Monthly Update- Performance & Risk
Public Employees' Retirement Fund (PERF)

December 31, 2017

CalPERS

Strategic Asset Allocation

Investment Belief 6: Strategic asset allocation is the dominant determinant of portfolio risk and return. CalPERS strategic asset allocation process transforms the fund's targeted rate of return to the market exposures that staff will manage. CalPERS will aim to diversify its overall portfolio across distinct risk factors and return drivers.

Total Fund Objective

CalPERS' general investment goals are broad in nature. The overall objective of CalPERS' investment program is to provide members and beneficiaries with benefits as required by law. This will be accomplished through a carefully planned and executed long-term investment program that efficiently and effectively allocates and manages the assets of CalPERS. CalPERS' investment policies have been designed to allow CalPERS to achieve a long-term total return. As such, prudent risk-taking is appropriate within the context of overall diversification to meet CalPERS' long-term investment objectives. The assets of CalPERS will be broadly diversified to minimize the effect of short-term losses within any investment program.

Actual Capital Allocation
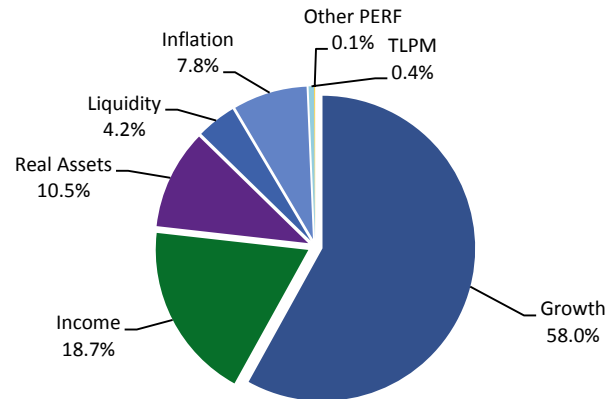
Strategic Allocation Target Range
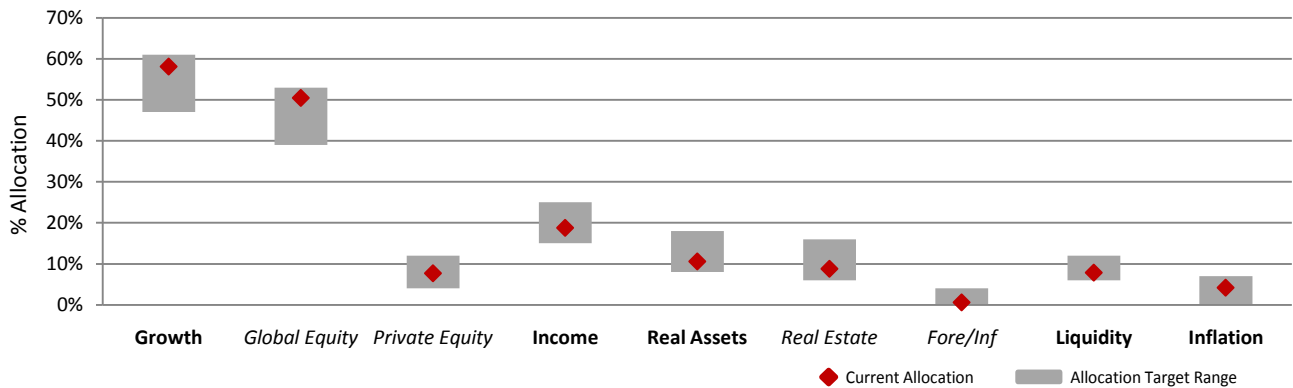
Asset Class As Of: December 31, 2017	Current Allocation(%)	Interim Strategic Target (%)[1]	Variance(%)	Current Allocation (billions)	Interim Strategic Target (billions)	Variance (billions)
Growth	58.0%	54%	4.0%	$ 203.2	$ 189.0	$ 14.2
Global Equity	*50.4%*	*46%*	*4.4%*	$ 176.4	$ *161.0*	$ *15.4*
Private Equity	*7.6%*	*8%*	*(0.4%)*	$ 26.7	$ *28.0*	$ *(1.3)*
Income	18.7%	20%	(1.3%)	$ 65.6	$ 70.0	$ (4.4)
Real Assets	10.5%	13%	(2.5%)	$ 36.8	$ 45.5	$ (8.7)
Real Estate	*8.8%*	*11%*	*(2.2%)*	$ 30.7	$ *38.5*	$ *(7.8)*
Infrastructure	*1.2%*	*1%*	*0.2%*	$ 4.2	$ *3.5*	$ *0.7*
Forestland	*0.6%*	*1%*	*(0.4%)*	$ 2.0	$ *3.5*	$ *(1.5)*
Inflation	7.8%	9%	(1.2%)	$ 27.4	$ 31.5	$ (4.1)
Liquidity	4.2%	4%	0.2%	$ 14.7	$ 14.0	$ 0.7
TLPM[2]	0.6%	-	0.6%	$ 2.1	-	$ 2.1
Other PERF[3]	0.1%	-	*0.1%*	$ 0.3	-	$ *0.3*
Total Fund	100.0%	100%	0.0%	$ 350.0	$ 350.0	$ -

[1] Interim strategic targets adopted by the Investment Committee at the September 2016 Investment Committee meeting.

[2] TLPM includes Multi Asset Class, Completion Overlay, and Risk Mitigation portfolios.

[3] OTHER PERF includes Absolute Return Strategies and Other Plan Level portfolios.

Asset Liability Management Expectations vs. Actual Results

Investment Belief 7: CalPERS will take risk only where we have a strong belief we will be rewarded for it. An expectation of a return premium is required to take risk; CalPERS aims to maximize return for the risk taken.

Asset Liability Assumptions

As part of the Strategic Asset Allocation process, a comprehensive strategy analysis shall be completed at least once every four years and will be presented to the Investment Committee (IC) for review and approval of policy target asset class allocations and ranges. Staff may recommend a more frequent analysis of asset class allocations and ranges if expected returns, risks or liability values have substantially changed since the prior analysis. Additionally, the strategy shall be reviewed by staff at the mid-point of the four year cycle or as needed to ensure that all assumptions used in establishing the strategy continue to be reasonable. Staff may also recommend to the IC changes in the policy targets and ranges. The strategy shall reflect analyses that consider the current and expected financial condition of CalPERS including projected CalPERS liabilities. Analyses shall also encompass the expected long-term capital markets outlook, expected inflation, and CalPERS risk tolerance.

Expected Return vs. 5-Year Actual Return
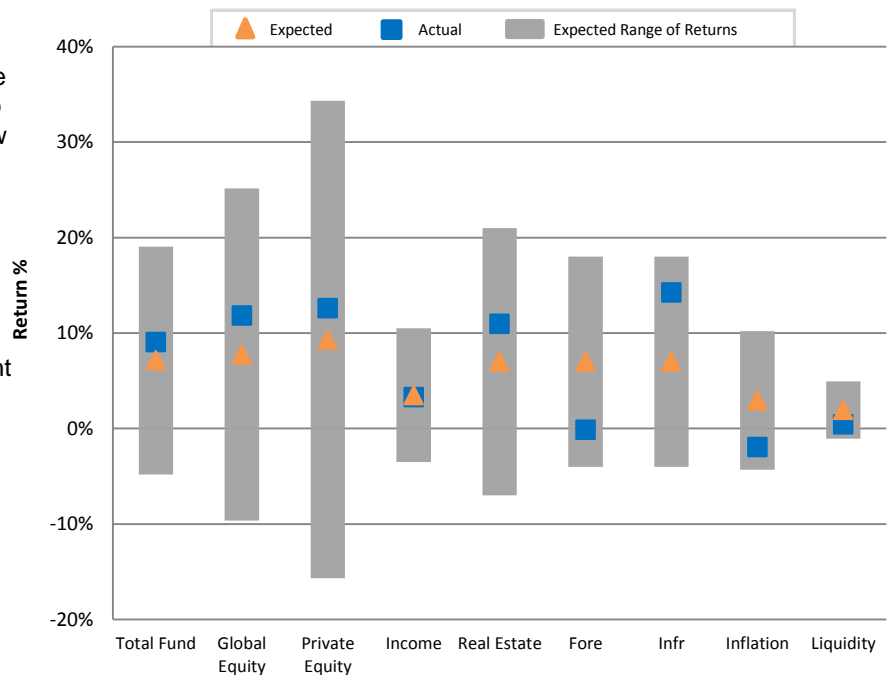
Note: The expected range of returns is based on the expected volatility of returns (standard deviation) from the 2013 ALM Workshop.

Expected Risk and Return* vs. 5-Year Realized Risk and Return

*Expected risk and return is based on the 2013 ALM Workshop and uses the short-term (1-10year) expected return from capital market assumptions.
** The ALM Expected Return and Risk for Infrastructure and Forestland are identical.

Performance Summary

Investment Belief 5: CalPERS must articulate its investments goals and performance measures and ensure clear accountability for their execution.

Asset Class As Of: December 31, 2017	FYTD Net Return	FYTD Excess BPS	1-Yr Net Return	1-Yr Excess BPS	3-Yr Net Return	3-Yr Excess BPS	5-Yr Net Return	5-Yr Excess BPS	10-Yr Net Return	10-Yr Excess BPS	20-Yr Net Return	20-Yr Excess BPS
Growth	11.4%	(19)	23.2%	(104)	10.0%	(39)	11.9%	(46)	6.0%	(111)	7.0%	(21)
Global Equity	11.6%	(0)	24.0%	(35)	10.0%	10	11.8%	22	5.5%	(26)	6.6%	1
Private Equity	9.7%	(138)	18.0%	(486)	9.9%	(213)	12.6%	(274)	9.1%	(407)	10.7%	112
Income	2.7%	12	7.2%	65	3.7%	62	3.3%	80	6.0%	72	6.5%	56
Real Assets	4.5%	151	8.5%	209	9.4%	28	10.4%	55	(0.9%)	(731)	7.0%	(266)
Real Estate	3.8%	69	7.8%	113	10.0%	13	10.9%	34	(1.3%)	(856)	6.8%	(336)
Infrastructure	12.5%	925	18.2%	1,192	12.4%	716	14.3%	891	N/A	N/A	N/A	N/A
Forestland	0.0%	(128)	0.8%	(253)	(3.0%)	(823)	(0.1%)	(728)	N/A	N/A	N/A	N/A
Inflation	7.4%	39	6.3%	17	0.1%	31	(2.0%)	56	0.1%	2	N/A	N/A
Liquidity	0.7%	13	1.2%	30	0.7%	9	0.4%	(16)	1.1%	(14)	2.6%	8
TLPM[3]												
Other PERF[4]												
Total Fund	8.1%	35	15.7%	25	7.6%	(0)	9.0%	19	4.9%	(114)	6.7%	(28)

Total Fund Since Inception Date Net Rate Of Return (07/01/1988)   8.57%

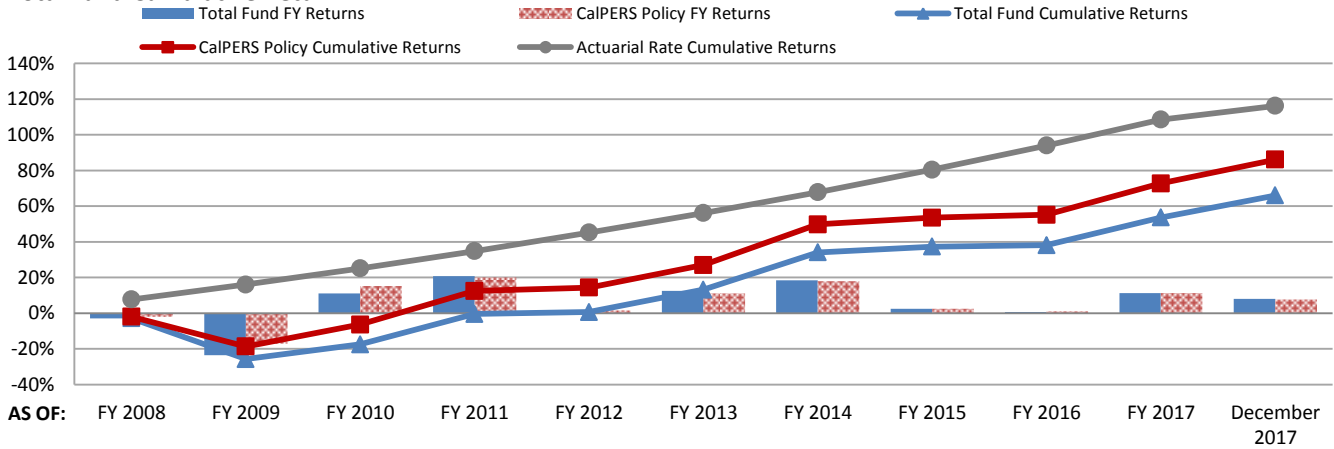|	FYTD Net Return	FYTD Excess BPS	1-Yr Net Return	1-Yr Excess BPS	3-Yr Net Return	3-Yr Excess BPS	5-Yr Net Return	5-Yr Excess BPS	10-Yr Net Return	10-Yr Excess BPS	20-Yr Net Return	20-Yr Excess BPS
Total Fund (TF)	8.1%	35	15.7%	25	7.6%	(0)	9.0%	19	4.9%	(114)	6.7%	(28)
TAP[1]	2.7%	-	5.0%	-	2.6%	-	-	-	-	-	-	-
TF Plus TAP	8.1%	-	15.7%	-	7.6%	-	9.0%	-	4.9%	-	6.7%	-

[1] Terminated Agency Pool (TAP) funded in July 2013 and exists to provide benefit payments to members who are employees of agencies that have terminated their contract with CalPERS.

[2] The notation "N/M" indicates that the return is not meaningful as Private Asset performance is measured on a quarterly cycle.
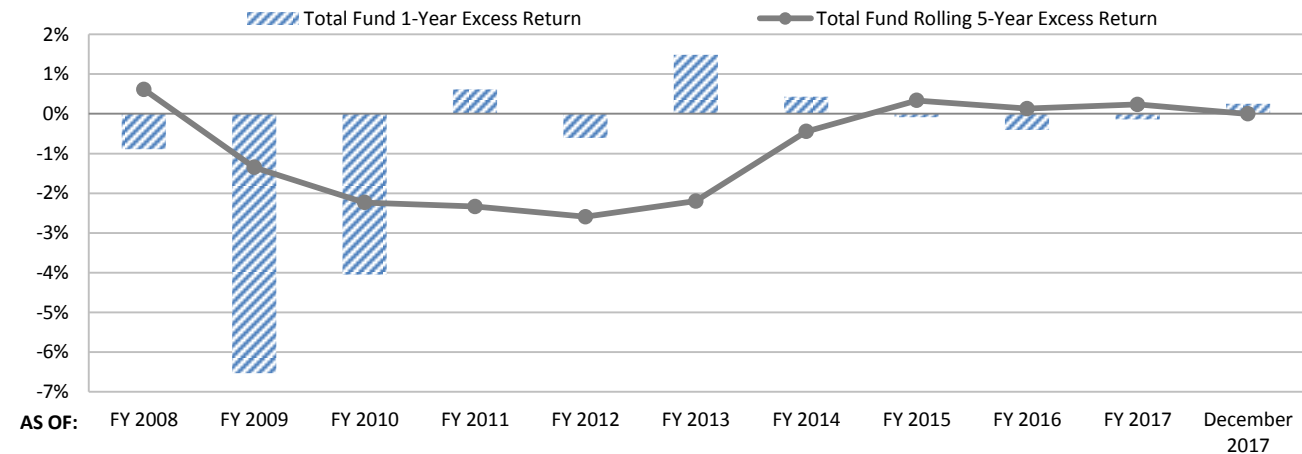
[3] TLPM includes Multi Asset Class, Completion Overlay, and Risk Mitigation portfolios.

[4] OTHER PERF includes Absolute Return Strategies and Other Plan Level portfolios.

Total Fund Cumulative Return

Legend: Total Fund FY Returns; CalPERS Policy FY Returns; Total Fund Cumulative Returns; CalPERS Policy Cumulative Returns; Actuarial Rate Cumulative Returns

AS OF: FY 2008, FY 2009, FY 2010, FY 2011, FY 2012, FY 2013, FY 2014, FY 2015, FY 2016, FY 2017, December 2017

Total Fund Rolling Excess Return

Legend: Total Fund 1-Year Excess Return; Total Fund Rolling 5-Year Excess Return

AS OF: FY 2008, FY 2009, FY 2010, FY 2011, FY 2012, FY 2013, FY 2014, FY 2015, FY 2016, FY 2017, December 2017

Total Fund Risk

Investment Belief 9: Risk to CalPERS is multi-faceted and not fully captured through measures such as volatility or tracking error. CalPERS shall develop a broad set of investment and actuarial risk measures and clear processes for managing risk. The path of returns matters, because highly volatile returns can have unexpected impacts on contribution rates and funding status.

Overview

Risk management is central to managing the assets of CalPERS and to achieving the strategic objectives. A framework for risk management is established through the adoption of the Total Fund Investment Policy which includes investment policies for total fund strategic asset allocation, individual asset classes and portfolios with appropriate benchmarks and reasonable risk limits for the implementation of the risk program. The level of risk assumed will be monitored and reported using selected risk metrics as required in the policy.

Risk Measure	12/31/2017	6/30/2017	Explanation of Risk Measures:
Forecast Volatility			The total (absolute) risk of the Total Fund is commonly defined through volatility as the annualized standard deviation of the fund's total return distribution. The expected arithmetic return of the Total Fund is 6.5%. Thus, there is about two-thirds probability that the Total Fund return over the next year will be between -0.9% and 13.9%, and a 95% probability that the fund will return between -8.3% and 21.3%.
Portfolio	7.4%	8.1%	
Benchmark	7.0%	7.8%	
Forecast Tracking Error			Forecast tracking error is the difference in risk between a managed portfolio and benchmark, measured as the annualized standard deviation of the differential return between the portfolio and an equal investment in the benchmark. There is about two-thirds probability that the Total Fund excess return will fall within 0.6% above or below the policy benchmark return, and 95% probability the return of the Total Fund will fall within 1.2% above or below the policy benchmark return.
Portfolio	0.6%	0.5%	
Value at Risk (1-year, 95%)[1]			Value at Risk (VaR) characterizes the potential loss in a portfolio over a given period for a chosen probability level. There is a 1 in 20 chance that the Total Fund will experience a drawdown greater than the specified amount over a 1-year period.
Portfolio	$19.9 B	$22.2 B	
Expected Shortfall (1-year, 95%)[1]			Expected shortfall measures the magnitude of loss in an event outside of a specified VaR confidence level and mathematically it is the mean of the tail distribution. The expected shortfall of the portfolio over a 1-year horizon and 95% confidence level is the specified amount.
Portfolio	$30.8 B	$33.2 B	

	Risk and Return Summary						
December 31, 2017	**Portfolio Risk**			**Active Risk**			
Asset Class	5-Year Realized Net Return(%)	5-Year Realized Volatility (%)[2]	1-Year Projected Volatility (%)	5-Year Active Return(%)	5-Year Realized Tracking Error (%)[2]	1-Year Projected Tracking Error (%)	5-Year Realized Information Ratio[3]
Growth	11.9%	8.4%	10.9%	(0.5%)	1.8%	0.6%	(0.3)
Global Equity	11.8%	10.0%	10.8%	0.2%	0.3%	0.2%	0.7
Private Equity	12.6%	4.1%	12.7%	(2.7%)	6.2%	3.3%	(0.4)
Income	3.3%	4.9%	5.4%	0.8%	0.6%	0.3%	1.3
Real Assets	10.4%	4.7%	10.0%	0.6%	4.8%	2.3%	0.1
Real Estate	10.9%	5.4%	10.7%	0.3%	5.5%	2.0%	0.1
Infrastructure	14.3%	5.2%	7.5%	8.9%	5.0%	7.8%	1.8
Forestland	(0.1%)	5.3%	14.7%	(7.3%)	4.3%	8.6%	(1.7)
Inflation	(2.0%)	6.0%	7.4%	0.6%	0.8%	0.3%	0.7
Liquidity	0.4%	1.0%	0.1%	(0.2%)	0.5%	0.1%	(0.3)
TLPM	-	-	6.7%	-	-	6.7%	-
Other PERF	-	-	5.9%	-	-	5.9%	-
Total Fund	9.0%	5.6%	7.4%	0.2%	1.2%	0.6%	0.2

[1] VaR and Expected Shortfall are adjusted to account for the expected return of the Total Fund

[2] Realized Volatility and Tracking Error for private asset classes is computed from quarterly net returns

[3] Information ratios for private assets may not be meaningful or comparable to public assets as their returns are based on infrequent valuations