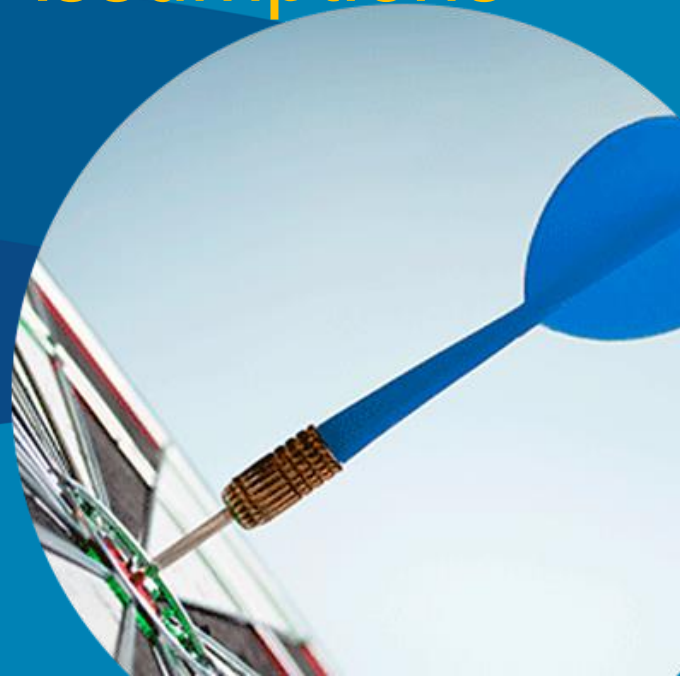


Kentucky Public Pension Oversight Board (PPOB)

Trends in Investment Return Assumptions for Public Pension Plans

September 24, 2018

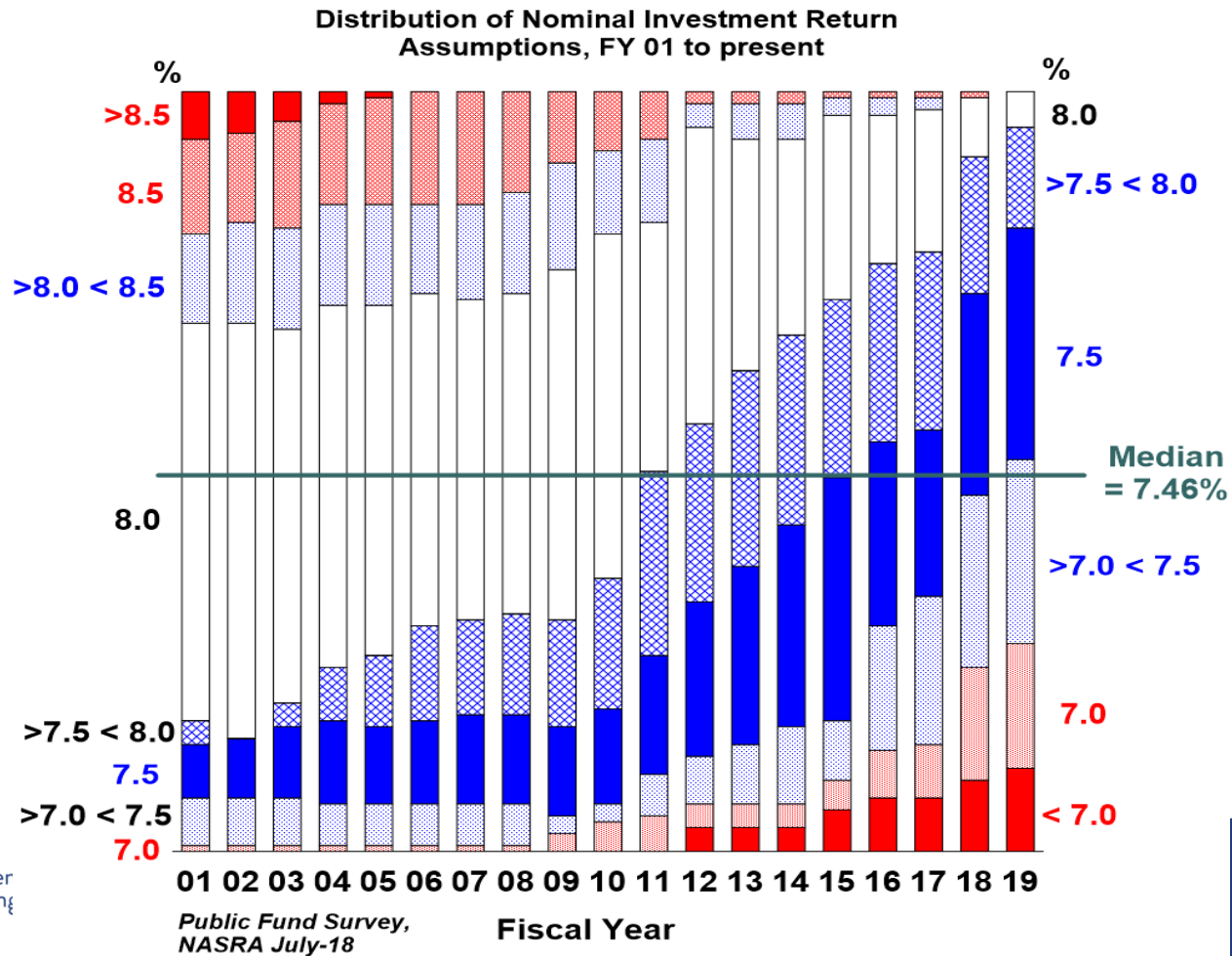


Agenda

- Trends in the Investment Return Assumption
- Purpose of an Actuarial Valuation and the Assumptions used in a Valuation
- Actuarial Standards of Practice regarding Assumption Selection
- Historical Economic Conditions
 - Overview of key economic metrics and example how it impacts forward looking return expectations
- What is the appropriate time horizon?
- Closing Remarks

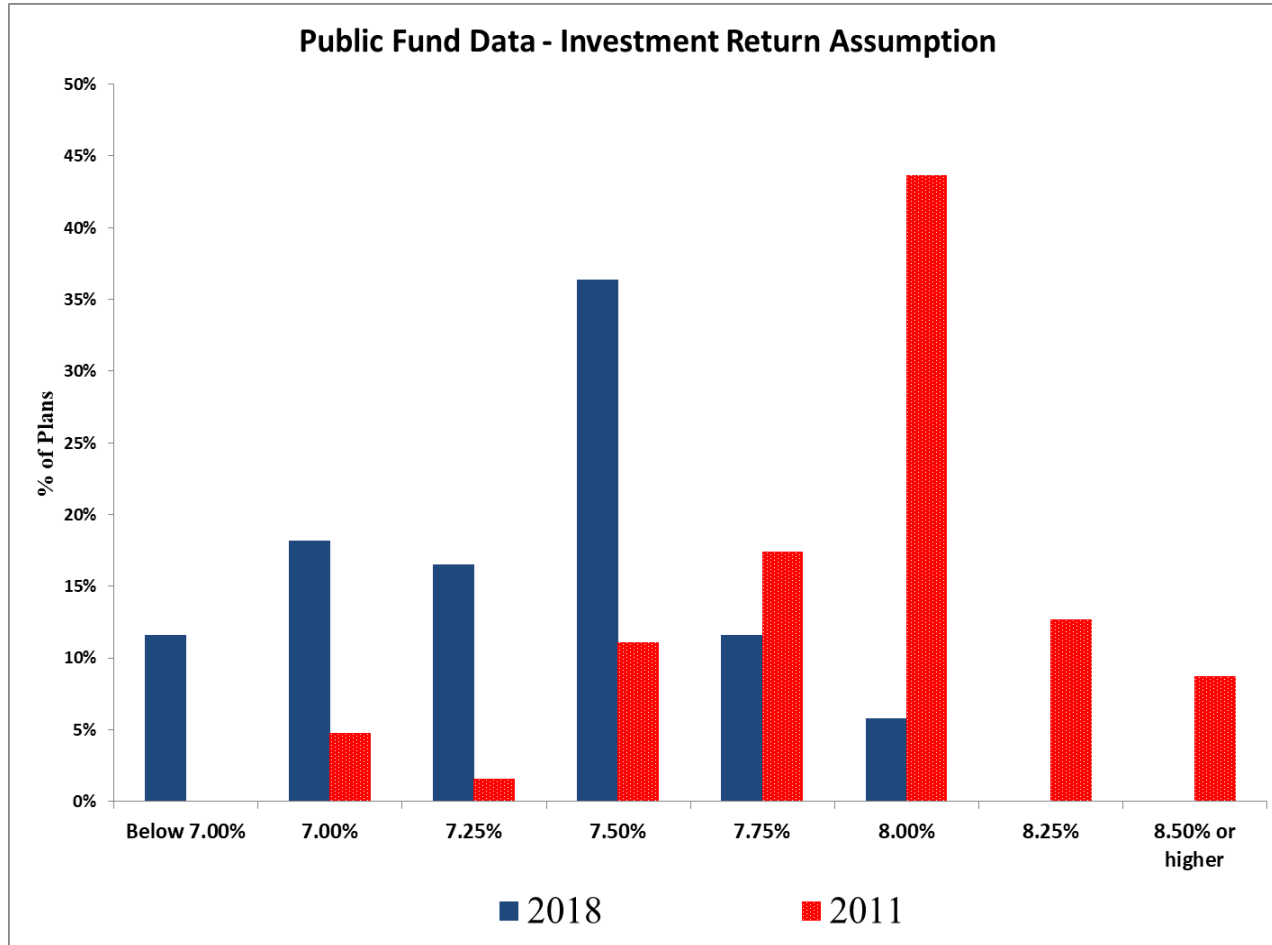
Trends in Investment Return Assumptions

Change in the Investment Return Assumption used by Large Public Retirement Systems



Investment Return Assumption

Comparison to Peers

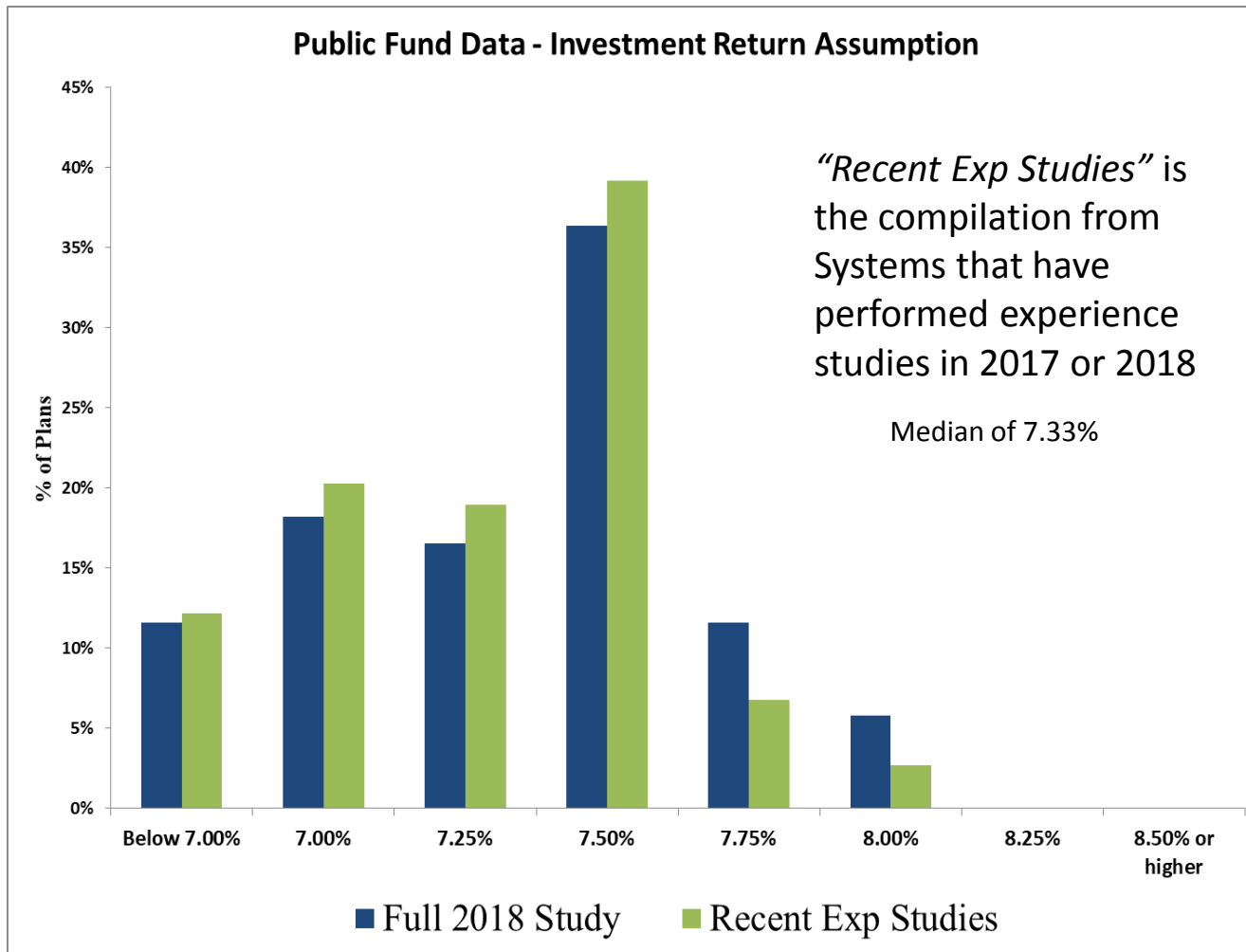


2018 Median: 7.46%

Source: 2018 Public Plans Database

Investment Return Assumption

Comparison to Peers



Purpose of an Actuarial Valuation

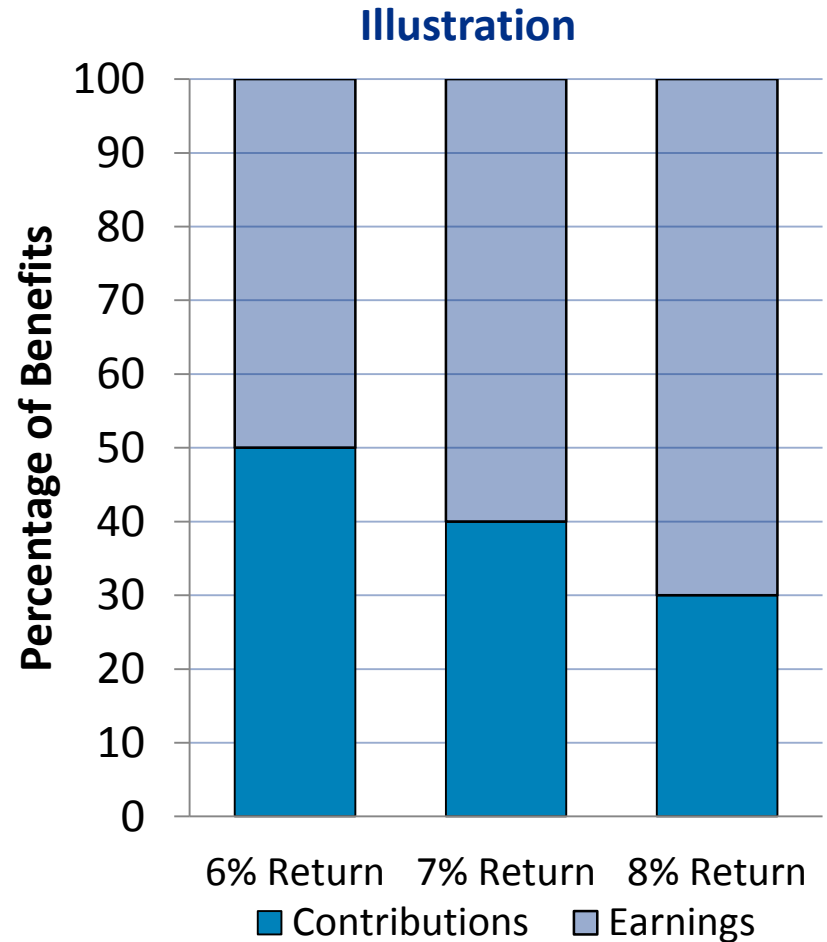
- The ***primary*** purpose of the an actuarial valuation is to either (1) set or (2) assess the adequacy of the contribution policy
 - “Funding” or “contribution allocation procedure”
- The funding policy is the pattern of contributions, not necessarily the contribution in a given year

How Assumptions Factor in a Valuation

- Over time, the true cost of benefits will be borne out in actual experience
 - Cost of benefits NOT affected by actuarial assumptions
 - Determined by actual participant behavior (termination, retirement), plan provisions, and actual investment returns
- Assumptions help us anticipate and manage what each component of the equation will be
 - Develop expectations for future contributions, investment returns and benefit payments
 - Important for decision making
 - Assumptions dictate the timing of the contributions

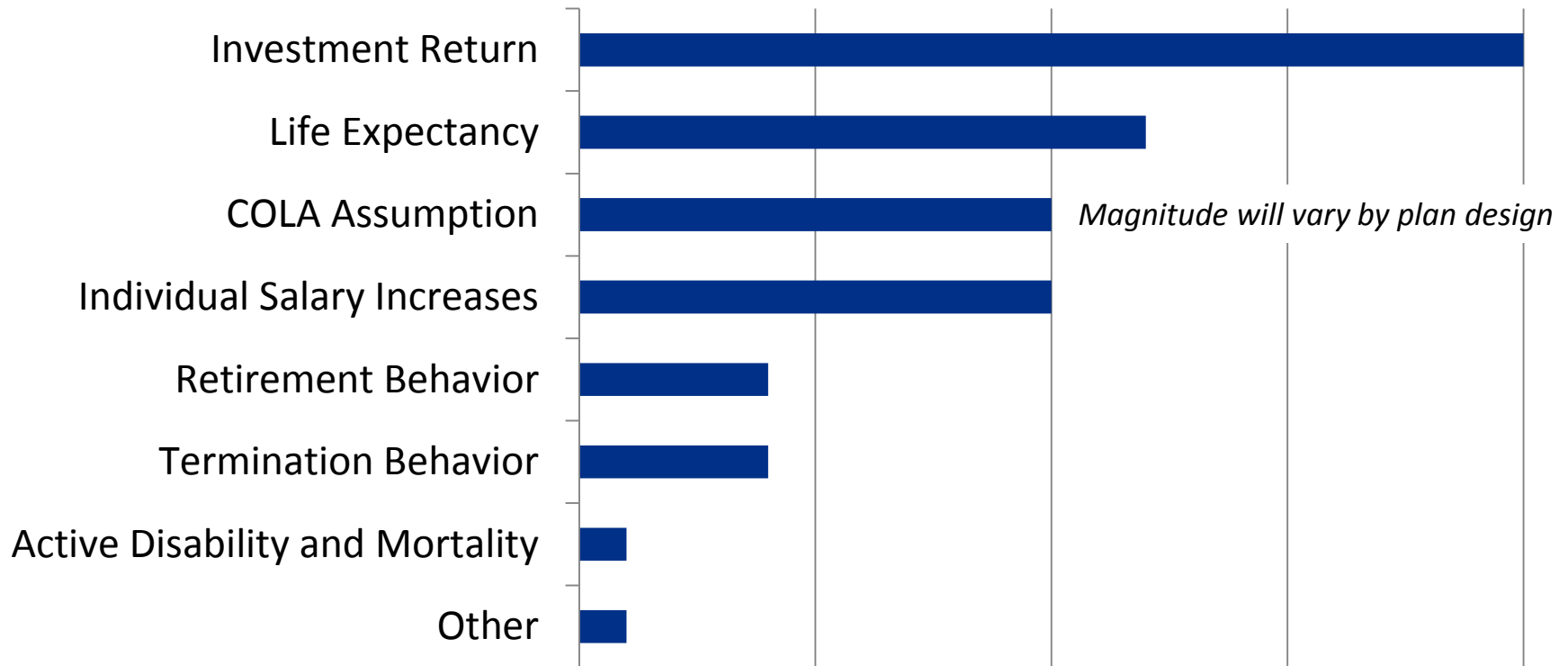
Investment Return Assumption

- This assumption is used to predict what percentage of a future benefit payments will be financed by investment returns versus contributions.
- Lower Returns/Higher Contributions



Magnitude of Principal Actuarial Assumptions

Impact on Determination of Contribution Rates



- Each individual assumption must satisfy the Actuarial Standards
- Assumption set should be internally consistent

Actuarial Standards of Practice

- Guidelines for the assumption setting process are set by the Actuarial Standards of Practice (ASOP)
 - ASOP #4 Measuring Pension Obligations
 - ASOP #27 Selection of Economic Assumptions
 - Revised 2013: Change from “Reasonable Range” to “Best Estimate”
 - ASOP #35 Selection of Demographic and Other Noneconomic Assumptions
 - Revised 2011: Increased emphasis on mortality assumption
 - ASOP #44 Selection and Use of Asset Valuation Methods

Per ASOP No. 27: Reasonable Assumptions

- An economic assumption is reasonable if
 - It is appropriate for the purpose of the measurement
 - It reflects the actuary's professional judgement
 - It takes into account historical and current economic data that is relevant as of the **measurement date**
 - It reflects the actuary's estimate of future experience
 - It has no significant bias (i.e., it is not significantly optimistic or pessimistic)
 - Allowance for adverse experience may be appropriate
- The standard of practice explicitly advises an actuary not to give undue weight to recent experience
- In addition to each individual assumption meeting the standard, the combined set of assumptions must also satisfy the standard of practice

Per ASOP No. 27: Selecting an Inflation Assumption

- The actuary should review appropriate inflation data. This data may include consumer price indices, the implicit price deflator, forecasts of inflation, yields on government securities of various maturities, and yields on nominal and inflation-indexed debt.

Per ASOP No. 27: Selecting an Investment Return Assumption

- The investment return assumption reflects the anticipated returns on the plan's current and, if appropriate for the measurement, future assets.
- This assumption is typically constructed by considering various factors including, but not limited to, the time value of money; inflation and inflation risk illiquidity; credit risk; macroeconomic conditions; and growth in earnings, dividends, and rents.

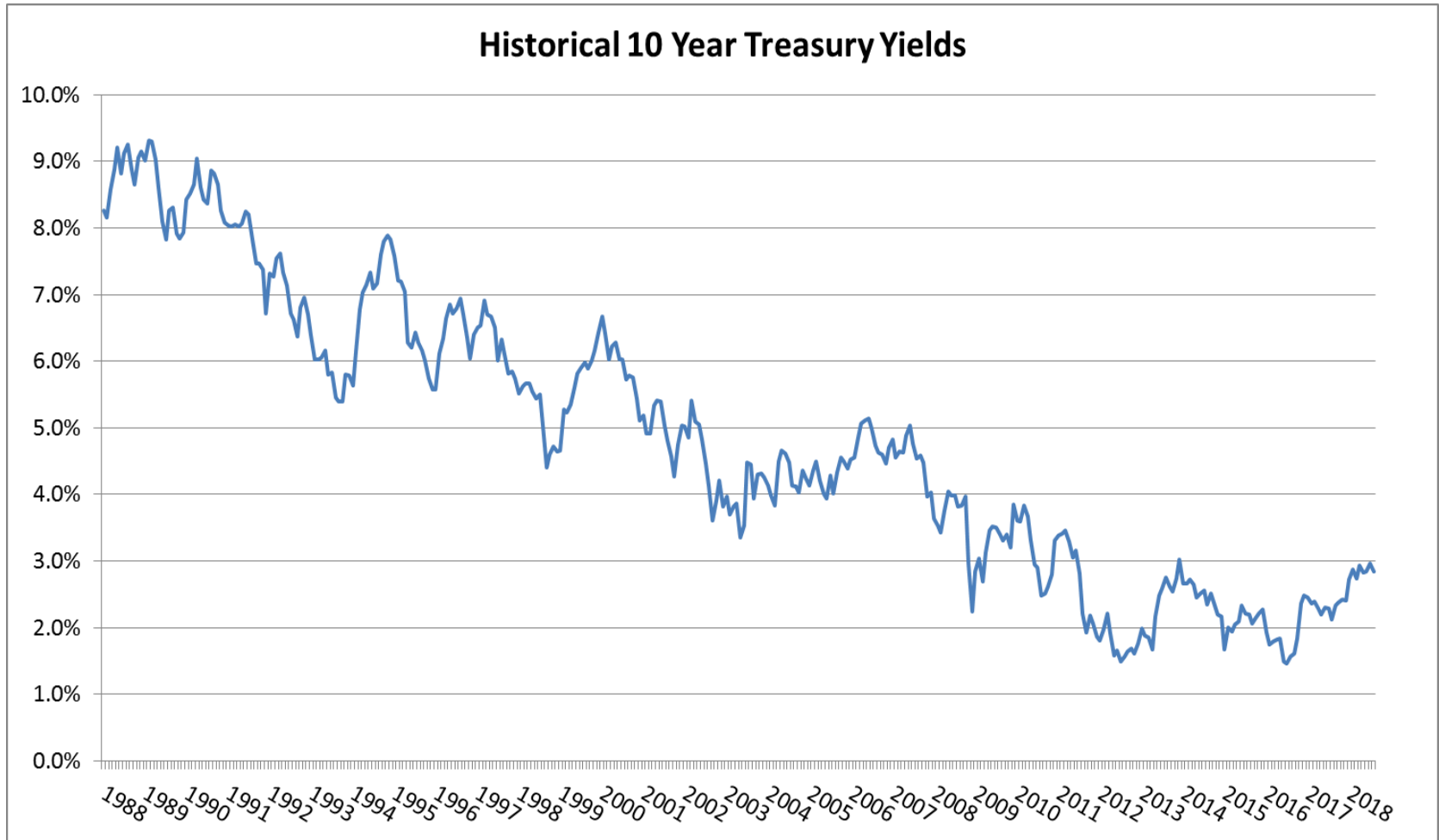
Per ASOP No. 27: Selecting an Investment Return Assumption (Continued)

- The actuary should review appropriate **investment** data which may include:
 - current yields to maturity of fixed income securities
 - Forecasts of inflation, GDP growth, and total returns by asset class
 - Historical and current investment data including real and nominal returns, dividend yields, earnings yields, etc.
 - historical plan performance.
- The actuary may consider a broad range of data and other inputs, including the judgment of investment professionals

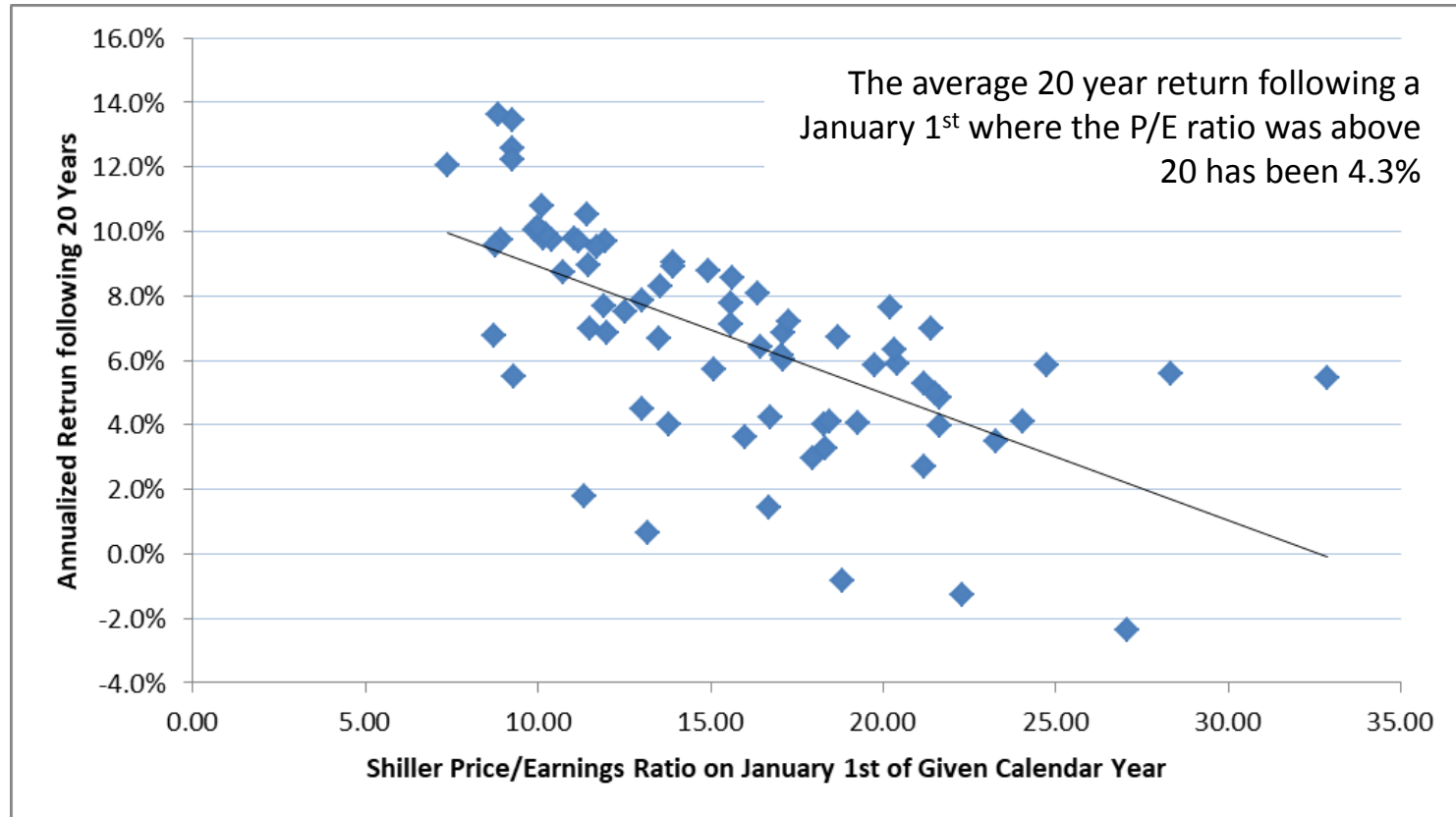
Use of Historical Economic Information

- There is a widely held opinion in the investment profession that future return expectations will be lower than historical experience
- The following slides provides some key perspectives on historical economic conditions and how they can affect perspectives on future expectations
- Includes an over simplistic example using a simple portfolio of stocks and bonds to illustrate how these conditions can effect the development and selection of a reasonable investment return assumption

Historical Economic Conditions – Declining Interest Rate Environment

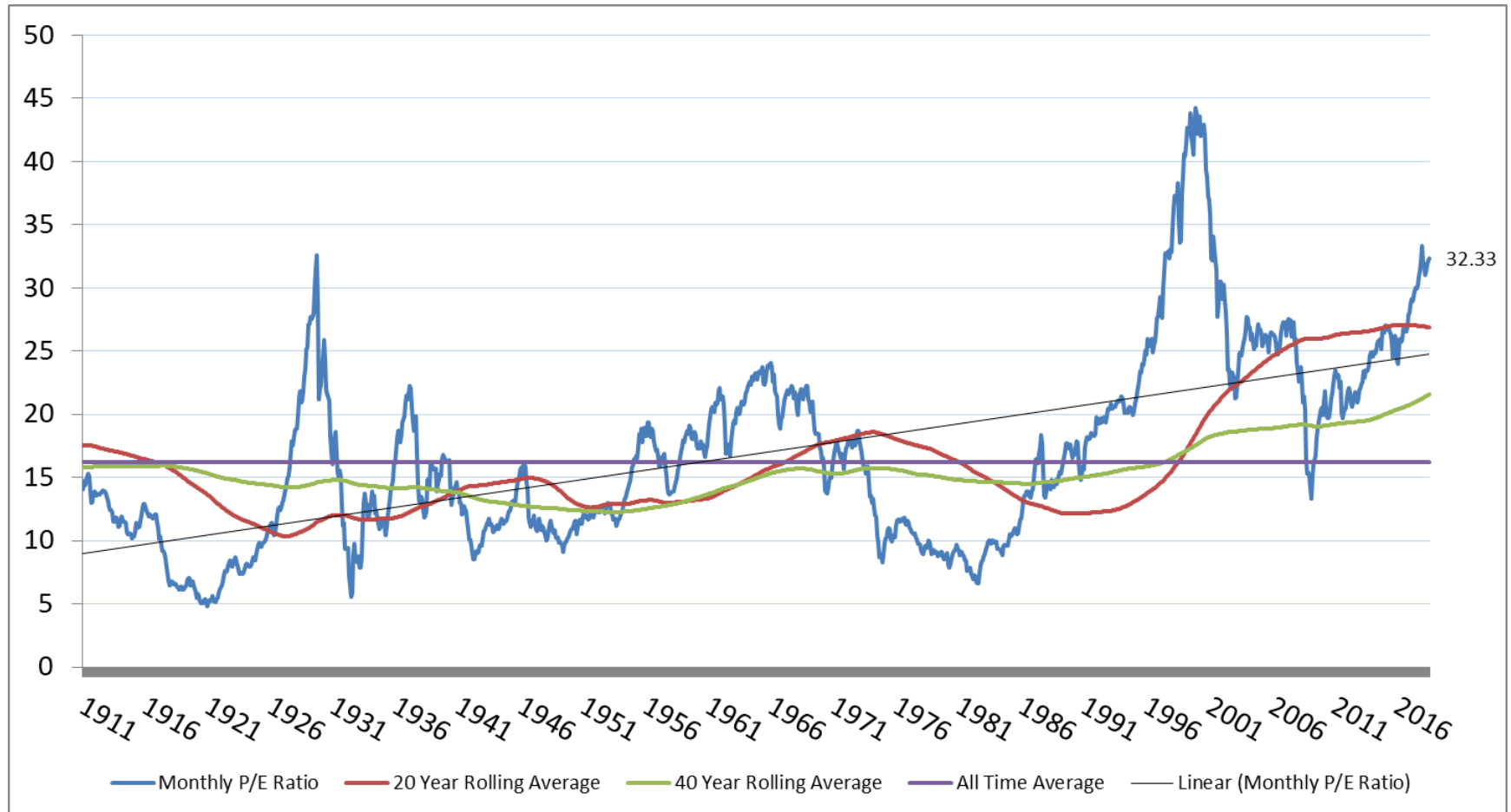


Historical Economic Conditions - Impact of Starting Point on Equity Returns



Returns on the nominal returns of the S&P 500 Index
Periods beginning January 1, 1926

Historical Economic Conditions - Historical Shiller P/E Ratio



Historical Economic Conditions - Simplistic Investment Expectation Review 20 Years Ago

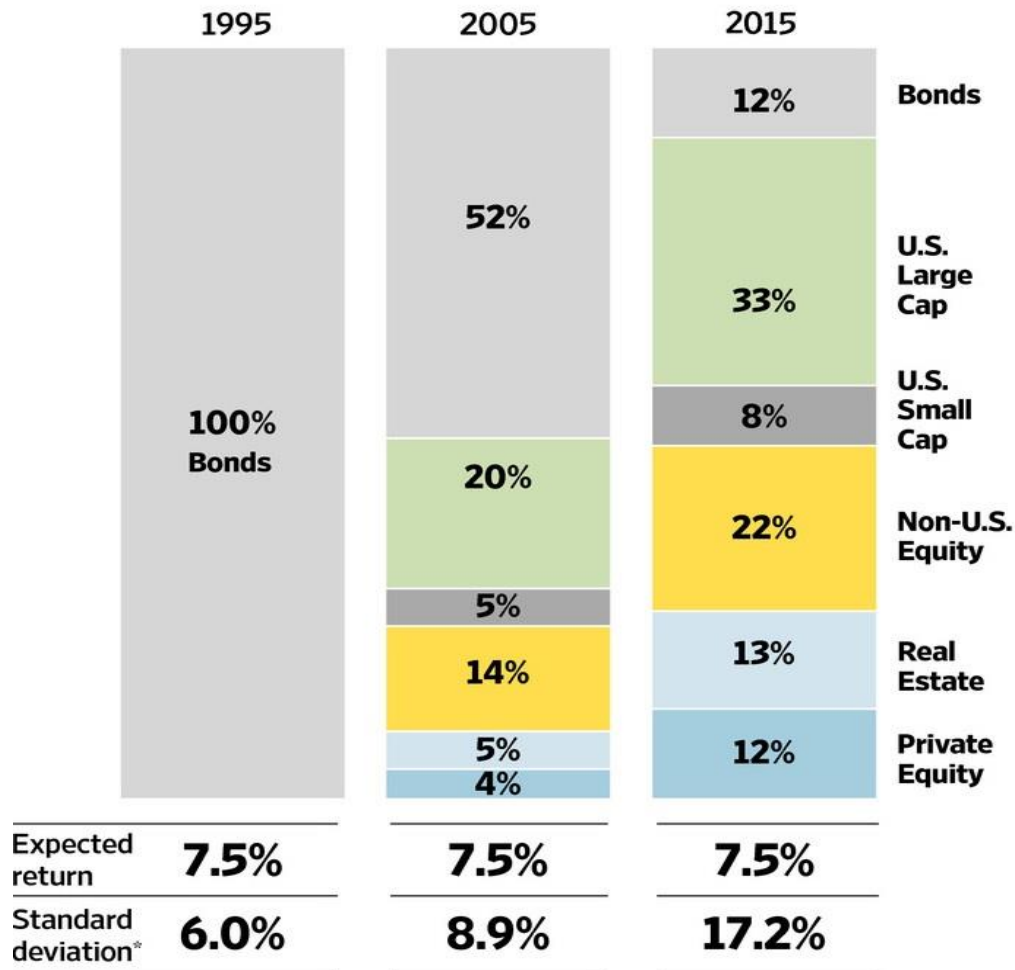
- **Example Investment Return Review in 1998**
- Using historical returns
 - Stocks had returned approximately 11% nominally from 1926 to 1998
 - Bonds yields in 1998 were about 6%
 - A 60% equity /40% fixed income portfolio would be expected to achieve a 9.1% investment return
 - $(60\% \times 11\% + 40\% \times 6\%)$
- At that time, an 8.0% return assumption may have been considered conservative

Historical Economic Conditions - Simplistic Investment Expectation Review Today

- **Example Investment Return Review in 2018 (Current)**
- Current bonds yields approximately 3.5%
- Inflation expectations are currently 2.0% - 2.5%
- According to Ibbotson: An aggressive real return spread for equities is 6.0%
 - An aggressive expectation for equity securities would be 8.5% (2.5% + 6.0%)
 - A 60% equity /40% fixed income portfolio would be expected to achieve 6.5% investment return
 - $(60\% \times 8.5\% + 40\% \times 3.5\%)$
 - A 80% equity / and 20% fixed policy would expect to achieve a 7.5% investment return

Change in Return Expectations

Estimates of what investors needed to earn 7.5%

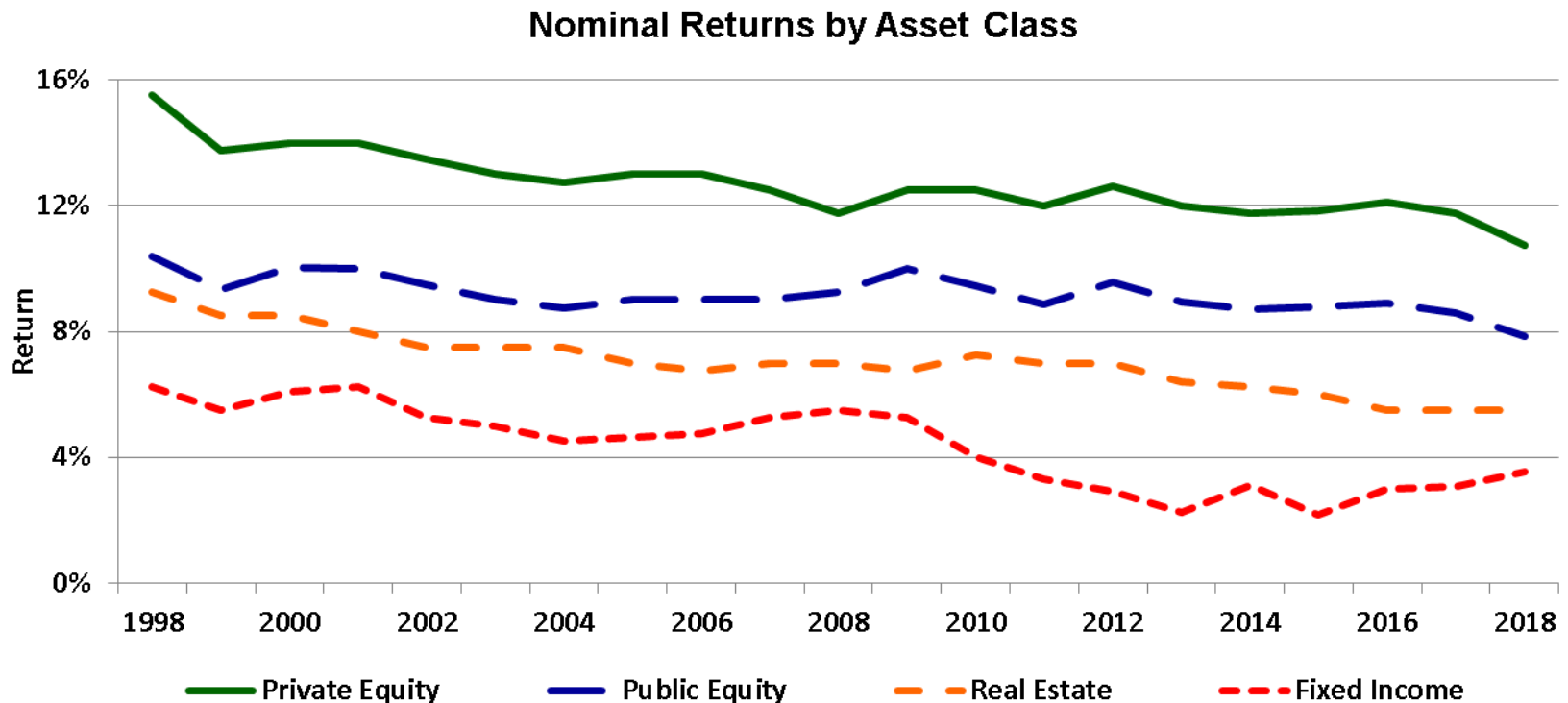


*Likely amount by which returns could vary
Source: Callan Associates

THE WALL STREET JOURNAL.

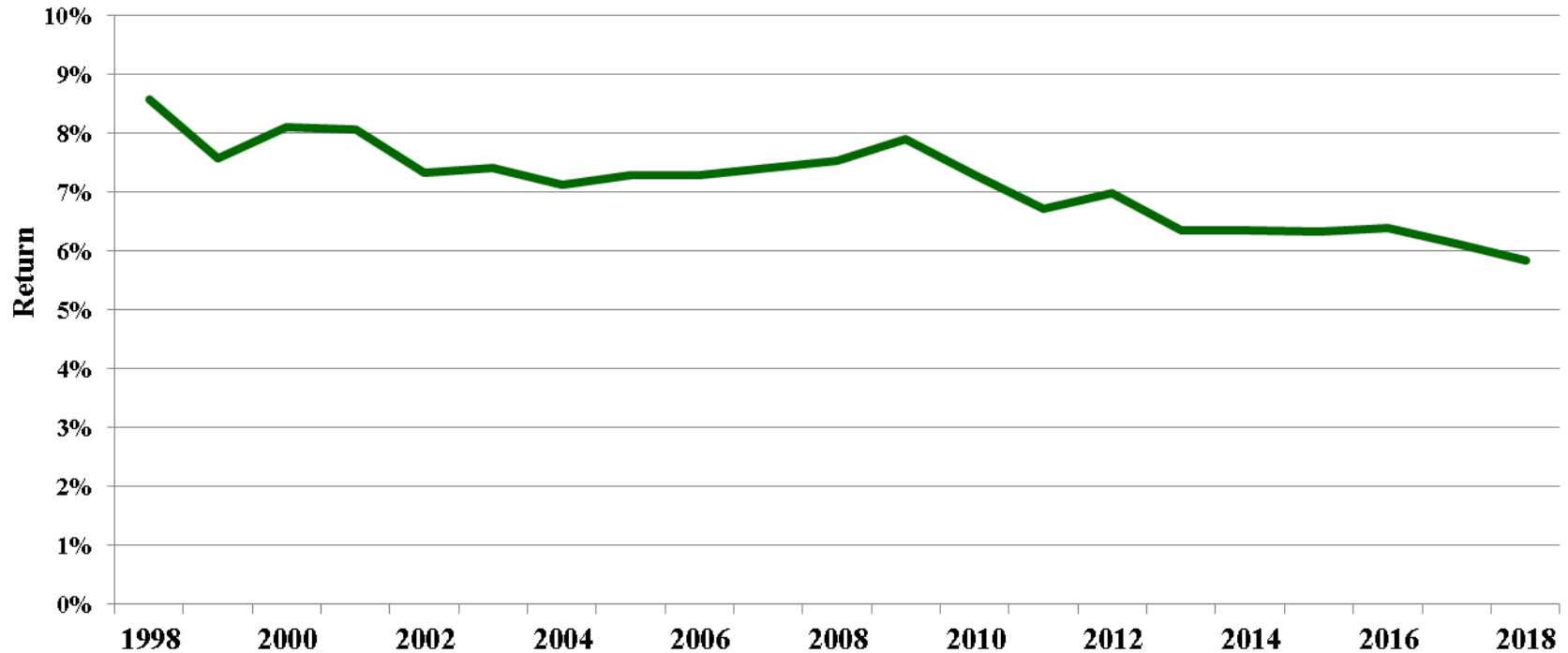
Trend of Declining Expectations in Future Investment Returns

History of Forward-Looking Return Expectations by Asset Class



Trend of Declining Expectations in Future Investment Returns (Continued)

History of Forward-Looking Return Expectation for a Hypothetical Investment Portfolio Expected 50th Percentile Return

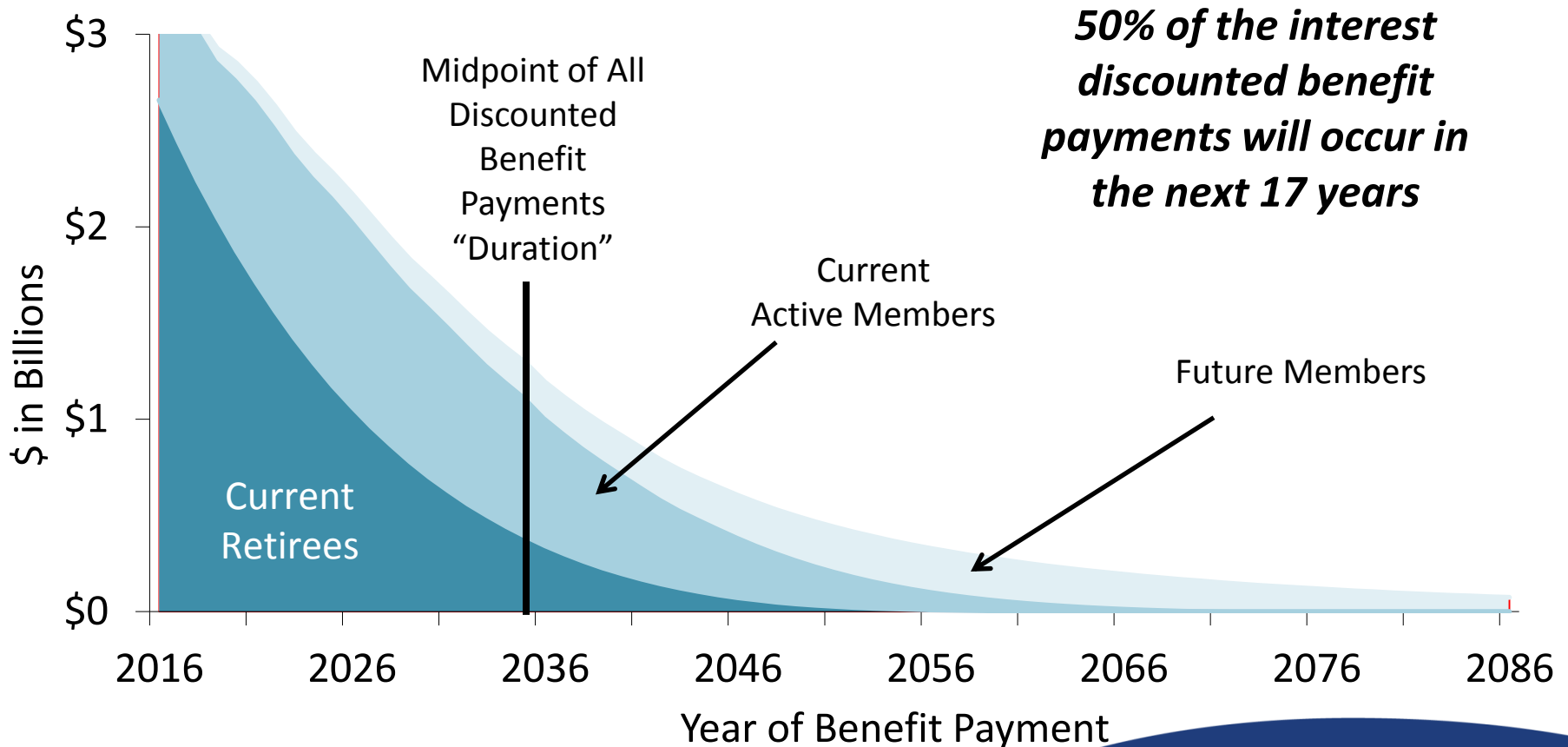


Time Horizon Considerations

- Most investment professionals develop market expectations have a 7 to 10 year time horizon
 - Some investment professionals develop longer 20 to 30 year return expectations
- Some retirement system stakeholders claim that pension plans have an almost infinite time horizon and should only focus very long term expectations
- While the time horizon for most pension plans is much longer than 10 years, due to the duration of the liability and benefit payments, the applicable time horizon for choosing an investment return assumption most pension plans is approximately 15-20 years
 - Typically 60%-70% of liability is attributable to members already retired and receiving benefits from the System

Time Horizon Considerations – Duration of the Liability

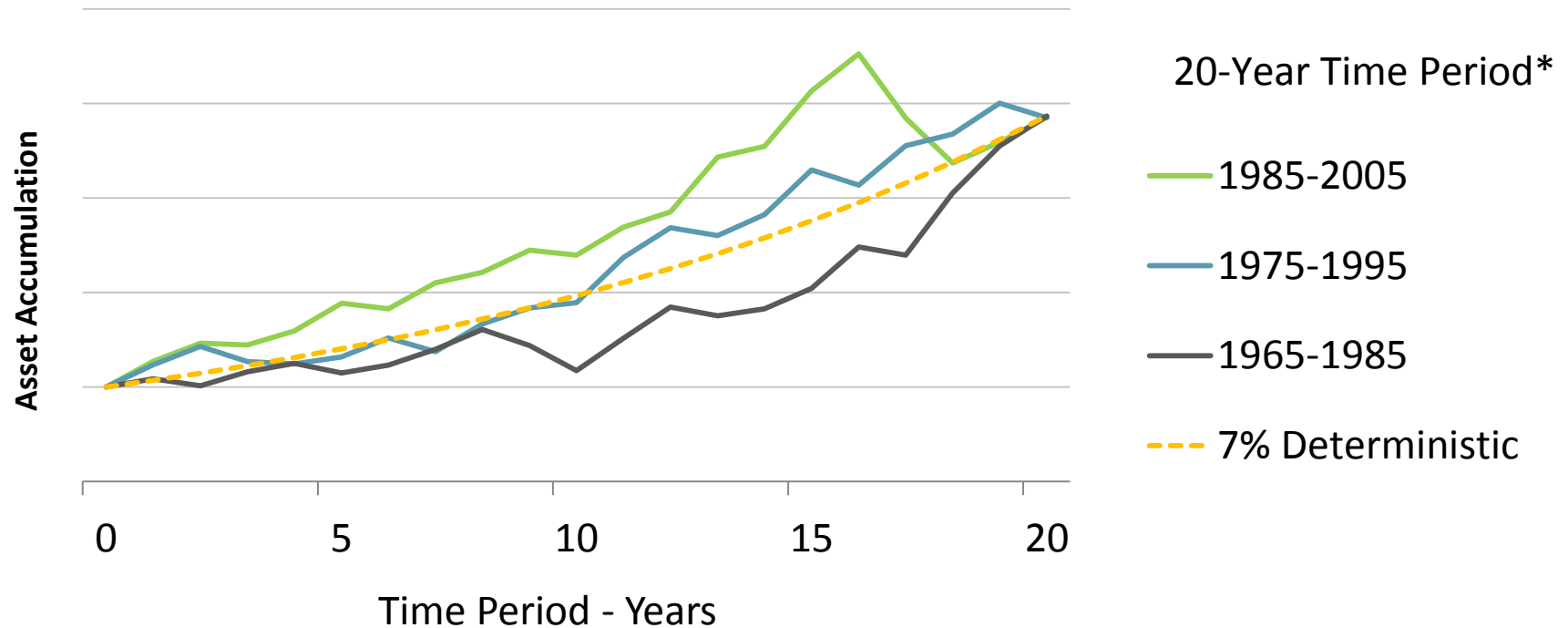
Illustration of an Analysis Performed by GRS for a Large Retirement System



Time Horizon Considerations – Impact of Order on Asset Accumulation

Return Scenarios Based on Select Recent Time Periods' Volatilities

Asset Accumulation Illustration



The above scenarios all achieve an 7% compound return over a 20-year period.

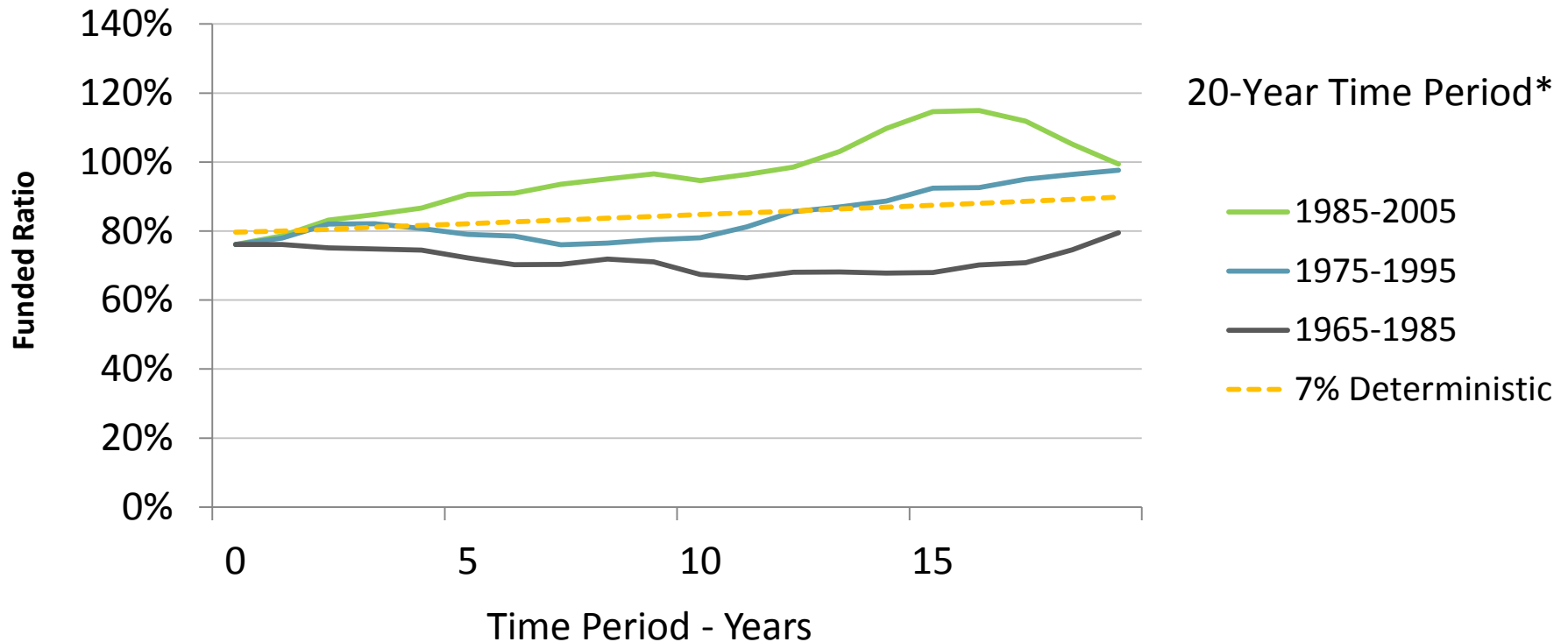
* Modeled returns each year are based on the actual historical pattern during the range provided, with an overall adjustment to achieve an 7% return.

Source: Developed by GRS

Time Horizon Considerations – Impact of Order on Funded Ratio

Return Scenarios Based on Select Recent Time Periods' Volatilities

Funded Ratio Illustration



The above scenarios all achieve an 7% compound return over a 20-year period.

* Modeled returns each year are based on the actual historical pattern during the range provided, with an overall adjustment to achieve an 7% return.

Source: Developed by GRS

Time Horizon Considerations

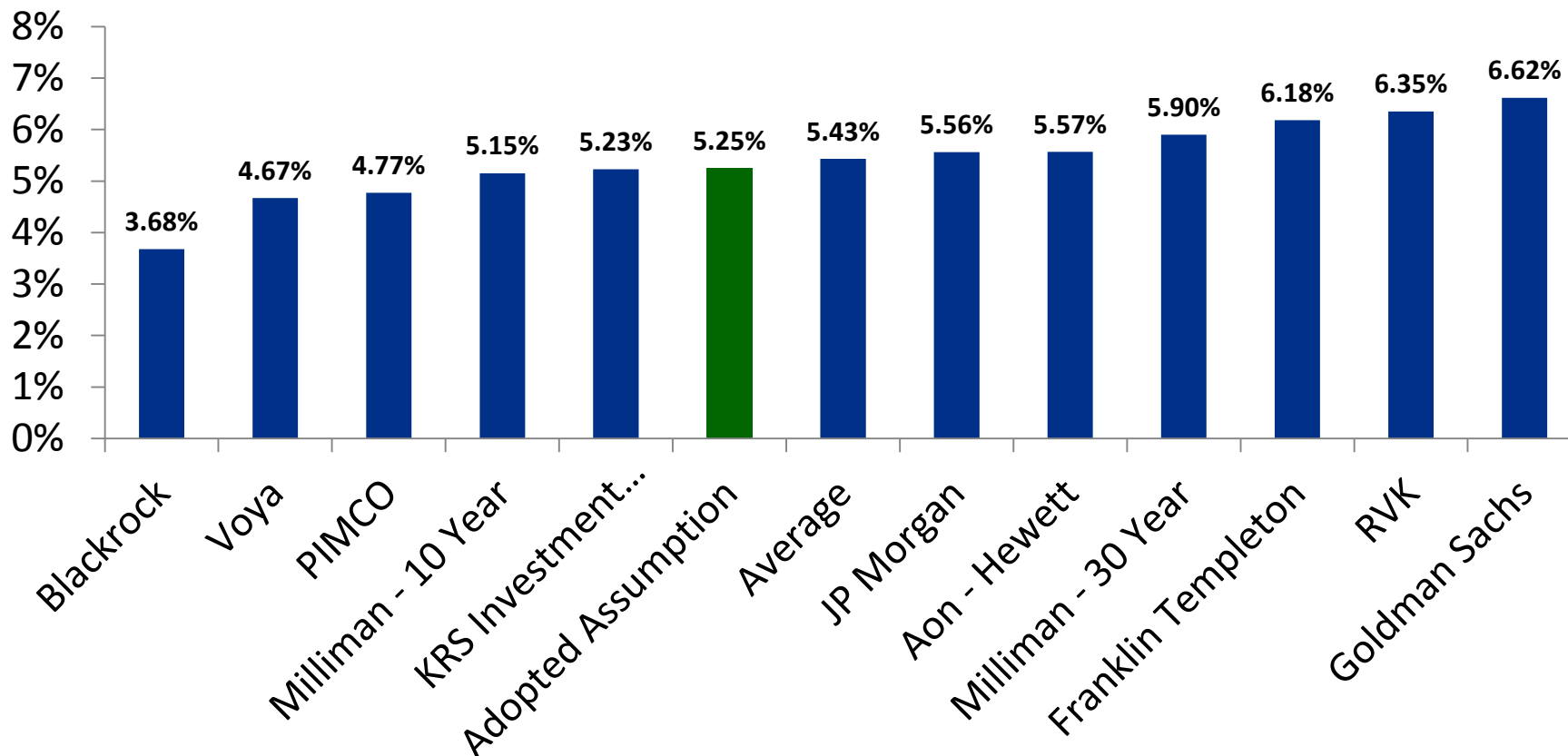
- As shown on the previous slides, the order of the future investment returns impact the asset accumulation, meaning poor returns in the short term will result in fewer assets over time even if the longer term returns are closer to the return expectations
- The duration of the liabilities of the average pension plan (average interest discounted benefit payment) will typically occur 15- 20 years from the valuation date
 - Or, if the liability stream were compared to a portfolio of bonds, it would behave similarly to a bond with a 15-20 year duration
 - Meaning on average, the system has 15-20 years to invest the money before a payment is due
- Thus, we believe the preferable time horizon for setting this assumption to be approximately 15-20 years, or in the range between the shorter term (10 year) and longer term (20-30 year) capital market expectation developed by investment professionals

Short-Term versus Long-Term Return Expectations

- Forward-looking market expectations developed by most investment professionals are based on a 7 to 10 year time horizon
 - Expectations have a greater emphasis on current interest rates and anticipated economic growth
- A few investment professionals also develop longer 20 to 30 year return expectations
 - Often these are developed assuming historical investment experience will persist in the future
 - We are beginning to observe a few investment consultants decreasing their long-term expectations under the assumption that long-term interest rates will increase, but continue to remain below historical levels
- Users of this information (short-term and long-term) have a responsibility to understand how the expectations are developed to ensure they are appropriately used

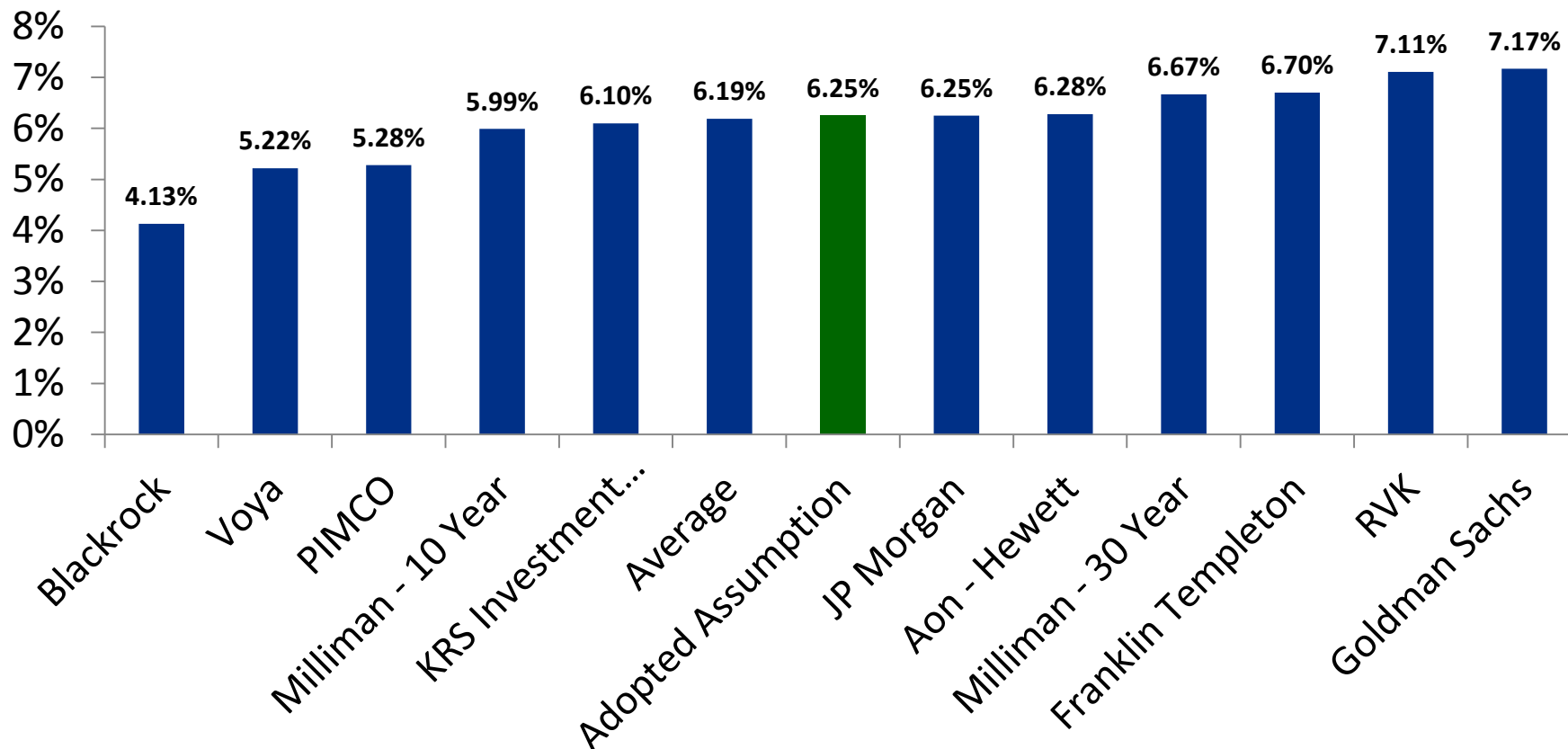
Data from 2017 Assumption Review (KRS Non-Haz & State Police)

Return Expectations



Data from 2017 Assumption Review (KRS Haz, CERS Non-Haz and Haz)

Return Expectations



Closing Summary

- The 2008 / 2009 financial collapse resulted in increased focus on investment risk for public pension systems
- Forward-looking capital market expectations have been declining for the last several years
- Public pension systems have made material reductions in their investment return assumption

Sources and other reference materials

- Macroeconomic Expectations and the Stock Market: The Importance of a Longer-Term Perspective, Vanguard Investment Counseling & Research, <https://personal.vanguard.com/pdf/icrmaca.pdf>
- DIMINISHING RETURNS: WHY INVESTORS MAY NEED TO LOWER THEIR EXPECTATIONS, Mckinsey Global Institute, <https://www.mckinsey.com/~media/McKinsey/Industries/Private%20Equity%20and%20Principal%20Investors/Our%20Insights/Why%20investors%20may%20need%20to%20lower%20their%20sights/MGI-Diminishing-returns-Full-report-May-2016.ashx>
- How Inflation And Interest Rates Affect Bonds <https://www.investopedia.com/walkthrough/corporate-finance/3/bonds/inflation-interest.aspx#ixzz5OunUJZuP>
- <http://www.multpl.com/shiller-pe/>
- <https://www.nasra.org/latestreturnassumptions>
- <http://www.horizonactuarial.com/blog/category/publications>