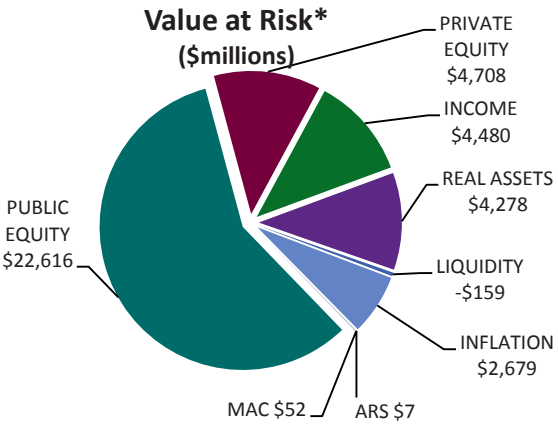
CIO Total Fund Performance & Risk Report
RISK MANAGEMENT SUMMARY

Period Ending November 30, 2016

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.*

Total Fund Forecast Volatility Trends (%)				
	Policy Limit	Current 11/30/2016	Last Qtr 9/30/2016	Last Year 11/30/2015
Total	n/a	9.3	9.7	9.9
Benchmark	n/a	8.9	9.9	9.5
Tracking Error	< 1.5%	0.6	0.6	0.8
Allocation	< .75%	0.0	0.4	0.2
Selection	n/a	0.6	0.2	0.7



Comments:

Forecast Total Volatility of the PERF has decreased by 62 bps over the last year, which reflects the change in the interim asset allocation to reduce the Total Fund risk. During that period, Forecast Tracking Error has been in the 50-85 bps range.

Asset Class	Market Value ($millions)	Total Forecast Volatility (%)	% Contribution to Total Vol	Tracking Error (%)	Value at Risk* ($millions)	Conditional VaR* ($millions)
PUBLIC EQUITY	$ 140,805	13.9%	68.0%	0.3%	$ 22,616	$ 30,145
PRIVATE EQUITY	$ 25,710	18.5%	14.9%	4.2%	$ 4,708	$ 6,583
INCOME	$ 54,748	6.1%	1.8%	0.7%	$ 4,480	$ 5,999
REAL ASSETS	$ 32,781	11.9%	10.8%	2.7%	$ 4,278	$ 5,823
LIQUIDITY	$ 13,908	0.0%	0.0%	0.1%	$ (159)	$ (158)
INFLATION	$ 28,292	7.8%	4.3%	0.7%	$ 2,679	$ 3,490
ARS	$ 298	5.5%	0.0%	5.6%	$ 7	$ 14
MAC	$ 1,185	6.6%	0.2%	6.6%	$ 52	$ 82
TOTAL FUND	**$ 299,940**	**9.3%**	**100.0%**	**0.6%**	**$ 28,135**	**$ 39,209**

*1-year, 95% confidence Value at Risk. Conditional Value at Risk measures the mean of the tail distribution beyond the 95% confidence level. Both are adjusted to account for expected returns of each asset class and the PERF using Wilshire June 2016 expected return assumptions.

Due to reporting constraints, all risk statistics are as of November 30, 2016 unless otherwise stated

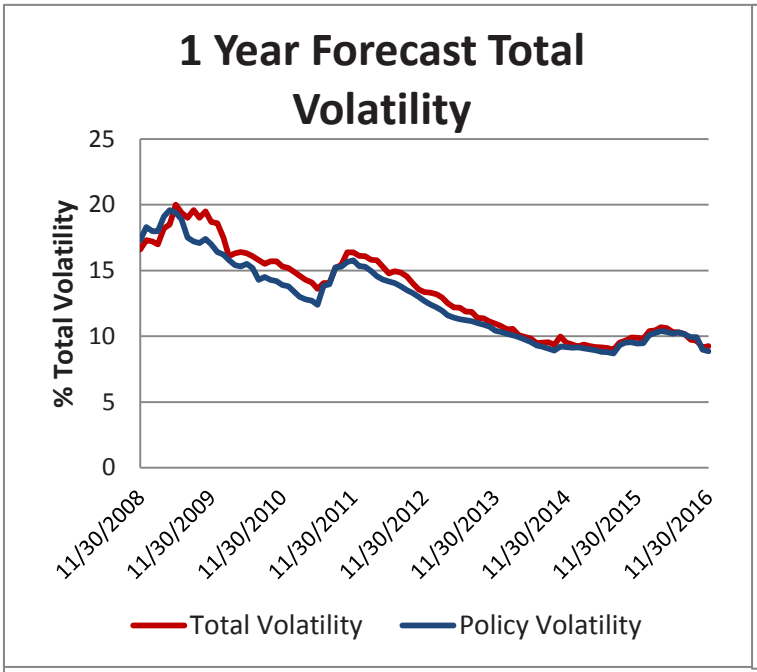
Source: BarraOne / CalPERS

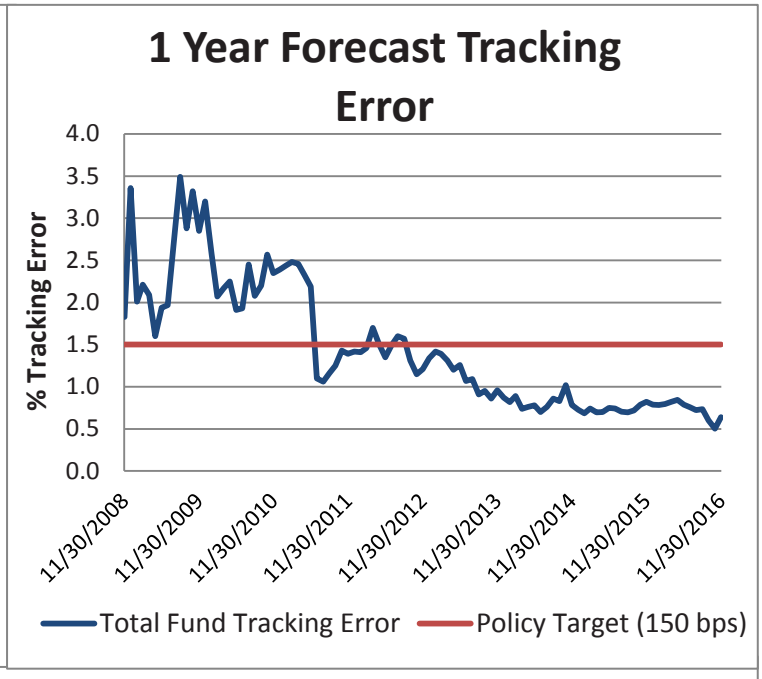
RISK MANAGEMENT TIME SERIES

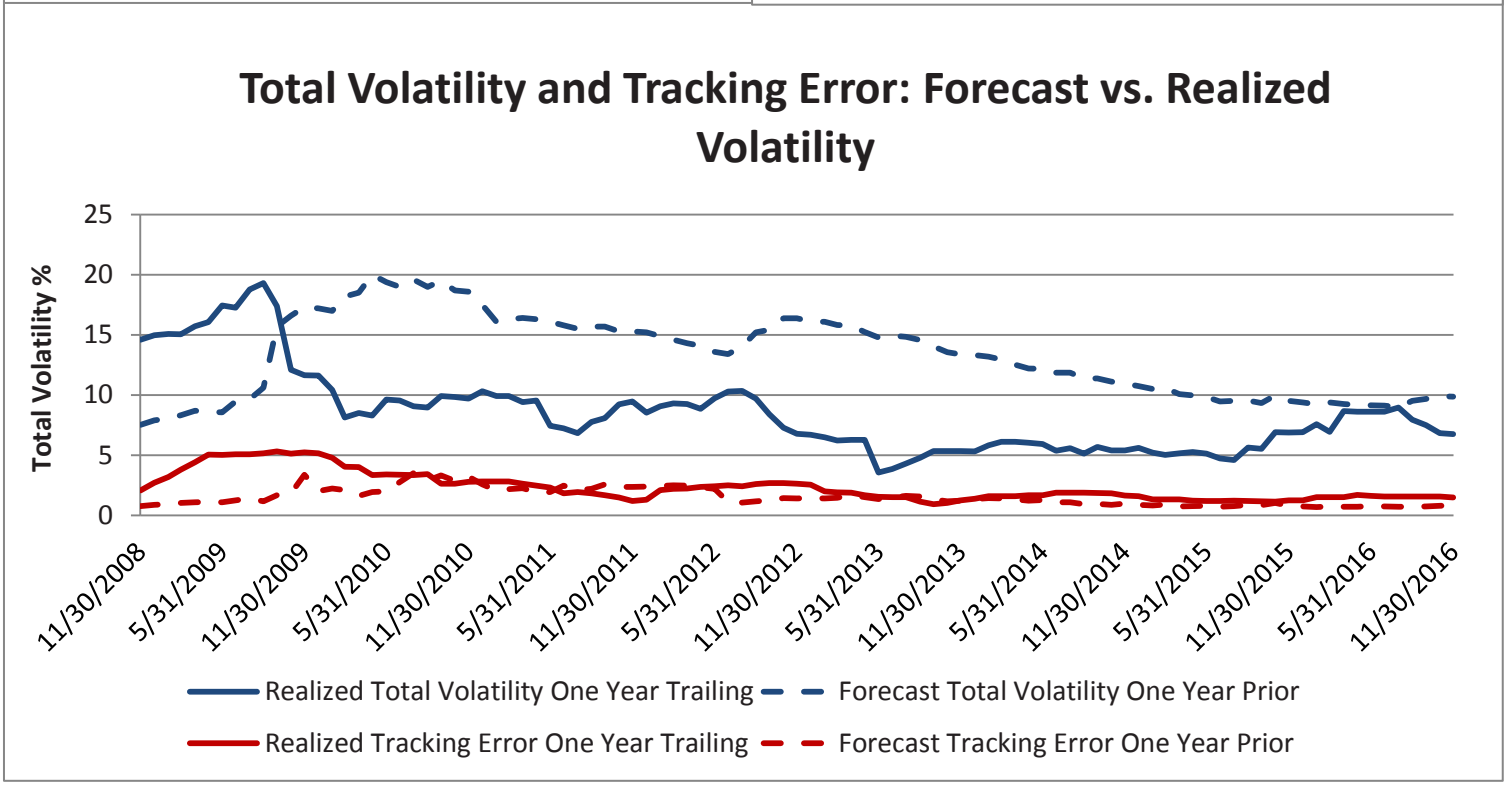
Top Charts:
1 year Forecast Total Volatility and Forecast Tracking Error for the Total Fund are shown.

Bottom Chart:
The bottom chart plots the Forecast Total Volatility and Tracking Error for the Total Fund one year prior to each date vs. the Total Volatility and Tracking Error realized for that date. The graph shows the lagged nature of long term risk models that incorporate a larger backward estimation window which you can see from the realized volatility leading the forecast from the model and highlights the importance of looking at changes in realized volatility that may indicate a deviation from capital markets assumptions.

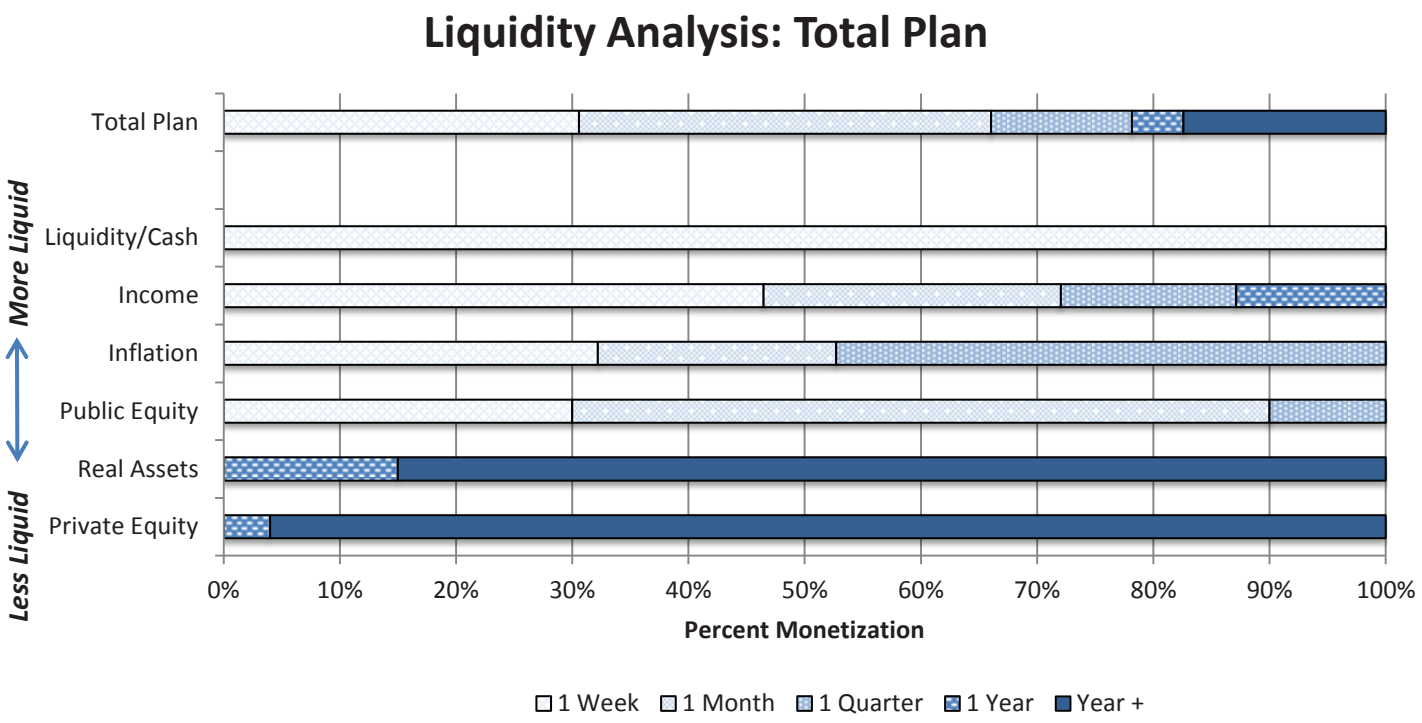
Source: BarraOne , SSB, CalPERS







LIQUIDITY

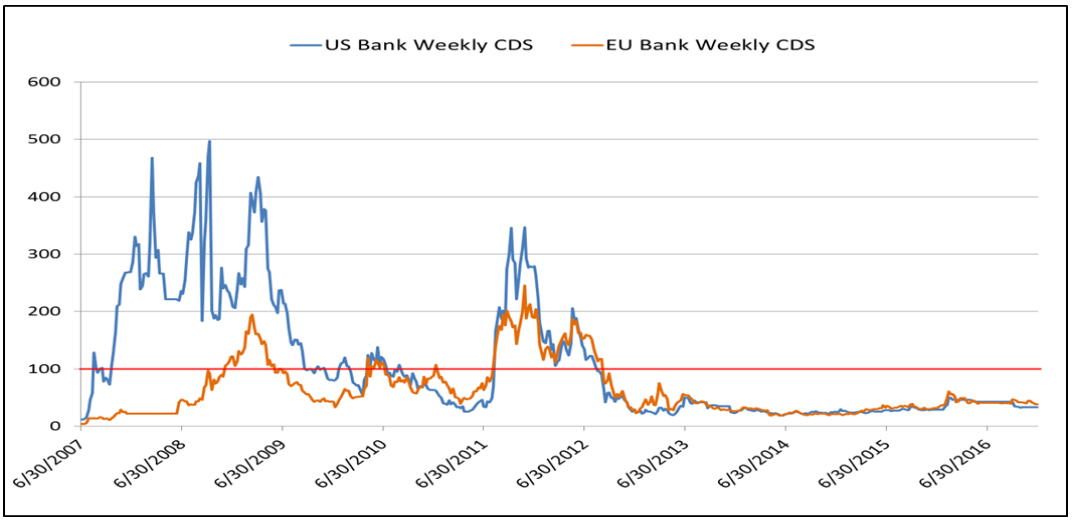


Transactional liquidity is estimated for each asset class /strategy based on the current market environment while also accounting for legal structures or other factors that may impact liquidity. *Source: SSB, CalPERS*

	PERF LIQUIDITY SNAPSHOT As of January 1, 2017			
		Cash	Expected Cash Flows for 1 Month	
a	Sources Total (cash flow in)	-	$ 1,538,562,160	
b	Uses Total (cash flow out)	-	$ (2,484,394,190)	
c	Contingency Use*		$ (15,040,169)	
d	Total Cash and Cash Equivalents	$ 13,178,656,230		
	Liquidity Coverage Ratio		589%	= (a+d)/-(b+c)
	* Contingency Use is based on a 10 Day, 99% confidence VaR of derivatives positions + contingent exposure estimates			

The Tactical Liquidity snapshot is built from estimates of future cash inflows and outflows up to a 1 year horizon. For this report the 1 month forward period is being shown along with a Liquidity Coverage ratio which can be interpreted as how many times (in this case 5.9 times) our available liquid cash /cash equivalents could cover our projected cash needs over a 1 month forward period assuming normal market conditions. *Source: BarraOne, SSB, CalPERS*

COUNTERPARTY RISK



CDS spreads are regularly monitored for individual CalPERS counterparties. In addition, when aggregate spreads rise above 100 bps additional oversight measures are taken.

Counterparty	Net MTM FORWARDS ($)	Net MTM OPTIONS ($)	Net MTM SWAPS ($)	CalPERS Exposure ($)	Counter Party Exposure ($)	Net MTM Total ($)	Collateral Posted ($)*	Net Credit Net Exposure ($)
Bank of Montreal	1,508			5,057	(3,549)	1,508	0	1,508
Bank of America	(32,533,196)		13,180,779	27,234,310	(46,586,727)	(19,352,417)	33,390,000	14,037,583
BNP Paribas	(2,226,301)	17,458,237	27,565,537	53,591,682	(10,794,209)	42,797,473	(42,700,000)	97,473
Barclays	(250,259)			1,153,022	(1,403,281)	(250,259)	0	(250,259)
Citigroup	17,216,774	(13,913)	7,871,744	30,665,748	(5,591,143)	25,074,605	(25,950,000)	(875,395)
Canadian Imperial Bank of Commerce			8,305,389	8,305,389		8,305,389	(9,860,000)	(1,554,611)
Credit Suisse International	37,574,527	4,007		37,645,938	(67,404)	37,578,534	(29,200,000)	8,378,534
Deutsche Bank	(106,985)			1,723	(108,708)	(106,985)	130,000	23,015
Goldman Sachs Bank			1,373,491	1,391,420	(17,929)	1,373,491	(850,000)	523,491
Goldman Sachs Intl.	24,144,987	12,533,329	78,606,367	160,352,157	(45,067,474)	115,284,683	(130,800,000)	(15,515,317)
HSBC	13,357,650		605,957	13,979,471	(15,864)	13,963,607	(13,300,000)	663,607
JPMorgan Chase Bank	5,186,275	35,464,084	46,625,646	94,918,188	(7,642,183)	87,276,005	(97,850,000)	(10,573,995)
Morgan Stanley Capital Group			5,824,511	5,824,511		5,824,511	0	5,824,511
Morgan Stanley Capital Service	9,783,930		1,050,835	11,849,349	(1,014,584)	10,834,765	(16,350,000)	(5,515,235)
Standard Chartered Bank	(344,802)			2,463	(347,265)	(344,802)	960,000	615,198
Societe Generale	3,825,252	(197,644)	9,497,643	19,814,100	(6,688,849)	13,125,251	0	13,125,251
State Street	(12,162,977)			751,277	(12,914,254)	(12,162,977)	15,290,000	3,127,023
UBS AGG	(3,325,127)				(3,325,127)	(3,325,127)	0	(3,325,127)
Wells Fargo			24,744,125	24,744,125		24,744,125	(29,380,000)	(4,635,875)
Grand Total	60,141,256	65,248,100	225,252,024	492,229,930	(141,588,550)	350,641,380	(346,470,000)	4,171,380

**As of 12/31 Counterparties posted 396mm to CalPERS which includes Internal and External Collateral*

Above: Total market value exposure and net credit exposures are monitored for all of our OTC (over-the-counter) positions. The green check box in the OTC exposure table indicates that the total market value exposure is within our procedural tolerances.
Source: Blackrock, CalPERS

Below: FCM (Futures Commission Merchant) exposures are monitored for how much initial margin we have posted with our FCM in addition to reviewing key metrics that provide some insight on the FCM's risk profile such as Excess Net Capital (amount of additional capital the FCM has to support the business) and customer assets. Large changes in these metrics could be an indicator of potential credit or operational issues with the FCM and would trigger an internal review. *Source: CalPERS, CFTC*

FUTURES CLEARING MERCHANT EXPOSURE

Futures Commission Merchant	Collateral Posted	Procedure Check	Excess Net Capital	Procedure Check	Customers' Assets	Procedure Check
MERRILL LYNCH PIERCE FENNER & SMITH INCORPORATED	73,246,740	✓	9,945,253,297	✓	14,429,012,277	✓
CITIGROUP GLOBAL MARKETS INC	311,770,210	✓	5,148,101,240	✓	8,113,702,434	✓

**As of December 31, 2016*

Total Fund Leverage Report

as of 12/31/16

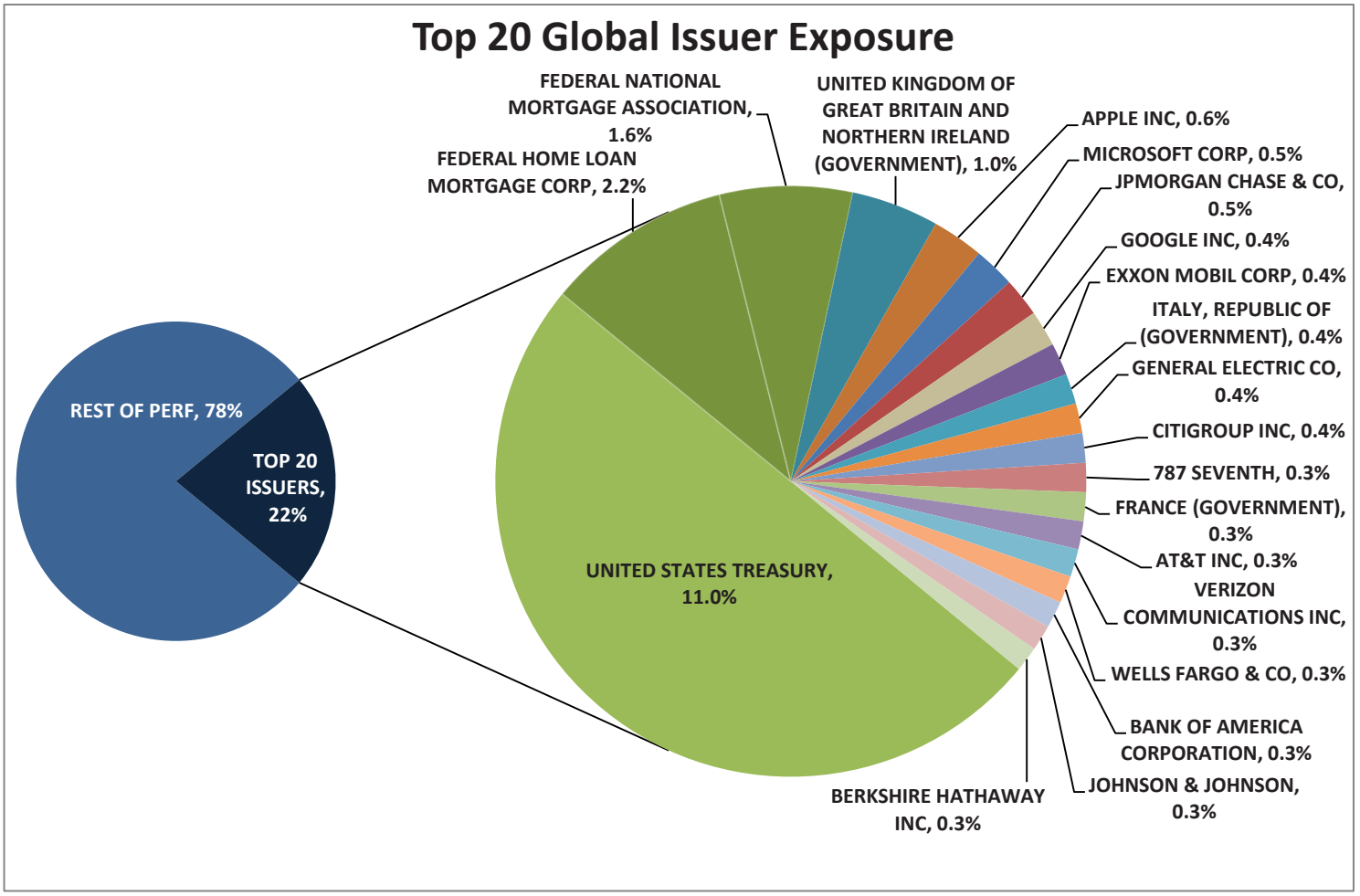
			Leverage Sources							
			CalPERS controlled leverage deployment ($Billions)						*Leverage embedded in company structure or investment vehicle ($Billions)*	
Asset Class	**Net Market Value ($Billions)**	**Notional Exposure**	**Non Recourse Debt**	**Recourse Debt[4]**	**Contingent Claim**	**Policy Leverage Calc %[10]**	**Policy Limit**	**Embedded Leverage Sources[4,6]**	**Total Gross Exposure[8] ($Billions)**
Public Equity[2,3]	143.9	5.1	-	-	-	4%	10%	53.0	$ 202.1
Private Equity[5]	25.4	-	-	-	-	-	-	10.4	35.8
Income	57.1	2.2	-	-	-	4%	10%		59.3
Liquidity	13.2	-	-	-	-	0%	2%		13.2
Real Estate	27.9	-	13.0	0.005	-	32%	50%		40.9
Infrastructure	3.1	-	2.6	-	-	45%	65%		5.7
Forestland	2.0	-	0.6	-	-	23%	50%		2.6
Inflation Linked	28.7	-	-	-	-	-	-		28.7
ARS (incl. MAC)[9]	1.5	-	-	-	-	-	-		1.5
Transition + Overlay	0.0	-	-	-	-	-	-		0.0
Total Fund	$ 302.8	7.4	16.2	0.005	-	-	-	63.4	$ 389.8

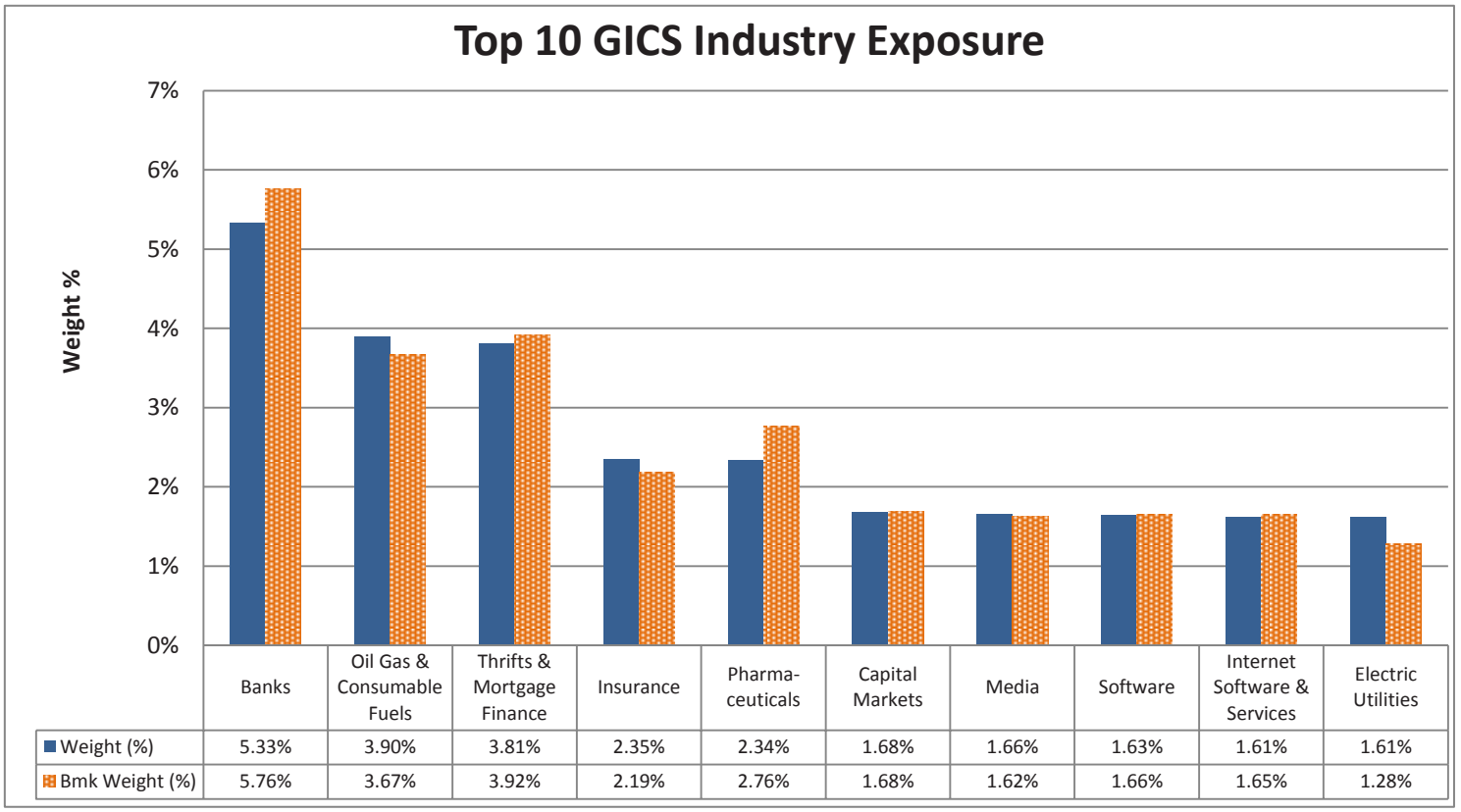
Programs	**Net Market Value ($Billions)**	**Notional Exposure**	**Non Recourse Debt**	**Recourse Debt**	**Contingent Claim**	**Policy Leverage Calc %**	**Policy Limit**	**Embedded Leverage Sources**	**Total Gross Exposure[8] ($Billions)**
Credit Enhancement[6]	-	-	-	-	0.3	-	-	-	0.3
Asset Based Lending[7]	-	-	-	-	-	-	-	-	-
Securities Lending[1]	-	1.4	-	-	-	14%	70%	-	1.4
Total- Unfunded Programs/Overlays	-	1.4	-	-	0.3	-	-	-	$ 1.7
Total Asset Class + Programs	$ 302.8	8.8	16.2	0.005	0.3	-	-	63.4	$ 391.4

1. Securities Lending notional exposure is the dollar amount of reinvested capital with maturity greater than 90 days. Policy Leverage % for Securities Lending is calculated as the notional exposure divided by the total size of the program. The size of the Securities Lending program as of 12/13/16 was $10.3 Billion.
2. Public Equity Notional Exposure is the net notional value of derivatives that are not backed by cash like instruments.
3. Embedded leverage represented for Public Equity is non-recourse debt. This amount is estimated using the average LT Debt/Capital ratio (currently at 36.9%) for Public Equity.
4. Recourse Debt in Real Estate decreased by $24 Million from the prior period.
5. Embedded leverage for Private Equity is non-recourse debt exposure at the investment company level or within commingled funds. This is estimated using the average Net Debt/Enterprise Value ratio (currently estimated at 40.7%) for all PE holdings as of 12/31/16.
6. Credit Enhancement - exposure is contingent upon default of underlying obligation being insured + estimated recovery ratio on the security.
7. Asset Based Lending - exposure is contingent upon default of underlying obligation + estimated sale of recoverable assets.
8. Total Gross Exposure is the sum of Net Market Value + Leverage Sources (within CalPERS direct control for implementation as well as embedded leverage).
9. ARS is currently being wound down.
10. Policy Calculations - limits for leverage are typically set on leverage source(s) within an asset class/program where deployment is controlled or influenced by internal staff. The below table summarizes the specific policy limits shown in the table above and which leverage source they are specified against.

Asset Class / Program	Leverage Type	Policy Limit
Public Equity	Notional Leverage	10%
Income	Notional Leverage	10%
Real Estate	Non-Recourse + Recourse	50%
Infrastructure	Non-Recourse + Recourse	65%
Forestland	Non-Recourse + Recourse	50%
Securities Lending	Notional Leverage	70%

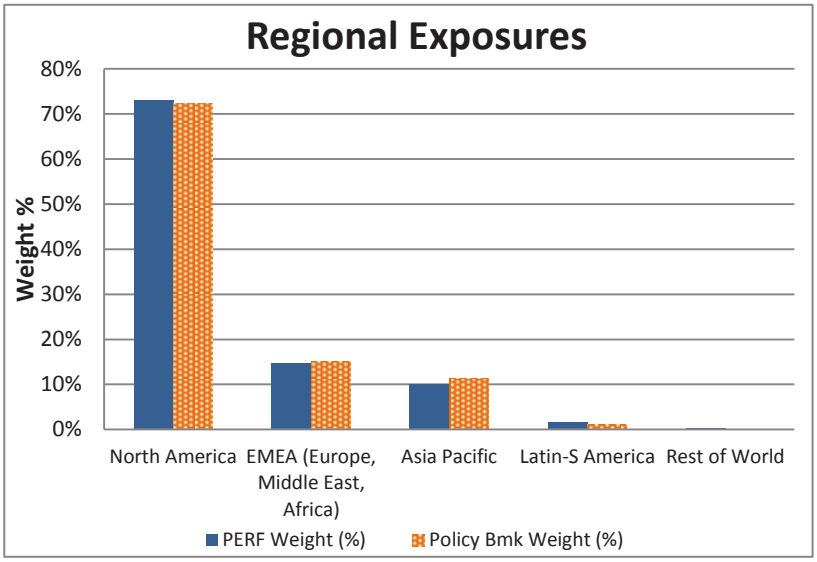
CONCENTRATION REPORT



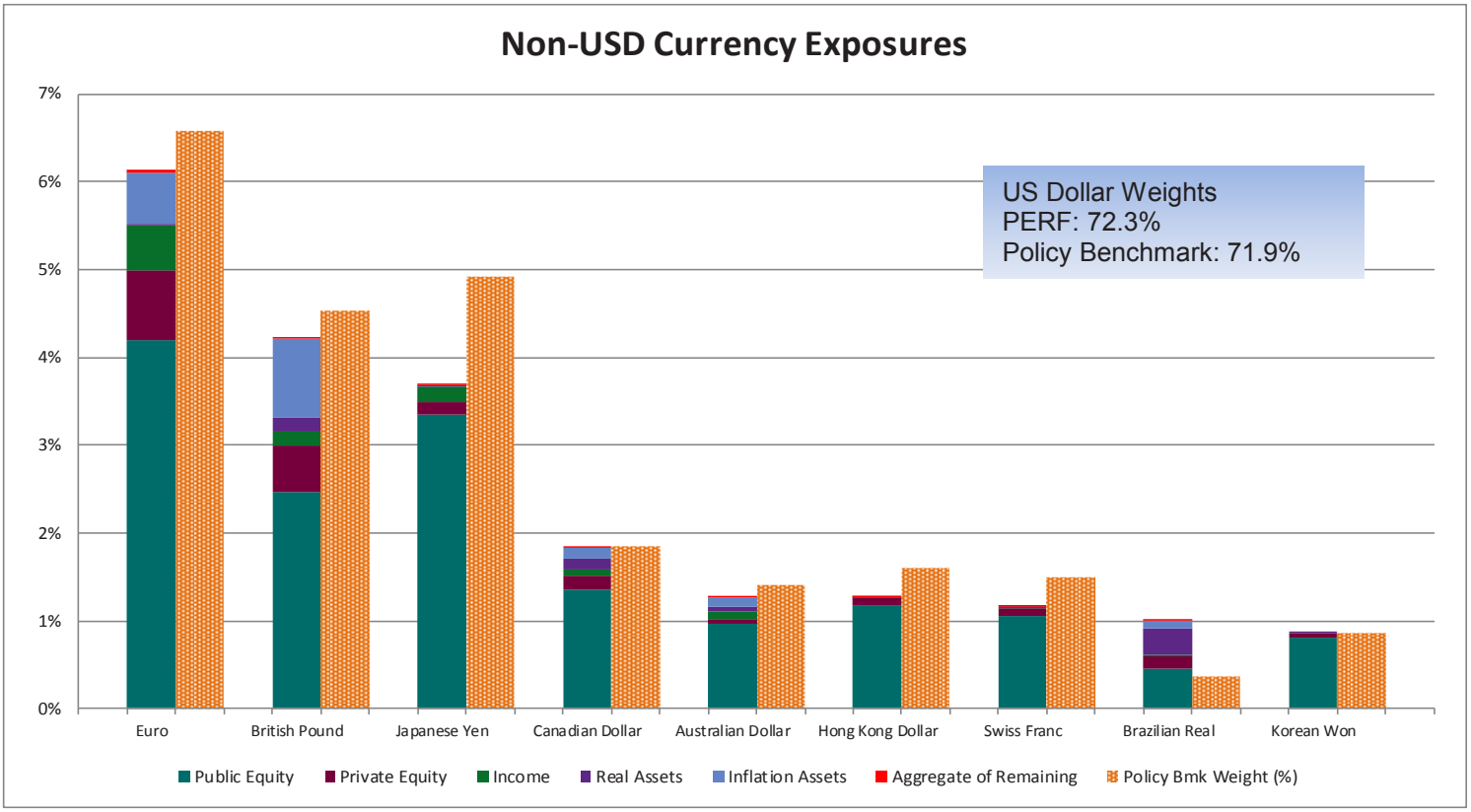


	Banks	Oil Gas & Consumable Fuels	Thrifts & Mortgage Finance	Insurance	Pharma-ceuticals	Capital Markets	Media	Software	Internet Software & Services	Electric Utilities
Weight (%)	5.33%	3.90%	3.81%	2.35%	2.34%	1.68%	1.66%	1.63%	1.61%	1.61%
Bmk Weight (%)	5.76%	3.67%	3.92%	2.19%	2.76%	1.68%	1.62%	1.66%	1.65%	1.28%

CONCENTRATION REPORT



Country	PERF Weight (%)	Policy Bmk Weight (%)	Active Weight (%)
United States	71.20%	70.32%	0.87%
United Kingdom	4.36%	4.70%	-0.35%
Japan	3.69%	4.97%	-1.28%
Canada	1.98%	2.06%	-0.08%
France	1.76%	2.14%	-0.37%
Germany	1.65%	1.94%	-0.30%
Australia	1.25%	1.40%	-0.15%
Switzerland	1.18%	1.53%	-0.36%
Brazil	0.96%	0.39%	0.57%
Korea	0.86%	0.88%	-0.02%



HISTORICAL SCENARIOS

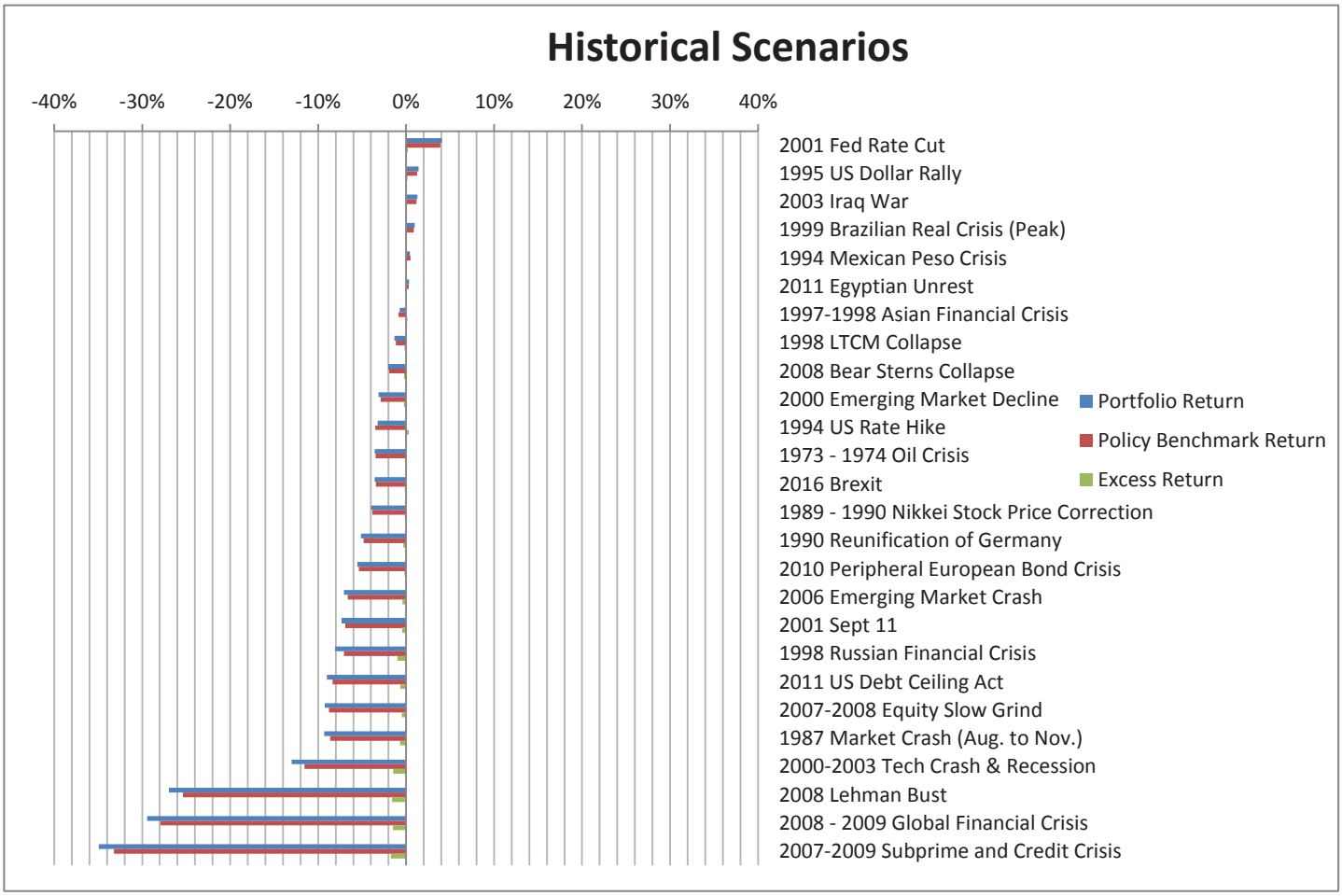
Historical scenarios highlight the sensitivity of the portfolio to past economic regimes or specific events. The scenarios can be used as a "what if" gauge of current portfolio positioning to understand the potential impact if a similar event or regime were to repeat.

Best and Worst Scenarios - Excess Return

Scenario	Portfolio Return	Policy Benchmark Return	Excess Return
1994 US Rate Hike	-3.2%	-3.5%	0.3%
2001 Fed Rate Cut	4.1%	3.9%	0.2%
1995 US Dollar Rally	1.4%	1.2%	0.2%
2008 - 2009 Global Financial Crisis	-29.4%	-27.9%	-1.5%
2008 Lehman Bust	-27.0%	-25.4%	-1.6%
2007-2009 Subprime and Credit Crisis	-35.0%	-33.2%	-1.8%

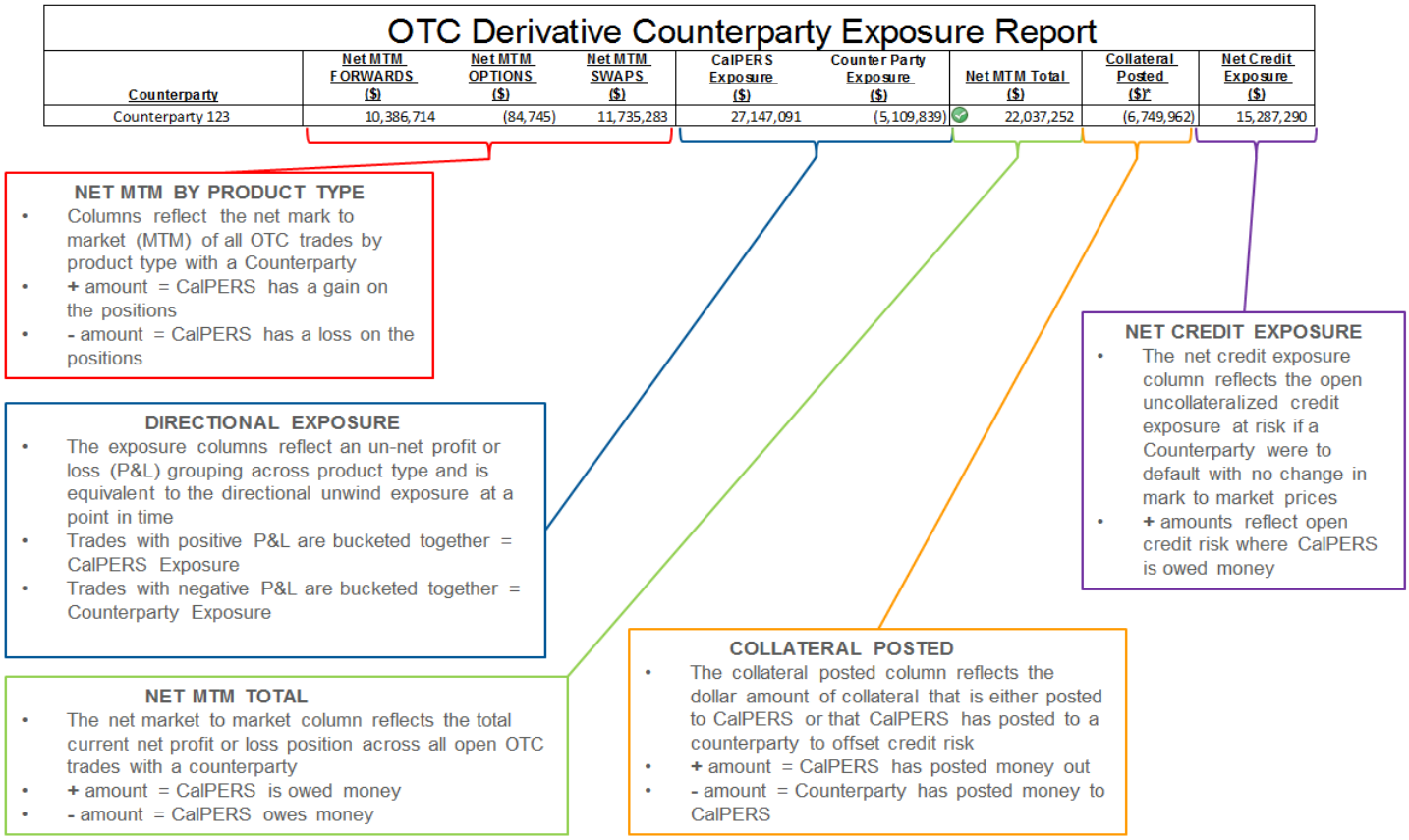
Best and Worst Scenarios - Portfolio Return

Scenario	Portfolio Return	Policy Benchmark Return	Excess Return
2001 Fed Rate Cut	4.1%	3.9%	0.2%
1995 US Dollar Rally	1.4%	1.2%	0.2%
2003 Iraq War	1.3%	1.2%	0.1%
2008 Lehman Bust	-27.0%	-25.4%	-1.6%
2008 - 2009 Global Financial Crisis	-29.4%	-27.9%	-1.5%
2007-2009 Subprime and Credit Crisis	-35.0%	-33.2%	-1.8%



Source: BarraOne / CalPERS

1. How to interpret the OTC Counterparty Risk Exposure section



*Net mark to market (MTM): positions are adjusted to reflect current market values and then summed