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Wilshire Consulting

California Public Employees' Retirement System

Performance Review – June 30, 2019

Wilshire Consulting

JUNE 2019 ASSET CLASS ASSUMPTIONS

	EQUITY						FIXED INCOME						REAL ASSETS					
		Dev		Global					LT			Dev ex-	Real Estate					
	US	ex-US	Emg	ex-US	Global	Private		Core	Core		High	US Bond	US	Global	Private		Real	US
	Stock	Stock	Stock	Stock	Stock	Equity	Cash	Bond	Bond	TIPS	Yield	(Hdg)	RES	RES	RE	Cmdty	Assets	CPI
COMPOUND RETURN (%)	6.00	6.50	6.50	6.75	6.45	8.35	1.90	3.05	3.45	2.00	4.30	0.90	5.05	5.25	6.55	3.60	5.80	1.70
ARITHMETIC RETURN (%)	7.30	7.95	9.45	8.35	7.75	11.70	1.90	3.20	3.90	2.20	4.75	0.95	6.40	6.40	7.45	4.65	6.15	1.70
EXPECTED RISK (%)	17.00	18.00	26.00	18.80	17.05	28.00	1.25	5.15	9.85	6.00	10.00	3.50	17.00	15.80	14.00	15.00	8.75	1.75
CASH YIELD (%)	2.00	3.50	2.50	3.25	2.55	0.00	1.90	3.30	4.50	2.80	7.55	1.60	3.75	3.75	2.55	1.90	2.50	0.00
CORRELATIONS																		
US Stock	1.00																	
Dev ex-US Stock (USD)	0.81	1.00																
Emerging Mkt Stock	0.74	0.74	1.00															
Global ex-US Stock	0.83	0.96	0.86	1.00														
Global Stock	0.94	0.92	0.82	0.94	1.00													
Private Equity	0.74	0.64	0.62	0.67	0.74	1.00												
Cash Equivalents	-0.05	-0.09	-0.05	-0.08	-0.07	0.00	1.00											
Core Bond	0.28	0.13	0.00	0.09	0.20	0.31	0.19	1.00										
LT Core Bond	0.31	0.16	0.01	0.12	0.23	0.32	0.11	0.93	1.00									
TIPS	-0.05	0.00	0.15	0.05	0.00	-0.03	0.20	0.60	0.47	1.00								
High Yield Bond	0.54	0.39	0.49	0.45	0.51	0.34	-0.10	0.25	0.32	0.05	1.00							
Dev ex-US Bond (Hdg)	0.16	0.25	-0.01	0.18	0.18	0.26	0.10	0.67	0.66	0.39	0.26	1.00						
US RE Securities	0.59	0.47	0.44	0.49	0.56	0.50	-0.05	0.17	0.23	0.10	0.56	0.05	1.00					
Global RE Securities	0.65	0.59	0.56	0.62	0.66	0.58	-0.05	0.17	0.22	0.11	0.62	0.03	0.94	1.00				
Private Real Estate	0.54	0.44	0.44	0.47	0.52	0.51	-0.05	0.19	0.25	0.09	0.57	0.05	0.77	0.76	1.00			
Commodities	0.25	0.34	0.39	0.38	0.32	0.27	0.00	-0.02	-0.02	0.25	0.29	-0.10	0.25	0.28	0.25	1.00		
Real Assets	0.42	0.43	0.50	0.48	0.47	0.43	0.01	0.24	0.25	0.41	0.53	0.06	0.65	0.69	0.69	0.59	1.00	
Inflation (CPI)	-0.10	-0.15	-0.13	-0.15	-0.13	-0.10	0.10	-0.12	-0.12	0.15	-0.08	-0.08	0.05	0.03	0.05	0.44	0.26	1.00

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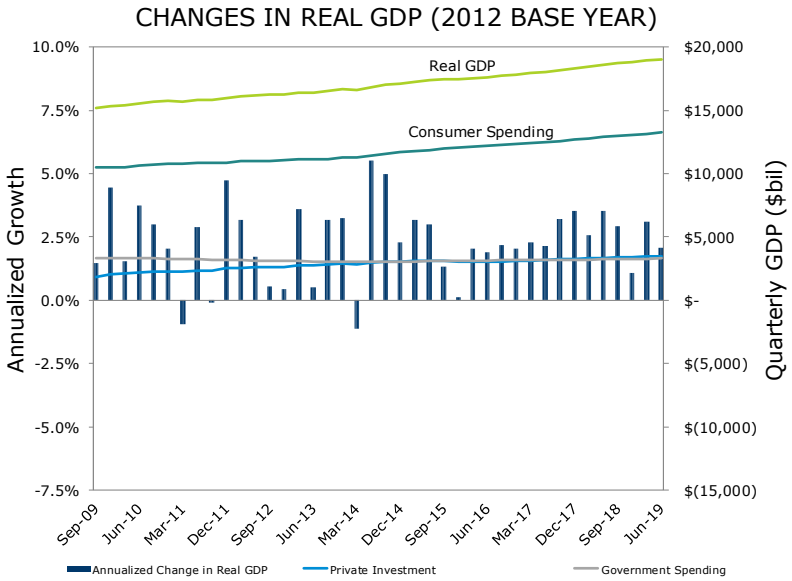
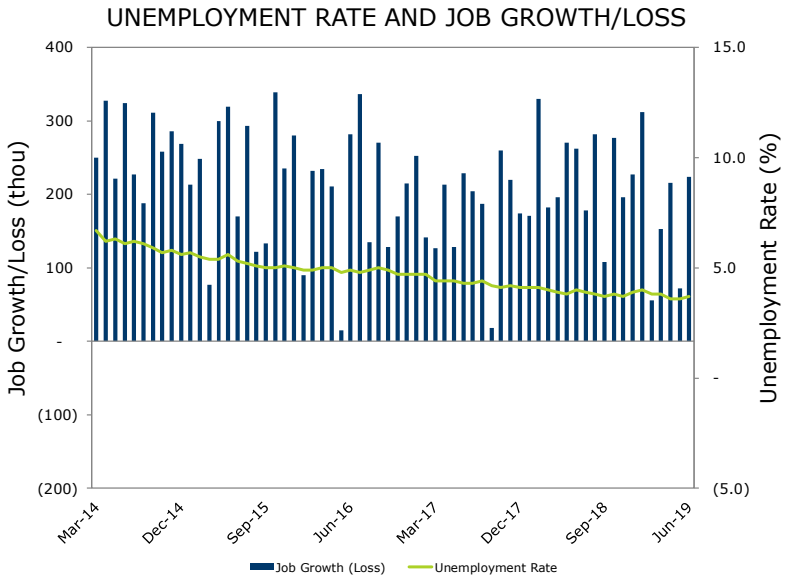
ECONOMIC REVIEW

AS OF JUNE 30, 2019	KEY ECONOMIC INDICATORS			
CPI (ALL ITEMS)	MONTHLY CHANGE		CUMULATIVE CHANGE	
SEASONALLY ADJUSTED	Jun-19	0.1	3-Mo.	0.5
	May-19	0.1	12-Mo.	1.7
	Apr-19	0.3	10-Yr. (Annual)	1.7
BREAKEVEN INFLATION	10-Yr.	1.7		
CONSUMER SENTIMENT	Jun-19	98.2		
U. OF MICHIGAN SURVEY	May-19	100.0		
	1-Yr. Ago	98.2	10-Yr. Avg	84.2
MANUFACTURING	Jun-19	51.7	CHANGE IN SECTOR	
INST. FOR SUPPLY MGMT	May-19	52.1	>50	Expansion
PURCHASING MNGRS' IDX	1-Yr. Avg.	56.0	<50	Contraction

Note: Seasonally adjusted CPI data is utilized to better reflect short-term pricing activity.





Data sources: Bureau of Labor Statistics, U.S. Treasury, University of Michigan, Institute for Supply Management, Bureau of Economic Analysis

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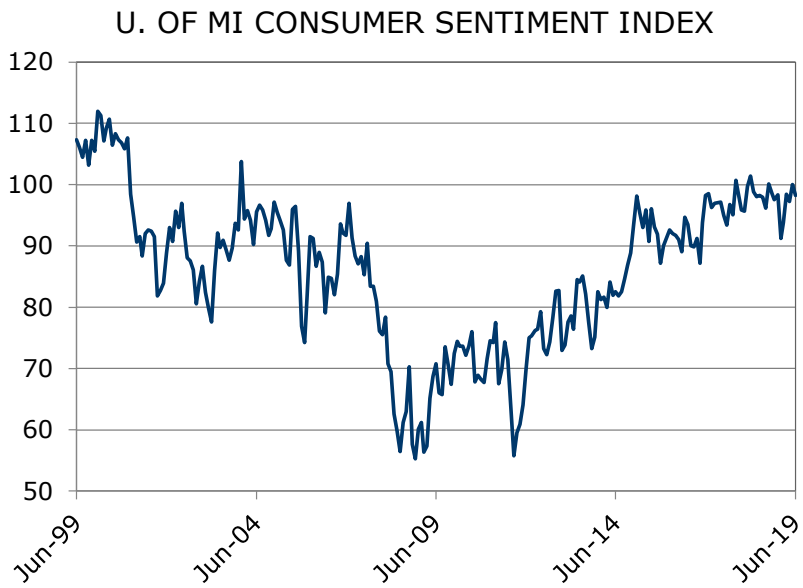
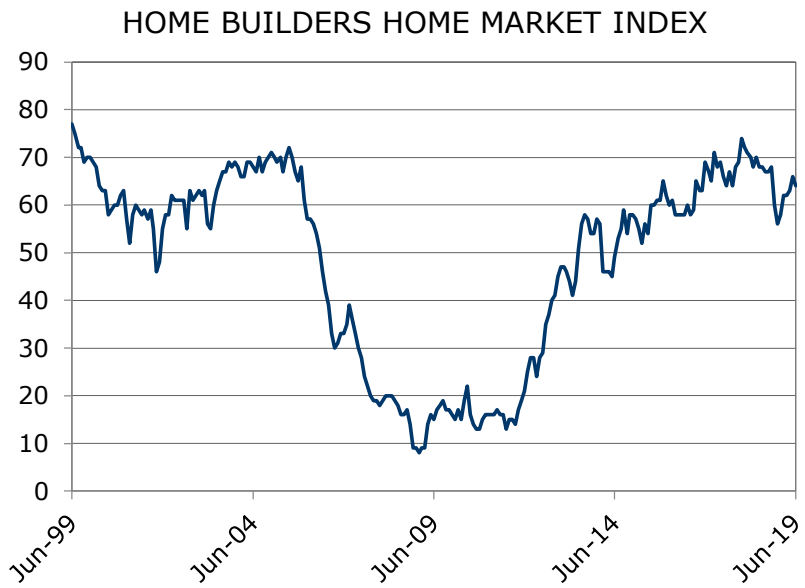
SIGNS OF SLOWING

- Surveys provide up-to-date proxy for economic activity
- Business activity continues to grow but has slowed; Consumer confidence proxies future demand
- Rate-sensitive sectors are slowing





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Data sources: Institute for Supply Management, University of Michigan, National Association of Home Builders

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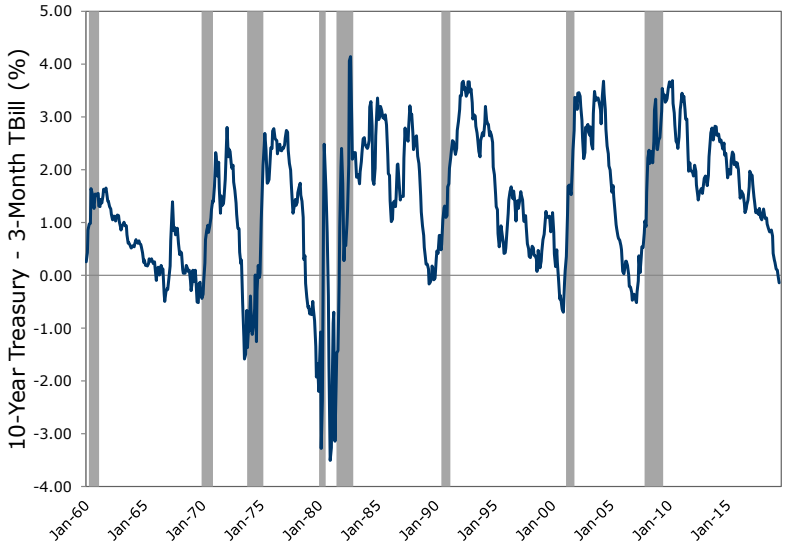
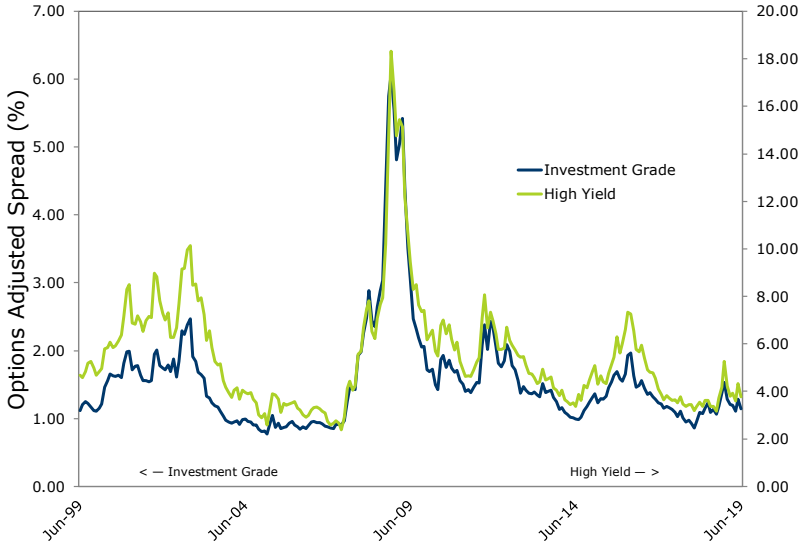
RISK MONITOR

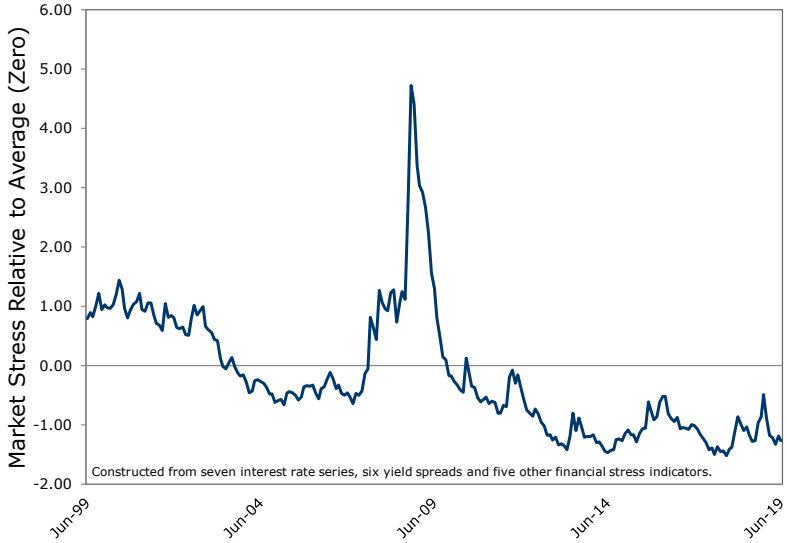
YIELD CURVE SLOPE VS RECESSIONS (IN GRAY)



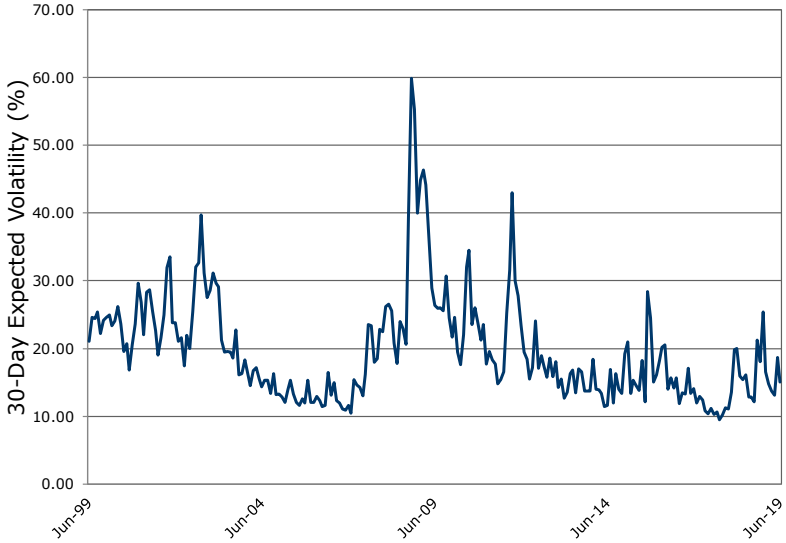
BLOOMBERG BARCLAYS CREDIT INDEXES



ST. LOUIS FED FINANCIAL STRESS INDEX



CBOE VOLATILITY INDEX



Data sources: Federal Reserve, Bloomberg Barclays

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ASSET CLASS PERFORMANCE

ASSET CLASS RETURNS - BEST TO WORST						ANNUALIZED 5-YEAR AS OF 6/2019
2014	2015	2016	2017	2018	2019 YTD	
REITs 31.8%	REITs 4.2%	MLPs 18.3%	Emrg Mrkts 37.7%	T-Bills 1.9%	U.S. Equity 18.7%	U.S. Equity 10.3%
U.S. Equity 12.7%	U.S. Equity 0.7%	High Yield 17.1%	Developed 25.6%	Core Bond 0.0%	REITs 17.9%	REITs 7.8%
Core Bond 6.0%	Core Bond 0.6%	U.S. Equity 13.4%	U.S. Equity 21.0%	U.S. TIPS -1.3%	MLPs 17.0%	High Yield 4.7%
MLPs 4.8%	T-Bills 0.1%	Commodities 11.8%	High Yield 7.5%	High Yield -2.1%	Developed 14.5%	Core Bond 3.0%
U.S. TIPS 3.6%	Developed -0.4%	Emrg Mrkts 11.6%	REITs 4.2%	REITs -4.8%	Emrg Mrkts 10.8%	Emrg Mrkts 2.9%
High Yield 2.5%	U.S. TIPS -1.4%	REITs 7.2%	Core Bond 3.6%	U.S. Equity -5.3%	High Yield 9.9%	Developed 2.7%
T-Bills 0.0%	High Yield -4.5%	U.S. TIPS 4.7%	U.S. TIPS 3.0%	Commodities -11.2%	U.S. TIPS 6.1%	U.S. TIPS 1.8%
Emrg Mrkts -1.8%	Emrg Mrkts -14.6%	Core Bond 2.6%	Commodities 1.7%	MLPs -12.4%	Core Bond 6.1%	T-Bills 0.9%
Developed -4.5%	Commodities -24.7%	Developed 1.5%	T-Bills 0.8%	Developed -13.4%	Commodities 5.1%	MLPs -7.2%
Commodities -17.0%	MLPs -32.6%	T-Bills 0.3%	MLPs -6.5%	Emrg Mrkts -14.2%	T-Bills 1.2%	Commodities -9.1%

Data sources: Wilshire Compass

Note: Developed asset class is developed equity markets ex-U.S., ex-Canada

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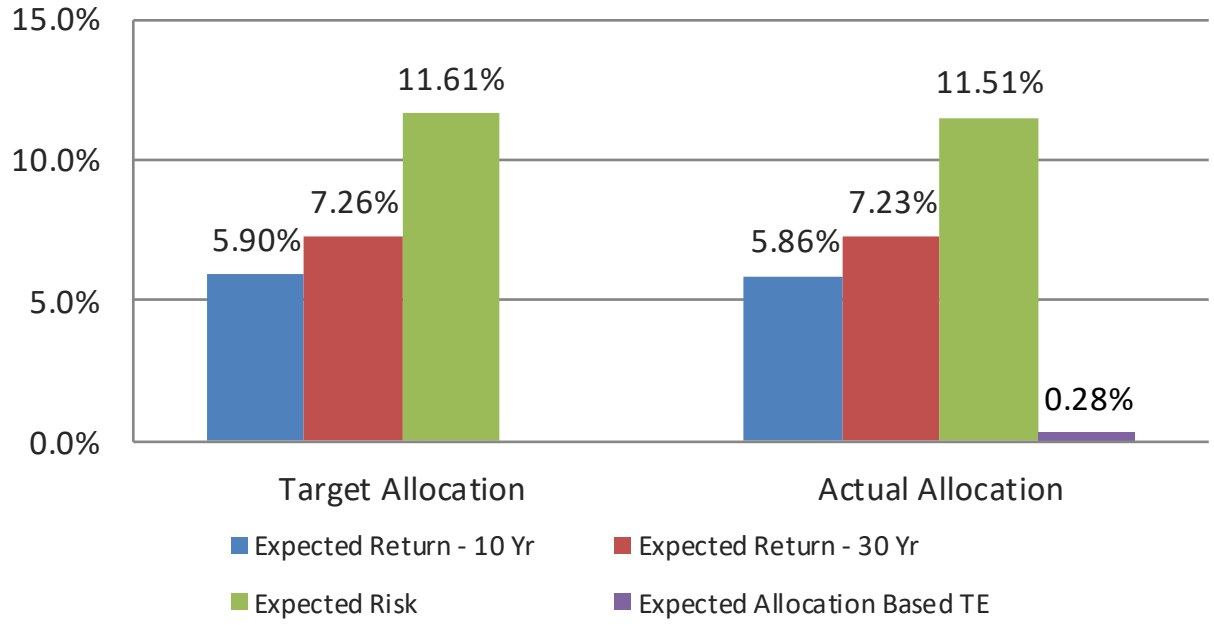
CalPERS Expected Return and Risk Estimates



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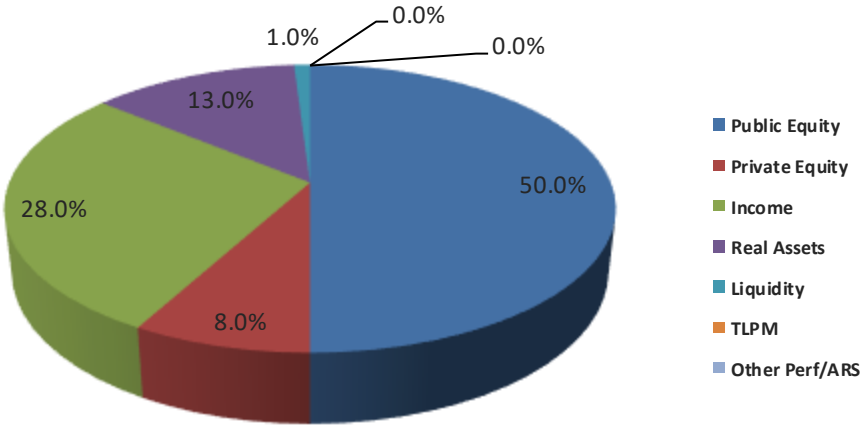
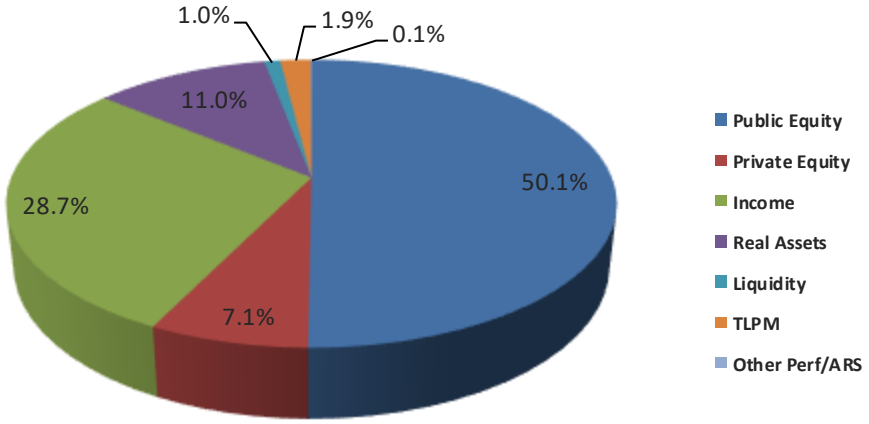
CalPERS Asset and Risk Allocation

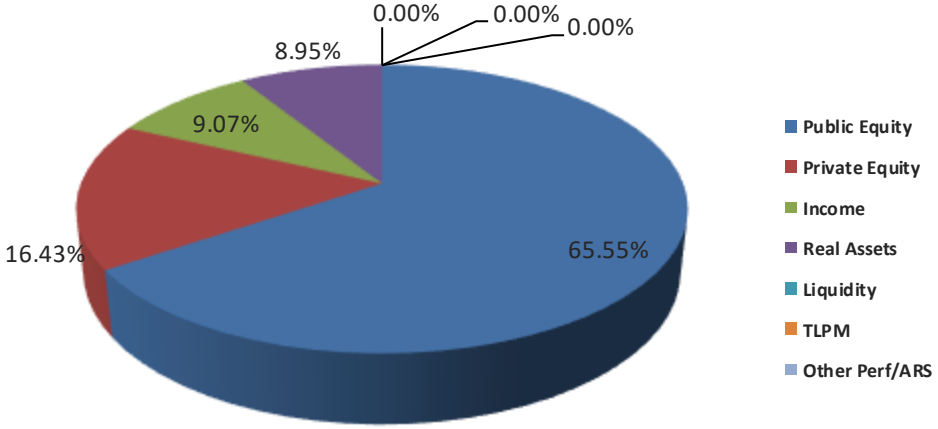
Target Asset Allocation



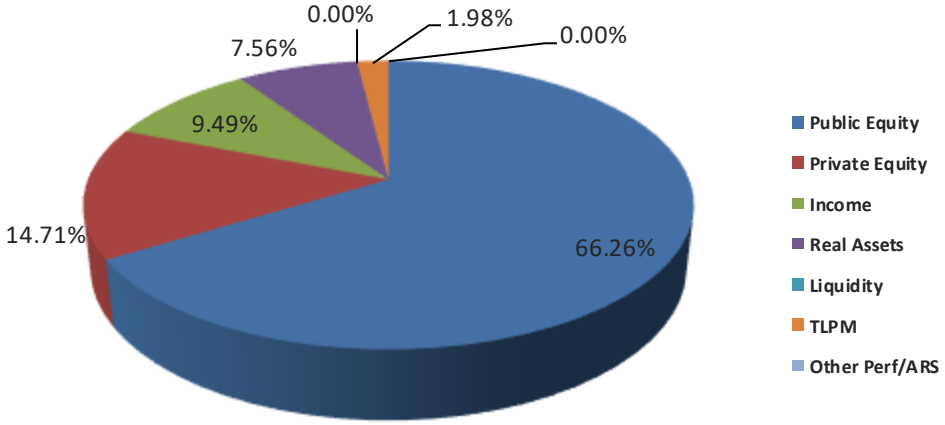
Actual Asset Allocation



Contribution to Total Risk - Target Allocation



Contribution to Total Risk - Actual Allocation



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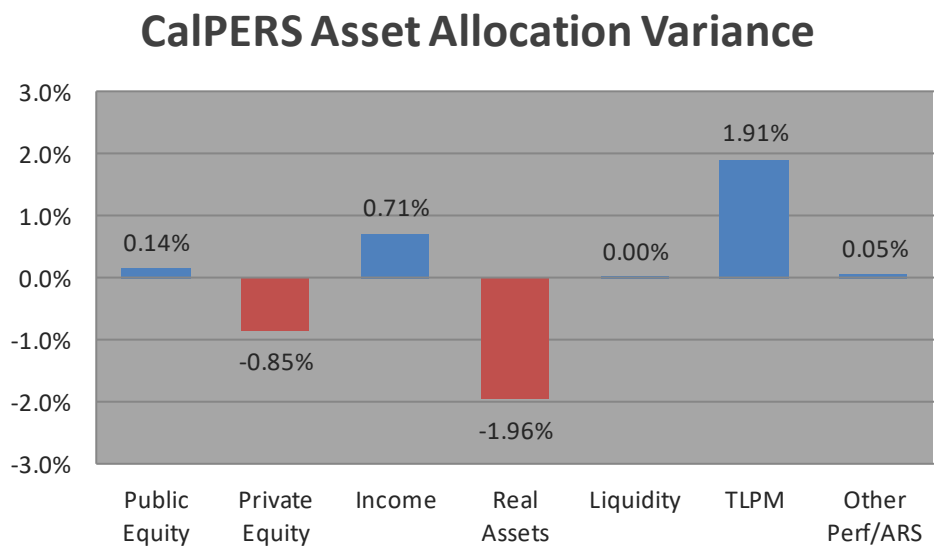
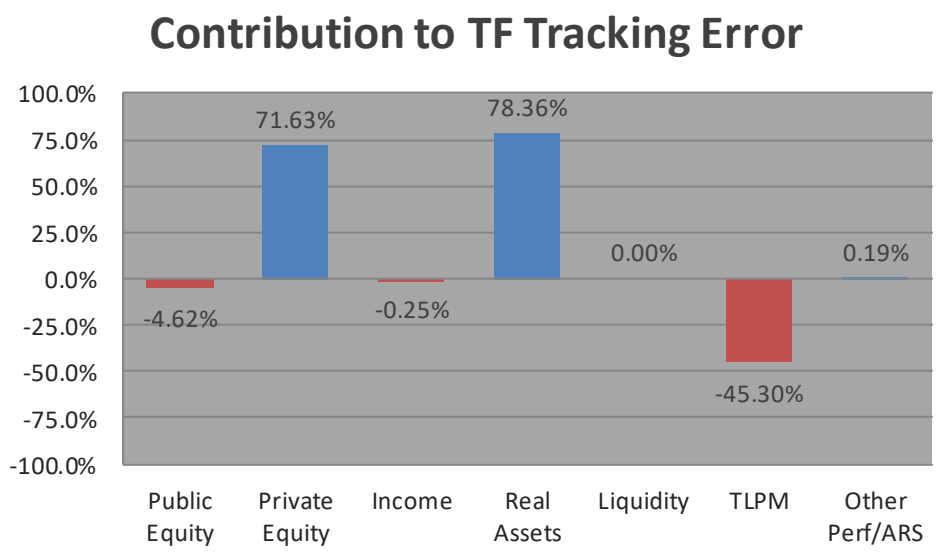
CalPERS Drivers of Expected Excess Risk





- This excess risk forecast is based on asset allocation variance only
- Other sources of risk (structural within asset classes, manager/program specific source of tracking error, covariance) are not considered here

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Total Fund – Performance

	Asset Value ($Billion)	Quarter	1-Year	3-Year	5-Year	10-Year	VaR ($Billion)	5-Year Ratios Sharpe	Info
TOTAL FUND	**$ 370.3**	**3.8%**	**6.7%**	**8.8%**	**5.8%**	**9.1%**	**$ 48.9**	**0.8**	**-0.2**
Total Fund Policy Benchmark		**4.4%**	**7.1%**	**9.0%**	**6.1%**	**9.5%**		**0.9**	**0.0**
Actuarial Rate		1.8%	7.3%	7.4%	7.5%	7.6%			
PUBLIC EQUITY	**$ 185.7**	**3.8%**	**6.1%**	**12.3%**	**6.7%**	**11.1%**	**$ 36.7**	**0.5**	**-0.2**
Public Equity Policy Benchmark		3.9%	6.2%	12.5%	6.8%	10.9%		**0.5**	**0.0**
PRIVATE EQUITY	**$ 26.5**	**3.5%**	**7.7%**	**12.5%**	**9.6%**	**14.0%**	**$ 10.7**	**2.4**	**-0.1**
Private Equity Policy Benchmark		12.7%	4.0%	14.1%	10.4%	16.6%		**0.8**	**0.0**
INCOME	**$ 106.3**	**4.3%**	**9.6%**	**3.3%**	**4.1%**	**6.6%**	**$ 9.9**	**0.7**	**1.2**
Income Policy Benchmark		4.2%	9.3%	2.7%	3.5%	5.2%		**0.6**	**0.0**
REAL ASSETS	**$ 40.9**	**2.6%**	**3.7%**	**6.4%**	**7.5%**	**4.1%**	**$ 5.9**	**1.5**	**-0.3**
Real Assets Policy Benchmark		1.2%	6.5%	6.8%	8.6%	8.4%		**2.2**	**0.0**
LIQUIDITY	**$ 3.7**	**0.7%**	**2.6%**	**1.7%**	**1.3%**	**1.1%**	**$ 0.01**	**0.6**	**0.2**
Liquidity Policy Benchmark		0.6%	2.2%	1.3%	1.2%	1.2%		**0.3**	**0.0**
TRUST LEVEL PORTFOLIO MGMT *	**$ 7.1**	**NM**	**NM**	**-.-%**	**-.-%**	**-.-%**	**$ 0.9**	**N/A**	**N/A**
CalPERS Reference Portfolio Benchmark		3.6%	7.2%	-.-%	-.-%	-.-%		**N/A**	**N/A**
OTHER PERF **	**$ 0.2**	**NM**	**NM**	**NM**	**NM**	**NM**		**N/A**	**N/A**
TERMINATED AGENCY POOL	**$ 0.2**	**3.9%**	**7.0%**	**2.4%**	**3.7%**	**-.-%**		**N/A**	**N/A**
TOTAL FUND PLUS TAP	**$ 370.5**	**3.8%**	**6.7%**	**8.8%**	**5.8%**	**9.1%**		**N/A**	**N/A**

* More detail of the TLPM return can be found in the program section, slide 48.

** More detail of the OTHER PERF return can be found in the program section, slide 49.

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Total Fund – Attribution (Quarter)

As of 6/30/2019

Asset Class	Actual (%)		Policy (%)		Difference (%)		Total Fund Return Contribution (%)		
	Weight *	Return	Weight *	Return	Weight	Return	Actual Allocation	Active Management	Total
Public Equity	49.93	3.84	50.00	3.86	-0.07	-0.02	-0.05	-0.01	-0.05
Public Equity - Cap Weighted	37.62	3.72	37.00	3.73	0.62	-0.01	-0.04	-0.01	-0.05
Public Equity - Factor Weighted	12.31	4.10	13.00	4.11	-0.69	-0.02	-0.01	0.00	0.00
Private Equity	7.38	3.50	8.00	12.73	-0.62	-9.23	-0.06	-0.67	-0.73
Income	28.85	4.33	28.00	4.19	0.85	0.14	-0.03	0.05	0.01
Treasury	10.44	5.03	10.00	5.03	0.44	-0.01	-0.01	0.00	-0.02
Spread	15.29	4.20	15.00	3.92	0.29	0.28	-0.02	0.04	0.03
High Yield	3.12	2.62	3.00	2.52	0.12	0.10	0.00	0.00	0.00
Real Assets	11.15	2.57	13.00	1.18	-1.85	1.40	0.05	0.16	0.21
Inflation	0.00	0.00	0.00	1.71	0.00	-1.71	0.00	0.00	0.00
Liquidity	1.13	0.66	1.00	0.58	0.13	0.08	0.00	0.00	0.00
TLPM	1.51	NM**	0.00	3.62	1.51	NM**	-0.01	0.00	-0.01
Other PERF/ARS	0.05	NM***	0.00	0.00	0.05	NM***	0.00	0.00	0.01
Monthly Linked Return	**100.00**	**3.79**	**100.00**	**4.36**		**-0.57**	**-0.08**	**-0.48**	**-0.56**
Residual		0.00		0.00		0.00			**-0.01**
Total		***3.79***		***4.36***		***-0.57***			***-0.57***

* Average period weight displayed.

** More detail of the TLPM return can be found in the program section, slide 48.

*** More detail of the OTHER PERF return can be found in the program section, slide 49.

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Total Fund – Attribution (Calendar YTD)

As of 6/30/2019

Asset Class	Actual (%)		Policy (%)		Difference (%)		Total Fund Return Contribution (%)		
	Weight *	Return	Weight *	Return	Weight	Return	Actual Allocation	Active Management	Total
Public Equity	49.17	16.29	49.78	16.46	-0.62	-0.17	-0.14	-0.09	-0.22
Public Equity - Cap Weighted	38.67	16.32	38.37	16.52	0.30	-0.20	-0.11	-0.08	-0.19
Public Equity - Factor Weighted	10.50	15.39	11.42	15.44	-0.92	-0.06	-0.03	0.00	-0.03
Private Equity	7.68	1.33	8.00	-1.77	-0.32	3.10	-0.07	0.24	0.17
Income	28.33	9.08	27.92	8.87	0.41	0.21	-0.04	0.06	0.02
Treasury	10.24	9.38	10.00	9.41	0.24	-0.04	-0.01	0.00	-0.02
Spread	15.16	8.70	15.05	8.38	0.11	0.33	-0.02	0.05	0.03
High Yield	2.94	10.62	2.87	10.21	0.07	0.42	0.00	0.01	0.01
Real Assets	11.30	2.81	12.60	2.71	-1.30	0.10	0.07	0.01	0.07
Inflation	0.57	3.67	0.63	8.20	-0.06	-4.52	0.00	-0.01	-0.01
Liquidity	1.21	1.36	1.07	1.16	0.14	0.20	0.00	0.00	0.00
TLPM	1.69	NM**	0.00	14.38	1.69	NM**	0.05	-0.06	-0.01
Other PERF/ARS	0.06	NM***	0.00	0.00	0.06	NM***	0.00	0.00	0.00
Monthly Linked Return	**100.00**	**11.06**	**100.00**	**11.03**		**0.02**	**-0.14**	**0.16**	**0.02**
Residual		0.00		0.00		0.00			**0.01**
Total		***11.06***		***11.03***		***0.03***			***0.03***

* Average period weight displayed.

** More detail of the TLPM return can be found in the program section, slide 48.

*** More detail of the OTHER PERF return can be found in the program section, slide 49.

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Total Fund – Attribution (Fiscal YTD)

As of 6/30/2019

Asset Class	Actual (%)		Policy (%)		Difference (%)		Total Fund Return Contribution (%)		
	Weight *	Return	Weight *	Return	Weight	Return	Actual Allocation	Active Management	Total
Public Equity	48.73	6.08	49.49	6.24	-0.76	-0.16	-0.09	-0.08	-0.17
Public Equity - Cap Weighted	41.55	5.06	41.41	5.27	0.14	-0.21	-0.01	-0.08	-0.09
Public Equity - Factor Weighted	7.18	13.41	8.08	13.51	-0.90	-0.10	-0.08	0.00	-0.09
Private Equity	7.73	7.72	8.00	4.04	-0.27	3.68	-0.09	0.25	0.16
Income	26.29	9.61	26.09	9.31	0.20	0.30	-0.04	0.07	0.03
Treasury	9.48	10.50	9.47	10.54	0.01	-0.04	-0.01	0.00	-0.02
Spread	14.52	9.47	14.35	8.98	0.17	0.49	-0.03	0.07	0.04
High Yield	2.28	8.41	2.27	8.00	0.01	0.41	0.00	0.01	0.01
Real Assets	11.15	3.69	12.30	6.52	-1.15	-2.83	0.00	-0.34	-0.34
Inflation	2.47	-3.49	2.55	0.54	-0.08	-4.03	0.00	0.00	-0.01
Liquidity	1.75	2.60	1.57	2.15	0.18	0.45	-0.01	0.01	0.00
TLPM	1.81	NM**	0.00	7.18	1.81	NM**	-0.05	-0.04	-0.09
Other PERF/ARS	0.06	NM***	0.00	0.00	0.06	NM***	0.00	0.00	0.00
Monthly Linked Return	**100.00**	**6.68**	**100.00**	**7.10**		**-0.42**	**-0.29**	**-0.13**	**-0.42**
Residual		0.00		0.00		0.00			**0.00**
Total		***6.68***		***7.10***		***-0.42***			***-0.42***

* Average period weight displayed.

** More detail of the TLPM return can be found in the program section, slide 48.

*** More detail of the OTHER PERF return can be found in the program section, slide 49.

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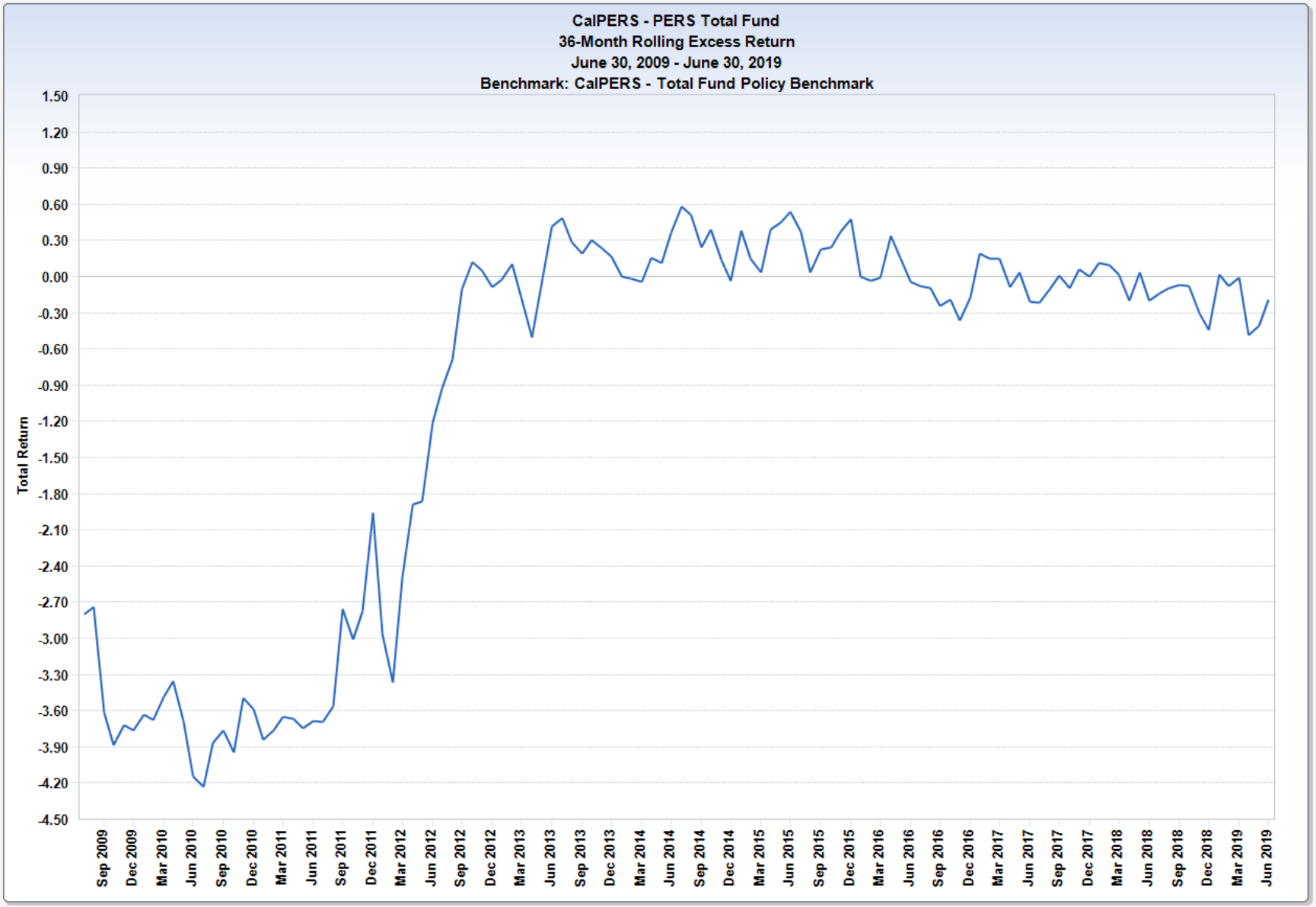
Total Fund – Rolling Excess Returns



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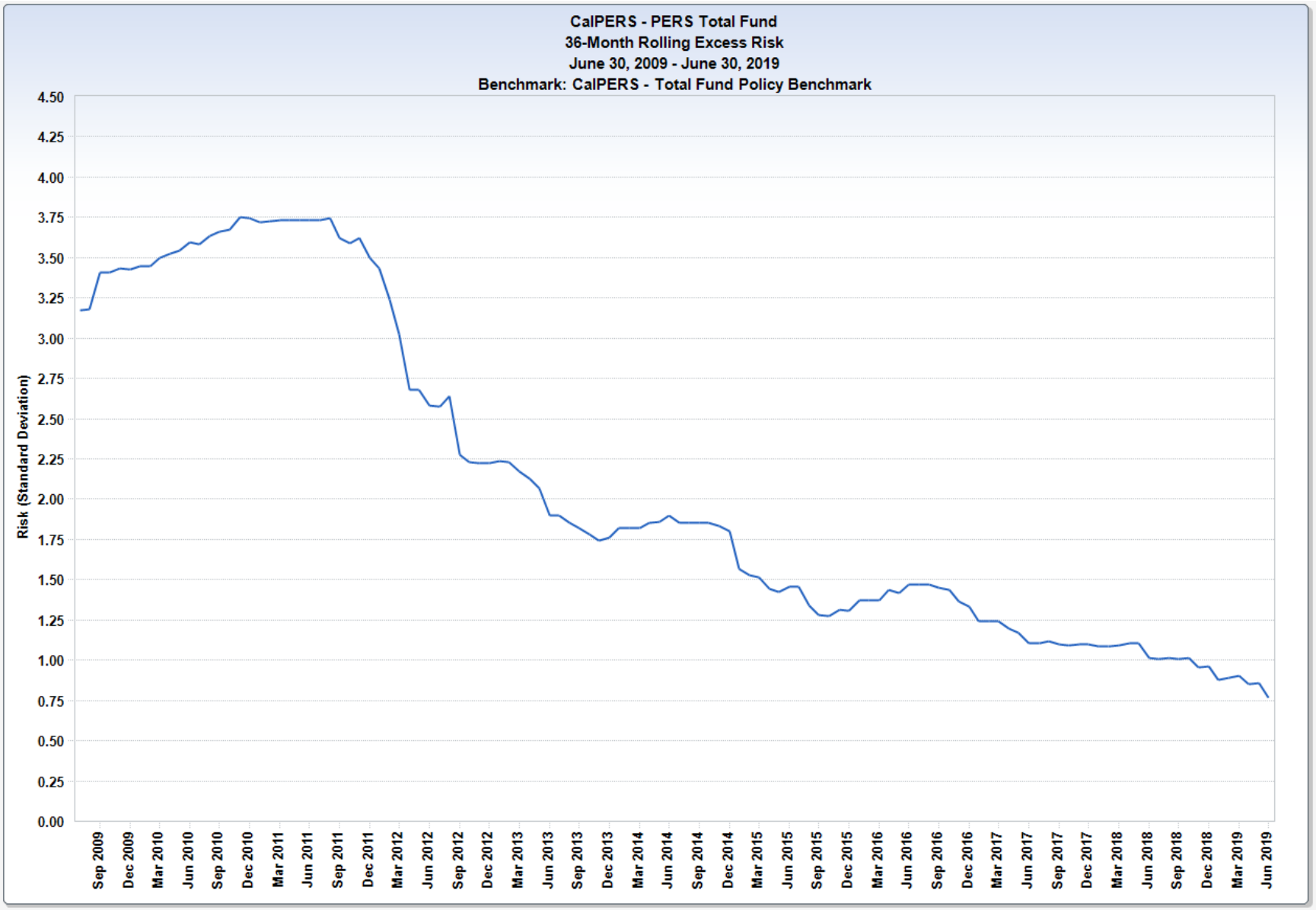
Total Fund – Rolling Tracking Error



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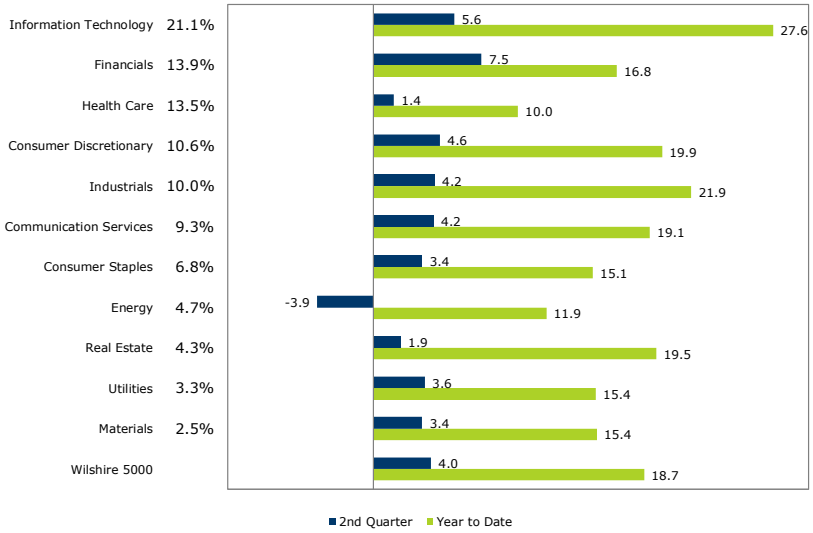
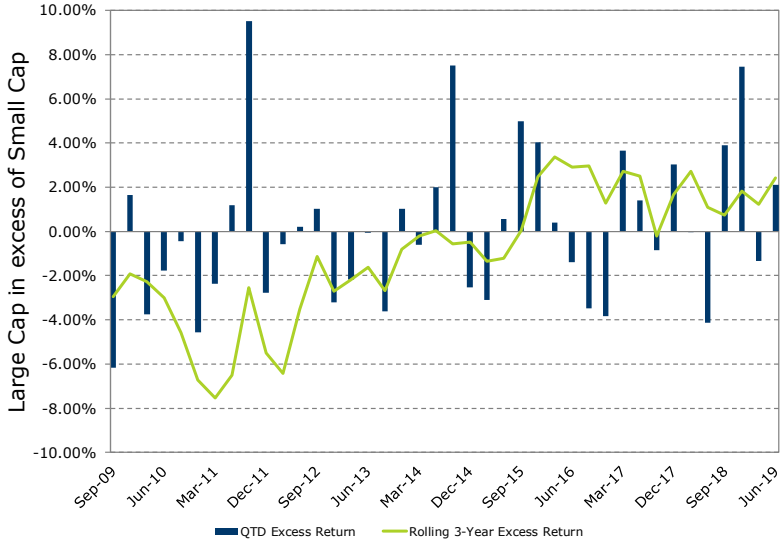
U.S. EQUITY MARKET

AS OF JUNE 30, 2019	QTR	YTD	1 YR	3 YR	5 YR	10 YR
WILSHIRE 5000 INDEX	4.0	18.7	9.1	14.0	10.3	14.7
WILSHIRE U.S. LARGE CAP	4.2	18.7	10.4	14.3	10.7	14.7
WILSHIRE U.S. SMALL CAP	2.0	17.9	-1.9	11.6	7.0	14.6
WILSHIRE U.S. LARGE GROWTH	4.7	21.1	10.0	18.1	12.4	15.7
WILSHIRE U.S. LARGE VALUE	3.8	16.7	10.7	10.7	9.0	13.6
WILSHIRE U.S. SMALL GROWTH	3.9	20.9	1.1	15.4	7.6	15.0
WILSHIRE U.S. SMALL VALUE	0.3	14.9	-4.7	7.9	6.3	14.0
WILSHIRE REIT INDEX	1.6	17.9	10.5	4.1	7.8	15.7
MSCI USA MIN. VOL. INDEX	5.5	18.6	18.0	11.8	12.3	14.6
FTSE RAFI U.S. 1000 INDEX	3.5	16.2	6.2	11.5	8.3	14.7

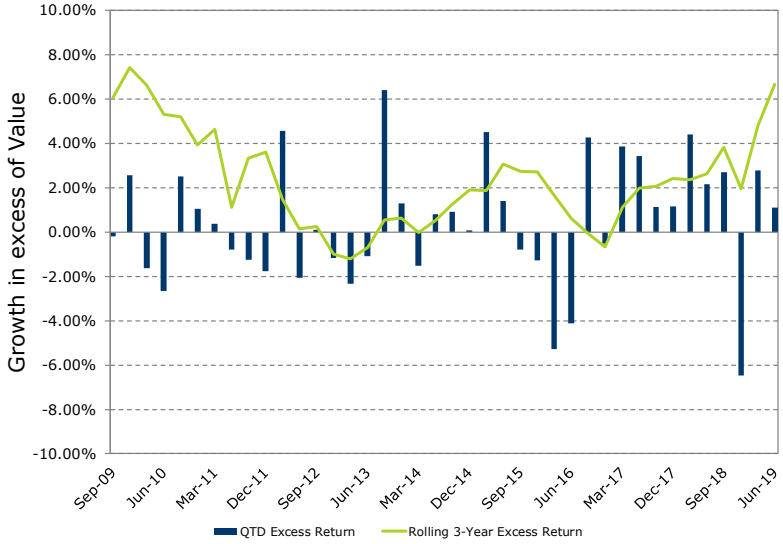
WILSHIRE 5000 SECTOR WEIGHT & RETURN (%)



LARGE CAP VS SMALL CAP



GROWTH VS VALUE



Data sources: Wilshire Compass, Wilshire Atlas

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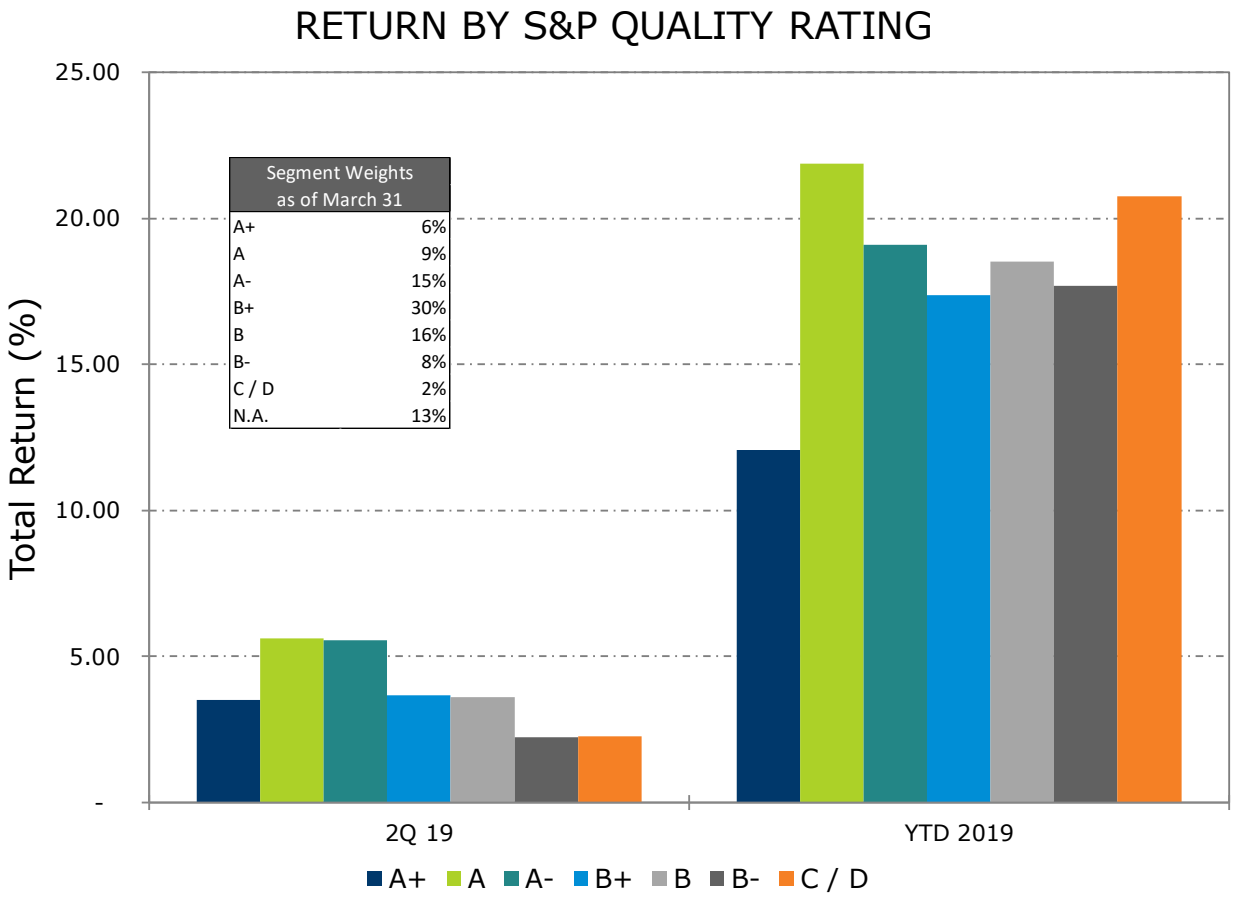
RETURNS BY QUALITY SEGMENT

Higher quality names led the market during the second quarter



Data sources: Wilshire Atlas

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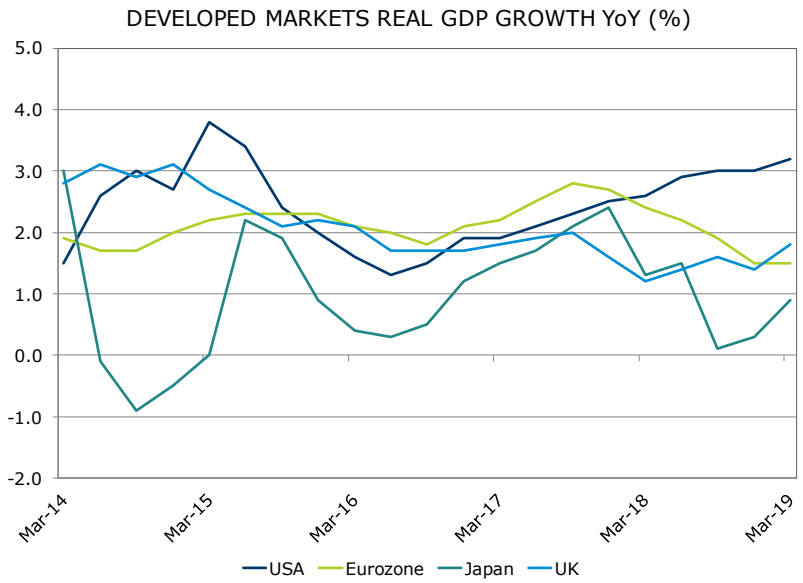
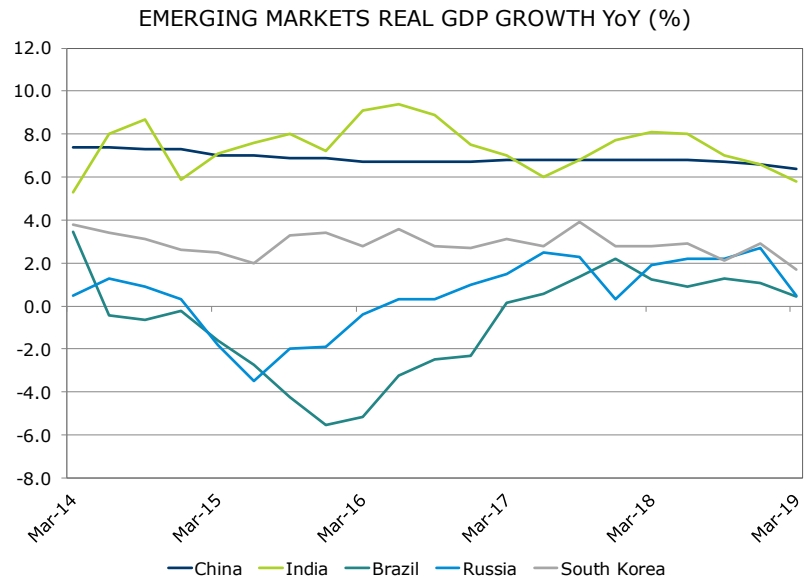
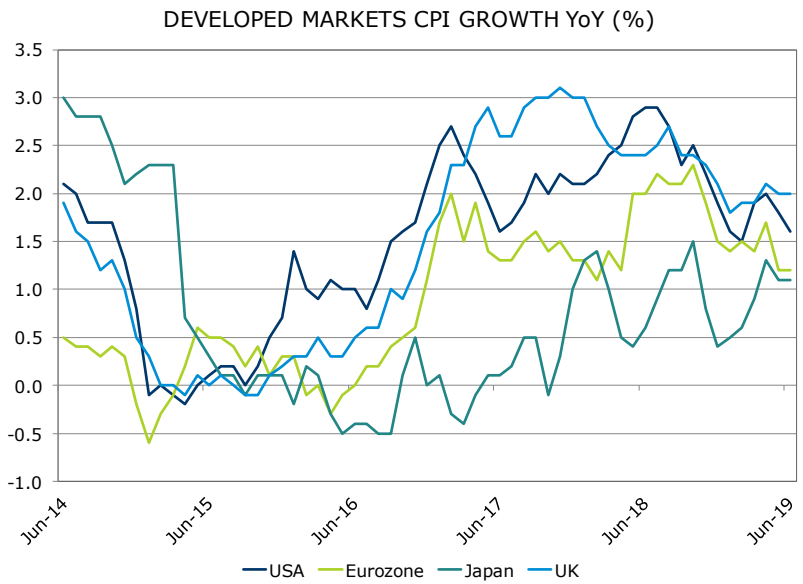
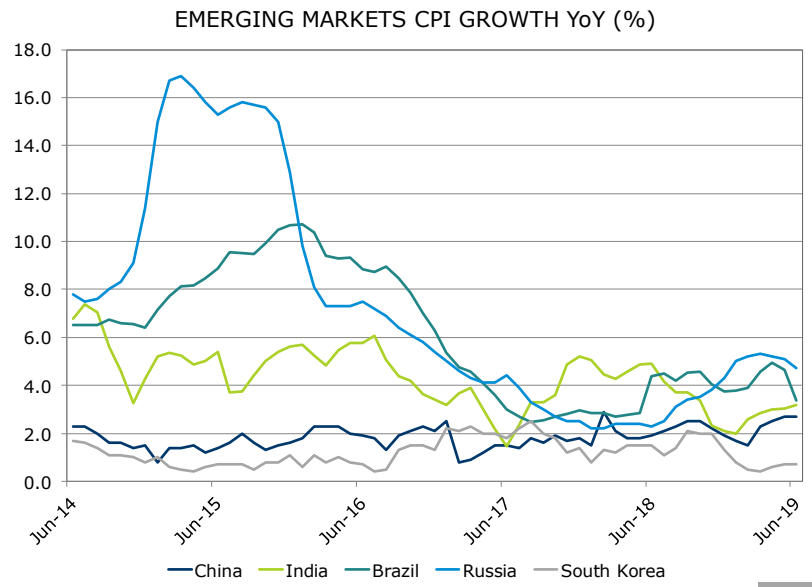
NON-U.S. GROWTH AND INFLATION









Data sources: Bloomberg

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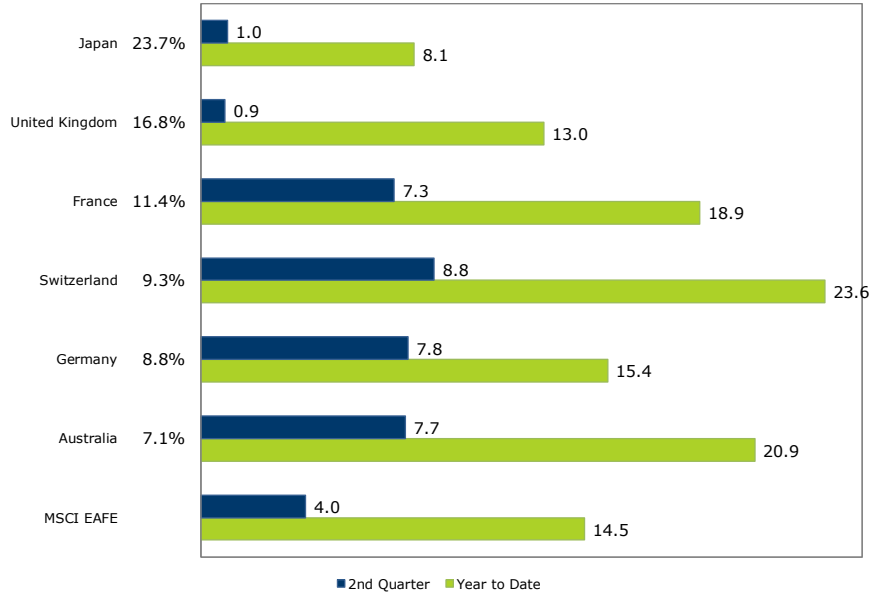
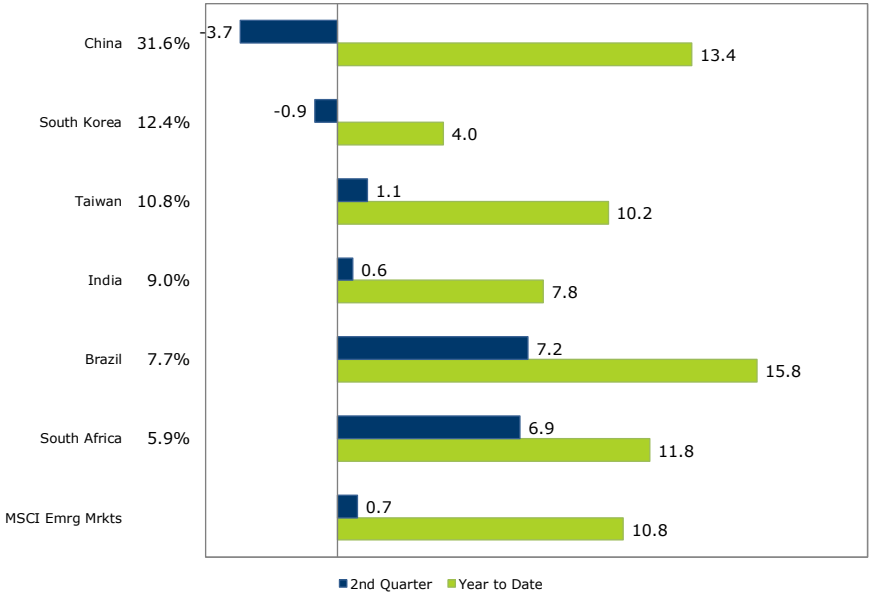
NON-U.S. EQUITY MARKET

AS OF JUNE 30, 2019	QTR	YTD	1 YR	3 YR	5 YR	10 YR
MSCI ACWI EX-US ($G)	3.2	14.0	1.8	9.9	2.6	7.0
MSCI EAFE ($G)	4.0	14.5	1.6	9.6	2.7	7.4
MSCI EMERGING MARKETS ($G)	0.7	10.8	1.6	11.1	2.9	6.2
MSCI FRONTIER MARKETS ($G)	4.9	12.1	5.2	8.7	-0.4	5.5
MSCI ACWI EX-US GROWTH ($G)	4.6	17.5	3.0	10.2	4.4	8.0
MSCI ACWI EX-US VALUE ($G)	1.9	10.5	0.6	9.6	0.9	6.0
MSCI ACWI EX-US SMALL ($G)	1.4	11.9	-5.5	8.3	3.2	9.0
MSCI ACWI MINIMUM VOLATILITY	4.3	14.8	13.7	9.4	9.5	12.0
MSCI EAFE MINIMUM VOLATILITY	3.1	11.4	5.5	7.2	5.8	9.2
FTSE RAFI DEVELOPED EX-US	2.4	11.3	-1.5	10.2	1.7	6.9
MSCI EAFE LC (G)	3.1	14.2	2.7	10.3	6.4	8.8

MSCI EAFE: LARGEST COUNTRIES & RETURN (USD)



MSCI EM: LARGEST COUNTRIES & RETURN (USD)



Data sources: Wilshire Compass

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CalPERS Public Equity – Performance

	Asset Value ($Billion)	Quarter	1-Year	3-Year	5-Year	10-Year	VaR ($Billion)	5-Year Ratios Sharpe	Info
PUBLIC EQUITY	**$ 185.7**	**3.8%**	**6.1%**	**12.3%**	**6.7%**	**11.1%**	**$ 36.7**	**0.5**	**-0.2**
Public Equity Policy Benchmark		3.9%	6.2%	12.5%	6.8%	10.9%		**0.5**	**0.0**
Public Equity - Cap Weighted	**$ 131.4**	**3.7%**	**5.1%**	**11.9%**	**6.5%**	**11.0%**	**$ 28.4**	**0.5**	**-0.3**
FTSE Global All Cap Custom Index Net		3.7%	5.3%	12.2%	6.6%	10.8%		**0.5**	**0.0**
Public Equity - Factor Weighted	**$ 54.3**	**4.1%**	**13.4%**	**-.-%**	**-.-%**	**-.-%**	**$ 8.6**	**N/A**	**N/A**
MSCI ACWI Select Factor Weighted Index		4.1%	13.5%	-.-%	-.-%	-.-%		**N/A**	**N/A**

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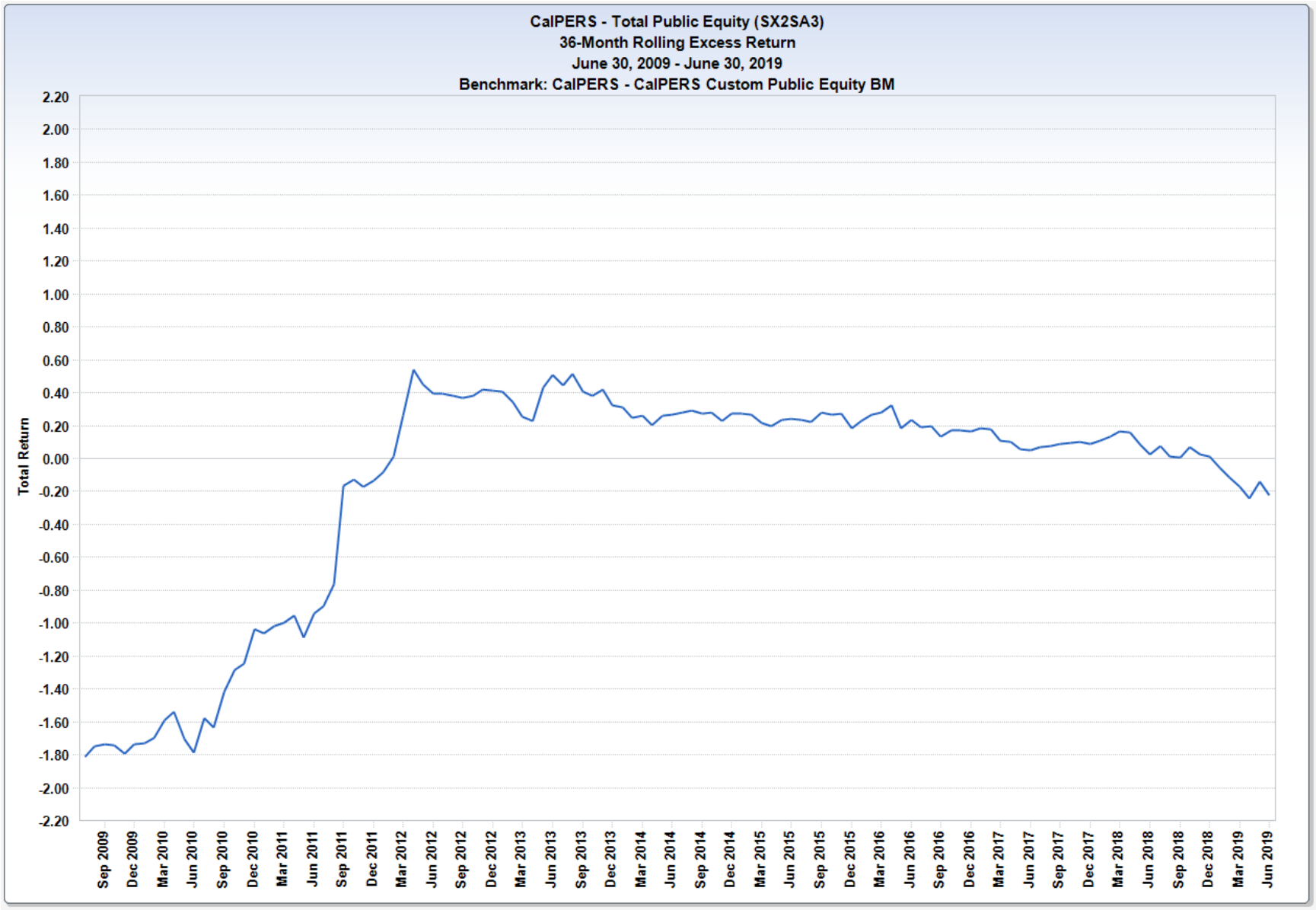
CalPERS Public Equity – Rolling Excess Returns



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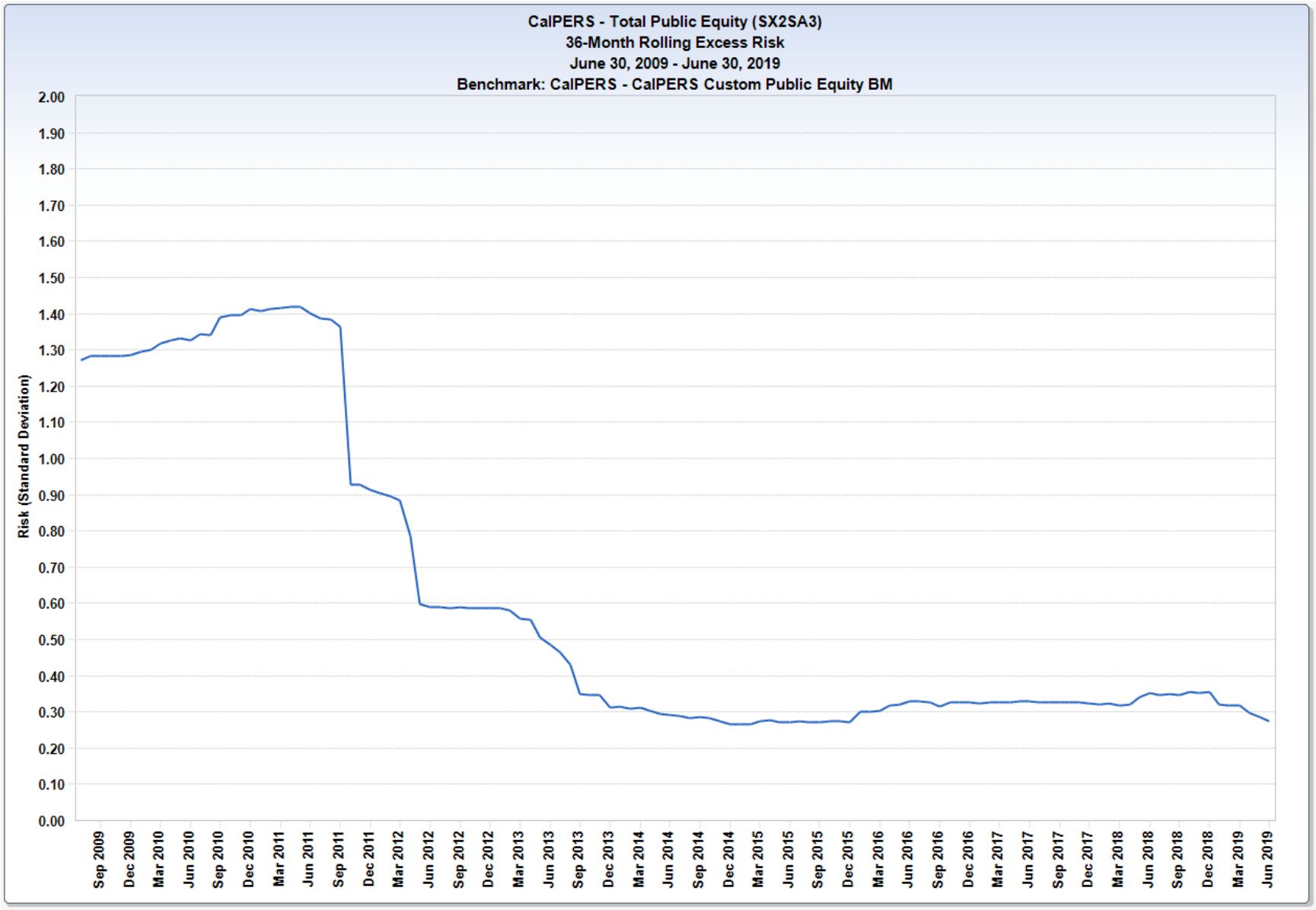
CalPERS Public Equity – Rolling Tracking Error



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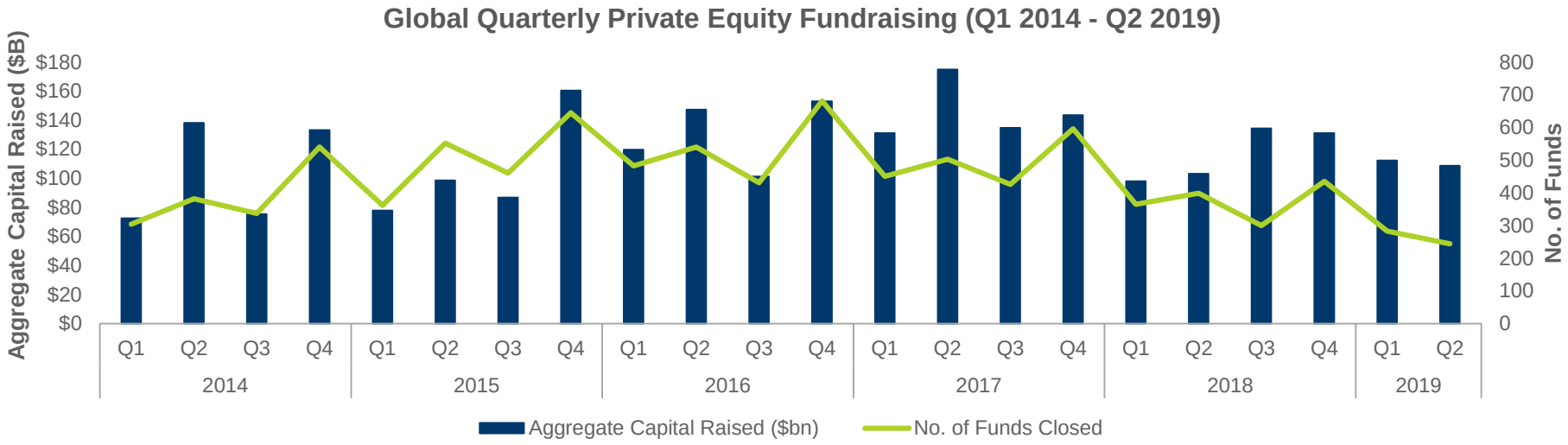
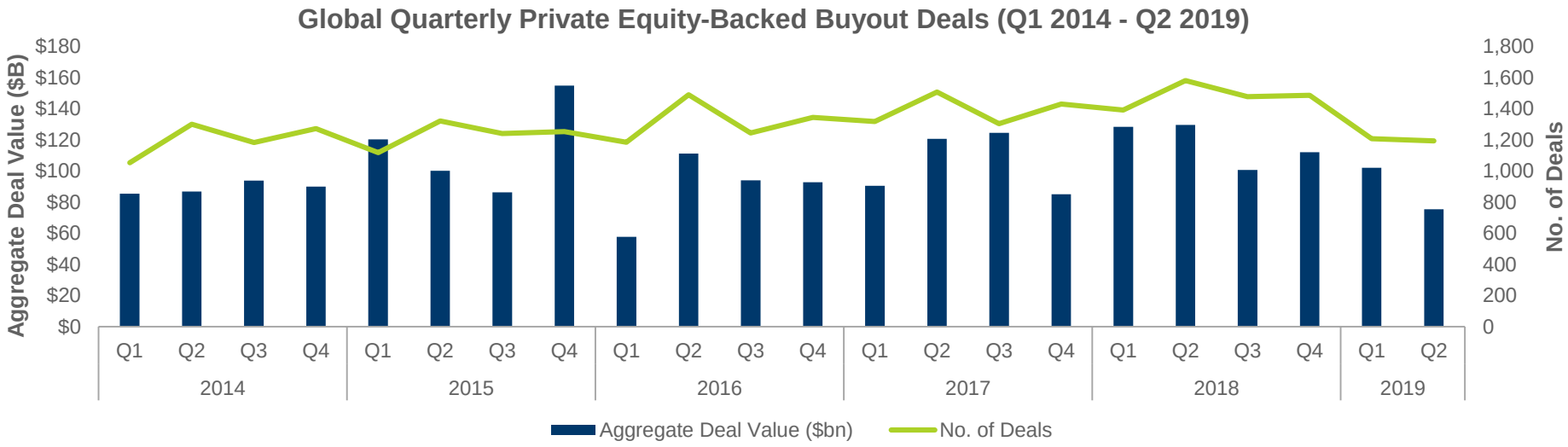
PRIVATE EQUITY – FUNDRAISING & INVESTMENT ACTIVITY





Source: Preqin, as of June 30, 2019.

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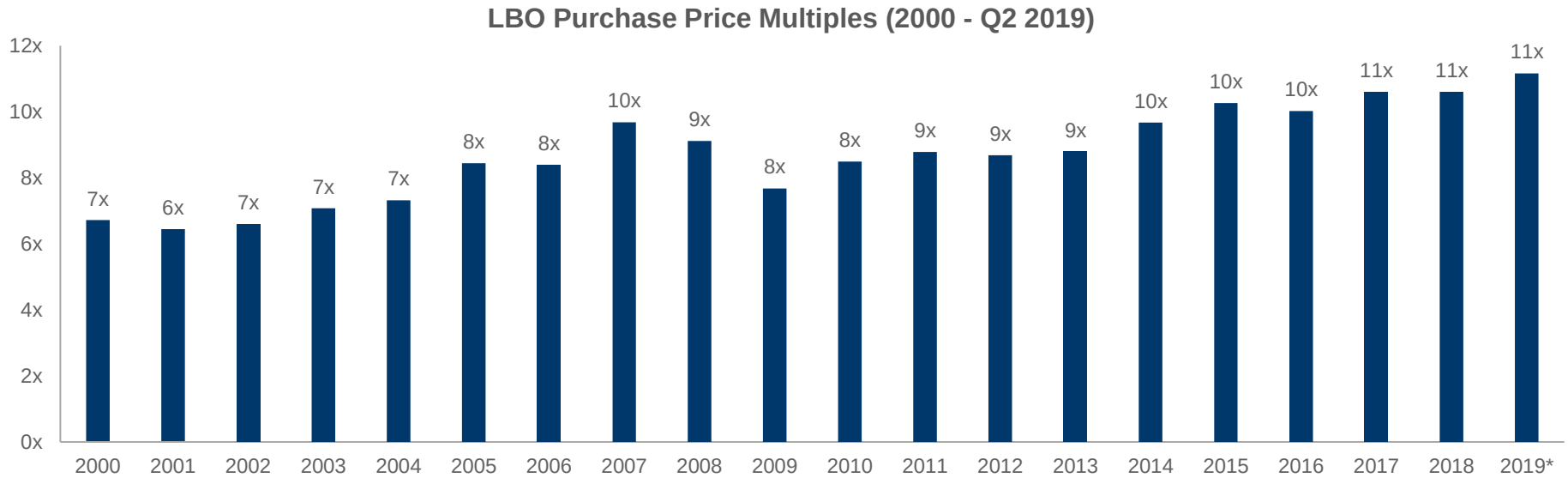
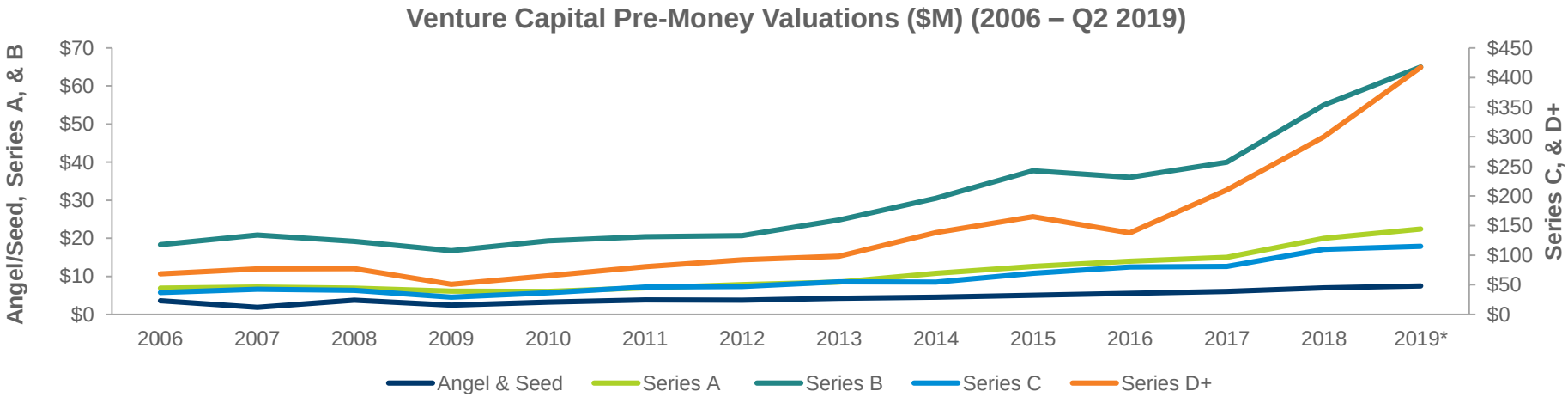
PRIVATE EQUITY – PRICING & VALUATIONS





Source: S&P LBO; PitchBook, *as of June 30, 2019.

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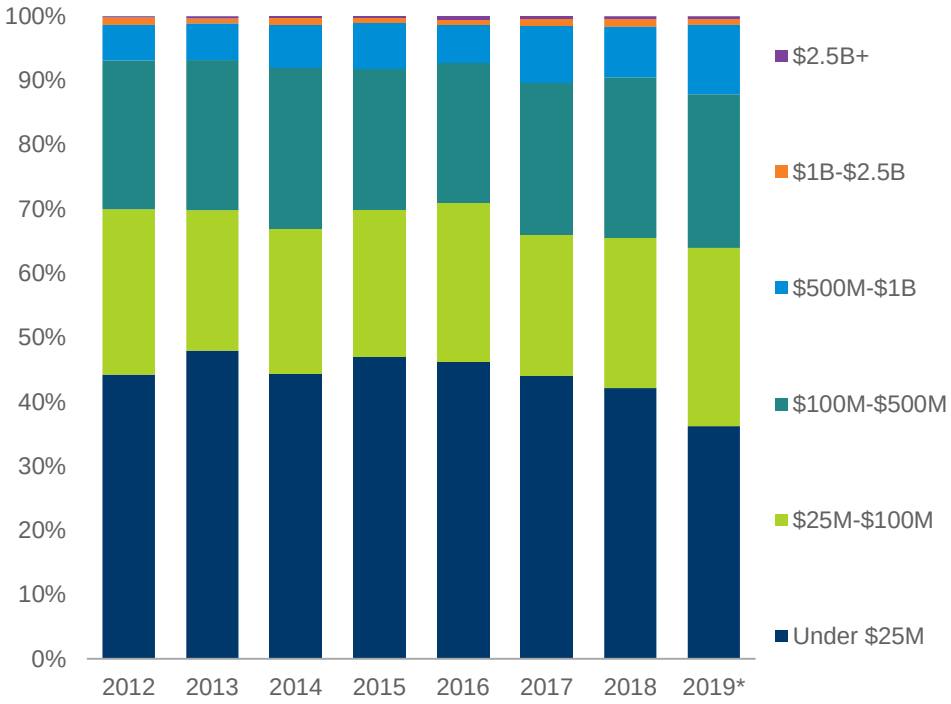
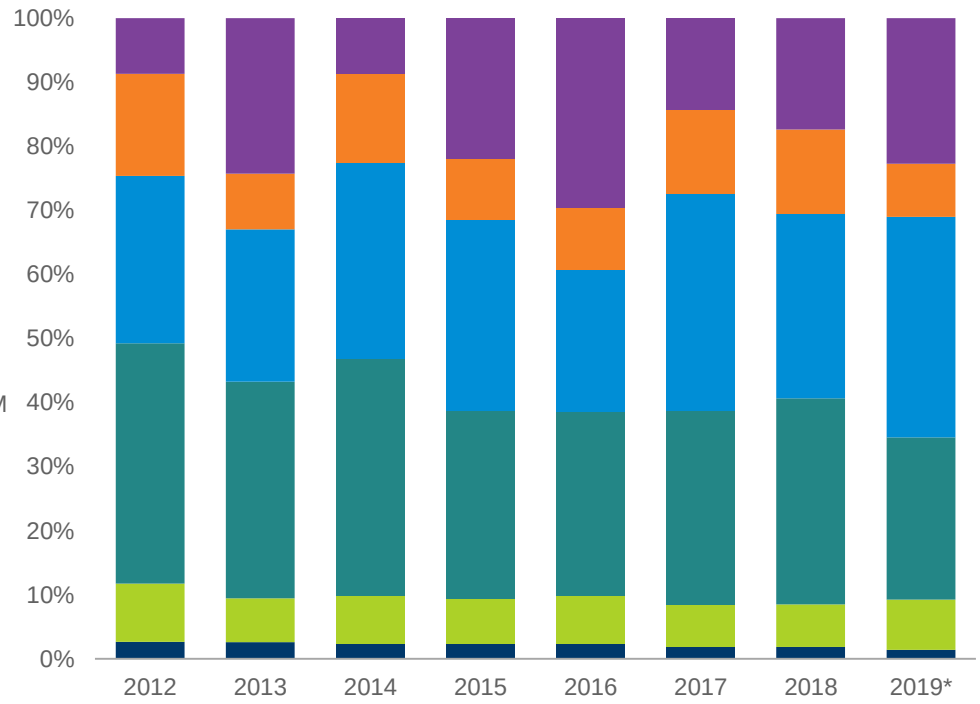
U.S. INVESTMENT ACTIVITY BY DEAL SIZE

Percentage of Deal Volume by Deal Size (by Count)



Percentage of Deal Volume by Deal Size (by Dollars)



- Deal volume continues to be dominated by lower middle market deals with investment sizes below $100 million through the second quarter of 2019
- However, deals with below $100 million check sizes comprised only 9% of all deal volume by amount of capital invested in the second quarter of 2019

Source: PitchBook, *as of June 30, 2019.

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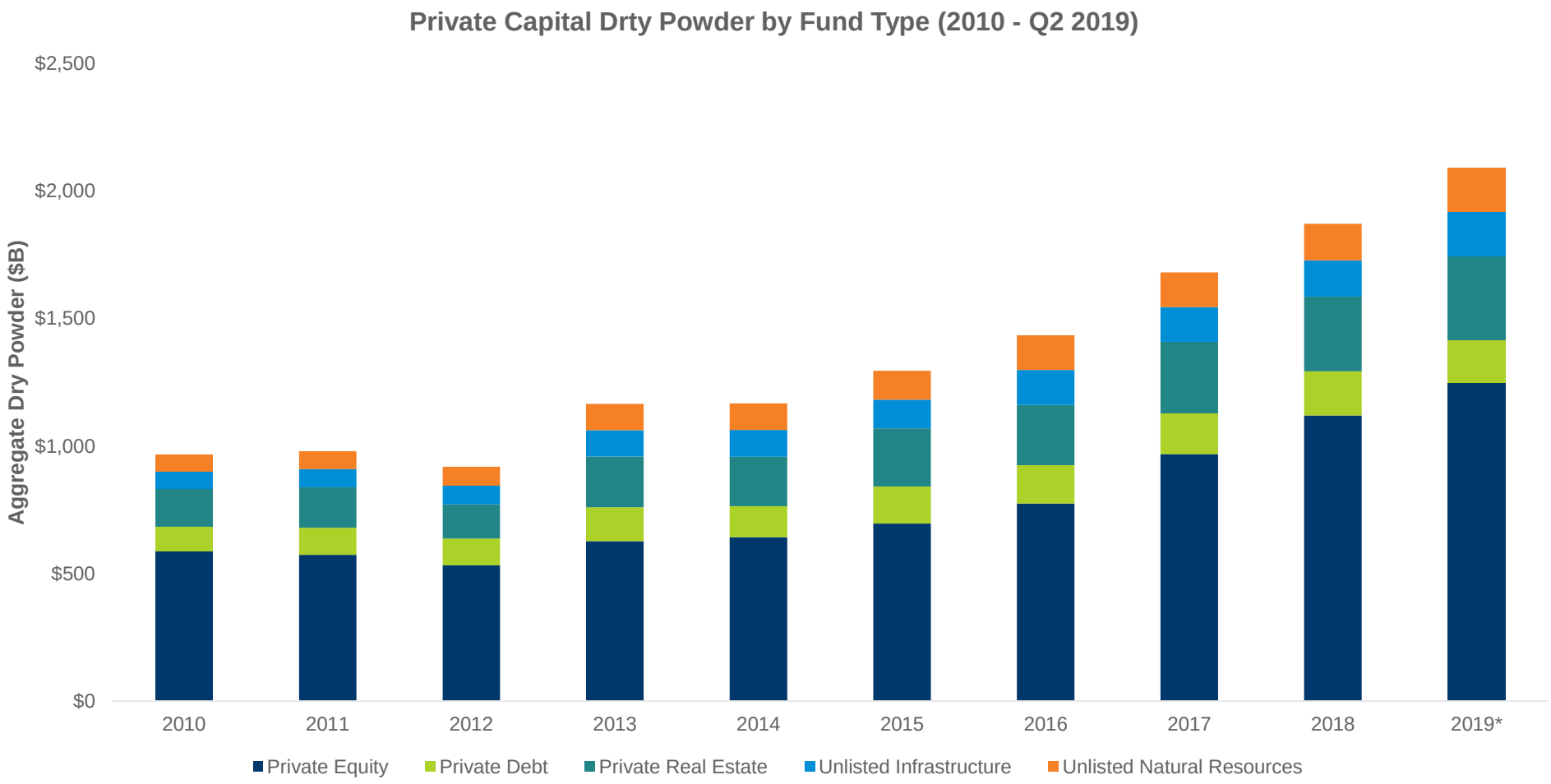
PRIVATE CAPITAL DRY POWDER



- Global private capital dry powder continues to increase, topping $2 trillion across all fund types
- Private equity comprises just under 60% of total dry powder in the market as of Q2 2019

Source: Preqin, as of *July 1, 2019.

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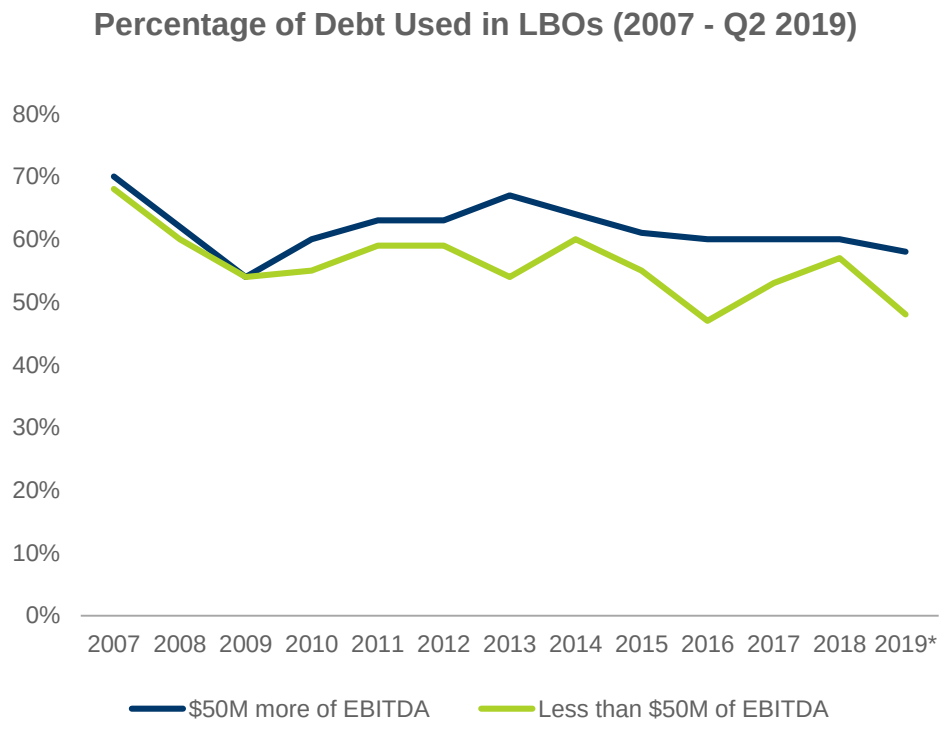
PRIVATE EQUITY - U.S. DEBT MARKETS



- 2019 began with approximately $45 billion in loan volume and is on pace to once again increase year-over-year through the first quarter of 2019
- As debt capital becomes less available, the percentage of debt used to finance leveraged buyouts of less than $50 million of EBITDA through the second quarter of 2019 has dropped from 2018 marks

Source: S&P LBO, as of *June 30, 2019.

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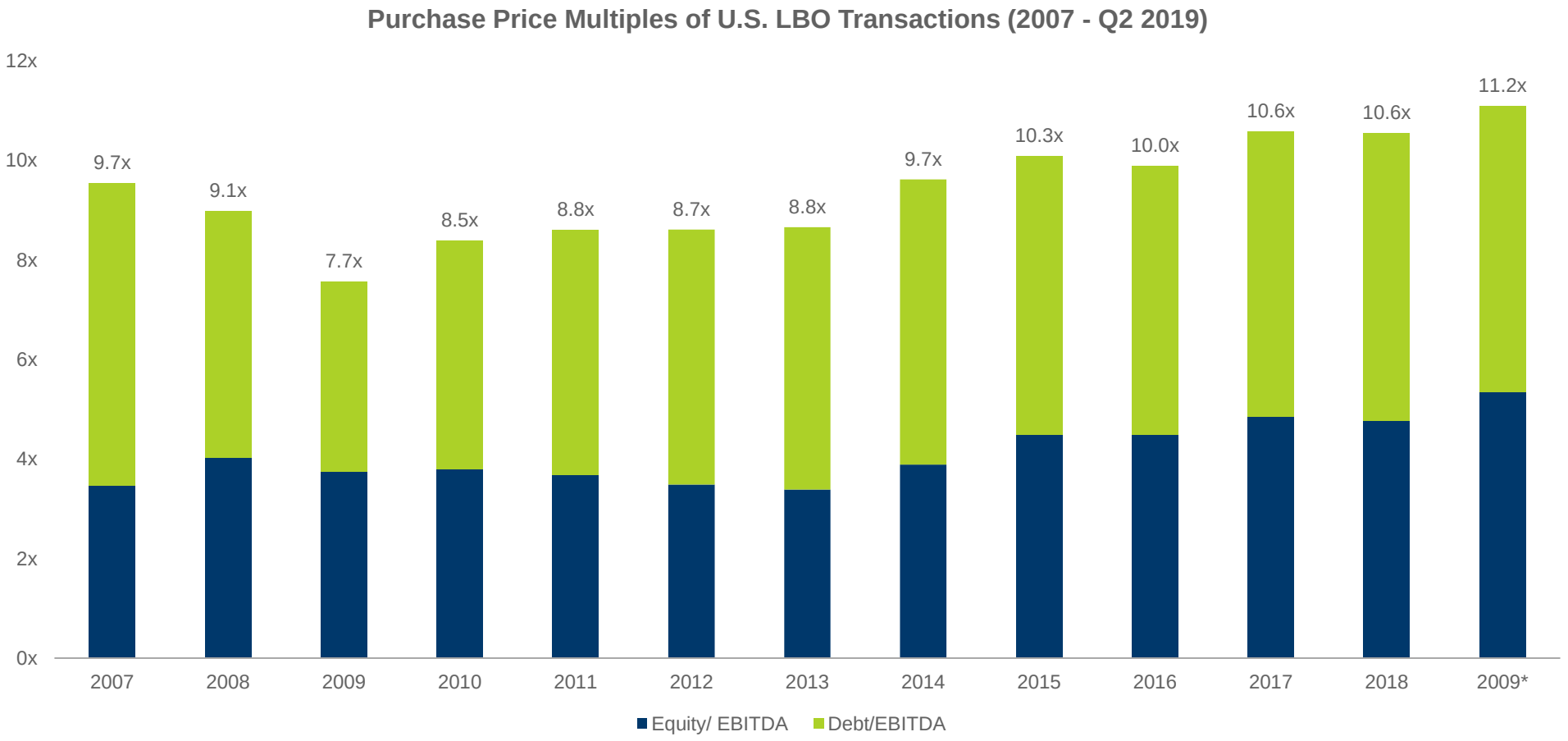
PRIVATE EQUITY - U.S. LBO PURCHASE PRICE MULTIPLES



- Due to the amount of equity that is readily available, purchase price multiples for U.S. LBOs have risen slightly through Q2 2019 relative to 2018 levels.

Source: S&P LBO, as of *June 30, 2019.

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CalPERS Private Equity – Performance

	Asset Value ($Billion)	Quarter	1-Year	3-Year	5-Year	10-Year	VaR ($Billion)	5-Year Ratios Sharpe	Info
PRIVATE EQUITY	**$ 26.5**	**3.5%**	**7.7%**	**12.5%**	**9.6%**	**14.0%**	**$ 10.7**	**2.4**	**-0.1**
CalPERS Custom Private Equity Benchmark		12.7%	4.0%	14.1%	10.4%	16.6%		**0.8**	**0.0**

	Asset Value ($Billion)	Quarter	1-Year	3-Year	5-Year	10-Year	VaR ($Billion)	5-Year Ratios Sharpe	Info
Private Equity									
Private Equity Partnership Investments	**$ 26.4**	**3.5%**	**7.8%**	**12.6%**	**9.6%**	**14.1%**		**N/A**	**N/A**
Private Equity Distribution Stock	**$ 0.0**	**7.9%**	**27.1%**	**27.2%**	**-5.4%**	**-7.6%**		**N/A**	**N/A**

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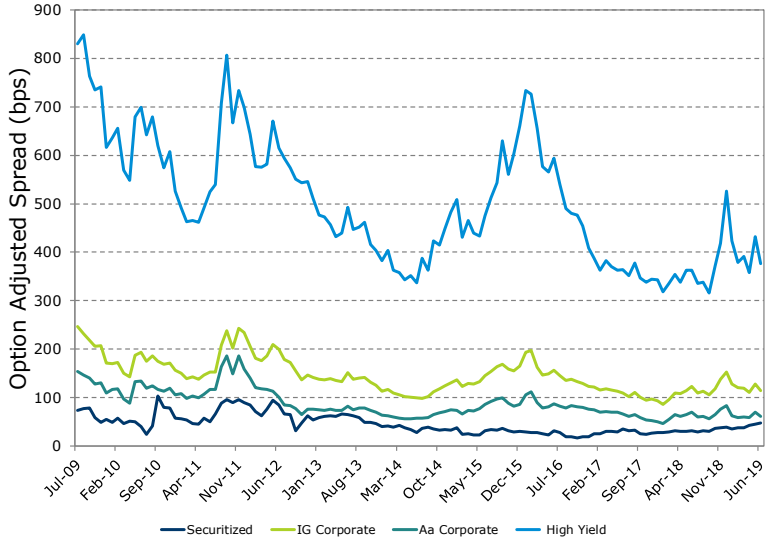
U.S. FIXED INCOME

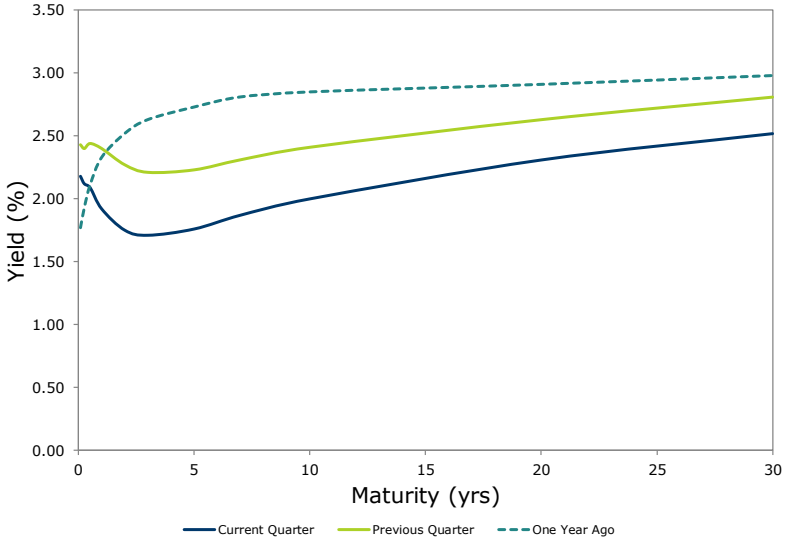
AS OF JUNE 30, 2019	YTM	DURATION	QTR	YTD	1 YR	3 YR	5 YR	10 YR
BLOOMBERG BARCLAYS AGGREGATE	2.5	5.7	3.1	6.1	7.9	2.3	3.0	3.9
BLOOMBERG BARCLAYS TREASURY	1.9	6.4	3.0	5.2	7.3	1.3	2.5	3.0
BLOOMBERG BARCLAYS GOV'T-REL.	2.6	5.6	3.0	6.2	7.9	2.5	2.9	3.5
BLOOMBERG BARCLAYS SECURITIZED	2.7	3.3	2.0	4.3	6.4	2.1	2.6	3.5
BLOOMBERG BARCLAYS CORPORATE	3.2	7.6	4.5	9.9	10.7	3.9	4.1	6.1
BLOOMBERG BARCLAYS LT G/C	3.3	15.6	6.6	13.5	13.8	3.8	5.7	7.6
BLOOMBERG BARCLAYS LT TREASURY	2.5	18.0	6.0	11.0	12.3	1.3	5.7	6.5
BLOOMBERG BARCLAYS LT GOV't-REL.	3.8	12.5	5.5	12.5	13.2	4.4	5.5	7.5
BLOOMBERG BARCLAYS LT CORP.	4.0	14.2	7.2	15.8	15.2	5.5	5.8	8.5
BLOOMBERG BARCLAYS U.S. TIPS *	1.9	7.6	2.9	6.1	4.8	2.1	1.8	3.6
BLOOMBERG BARCLAYS HIGH YIELD	6.3	3.2	2.5	9.9	7.5	7.5	4.7	9.2
TREASURY BILLS	2.1	0.25	0.6	1.2	2.3	1.4	0.9	0.5

* Yield and Duration statistics are for a proxy index based on similar maturity, the Bloomberg Barclays U.S. Treasury 7-10 Year Index

BLOOMBERG BARCLAYS FIXED INCOME INDEXES



TREASURY YIELD CURVE



Data sources: Wilshire Compass, Bloomberg Barclays, U.S. Treasury

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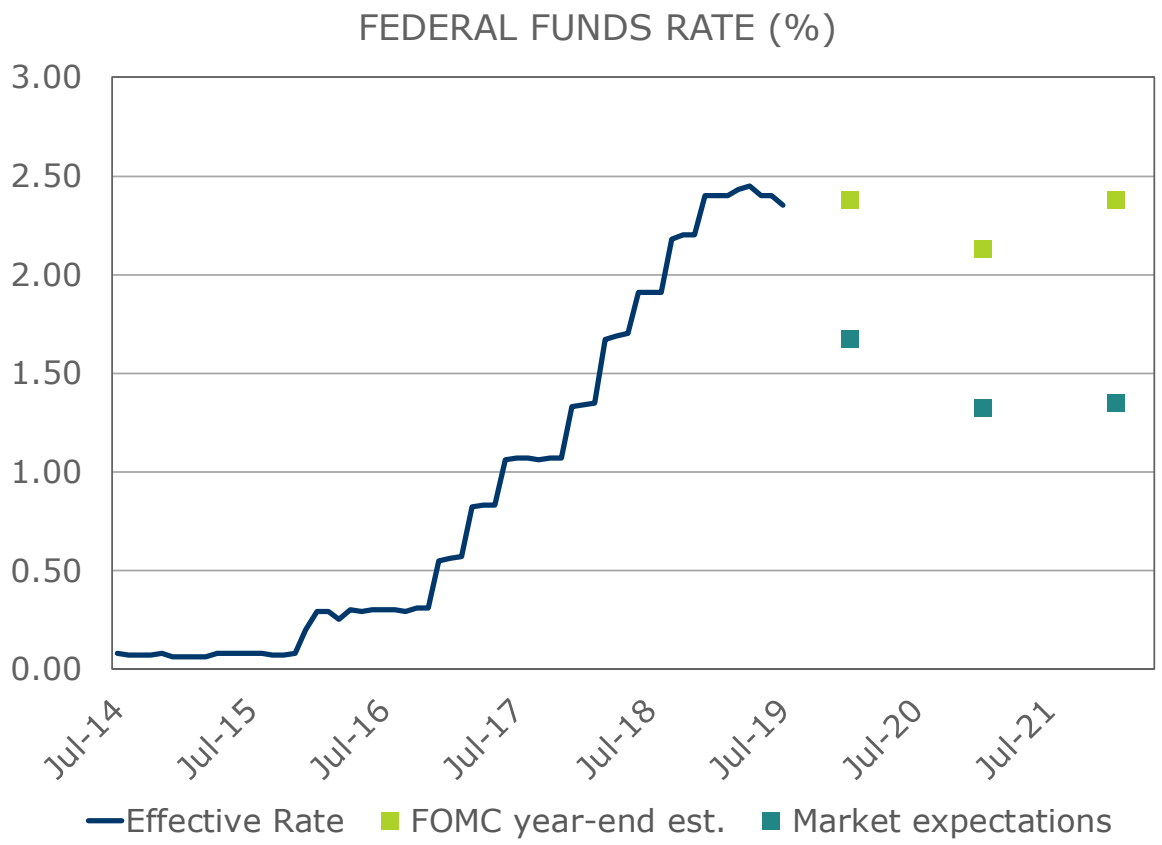
SHORT-TERM RATES

- Federal Reserve decreased the Fed Funds Rate for the first time since 2008
- Markets are expecting additional rate decreases this year



Data sources: U.S. Treasury, J.P. Morgan

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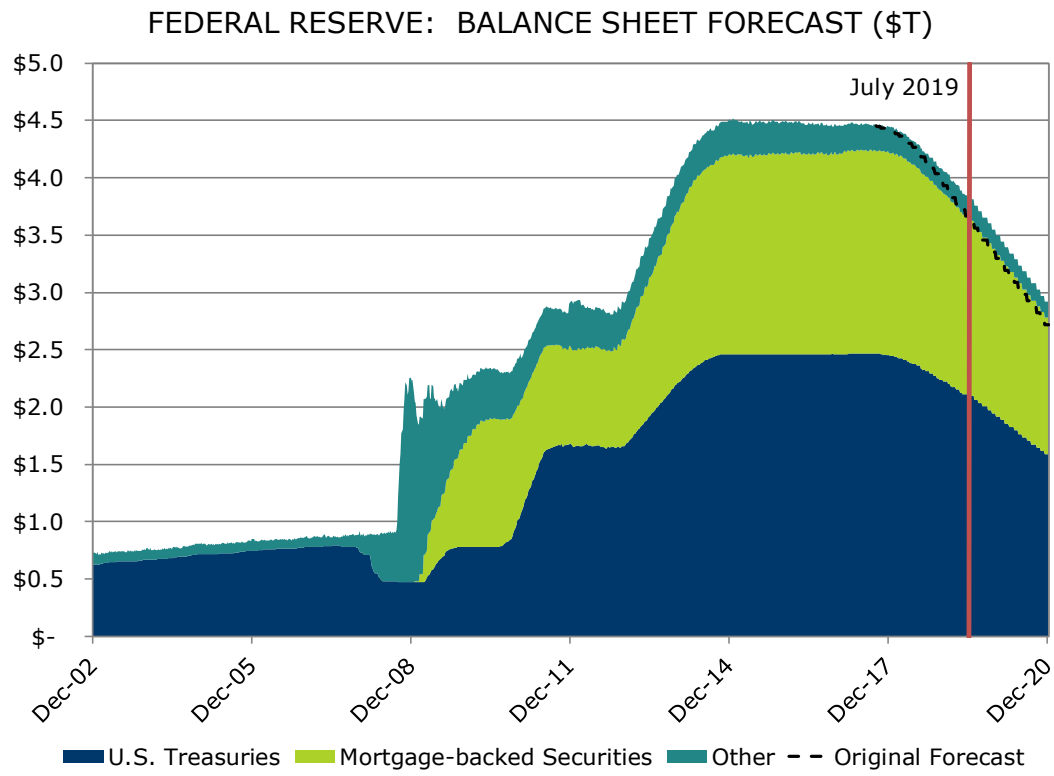
FED BALANCE SHEET

- Federal Reserve began their balance sheet normalization program during October 2017; targeting $10B in reductions per month while increasing to $50B per month in Q4 2018

- Fed stated in early January that future reductions will be data dependent; total reductions so far equal $640 billion



Data sources: Federal Reserve

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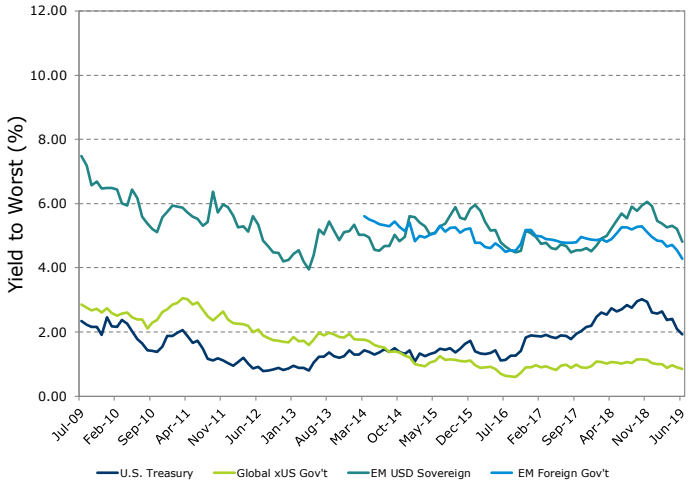
NON-U.S. FIXED INCOME

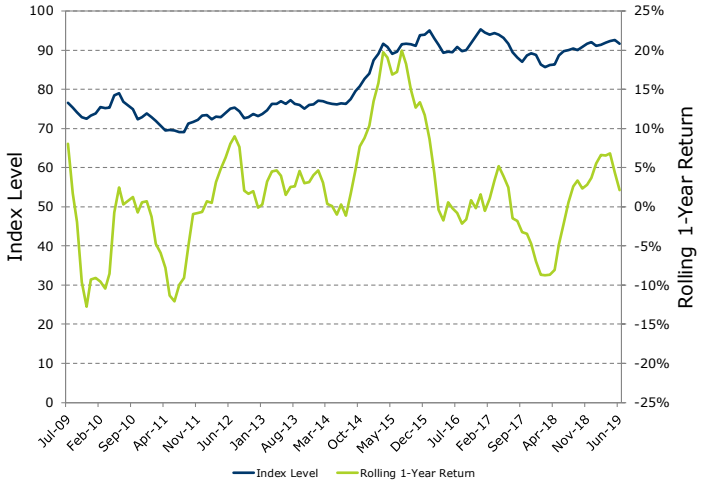
AS OF JUNE 30, 2019	QTR	YTD	1 YR	3 YR	5 YR	10 YR
DEVELOPED MARKETS						
BLMBRG BRCLYS GLBL AGGREGATE xUS	3.4	5.0	4.1	1.0	-0.1	2.1
BLMBRG BRCLYS GLBL AGGREGATE xUS *	2.8	5.8	7.6	3.3	4.4	4.4
BLMBRG BRCLYS GLOBAL INF LNKD xUS	1.8	6.2	2.9	3.0	0.8	3.7
BLMBRG BRCLYS GLOBAL INF LNKD xUS *	2.9	7.4	8.0	5.4	6.7	6.3
EMERGING MARKETS (HARD CURRENCY)						
BLMBRG BRCLYS EM USD AGGREGATE	3.8	9.4	10.9	5.0	4.6	7.7
EMERGING MARKETS (FOREIGN CURRENCY)						
BLMBRG BRCLYS EM LOCAL CURR. GOV'T	3.4	5.9	8.2	3.7	0.3	4.2
BLMBRG BRCLYS EM LOCAL CURR. GOV'T *	2.8	5.0	8.3	3.1	3.3	3.7
EURO vs. DOLLAR	1.4	-0.4	-2.5	0.8	-3.6	-2.1
YEN vs. DOLLAR	2.7	1.8	2.8	-1.6	-1.2	-1.1
POUND vs. DOLLAR	-2.3	-0.1	-3.6	-1.6	-5.7	-2.5

* Returns are reported in terms of local market investors, which removes currency effects.

BLOOMBERG BARCLAYS FIXED INCOME INDEXES



U.S. DOLLAR INDEX: MAJOR CURRENCIES



Data sources: Wilshire Compass, Bloomberg Barclays, Federal Reserve Bank of St. Louis

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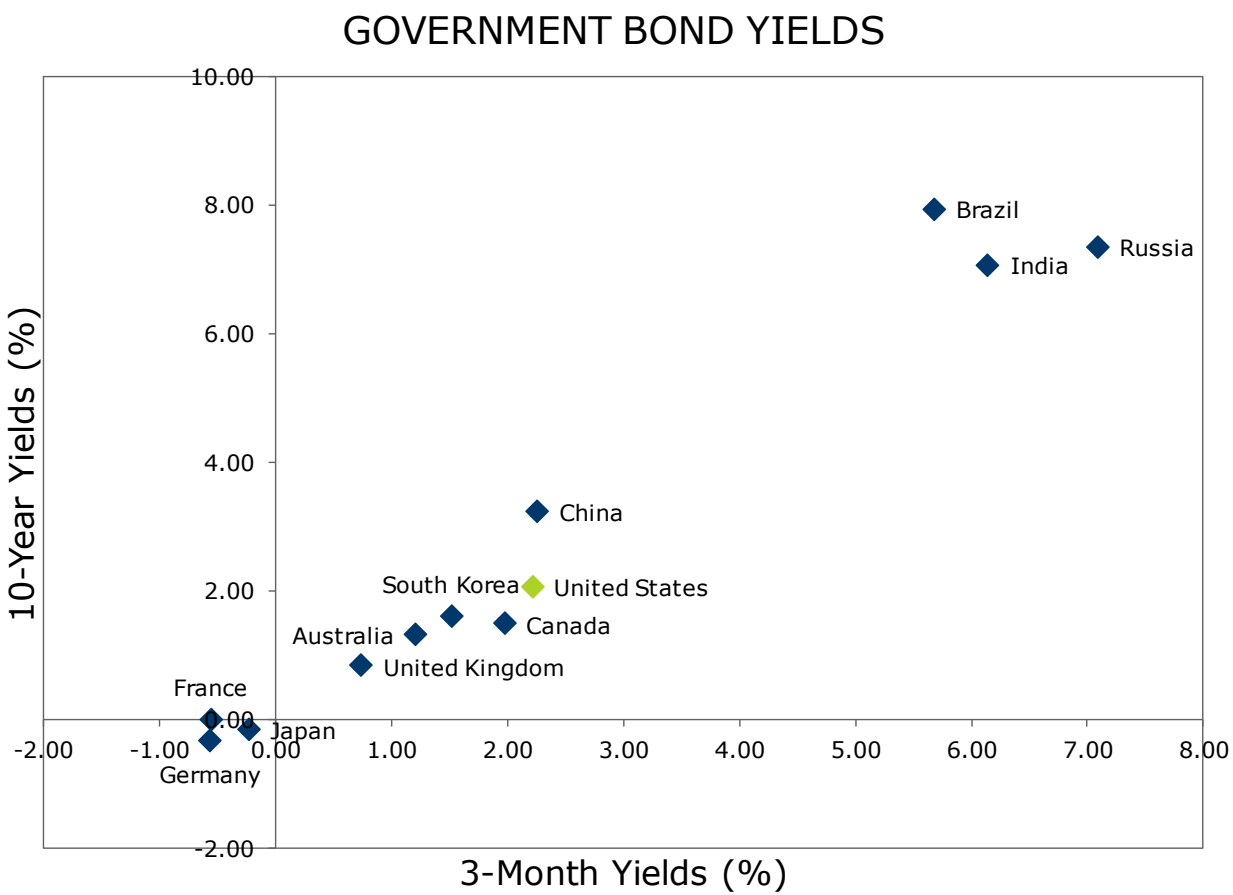
GLOBAL INTEREST RATES

Much of Europe and Japan exhibit negative rates; Long rates are down globally during the past six months



Data sources: Bloomberg

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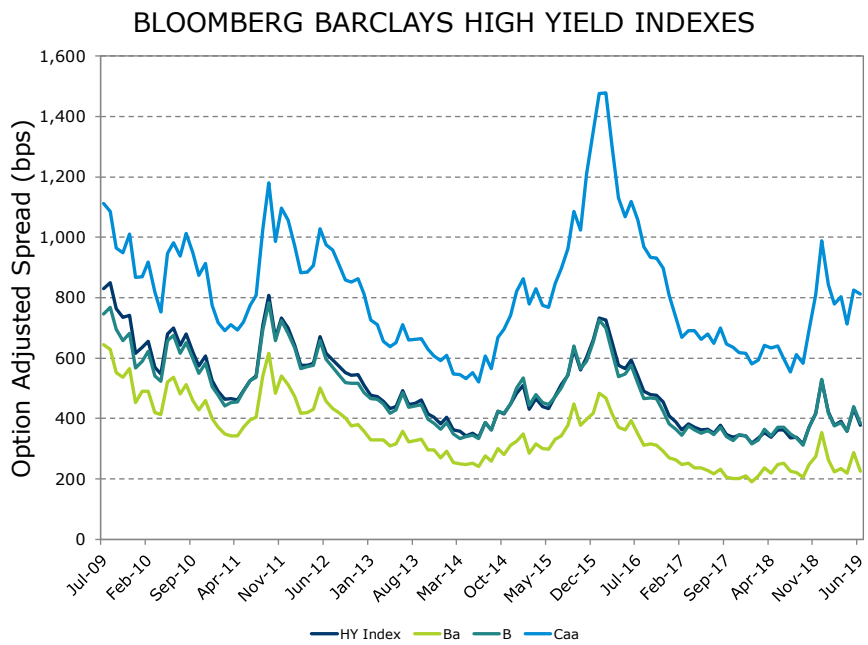
HIGH YIELD BOND MARKET

AS OF JUNE 30, 2019		QTR	YTD	1 YR	3 YR	5 YR	10 YR
BLOOMBERG BARCLAYS HIGH YIELD		2.5	9.9	7.5	7.5	4.7	9.2
CREDIT SUISSE LEVERAGED LOAN		1.6	5.4	4.1	5.4	3.9	6.3
HIGH YIELD QUALITY DISTRIBUTION	WEIGHT						
Ba U.S. HIGH YIELD	47.0%	3.1	10.5	9.8	6.6	5.2	8.8
B U.S. HIGH YIELD	39.5%	2.7	10.1	7.7	7.6	4.3	8.3
Caa U.S. HIGH YIELD	12.4%	0.3	7.5	0.1	8.9	4.3	10.5
Ca to D U.S. HIGH YIELD	0.8%	-1.8	15.4	-6.3	19.4	-8.0	4.4
Non-Rated U.S. HIGH YIELD	0.2%	1.2	4.8	4.5	4.8	-1.4	6.8



Data sources: Wilshire Compass, Bloomberg Barclays

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CalPERS Income – Performance

	Asset Value ($Billion)	Quarter	1-Year	3-Year	5-Year	10-Year	VaR ($Billion)	5-Year Ratios Sharpe	Info
INCOME	**$ 106.3**	**4.3%**	**9.6%**	**3.3%**	**4.1%**	**6.6%**	**$ 9.9**	**0.7**	**1.2**
Income Policy Benchmark		4.2%	9.3%	2.7%	3.5%	5.2%		**0.6**	**0.0**
Treasury	**$ 37.8**	**5.0%**	**10.5%**	**-.-%**	**-.-%**	**-.-%**	**$ 5.3**	**N/A**	**N/A**
CalPERS Custom Treasury Benchmark		5.0%	10.5%	-.-%	-.-%	-.-%		**N/A**	**N/A**
Spread	**$ 56.7**	**4.2%**	**9.5%**	**-.-%**	**-.-%**	**-.-%**	**$ 4.7**	**N/A**	**N/A**
BBG Barc Custom Global Long Spread Index		3.9%	9.0%	-.-%	-.-%	-.-%		**N/A**	**N/A**
High Yield	**$ 11.7**	**2.6%**	**8.4%**	**-.-%**	**-.-%**	**-.-%**	**$ 1.4**	**N/A**	**N/A**
BBG Barclays US High Yield BB/B Liquid Index		2.5%	8.0%	-.-%	-.-%	-.-%		**N/A**	**N/A**

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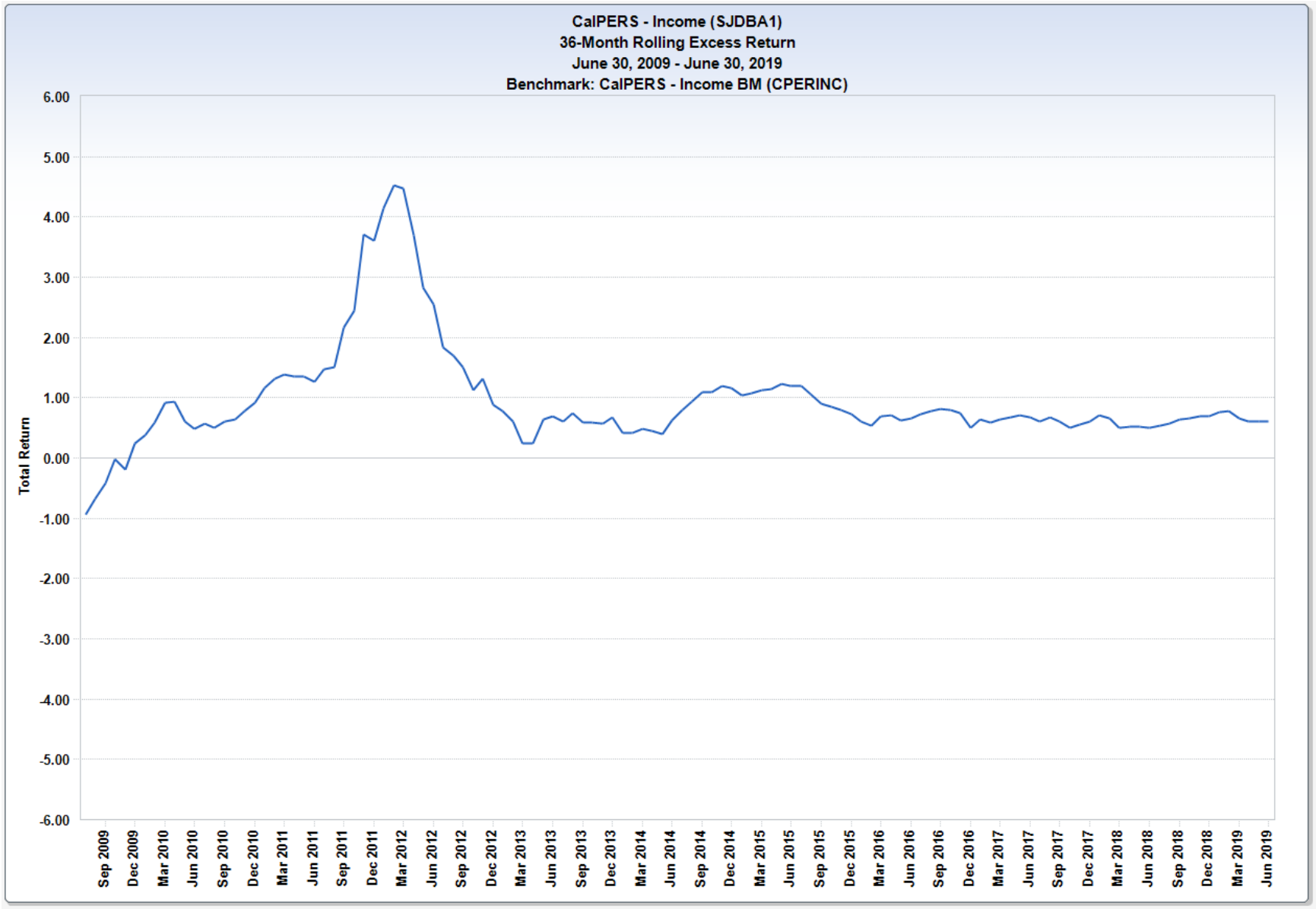
CalPERS Income – Rolling Excess Returns



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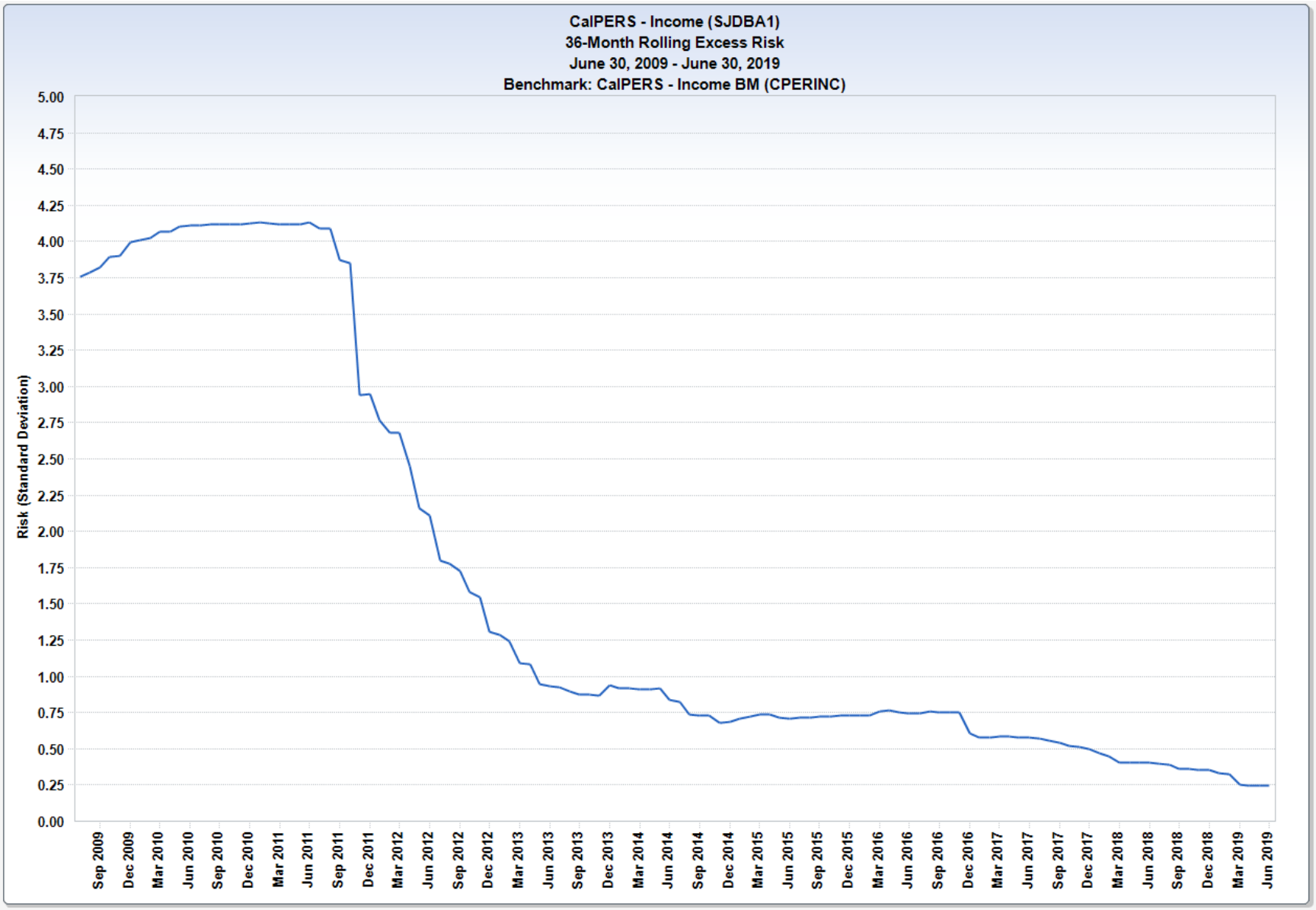
CalPERS Income – Rolling Tracking Error



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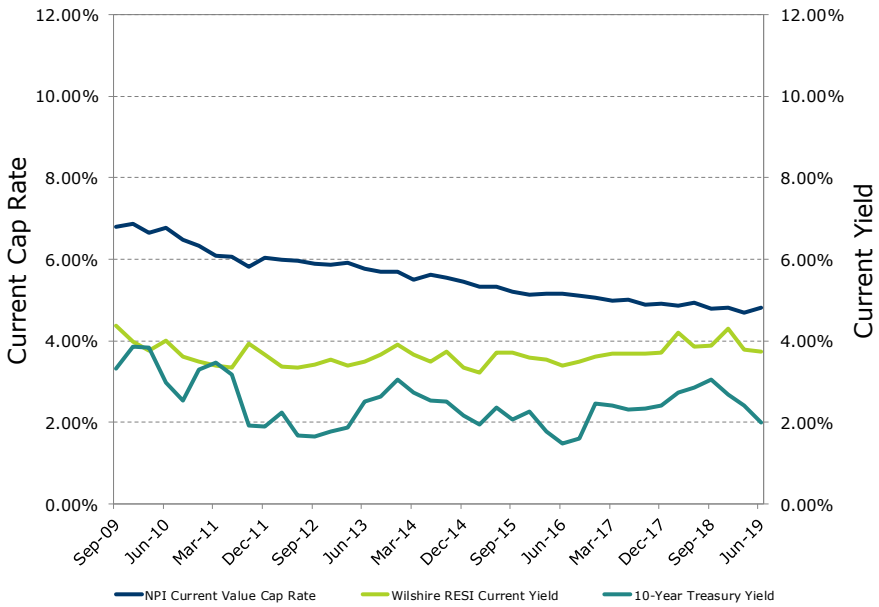
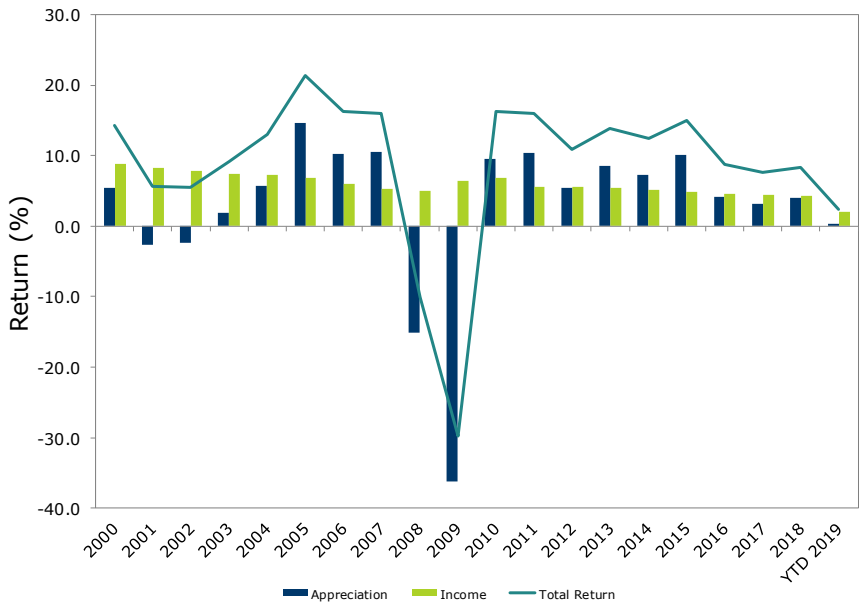
REAL ASSETS

AS OF JUNE 30, 2019	QTR	YTD	1 YR	3 YR	5 YR	10 YR
BLOOMBERG BARCLAYS U.S. TIPS	2.9	6.1	4.8	2.1	1.8	3.6
BLOOMBERG COMMODITY INDEX	-1.2	5.1	-6.8	-2.2	-9.1	-3.7
WILSHIRE GLOBAL RESI INDEX	1.5	16.7	9.9	5.3	6.5	13.2
NCREIF ODCE FUND INDEX	1.0	2.4	6.4	7.6	9.8	9.9
NCREIF TIMBERLAND INDEX	1.0	1.2	2.9	3.3	4.6	4.0
ALERIAN MLP INDEX (OIL & GAS)	0.1	17.0	3.1	-0.4	-7.2	8.2

REAL ESTATE VALUATION



NCREIF ODCE FUND INDEX RETURN



Data sources: Wilshire Compass, National Council of Real Estate Investment Fiduciaries

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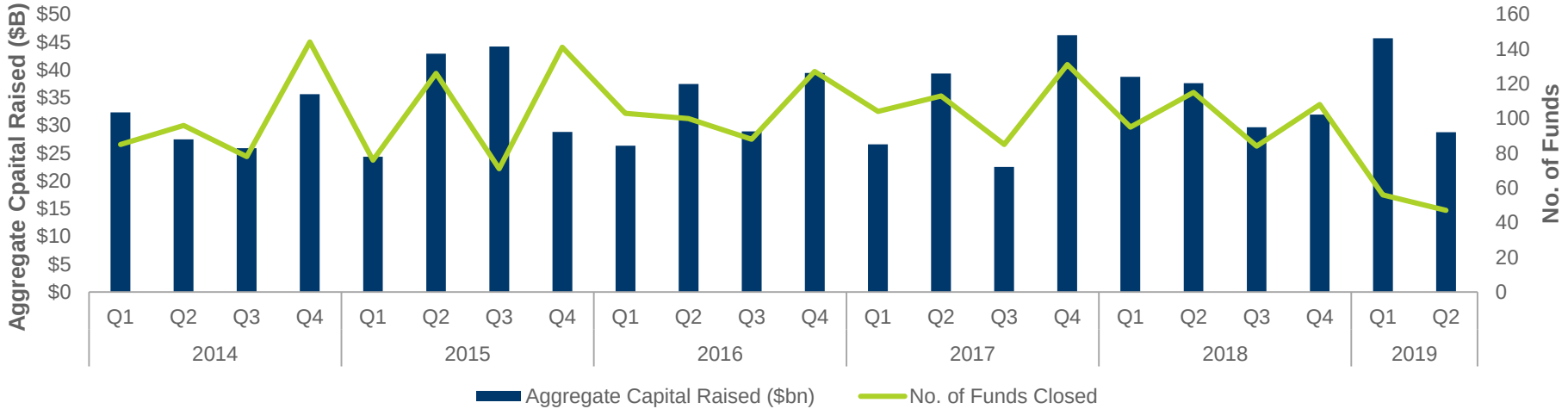
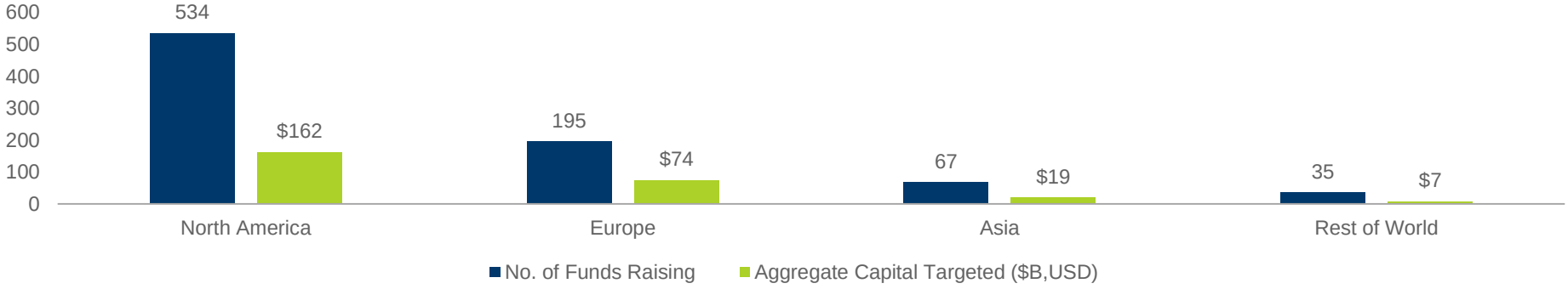
PRIVATE REAL ESTATE – FUNDRAISING ACTIVITY

Global Quarterly Closed-End Private Real Estate Fundraising (Q1 2014 – Q2 2019)



Closed-End Private Real Estate Fund Actively in Market in Q2 2019 by Primary Geographic Focus



Source: Preqin, as of June 30, 2019.

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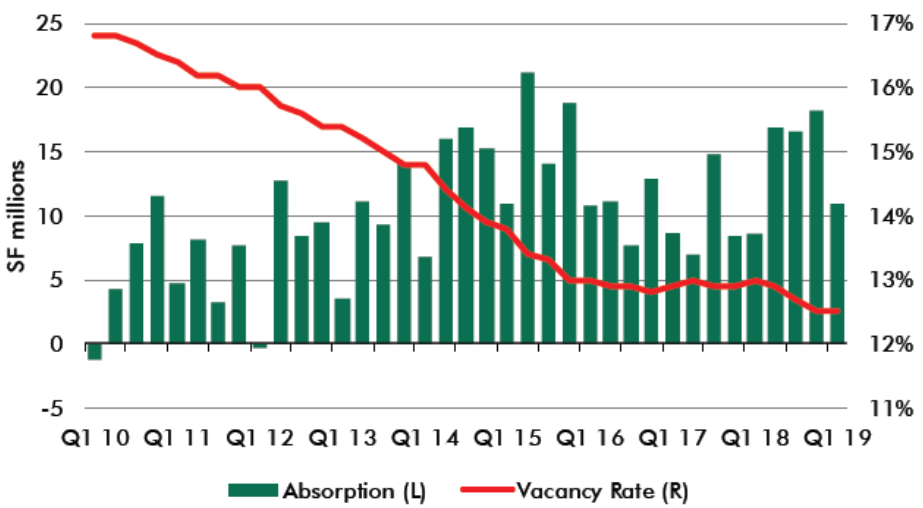
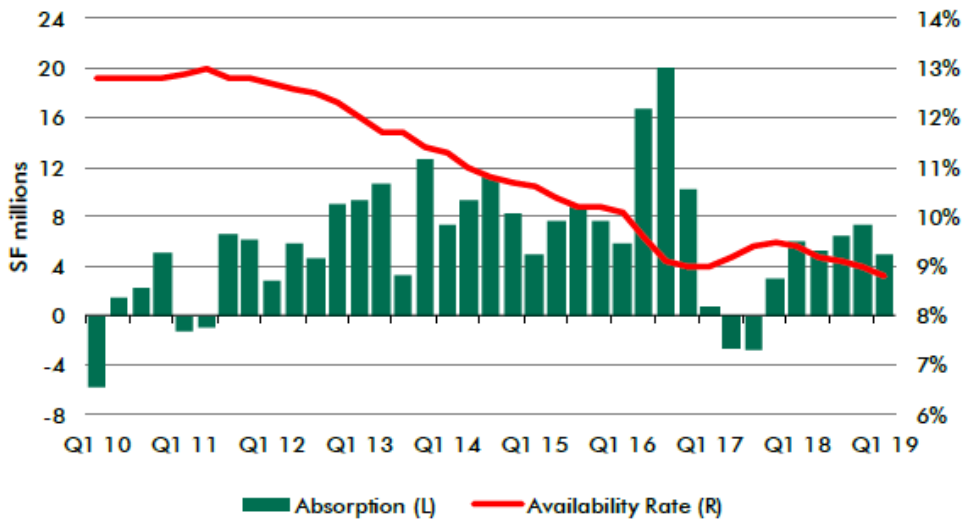
COMMERCIAL PROPERTY

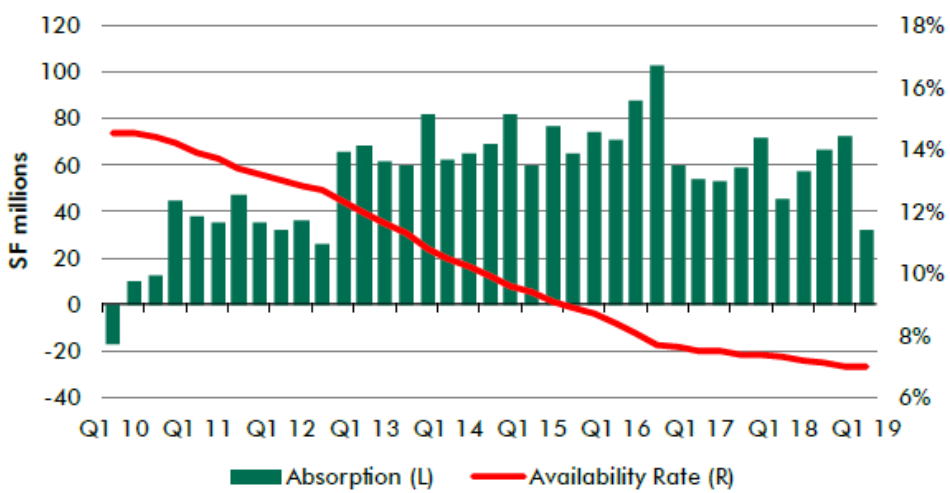
OFFICE



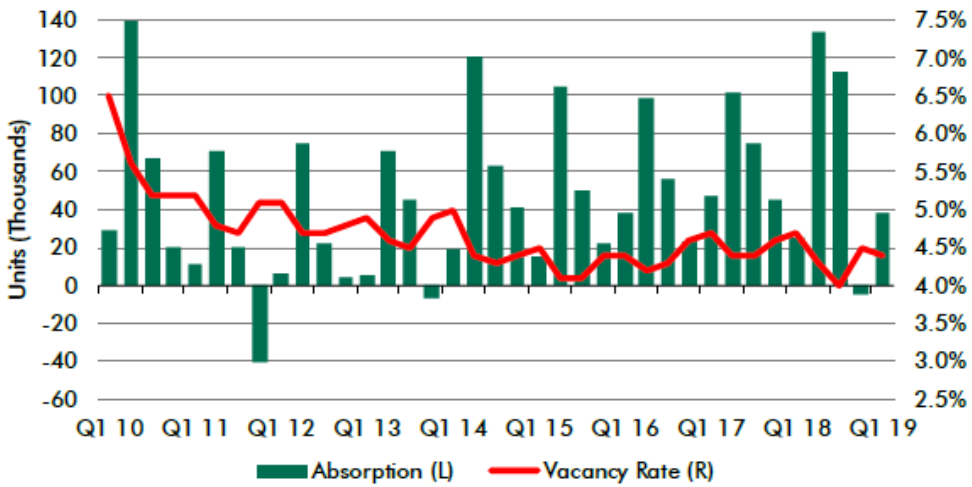
RETAIL



INDUSTRIAL



APARTMENTS



Data sources: CB Richard Ellis

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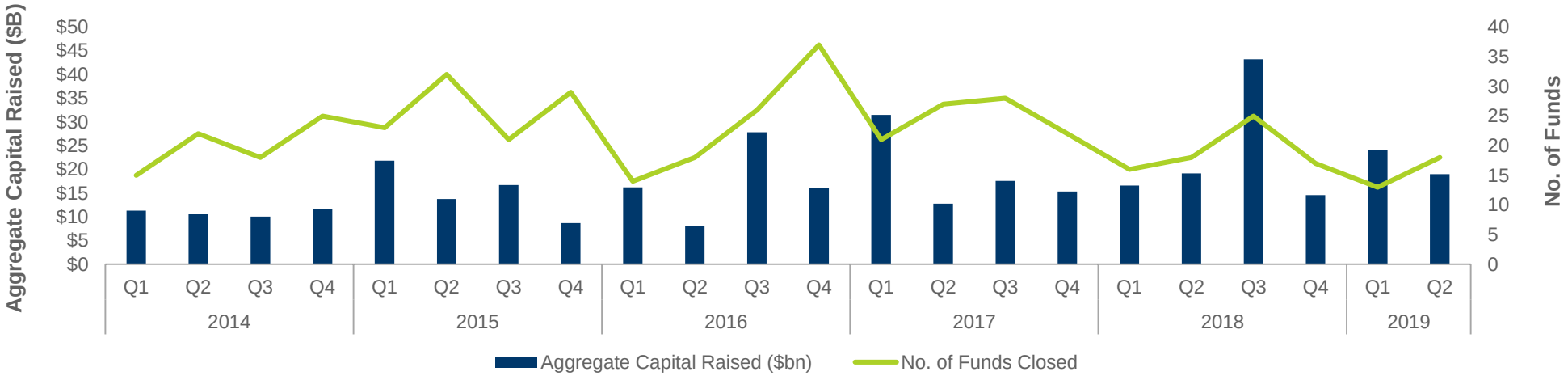
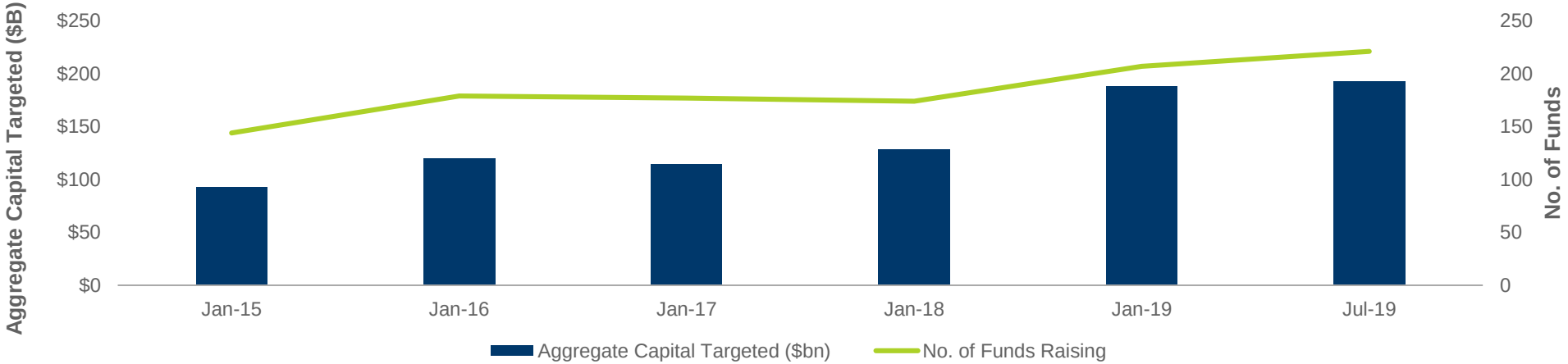
UNLISTED INFRASTRUCTURE – FUNDRAISING & INVESTMENT ACTIVITY

Global Quarterly Unlisted Infrastructure Fundraising (Q1 2014 – Q2 2019)



Unlisted Infrastructure Funds in Market over Time (Jan 2015 - July 2019)



Source: Preqin, as of June 30, 2019.

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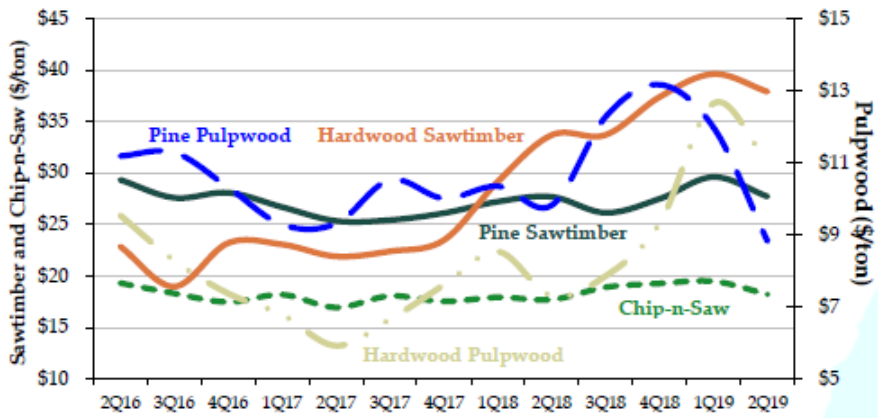
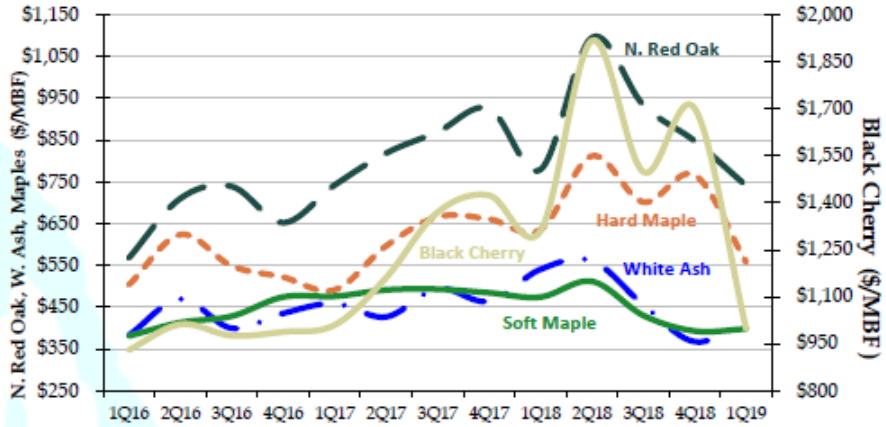
TIMBER

Southeastern Timber Prices



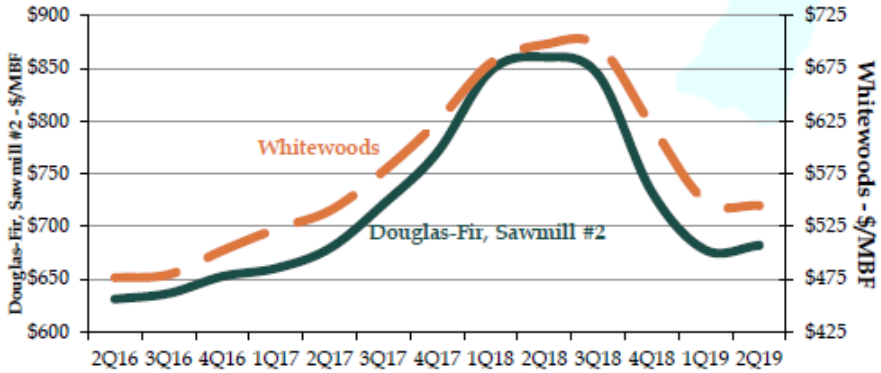
Source: Forest2Market®

Northeastern Hardwood Timber Prices



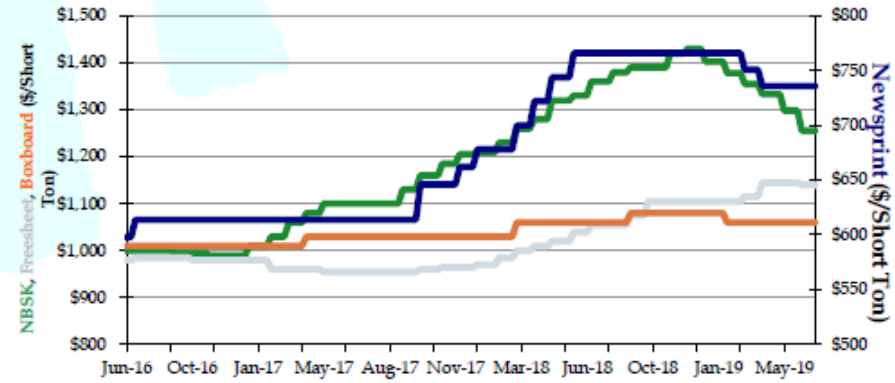
Source: Pennsylvania Woodlands Timber Market Report - Northwest Region

Pacific Northwest Timber Prices



Source: Log Lines®

Pulp and Paper



Source: FOEX Indexes, Ltd., RISI Pulp & Paper Week

Data sources: Forest Investment Associates

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CalPERS Real Assets – Performance

	Asset Value ($Billion)	Quarter	1-Year	3-Year	5-Year	10-Year	VaR ($Billion)	5-Year Ratios Sharpe	Info
REAL ASSETS	**$ 40.9**	**2.6%**	**3.7%**	**6.4%**	**7.5%**	**4.1%**	**$ 5.9**	**1.5**	**-0.3**
Real Assets Policy Benchmark		1.2%	6.5%	6.8%	8.6%	8.4%		**2.2**	**0.0**
Real Estate	**$ 34.8**	**2.5%**	**3.4%**	**5.9%**	**7.6%**	**4.0%**	**$ 5.0**	**1.4**	**-0.4**
CalPERS Custom Real Estate Benchmark		1.2%	6.5%	7.0%	9.2%	9.5%		**2.1**	**0.0**
Forestland	**$ 1.3**	**0.8%**	**-10.7%**	**-2.8%**	**-3.7%**	**-2.2%**	**$ 0.2**	**-0.7**	**-1.2**
CalPERS Custom Forestland Benchmark		1.2%	6.5%	4.6%	5.5%	4.2%		**1.4**	**0.0**
Infrastructure	**$ 4.8**	**3.4%**	**11.1%**	**13.8%**	**12.7%**	**17.9%**	**$ 0.7**	**2.0**	**1.2**
CalPERS Custom Infrastructure Benchmark		1.2%	6.5%	6.5%	5.6%	6.2%		**3.1**	**0.0**

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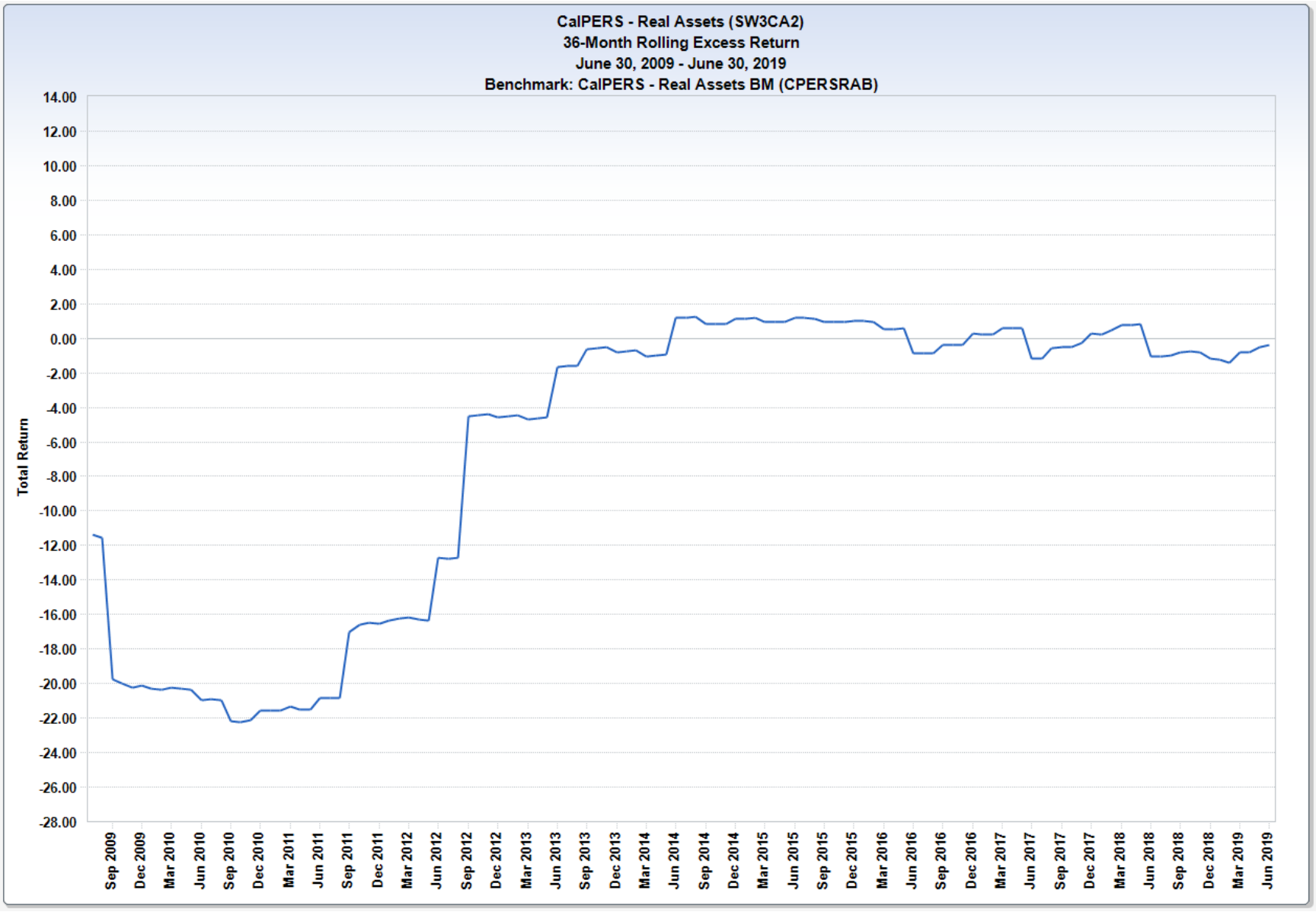
CalPERS Real Assets – Rolling Excess Returns



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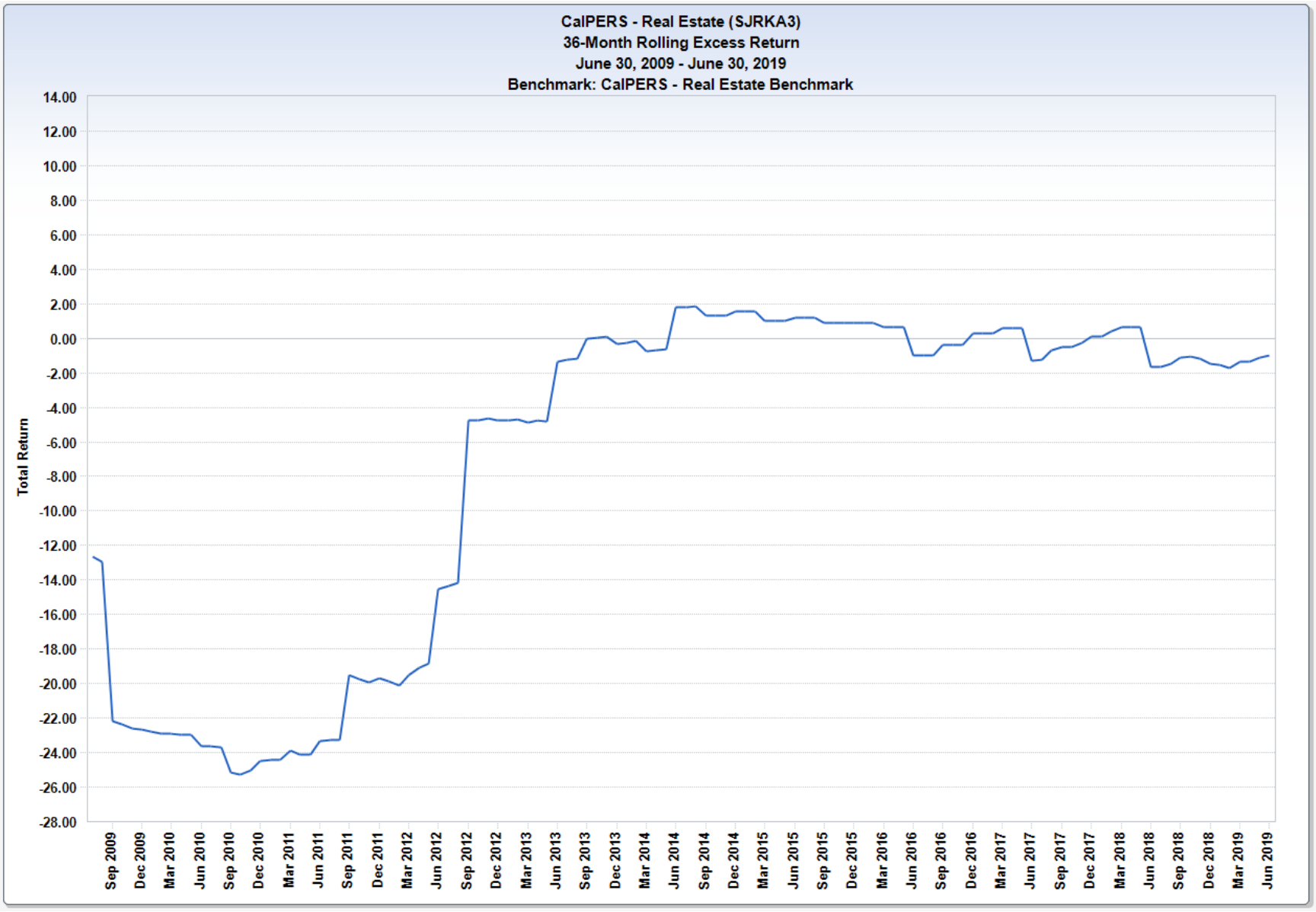
CalPERS Real Estate – Rolling Excess Returns



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CalPERS Liquidity – Performance

	Asset Value ($Billion)	Quarter	1-Year	3-Year	5-Year	10-Year	VaR ($Billion)	5-Year Ratios Sharpe	Info
LIQUIDITY	**$ 3.7**	**0.7%**	**2.6%**	**1.7%**	**1.3%**	**1.1%**	**$ 0.01**	**0.6**	**0.2**
Liquidity Policy Benchmark		0.6%	2.2%	1.3%	1.2%	1.2%		**0.3**	**0.0**
Internal Short Term Cash Portfolio	**$ 3.7**	**0.7%**	**2.6%**	**1.7%**	**1.1%**	**0.7%**	**$ 0.01**	**0.6**	**0.2**
CalPERS Short Term Benchmark		0.6%	2.2%	1.4%	0.9%	0.5%		**0.3**	**0.0**

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Trust Level Portfolio Management – Performance

	Asset Value ($Billion)	Quarter	1-Year	3-Year	5-Year	10-Year	VaR ($Billion)	5-Year Ratios Sharpe	Info
TRUST LEVEL PORTFOLIO MGMT	**$ 7.1**	**3.4%**	**2.5%**	**-.-%**	**-.-%**	**-.-%**	**$ 0.9**	**N/A**	**N/A**
CalPERS Reference Portfolio Benchmark		3.6%	7.2%	-.-%	-.-%	-.-%		**N/A**	**N/A**
External Multi-Asset Class	**$ 2.6**	**2.8%**	**4.0%**	**4.6%**	**3.7%**	**-.-%**		**N/A**	**N/A**
CalPERS Reference Portfolio Benchmark		3.6%	7.2%	8.3%	5.5%	-.-%		**N/A**	**N/A**
TLPM Overlay	**$ 0.6**	**3.5%**	**7.4%**	**-.-%**	**-.-%**	**-.-%**		**N/A**	**N/A**
CalPERS Reference Portfolio Benchmark		3.6%	7.2%	-.-%	-.-%	-.-%		**N/A**	**N/A**
TLPM Risk Mitigation *	**$ 0.2**	**-27.5%**	**-82.1%**	**-.-%**	**-.-%**	**-.-%**		**N/A**	**N/A**
TLPM Transition	**$ 0.2**	**-.-%**	**-.-%**	**-.-%**	**-.-%**	**-.-%**		**N/A**	**N/A**
Cross Asset Volatility Premia *	**$ 0.007**	**-41.6%**	**-38.0%**	**-.-%**	**-.-%**	**-.-%**		**N/A**	**N/A**
Custom Volatility Premia Benchmark		0.6%	-5.8%	-.-%	-.-%	-.-%		**N/A**	**N/A**
TLPM Emerging Managers Program	**$ 3.5**	**-.-%**	**-.-%**	**-.-%**	**-.-%**	**-.-%**		**N/A**	**N/A**
FTSE Global All Cap Custom Index		-.-%	-.-%	-.-%	-.-%	-.-%		**N/A**	**N/A**

* The Risk Mitigation and Cross Asset Volatility Premia portfolios are small components whose average monthly market values over the 2018-2019 fiscal year represented 0.038% and 0.010% of CalPERS total assets, respectively.
Due to their relative size, performance contribution to CalPERS Total Fund is estimated to be -0.031% and -0.004%, respectively, over the same period.

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Other Perf – Performance

	Asset Value ($Billion)	Quarter	1-Year	3-Year	5-Year	10-Year	VaR ($Billion)	5-Year Ratios Sharpe	Info
OTHER PERF	**$ 0.2**	**NM**	**NM**	**NM**	**NM**	**NM**	**$ -**	**N/A**	**N/A**
Absolute Return Strategies *	**$ 0.2**	**-2.4%**	**-13.6%**	**-6.7%**	**-3.0%**	**1.2%**		**-0.6**	**-1.3**
Total ARS Program Blended Benchmark		2.2%	8.1%	6.5%	6.1%	5.8%		**13.0**	**0.0**
Other Plan Level	**$ 0.0**	**-.-%**	**-.-%**	**-.-%**	**-.-%**	**-.-%**			

* The Absolute Return Strategies portfolio is a small component whose average monthly market values over the 2018-2019 fiscal year represented 0.06% of CalPERS total assets.
Due to its relative size, performance contribution to CalPERS Total Fund is estimated to be -0.008% over the same period.

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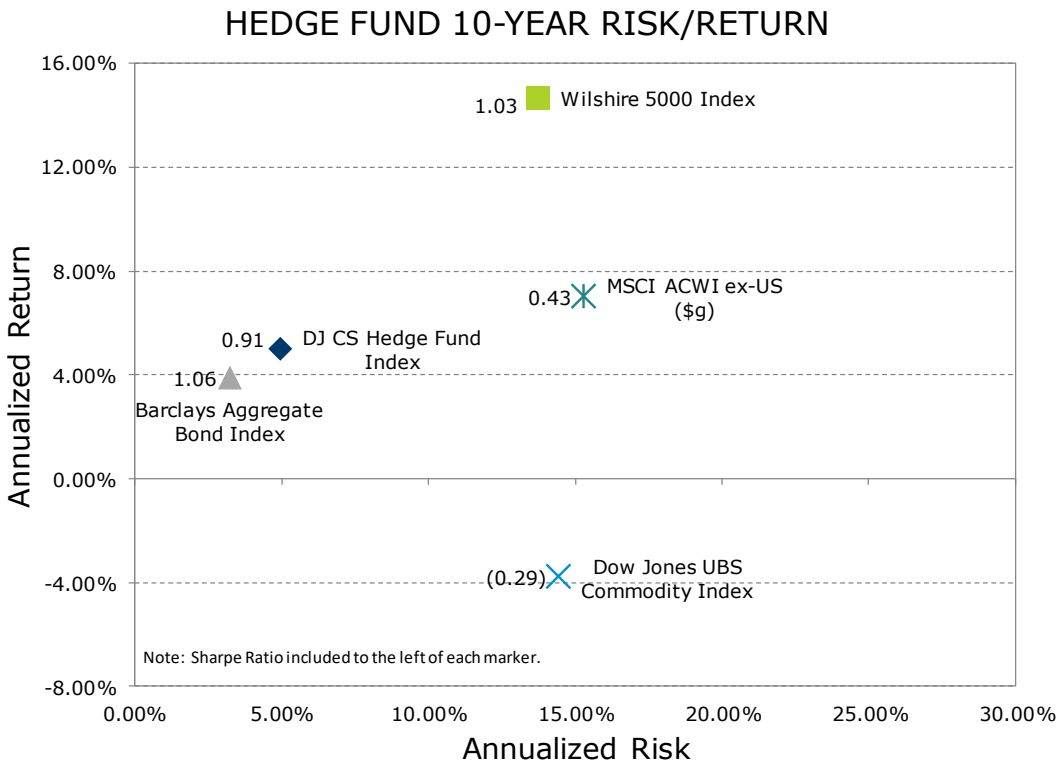
HEDGE FUND PERFORMANCE

AS OF JUNE 30, 2019	QTR	YTD	1 YR	3 YR	5 YR	10 YR
DJ CS HEDGE FUND INDEX	2.3	6.4	2.5	4.3	2.4	5.0
EVENT DRIVEN	2.4	7.5	1.9	4.9	0.3	4.7
GLOBAL MACRO	4.6	7.3	5.2	4.8	3.0	5.2
LONG/SHORT EQUITY	1.2	6.7	1.1	5.5	3.4	5.7
MULTI-STRATEGY	2.1	5.2	2.2	4.9	4.4	6.9
WILSHIRE 5000	4.0	18.7	9.1	14.0	10.3	14.7
MSCI ACWI EX-US ($G)	3.2	14.0	1.8	9.9	2.6	7.0
BLOOMBERG BARCLAYS AGGREGATE	3.1	6.1	7.9	2.3	3.0	3.9
DOW JONES UBS COMMODITY	-1.2	5.1	-6.8	-2.2	-9.1	-3.7



Data sources: Wilshire Compass

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