



Investment Committee Agenda Item 5a

June 19, 2017

Item Name: ALM: Adoption of Capital Market Assumptions

Program: Asset Allocation & Risk Management

Item Type: Action

Recommendation

Adopt the Capital Market Assumptions (CMAs), as presented by staff in Table 1 and the benchmarks as presented in Table 2, for use in the 2017 Asset Liability Management (ALM) process. In Attachment 1, we include more information on the methodology we used to develop the CMAs. Consultant opinion letters from Wilshire Associates, Pension Consulting Alliance, and Meketa Investment Group are provided as Attachments 2, 3, and 4, respectively.

Table 1

Asset Class	Compound Return	Volatility (Std. Dev)	Correlation					
			Global Equity	Private Equity	Fixed Income	Real Assets	Inflation	Liquidity
Global Equity	6.8%	17.0%	1.00					
Private Equity	8.3%	25.5%	0.81	1.00				
Fixed Income	3.0%	6.6%	0.01	0.00	1.00			
Real Assets	5.8%	12.6%	0.59	0.48	0.09	1.00		
Inflation	2.8%	8.0%	0.39	0.33	0.40	0.21	1.00	
Liquidity	2.0%	1.0%	0.00	0.00	0.31	0.00	0.08	1.00

U.S. Inflation Assumption: 2.00%

Table 2

Asset Class / Segment	Benchmark Proxy
Public Equity Cap Weighted (inclusive of Private Equity)	Custom FTSE All World, All Capitalization + return hurdle (TBD)
Global Fixed Income	90% Bloomberg-Barclays Long Liabilities + 10% Bloomberg-Barclays International Fixed Income Index GDP weighted ex-U.S.
Real Assets (inclusive of Real Estate, Infra., Forest)	MSCI Investment Property Databank U.S. Core – Fund Level (MSCI IPD) benchmark
Inflation	75% Bloomberg-Barclays Global Inflation Linked Bonds + 25% S&P Goldman Sachs Commodity Index (GSCI)
Liquidity	3-Month U.S. Treasury Bills

Executive Summary

CMAAs are essential inputs into the 2017 Asset Liability Management (ALM) process. The chronology of key activities for the 2017 ALM process is outlined in Attachment 5. The presented metrics represent the output of a comprehensive and prudent estimation approach that has been informed by multiple sources including outside consultants and internal senior Staff. Consensus was reached through an open and thorough discussion process. While return prospects have been declining for decades following the downward trend in interest rates, the capital market expectations being recommended for adoption do not represent a material change in expectations from our presentation to the Board in the 2016 Interim Asset Allocation Targets Review. Important to note, however, is an expected decline in inflation from the level used in 2013 of 2.75% to 2.00%.

Strategic Plan

This item supports California Public Employees' Retirement System (CalPERS) Strategic Plan goal of improving long-term pension and health benefit sustainability. CalPERS conducts an in-depth ALM process every four years to review asset and liability management. These processes culminate in the selection of a Policy Portfolio which is then used to guide and define the strategic asset allocation across the Total Fund.

Investment Beliefs

The Asset-Liability Management (ALM) process and associated Strategic Asset Allocation are primary activities underlying the exercise of fiduciary responsibility by the CalPERS Board and staff. Many of CalPERS' Investment Beliefs are associated with this activity and agenda item, including:

Investment Belief 1:

Liabilities must influence the asset structure.

Investment Belief 2:

A long time horizon is a responsibility and an advantage.

Investment Belief 5:

CalPERS must articulate its investment goals and performance measures and ensure clear accountability for their execution.

Investment Belief 6:

Strategic asset allocation is the dominant determinant of portfolio risk and return.



Investment Belief 7:

CalPERS will take risk only where we have a strong belief we will be rewarded for it.

Investment Belief 9:

Risk to CalPERS is multi-faceted and not fully captured through measures such as volatility or tracking error.

Background

The ALM process is an important step to help ensure that contributions, plus investment returns, are sufficient to pay CalPERS' benefits and expenses. Every four years, staff presents to the Investment Committee potential Strategic Asset Allocations to each asset class that are estimated to allow CalPERS to realize its long-term assumed rate of return while maintaining prudent levels of risk.

CMAs for each asset class are critical inputs to the process that ultimately constructs the Policy Portfolio. CMAs have a direct impact on the composition of the Policy Portfolio and therefore directly affect the risk and return profile of the Total Fund.

Analysis

Identifying CMAs is a critical step in the ALM process. Not only does it require knowledge and expertise of every asset class in our Policy Portfolio, but it also depends on CalPERS customized benchmarks and investment strategies. In addition, forecasting CMAs for asset classes entails a meaningful level of uncertainty, particularly for more volatile asset classes. An open and inclusive approach, including surveying all major investment banks and Board Consultants, was adopted to gain as much information as possible.

Consensus was reached through open and thorough discussions between consultants and internal staff. For every asset class, these discussions verified the theoretical justification for the underlying valuation models and assumptions used therein. We noted the legitimate dispersion of opinions regarding expectations about the future and made choices consistent with our best knowledge. For example, there is a limited range of dispersion regarding the expected returns of Global Equity because there is widely available information and more industry consensus on fundamental valuation models. On the other hand, expected returns for Private Equity and Real Assets have wider dispersion due to the various benchmarks, methodologies and leverage assumptions used. In that case, we had a deeper discussion and adopted assumptions that were most consistent with our investment strategy for Private Equity and Real Assets.

Budget and Fiscal Impacts

Not Applicable.

Benefits and Risks

CMAs are the essential inputs and starting points of the ALM process. All subsequent analyses depend on their identification making the timing of adoption important. Staff recommends adoption of the presented CMAs for the following reasons:

1. Our procedure is consistent with industry practice;
2. There are no pending issues nor unresolved concerns;
3. Our consensus was reached through open and thorough discussions;
4. Inherent uncertainty has been adequately noted and will be incorporated into our subsequent analyses.

The benefit of adoption of these metrics is that it allows staff to proceed with the ALM process and devote more time and effort to subsequent analyses which involve a conscious attempt to compensate for some of the uncertainty inherent in estimating CMAs. The risk of non-adoption would be more time and effort spent without a clear target for improvement.

Attachments

Attachment 1 – 2017 10-Year Capital Market Assumptions

Attachment 2 – Wilshire Associates Opinion Letter

Attachment 3 – Pension Consulting Alliance Opinion Letter

Attachment 4 – Meketa Investment Group Opinion Letter

Attachment 5 – Ensuring a Sound and Sustainable Pension Fund

Eric Baggesen

Managing Investment Director

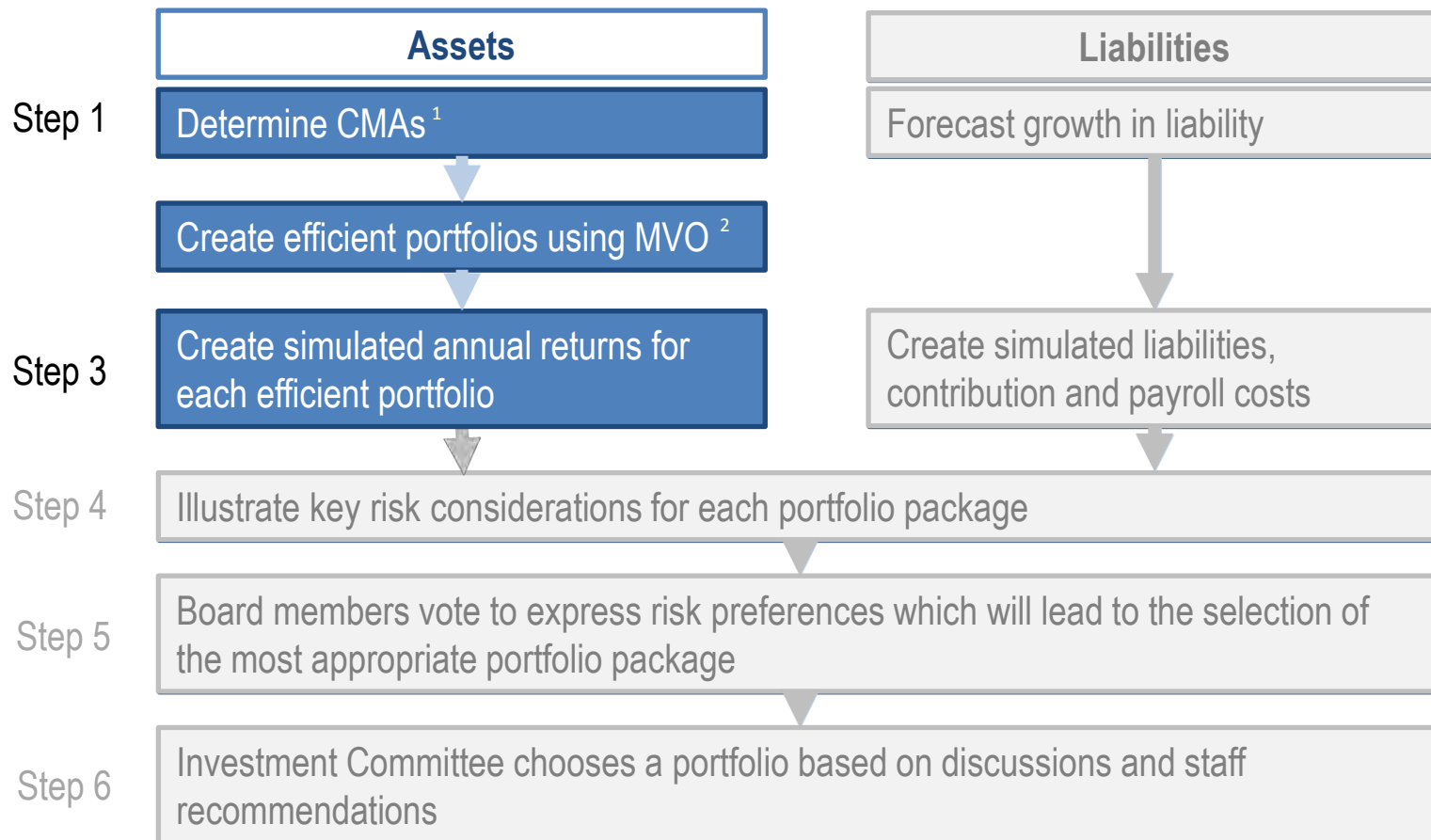
Theodore Eliopoulos

Chief Investment Officer

2017 10-Year Capital Market Assumptions

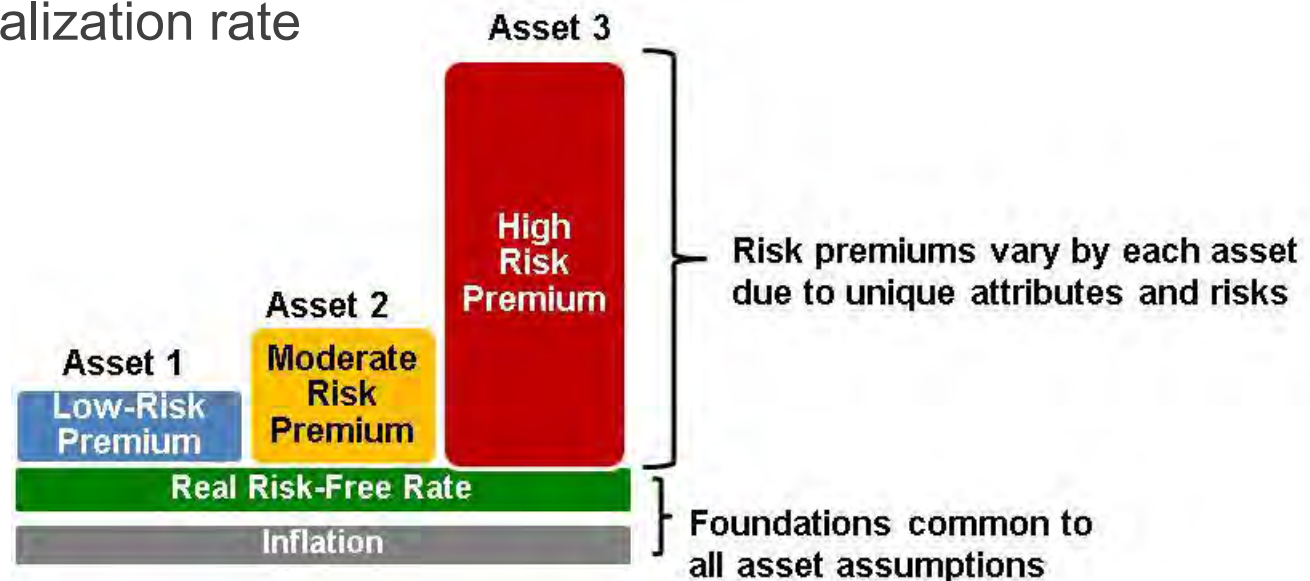
June 19, 2017

Steps to Obtain Policy Portfolio in ALM Workshops



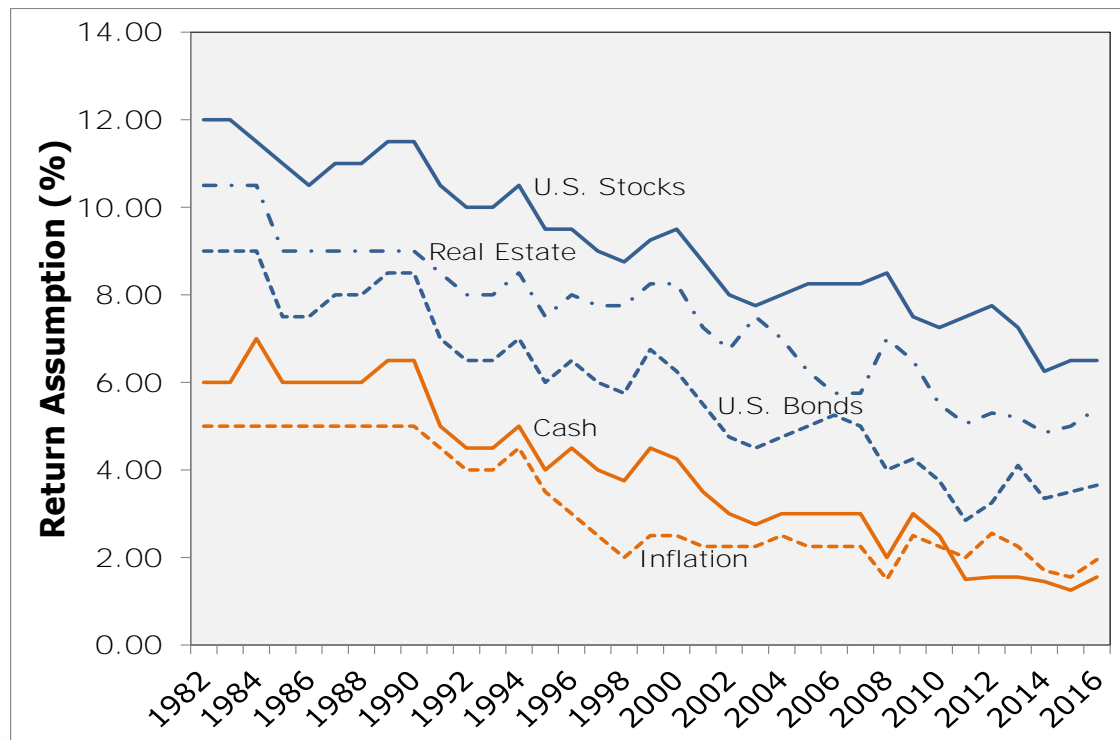
Methodology for Expected Returns

- Building Blocks Approach
- Various Fundamental Valuations Models
- Predictions on valuation metrics, such as earnings yield, credit spread and capitalization rate
- Industry survey



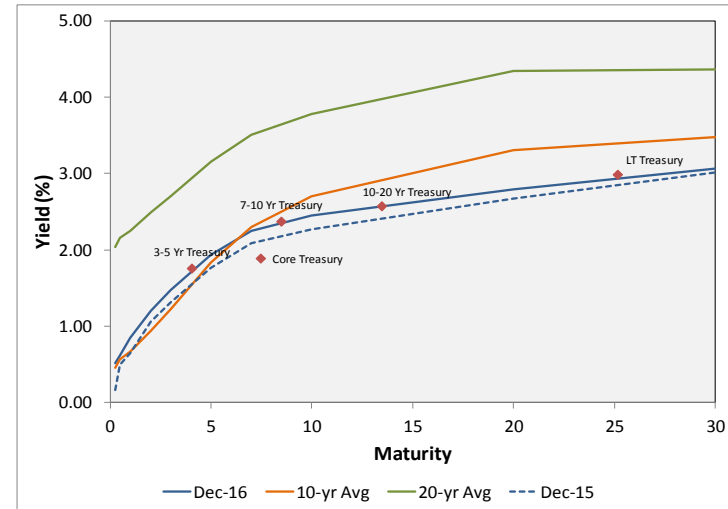
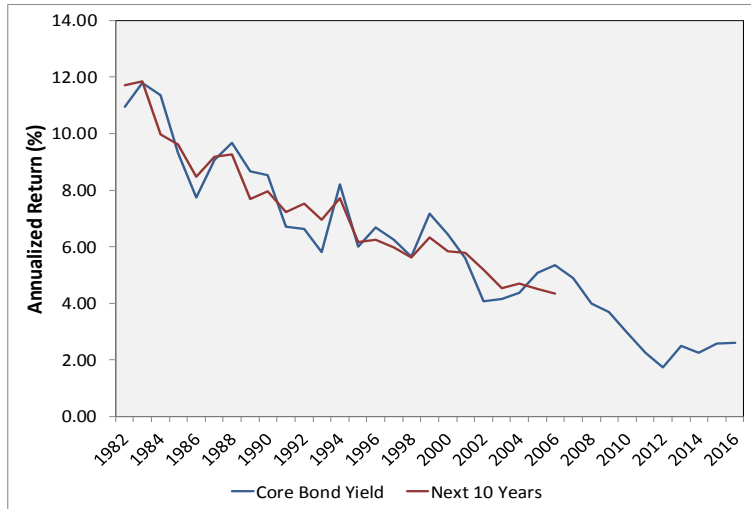
Wilshire Forecasts through Time

- Return prospects have been declining for decades, following the downward trend in interest rates



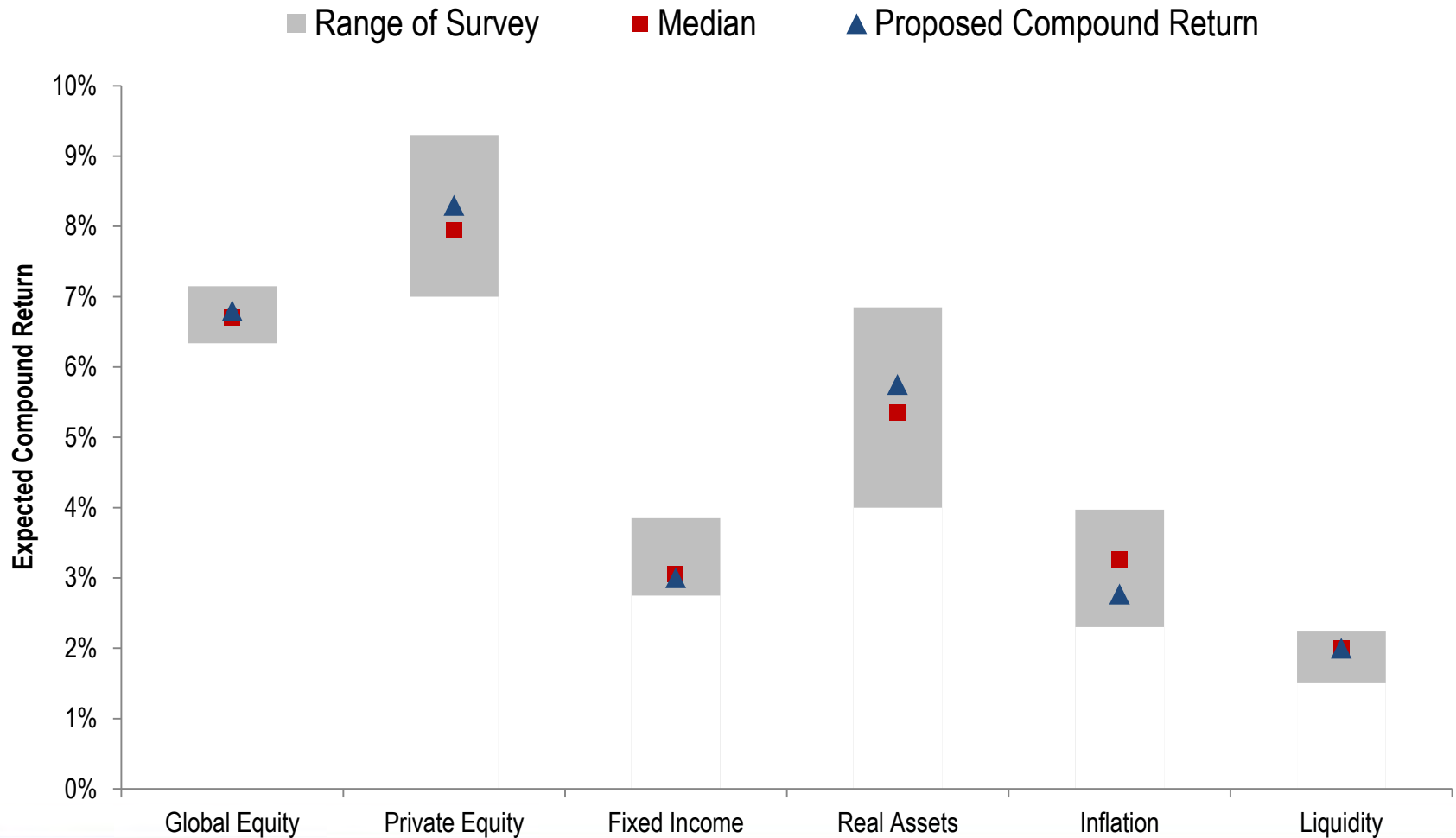
Source: Wilshire

Core Fixed Income Forecasts Remain Low

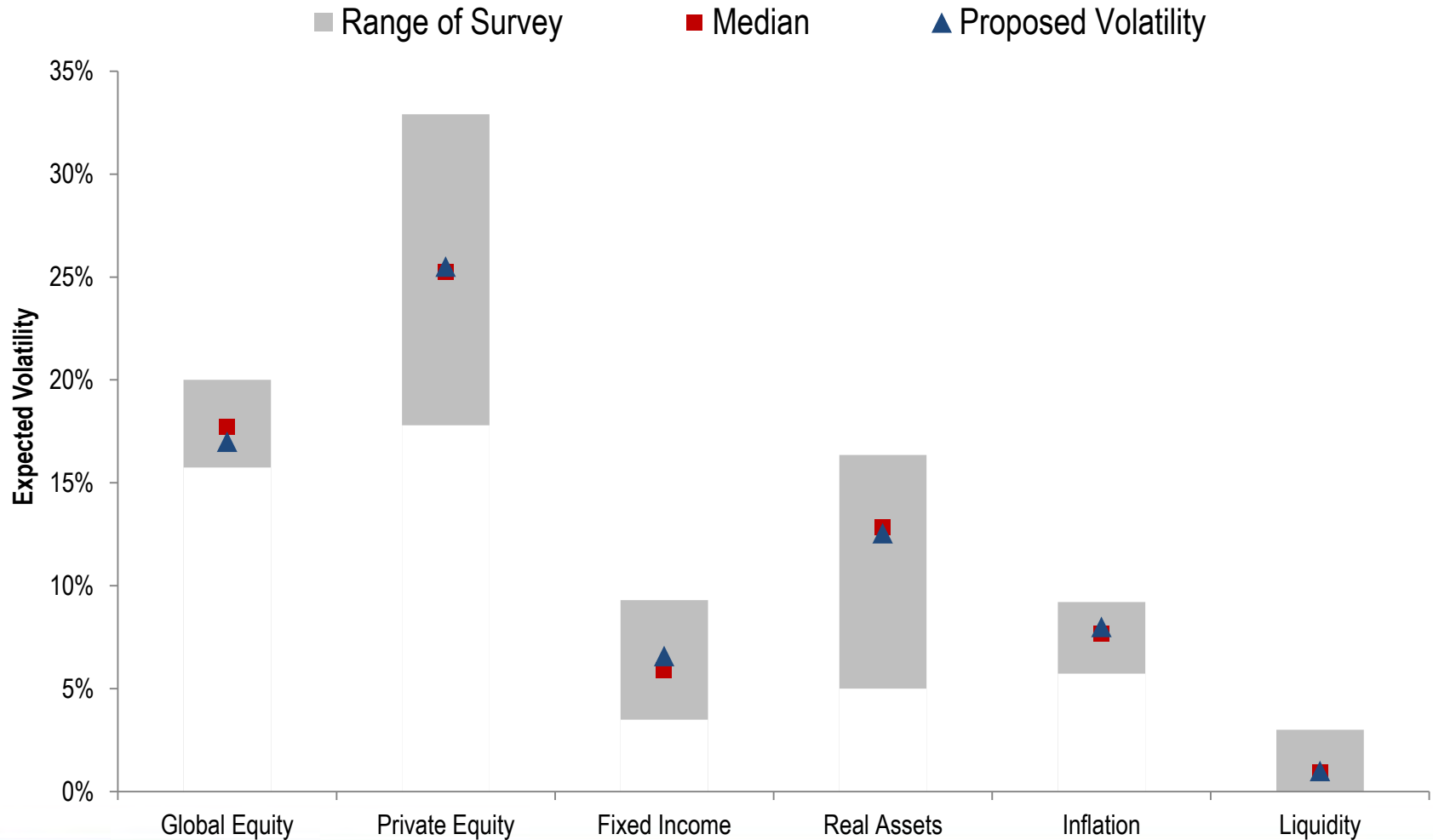


- Fixed income assets (and return prospects) are anchored by current interest rates (i.e. the “going in” yield)
- Risk premium for every other asset classes is anchored relative to fixed income assets

Range of Surveyed Expected Returns



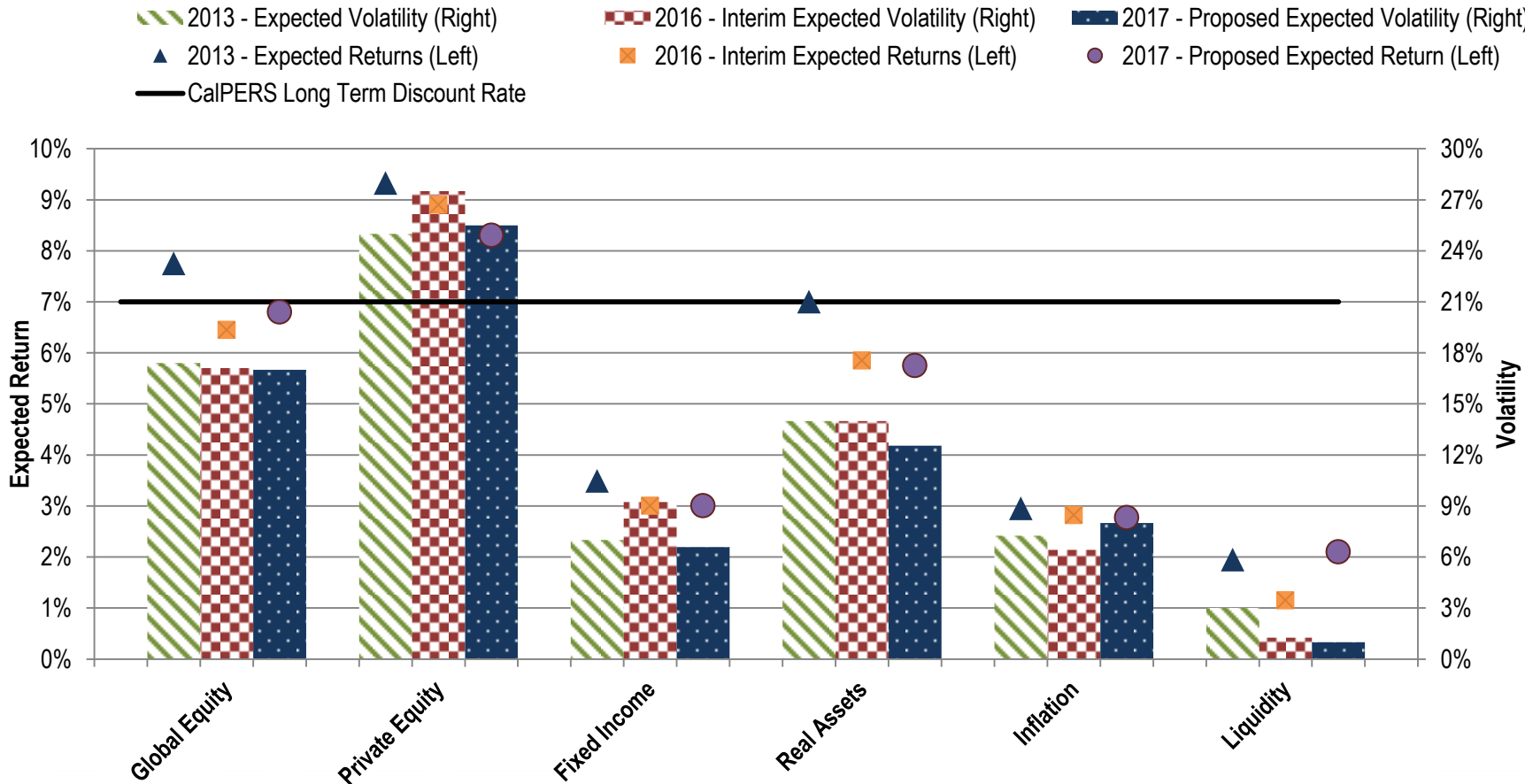
Range of Surveyed Expected Volatility



Proposed Capital Market Assumptions (CMAs)

Asset Class	Compound Return	Volatility (Std. Dev)	Correlation					
			Global Equity	Private Equity	Fixed Income	Real Assets	Inflation	Liquidity
Global Equity	6.8%	17.0%	1.00					
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U.S. Inflation Assumption: 2.00%								

10-Year Expected Returns & Volatilities: 2017 vs. 2013 CMA's and 2016 Interim Expectations



Appendix

Most Common Expected Return Approaches

Fixed Income

- Yield-to-maturity plus spread adjustment

Real Assets

- Capitalization rate forecast adjusted for capex + cash flow forecast
- Risk premium between Equity and Fixed Income

Inflation

- Commodity estimated as a function of spot return + collateral return + roll return
- TIPS and Global Linkers are a function of current yields and inflation expectations

Public Equity

- Dividend Discount Model
- Inflation + Real Risk Free Rate of Cash + Risk Premium

Private Equity

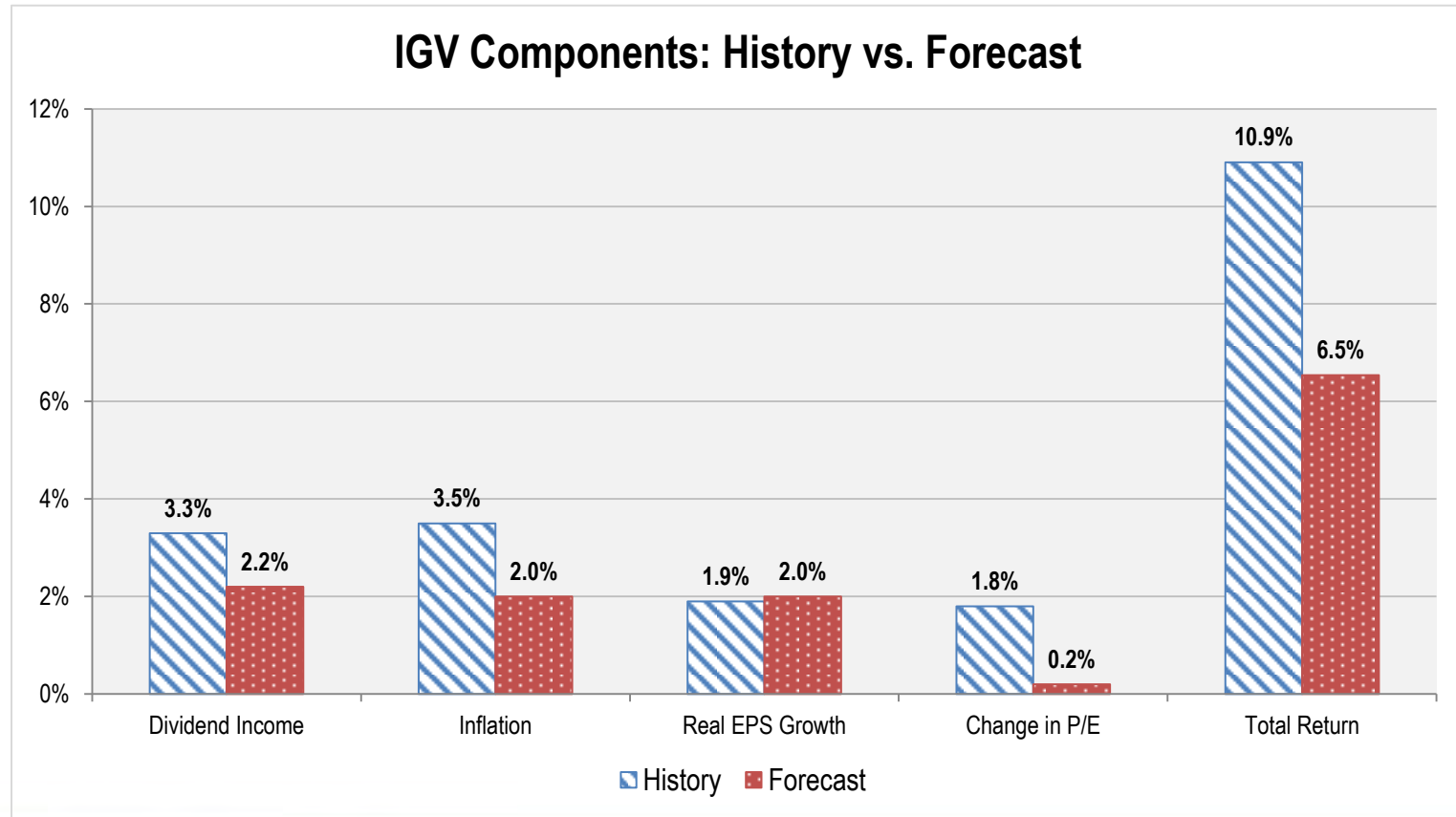
- Private Equity is a weighted average of levered equity and fixed income index
- Public Equity plus illiquidity premium and other adjustments

Risks and Correlations Estimation

- Is largely based on observed historical asset class behavior and an understanding of the response of individual asset classes to changes in economic factors
- Adjusts the historical asset class behavior to account for evident trends and recent abnormalities
- For correlations, mostly relied on the BarraOne risk system

Example Equity Forecast

- Historical results helped by valuation shifts plus higher dividend yields and inflationary growth



Source: Wilshire



Steven J. Foresti
Chief Investment Officer, Wilshire Consulting

June 2, 2017

Mr. Henry Jones
Chair of the Investment Committee
California Public Employees' Retirement System
400 Q Street
Sacramento, CA 95814

Re: Adoption of 2017 Capital Market Assumptions

Dear Mr. Jones:

You requested Wilshire's opinion with respect to adoption of the proposed 2017 capital market assumptions (CMAs) for use in CalPERS' 2017-2018 Asset Liability Management (ALM) process. The importance of the ALM process is clearly articulated by CalPERS Investment Belief 6, which recognizes that **strategic asset allocation is the dominant determinant of portfolio risk and return**. The CMAs represent key inputs into that process and serve to establish baseline expectations to define the characteristics of investable asset classes (i.e. the "A" in "ALM").

The Process

Staff coordinated an open, collaborative and robust process for developing the proposed capital market assumptions. The process collected and compared market forecasts and modeling methodologies from Wilshire, other Board consultants, external investment managers/advisors and directly from the various CalPERS INVO asset class teams. This initial set of views was further refined through open meetings and deliberation between Staff, Wilshire, PCA and Meketa. While recognizing the inherent imprecision in forward-looking market views, the process was transparent, rigorous and facilitated critical analysis of the final recommended assumptions suite.

The Results

Wilshire believes that Staff's recommended 2017 Capital Market Assumptions represent an appropriate reflection of the potential return, risk and diversification properties across CalPERS' asset class universe. The results are guided by sound methodologies and reflective of current market conditions. Though they contain input from a variety of sources, Staff's



recommended CMAs are generally consistent with Wilshire's standard assumptions in these asset classes.

Recommendation

Wilshire is comfortable with both the process followed and the results produced through that process and, therefore, believes that the Investment Committee should approve use of the 2017 capital market assumptions as proposed by Staff. In addition to being appropriate for the current market environment, the proposed assumptions remain consistent with the market views recently used to support CalPERS discount rate adjustments.

Should you require anything further or have any questions, please do not hesitate to contact us.

Best regards,

A handwritten signature in black ink, appearing to read 'Peter J. Forti'.



June 2, 2017

Mr. Henry Jones, Chairman
Investment Committee
California Public Employees' Retirement System
Sacramento, California 95814

Re: 2017 Capital Market Assumptions

Dear Mr. Jones,

The purpose of this letter is to provide the Investment Committee (IC) with Pension Consulting Alliance's (PCA's) opinion regarding Agenda Item 5a in Open Session for the June Investment Committee meeting. In summary, PCA recommends that the IC adopt Staff's recommendations for the 2017 Capital Market Assumptions (CMAs) as presented in Attachment 1 to their memo. These CMAs are key inputs to the 2017 Asset Liability Management (ALM) Process.

In our view, Staff has provided PCA and the other consultants with an appropriate opportunity to review and examine the development of the recommended CMAs. While it is very difficult to accurately forecast future outcomes, PCA believes the recommended 2017 CMAs are reasonable, appropriate, and prudent.

As highlighted elsewhere under this agenda item, the proposed 2017 CMAs generally exhibit lower expected returns and higher expected volatilities for CalPERS strategic investment classes versus the CMAs developed for the 2013 ALM project. As a result, these latest inputs will very likely translate into lower long-term expected compound returns for the range of strategic portfolio options the IC will consider during the 2017 ALM process.

We look forward to addressing any questions or clarifications on this matter at the Investment Committee meeting.

Respectfully,

A handwritten signature in blue ink, appearing to read "Allan Emkin".

Allan Emkin



M E K E T A I N V E S T M E N T G R O U P

BOSTON MA
 CHICAGO IL
 MIAMI FL
 PORTLAND OR
 SAN DIEGO CA
 LONDON UK

June 2, 2017

Mr. Henry Jones
 Chair, Investment Committee
 California Public Employees' Retirement System
 400 Q Street
 Sacramento, CA 95814

RE: CAPITAL MARKET ASSUMPTIONS

Dear Mr. Jones:

Meketa Investment Group has been asked in its capacity as Board Consultant for Private Equity (the "Program") to opine on the Capital Market Assumptions (the "CMAs") to be used for the 2017 Asset Liability Management Process. CalPERS conducts an in-depth Asset Liability Process every four years. The CMAs are important factors in assisting CalPERS develop its strategic investment plan for the coming years. We note that CMAs are estimates based on a current assessment of the financial markets, as well as projected economic, political, and capital market conditions. As such, the actual performance of CalPERS' investments will almost certainly be different than what is projected in the CMAs. However, the CMAs should represent a reasonable and unbiased estimate of forward-looking asset class returns, risks, and correlations. The CMAs proposed by Staff are described in Item 5a.

Meketa Investment Group participated in several discussions with Staff and other CalPERS' consultants in this process, with our particular focus on the assumptions for the private equity asset class.

The table below compares Staff's recommended return assumption for the private equity asset class to Meketa Investment Group's long-term return assumption.

Private Equity Projected Return Assumption

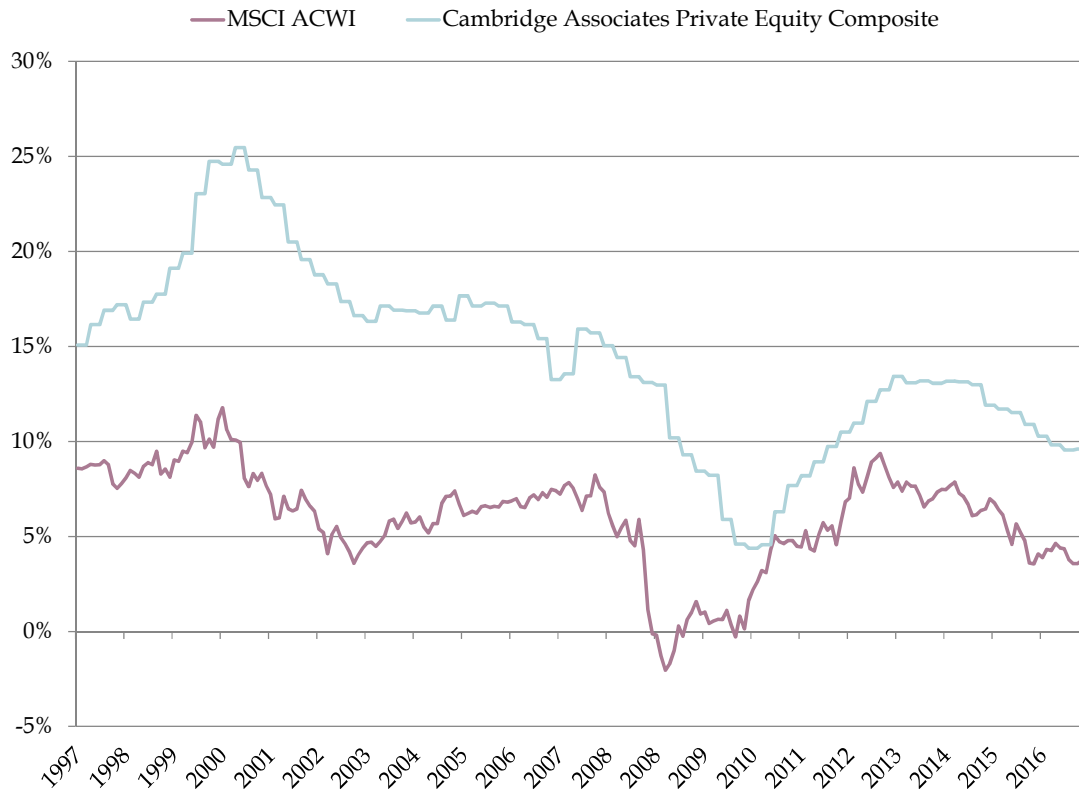
	CalPERS Staff Recommended (%)	Meketa Investment Group (%)
Expected Geometric Nominal Return	8.3	9.6
Return Spread Above Global Equity	1.5	1.4

June 2, 2017
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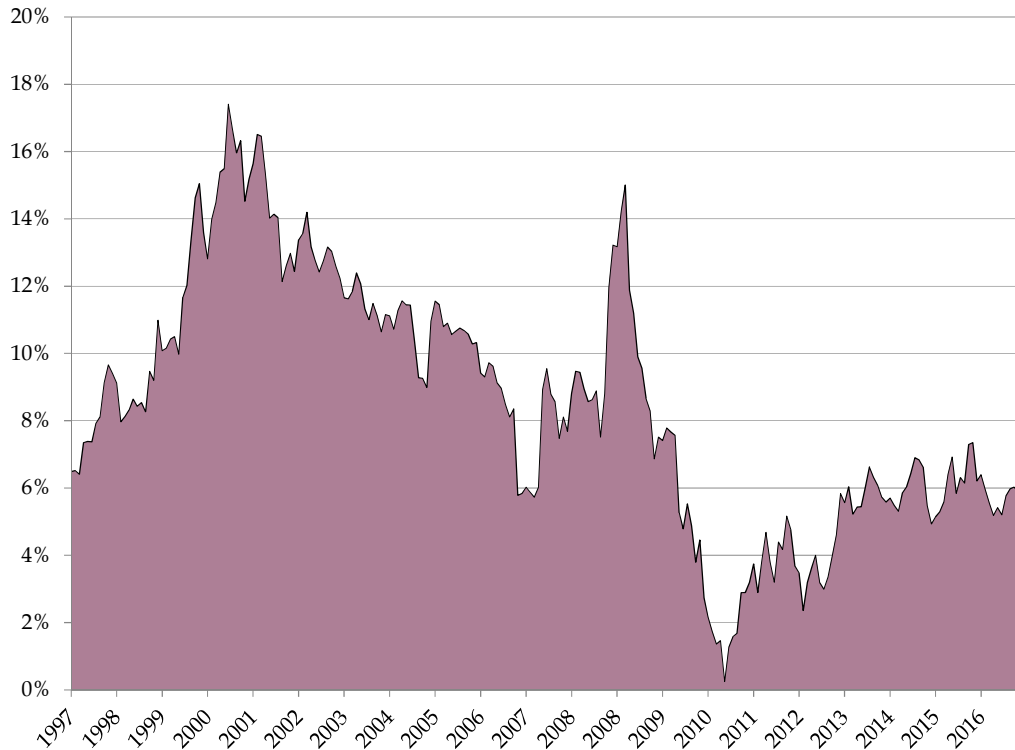
While Meketa Investment Group's projected return for the private equity asset class is somewhat higher than Staff's, this difference is driven largely by Staff's lower return expectation for global equity. The "return premium" of private equity we estimated (1.4%) is in line with Staff's estimate (1.5%) for the private equity return premium. It is this premium that is the critical private equity return assumption for the asset allocation process.

Instead of using a static private equity premium to develop our forward looking assumptions, Meketa Investment Group uses a fundamental approach that captures the current valuations via purchase price multiples and levels of debt to arrive at the private equity premium estimate. Based on these fundamental inputs and taking into account the empirical decline in the premium, we believe these estimates remain appropriately conservative.

Rolling Ten-Year Annualized Returns for Public and Private Equity



Spread of Ten-Year Annualized Rolling Returns between Public and Private Equity



We note that, in general, the spread in returns between public and private equity has diminished over time. We believe that this trend will continue, in part due to increasing competition within the private equity asset class.

Both Meketa Investment Group and Staff estimate that private equity risk (volatility) should be modeled as higher than what is historically observed, due to the fact that private equity returns are calculated on a quarterly basis and that asset values are largely appraisal based.

Historical vs. Estimated Volatility for Private Equity

	% Per Year
Historical Private Equity Volatility ¹	12.2
Meketa Forecasted Private Equity Volatility	25.0

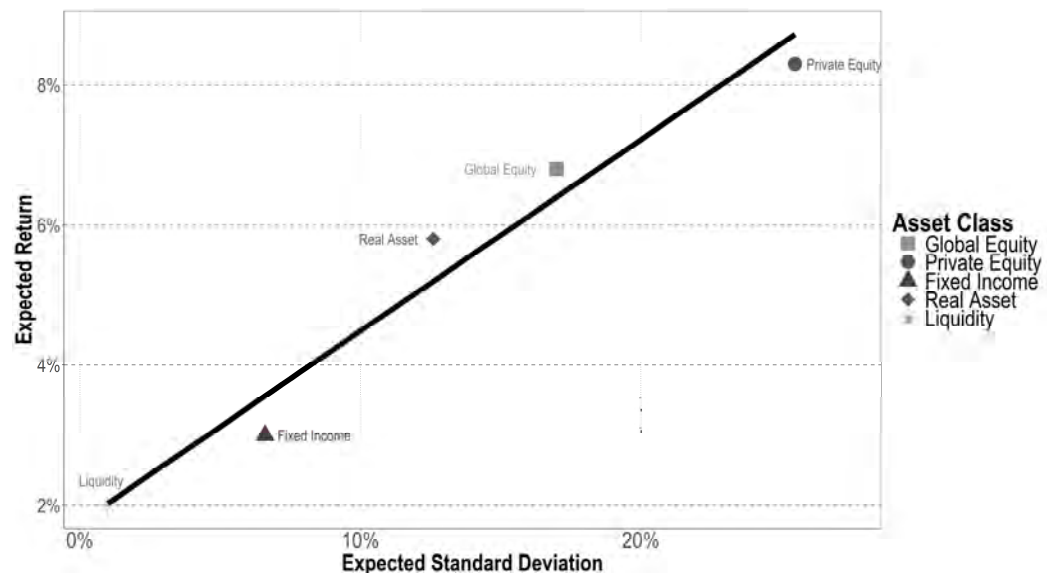
¹ Based on Cambridge Associates Private Equity Composite.

June 2, 2017

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In reviewing the private equity asset class risk and return assumptions in relation to those of other CalPERS asset classes, they conform with the underlying foundation of capital markets theory that risk and return are positively correlated over the long term. None of the asset class risk and return assumptions recommended by Staff appear disproportionately attractive or unattractive from a risk-adjusted standpoint.

Expected Risk vs. Expected Return in CalPERS CMA



Finally, Staff's correlation assumptions for private equity appear appropriately conservative (i.e., higher than historically observed correlations). We agree with this conservatism in the modeling process, as the underlying risks of private equity are almost certainly more related to the underlying risks of public equity than would be observed in historical return streams, due to the lagged nature of private equity returns, and to the appraisal-based valuation processes.

Overall, we support the Staff's proposed projected returns and volatility for private equity and the other asset classes.

SPM/SKH/nca

Ensuring a Sound and Sustainable Pension Fund

Asset Liability Management (ALM)

Ongoing CalPERS Board Review and Decisions

Bolded items are actionable by Board Committees and/or Board of Administration

2017

January

Educational Workshop:

- CalPERS adopts an asset allocation mix that lowers investment risk but largely keeps investment strategy unchanged

February

Board Adopts:

- **Modifications to Funding Risk Mitigation Policy and temporarily suspends**

April

Educational Workshop:

- Private asset roles and benchmarks

FAC Review:

- Affiliate Funds Valuations

June

IC Approves:

- **Capital Market & Economic Assumptions for 2018-2028 July**

July

Release FY 2016-17 Investment Returns

Educational Forum:

- Use of leverage in strategic asset allocation decisions

September

FAC Review:

- Notification of Risk Mitigation Policy Thresholds (Policy temporarily suspended)
- Negative cash flow analysis and strategic approach

October

CalPERS Educational Forum:

- Education and engagement opportunity with employers and other stakeholders

November

Educational Workshop:

- Candidate portfolios for strategic ALM

FAC Review:

- Experience Study that looks at lifespan, workforce changes, and payroll trends

December

Experience study results

First Opportunity for Board to adopt:

- **Strategic asset allocation mix**
- **Actuarial assumptions**

2018

February

Second Opportunity for Board to Adopt:

- **Strategic asset allocation mix**
- **Actuarial assumptions (tentative pending Board decision in December)**

April

FAC Review:

- Affiliate Funds Valuations which may include asset allocation mix

July

CalPERS Implements:

- Board adopted strategic asset allocation for PERF

September

FAC Reviews:

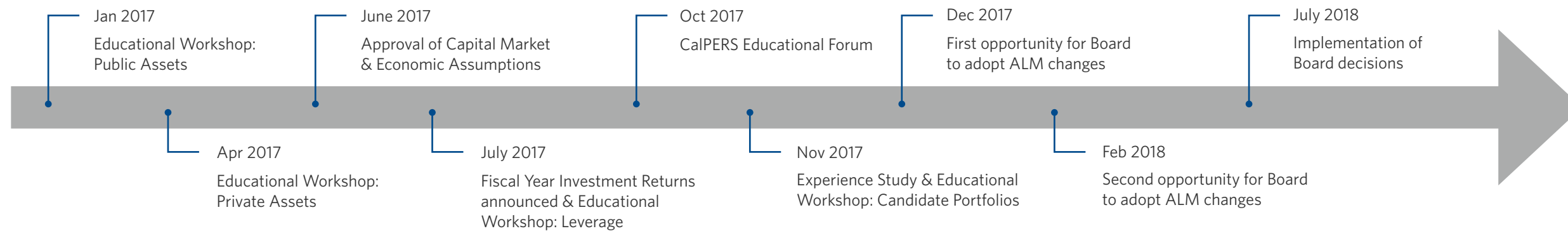
- Notification of Risk Mitigation Policy Thresholds (Policy temporarily suspended)

November

FAC Review:

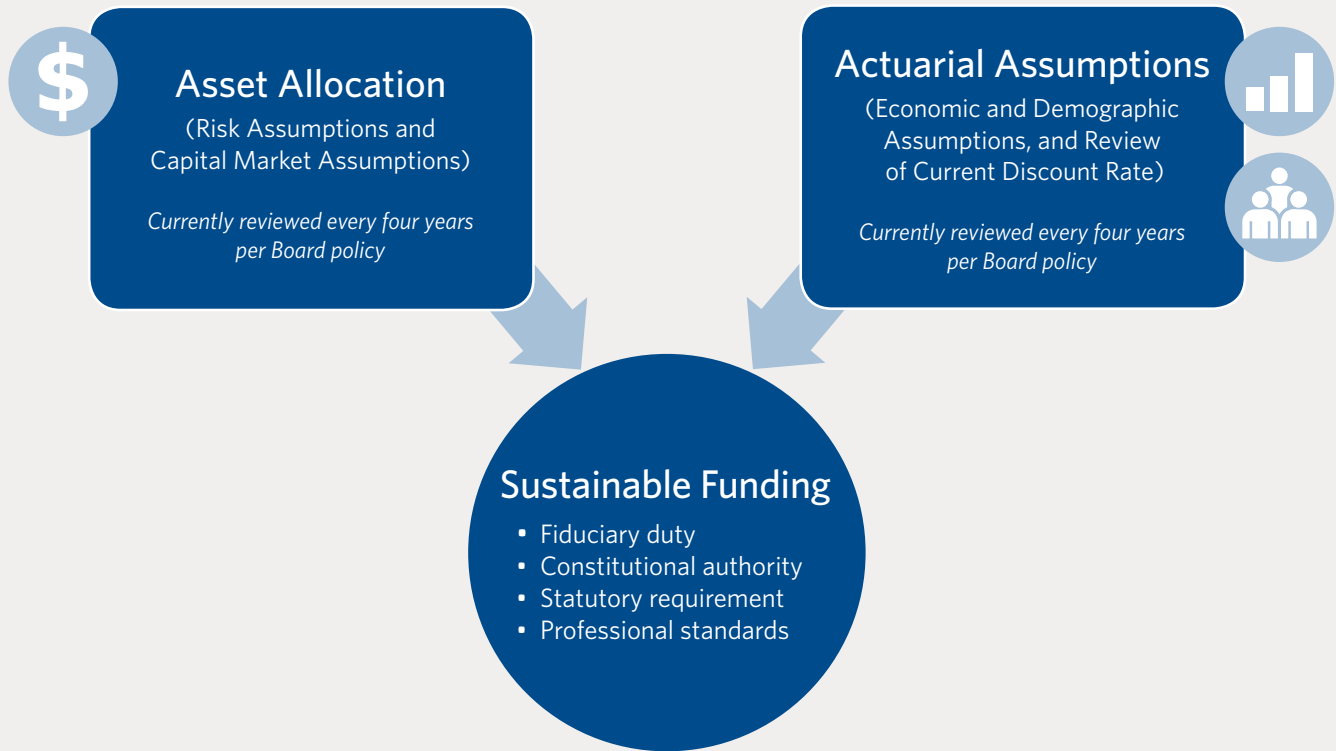
- Use of leverage in strategic asset allocation decisions

2017-18 Key Asset Liability Management Milestones



Asset Liability Management (ALM)

The ALM is an integrated review of our assets and liabilities to inform decisions designed to achieve a sound and sustainable fund. It is an innovative and transparent approach to guide the Board in sound decision making.



ALM Review Cycle Components & History

Asset Allocation (including expected investment return)

This process includes a review of the current Asset Allocation and the role each asset class plays within the portfolio. It looks at risk tolerances for each asset class and most importantly, provides Capital Market Assumptions that reflect the expectations of what the financial markets will deliver.

Asset Allocations were reviewed in 2014, 2010, 2007 and 2004

Actuarial Assumptions (including Discount Rate)

Economic Assumptions include the Discount Rate, and wage and price inflation projections; Demographic Assumptions include retirement, employment and mortality rate projections. The Discount Rate is the long term interest rate used to fund future pension benefits.

Economic Assumptions were reviewed in 2014, 2012 and 2004

Demographic Assumptions were reviewed in 2014, 2010 and 2004

Discount Rate was reviewed in 2016 (reduced to 7.0% over 3 years, 2012 (changed from 7.75 to 7.5%), 2011 (no change) and 2004 (changed from 8.25 to 7.75%)

Funding Levels & Risk Report

An annual assessment of the funded status and overall soundness and sustainability of the plan, beginning in 2012.

Funding Risk Mitigation Policy

CalPERS Board of Administration approved November 2015, suspended until 2020.