

# CalPERS Trust Level Review

## Investment Review

Period Ending December 31, 2017

Ted Eliopoulos, Chief Investment Officer  
Matt Flynn, Interim Chief Operating Investment Officer  
Eric Baggesen, Managing Investment Director  
Michael Krimm, Investment Director

Investment Committee  
February 12, 2018

# Investment Review Outline

- I. Performance
- II. Risk
- III. Global Investment Performance Standards

# Executive Summary

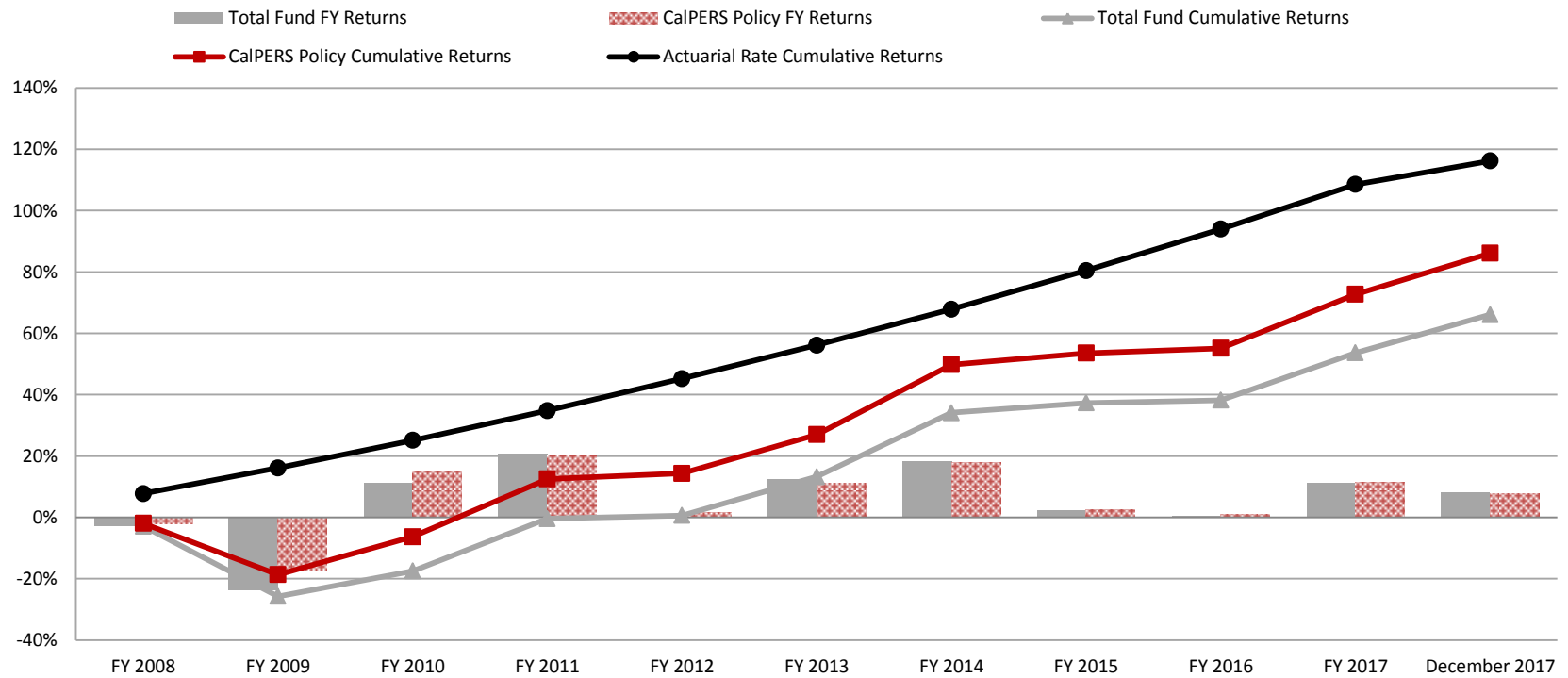
- Performance
  - Total Fund calendar year 2017 (CY2017) return was 15.7%
    - Global Equity was the strongest performer with 24.0% return and accounts for 11.1% of total fund return
    - All program areas experienced positive performance
  - Total Fund CY2017 excess return was 25 bps
  - Affiliate Investment Programs returns were in line with their respective asset allocations, largely positive for CY2017
- Risk
  - Current volatility estimate of 7.4% is down by 1.8% from prior year
    - This low estimate is a function of the model placing greater emphasis on recent history, where realized volatility was the lowest in 50 years
    - Rapid shifts in volatility regime can occur and would not be predicted by this model. The best interpretation of this estimate is as an indicator of the plan's volatility given the current market environment
  - Current active volatility estimate is 0.6%

# Performance Summary

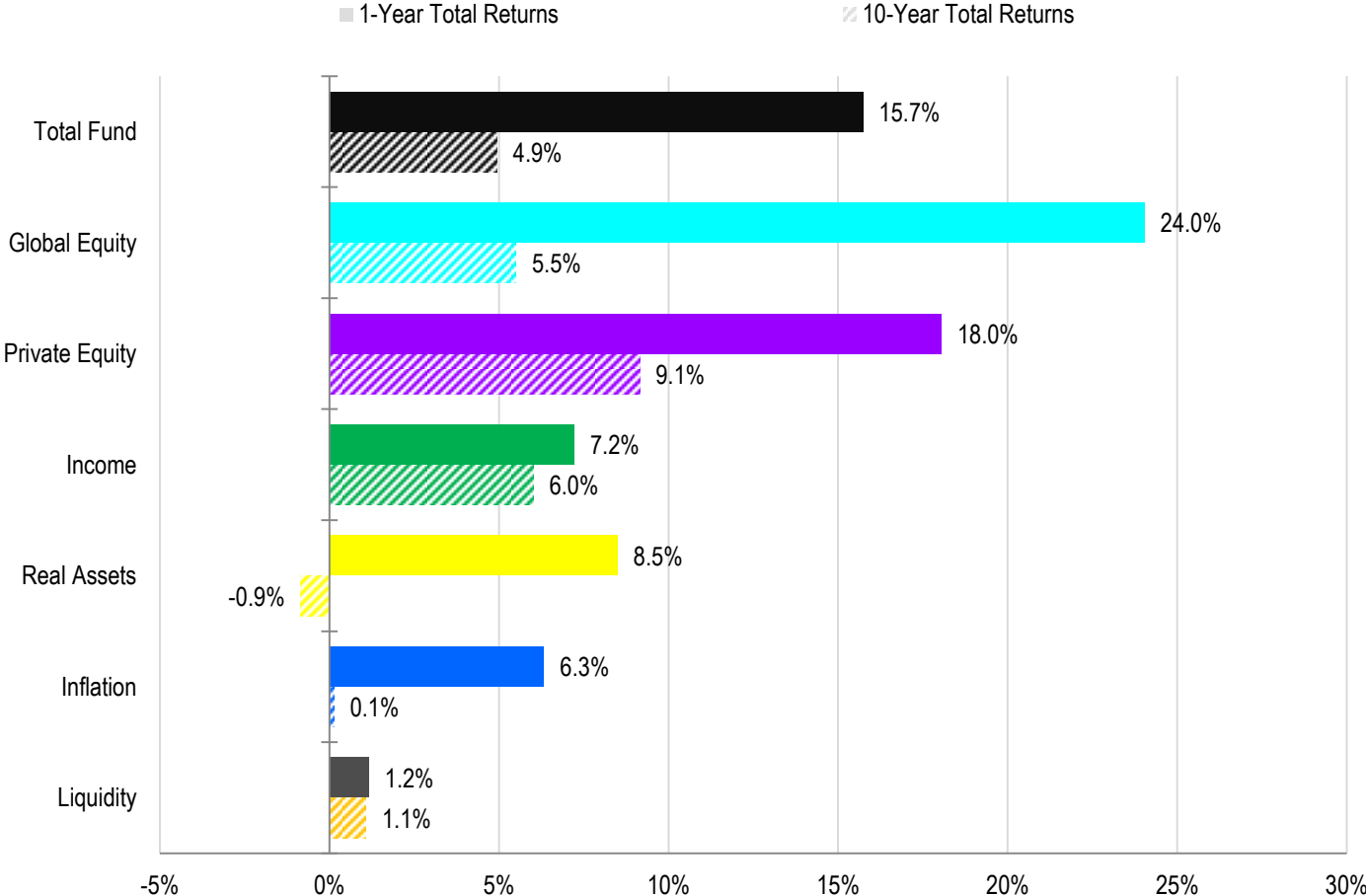
Funds Managed	As of December 31, 2017 Ending Market Value (MM)	FYTD		1-Yr		3-Yr		5-Yr		10-Yr	
		Net Return	Excess bps	Net Return	Excess bps	Net Return	Excess bps	Net Return	Excess bps	Net Return	Excess bps
Public Employees' Retirement Fund	349,986	8.1%	35	15.7%	25	7.6%	(0)	9.0%	19	4.9%	(114)
Judges' Retirement Fund	43	0.6%	6	1.0%	18	0.6%	17	0.4%	10	0.5%	14
Judges' Retirement System II Fund	1,484	7.8%	9	15.5%	35	6.7%	25	8.0%	26	5.7%	5
Legislators' Retirement System Fund	118	5.3%	9	10.2%	35	4.7%	24	5.1%	35	5.4%	26
CERBT Strategy 1	6,512	8.3%	16	16.7%	51	7.1%	46	8.1%	44	5.3%	30
CERBT Strategy 2	1,014	6.7%	15	13.4%	51	5.9%	42	6.5%	41	-	-
CERBT Strategy 3	343	5.3%	15	10.1%	48	4.6%	37	4.9%	43	-	-
CalPERS Health Care Bond Fund	450	1.2%	(2)	3.6%	4	2.3%	4	2.5%	36	4.2%	23
Long-Term Care Fund	4,579	5.0%	3	9.1%	22	3.8%	10	3.7%	22	3.9%	12
Terminated Agency Pool	144	2.7%	-	5.0%	-	2.6%	-	-	-	-	-

# PERF 10 Year Cumulative Returns

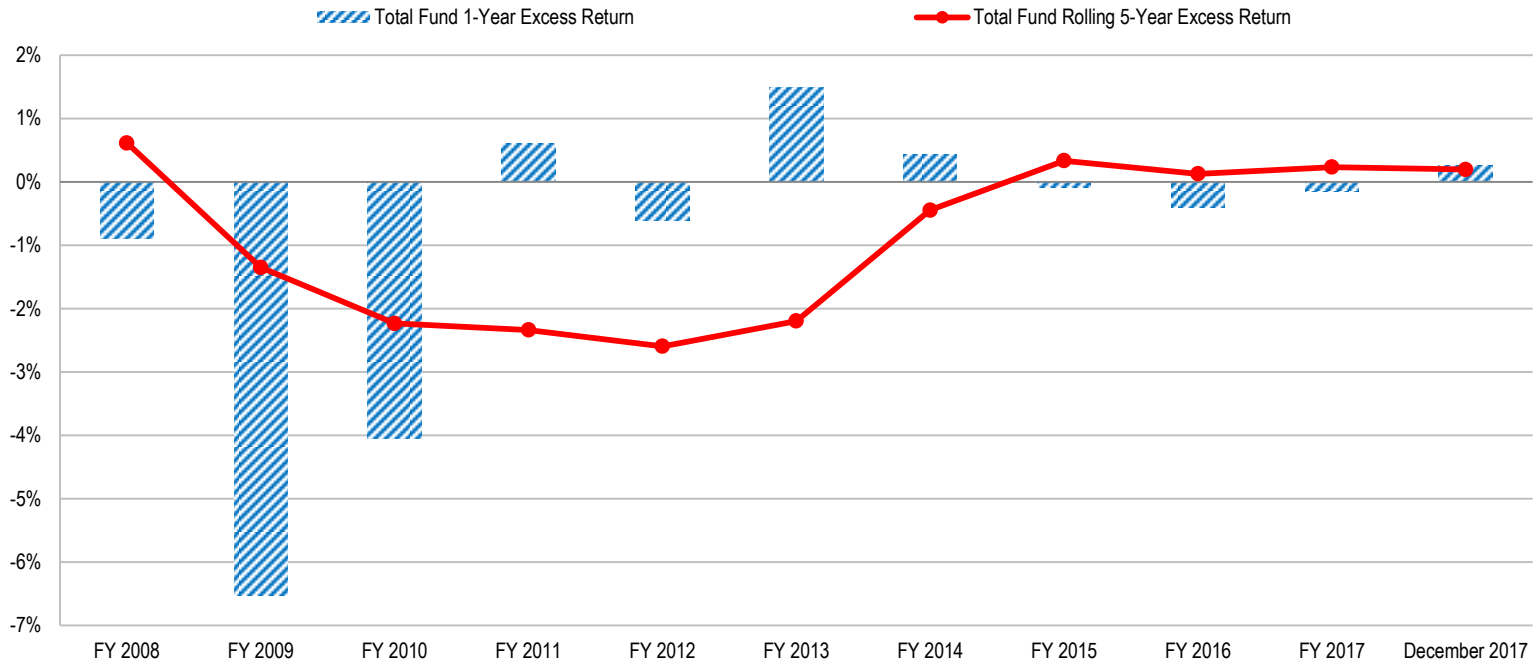
## Total Fund Cumulative Returns



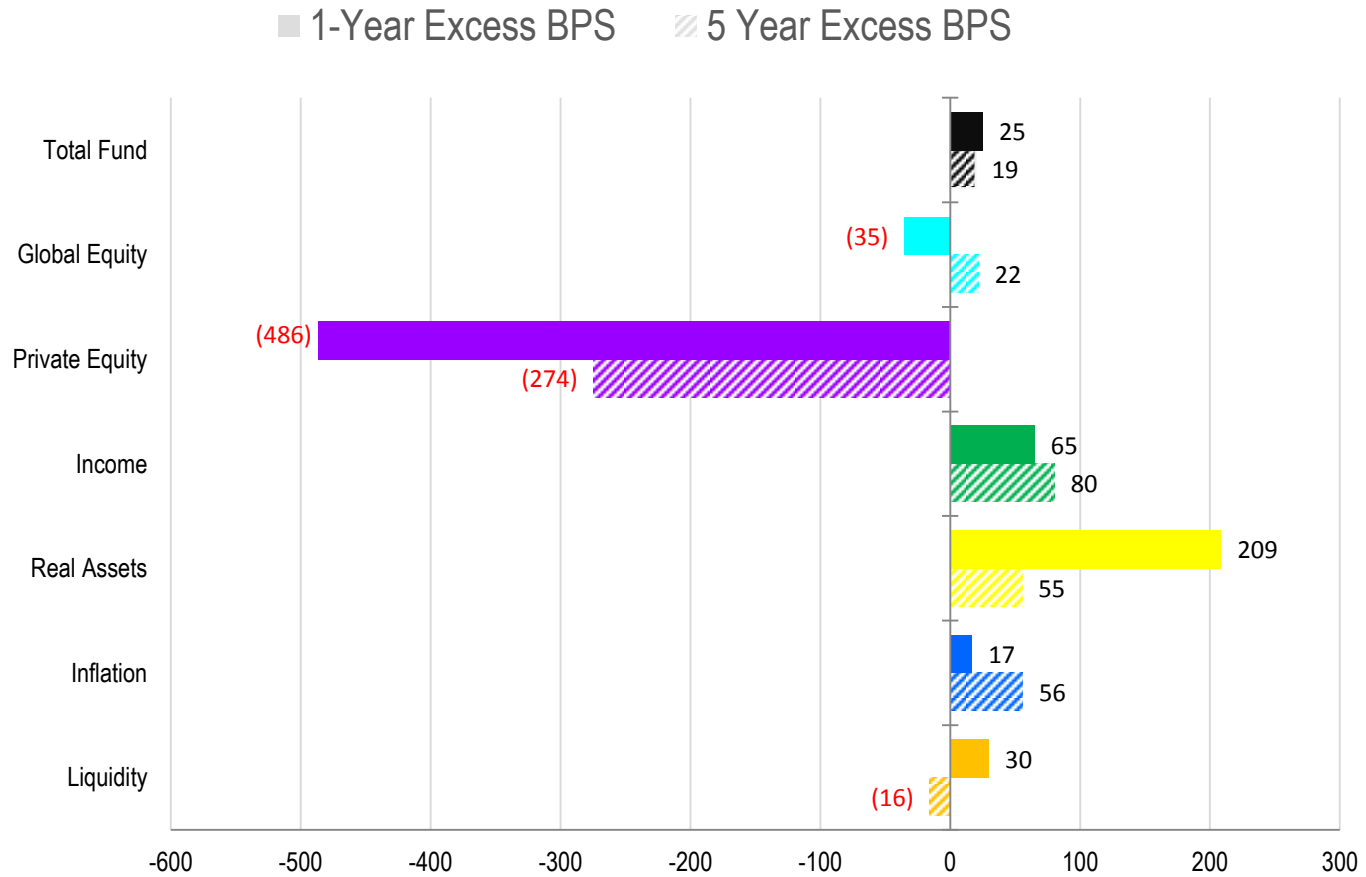
# PERF Short-Term vs. Long-Term Performance



# PERF Rolling 5-Year Excess Returns



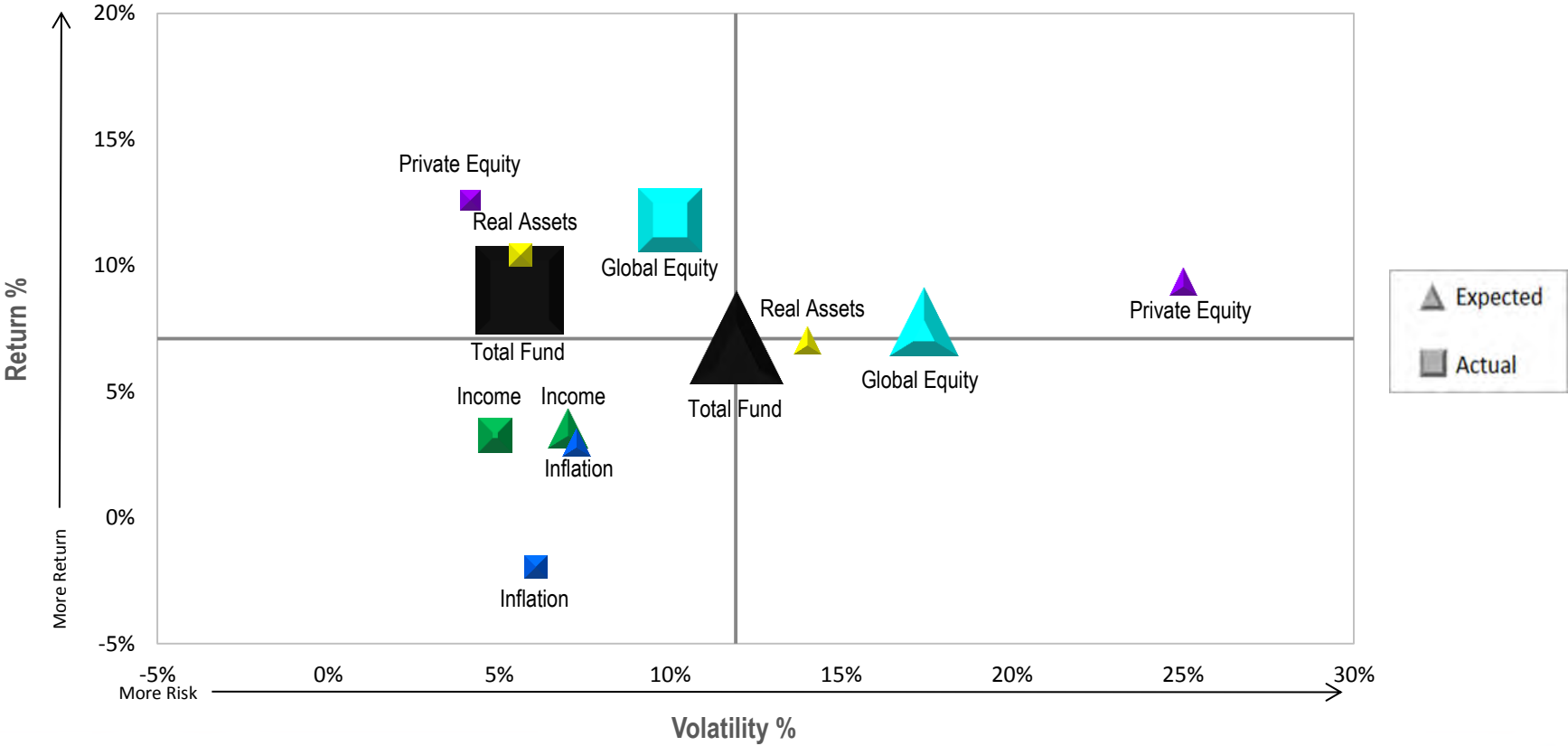
# PERF 1-Year and 5-Year Excess Returns





# PERF Asset Liability Management Assumptions

### Expected vs. 5-Year Realized Volatility and Return



\*Expected volatility and return is based on the 2013 ALM Workshop and uses the short-term (1-10year) expected return from capital market assumptions.





# Excess Returns Attribution

## Total Fund Attribution

As of : December 31, 2017 (Annualized)

	Average Weight in Plan	Program Excess Return (bps)			Contribution to Plan Excess (bps) <sup>1</sup>		
		5 Year	1 Year	3 Year	5 Year	1 Year	3 Year
<b>Total Excess Return (bps)</b>					25	(0)	19
<b>Public Program Contributions</b>					1	22	34
Global Equity	52%	(35)	10	22	(15)	5	13
Income	18%	65	62	80	13	13	15
Inflation	6%	17	31	56	1	2	3
Liquidity	3%	30	9	(16)	2	1	(0)
Other					(0)	2	3
<b>Private Program Contributions</b>					(12)	(17)	(19)
Private Equity	10%	(486)	(213)	(274)	(36)	(18)	(22)
Real Assets	10%	209	28	55	24	1	3
<b>Allocation Management<sup>2</sup></b>					14	(1)	1
<b>Public Proxy Performance<sup>3</sup></b>					22	(4)	(8)
<b>Other<sup>4</sup></b>					-	-	12

### 5 Year Key Excess Return Drivers:

-  Positive contribution from public programs
-  Neutral impact from allocation management
-  Negative contribution from Private Equity
-  Modest negative contribution from holding additional public assets to proxy policy underweights in private assets

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

<sup>2</sup> Contribution from MAC and ARS Programs are included in Allocation Impact.

<sup>3</sup> Impact of not obtaining full desired interim policy exposure to private asset classes and proxying these with public assets. Includes the impact of lagged reporting of private asset benchmarks relative to current month reporting of public proxies.

<sup>4</sup> Includes impact of 2009-2013 benchmark currency hedge calculation.

# PERF Risk Highlights (as of 12/31/2017)

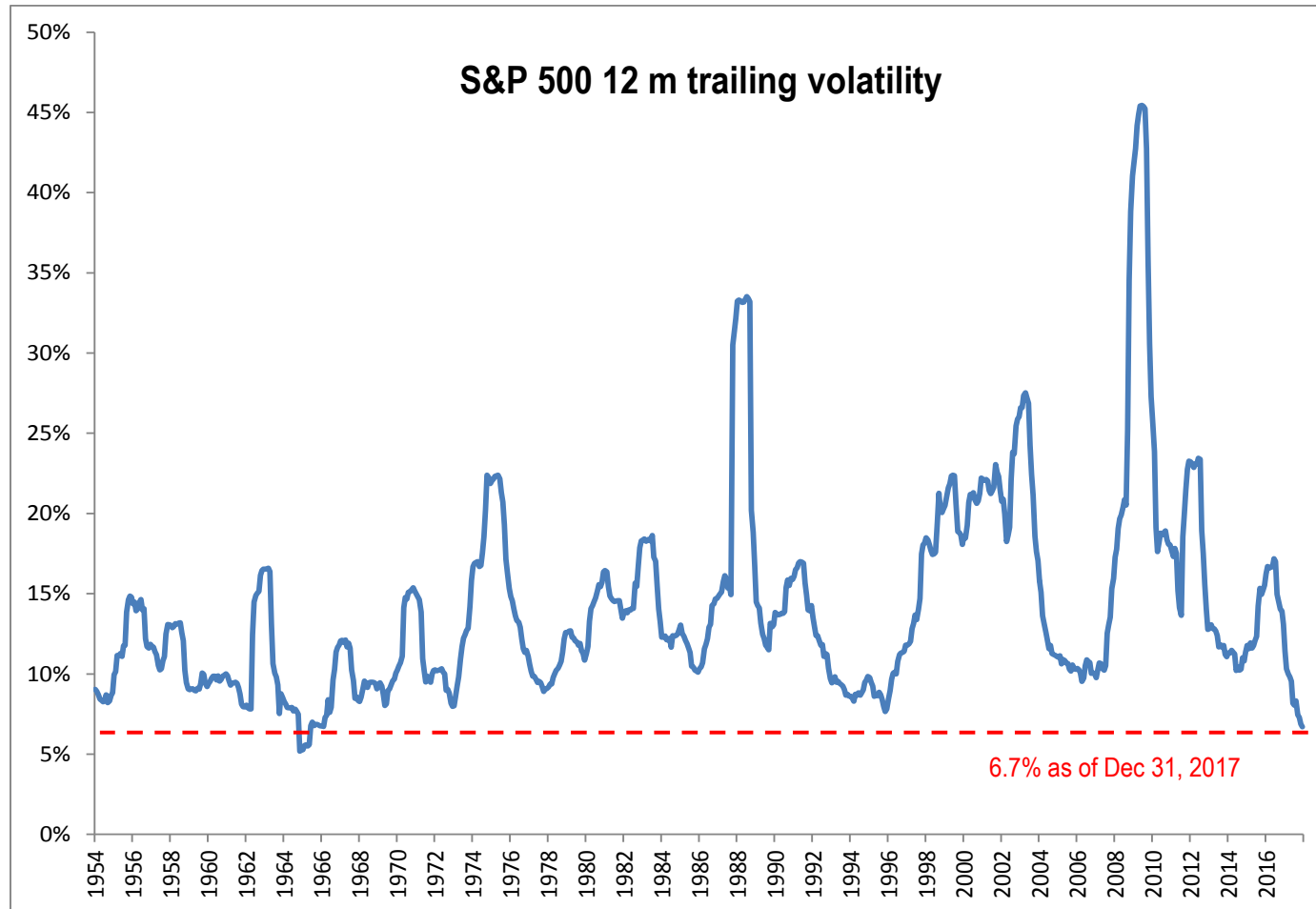
## One Year Volatility Estimates

- Current volatility estimate of 7.4% is down by 1.8% from prior year
  - This low estimate is a function of the model placing greater emphasis on recent history, where realized volatility was the lowest in 50 years
  - Rapid shifts in volatility regime can occur and would not be predicted by this model. The best interpretation of this estimate is as an indicator of the plan's volatility given the current market environment
- Growth assets, especially public equities, remain the primary driver of total volatility
- Current active volatility estimate is 0.6%, within the 1.5% target

## Other considerations

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

# Market volatility is the lowest in the last 50 years



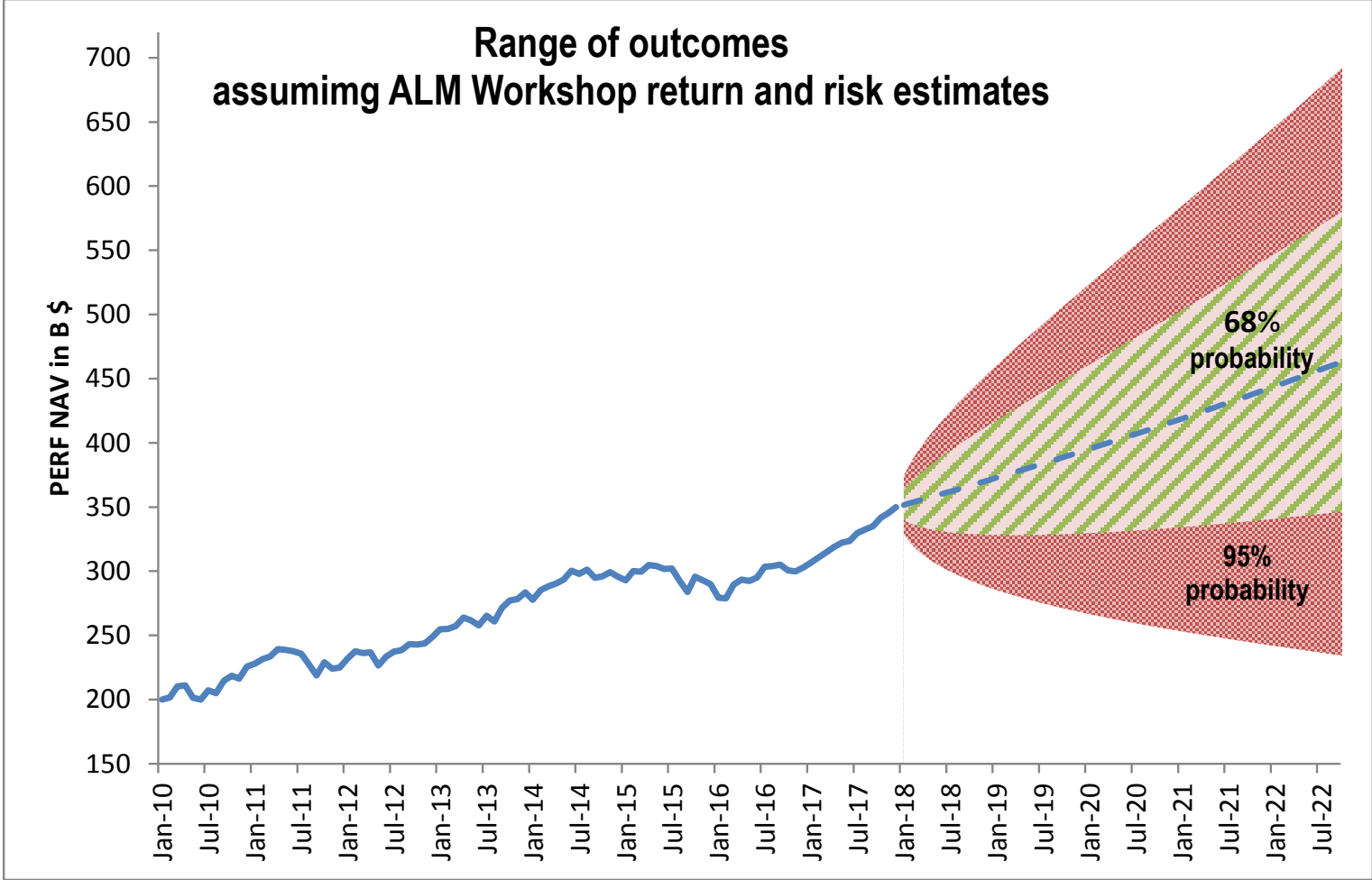
Source: Global Financial Data

# 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 allocation purposes
- Longer term model volatility is higher, reflecting a broader range of market environments

	Barra Model Used for Risk Reporting (Short term)	ALM Workshop Estimate (Long term)
<b>Forecasted Absolute Volatility - PERF</b>	<b>7.4%</b>	<b>11.5%</b>

# Volatility Estimates Interpretation



# Drawdown Risk

Scenario	Simulated Impact on Current Portfolio		
	Simulated Return	Gain/Loss	Estimated Funding Ratio*
Subprime and Credit Crisis (Oct 07 – Mar 09)	-36%	-\$127B	43%
Tech Crash and Recession (Jan 00-Mar 03)	-16%	-\$55B	57%

\*Estimate is a one year projection. Assumes starting funding ratio of 71.4% as of 12/31/2017 and one year growth in liabilities and cash flow projections as per CalPERS Actuarial Office.

# Global Investment Performance Standards (GIPS)

- Starting July 1, 2017, CalPERS is claiming compliance with the GIPS standards
- The GIPS standards are sponsored by the CFA Institute and are widely adopted by asset managers as a set of standardized, ethical principles that guide firms on how to calculate and present their investment results
- CalPERS successfully completed a verification and examination of our performance measurement/reporting process conducted by The Spaulding Group
- As part of the standards, will publish Compliant Presentations on an annual basis (attachment 6)

*The GIPS standards “provide an ethical framework for the calculation and presentation of the investment performance ... The GIPS standards are a voluntary set of standards based on the fundamental principles of full disclosure and fair representation of performance results.”*

*- CFA Institute*



# GIPS | Increased Credibility and Consistency



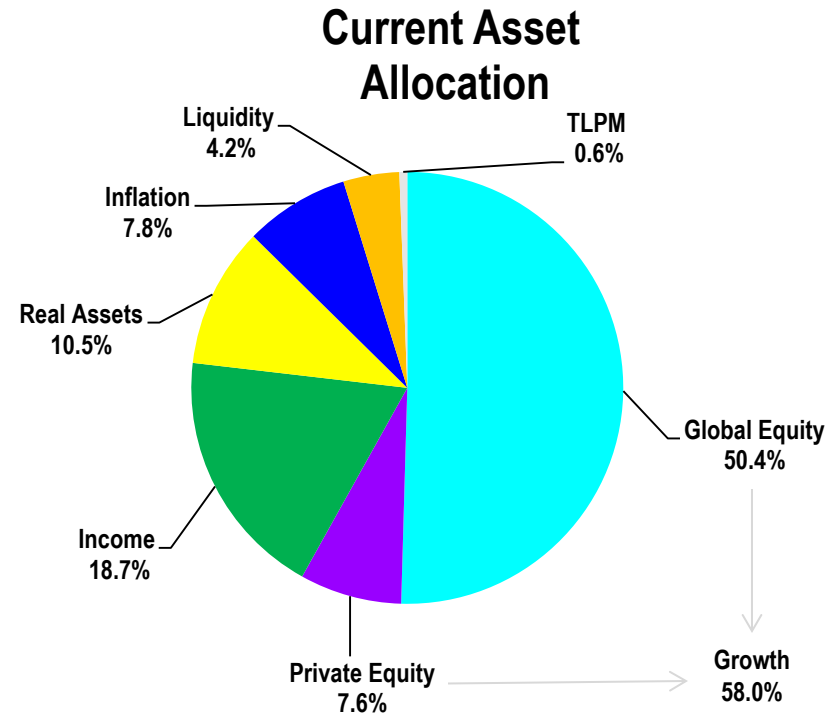
## GIPS | What Changed in our Measurement and Reporting?

- Performance processes were already largely in line with the standards
- Implemented processes to:
  - Value real assets quarterly (vs. Annually) – started FY15/16
  - Include INVO internal expenses in performance (e.g. 4 BPs annually for PERF) – started FY15/16
- Reviewed, revised and formalized documentation for performance measurement

# Appendix

# PERF Asset Allocation

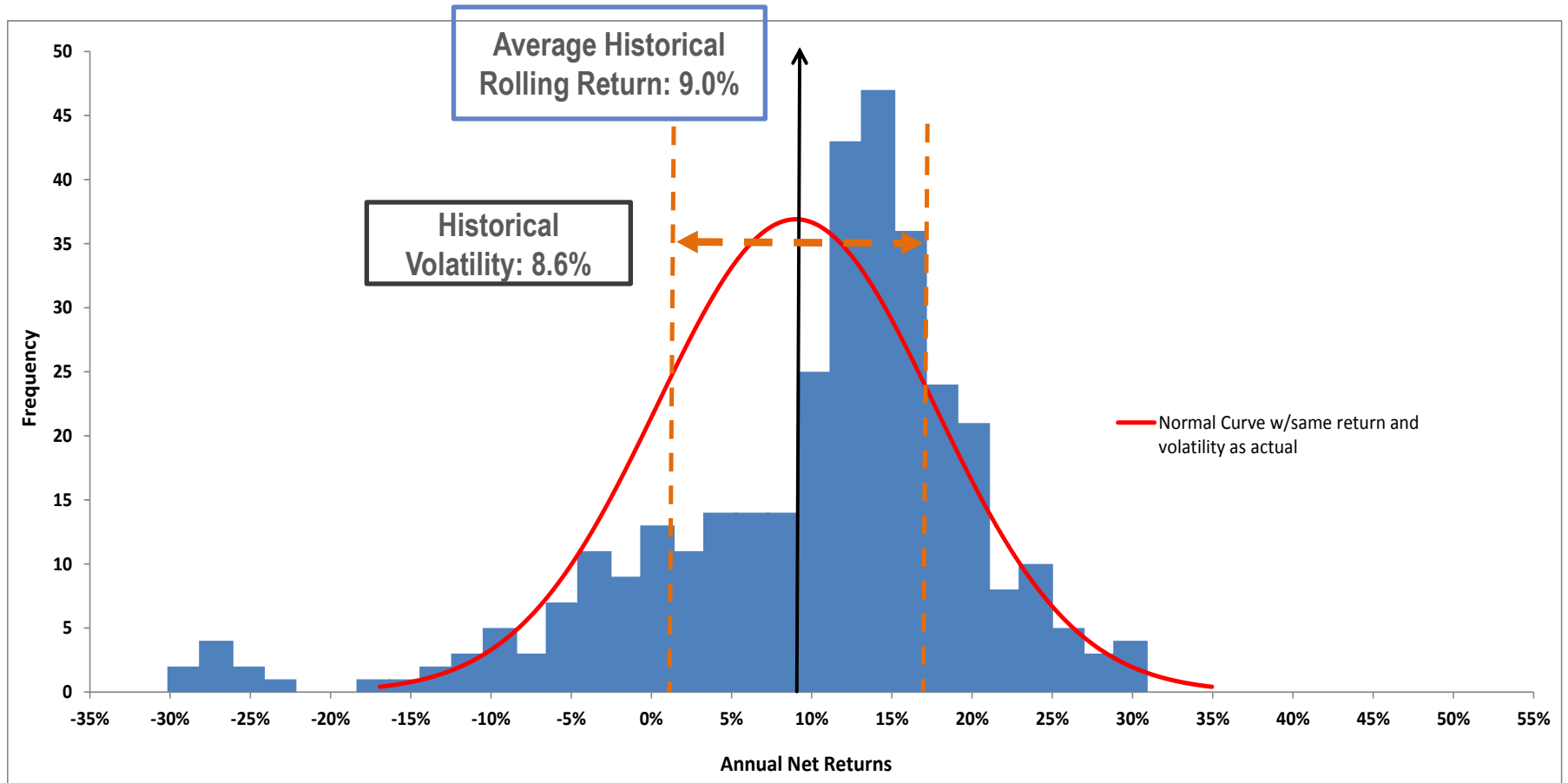
Asset Class as of: December 31, 2017	Current Allocation (%)	Interim Strategic Target (%)*
<b>Growth</b>	<b>58.0%</b>	<b>54%</b>
<i>Global Equity</i>	50.4%	46%
<i>Private Equity</i>	7.6%	8%
<b>Income</b>	<b>18.7%</b>	<b>20%</b>
<b>Real Assets</b>	<b>10.5%</b>	<b>13%</b>
<i>Real Estate</i>	8.8%	11%
<i>Infrastructure</i>	1.2%	1%
<i>Forestland</i>	0.6%	1%
<b>Inflation</b>	<b>7.8%</b>	<b>9%</b>
<b>Liquidity</b>	<b>4.2%</b>	<b>4%</b>
<b>TLPM</b>	<b>0.6%</b>	<b>-</b>
<b>Total Fund</b>	<b>100.0%</b>	<b>100.0%</b>



# PERF Contribution to Return

<b>Asset Class</b>	<b>1-Yr Average Weight (%)</b>	<b>1-Yr Return (%)</b>	<b>1 Yr Contribution to Return (%)</b>
<b>Growth</b>	<b>56.8</b>	<b>23.2</b>	<b>12.6</b>
<i>Global Equity</i>	48.8	24.0	11.1
<i>Private Equity</i>	8.0	18.0	1.4
<b>Income</b>	<b>18.9</b>	<b>7.2</b>	<b>1.3</b>
<b>Real Assets</b>	<b>10.8</b>	<b>8.5</b>	<b>0.9</b>
<i>Real Estate</i>	9.1	7.8	0.7
<i>Infrastructure</i>	1.1	18.2	0.2
<i>Forestland</i>	0.6	0.8	0.0
<b>Inflation</b>	<b>8.3</b>	<b>6.3</b>	<b>0.5</b>
<b>Liquidity</b>	<b>4.5</b>	<b>1.2</b>	<b>0.1</b>
<b>Other</b>	<b>0.9</b>	<b>-</b>	<b>0.4</b>
<b>Total Fund</b>	<b>100</b>	<b>15.7</b>	<b>15.7</b>

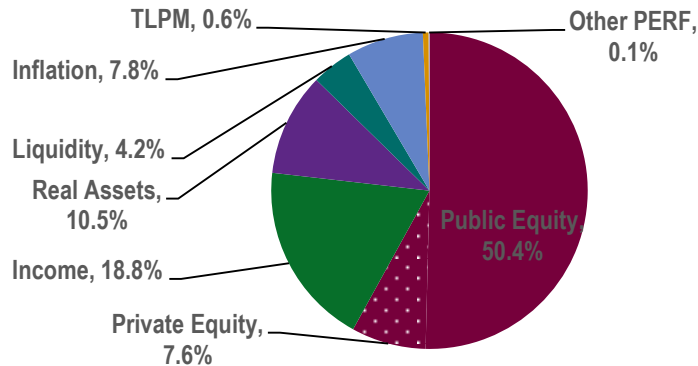
# Historical Returns Are Not Normally Distributed



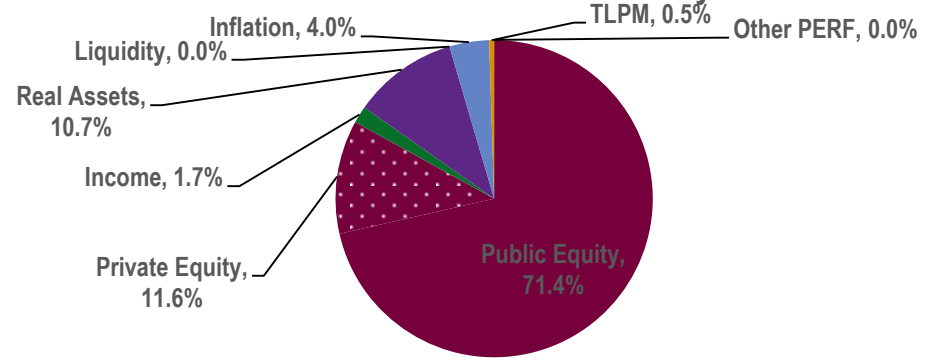
# Growth Assets Dominate Volatility

As of December 31, 2017

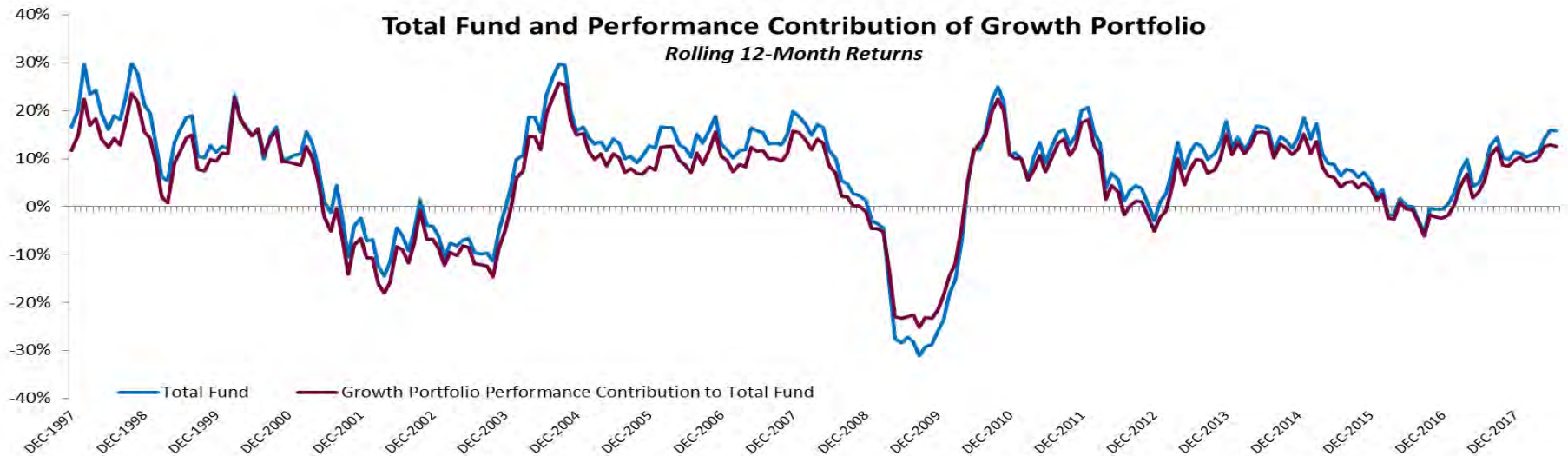
**Portfolio Allocation**



**Forecast Contribution to Volatility**



**Total Fund and Performance Contribution of Growth Portfolio**  
Rolling 12-Month Returns



# Historical Equity Market Drawdowns

— S&P composite declines from all-time highs

