection of Economic Assumptions for Measuring Pension Obligations Category: Pension Date: September 2013 Status: Adopted <a href="#">View</a>   <a href="#">Download PDF</a>
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**ASOP 34**  
Actuarial Practice Concerning Retirement Plan Benefits in Domestic Relations Actions  
Category: Pension  
Date: June 2015  
Status: Adopted  
[View](#) | [Download PDF](#)**ASOP 35**  
Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations  
Category: Pension  
Date: September 2014  
Status: Adopted  
[View](#) | [Download PDF](#)**ASOP 44**  
Selection and Use of Asset Valuation Methods for Pension Valuations  
Category: Pension  
Date: May 2011  
Status: Adopted  
[View](#) | [Download PDF](#)**ASOP 51**  
Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions  
Category: Pension Soon-To-Be-Effective-ASOPs  
Date: September 2017  
Status: Adopted  
[View](#) | [Download PDF](#)

# Focus of This Session

- **ASOP No. 4** – Measuring Pension Obligations and Determining Pension Plan Costs or Contributions (revised December 2013)
- **ASOP No. 27** – Selection of Economic Assumptions for Measuring Pension Obligations (revised September 2013)
- **ASOP No. 51** – Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions(adopted September 2017)

# Some ASOP Principles

- ASOPs set standards for “appropriate practice” (ASOP No. 1, sections 1 and 3.1.1, and transmittal memo)
  - Transmittal memo: “The Introduction was updated in October 2008 to make clear that the ASB, in promulgating ASOPs, seeks to define an appropriate level of practice (rather than simply codifying current practices).”

# Principles of Pension ASOPs

- Generally been applicable to all plan *sectors*, private and public
- Generally been applicable to all plan *sizes*

# ASOP No. 4

## *Measuring Pension Obligations and Determining Pension Plan Costs or Contributions*



# Overview

- The umbrella standard for pension valuations
- Most recently updated December 2013
- Effective for any actuarial work product with a measurement date on or after December 31, 2014
- Pension Committee of the ASB currently reviewing comments on Exposure Draft Proposed Revision (released March 2018)
- Second Exposure of Proposed Revisions is expected

# Scope

- This standard generally applies to pension actuarial services such as:
  - Measuring pension obligations.
  - Computing actuarially determined contributions
  - Determining periodic costs
  - Determining the types and levels of benefits supportable by specified cost or contribution levels
  - Projections of pension obligations, periodic costs or actuarially determined contributions, cash flows and other related measurements
- Does not apply to individual benefit calculations
- Does not require the actuary to assess the sponsor's ability to make contributions when due

# Measuring Pension Obligations

- Actuary should qualitatively assess the implications of the contribution allocation procedure or plan sponsor's funding policy on the plan's expected future contributions and funded status
  - Contributions set by law or by a contract, such as a collective bargaining agreement, constitute a funding policy
  - Actuary may presume that all actuarial assumptions will be realized and the sponsor (or other contributing entity) will make contributions anticipated by the contribution allocation procedure or funding policy
  - Assessment should be disclosed

# Measuring Pension Obligations (cont'd)

- Market-consistent present value
  - If the actuary calculates a market-consistent present value, the actuary should do the following:
    - Select assumptions based on the actuary's observation of the estimates inherent in market data in accordance with the guidance in ASOP Nos. 27 and 35, depending on the purpose of the measurement; and
    - Reflect benefits earned as of the measurement date
  - The actuary may consider how benefit payment default risk or the financial health of the plan sponsor affects the calculation – with disclosure

# Measuring Pension Obligations (cont'd)

- Disclosure of reason for, and general effects of, changes in cost or contribution allocation procedure
- Disclose the amortization schedule
- Disclose the source of Prescribed Assumptions or Methods
- For Prescribed Assumptions or Methods other than those set by federal law or regulation:
  - Whether they significantly conflict with what the actuary believes is reasonable
  - If the actuary is unable to assess reasonableness

# Measuring Pension Obligations (cont'd)

## March 2018 Exposure Draft Proposed Changes

- Disclosure of Investment Risk Defeasement Measure (IRDM)
- Guidance on selection of amortization methods
- Guidance on selection of output smoothing methods
- Additional guidance on selection of cost allocation procedure or contribution allocation procedure
- Guidance for calculation of a reasonable actuarially determined contribution
- Additional guidance for gain and loss analysis

# ASOP No. 27

*Selection of Economic  
Assumptions for Measuring  
Pension Obligations*

# Overview

- Most recently updated September 2013
- Effective for any actuarial work product with a measurement date on or after September 30, 2014
- First exposure draft of Proposed Revisions in 2018 (18 comment letters)
- Second exposure draft of Proposed Revisions released in June of 2019 (8 comment letters)



To which of the following situations does ASOP 27 apply?

- a) Preparing a valuation report on a U.S. public sector pension plan when the discount rate is prescribed by law
- b) Advising a Canadian subsidiary of a U.S. company on the selection of the expected return on assets to use for U.S. GAAP accounting
- c) Advising the board of a U.S. multiemployer pension plan on the discount rate to be used for a funding valuation
- d) Advising a U.S. single-employer plan sponsor on the cost of a plan design change
- e) None of the above
- f) All of the above
- g) Some of the above

## *Live Content Slide*

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**Poll: To which of the following situations does ASOP 27 apply?**

# Scope

- This standard applies to the selection of economic assumptions to measure obligations under any defined benefit pension plan (that is not a social insurance program) and any retiree group benefit plan
- Applicable to measurements of pension obligations as described in ASOP Nos. 4 and 6
- Generally not applicable to
  - individual benefit calculations,
  - individual benefit statement estimates, or
  - nondiscrimination testing

# Other Guidance

- AAA Pension Practice Council Practice Note, February 2019  
*Forecasting Investment Returns and Expected Return Assumptions for Pension Actuaries*
- AAA Webcast, July 30, 2019  
*Developing Return Expectations in Today's Capital Markets—  
What Methods Work Now?*
- SOA Webcast, August 20, 2019  
*Pension Investment Return Assumptions — “It’s All About  
Process”*

# Selection of Economic Assumptions

- “Reasonable” assumption definition is principles based
  - Appropriate for the purpose of the measurement
  - Reflects actuary’s professional judgment
  - Takes into account relevant historical and current economic data
  - Reflects actuary’s estimate of future experience or the estimates inherent in market data
  - No significant bias, except
    - To provide for adverse deviation (with disclosure); or
    - For measurement of difficult-to-measure plan provisions (with disclosure); or
    - For the assessment of risk
- Economic assumptions in a single measurement should be consistent
- A range of reasonable assumptions is possible

# Selection of Economic Assumptions (cont'd)

- Disclose rationale for each non-prescribed assumption with a significant effect
- Disclose rationale for assumption changes if not prescribed
- Prescribed assumptions set by another party or set by (federal) law
  - Disclose source of prescribed methods and assumptions
  - Disclosure required if method or assumption set by another party significantly conflicts with reasonableness standard in actuary's professional judgment
  - Disclosure required if actuary is unable to evaluate reasonableness of assumption or method set by another party

# Selection of Economic Assumptions (cont'd)

- Conservatism
  - Provision for adverse deviation allowed, with disclosure
- Active vs. passive investment strategies
  - Actuary should not assume that superior or inferior returns will be achieved, net of investment expenses, from an active investment management strategy compared to a passive investment management strategy unless the actuary believes, based on relevant supporting data, that such superior or inferior returns represent a reasonable expectation over the measurement period
- Distinct discount rate selection guidance
  - Previous ASOP had investment return and discount rate guidance closely linked

# Rates of Return

- Geometric and arithmetic returns
  - Draws the actuary's attention to the fact that investment return expectations are sometimes quoted as:
    - Forward looking expected arithmetic returns
    - Forward looking expected geometric returns
  - Actuary should ensure knowing what type of return is received from an investment professional
  - Actuary should consider implications of using either a forward looking expected arithmetic return or a forward looking expected geometric return



# Selection of Economic Assumptions

## March 2018 Exposure Draft Proposed Changes

- Guidance regarding phase-in of assumption changes
- Additional guidance regarding review of previously selected assumptions
- Clarify disclosure requirement for the rationale of assumptions

# Selection of Economic Assumptions

## June 2019 Second Exposure Draft Proposed Changes

- Clarify application when an assumption is not selected by the actuary
- Provides for use of other sources of economic data and analyses
- Clarify reasonable assumptions must be used at each measurement date in a phase-in period
- Combined Effect of Assumptions should not have significant bias
- Consistency of Assumptions Selected by the Actuary
- Arithmetic and Geometric Returns Appendix removed

# ASOP No. 51

*Assessment and Disclosure of Risk  
Associated with Measuring  
Pension Obligations and  
Determining Pension Plan  
Contributions*

# Overview

- Adopted September 2017
- Effective for any actuarial work product with a measurement date on or after November 1, 2018

# Polling Question

To which of the following situations does ASOP 51 apply?

- a) Preparing a valuation report on a U.S. public sector pension plan when the discount rate is prescribed by law.
- b) Advising a Canadian subsidiary of a U.S. company on the selection of the expected return on assets to use for U.S. GAAP accounting
- c) Advising the board of a U.S. multiemployer pension plan on the discount rate to be used for a funding valuation
- d) None of the above
- e) All of the above
- f) Some of the above

## *Live Content Slide*

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**Poll: To which of the following situations does ASOP 51 apply?**

# Scope

- This standard applies to actuaries when performing
  - a funding valuation of a pension plan
  - a pricing valuation of a proposed pension plan change that would, in the actuary's professional judgment, significantly change the types or levels of risks of the pension plan.
  - a risk assessment that is not part of a funding valuation or pricing valuation

## Scope (cont'd)

- Funding valuation - A measurement of pension obligations or projection of cash flows performed by the actuary intended to be used by the **principal** to determine plan contributions or to evaluate the adequacy of specified contribution levels to support benefit provisions
- Pricing valuation - A measurement of pension obligations or projection of cash flows performed by the actuary to estimate the impact of proposed changes to plan benefit provisions on the plan contributions or to determine whether the proposed benefit provisions are supportable by specified contribution levels



# Scope (cont'd)

- “Funding valuation” may not be your ERISA valuation
  - It is the basis for funding – so if funding is based on something else, this applies to that “something else”
    - Corporate: accounting work, funding forecast, termination estimate?
    - Multiemployer: zone certification?

## Scope (cont'd)

- This standard does not apply to actuaries when performing
  - services in connection with applications for plan partitions or benefit suspensions under the Multiemployer Pension Relief Act of 2014
  - services in connection with other post-employment benefits, such as medical benefits
  - social insurance programs as described in section 1.2, Scope, of ASOP No. 32, Social Insurance (unless an ASOP on social insurance explicitly calls for application of this standard)
  - advising a plan sponsor on the management or reduction of risk.

# Definitions

- Risk is defined as

The potential of actual future measurements deviating from expected future measurements resulting from actual future experience deviating from actuarially assumed experience.

# Identify Risks to be Assessed

- Risks that, in the actuary's professional judgment, may reasonably be anticipated to significantly affect the plan's future financial condition
- Examples of risks include the following
  - investment risk
  - asset/liability mismatch risk
  - interest rate risk
  - longevity and other demographic risks (i.e., the potential that mortality or other demographic experience will be different than expected); and
  - contribution risk

# Assess Risks

- Assessment of risk
  - Assess those risks identified
  - Does not require numerical calculations
- Methods for assessment of risk
  - Scenario tests
  - Sensitivity tests
  - Stress tests
  - Stochastic modeling
- Assumptions for assessing risk should differ from valuation assumptions

# Additional Assessment

- If, in the actuary's professional judgment, a more detailed assessment would be significantly beneficial for the intended user to understand the risks identified by the actuary, the actuary should recommend to the intended user that such an assessment be performed.

Conclusions

Comments

Questions