

# CalPERS Trust Level Review

## Investment Review

Period Ending June 30, 2018

Ted Eliopoulos, Chief Investment Officer  
Elisabeth Bourqui, Chief Operating Investment Officer  
Eric Baggesen, Managing Investment Director

Investment Committee  
August 13, 2018

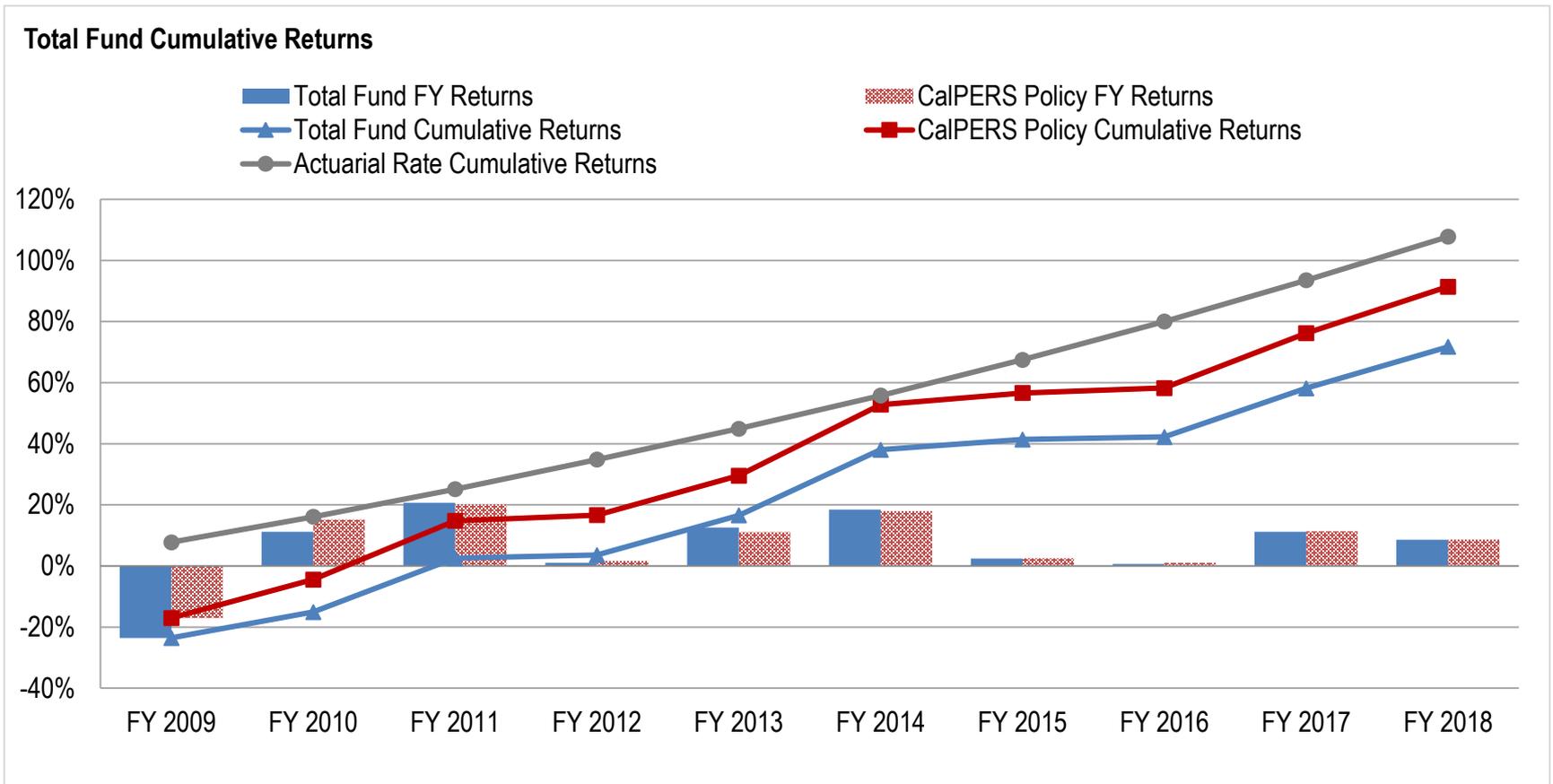
# Executive Summary

- Performance
  - Total Fund fiscal year 2018 (FY2018) return was 8.6%
    - Public Equity returned 11.5%, contributing 5.6% of total fund return
    - All program areas experienced positive performance with Private Equity achieving highest total return of 16.1%
  - Total Fund FY2018 excess return was -6 bps
    - Biggest contributors to FY excess return were Public Equity (-19 bps), Private Equity (-17 bps), and Real Assets (+13 bps)
  - Affiliate Investment Program returns were in line with their respective asset allocations, largely positive for FY2018
- Risk
  - The plan's risk is driven primarily by growth assets, with performance closely tied to the equity market
  - The current Barra risk model estimate for total plan volatility is 7.6%
    - This is a short term estimate indicative of behavior given the current environment. The bigger risk for PERF remains that of a severe and/or sustained drawdown in global equity markets which would not be predicted by the model
  - Current active volatility estimate is 0.5%, within the 1.5% target

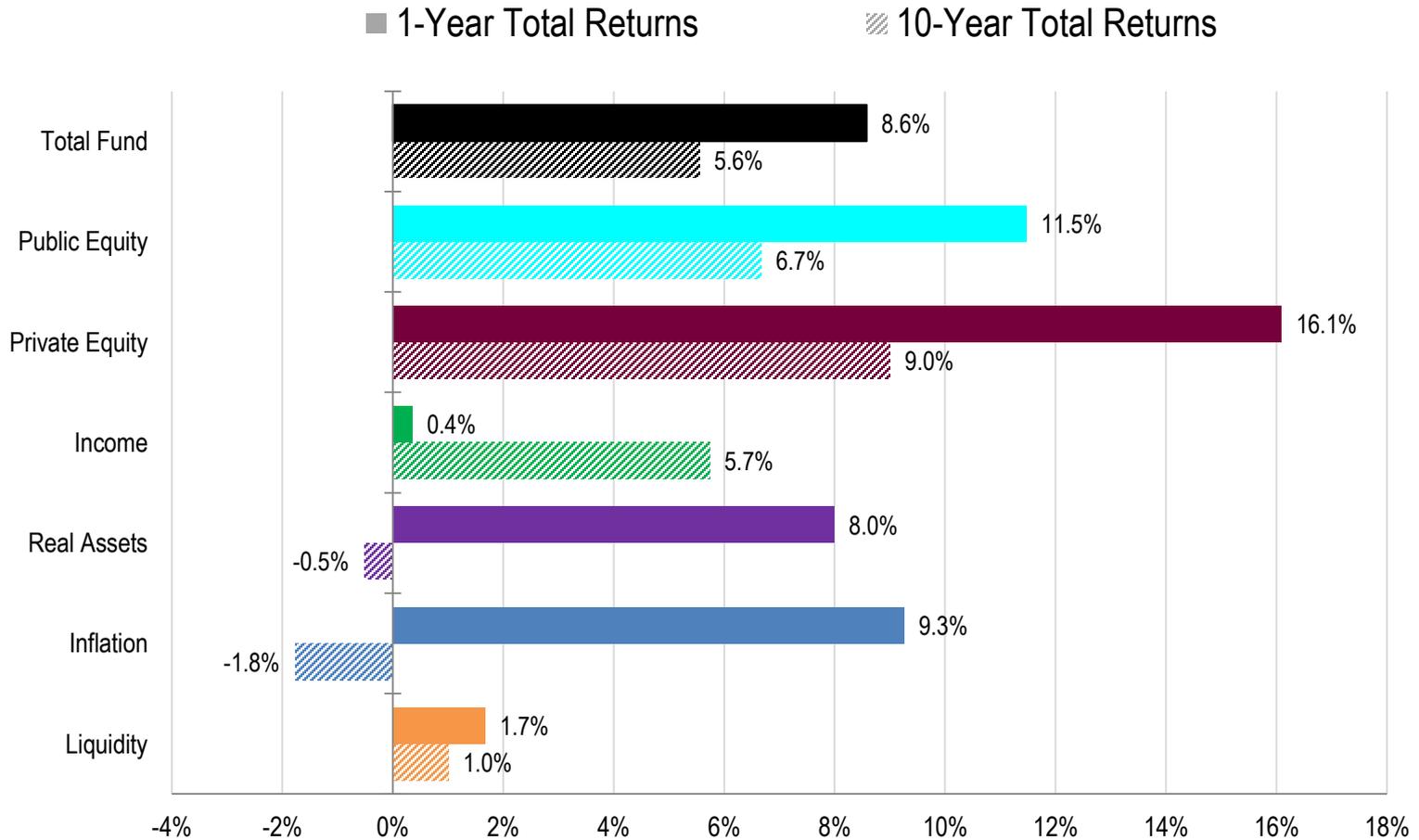
# Performance Summary

Funds Managed	As of June 30, 2018 Ending Market Value (MM)	1-Yr		3-Yr		5-Yr		10-Yr	
		Net Return	Excess bps						
Public Employees' Retirement Fund	351,807	8.6%	(6)	6.7%	(21)	8.1%	(7)	5.6%	(115)
Judges' Retirement Fund	40	1.5%	12	0.9%	17	0.5%	12	0.5%	11
Judges' Retirement System II Fund	1,522	7.5%	14	6.2%	23	7.2%	23	6.3%	4
Legislators' Retirement System Fund	114	4.8%	15	4.4%	21	5.2%	29	5.8%	31
CERBT Strategy 1	6,801	8.0%	29	6.4%	42	7.4%	42	5.9%	15
CERBT Strategy 2	1,090	6.2%	35	5.4%	40	6.2%	40	-	-
CERBT Strategy 3	395	4.7%	27	4.3%	33	5.1%	42	-	-
CalPERS Health Care Bond Fund	443	-0.3%	7	1.8%	3	2.5%	28	4.0%	32
Long-Term Care Fund	4,515	4.0%	8	3.7%	13	4.1%	20	4.4%	14
Terminated Agency Pool	134	2.3%	-	3.3%	-	3.3%	-	-	-

# PERF 10 Year Cumulative Returns

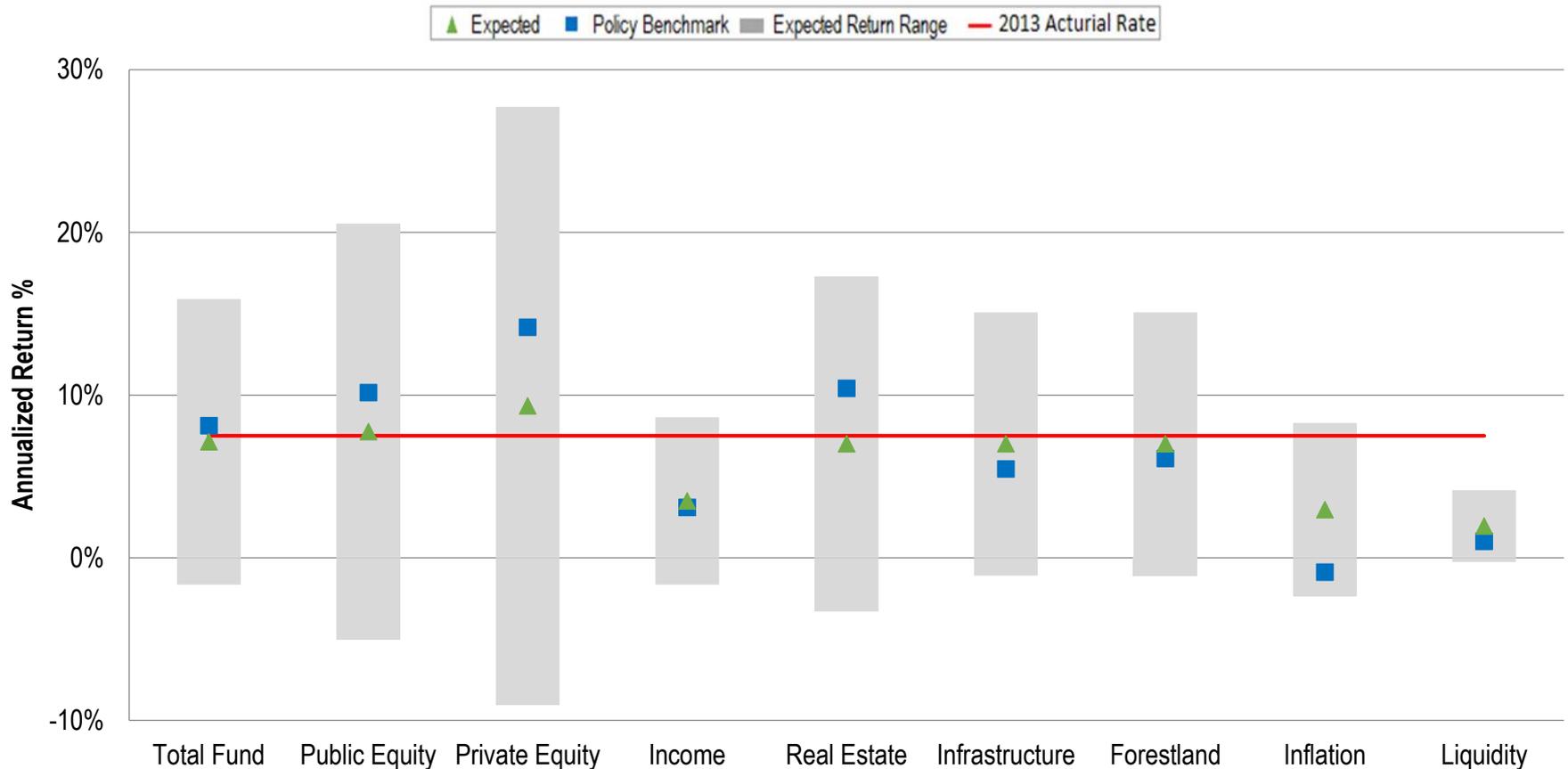


# PERF Short-Term vs. Long-Term Performance



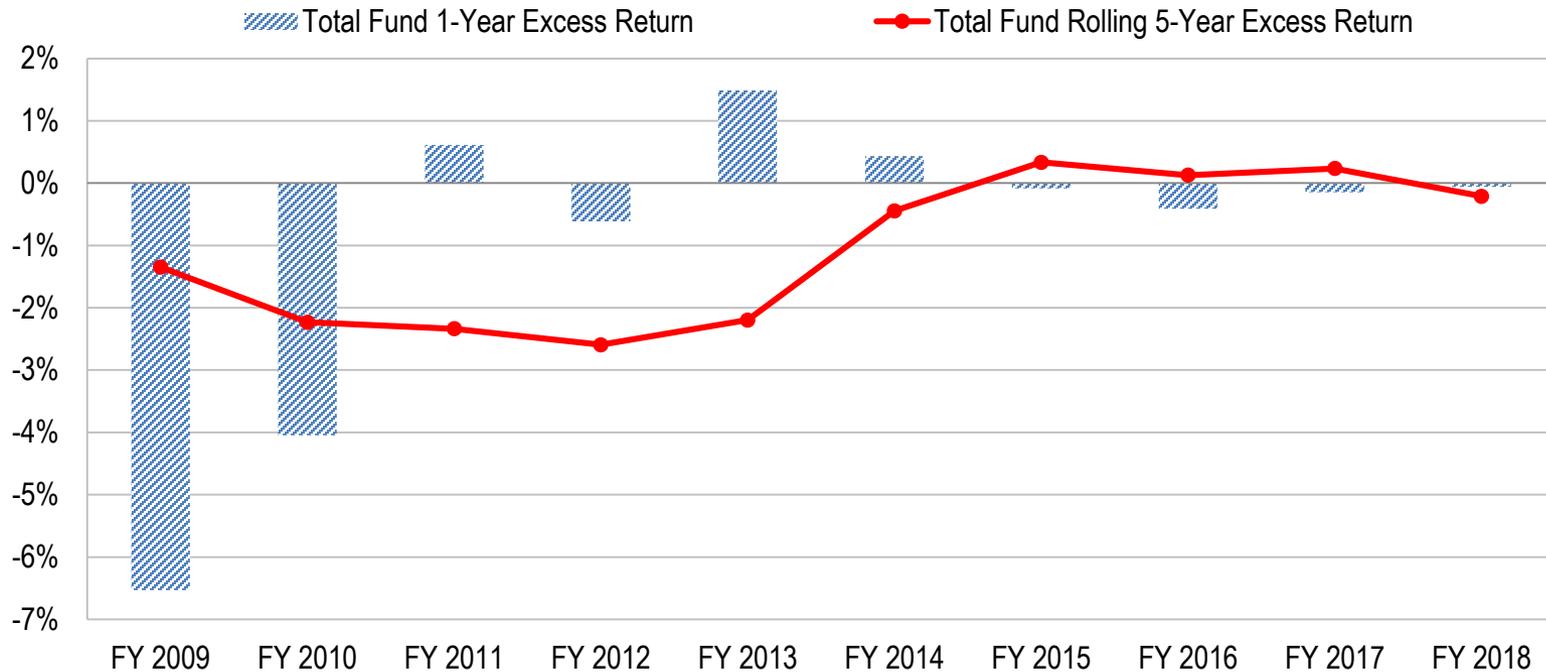
# PERF Policy Benchmark: Expected vs. Realized

## 2013 ALM Return Expectations vs. 5-Yr Realized Policy Benchmark Returns\*

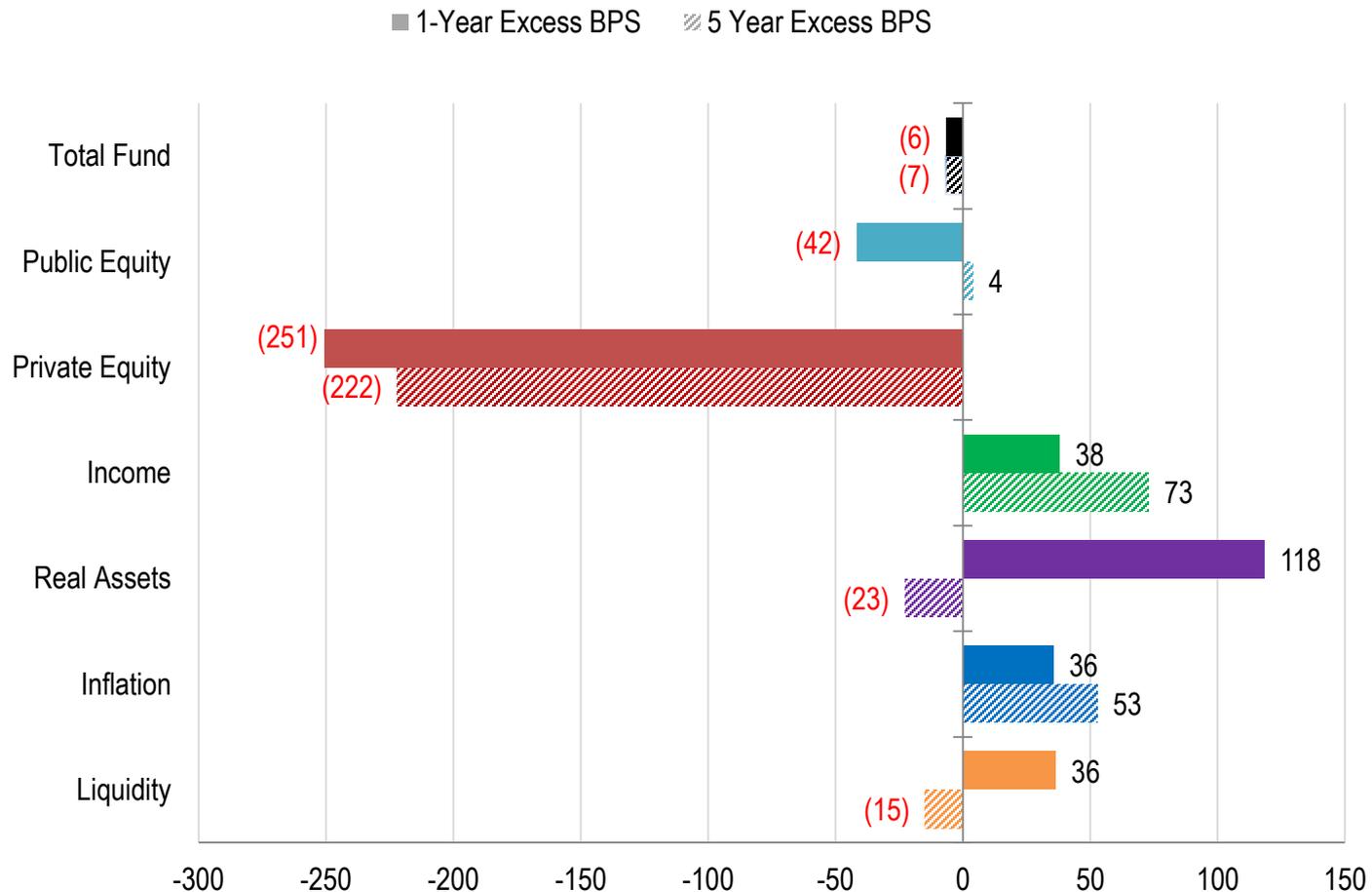


# PERF Rolling 5-Year Excess Returns

Total Fund Rolling Excess Return



# PERF 1-Year and 5-Year Excess Returns



# Excess Returns Attribution (as of June 30, 2018)

	Average Weight in Plan	Program Excess Return (bps)		Contribution to Plan Excess (bps) <sup>1</sup>	
		5 Year	1 Year	5 Year	1 Year
<b>Total Excess Return (bps)</b>					
				(6)	(7)
<b>Public Program Contributions</b>				<b>(11)</b>	<b>21</b>
PUBLIC EQUITY	52%	(42)	4	(19)	3
INCOME	18%	38	73	8	13
INFLATION	6%	36	53	3	3
LIQUIDITY	3%	36	(15)	2	(0)
TLPM	0%			(3)	(1)
OTHER PLAN LEVEL	2%			(1)	3
<b>Private Program Contributions</b>				<b>(4)</b>	<b>(25)</b>
PRIVATE EQUITY	9%	(251)	(222)	(17)	(21)
REAL ASSETS	10%	118	(23)	13	(4)
<b>Allocation Management</b>				<b>9</b>	<b>5</b>
<b>Public Proxy Performance <sup>2</sup></b>				<b>(1)</b>	<b>(7)</b>

<sup>1</sup> Contribution figures are calculated on monthly basis and aggregated over the respective period.

<sup>2</sup> Impact of not obtaining full desired interim policy exposure to private asset classes and proxying these with public assets.

## Key 5 Year Excess Return Drivers:

- + Positive contribution from public assets, predominantly Fixed Income
- Negative contribution from private assets, predominantly Private Equity
- Negative contribution from underweights to private assets requiring proxying with publics

## Key 1 Year Excess Return Drivers:

- + Positive contribution from Real Assets, Allocation, and Fixed Income
- Negative contribution from Public and Private Equity

# PERF Asset Risk Highlights (as of 6/30/2018)

## Total Plan Risk

- The plan's risk is driven primarily by growth assets and the performance of PERF is closely tied to the equity market
- Over the past 6 months, market volatility increased somewhat, but overall the environment has remained calm by historical standards
  - The Barra risk model's estimate for total plan volatility is 7.6%. This is a relatively short term estimate indicative of the plan's volatility given the current environment. Rapid shifts in volatility regime can occur and would not be predicted by this model
- The bigger risk for PERF remains that of a severe and/or sustained drawdown in global equity markets. Over the past 20 years, two such events occurred, during which the current portfolio would have lost on the order of \$100B. Such losses today would leave the funded status of the plan around 50%

## Active Risk

- Current active volatility estimate is 0.5%, within the 1.5% target. Active volatility provides a quantification of how actual implementation of the portfolio differs from the policy benchmark

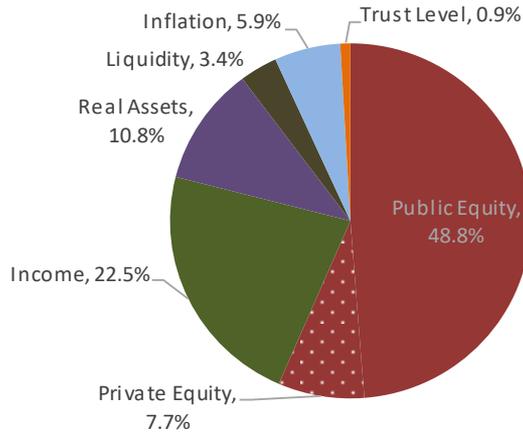
## Other considerations

- Well diversified across individual issuers/companies
- Adequate liquidity coverage and modest leverage level
- Counterparty risk remains modest

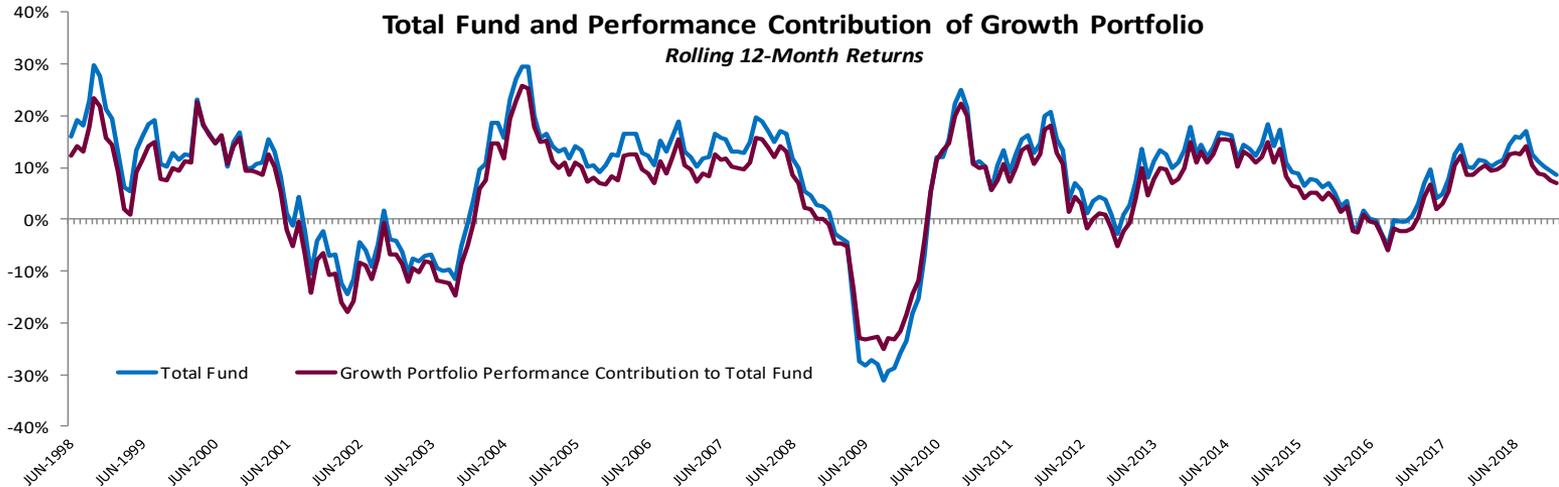
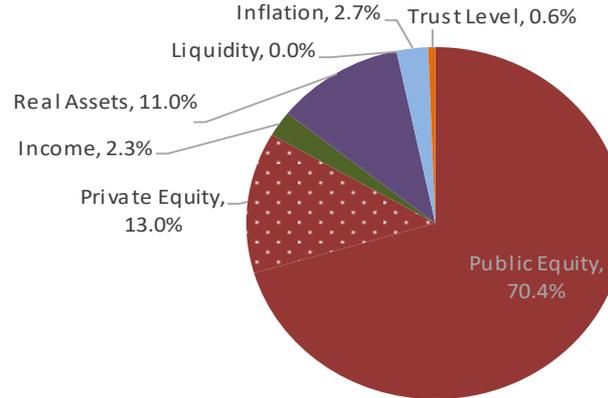
# Growth Assets Dominate Risk

As of June 30, 2018

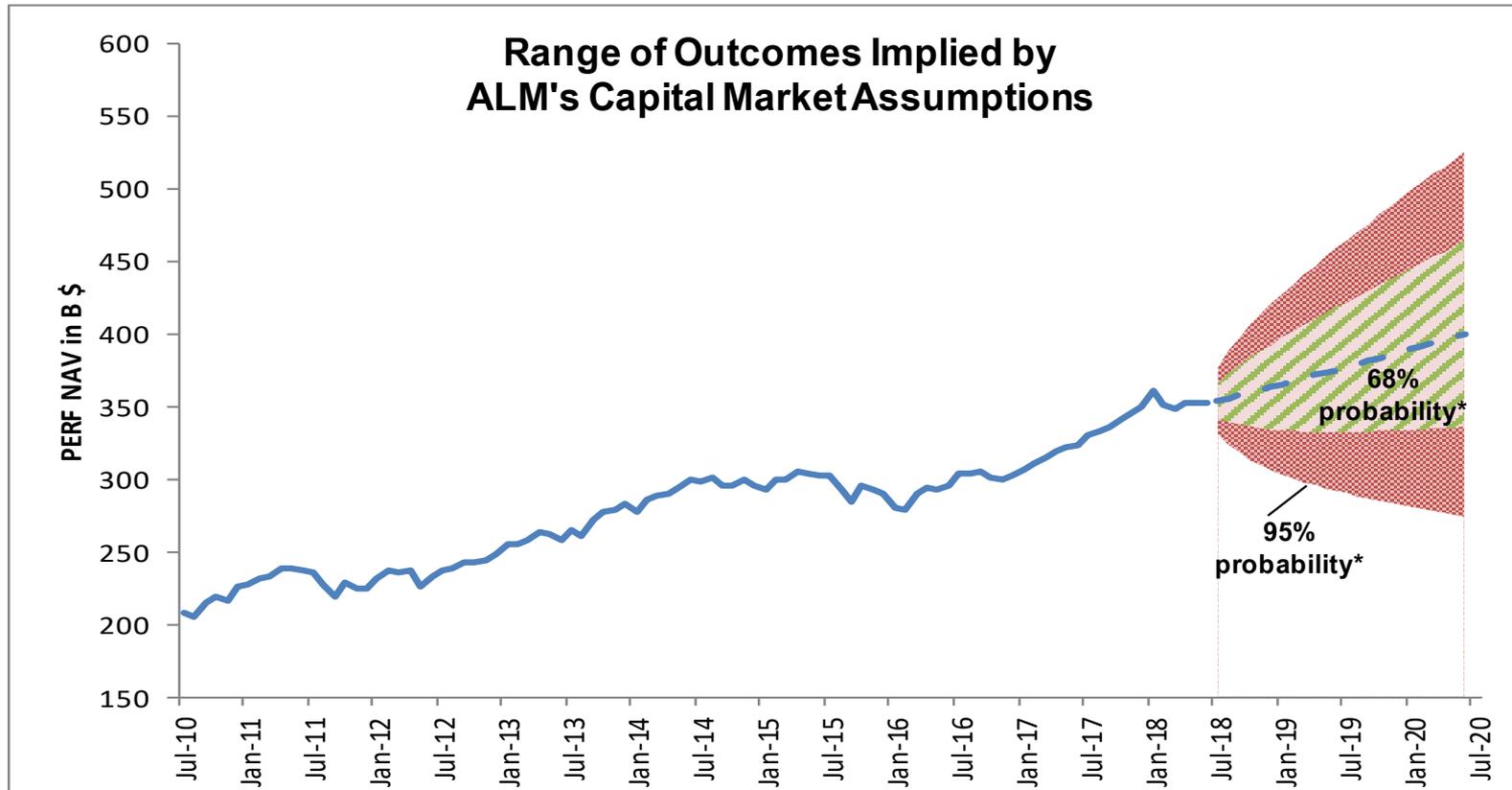
Portfolio Allocation



Forecast Contribution to Volatility



# Volatility Estimates Interpretation



\* Most risk models assume that returns are evenly distributed around an average expectation (as shown above). In the real world, worse outcomes than these occur more frequently than implied by the models.

Note: This is an illustrative example with CalPERS risk and return capital market assumptions from 2017 ALM workshop applied to portfolio positions on Jun 29, 2018.

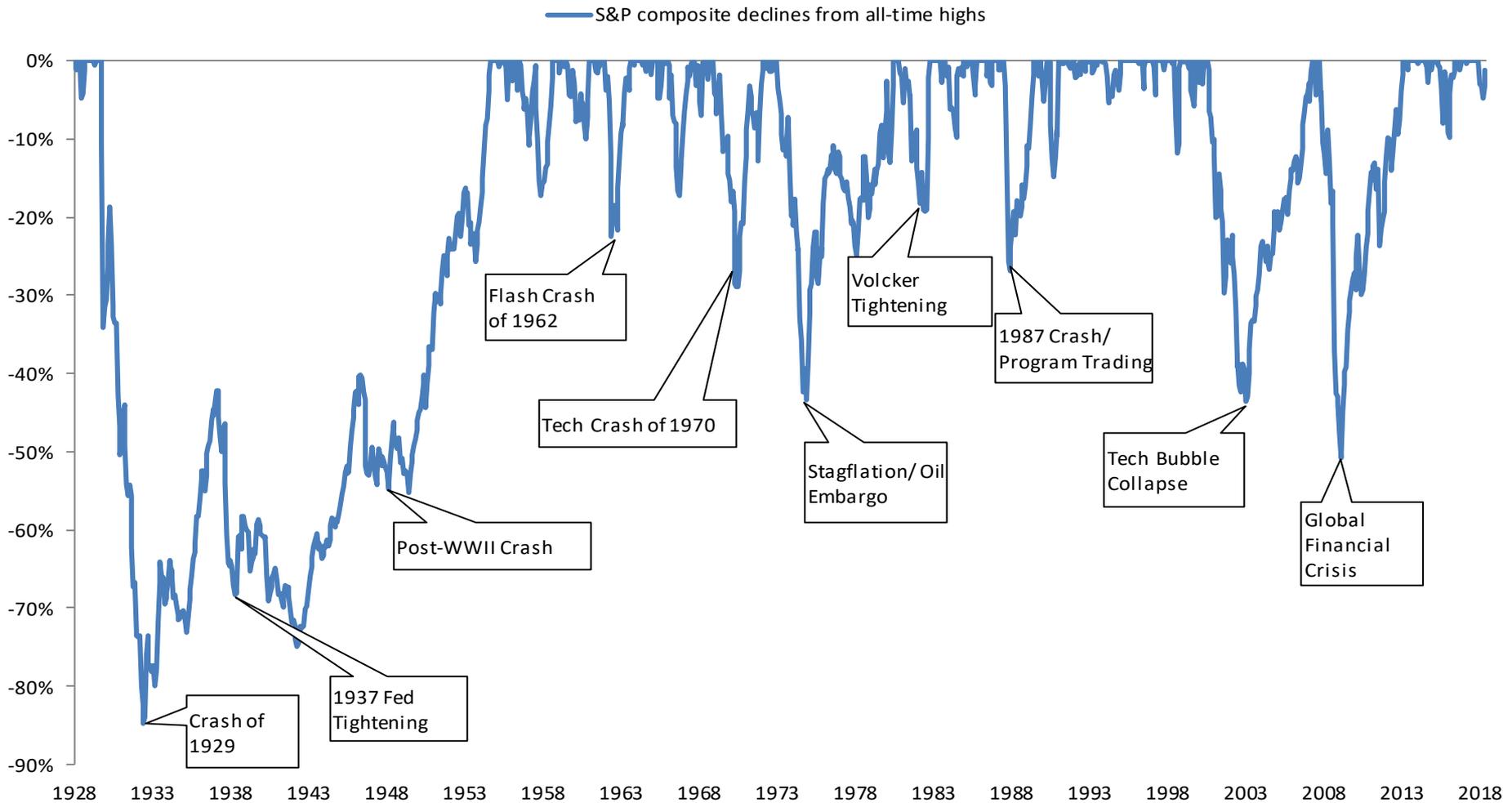
# Drawdown Risk

- Looking at how today’s portfolio would have performed during past market events provides an alternate perspective on risk
- While no two market declines unfold in the same way, historical simulation can provide an indication of the magnitude of potential losses

Scenario	Simulated Impact on Current Portfolio		
	Simulated Return	Gain/Loss	Estimated Funding Ratio*
Subprime and Credit Crisis (Oct 07 – Mar 09)	-34%	-\$119B	44%
Tech Crash and Recession (Jan 00-Mar 03)	-22%	-\$78B	52%

\*Estimate is a one year projection. Assumes starting funding ratio of 71% as of 6/30/2018 and one year growth in liabilities and cash flow projections as per CalPERS Actuarial Office.

# Historical Equity Market Drawdowns



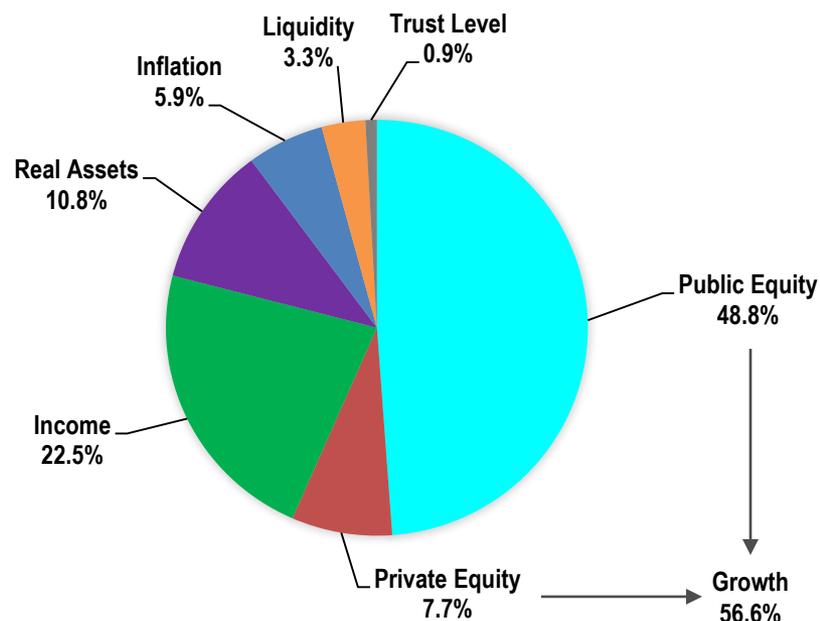
# Updates to Performance and Risk Reporting

- Semi Annual Trust Summary (*Eliminating*)
  - Content also existed in either the *Monthly Update - Performance and Risk Report* or in the annual program reviews
- Monthly Update – Performance and Risk (*Updating*)
  - Consolidates PERF and Affiliate trusts into single report with consistent presentation
  - Adds realized volatility statistics & benchmark descriptions for Affiliate trusts
  - Removes asset/liability assumptions as they are included in the annual program reviews
  - Eliminates unnecessary text
  - Improves ability to adhere to accessibility standards

# Appendix

# PERF Asset Allocation

Asset Class As of: June 30, 2018	Current Allocation
<b>Growth</b>	<b>56.6%</b>
Public Equity	48.8%
Private Equity	7.7%
<b>Income</b>	<b>22.5%</b>
<b>Real Assets</b>	<b>10.8%</b>
Real Estate	9.0%
Infrastructure	1.2%
Forestland	0.6%
<b>Inflation</b>	<b>5.9%</b>
<b>Liquidity</b>	<b>3.3%</b>
<b>Trust Level</b>	<b>0.9%</b>
<b>Total Fund</b>	<b>100.0%</b>

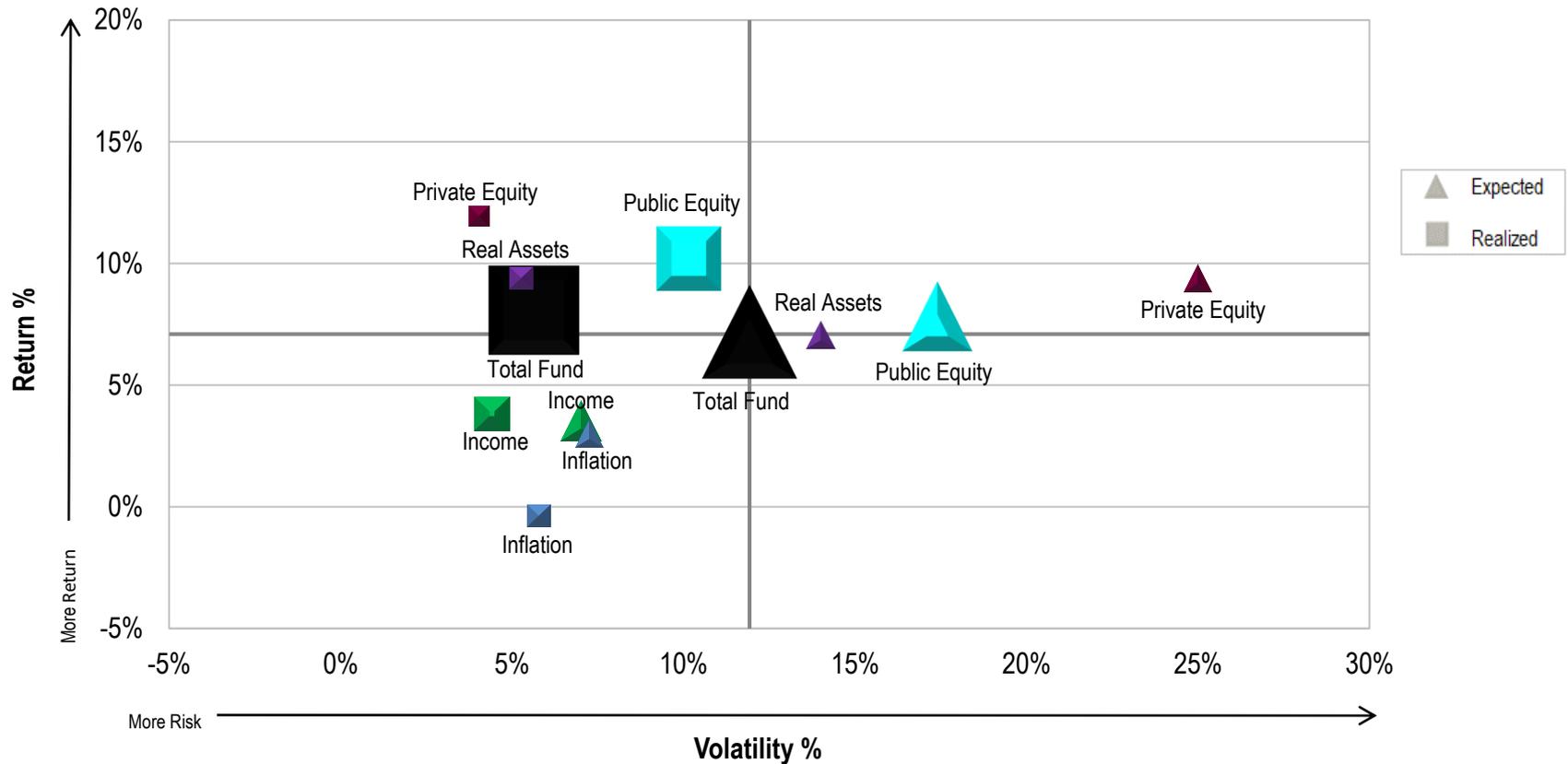


# PERF Contribution to Return

Asset Class	1-Yr Average Weight (%)	1-Yr Return (%)	1-Yr Contribution to Return (%)
<b>Growth</b>	<b>57.3</b>	<b>12.1</b>	<b>6.9</b>
<i>Public Equity</i>	49.5	11.5	5.7
<i>Private Equity</i>	7.8	16.1	1.2
<b>Income</b>	<b>19.8</b>	<b>0.4</b>	<b>0.1</b>
<b>Real Assets</b>	<b>10.6</b>	<b>8.0</b>	<b>0.9</b>
<i>Real Estate</i>	8.9	6.9	0.6
<i>Infrastructure</i>	1.1	20.6	0.2
<i>Forestland</i>	0.6	1.9	0.0
<b>Inflation</b>	<b>7.4</b>	<b>9.3</b>	<b>0.7</b>
<b>Liquidity</b>	<b>4.2</b>	<b>1.7</b>	<b>0.1</b>
<b>Trust Level</b>	<b>0.7</b>	<b>-</b>	<b>-0.1</b>
<b>Total Fund</b>	<b>100</b>	<b>8.6</b>	<b>8.6</b>

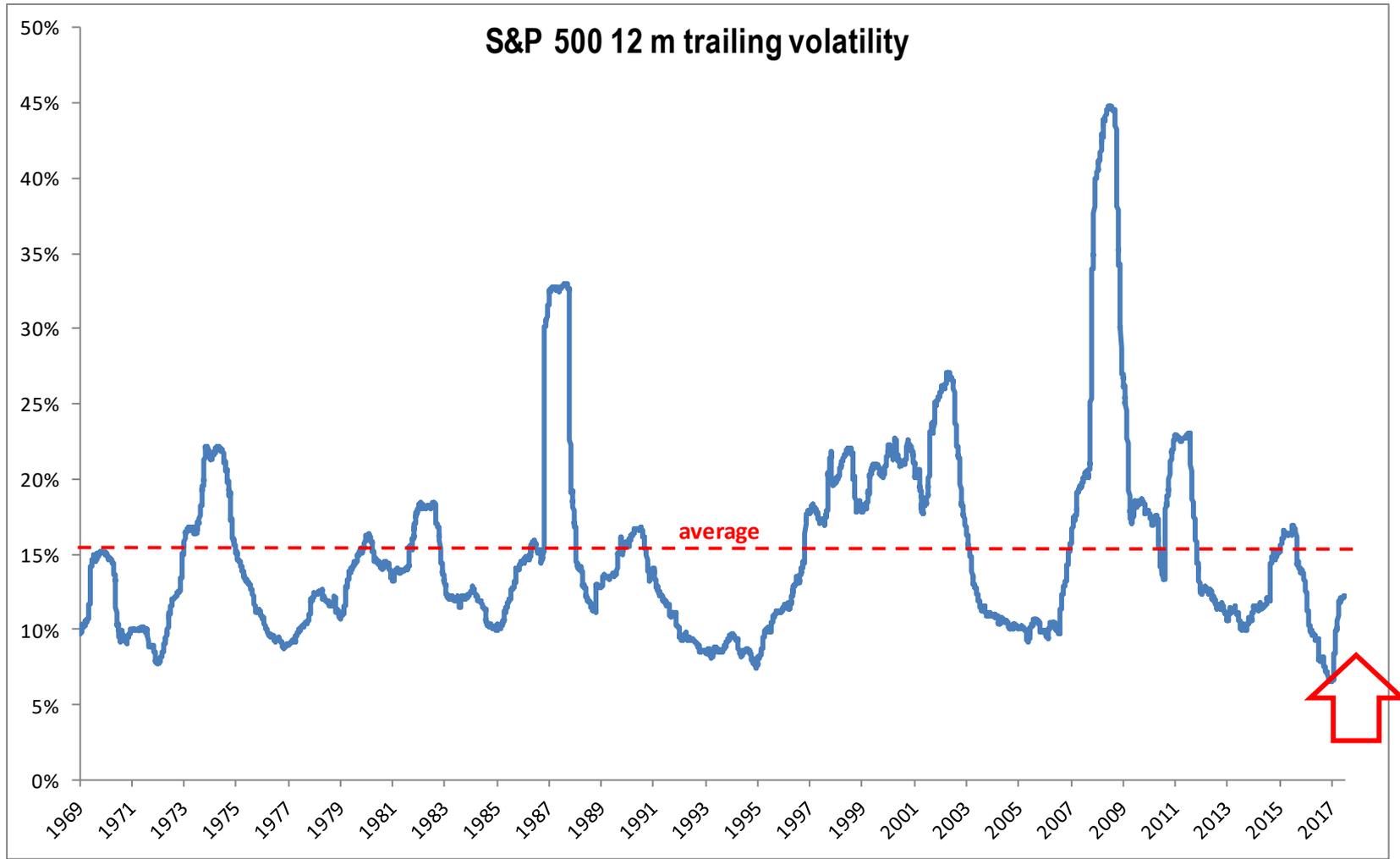
# PERF Asset Liability Management Assumptions

## Return and Volatility (Expected vs 5-Year Realized)



- Expected volatility and return is based on the 2013 ALM Workshop and uses the short-term (1-10year) expected return from capital market assumptions.
- Data points scaled based on size of assets.

# Recent market volatility slightly higher, but still low historically

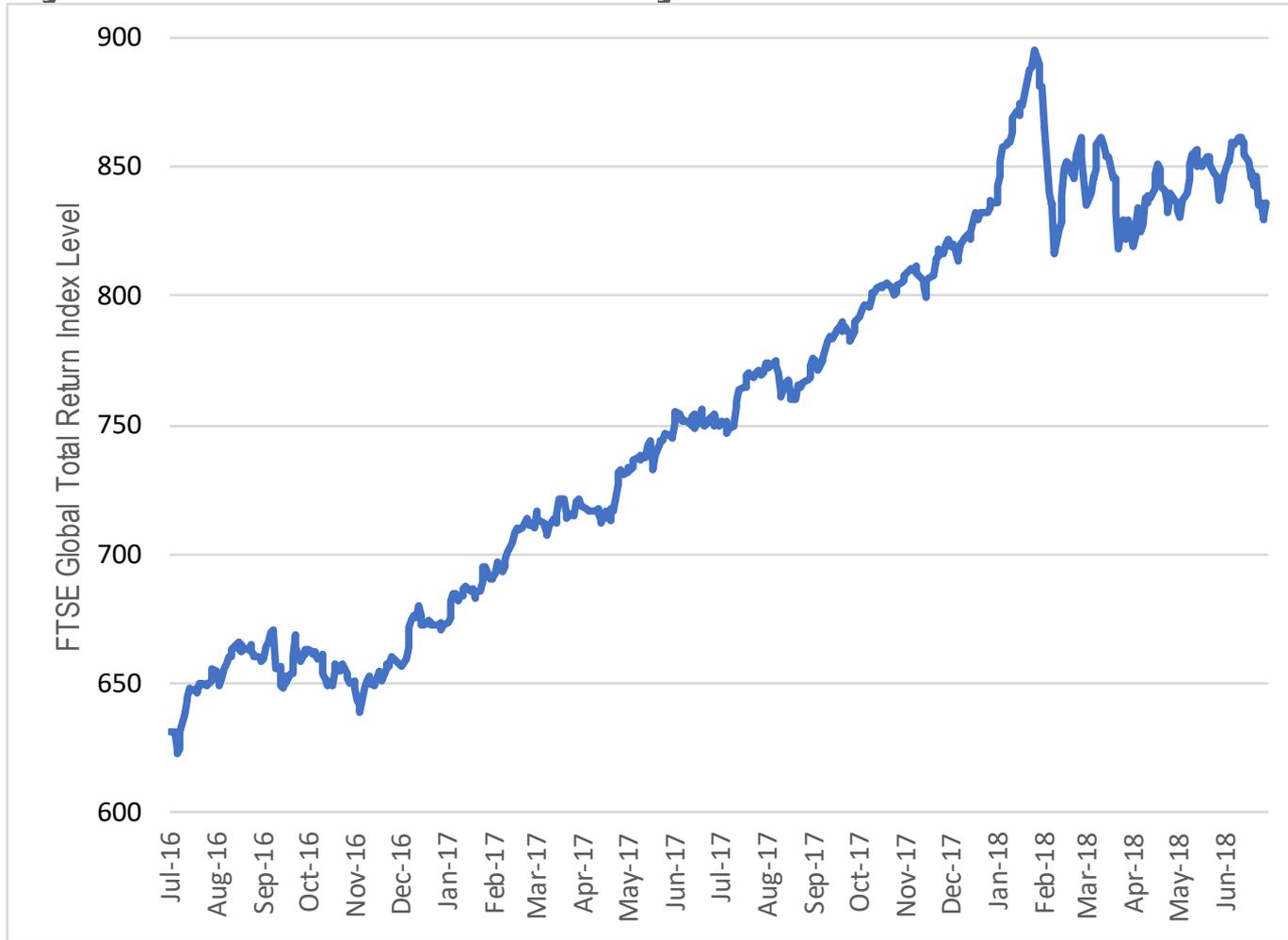


# Volatility estimates vary with models used

- Risk models are calibrated with historical data and are especially sensitive to historical look back period
- Barra’s model used for risk reporting is calibrated from last 1-3 years of data, while 20+ history is used for models utilized for ALM purposes
- Longer term model volatility is higher, reflecting a broader range of market environments

	<b>Barra Model Used for Risk Reporting (Short term)</b>	<b>Estimate from ALM’s Capital Market Assumptions (Long term)</b>
<b>Forecasted Absolute Volatility - PERF</b>	<b>7.6%</b>	<b>11.3%</b>

# Equity returns for last two years



# Equity returns for FY 2017-18 - A year of two halves



# Historical Returns Are Not Normally Distributed

PERF's Rolling Annual Returns: Jun 89-Jun 18

