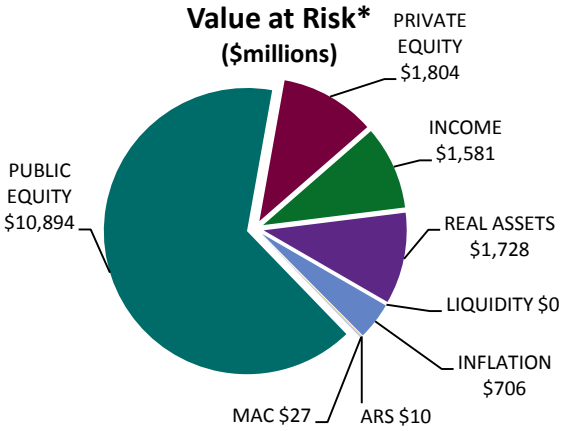
CIO Total Fund Performance & Risk Report
RISK MANAGEMENT SUMMARY

Period Ending May 31, 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 Volatility Trends (%)				
	Policy Limit	Current 5/31/2016	Last Qtr 3/31/2016	Last Year 5/31/2015
Total	n/a	10.3	10.7	9.1
Benchmark	n/a	10.2	10.4	8.8
Active	< 1.5%	0.8	0.8	0.8
Allocation	< .75%	0.0	0.0	0.1
Selection	n/a	0.8	0.8	0.6



Comments:

Forecast Total Volatility for the PERF has increased by 118bps in the past year to 5/31/16 in line with the Policy Benchmark. Forecast Active Volatility has been in the 70-85ps range for the past year.

Asset Class	Market Value ($millions)	Total Volatility (%)	% Contribution to Total Vol	Tracking Error (%)	Correlation**	Value at Risk* ($millions)	Conditional VaR* ($millions)
PUBLIC EQUITY	$ 154,021	14.9%	73.9%	0.3%	0.99	$ 10,894	$ 13,376
PRIVATE EQUITY	$ 26,787	14.5%	11.8%	6.2%	0.92	$ 1,804	$ 2,245
INCOME	$ 58,135	5.2%	1.8%	0.6%	0.17	$ 1,581	$ 2,000
REAL ASSETS	$ 30,190	12.4%	9.7%	4.4%	0.80	$ 1,728	$ 2,215
LIQUIDITY	$ 4,115	0.0%	0.0%	0.1%	0.10	$ 0	$ 0
INFLATION	$ 17,493	8.8%	2.7%	1.5%	0.54	$ 706	$ 876
ARS	$ 396	5.1%	0.0%	5.2%	0.23	$ 10	$ 12
MAC	$ 1,190	4.7%	0.1%	4.7%	0.69	$ 27	$ 33
TOTAL FUND**	**$ 292,337**	**10.32**	**100.0%**	**0.79**	**1.00**	**$ 14,500**	**$ 17,957**

*1 month, 95% confidence Value at Risk. Conditional Value at Risk measures the mean of the tail distribution beyond the 95% confidence level

**Correlations are vs. the entire PERF portfolio

Due to reporting constraints, all risk statistics are as of May 31, 2016 unless otherwise stated

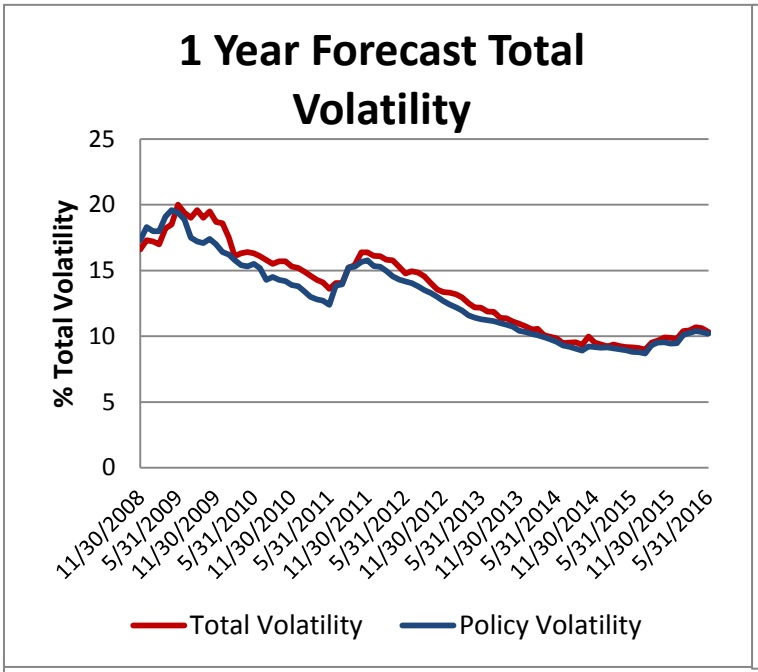
Source: BarraOne / CalPERS

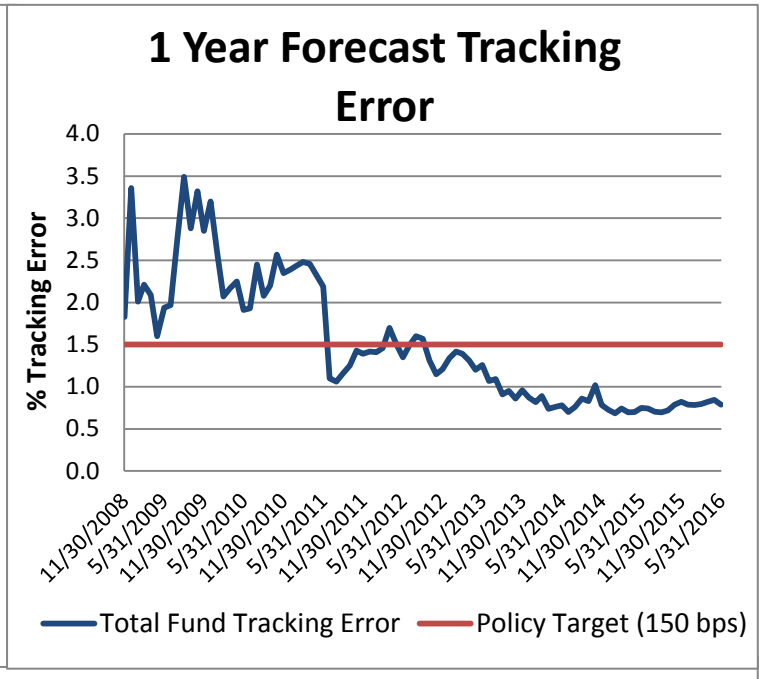
RISK MANAGEMENT TIME SERIES

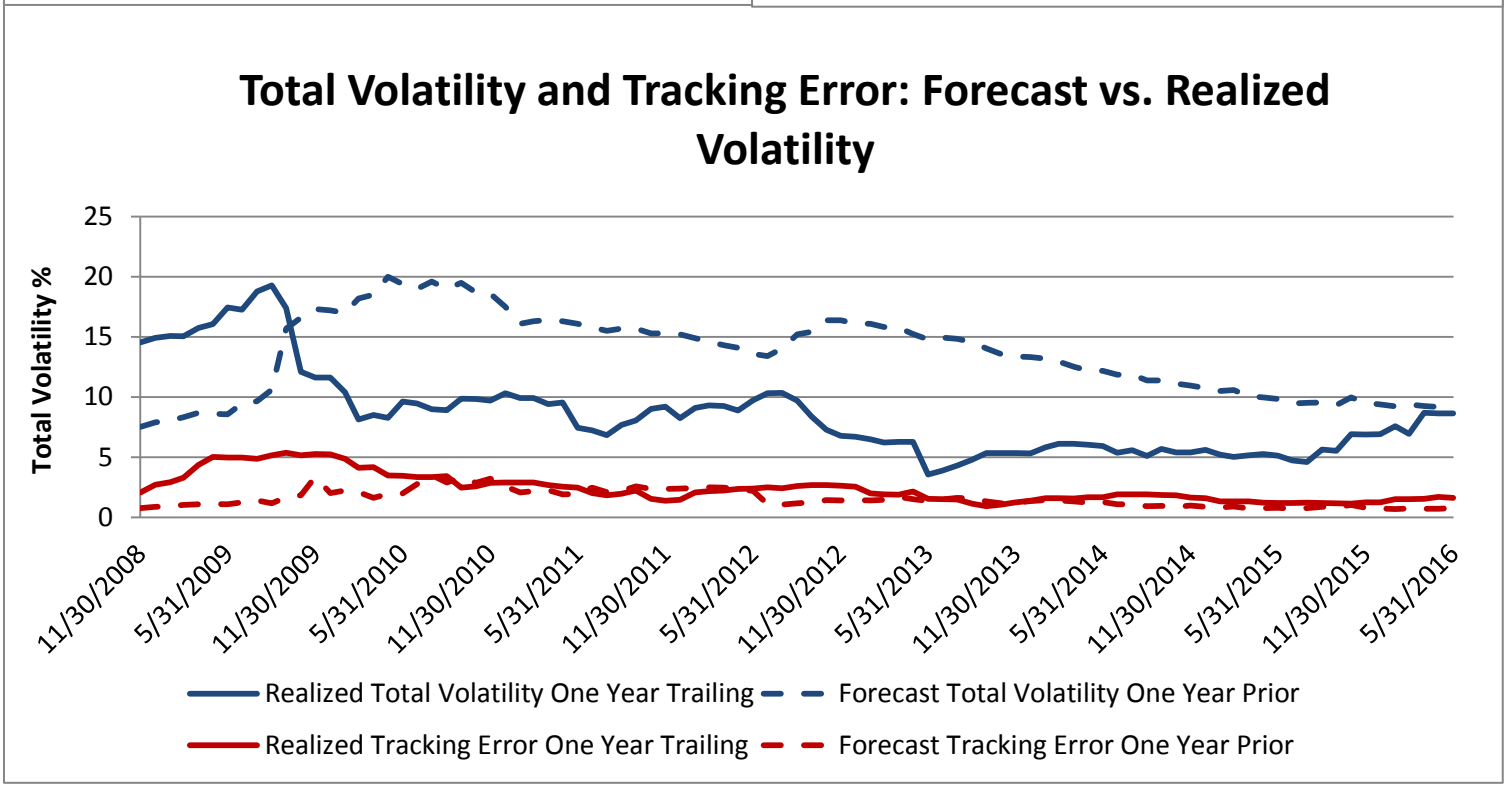
Top Charts:
1 year Forecast Total Volatility and Forecast Tracking Error for the Total Fund are shown.

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.

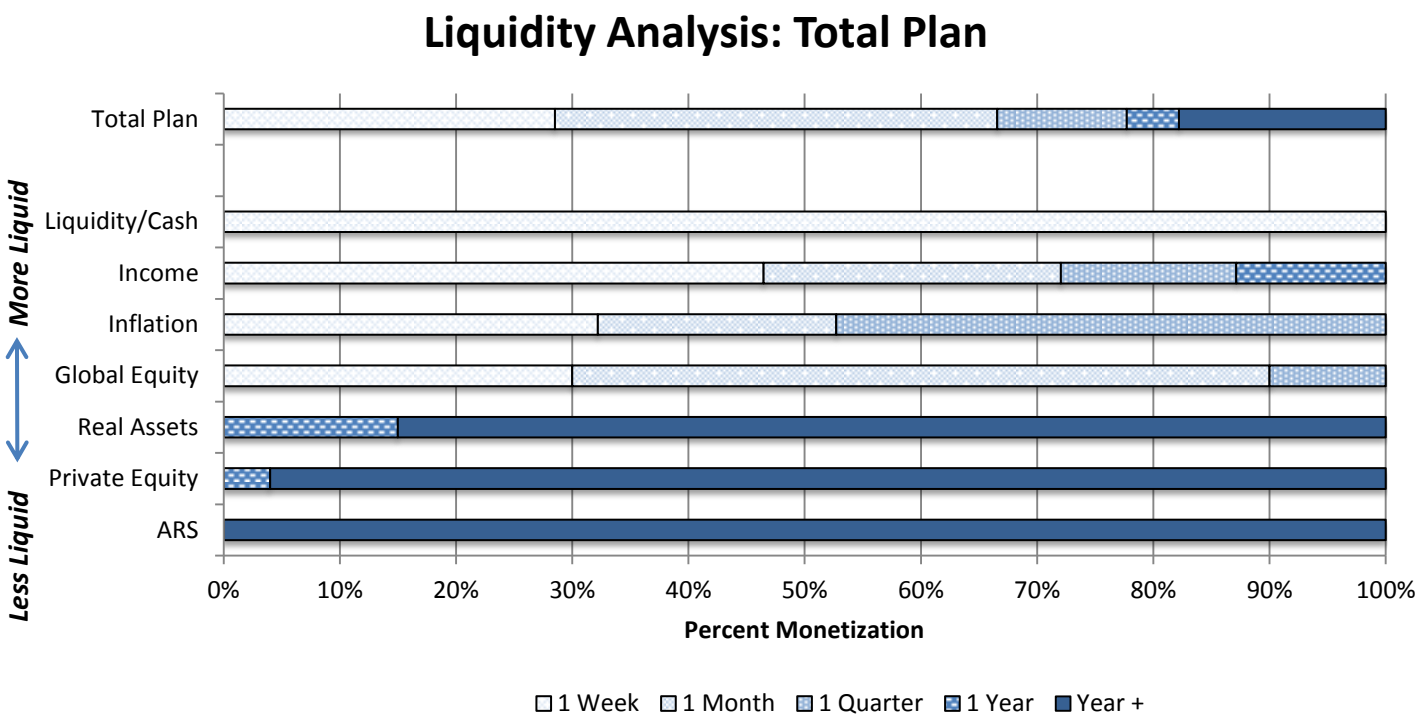
Source: BarraOne , SSB, CalPERS







LIQUIDITY

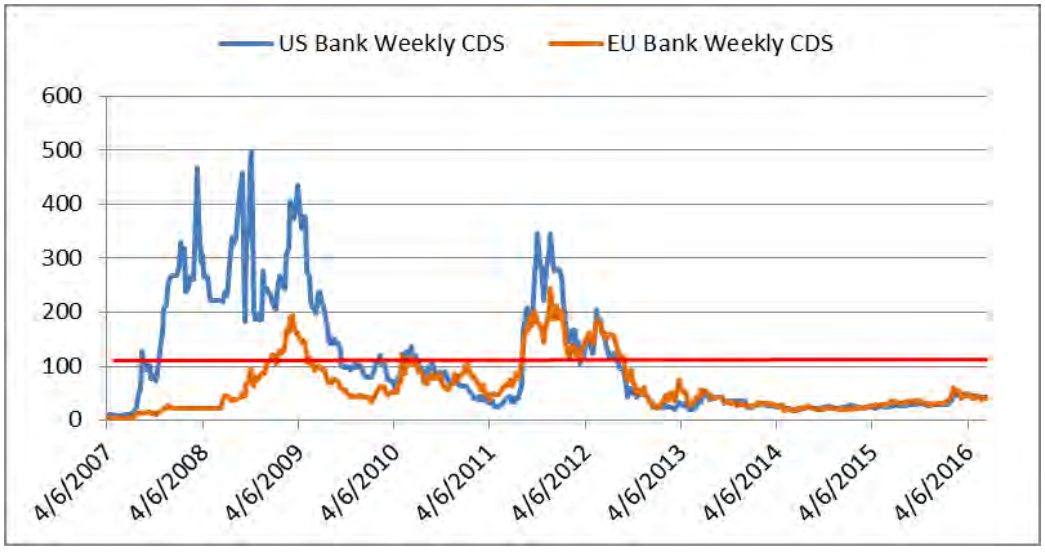


Transactional liquidity is estimated for each asset class /strategy based on the current market environment while also accounting for legal structures or other factors that may impact liquidity. *Source: SSB, CalPERS*

	PERF TACTICAL LIQUIDITY SNAPSHOT As of June 1, 2016			
		Overnight	2 days - EOM	
	Sources:			
a	**Sources Total (cash flow in)**	-	$ 2,011,890,675	
b	**Uses Total (cash flow out)**	-	$ (2,122,028,824)	
c	**Sources in Excess (Deficit) of Uses**		$ (110,138,149)	**= a+b**
d	**Contingency Use***		$ (43,098,824)	
e	**Total Cash and Cash Equivalents**	$ 4,115,445,199	$ 4,005,307,050	
	Liquidity Coverage Ratio		**283%**	**= (a+e)/(b+d)**
	* 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 over 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 2.8 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



Current CDS spreads are tracked for CalPERS counterparties. If the average of the CDS spreads rises above 100bps an internal meeting is held to discuss the change in trend and potential credit risk mitigating actions that might be 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	(1,229,934.00)	426,620.00		514,821.00	(1,318,135.00)	(803,314)	400,000.00	(403,314)
Bank of America	15,159,777.00		10,638,365.00	27,852,735.00	(2,054,593.00)	25,798,142	(23,769,347.53)	2,028,794
BNP Paribas	(5,777,744.00)	21,838,395.00	20,490,217.00	44,899,701.00	(8,348,833.00)	36,550,868	(13,096,645.00)	23,454,223
Barclays	1,104,410.00		-	2,129,616.00	(1,025,206.00)	1,104,410	697,624.04	1,802,034
Citigroup	10,798,997.00		3,563,803.00	19,919,094.00	(5,556,294.00)	14,362,800	(4,334,526.37)	10,028,274
Canadian Imperial Bank of Commerce	247,626.00		4,428,273.00	4,675,899.00		4,675,899	(1,240,000.00)	3,435,899
Credit Suisse International	6,338,495.00		2,135,818.00	8,794,358.00	(320,045.00)	8,474,313	131,033.00	8,605,346
Deutsche Bank	(708,922.00)	(379,648.00)	3,782,298.00	4,267,728.00	(1,574,000.00)	2,693,728	2,647,056.05	5,340,784
Goldman Sachs Bank		(376,935.00)	12,142,912.00	12,142,912.00	(376,935.00)	11,765,977	(9,100,313.33)	2,665,664
Goldman Sachs Intl.	(1,330,934.00)	40,094,900.00	16,632,422.00	61,151,131.00	(5,754,743.00)	55,396,388	(41,100,000.00)	14,296,388
HSBC	5,356,798.00		12,241,373.00	20,940,729.00	(3,342,558.00)	17,598,171	(11,953,163.00)	5,645,008
JPMorgan Chase Bank	(4,437,692.00)	79,652,664.00	17,697,490.00	108,588,537.00	(15,676,075.00)	92,912,462	(81,324,163.86)	11,588,298
Macquarie			3,980,750.00	3,980,750.00		3,980,750	(750,000.00)	3,230,750
Morgan Stanley Capital Service	(10,489,016.00)	(139,120.00)	2,939,914.00	9,390,331.00	(17,078,553.00)	(7,688,222)	9,700,000.00	2,011,778
RBC Capital Markets	(1,261,800.00)			54,782.00	(1,316,582.00)	(1,261,800)	1,680,000.00	418,200
Standard Chartered Bank	168,385.00			169,350.00	(965.00)	168,385	899,273.00	1,067,658
Societe Generale	11,554,206.00	(72,422.00)	2,626,639.00	23,123,900.00	(9,015,477.00)	14,108,423	0.00	14,108,423
State Street	2,427,094.00			3,226,130.00	(799,036.00)	2,427,094	(2,450,000.00)	(22,906)
UBS AGG	764,214.00			1,224,894.00	(460,680.00)	764,214	346,947.00	1,111,161
WestPac Bank	(198,707.00)				(198,707.00)	(198,707)	0.00	(198,707)
Grand Total	28,485,253.00	141,044,454.00	113,300,274.00	357,047,398.00	(74,217,417.00)	282,829,981	(172,616,226.01)	110,213,755

**As of 6/24 Counterparties posted 189mm 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
CITIGROUP GLOBAL MARKETS INC	441,605,710	✓	5,582,015,544	✓	8,752,851,652	✓

**As of June 24, 2016*

LEVERAGE

Total Fund Leverage Report

as of 6/30/16

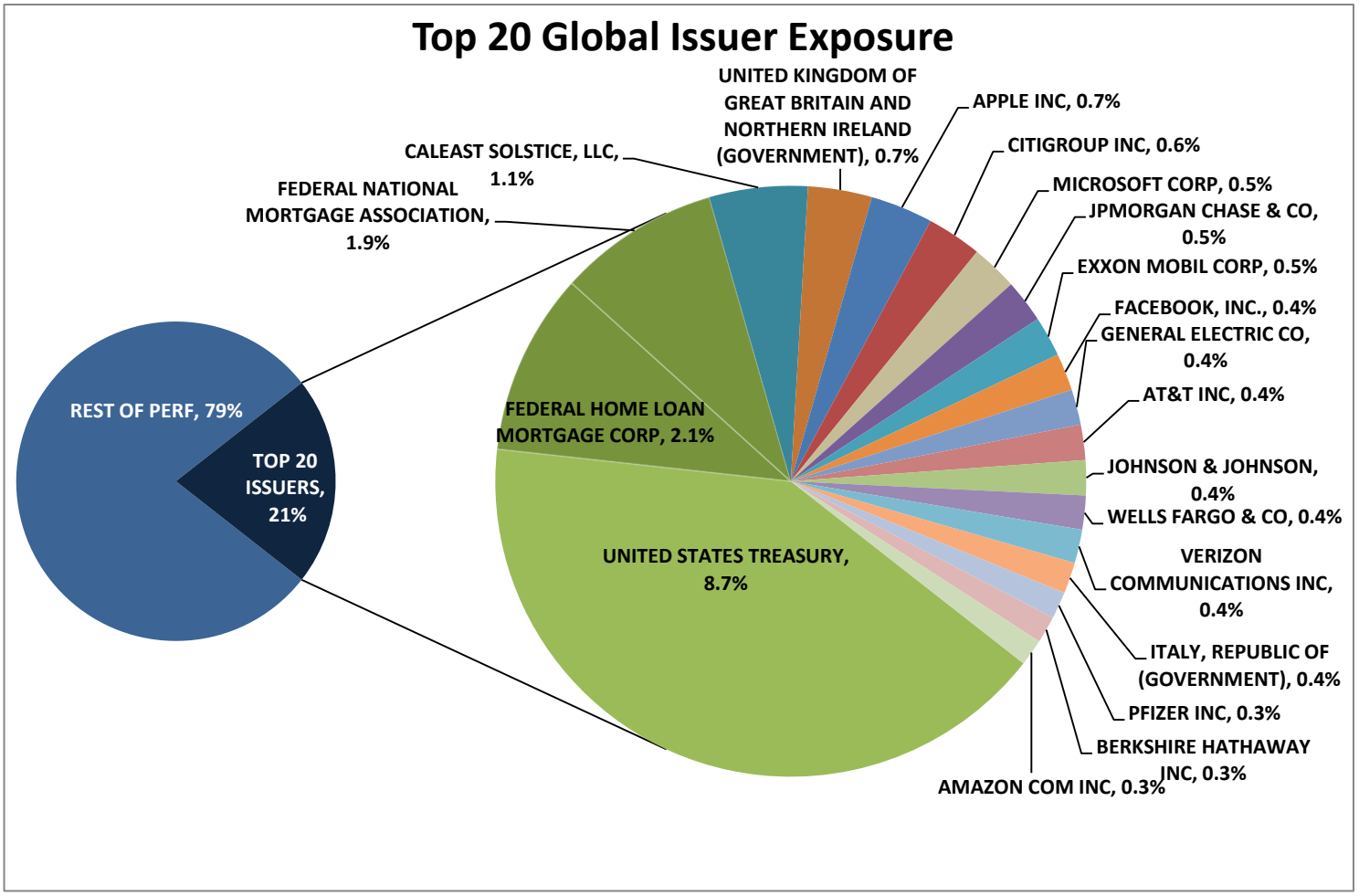
		Leverage Sources							
		CalPERS controlled leverage deployment ($Billions)						*Leverage embedded in company structure or investment vehicle ($Billions)*	
Asset Class	Net Market Value ($Billions)	Notional Exposure	Non Recourse Debt	Recourse Debt[4]	Contingent Claim	Policy Leverage Calc %[10]	Policy Limit	Embedded Leverage Sources[4,6]	Total Gross Exposure[8] ($Billions)
Public Equity[2,3]	153.1	6.3	-	-	-	4%	10%	35.6	$ 195.0
Private Equity[5]	26.4	-	-	-	-	-	-	11.7	38.1
Income	59.9	2.3	-	-	-	4%	10%		62.2
Liquidity	4.5	-	-	-	-	0%	2%		4.5
Real Estate	27.3	-	12.6	0.02	-	32%	50%		39.9
Infrastructure	2.6	-	2.3	-	-	47%	65%		4.8
Forestland	2.0	-	0.6	-	-	23%	50%		2.6
Inflation Linked	17.8	-	-	-	-	-	-		17.8
ARS (incl. MAC)[9]	1.6	-	-	-	-	-	-		1.6
Transition + Overlay	0.0	-	-	-	-	-	-		0.0
Total Fund	$ 295.1	8.6	15.5	0.02	-	-	-	47.3	$ 366.4

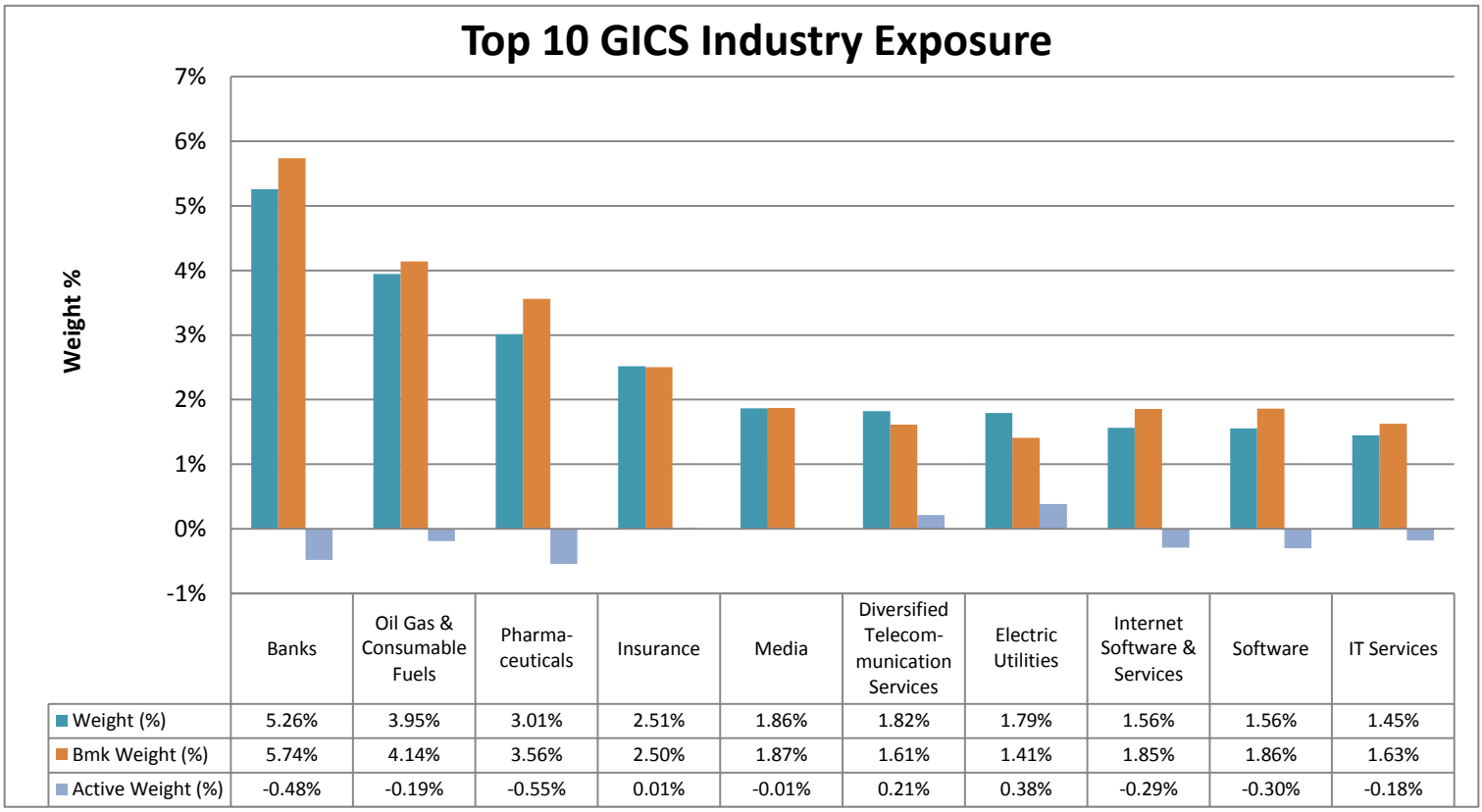
Programs	Net Market Value ($Billions)	Notional Exposure	Non Recourse Debt	Recourse Debt	Contingent Claim	Policy Leverage Calc %	Policy Limit	Embedded Leverage Sources	Total Gross Exposure[8] ($Billions)
Credit Enhancement[6]	-	-	-	-	0.4	-	-	-	0.4
Asset Based Lending[7]	-	-	-	-	-	-	-	-	-
Securities Lending[1]	-	1.8	-	-	-	14%	70%	-	1.8
Total- Unfunded Programs/Overlays		1.8			0.4	-	-	-	$ 2.2
Total Asset Class + Programs	$ 295	10.4	15.5	0.02	0.4	-	-	47.3	$ 368.6

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 6-30 was $12.5 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/Assets ratio (currently at 23%) of the FTSE Global All Cap Index.
4. Recourse Debt in Real Estate increased by $2.5 Million from the prior report.
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 44.2%) for all PE holdings.
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).
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%

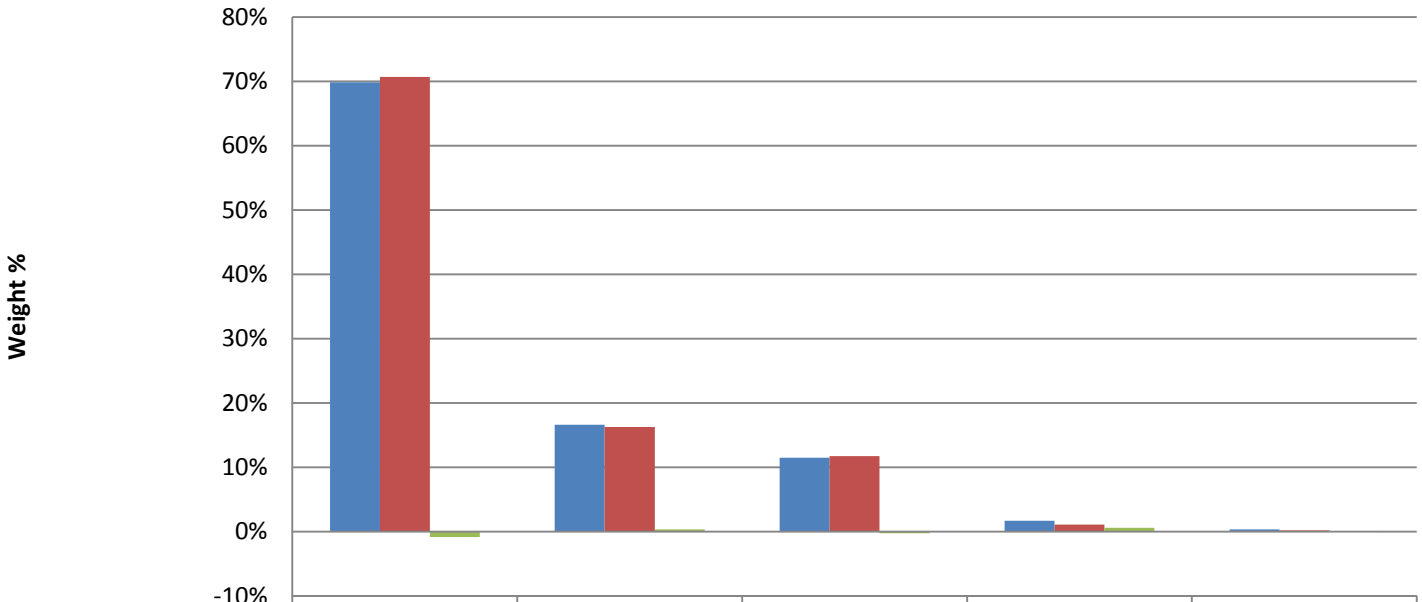
CONCENTRATION REPORT





	Banks	Oil Gas & Consumable Fuels	Pharma-ceuticals	Insurance	Media	Diversified Telecom-munication Services	Electric Utilities	Internet Software & Services	Software	IT Services
Weight (%)	5.26%	3.95%	3.01%	2.51%	1.86%	1.82%	1.79%	1.56%	1.56%	1.45%
Bmk Weight (%)	5.74%	4.14%	3.56%	2.50%	1.87%	1.61%	1.41%	1.85%	1.86%	1.63%
Active Weight (%)	-0.48%	-0.19%	-0.55%	0.01%	-0.01%	0.21%	0.38%	-0.29%	-0.30%	-0.18%

CONCENTRATION REPORT



	North America	EMEA (Europe, Middle East, Africa)	Asia Pacific	Latin-S America	Rest of World
PERF Weight (%)	69.84%	16.63%	11.49%	1.69%	0.35%
Policy Bmk Weight (%)	70.70%	16.26%	11.74%	1.09%	0.22%
Active Weight (%)	-0.86%	0.37%	-0.25%	0.60%	0.13%

Country	PERF Weight (%)	Policy Bmk Weight (%)	Active Weight (%)
United States	67.66%	68.63%	-0.98%
United Kingdom	4.91%	4.76%	0.15%
Japan	4.53%	5.18%	-0.65%
Canada	2.18%	2.06%	0.12%
France	1.95%	2.19%	-0.24%
Germany	1.90%	2.02%	-0.13%
Switzerland	1.40%	1.67%	-0.27%
Australia	1.40%	1.45%	-0.05%
Korea	0.95%	0.88%	0.07%
Brazil	0.84%	0.37%	0.47%

Currency	PERF Weight (%)	Policy Bmk Weight (%)	Active Weight (%)
US Dollar	68.92%	70.16%	-1.24%
Euro	6.92%	7.05%	-0.13%
British Pound	4.73%	4.57%	0.16%
Japanese Yen	4.54%	5.14%	-0.61%
Canadian Dollar	2.02%	1.85%	0.17%
Hong Kong Dollar	1.48%	1.75%	-0.27%
Australian Dollar	1.43%	1.45%	-0.02%
Swiss Franc	1.41%	1.67%	-0.26%
Korean Won	0.94%	0.85%	0.08%
Brazilian Real	0.83%	0.36%	0.47%

HISTORICAL SCENARIOS

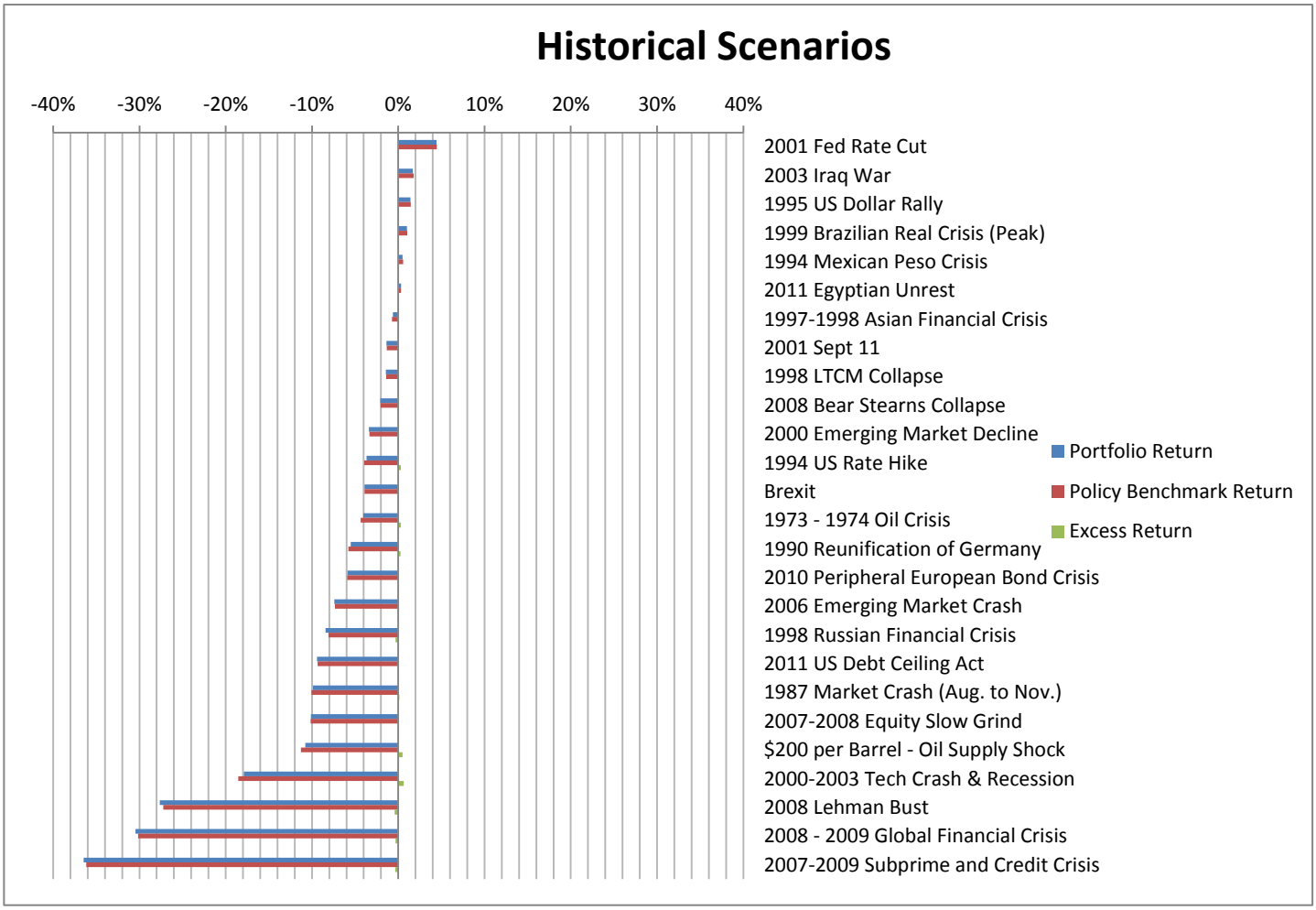
Historical scenarios highlight the sensitivity of the portfolio to past economic regimes or specific events. The scenarios can be used as a "what if" gauge of current portfolio positioning to understand the potential impact if a similar event or regime were to repeat.

Best and Worst Scenarios - Excess Return

Scenario	Portfolio Return	Policy Benchmark Return	Excess Return
2000-2003 Tech Crash & Recession	-17.9%	-18.6%	0.6%
$200 per Barrel - Oil Supply Shock	-10.8%	-11.3%	0.5%
1994 US Rate Hike	-3.7%	-3.9%	0.3%
1998 Russian Financial Crisis	-8.4%	-8.1%	-0.3%
2007-2009 Subprime and Credit Crisis	-36.5%	-36.1%	-0.3%
2008 Lehman Bust	-27.6%	-27.2%	-0.4%

Best and Worst Scenarios - Portfolio Return

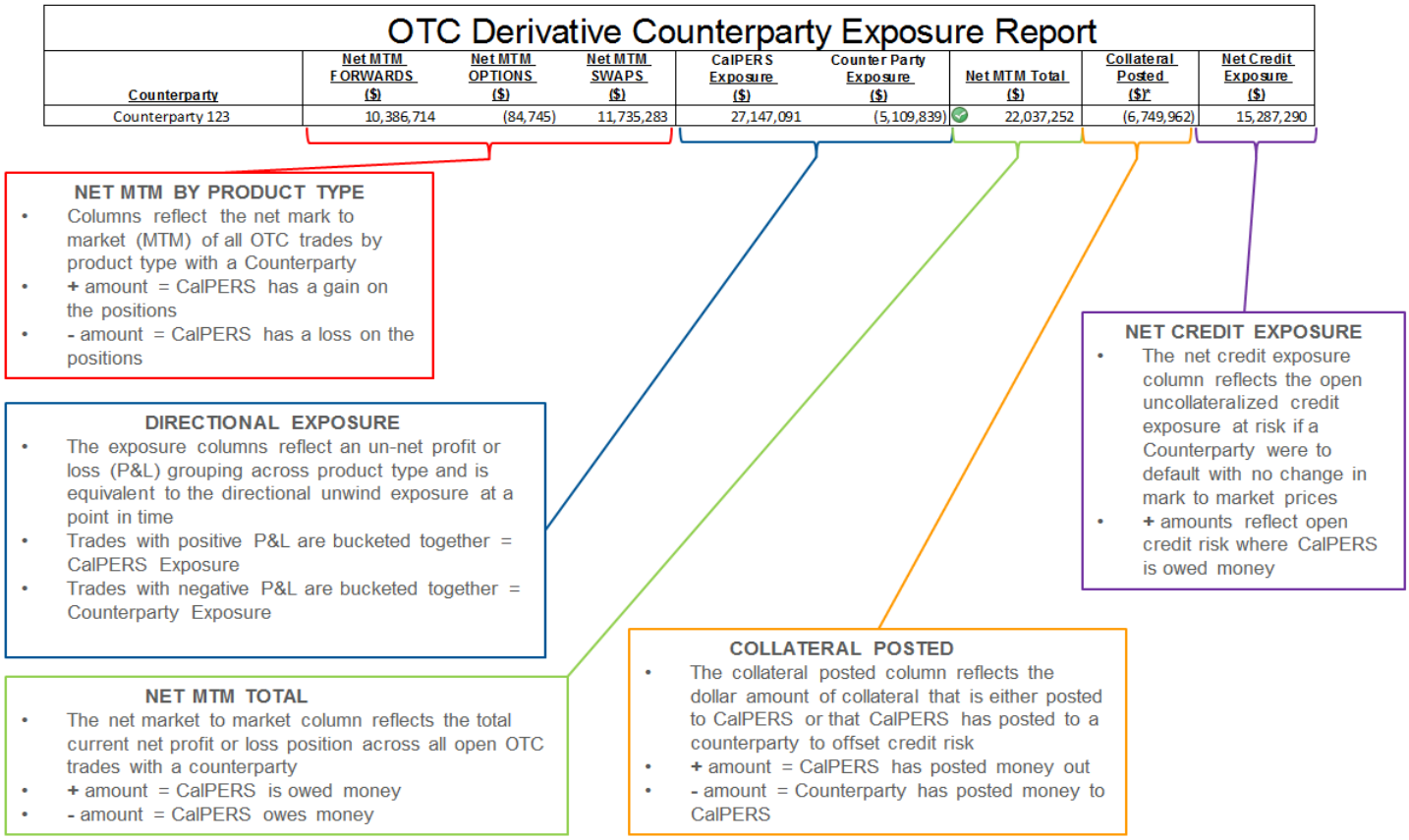
Scenario	Portfolio Return	Policy Benchmark Return	Excess Return
2001 Fed Rate Cut	4.4%	4.5%	0.0%
2003 Iraq War	1.7%	1.8%	-0.1%
1995 US Dollar Rally	1.4%	1.4%	0.0%
2008 Lehman Bust	-27.6%	-27.2%	-0.4%
2008 - 2009 Global Financial Crisis	-30.4%	-30.1%	-0.3%
2007-2009 Subprime and Credit Crisis	-36.5%	-36.1%	-0.3%



Source: BarraOne / CalPERS

Appendix

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