

CalPERS Trust Level Review

Investment Review

Period Ending December 31, 2018

Yu Ben Meng, Chief Investment Officer
Dan Bienvenue, Interim Chief Operating Investment Officer
Eric Baggesen, Managing Investment Director

Investment Committee
February 19, 2019

Executive Summary

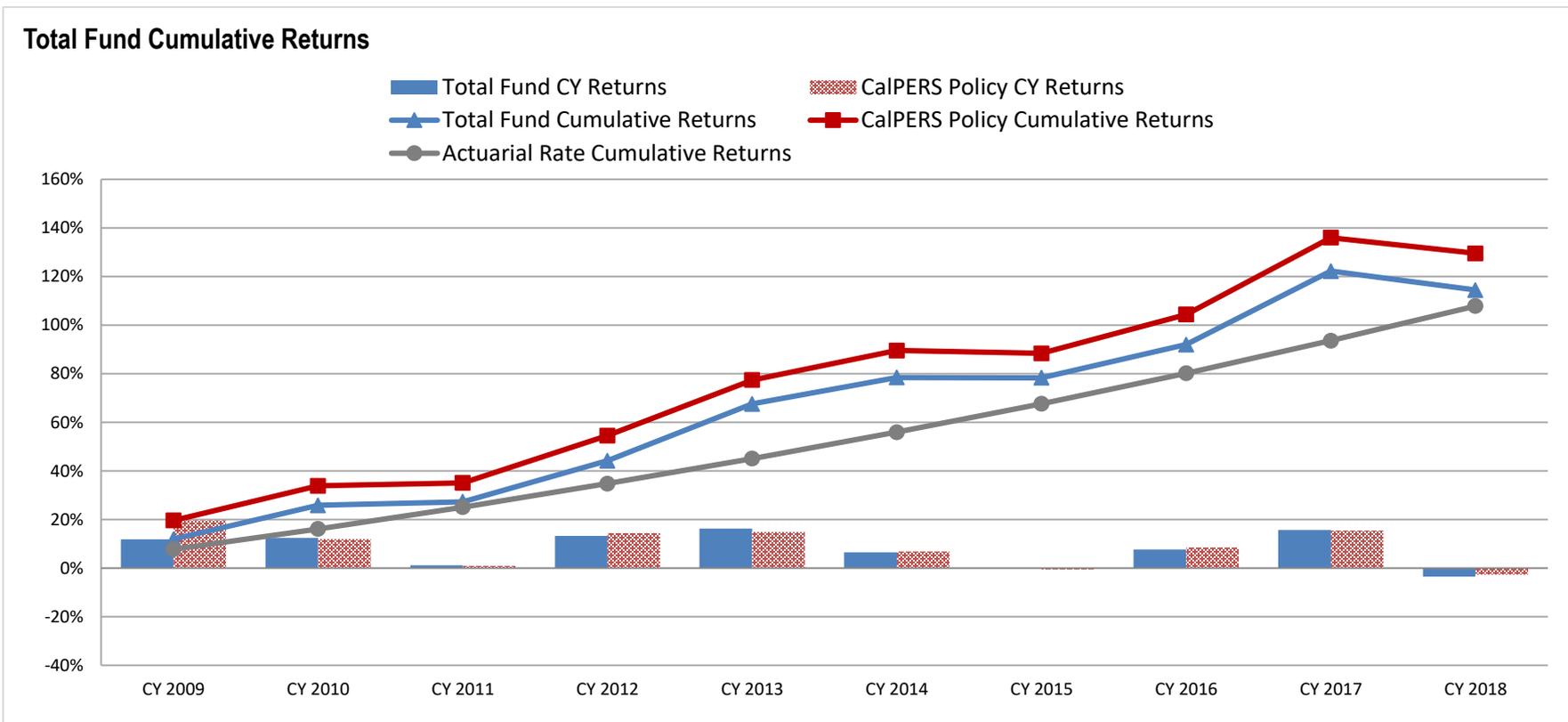
- Performance
 - Total Fund calendar year 2018 (CY2018) return was -3.5%
 - Public Equity returned -8.9%, contributing -4.4% of total fund return
 - Private Equity (+12.5%) and Real Assets (+4.2%) had a combined contribution of +1.27%
 - Total Fund CY2018 excess return was -77 bps
 - Real Assets contributed -34 bps with most of this attributed to underperformance of core real estate
 - GE contributed -19 bps with most of this coming from underperformance of active strategies in first half of year
 - Affiliate Investment Program returns for CY2018 were in line with their respective asset allocations
- 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 8.1%
 - 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 0.4%, within the 1.5% limit

Performance Summary (as of December 31, 2018)

As of December 31, 2018 Funds Managed	Ending Market Value (MM)	FYTD		1-Yr		3-Yr		5-Yr		10-Yr	
		Net Return	Excess bps								
Public Employees' Retirement Fund	337,162	-3.9%	(40)	-3.5%	(77)	6.3%	(48)	5.1%	(23)	7.9%	(74)
Judges' Retirement Fund	34	1.1%	9	2.0%	16	1.2%	19	0.8%	14	0.5%	11
Judges' Retirement System II Fund	1,464	-5.8%	23	-6.1%	28	5.3%	35	3.8%	21	8.4%	30
Legislators' Retirement System Fund	107	-3.3%	17	-3.7%	23	4.1%	33	3.4%	21	7.0%	59
CERBT Strategy 1	6,555	-6.7%	17	-6.9%	28	5.3%	48	3.8%	38	8.5%	25
CERBT Strategy 2	1,094	-4.8%	12	-5.3%	30	4.7%	49	3.5%	33	-	-
CERBT Strategy 3	598	-3.4%	8	-3.9%	19	4.0%	41	3.3%	31	-	-
CalPERS Health Care Bond Fund	451	1.7%	1	0.1%	10	2.1%	4	2.7%	16	4.2%	73
Long-Term Care Fund	4,335	-3.4%	1	-4.3%	5	3.2%	2	2.8%	13	6.5%	28
Terminated Agency Pool	130	-1.2%	-	-1.6%	-	2.8%	-	3.8%	-	-	-

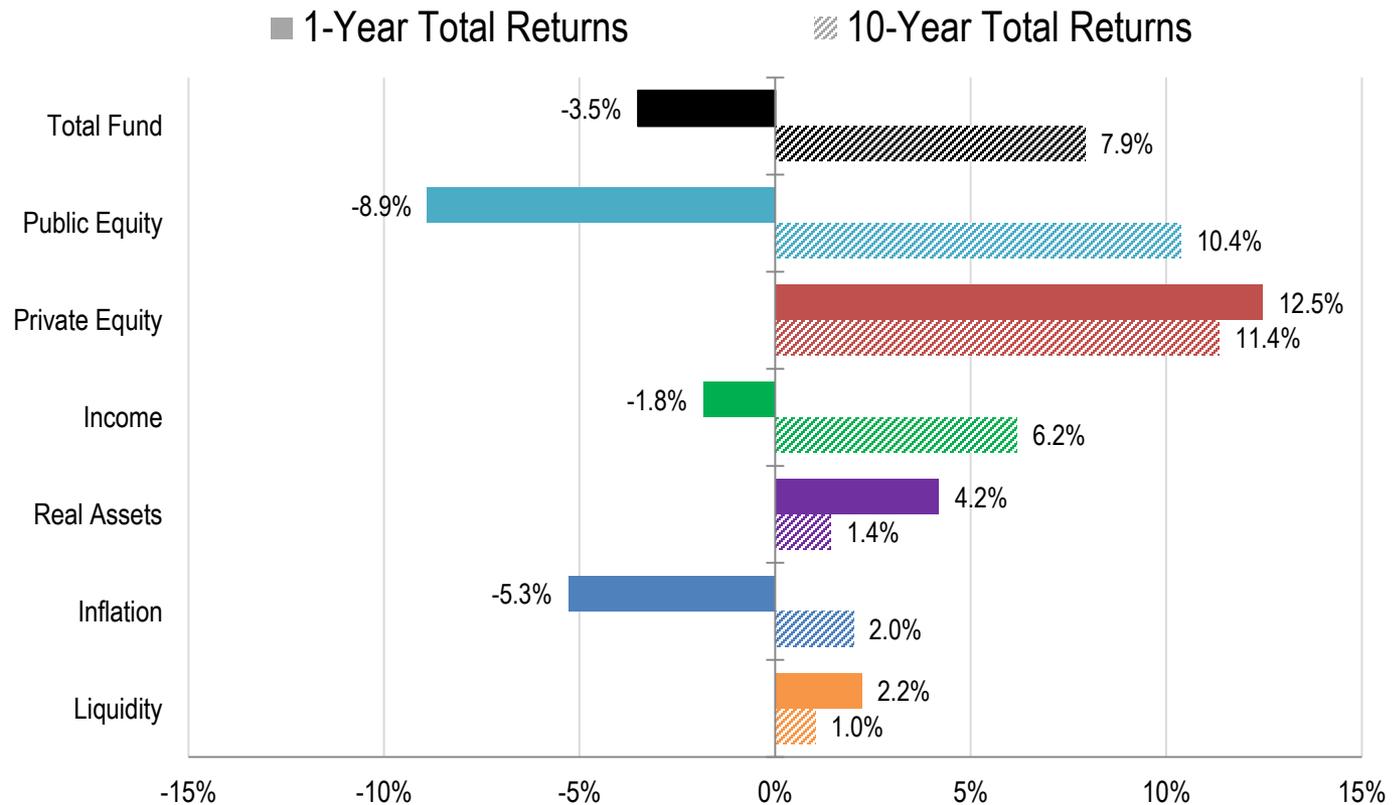
PERF Absolute Returns: 10-Yr Cumulative

(as of December 31, 2018)



PERF Absolute Returns: 1-Yr vs. 10-Yr

(as of December 31, 2018)



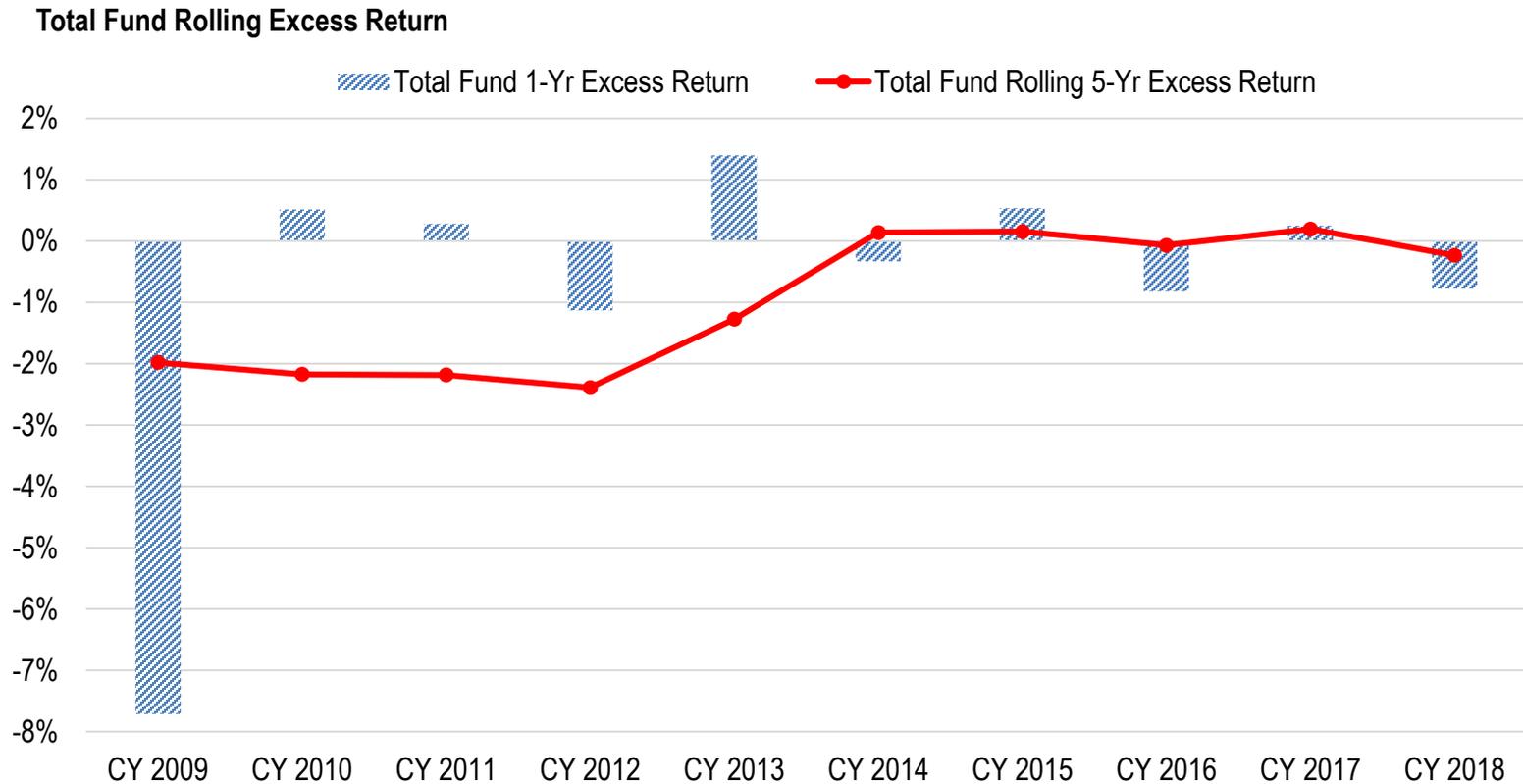
PERF Absolute Returns: 5-Yr Realized vs. Expected*

(as of December 31, 2018)



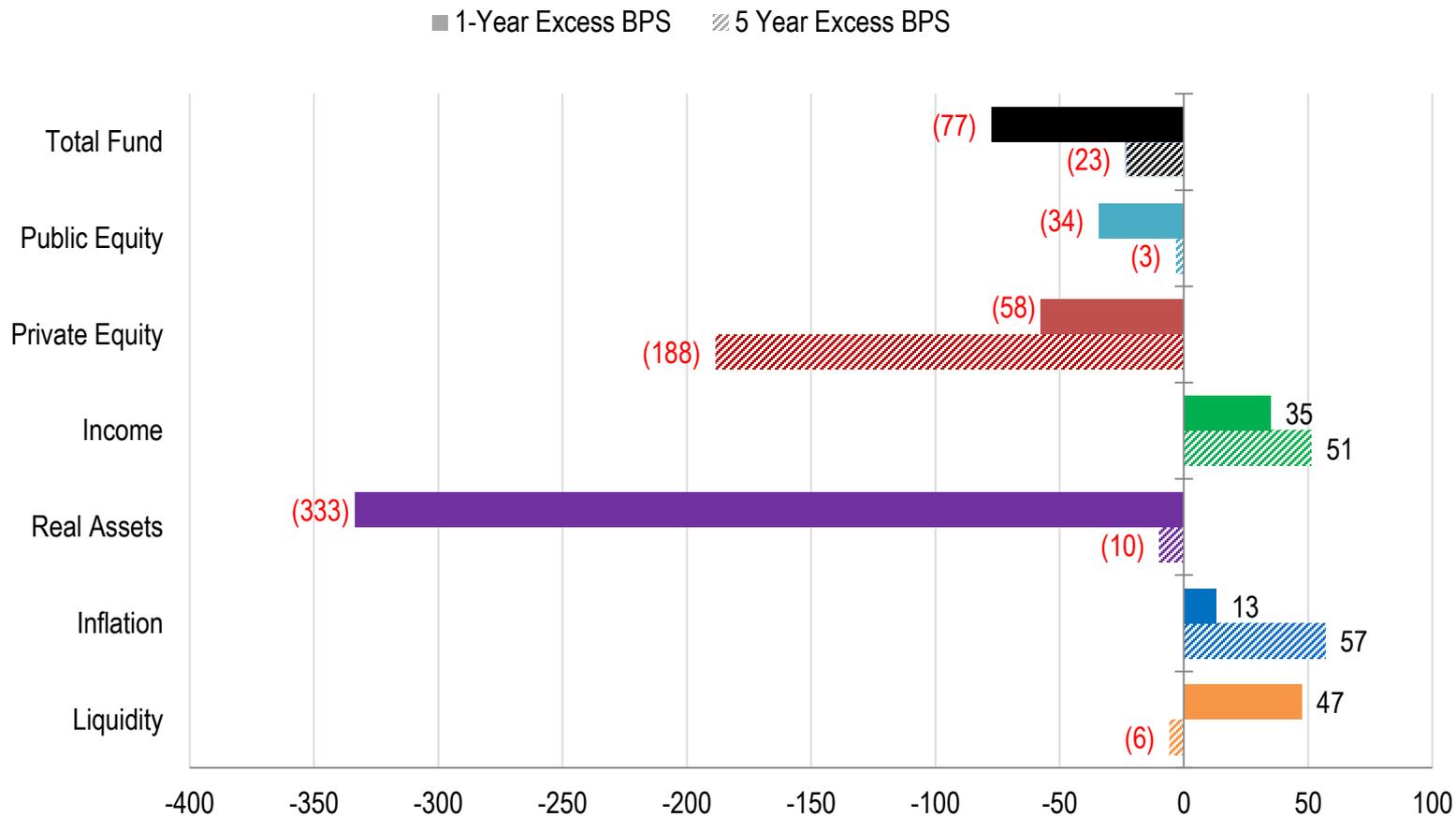
PERF Excess Returns: Rolling 5-Yr

(as of December 31, 2018)



PERF Excess Returns: 1-Yr and 5-Yr

(as of December 31, 2018)



PERF Excess Returns: Attribution

(as of December 31, 2018)

	Average Weight in Plan	Program Excess Return (bps)		Contribution to Plan Excess (bps) ¹	
		1 Year	5 Year	1 Year	5 Year
Total Excess Return (bps)				(77)	(23)
Public Program Contributions				(17)	10
PUBLIC EQUITY	51%	(34)	(3)	(17)	(2)
INCOME	19%	35	51	7	9
INFLATION	6%	13	57	0	3
LIQUIDITY	3%	47	(6)	1	(0)
TRUST LEVEL	1%			(8)	(0)
Private Program Contributions				(37)	(22)
PRIVATE EQUITY	9%	(58)	(188)	(4)	(18)
REAL ASSETS	11%	(333)	(10)	(34)	(4)
Allocation Management				(23)	(12)
PUBLIC ASSET: ALLOCATION & REBALANCING				(1)	1
PRIVATE ASSET: PROXYING ²				(23)	(13)

¹ Contribution figures are calculated on monthly basis and aggregated over the respective period.

² 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 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:

- Negative contribution from Real Assets, Public Equity, Private Equity and from underweights to private assets requiring proxying with publics

PERF Asset Risk Highlights (as of December 31, 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 reverted to historical levels
 - The Barra risk model's estimate for total plan volatility is 8.1%. 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 below 50%

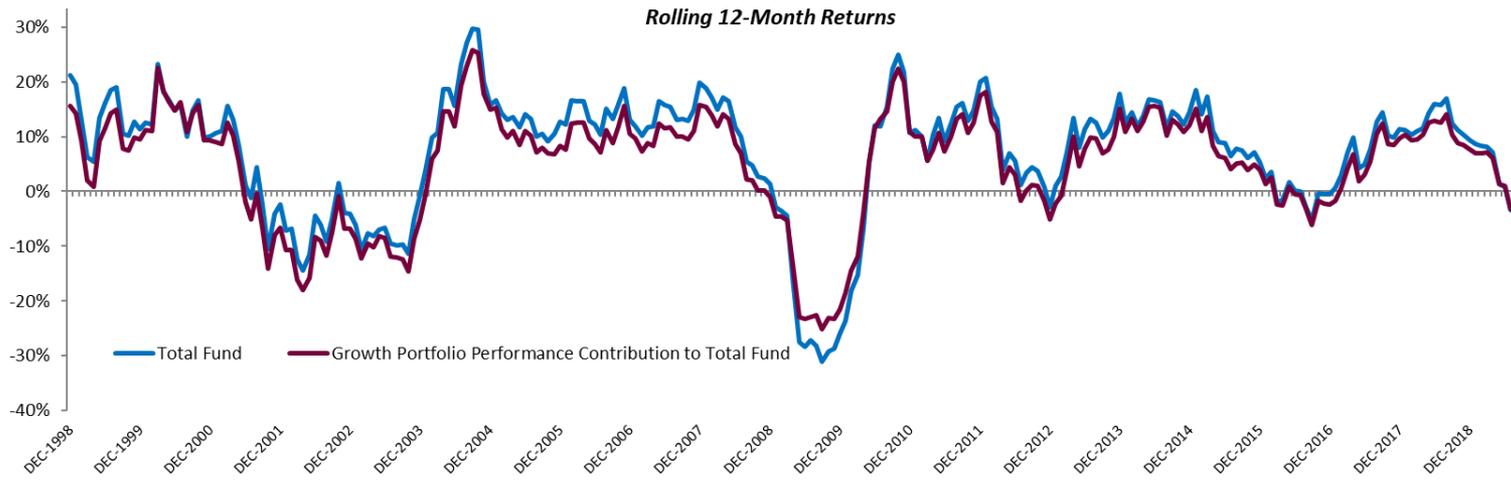
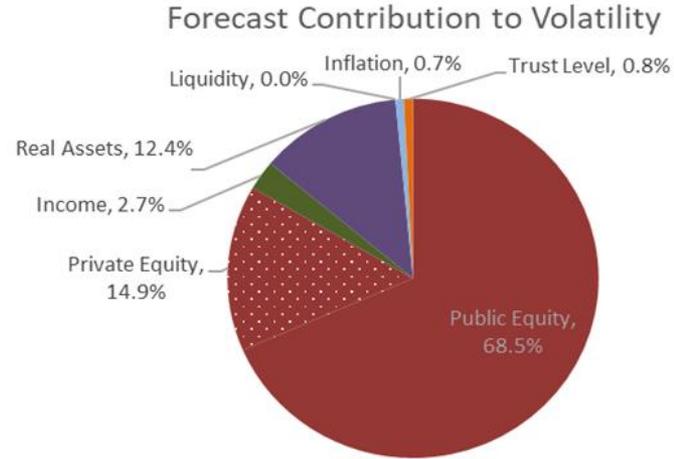
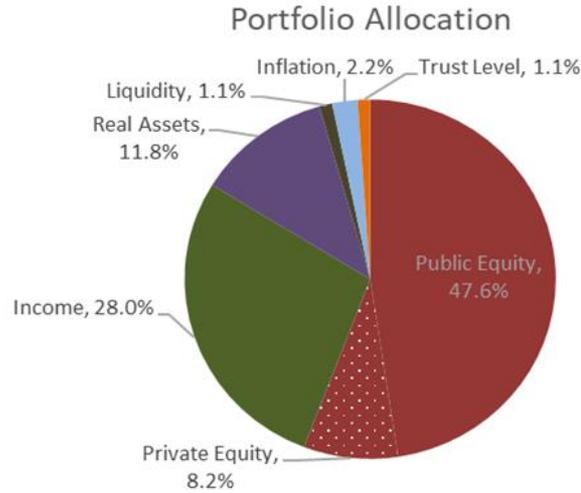
Active Risk

- Current active volatility estimate is 0.4%, within the 1.5% limit. Active volatility provides a quantification of how actual implementation of the portfolio differs from the policy benchmark

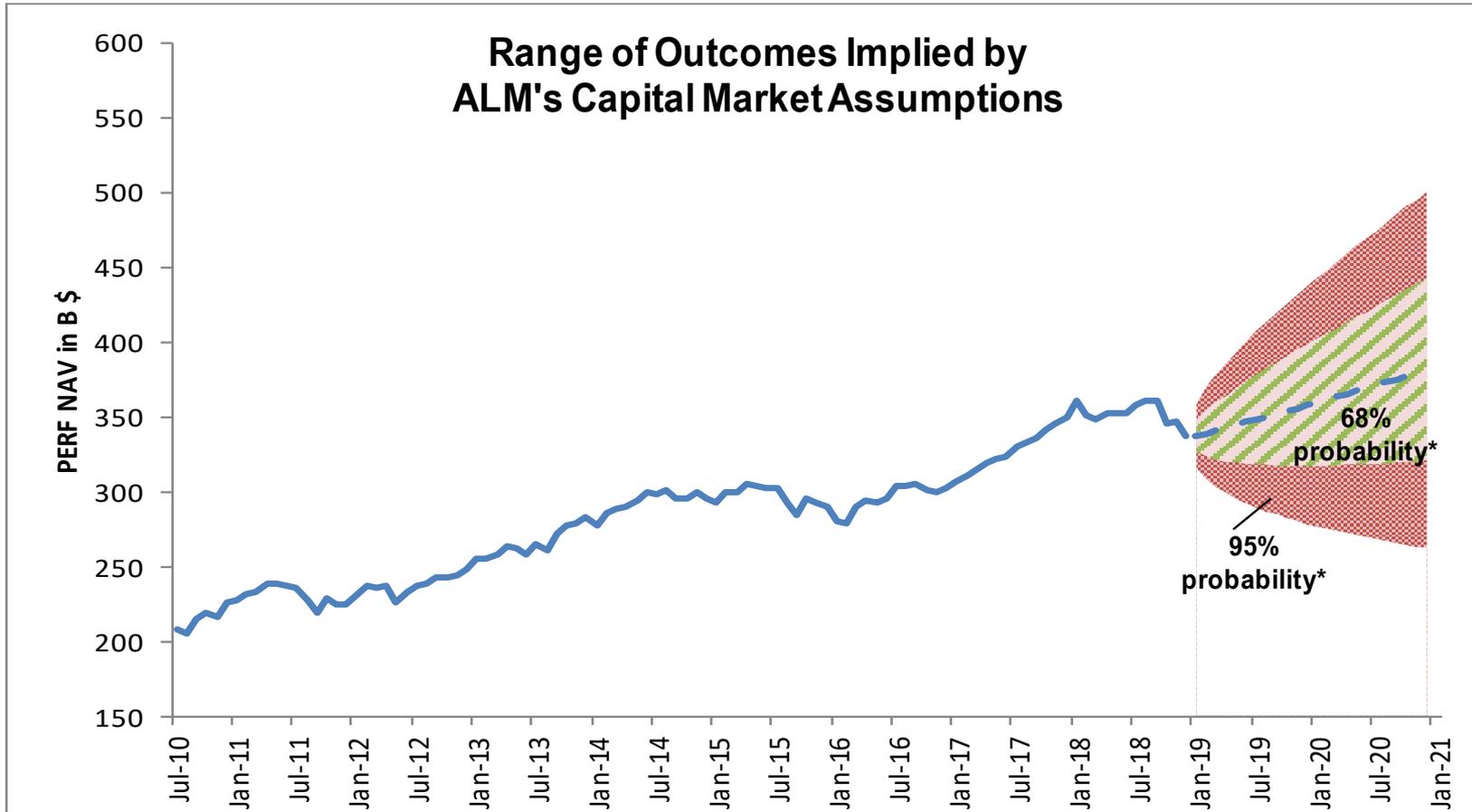
Other considerations

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

Growth Assets Dominate Risk (as of December 31, 2018)



Interpreting Return and Risk Estimates

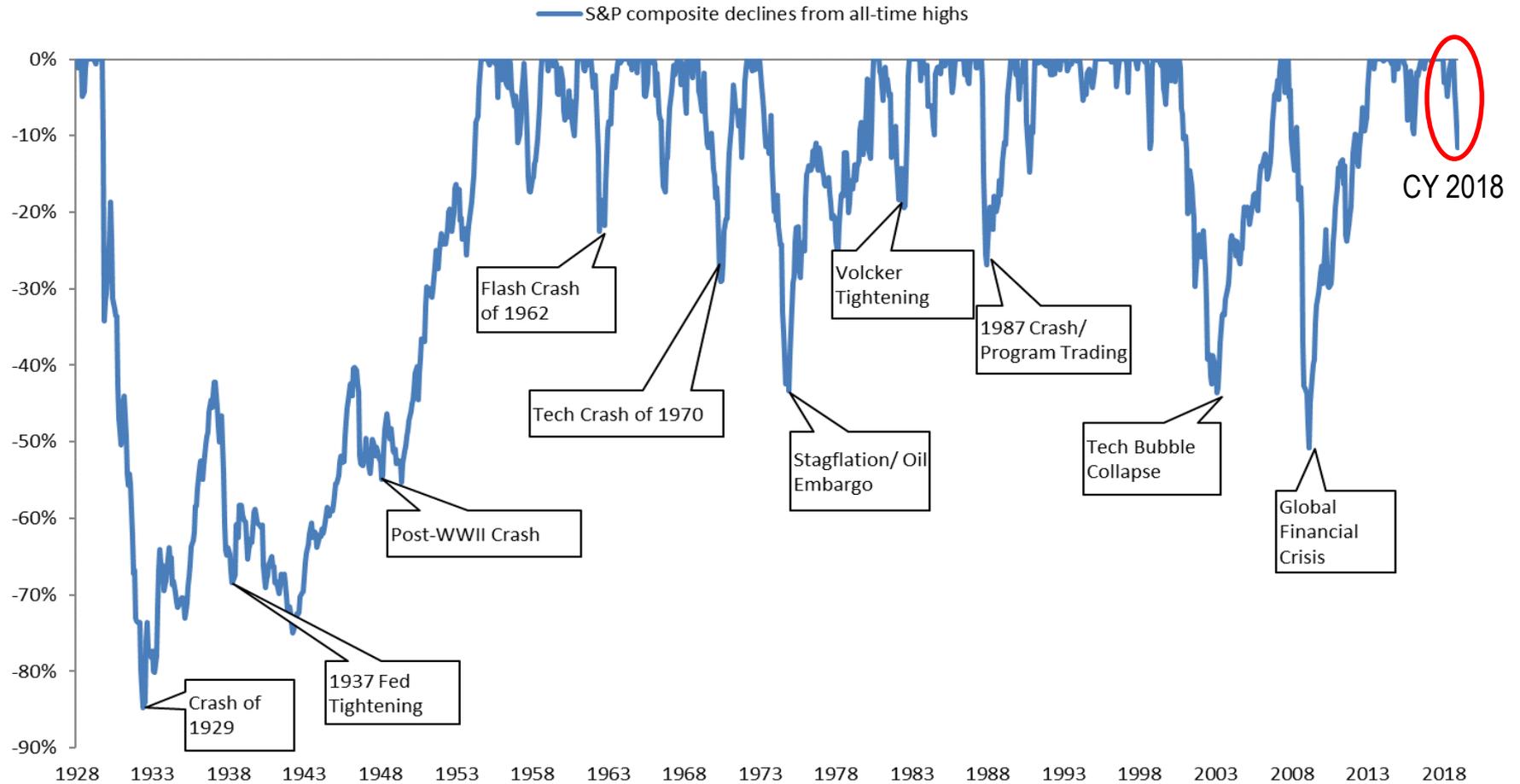


Drawdown Risk

Scenario	Simulated Impact on Current Portfolio		
	Simulated Return	Gain/Loss	Estimated Funded Ratio*
Subprime and Credit Crisis (Oct 07 – Mar 09)	-32%	-\$107B	42%
Tech Crash and Recession (Jan 00-Mar 03)	-21%	-\$71B	49%

*Simulations show the impact on the current portfolio and CalPERS funded ratio if subjected to either of two economic scenarios

Historical Equity Market Drawdowns



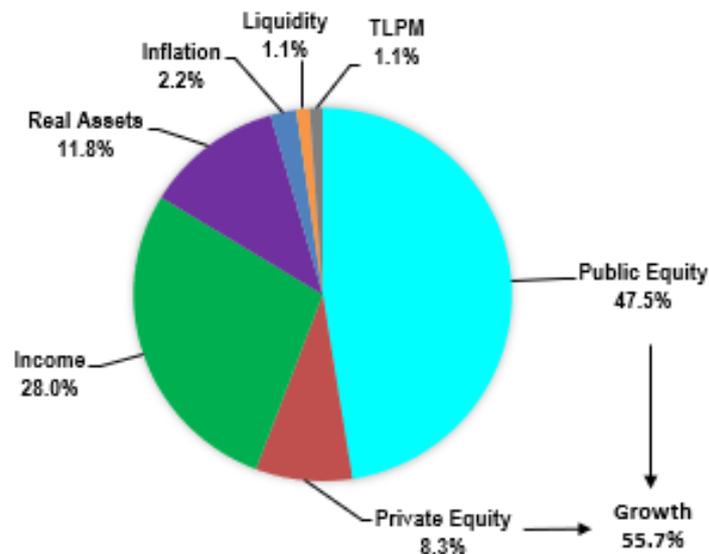
Updates to Performance and Risk Reporting

- CIO Performance Report (*Updating*)
 - Renaming to Public Employees Retirement Fund (PERF) Portfolio & Partnership Report
 - Fulfills legislative & policy requirements to provide Portfolio & Partnership level performance
 - Eliminates redundant information already presented in the Monthly Update – Performance & Risk and Annual Program Reviews
 - Improves ability to adhere to accessibility standards

Appendix

PERF Asset Allocation

Asset Class As of: December 31, 2018	Current Allocation
Growth	55.7%
Public Equity	47.5%
Private Equity	8.3%
Income	28.0%
Real Assets	11.8%
Real Estate	10.1%
Infrastructure	1.4%
Forestland	0.4%
Inflation	2.2%
Liquidity	1.1%
Trust Level	1.1%
Total Fund	100.0%

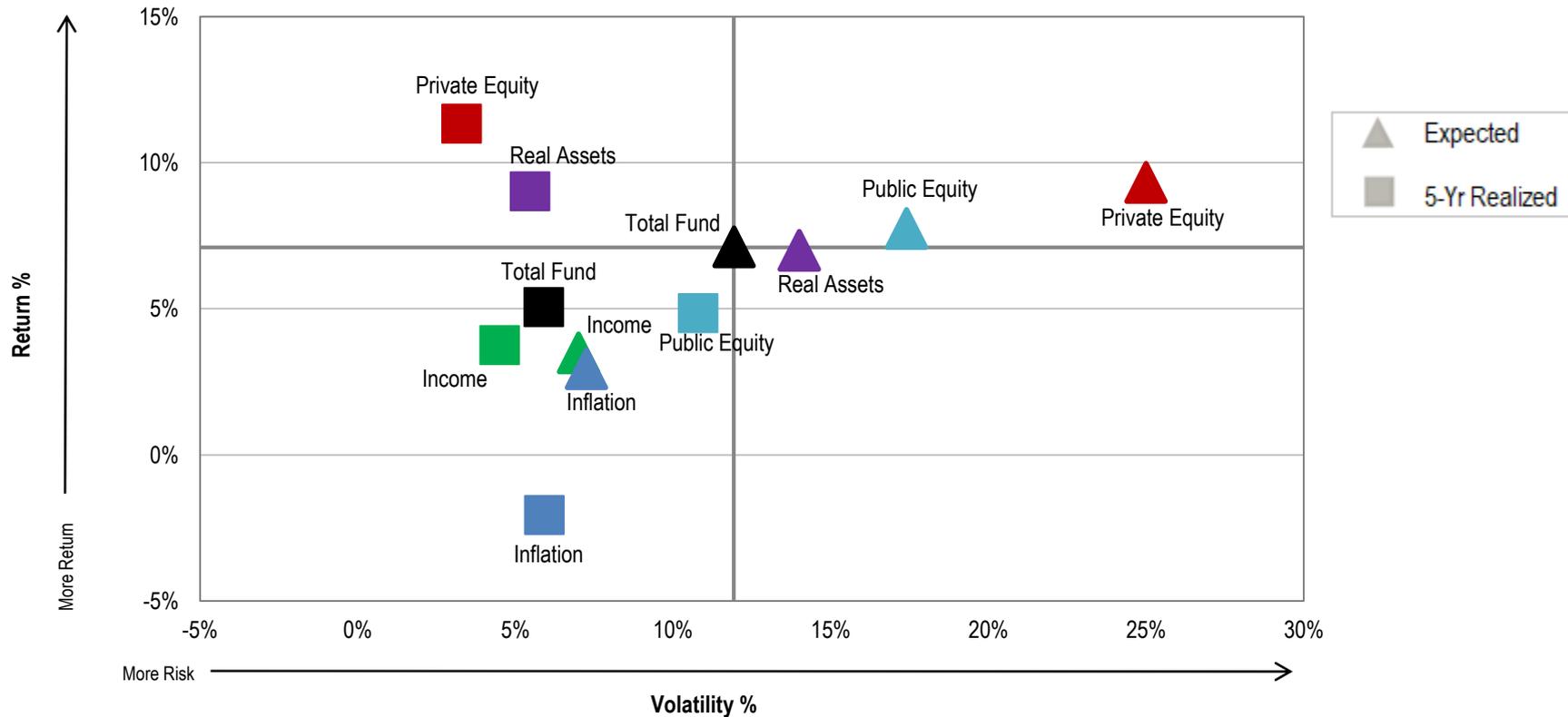


PERF Contribution to Return

Asset Class As of December 31, 2018	1-Yr Average Weight (%)	1-Yr Return (%)	1-Yr Contribution to Return (%)
Growth	56.4	-6.1	-3.4
<i>Public Equity</i>	48.7	-8.9	-4.4
<i>Private Equity</i>	7.8	12.5	0.9
Income	22.8	-1.8	-0.3
Real Assets	10.9	4.2	0.4
<i>Real Estate</i>	9.2	4.0	0.4
<i>Infrastructure</i>	1.2	11.3	0.1
<i>Forestland</i>	0.5	-11.1	0.0
Inflation	5.4	-5.3	-0.1
Liquidity	3.0	2.2	0.1
Fund Level	1.4	-	-0.2
Total Fund	100	-3.5	-3.5

PERF Asset Liability Management Assumptions

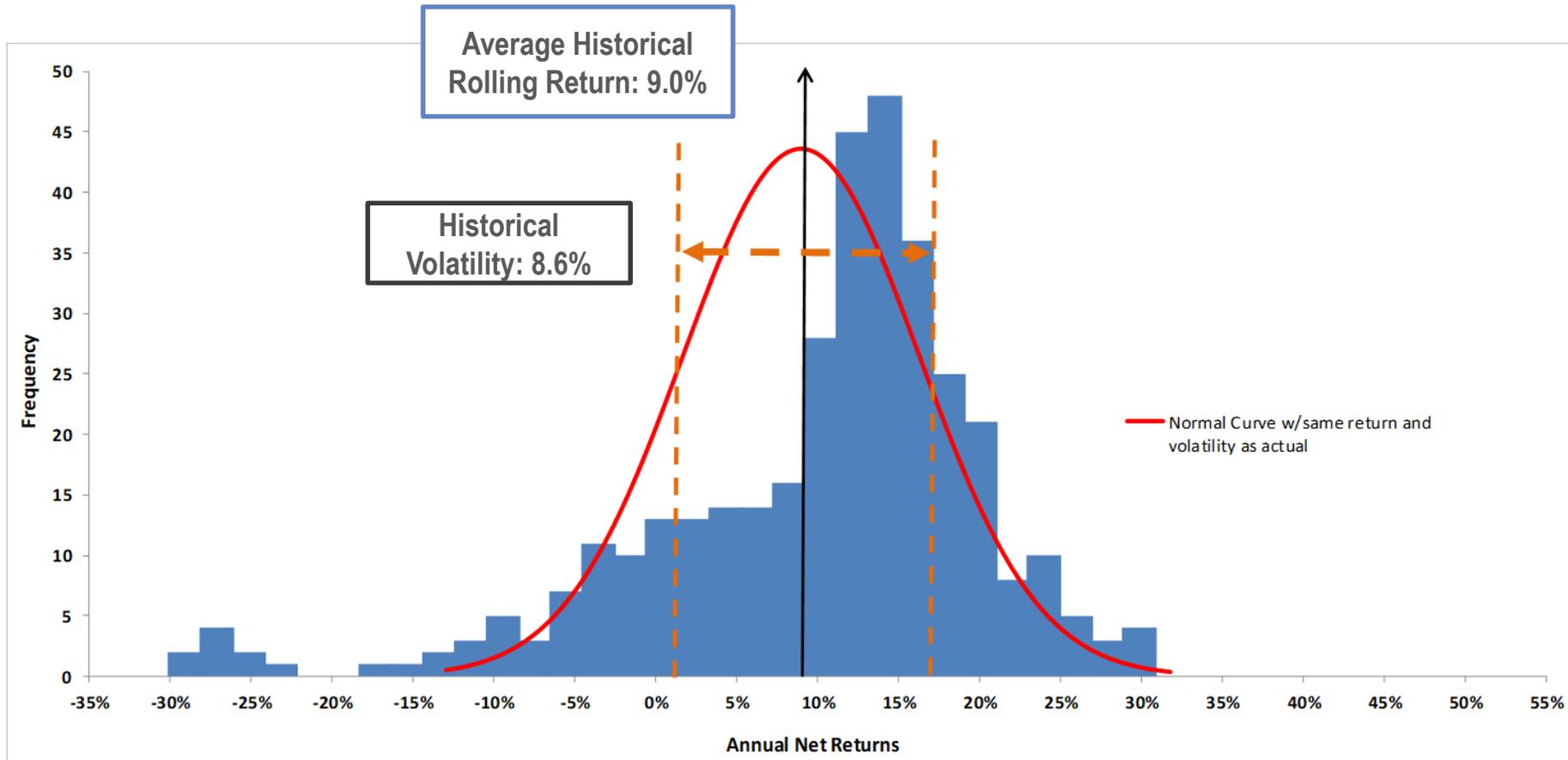
Return and Volatility (Expected 5-Year Realized)



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

Distribution of Historical Returns

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



Market Volatility

