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California Public Employees' Retirement System

Performance Review – June 30, 2017

Wilshire Consulting

ASSET CLASS PERFORMANCE

ASSET CLASS RETURNS - BEST TO WORST						ANNUALIZED 5-YEAR AS OF 6/2017
2012	2013	2014	2015	2016	YTD 2017	
Emrg Mrkts 18.6%	U.S. Equity 33.1%	REITs 31.8%	REITs 4.2%	MLPs 18.3%	Emrg Mrkts 18.6%	U.S. Equity 14.6%
Developed 17.9%	MLPs 27.6%	U.S. Equity 12.7%	U.S. Equity 0.7%	High Yield 17.1%	Developed 14.2%	REITs 9.3%
REITs 17.6%	Developed 23.3%	Core Bond 6.0%	Core Bond 0.6%	U.S. Equity 13.4%	U.S. Equity 8.7%	Developed 9.2%
U.S. Equity 16.1%	High Yield 7.4%	MLPs 4.8%	T-Bills 0.1%	Commodities 11.8%	High Yield 4.9%	High Yield 6.9%
High Yield 15.8%	REITs 1.9%	U.S. TIPS 3.6%	Developed -0.4%	Emrg Mrkts 11.6%	Core Bond 2.3%	Emrg Mrkts 4.3%
U.S. TIPS 7.0%	T-Bills 0.1%	High Yield 2.5%	U.S. TIPS -1.4%	REITs 7.2%	REITs 1.8%	Core Bond 2.2%
MLPs 4.8%	Core Bond -2.0%	T-Bills 0.0%	High Yield -4.5%	U.S. TIPS 4.7%	U.S. TIPS 0.9%	MLPs 1.8%
Core Bond 4.2%	Emrg Mrkts -2.3%	Emrg Mrkts -1.8%	Emrg Mrkts -14.6%	Core Bond 2.6%	T-Bills 0.3%	U.S. TIPS 0.3%
T-Bills 0.1%	U.S. TIPS -8.6%	Developed -4.5%	Commodities -24.7%	Developed 1.5%	MLPs -2.7%	T-Bills 0.2%
Commodities -1.0%	Commodities -9.5%	Commodities -17.0%	MLPs -32.6%	T-Bills 0.3%	Commodities -5.3%	Commodities -9.2%

Data sources: Wilshire Compass

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

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JUNE 2017 ASSET CLASS ASSUMPTIONS

	EQUITY						FIXED INCOME						REAL ASSETS					
													REAL ESTATE					
	US STOCK	DEV EX-US STOCK	EMG MRKT STOCK	GLOBAL EX-US STOCK	GLOBAL STOCK	PRIVATE EQUITY	CASH	CORE BOND	LT CORE BOND	US TIPS	HIGH YIELD	NON-US BOND (HDG)	US RES	GLOBAL RES	PRIVATE RE	CMDTY	REAL ASSETS	US CPI
EXPECTED COMPOUND RETURN (%)	6.50	6.50	6.50	6.70	6.70	9.05	1.45	3.50	3.80	2.75	4.90	1.40	5.15	5.35	5.70	3.20	6.05	1.75
EXPECTED ARITHMETIC RETURN (%)	7.80	7.95	9.45	8.30	8.05	12.25	1.45	3.65	4.25	2.90	5.35	1.45	6.50	6.50	6.60	4.25	6.40	1.75
EXPECTED RISK (%)	17.00	18.00	26.00	18.75	17.15	27.50	1.25	5.15	9.85	6.00	10.00	3.50	17.00	15.80	14.00	15.00	8.40	1.75
CASH YIELD (%)	2.00	3.00	2.25	2.85	2.40	0.00	1.45	3.55	4.75	3.05	8.10	1.80	3.85	3.85	2.70	1.45	2.75	0.00
CORRELATIONS																		
US STOCK	1.00																	
DEV EX-US STOCK (USD)	0.83	1.00																
EMERGING MARKET STOCK	0.75	0.75	1.00															
GLOBAL EX-US STOCK	0.85	0.96	0.87	1.00														
GLOBAL STOCK	0.96	0.94	0.84	0.96	1.00													
PRIVATE EQUITY	0.75	0.65	0.63	0.68	0.74	1.00												
CASH EQUIVALENTS	-0.05	-0.09	-0.05	-0.08	-0.07	0.00	1.00											
CORE BOND	0.29	0.13	0.00	0.10	0.20	0.32	0.19	1.00										
LT CORE BOND	0.32	0.16	0.01	0.12	0.23	0.33	0.11	0.95	1.00									
US TIPS	-0.05	0.00	0.15	0.05	0.00	-0.03	0.20	0.61	0.48	1.00								
HIGH YIELD BOND	0.55	0.40	0.50	0.45	0.52	0.34	-0.10	0.25	0.33	0.05	1.00							
NON-US BOND (HDG)	0.16	0.26	-0.01	0.19	0.18	0.27	0.10	0.68	0.65	0.40	0.27	1.00						
US RE SECURITIES	0.60	0.48	0.45	0.50	0.57	0.51	-0.05	0.17	0.23	0.10	0.57	0.05	1.00					
GLOBAL RE SECURITIES	0.66	0.60	0.57	0.63	0.67	0.58	-0.05	0.16	0.22	0.11	0.63	0.04	0.96	1.00				
PRIVATE REAL ESTATE	0.55	0.45	0.45	0.48	0.53	0.51	-0.05	0.19	0.26	0.09	0.58	0.05	0.79	0.77	1.00			
COMMODITIES	0.15	0.25	0.30	0.28	0.22	0.15	0.00	-0.04	-0.05	0.20	0.20	-0.05	0.26	0.29	0.25	1.00		
REAL ASSET BASKET	0.40	0.41	0.48	0.46	0.45	0.38	0.02	0.24	0.26	0.41	0.51	0.08	0.66	0.70	0.70	0.56	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	0.04	0.05	0.40	0.25	1.00

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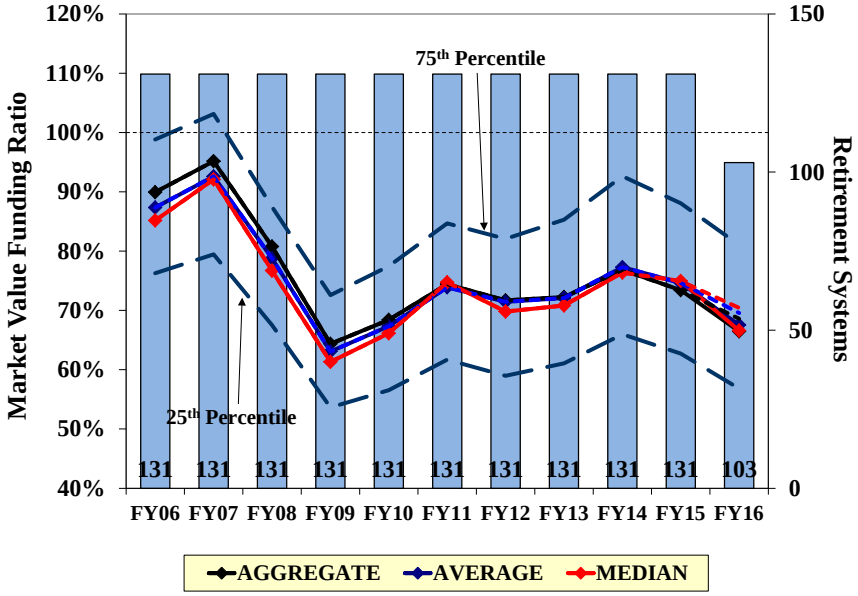
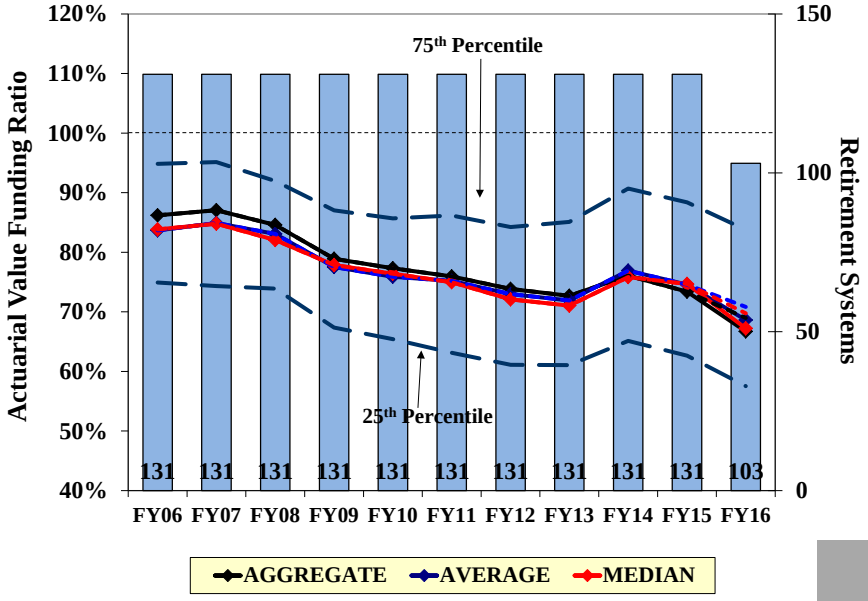
2017 STATE FUNDING STUDY

- 103 state retirement systems reported actuarial values on or after June 30, 2016
- Decline in funding ratio fueled by relatively poor equity returns during the fiscal year



- Funding ratios based on actuarial values were down for 2016
- Pension assets shrank while liabilities were up 5%



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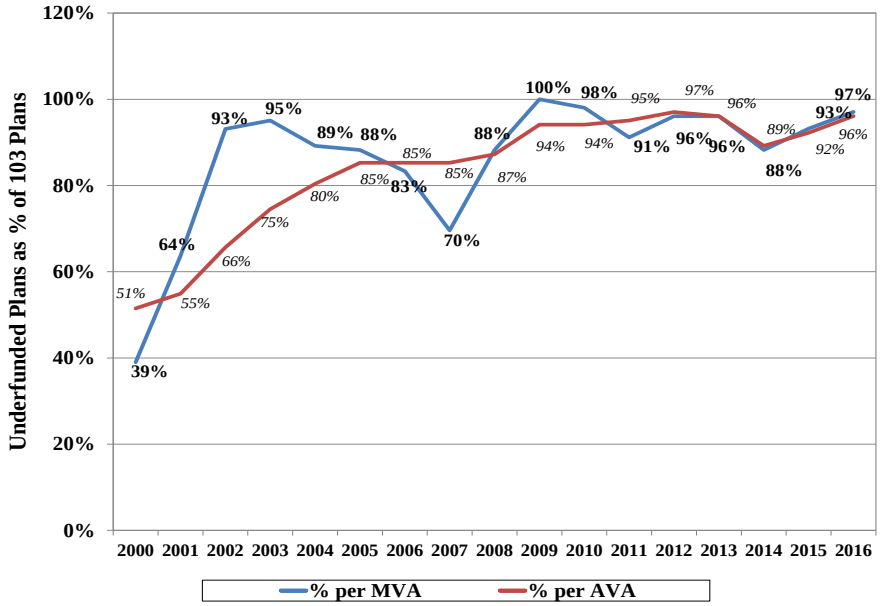
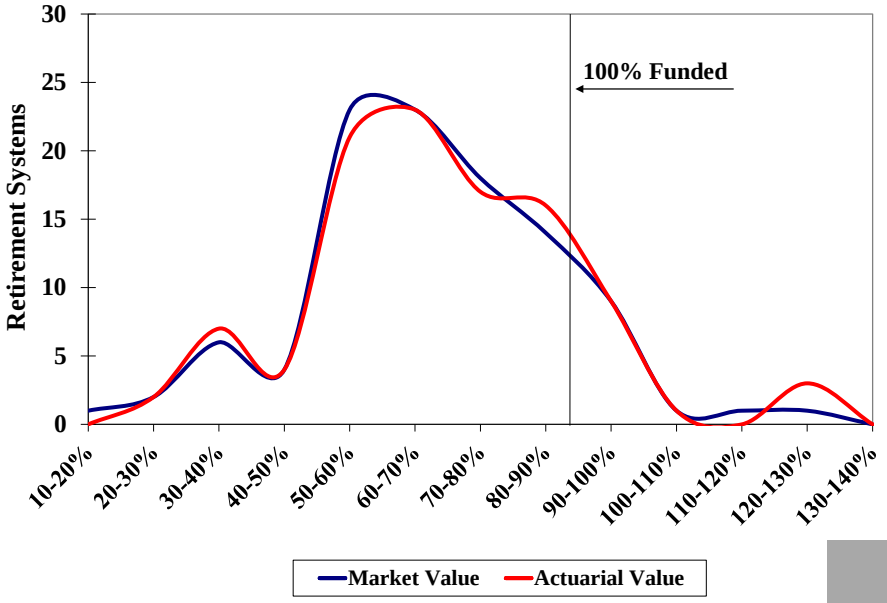
2017 STATE FUNDING STUDY

- Of the 103 plans with 2016 data, 97% of them were underfunded based on market values



- On a market value basis, a majority of the 103 plans are less than or equal to 70% funded



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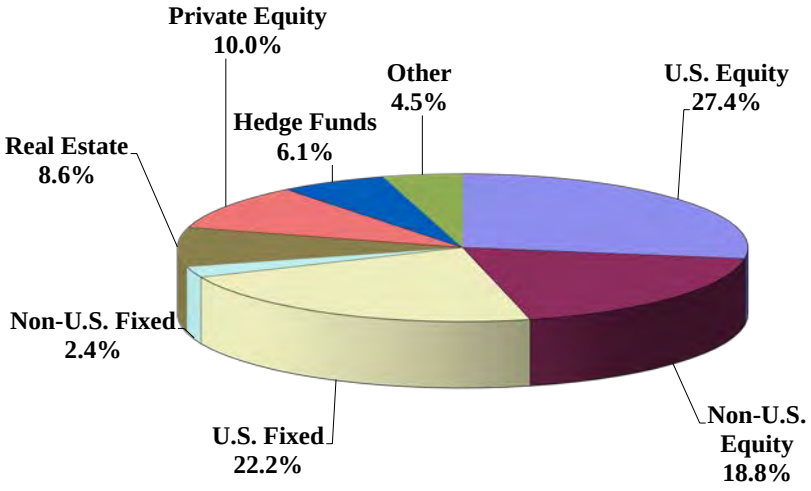
2017 STATE FUNDING STUDY

- U.S. Equity plus Non-U.S. Equity equals 46.2% of assets



- Average allocations to Non-U.S. Equity, Real Estate and Private Equity have increased while allocation to U.S. Bonds has decreased

				Change in Exposure	
Equity	2006	2011	2016	06-11	11-16
U.S. Equity	42.3 %	31.2 %	27.4 %	-14.9 %	-3.8 %
Non-U.S. Equity	17.1	19.9	18.8	1.7	-1.1
Real Estate	4.8	6.4	8.6	3.8	2.2
Private Equity	4.4	8.6	10.0	5.6	1.4
Equity Subtotal	68.6	66.0	64.8	-3.8	-1.2
Debt					
U.S. Fixed	27.2	23.4	22.2	-5.0	-1.2
Non-U.S. Fixed	0.9	1.7	2.4	1.5	0.7
Debt Subtotal	28.1	25.1	24.6	-3.5	-0.5
Other	3.3	8.9	10.6	7.3	1.7
Return *	6.1	6.1	6.4	0.3	0.2
Risk *	11.8	11.6	12.1	0.3	0.5

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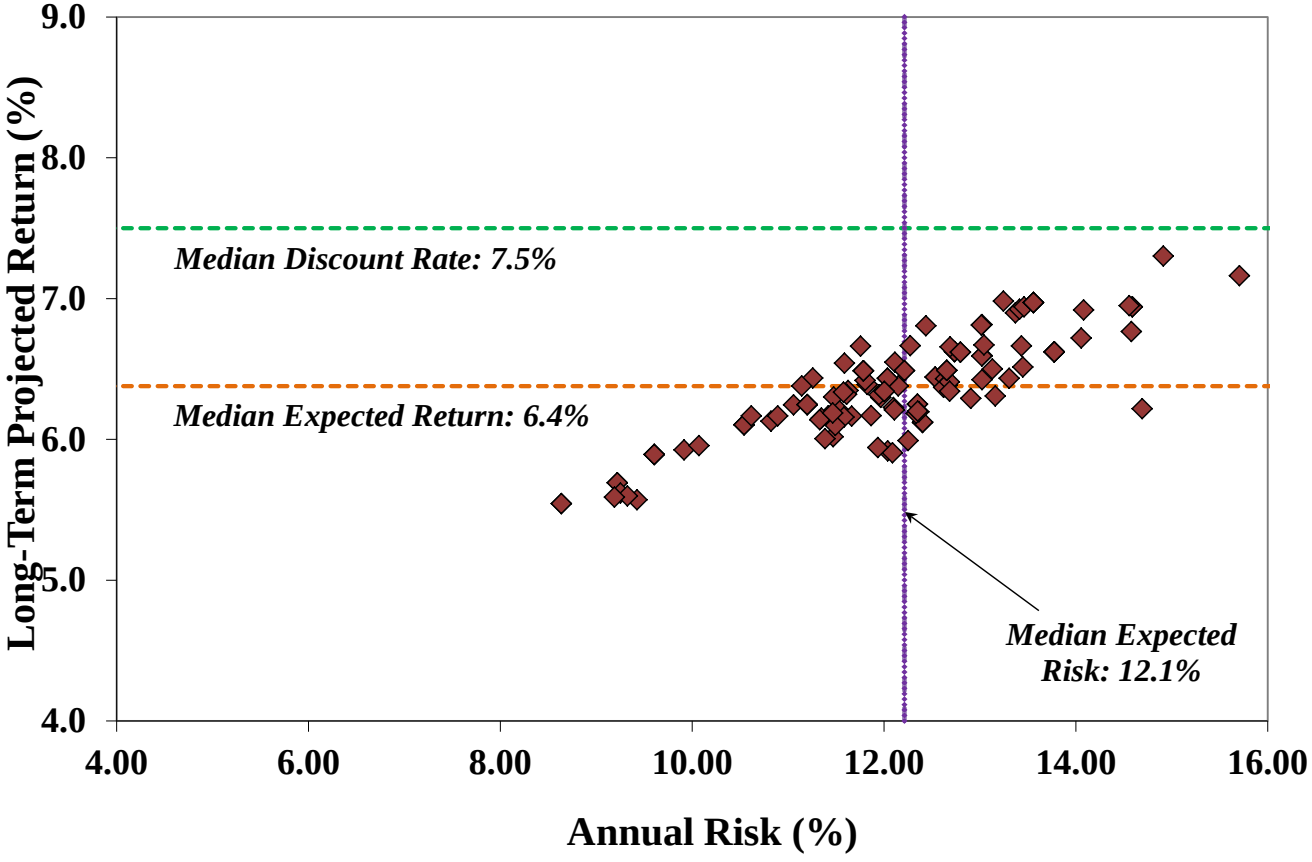
2017 STATE FUNDING STUDY

- Using Wilshire Consulting's asset class assumptions to calculate return forecasts for the 131 plans in our study, the median expected return is 6.4% per year
- None of the plans are projected to meet or exceed the median actuarial rate of 7.5%
- Using our 30-year assumptions, 58 of the 131 plans' assets, would be projected to earn long-term returns above their current discount rates



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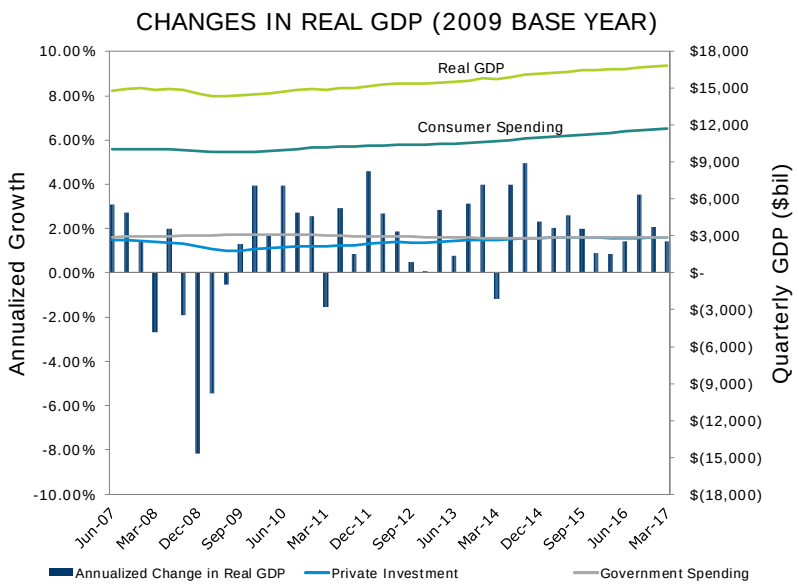
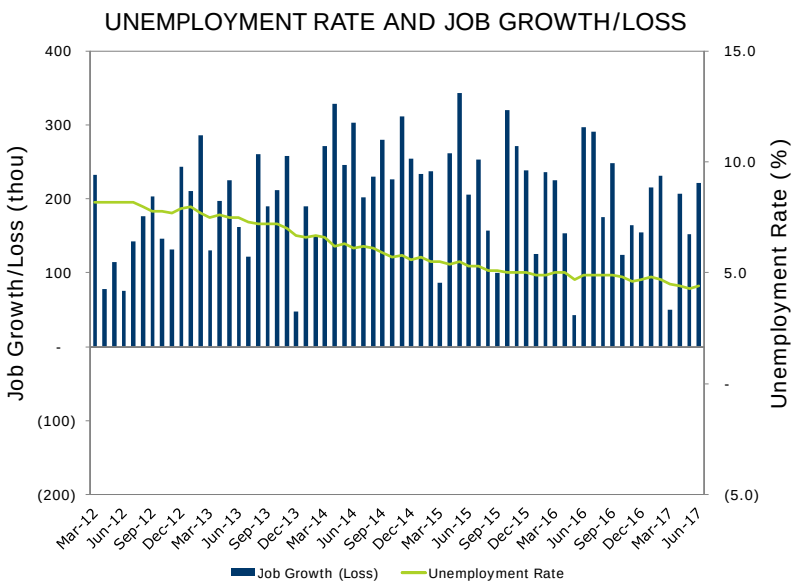
ECONOMIC REVIEW

AS OF JUNE 30, 2017	KEY ECONOMIC INDICATORS			
CPI (ALL ITEMS)	MONTHLY CHANGE		CUMULATIVE CHANGE	
SEASONALLY ADJUSTED	Jun-17	0.0	3-Mo.	0.0
	May-17	-0.1	12-Mo.	1.6
	Apr-17	0.2	10-Yr. (Annual)	1.6
BREAKEVEN INFLATION	10-Yr.	1.7		
CONSUMER SENTIMENT	Jun-17	95.1		
U. OF MICHIGAN SURVEY	May-17	97.1		
	1-Yr. Ago	93.5	10-Yr. Avg	78.3
MANUFACTURING	Jun-17	57.8	CHANGE IN SECTOR	
INST. FOR SUPPLY MGMT	May-17	54.9	>50	Expansion
PURCHASING MNGRS' IDX	1-Yr. Avg.	54.3	<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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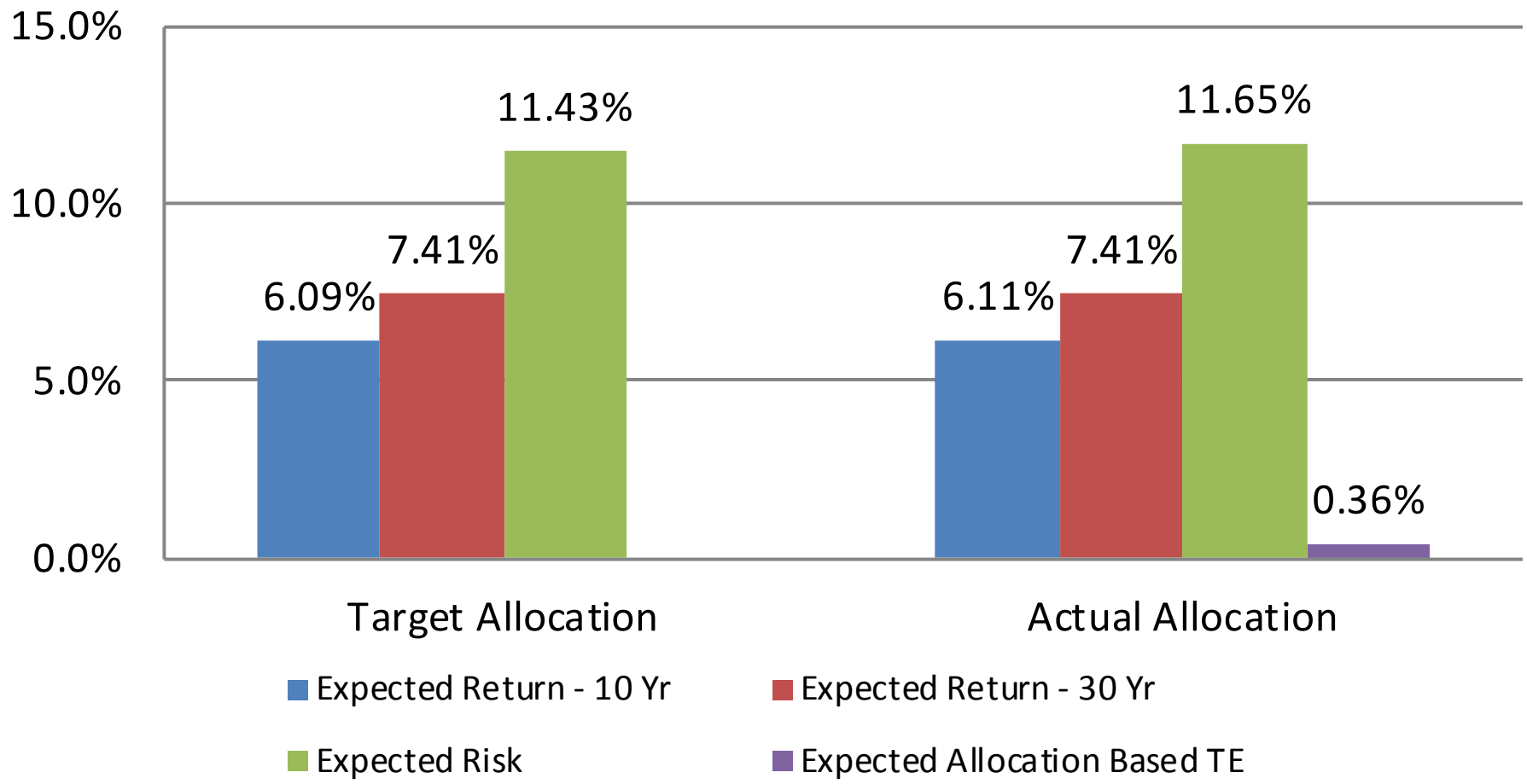
CalPERS Expected Return and Risk Estimates



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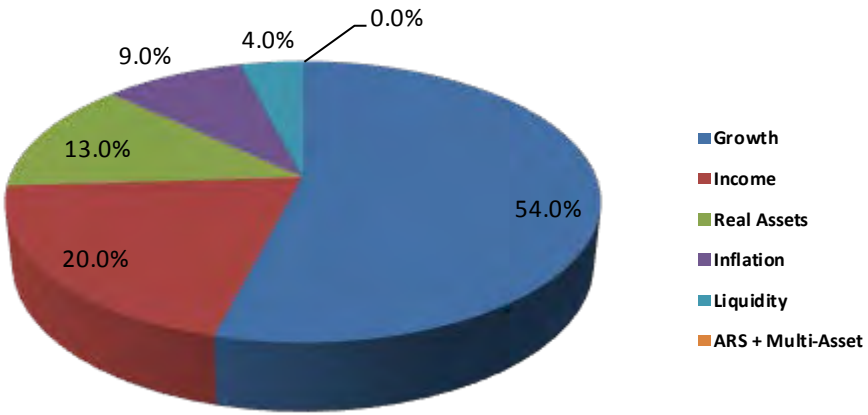
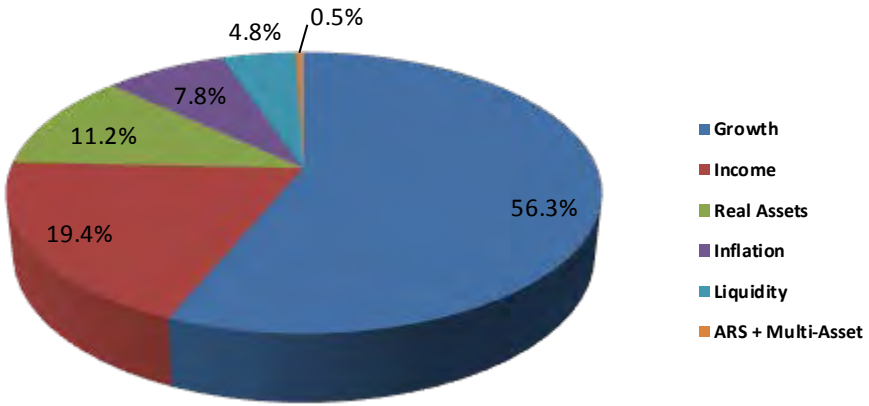
Asset and Risk Allocation

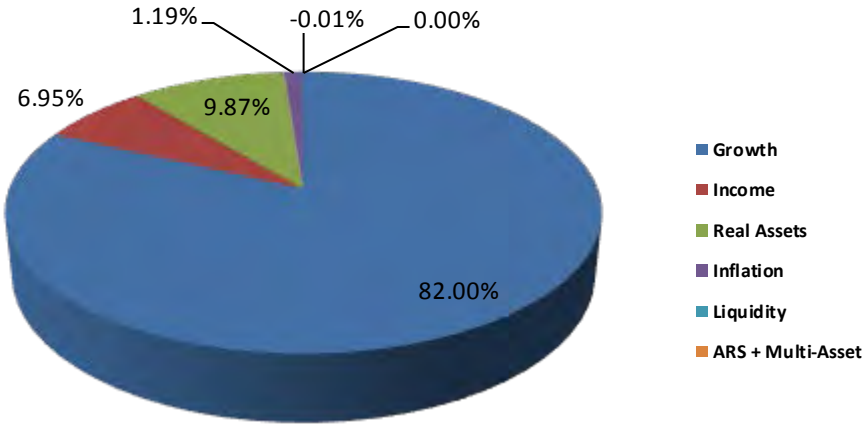
Target Asset Allocation



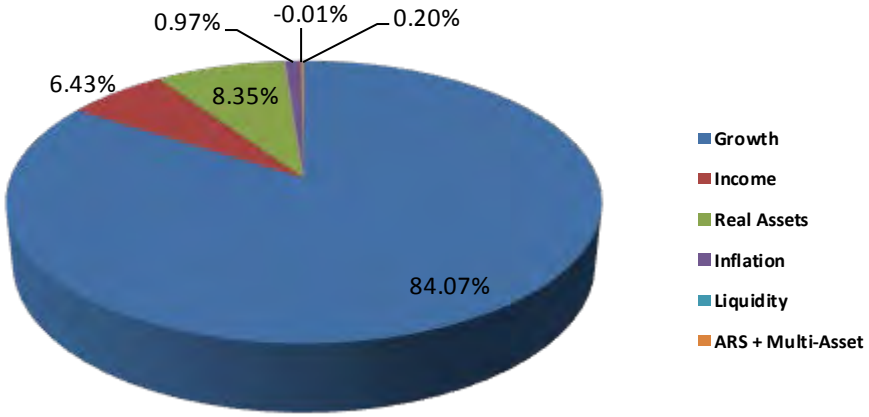
Actual Asset Allocation



Contribution to Total Risk - Target Allocation



Contribution to Total Risk - Actual Allocation



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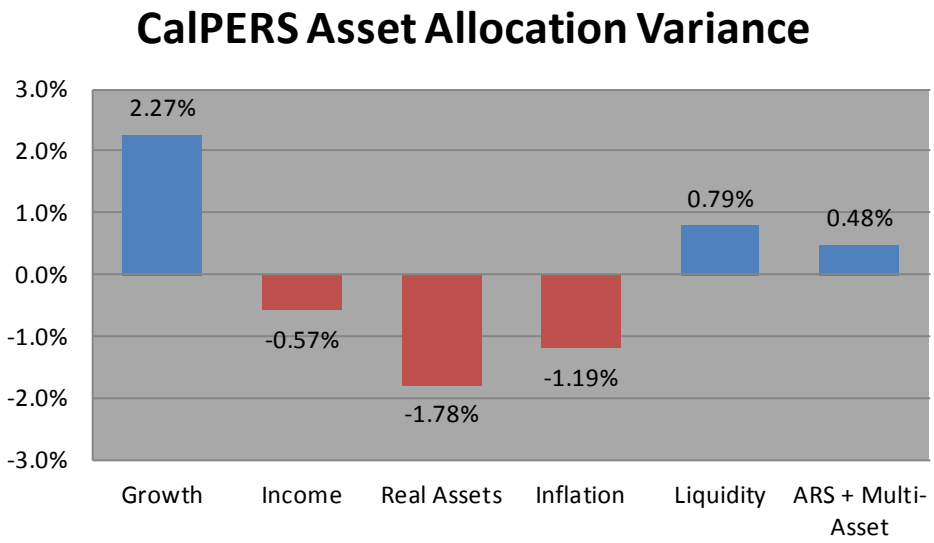
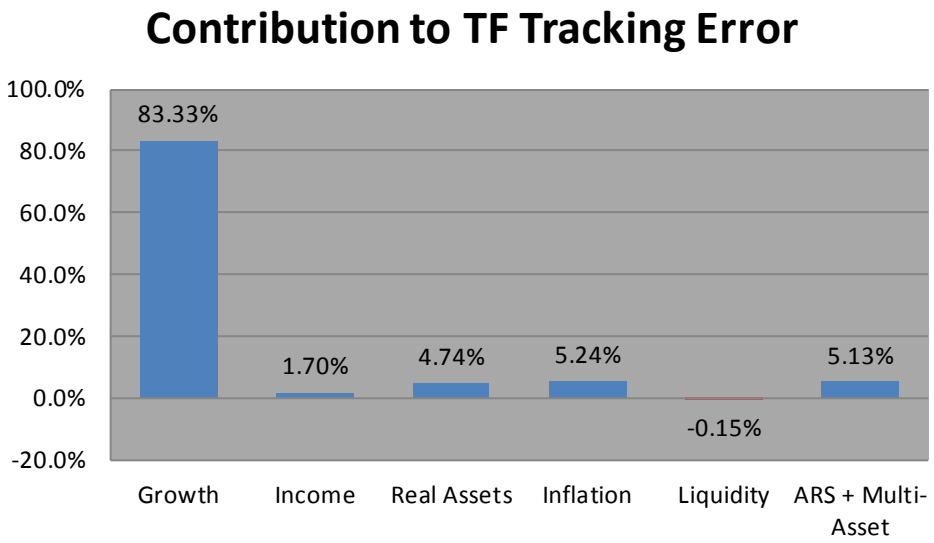
Drivers of Expected Excess Risk





- 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

	Market Value	Qtr	1-Year	3-Year	5-Year	10-Year	VaR	5-Year Ratios Sharpe	5-Year Ratios Info
TOTAL FUND	**$323.5 bil**	**3.0%**	**11.2%**	**4.6%**	**8.8%**	**4.4%**	**$39.2 bil**	**1.5**	**0.2**
Total Fund Policy Benchmark		**3.2%**	**11.3%**	**4.9%**	**8.6%**	**5.6%**		**1.5**	**0.0**
Actuarial Rate		1.8%	7.5%	7.5%	7.5%	7.6%			
GROWTH	**182.1**	**4.2%**	**18.8%**	**5.8%**	**11.5%**	**5.0%**	**$37.7 bil**	**1.3**	**-0.2**
Growth Policy Benchmark		4.8%	19.9%	6.1%	11.9%	6.1%		**1.4**	**0.0**
PUBLIC EQUITY	**156.2**	**4.2%**	**19.6%**	**5.3%**	**11.6%**	**4.3%**	**$31.5 bil**	**1.1**	**0.7**
Public Equity Policy Benchmark		4.4%	19.8%	5.3%	11.4%	4.7%		**1.1**	**0.0**
PRIVATE EQUITY	**25.9**	**3.9%**	**13.9%**	**8.1%**	**11.5%**	**9.3%**	**$8.5 bil**	**3.2**	**-0.2**
Private Equity Policy Benchmark		7.3%	20.3%	9.9%	13.7%	13.0%		**1.3**	**0.0**
INCOME	**62.9**	**2.5%**	**0.3%**	**3.5%**	**3.4%**	**6.5%**	**$6.9 bil**	**0.7**	**1.5**
Income Policy Benchmark		2.4%	-0.9%	2.8%	2.5%	5.8%		**0.5**	**0.0**
REAL ASSETS	**36.3**	**1.7%**	**7.4%**	**8.6%**	**10.0%**	**-0.9%**	**$5.4 bil**	**1.6**	**0.0**
Real Assets Policy Benchmark		1.5%	7.0%	9.9%	10.2%	6.9%		**2.5**	**0.0**
INFLATION	**25.3**	**-0.7%**	**-2.7%**	**-6.0%**	**-2.1%**	**-.-%**	**$1.8 bil**	**-0.4**	**0.7**
Inflation Policy Benchmark		-0.6%	-1.8%	-6.7%	-2.7%	-.-%		**-0.5**	**0.0**
LIQUIDITY	**15.5**	**0.3%**	**0.8%**	**0.7%**	**0.4%**	**1.3%**	**$0.1 bil**	**0.2**	**-0.4**
Liquidity Policy Benchmark		0.2%	0.5%	0.8%	0.6%	1.4%		**0.3**	**0.0**
ABSOLUTE RETURN STRATEGIES	**0.3**	**3.9%**	**-2.3%**	**1.0%**	**3.4%**	**1.5%**		**0.8**	**-0.4**
Absolute Return Strategies Policy Benchmark		1.4%	5.4%	5.4%	5.4%	6.3%		**24.9**	**0.0**
MULTI-ASSET CLASS COMPOSITE	**1.3**	**0.2%**	**6.9%**	**3.9%**	**-.-%**	**-.-%**		**N/A**	**N/A**
Absolute 7.5%		1.8%	7.5%	7.5%	-.-%	-.-%		**N/A**	**N/A**
CURRENCY + ASSET ALLOCATION TRANSITION	**0.0**	**-.-%**	**-.-%**	**-.-%**	**-.-%**	**-.-%**		**N/A**	**N/A**
TERMINATED AGENCY POOL	**0.1**	**0.9%**	**-2.0%**	**3.2%**	**-.-%**	**-.-%**		**N/A**	**N/A**
TOTAL FUND PLUS TAP	**323.7**	**3.0%**	**11.2%**	**4.6%**	**8.8%**	**4.4%**		**N/A**	**N/A**

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Total Fund – Attribution (Quarter)

California Public Employees' Retirement System
Total Fund Attribution - Quarter
As of 6/30/2017

Asset Class	Actual (%)		Policy (%)		Difference (%)		Total Fund Return Contribution (%)			
	Weight	Return	Weight	Return	Weight	Return	Actual Allocation	Interaction	Active Management	Total
Growth	56.00	4.19	54.00	4.79	2.00	-0.61	0.03	-0.01	-0.33	-0.31
Public Equity	47.83	4.23	46.00	4.36	1.83	-0.13	0.02	0.00	-0.06	-0.04
Private Equity	8.17	3.92	8.00	7.32	0.17	-3.40	0.01	-0.01	-0.27	-0.27
Income	18.82	2.51	20.00	2.41	-1.18	0.10	0.01	0.00	0.02	0.03
Real Assets	11.24	1.70	13.00	1.52	-1.76	0.18	0.03	0.00	0.02	0.05
Inflation	8.69	-0.68	9.00	-0.62	-0.31	-0.06	0.02	0.00	-0.01	0.01
MAC/Absolute Return	0.49	0.20	0.00	1.82	0.49	-1.62	-0.01	-0.01	0.00	-0.01
Liquidity	4.76	0.28	4.00	0.20	0.76	0.08	-0.02	0.00	0.00	-0.02
Monthly Linked Return	**100.00**	**2.95**	**100.00**	**3.21**		**-0.26**	**0.05**	**-0.02**	**-0.28**	**-0.26**
Trading/Hedging/Other		0.01		0.00		0.01				**0.01**
Total		***2.96***		***3.21***		***-0.25***				***-0.25***

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Total Fund – Attribution (Calendar YTD)

California Public Employees' Retirement System
Total Fund Attribution - Calendar Year-to-Date
As of 6/30/2017

Asset Class	Actual (%)		Policy (%)		Difference (%)		Total Fund Return Contribution (%)			
	Weight	Return	Weight	Return	Weight	Return	Actual Allocation	Interaction	Active Management	Total
Growth	56.06	10.59	54.00	11.33	2.06	-0.74	0.08	-0.01	-0.38	-0.32
Public Equity	47.81	11.12	46.00	11.43	1.81	-0.31	0.07	-0.01	-0.14	-0.07
Private Equity	8.26	7.58	8.00	10.61	0.26	-3.04	0.00	0.00	-0.25	-0.25
Income	18.79	4.38	20.00	3.87	-1.21	0.52	0.04	-0.01	0.11	0.14
Real Assets	11.00	3.80	13.00	3.30	-2.00	0.50	0.07	-0.01	0.07	0.13
Inflation	9.04	-0.98	9.00	-0.78	0.04	-0.21	0.00	0.00	-0.02	-0.02
MAC/Absolute Return	0.49	4.42	0.00	3.68	0.49	0.74	-0.02	0.00	0.00	-0.01
Liquidity	4.62	0.47	4.00	0.31	0.62	0.16	-0.04	0.00	0.01	-0.03
Monthly Linked Return	**100.00**	**7.07**	**100.00**	**7.19**		**-0.11**	**0.13**	**-0.02**	**-0.22**	**-0.11**
Trading/Hedging/Other		0.00		0.00		0.00				**0.00**
Total		***7.07***		***7.19***		***-0.12***				***-0.12***

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Total Fund – Attribution (Fiscal YTD)

California Public Employees' Retirement System
Total Fund Attribution - Fiscal Year-to-Date
As of 6/30/2017

Asset Class	Actual (%)		Policy (%)		Difference (%)		Total Fund Return Contribution (%)			
	Weight	Return	Weight	Return	Weight	Return	Actual Allocation	Interaction	Active Management	Total
Growth	57.14	18.82	55.75	19.90	1.39	-1.08	0.12	-0.01	-0.60	-0.49
Public Equity	48.72	19.65	47.25	19.83	1.47	-0.18	0.08	0.00	-0.08	-0.01
Private Equity	8.42	13.92	8.50	20.32	-0.08	-6.40	0.04	-0.01	-0.51	-0.48
Income	19.40	0.26	20.00	-0.89	-0.60	1.15	0.02	-0.01	0.25	0.27
Real Assets	10.86	7.43	12.75	7.00	-1.89	0.43	0.06	-0.01	0.06	0.11
Inflation	7.98	-2.67	8.25	-1.84	-0.27	-0.83	0.04	0.00	-0.06	-0.02
MAC/Absolute Return	0.50	6.94	0.00	7.50	0.50	-0.56	-0.02	0.00	0.00	-0.02
Liquidity	4.12	0.77	3.25	0.49	0.87	0.29	-0.07	0.00	0.01	-0.06
Monthly Linked Return	**100.00**	**11.13**	**100.00**	**11.34**		**-0.21**	**0.14**	**-0.03**	**-0.33**	**-0.21**
Trading/Hedging/Other		0.06		0.00		0.06				**0.06**
Total		***11.19***		***11.34***		***-0.15***				***-0.15***

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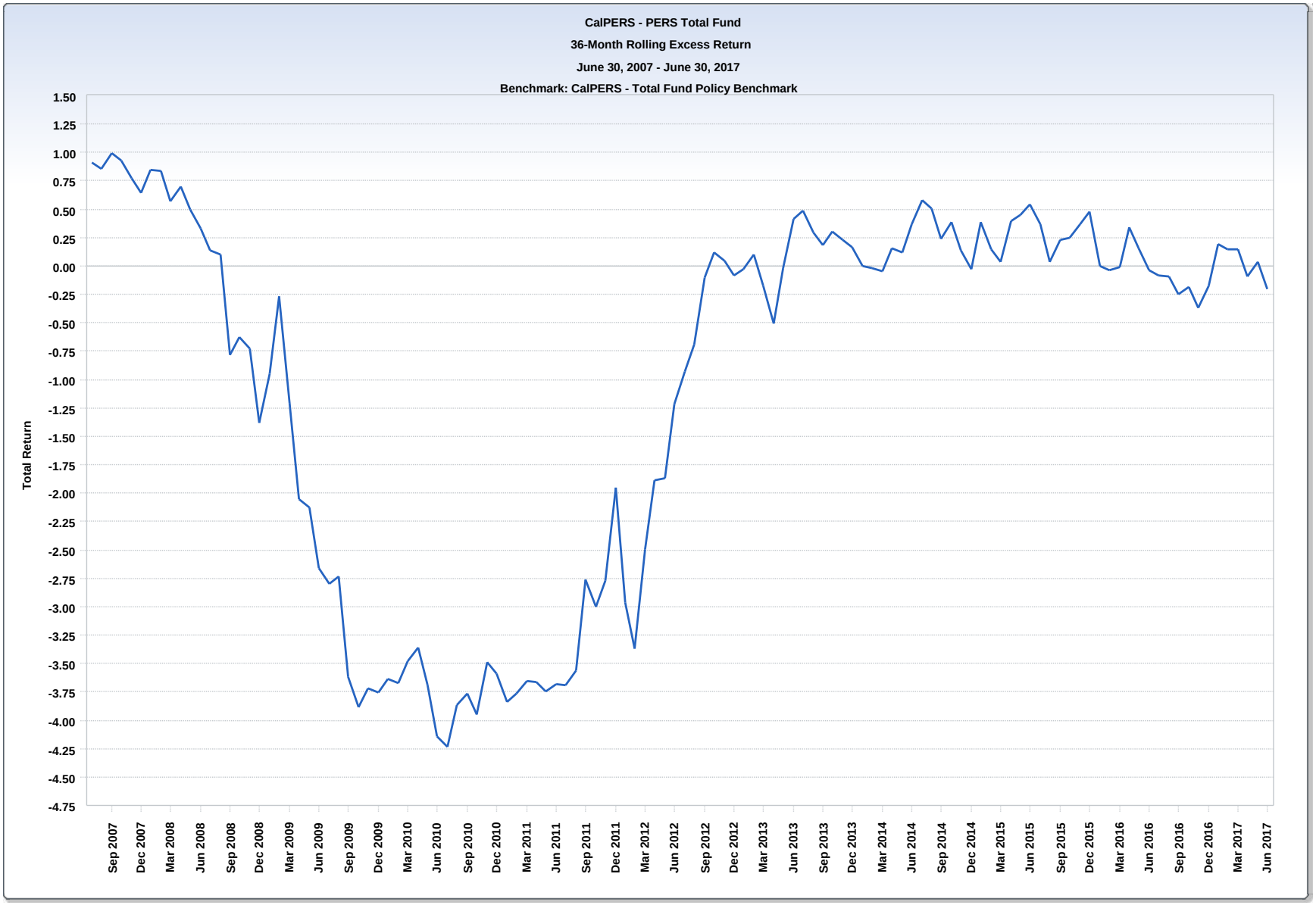
Total Fund – Rolling Excess Returns



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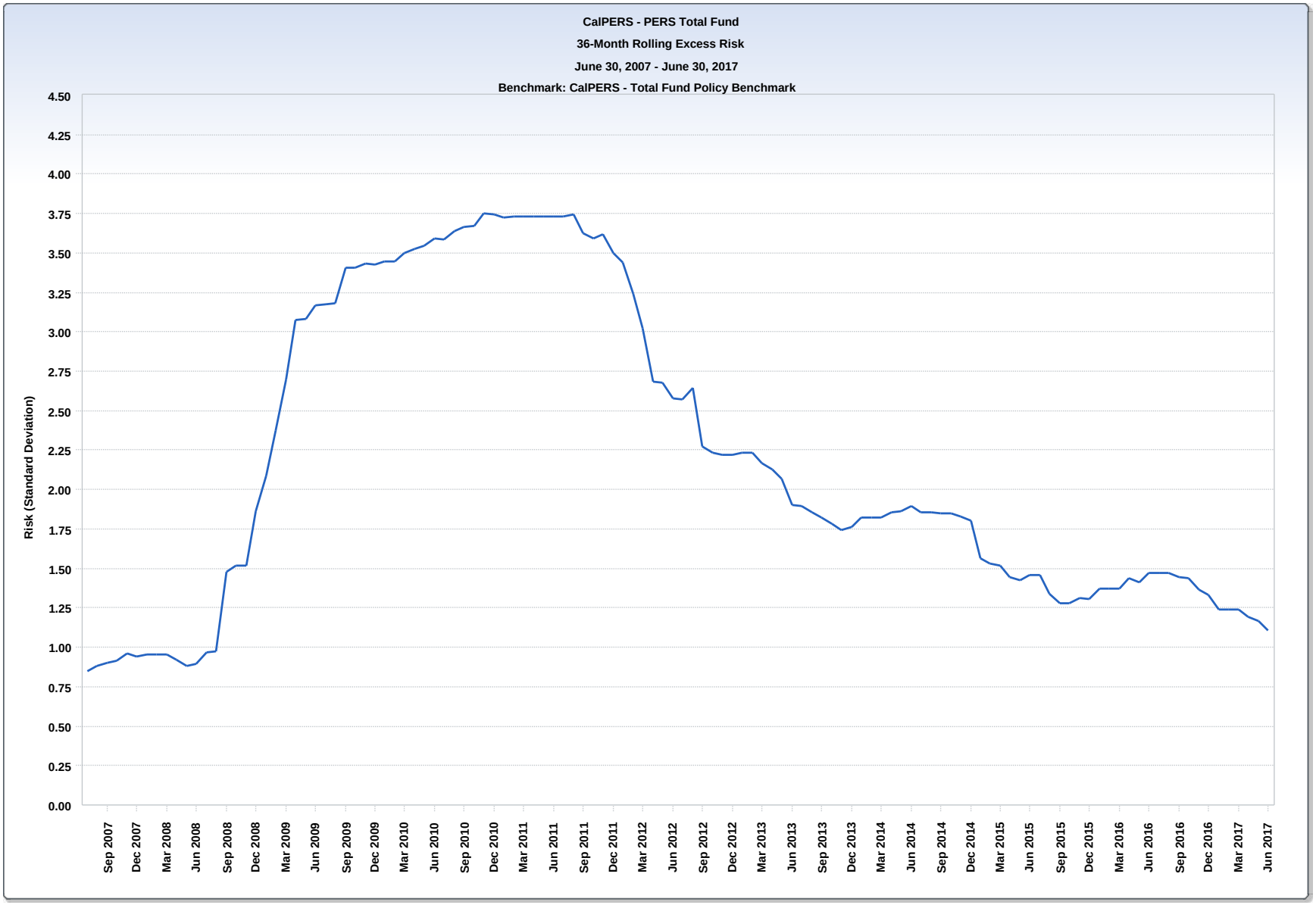
Total Fund – Rolling Tracking Error



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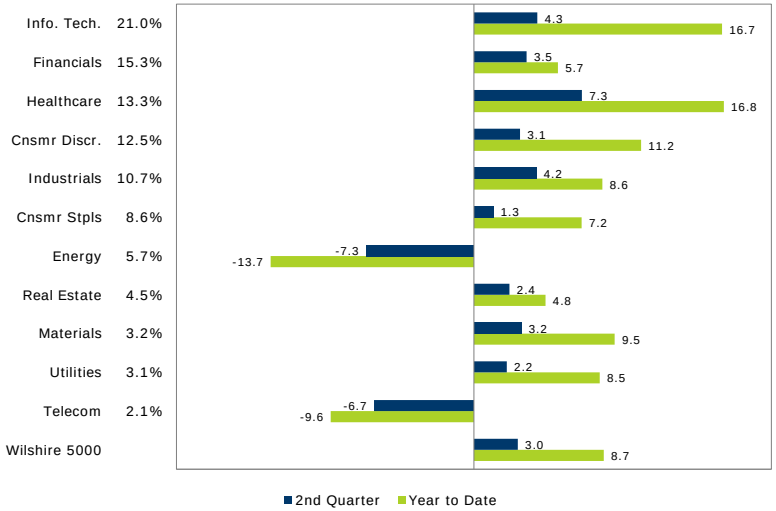
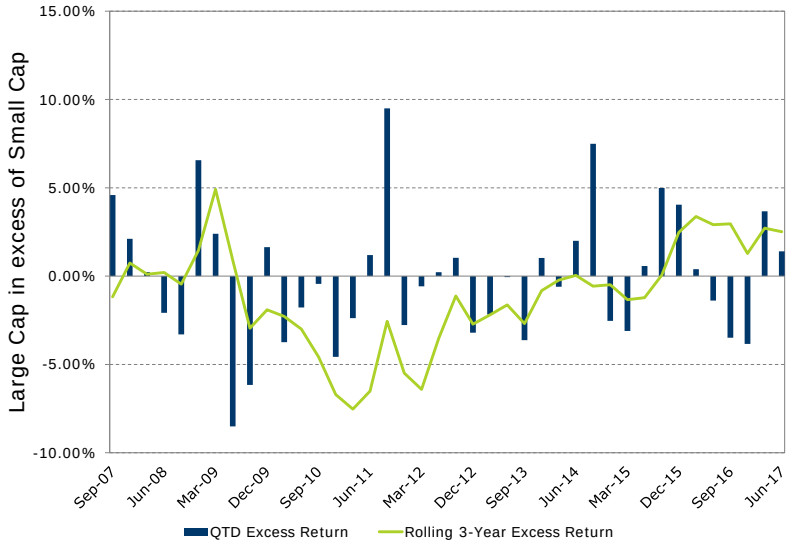
U.S. EQUITY MARKET

AS OF JUNE 30, 2017	QTR	YTD	1 YR	3 YR	5 YR	10 YR
WILSHIRE 5000 INDEX	3.0	8.7	18.5	9.3	14.6	7.3
WILSHIRE U.S. LARGE CAP	3.1	9.3	18.3	9.6	14.7	7.2
WILSHIRE U.S. SMALL CAP	1.7	3.9	21.2	6.9	14.3	8.1
WILSHIRE U.S. LARGE GROWTH	4.8	13.3	25.1	10.9	15.7	8.7
WILSHIRE U.S. LARGE VALUE	1.4	5.4	12.0	8.3	13.6	5.7
WILSHIRE U.S. SMALL GROWTH	3.8	7.6	26.6	5.9	14.0	8.3
WILSHIRE U.S. SMALL VALUE	-0.6	0.3	15.9	7.8	14.4	7.8
WILSHIRE REIT INDEX	1.8	1.8	-1.7	8.3	9.3	5.6
MSCI USA MIN. VOL. INDEX	3.0	9.0	7.5	11.2	12.9	7.9
FTSE RAFI U.S. 1000 INDEX	1.4	4.7	16.9	7.9	14.8	7.7

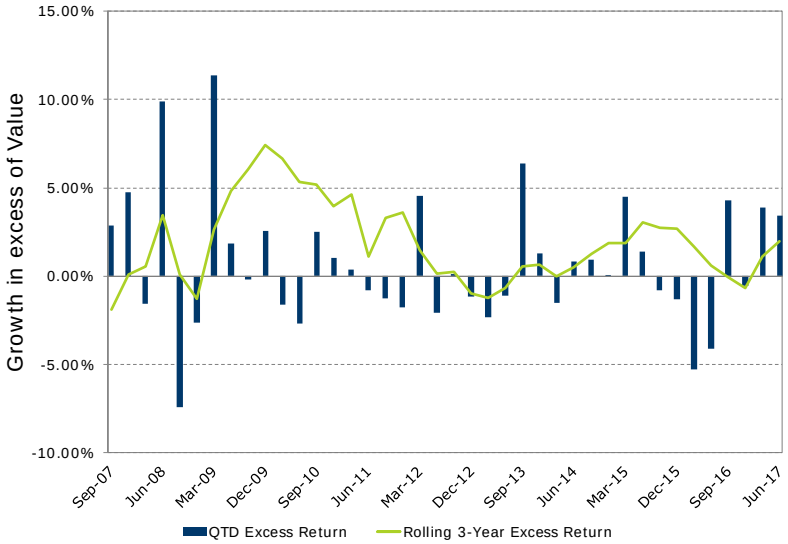
WILSHIRE 5000 SECTOR WEIGHT & RETURN (%)



LARGE CAP VS SMALL CAP



GROWTH VS VALUE



Data sources: Wilshire Compass, Wilshire Atlas

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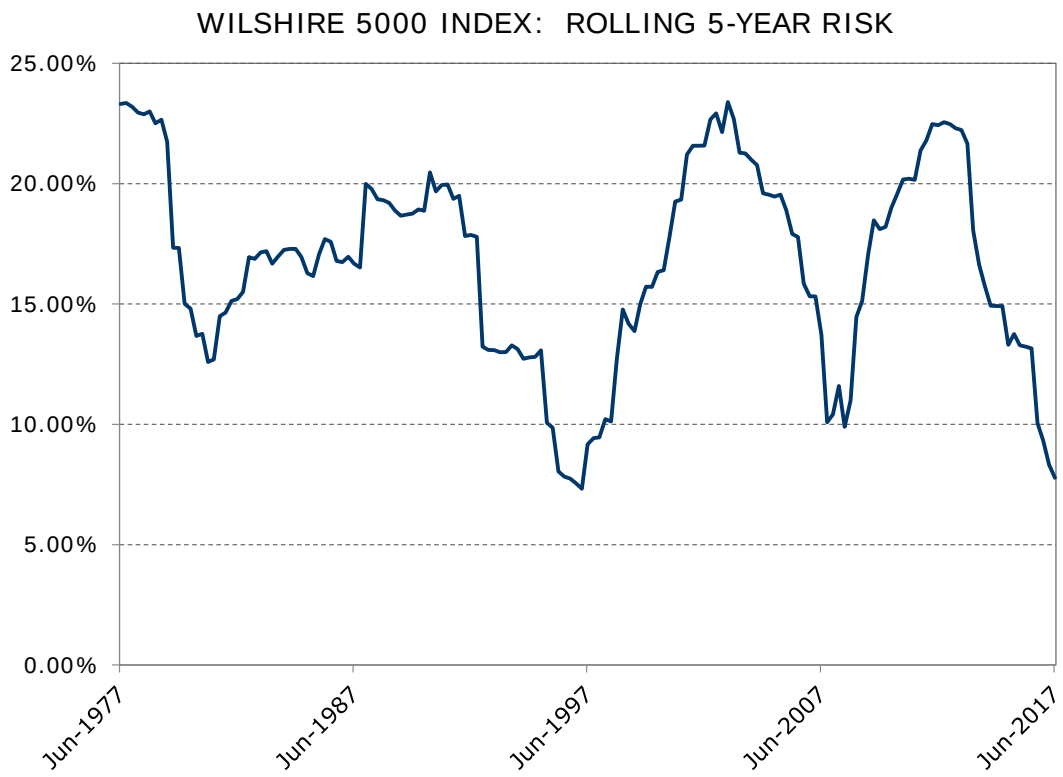
MARKET VOLATILITY

- U.S. Equity market has moved consistently higher during the past 5 years with only one negative quarter
- Latest 5-year risk number (defined as standard deviation) of 7.8% encompasses a period after the market completely recovered from the global debt crisis sell-off



Data sources: Wilshire Compass

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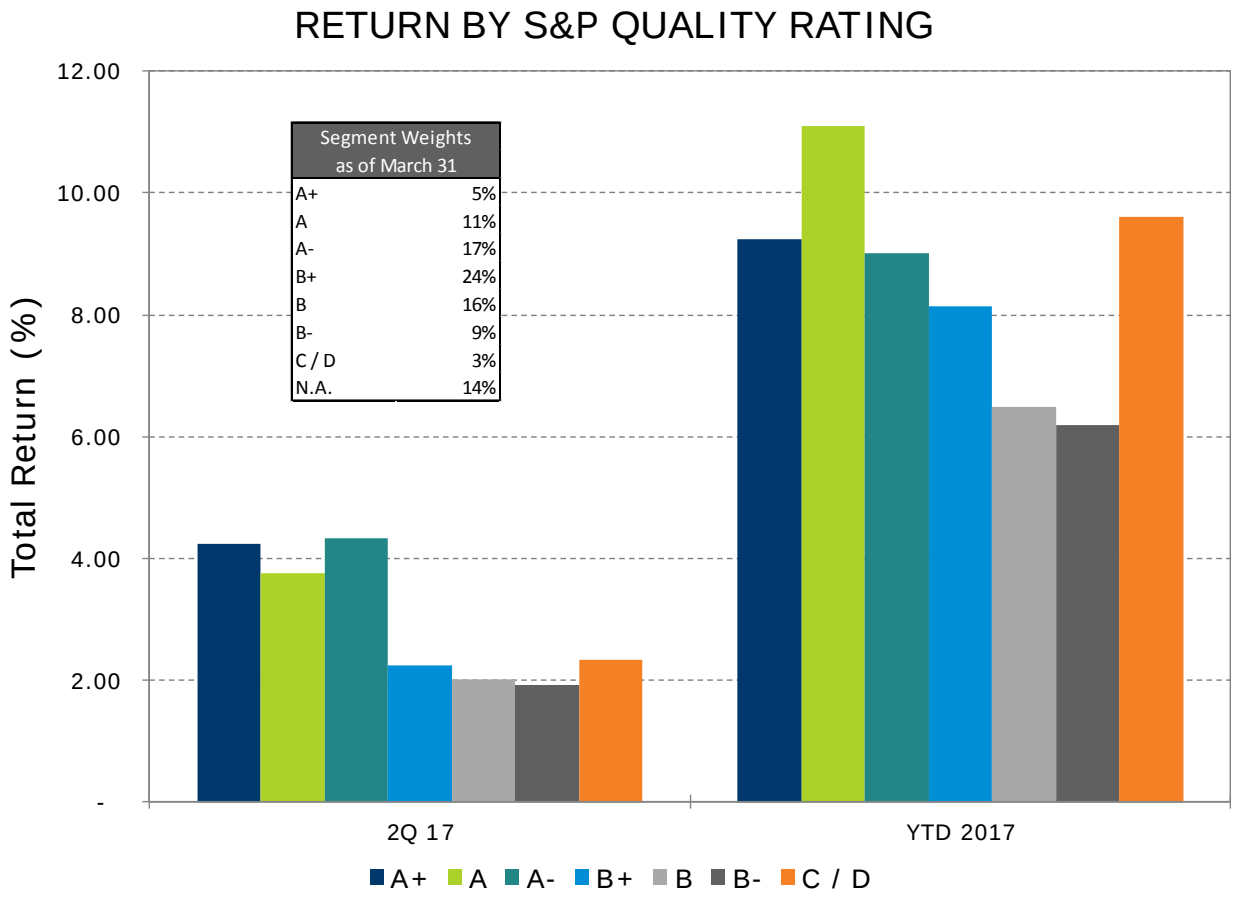
RETURNS BY QUALITY SEGMENT

In a reversal from last year, higher quality names are leading the market in 2017



Segment Weights as of March 31	
A+	5%
A	11%
A-	17%
B+	24%
B	16%
B-	9%
C / D	3%
N.A.	14%

Data sources: Wilshire Atlas

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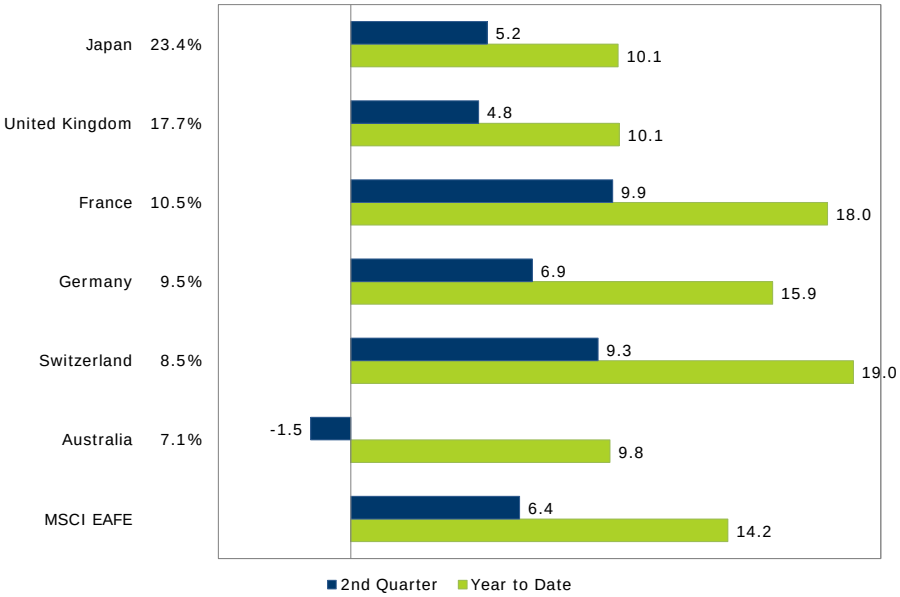
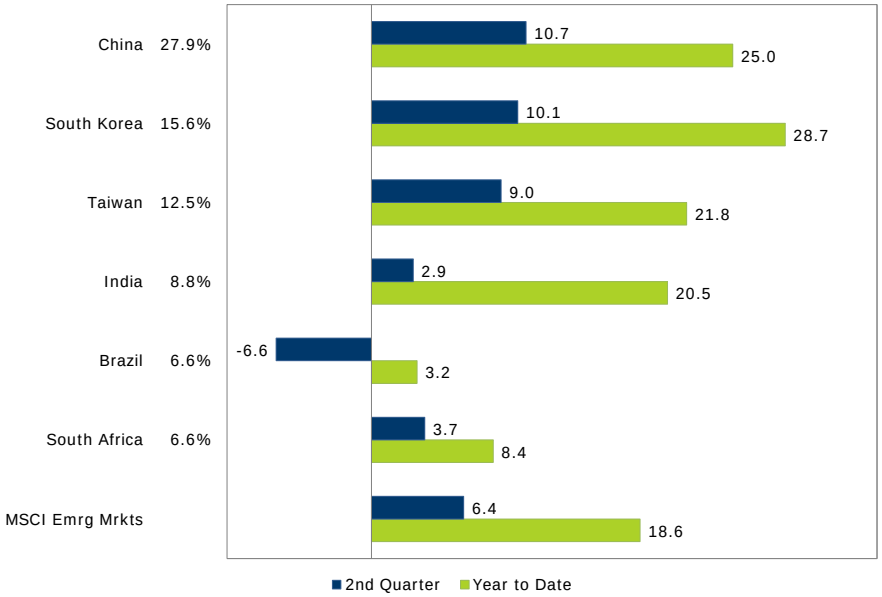
NON-U.S. EQUITY MARKET

AS OF JUNE 30, 2017	QTR	YTD	1 YR	3 YR	5 YR	10 YR
MSCI ACWI EX-US ($G)	6.0	14.4	21.0	1.3	7.7	1.6
MSCI EAFE ($G)	6.4	14.2	20.8	1.6	9.2	1.5
MSCI EMERGING MARKETS ($G)	6.4	18.6	24.1	1.4	4.3	2.2
MSCI FRONTIER MARKETS ($G)	6.3	15.9	19.7	-3.0	9.0	-0.9
MSCI ACWI EX-US GROWTH ($G)	7.7	17.7	17.8	2.9	8.4	2.2
MSCI ACWI EX-US VALUE ($G)	4.3	11.4	24.3	-0.4	6.9	0.9
MSCI ACWI EX-US SMALL ($G)	6.4	15.8	21.3	3.8	10.5	3.4
MSCI EAFE MINIMUM VOLATILITY	7.2	14.7	9.6	5.7	10.2	4.9
FTSE RAFI DEVELOPED EX-US	5.6	12.7	26.0	0.9	9.7	1.9
MSCI EAFE LC (G)	3.0	7.9	22.7	7.5	13.1	2.5
MSCI EMERGING MARKETS LC (G)	6.7	15.0	22.2	6.5	8.0	4.7

MSCI EAFE: LARGEST COUNTRIES & RETURN (USD)



MSCI EM: LARGEST COUNTRIES & RETURN (USD)



Data sources: Wilshire Compass

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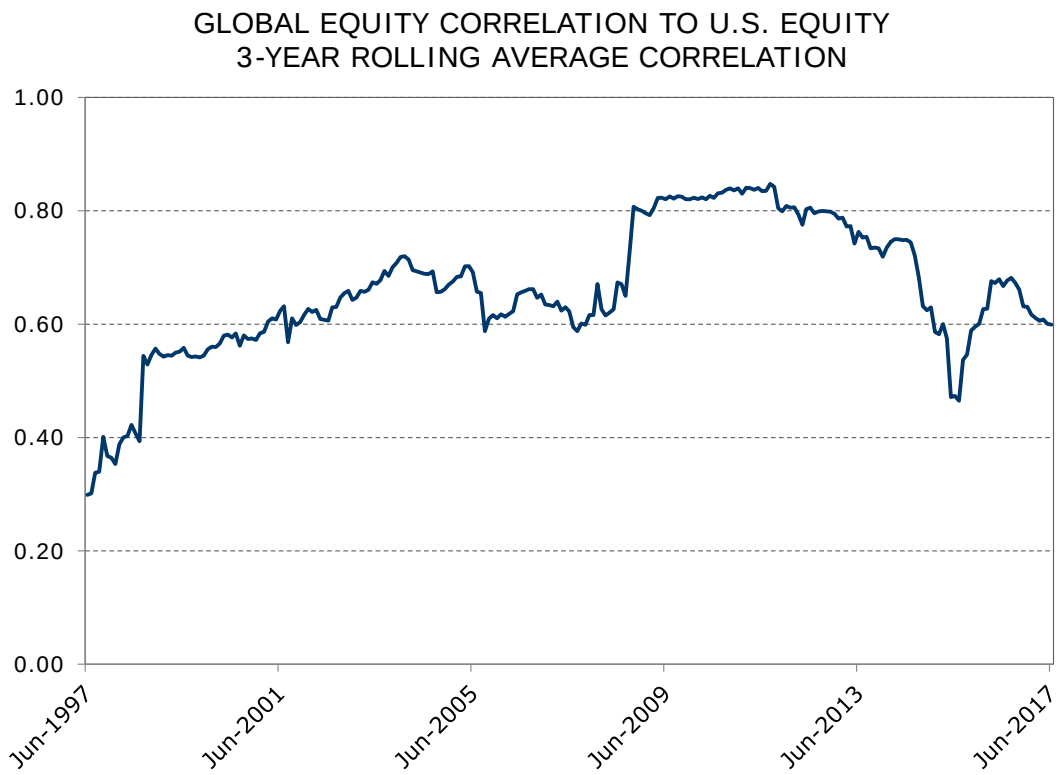
GLOBAL DIVERSIFICATION

- Exhibit below contains the average correlation among U.S. Equity and the 6 largest MSCI EAFE countries, 6 largest MSCI EM countries and Canada; represents 90% of global market cap
- Although 3 years is a relatively short timeframe, global diversification is showing signs of improvement as the average correlation has been trending downward



Data sources: Wilshire Compass

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Growth:
Public Equity – Performance

	Market Value	Qtr	1-Year	3-Year	5-Year	10-Year	VaR	5-year Sharpe Ratio	5-year Info Ratio
PUBLIC EQUITY	**156.2**	**4.2%**	**19.6%**	**5.3%**	**11.6%**	**4.3%**	**$31.5 bil**	**1.1**	**0.7**
Public Equity Policy Benchmark		4.4%	19.8%	5.3%	11.4%	4.7%		**1.1**	**0.0**
Value Added		-0.2%	-0.2%	0.0%	0.2%	-0.4%			
US Equity Composite	**82.2**	**2.9%**	**19.0%**	**8.5%**	**14.7%**	**7.1%**		**1.5**	**0.4**
Custom US Equity Benchmark		3.1%	18.8%	8.6%	14.5%	7.2%		**1.4**	**0.0**
Value Added		-0.2%	0.2%	-0.1%	0.2%	-0.1%			
Total Int'l Equity	**74.0**	**5.8%**	**20.4%**	**1.9%**	**8.6%**	**1.8%**		**0.7**	**-0.2**
Custom Int'l Equity Benchmark		5.6%	20.8%	1.9%	8.7%	1.7%		**0.8**	**0.0**
Value Added		0.2%	-0.4%	0.0%	-0.1%	0.1%			

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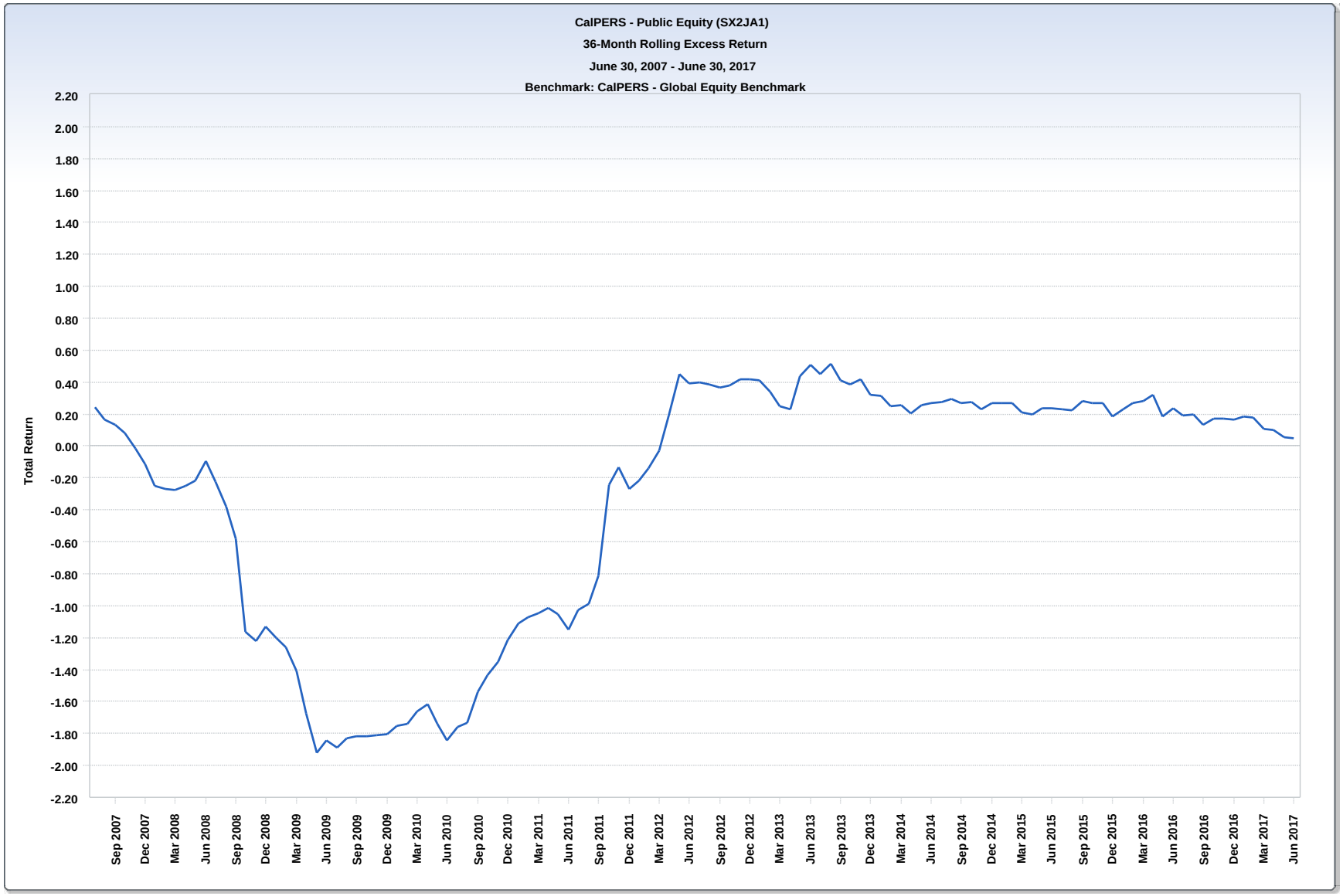
Growth:
Public Equity – Rolling Excess Returns



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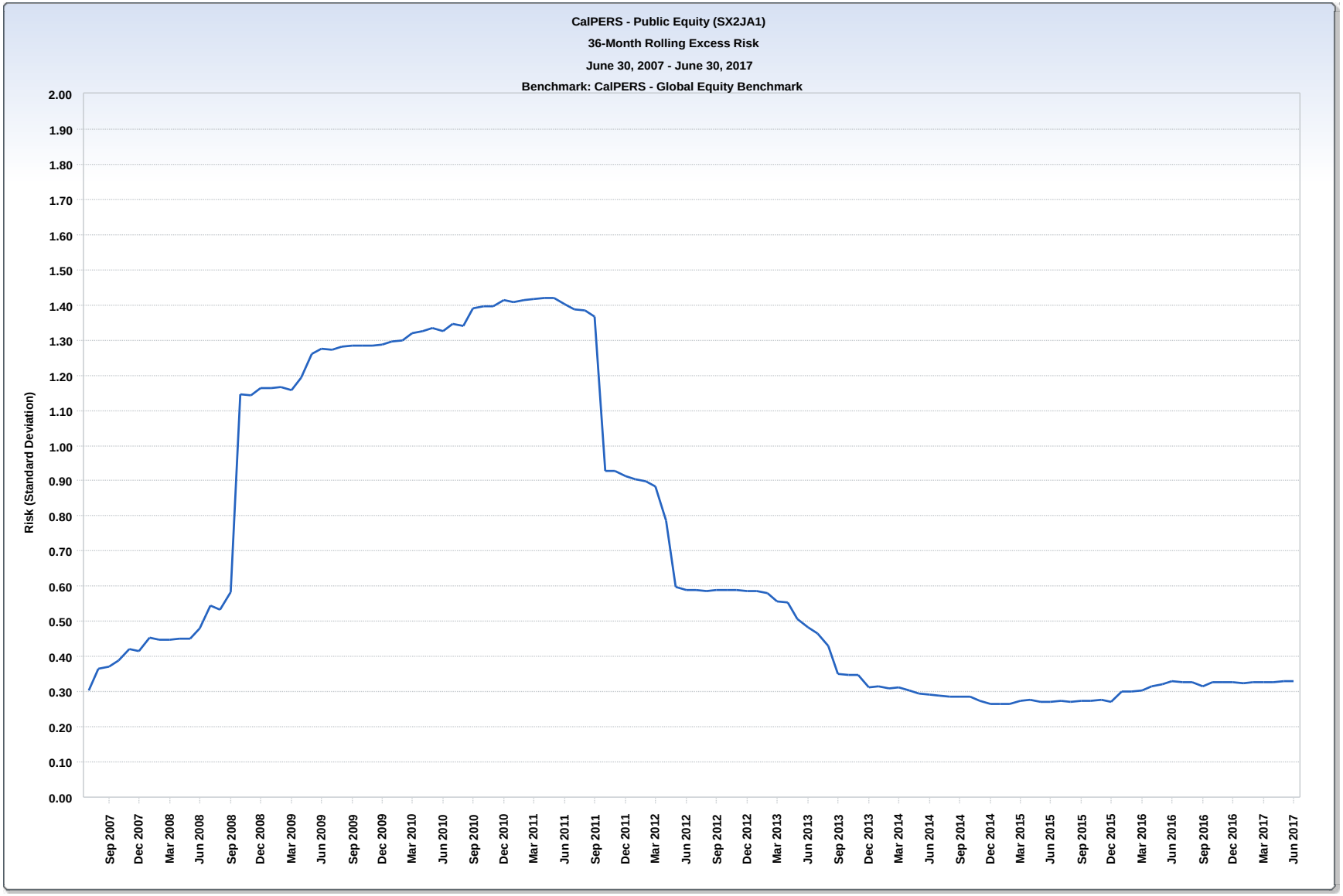
Growth:
Public Equity – Rolling Tracking Error



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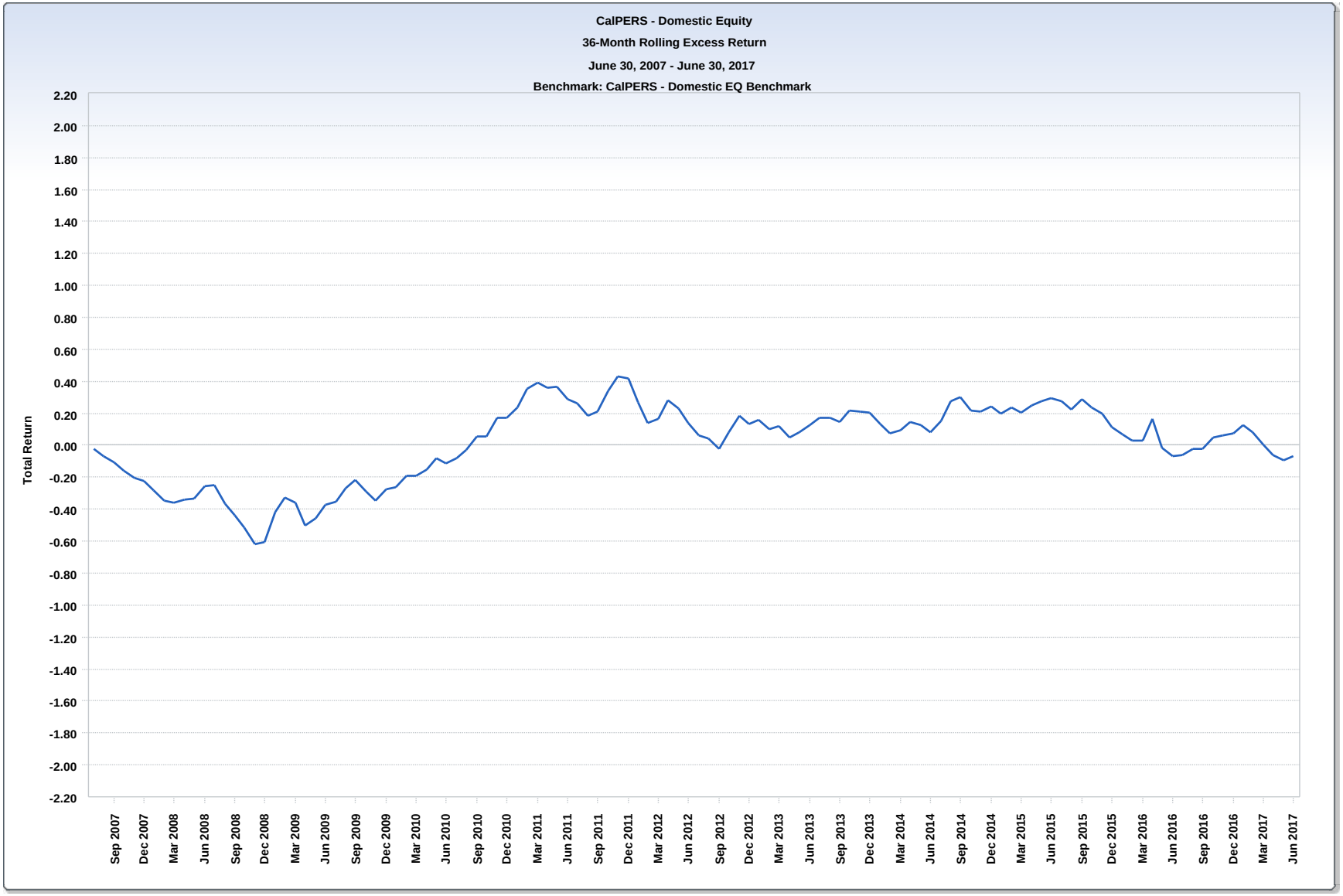
Growth:
U.S. Equity – Rolling Excess Returns



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Growth:
U.S. Equity – Rolling Tracking Error

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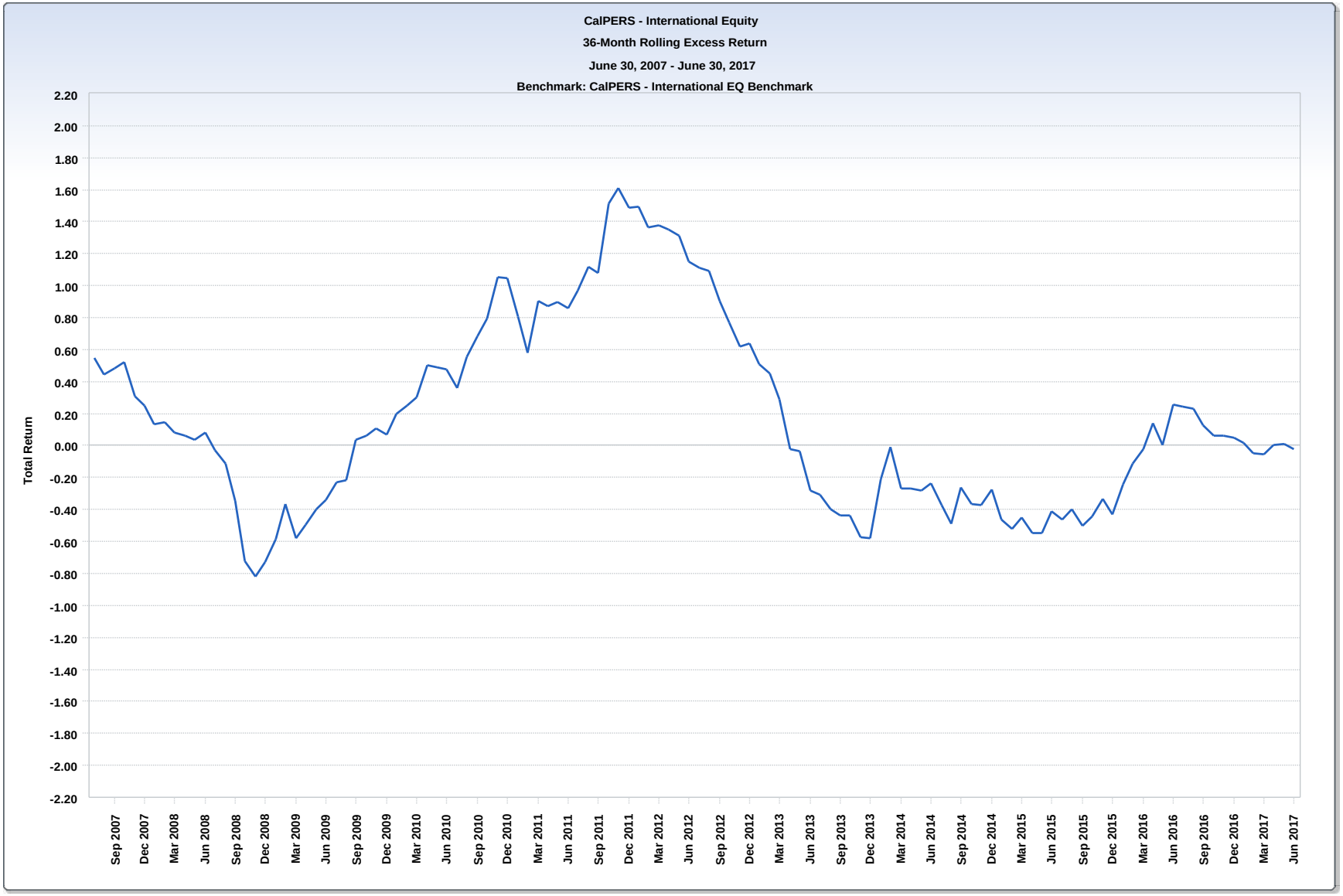
Growth:
International Equity – Rolling Excess Returns



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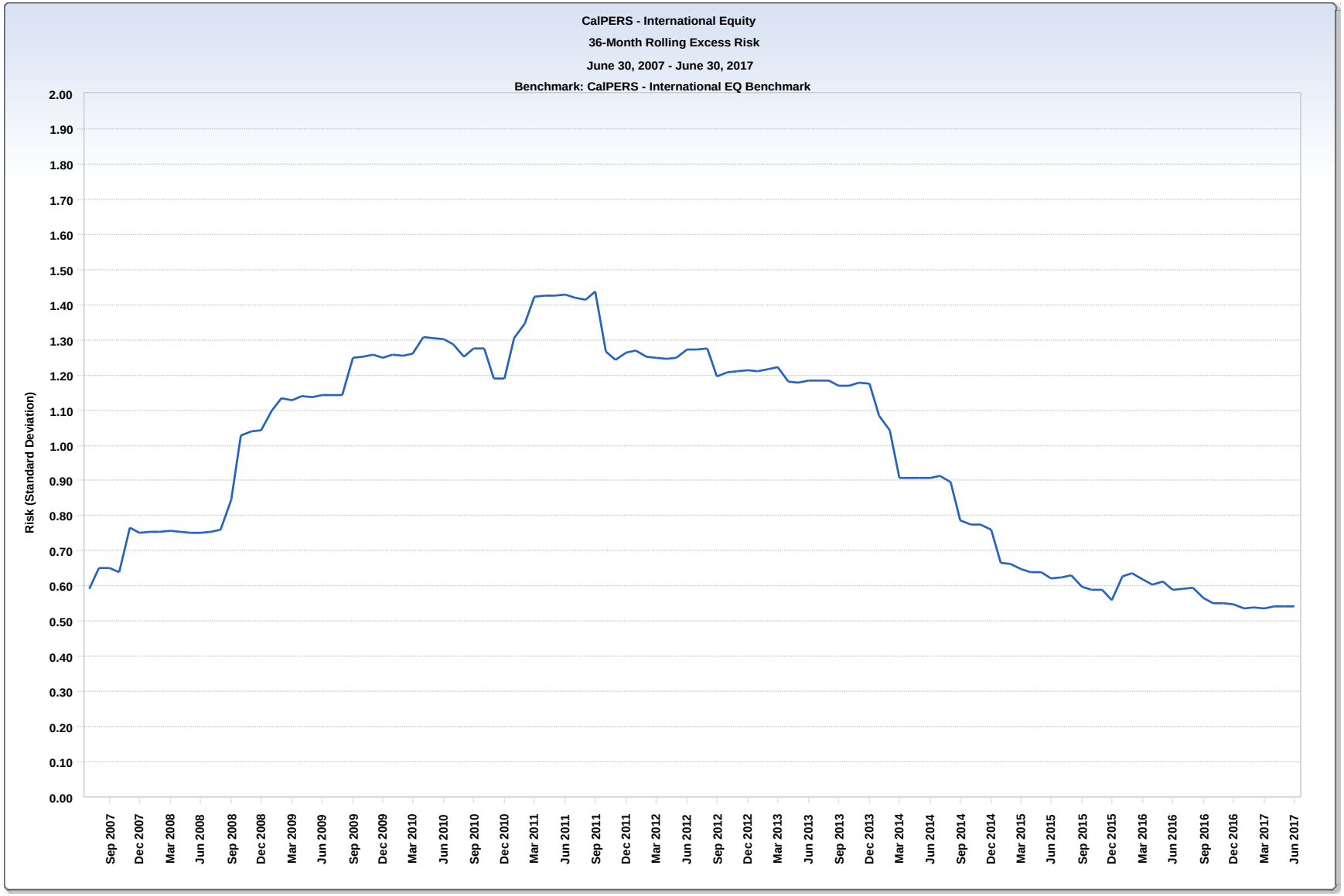
Growth:
International Equity – Rolling Tracking Error



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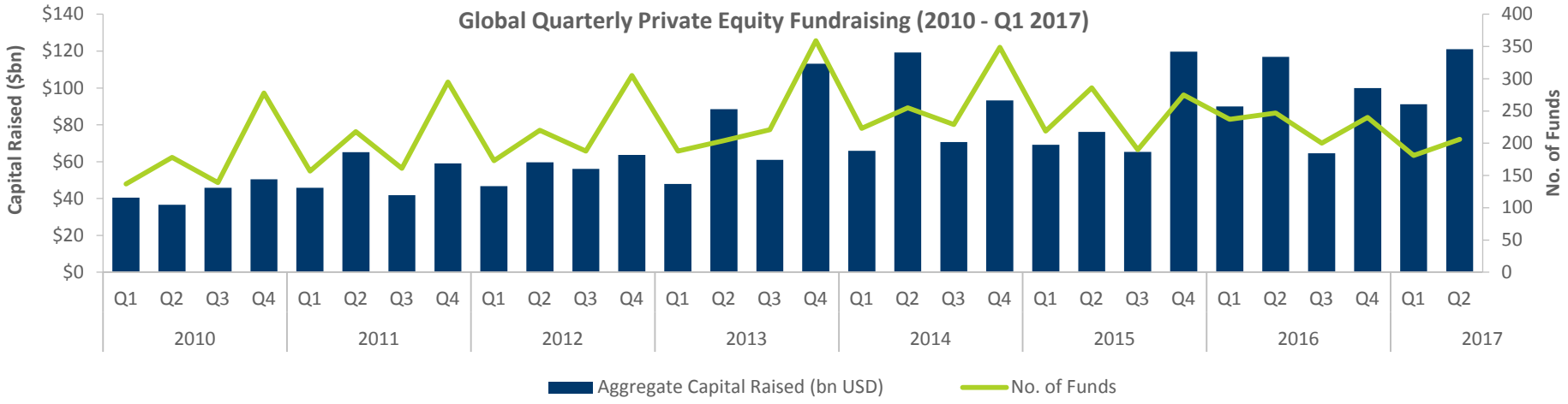
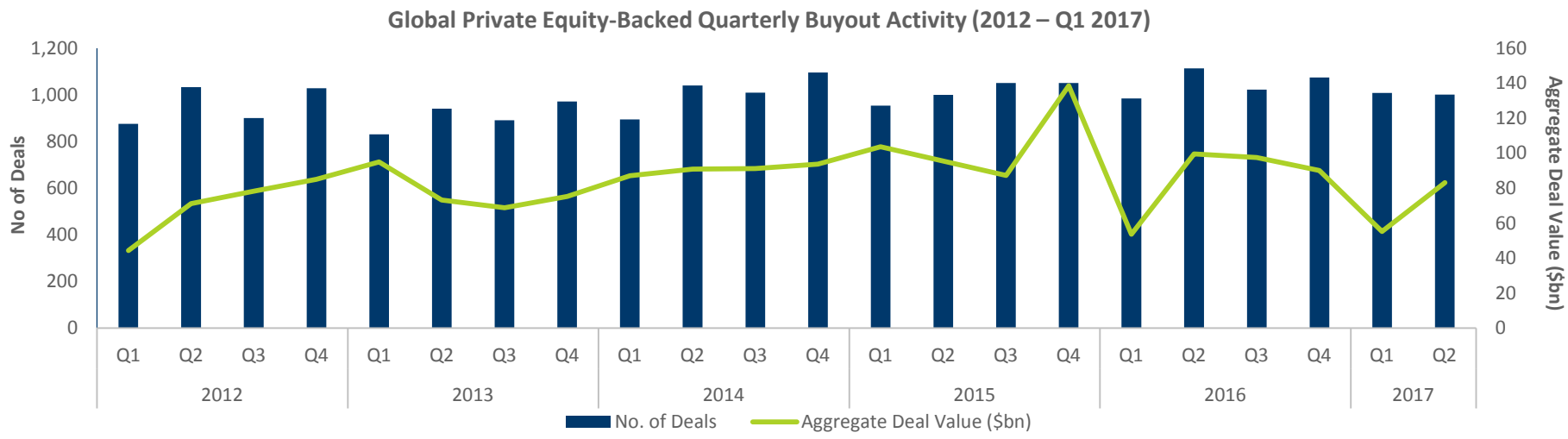
PRIVATE EQUITY – FUNDRAISING & INVESTMENT ACTIVITY





Source: Preqin, as of June 30, 2017

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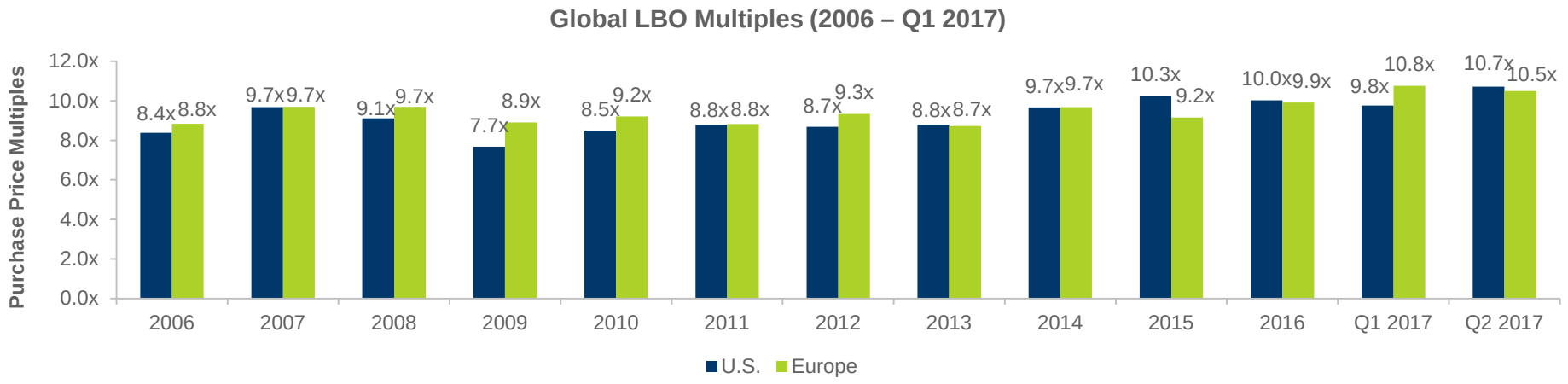
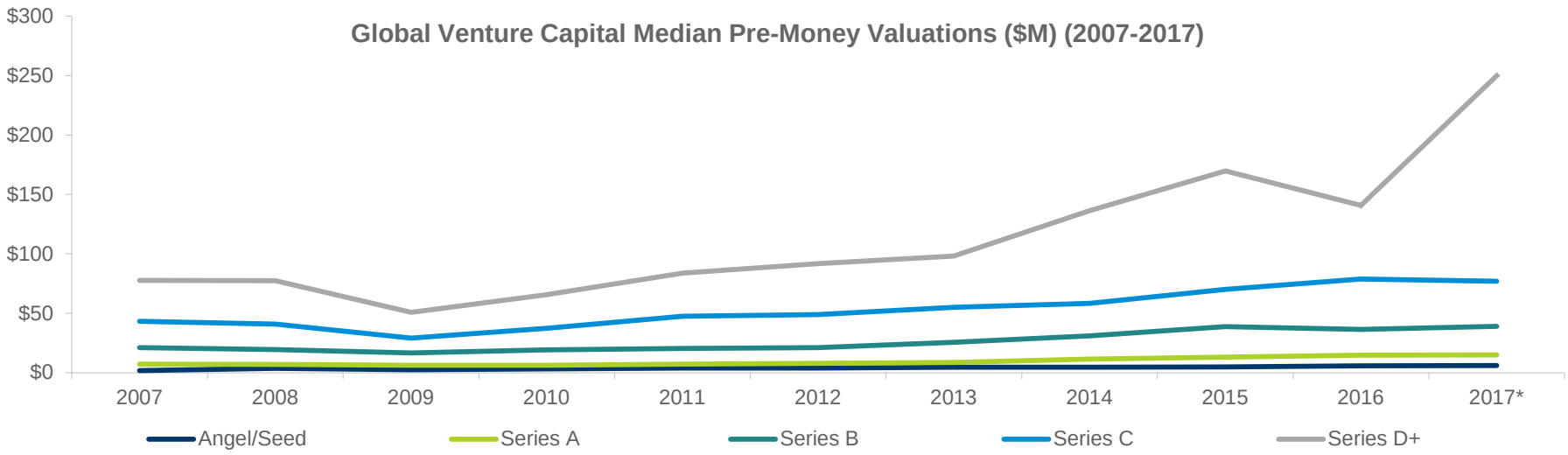
PRIVATE EQUITY- PRICING & VALUATIONS





Source: S&P LCD; *Pitchbook, as of June 30, 2017

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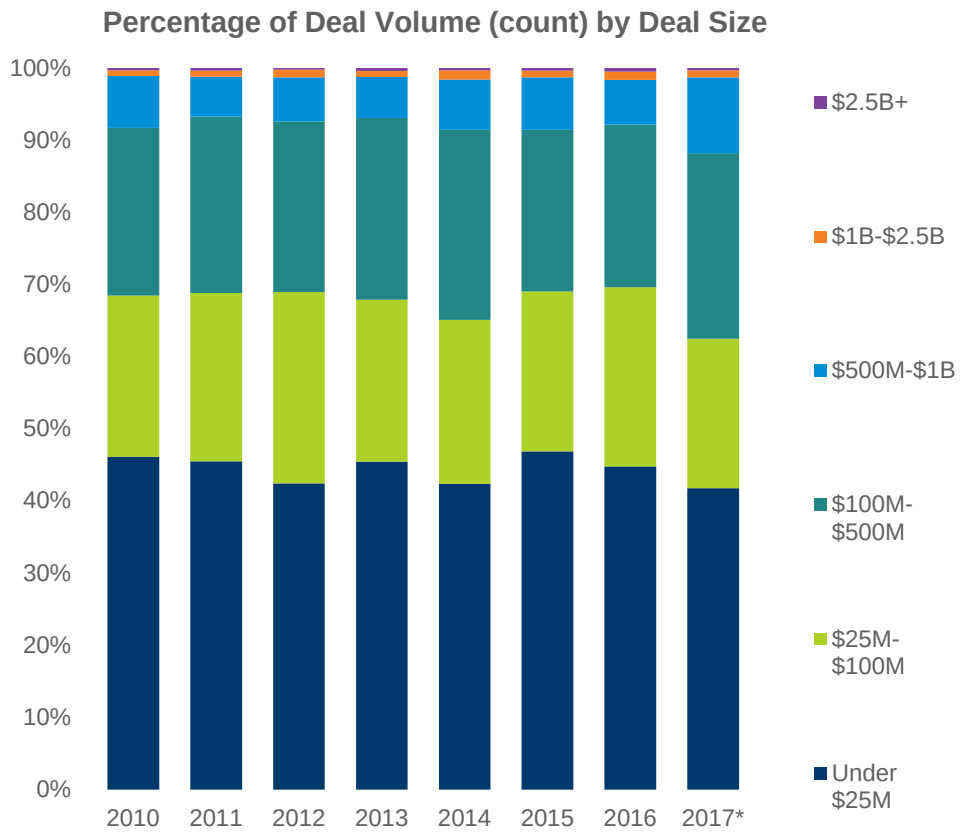
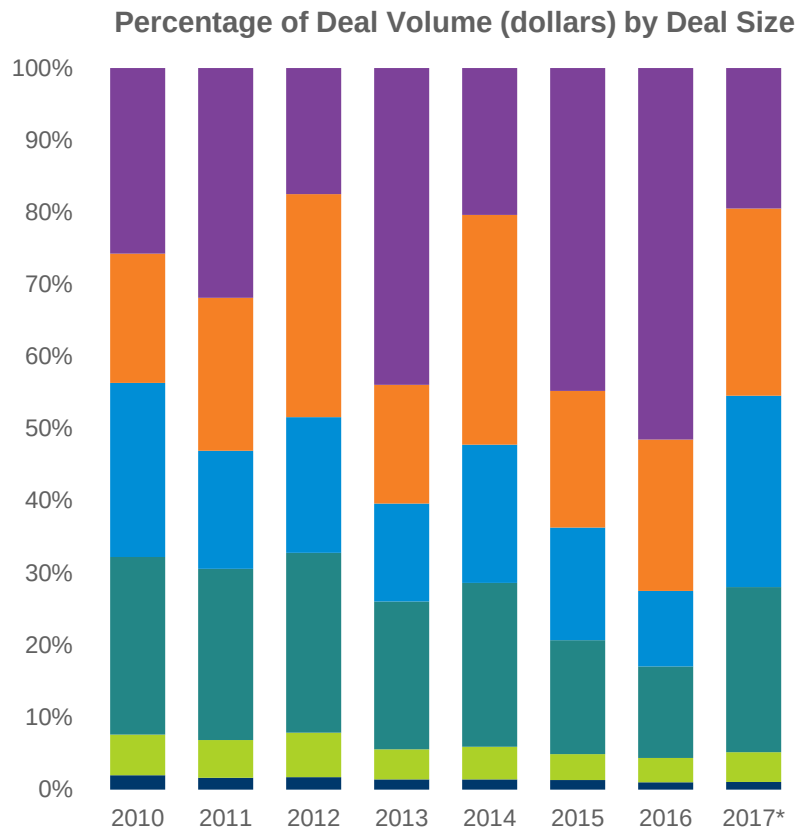
U.S. Investment Activity by Deal Size





- Smaller deals continue to dominant deal volume by number of deals
- Through the first half of 2017, larger deals between $100 million and $1 billion have made up a smaller percentage of deal volume in total dollars than in the past two years

*Source: PitchBook, as of June 30, 2017

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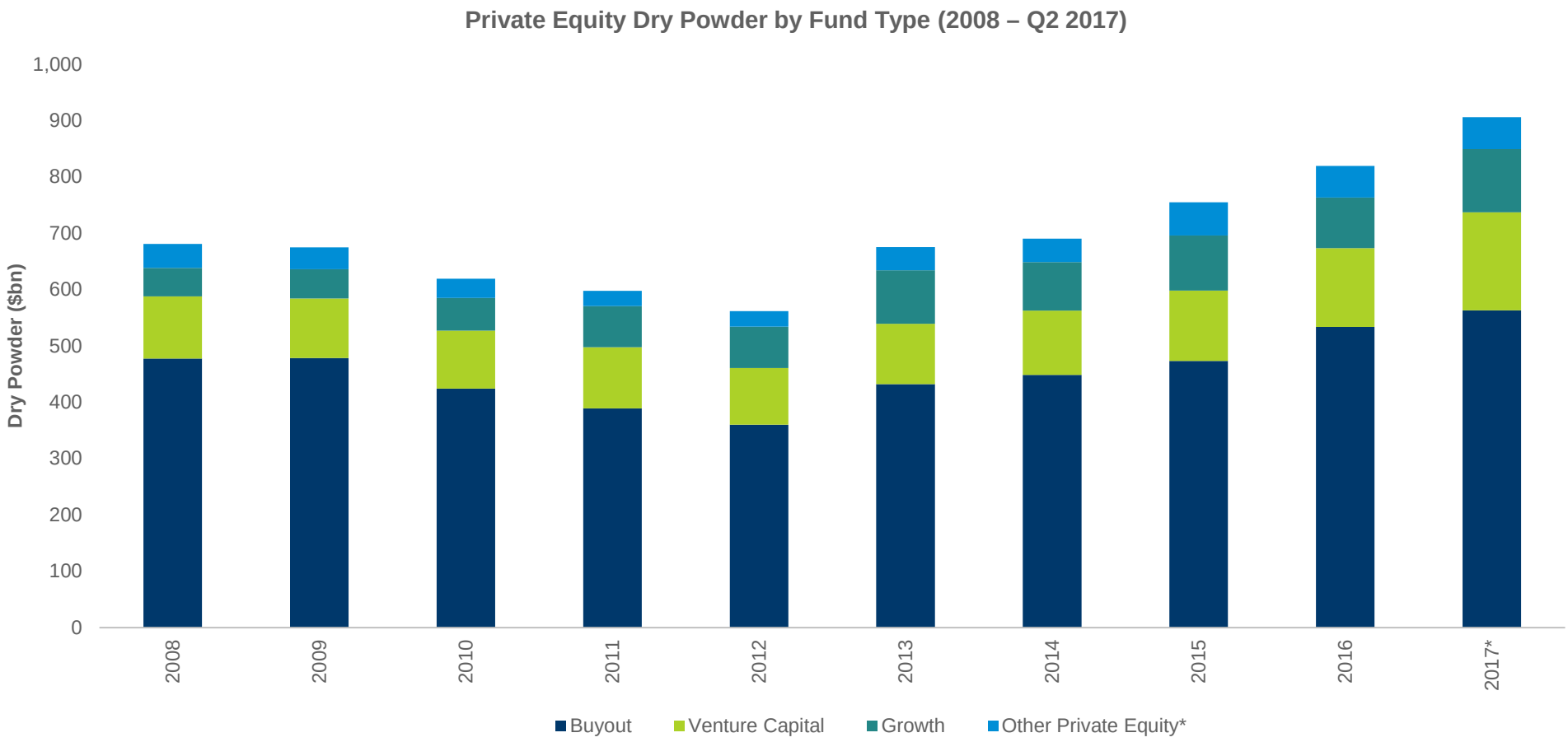
PRIVATE EQUITY DRY POWDER



- Global private equity dry powder continues to increase, topping $900 billion through May 2017 across all fund types
- This abundant capital should help fuel private equity deal flow over the next few years

*Source: Preqin, as of May 31, 2017

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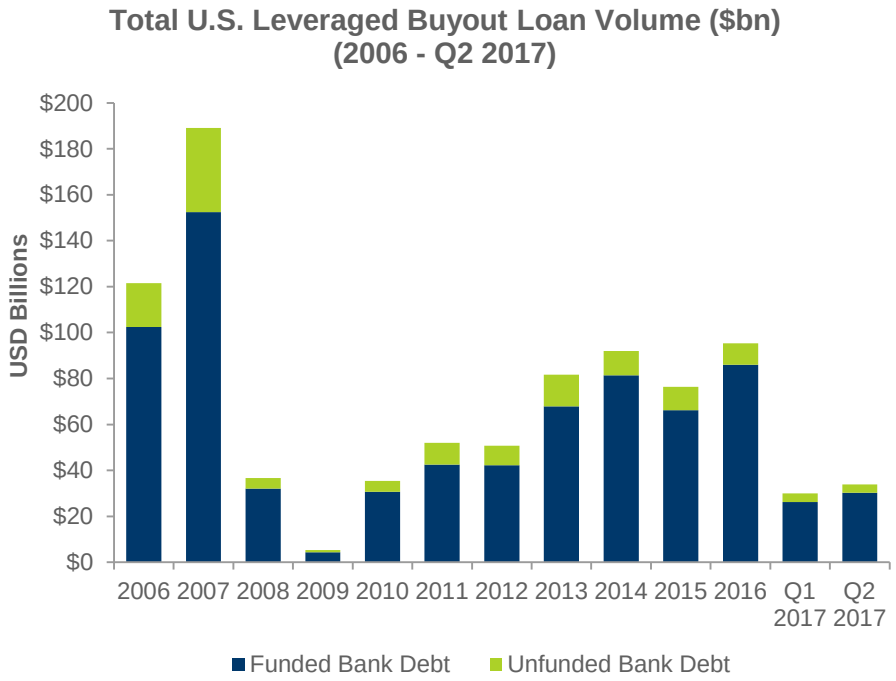
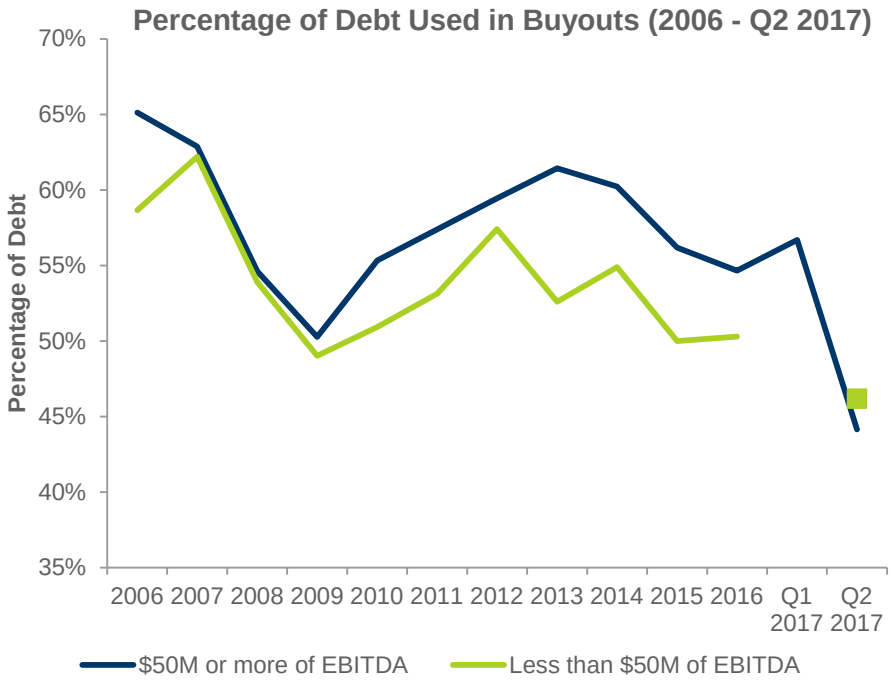
PRIVATE EQUITY- U.S. DEBT MARKETS





- The amount of capital available for leverage has decreased considerably since its peak volume in 2007; loan volume has been fairly consistent in the last few years and is on pace to continue this trend
- Historically, middle-market transactions apply less leverage than large-cap deals

Source: S&P LCD, as of June 30, 2017

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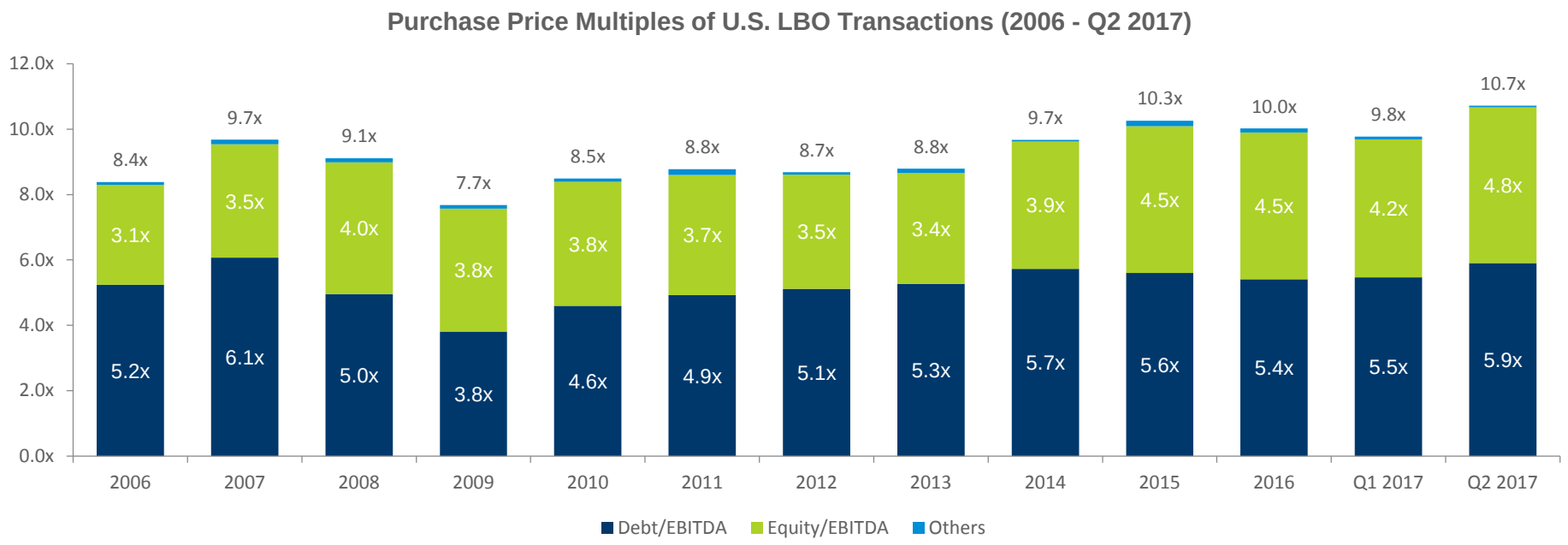
PRIVATE EQUITY- U.S. LBO PURCHASE PRICE MULTIPLES



- As debt has become more readily available, purchase price multiples have increased and remained high relative to 2009's low
- In Q2 2017, valuations topped their previous 2015 high at 10.7x EBITDA

Source: S&P LCD, as of June 30, 2017

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Growth:
Private Equity – Performance

	Market Value	Qtr	1-Year	3-Year	5-Year	10-Year	VaR	5-year Sharpe Ratio	5-year Info Ratio
PRIVATE EQUITY	**25.9**	**3.9%**	**13.9%**	**8.1%**	**11.5%**	**9.3%**	**$8.5 bil**	**3.2**	**-0.2**
PE Policy Benchmark		7.3%	20.3%	9.9%	13.7%	13.0%		**1.3**	**0.0**
Value Added		-3.4%	-6.4%	-1.8%	-2.2%	-3.7%			
Private Equity Partnership Investments	25.8	3.9%	14.0%	8.1%	11.5%	9.4%			
Private Equity Distribution Stock	0.1	10.4%	11.2%	-25.7%	-23.3%	-12.6%			

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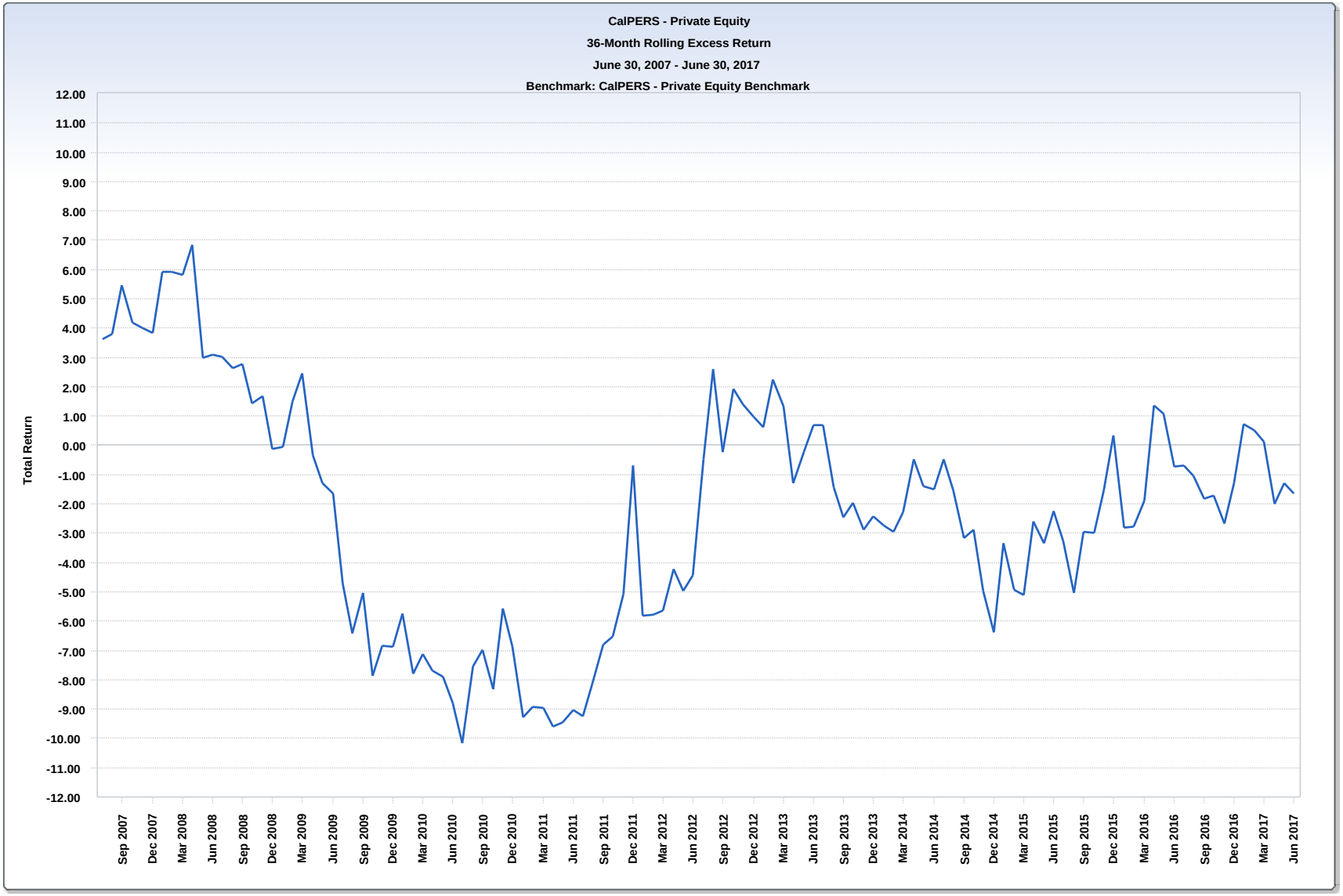
Growth:
Private Equity – Rolling Excess Returns



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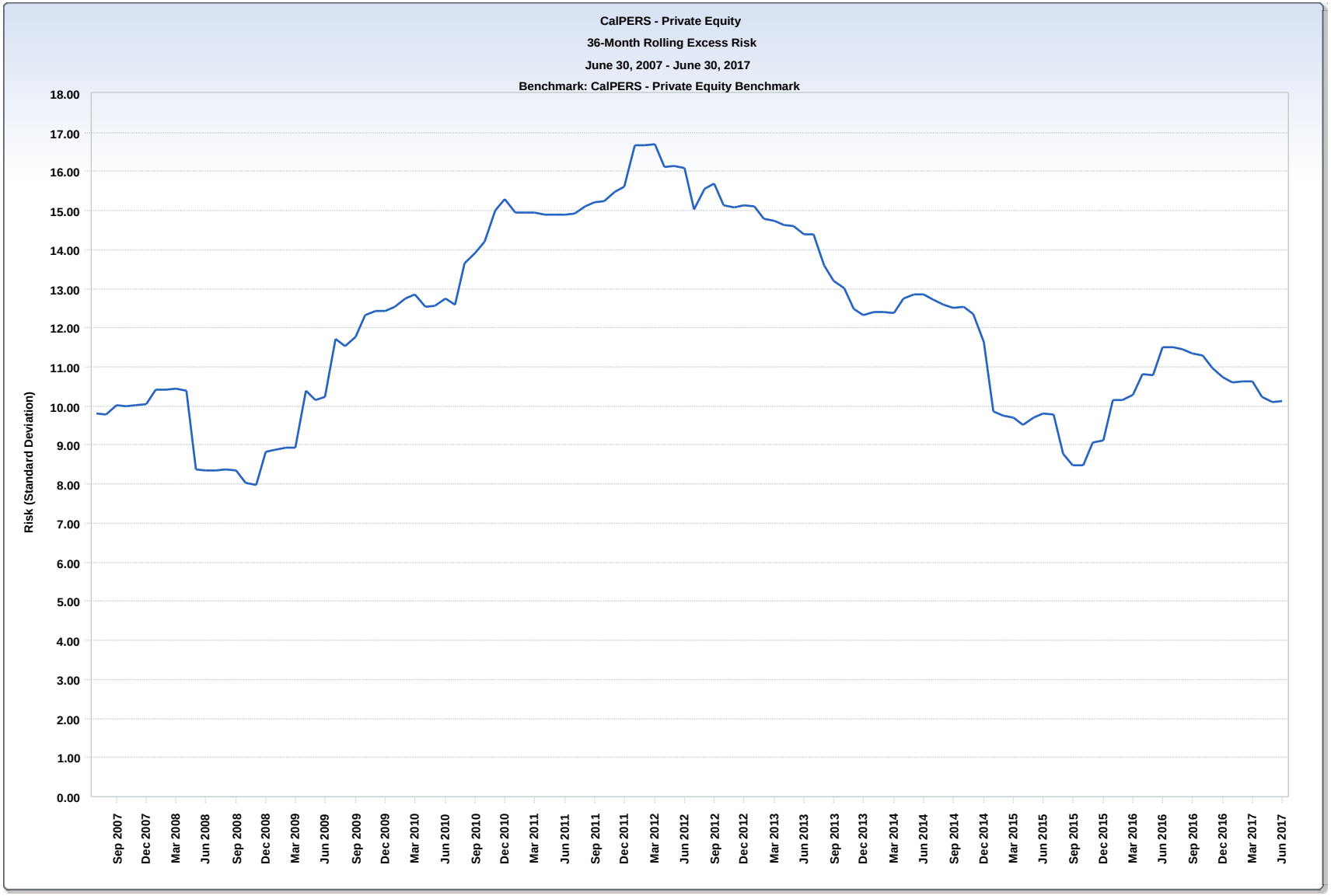
Growth:
Private Equity – Rolling Tracking Error



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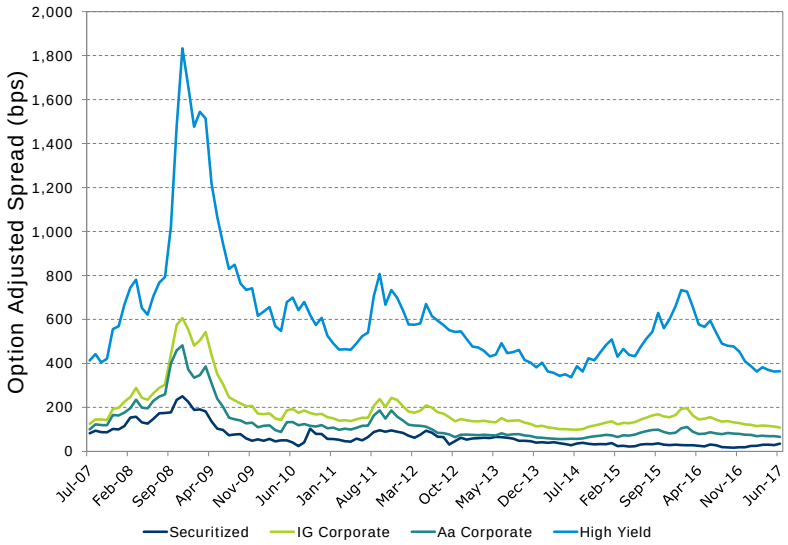
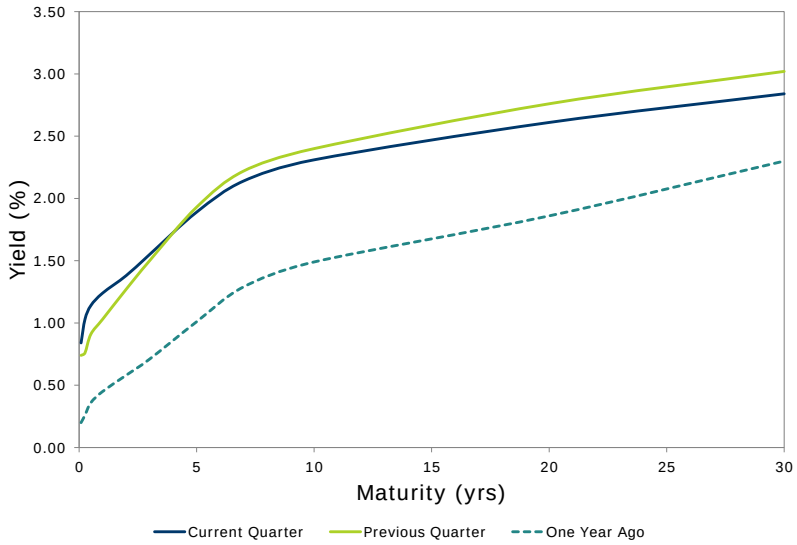
U.S. FIXED INCOME

AS OF JUNE 30, 2017	YTM	DURATION	QTR	YTD	1 YR	3 YR	5 YR	10 YR
BLOOMBERG BARCLAYS AGGREGATE	2.6	6.0	1.5	2.3	-0.3	2.5	2.2	4.5
BLOOMBERG BARCLAYS TREASURY	1.9	6.2	1.2	1.9	-2.3	2.0	1.3	4.1
BLOOMBERG BARCLAYS GOV'T-REL.	2.5	5.4	1.3	2.7	-0.2	2.2	2.1	4.2
BLOOMBERG BARCLAYS SECURITIZED	2.8	4.7	0.9	1.4	-0.1	2.2	2.0	4.3
BLOOMBERG BARCLAYS CORPORATE	3.2	7.5	2.5	3.8	2.3	3.6	4.0	5.8
BLOOMBERG BARCLAYS LT G/C	3.7	15.3	4.4	6.0	-1.1	5.3	4.3	7.6
BLOOMBERG BARCLAYS LT TREASURY	2.8	17.6	4.0	5.4	-7.2	5.6	2.8	7.3
BLOOMBERG BARCLAYS LT GOV't-REL.	4.1	12.5	3.3	6.6	-0.5	4.6	4.2	7.4
BLOOMBERG BARCLAYS LT CORP.	4.2	14.1	4.9	6.4	3.6	5.4	5.6	7.7
BLOOMBERG BARCLAYS U.S. TIPS	0.6	8.3	-0.4	0.9	-0.6	0.6	0.3	4.3
BLOOMBERG BARCLAYS HIGH YIELD	6.1	3.9	2.2	4.9	12.7	4.5	6.9	7.7
TREASURY BILLS	1.0	0.25	0.2	0.3	0.5	0.2	0.2	0.6

BLOOMBERG BARCLAYS FIXED INCOME INDEXES



TREASURY YIELD CURVE



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

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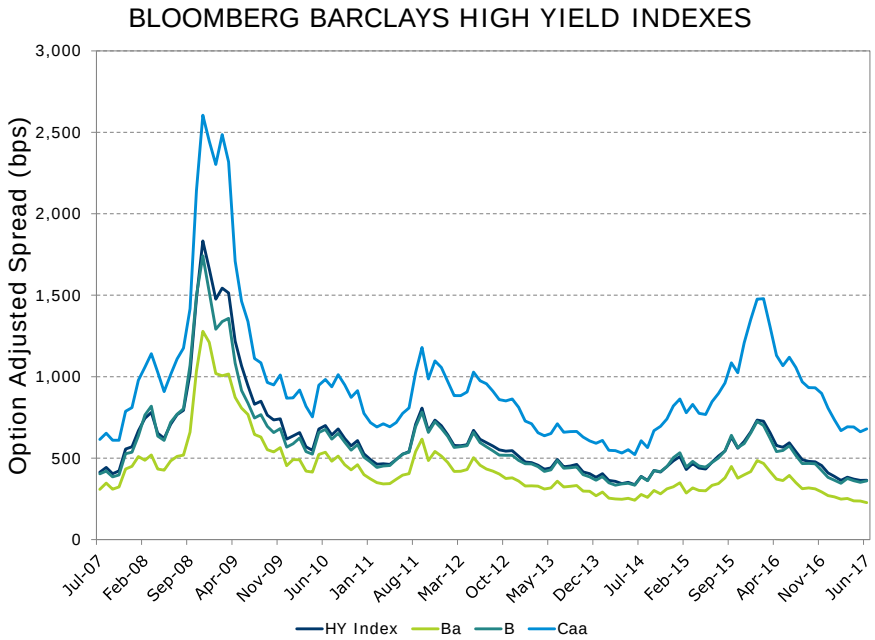
HIGH YIELD BOND MARKET

AS OF JUNE 30, 2017		QTR	YTD	1 YR	3 YR	5 YR	10 YR
BLOOMBERG BARCLAYS HIGH YIELD		2.2	4.9	12.7	4.5	6.9	7.7
CREDIT SUISSE LEVERAGED LOAN		0.8	2.0	7.5	3.5	4.8	4.2
HIGH YIELD QUALITY DISTRIBUTION	WEIGHT						
Ba U.S. HIGH YIELD	43.8%	2.7	4.8	9.8	5.2	6.8	8.2
B U.S. HIGH YIELD	40.2%	1.7	4.3	12.4	3.6	6.3	6.3
Caa U.S. HIGH YIELD	14.8%	1.9	6.6	20.8	4.8	8.5	6.9
Ca to D U.S. HIGH YIELD	0.9%	2.4	11.5	46.4	-17.3	-7.6	-2.8
Non-Rated U.S. HIGH YIELD	0.2%	2.9	8.6	7.9	-4.3	2.8	0.8



Data sources: Wilshire Compass, Bloomberg Barclays

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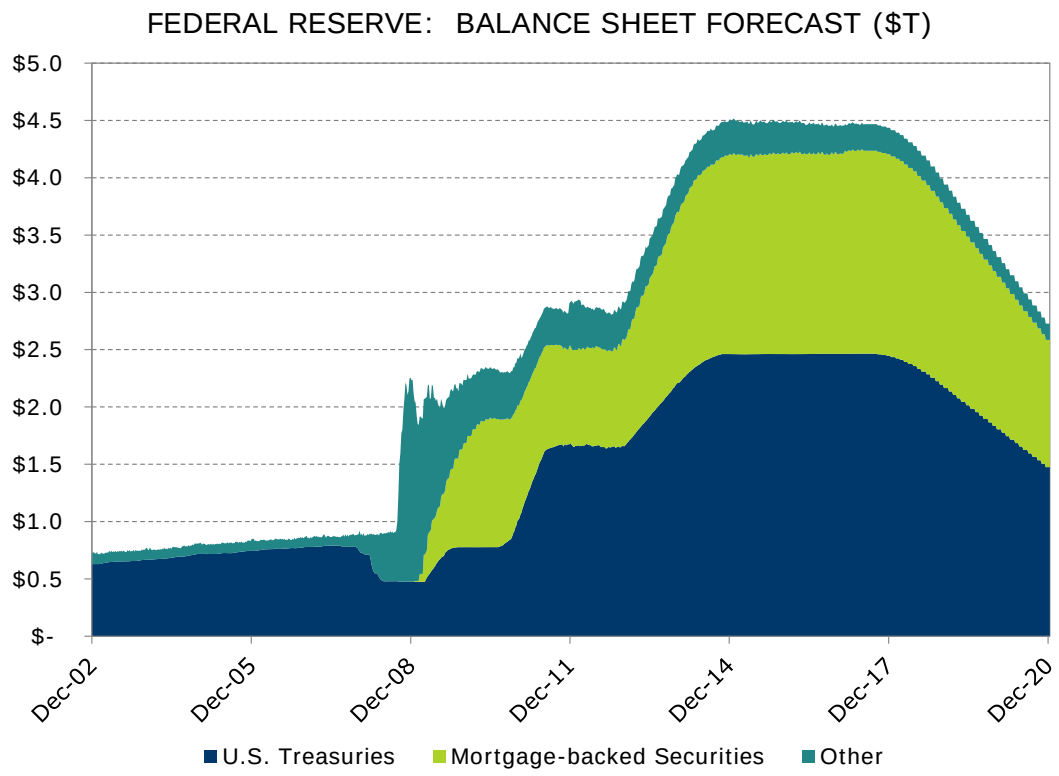
FEDERAL RESERVE

- Current plan to reduce Fed balance sheet by no longer reinvesting maturing bonds includes:
  - Treasuries: Reduce by $6B / month, increasing by $6B / quarter, until reaching $30B
  - MBS: Reduce by $4B / month, increasing by $4B / quarter, until reaching $20B
- While no commencement date was announced, following forecast assumes reductions begin during Q4-2017



Data sources: Federal Reserve

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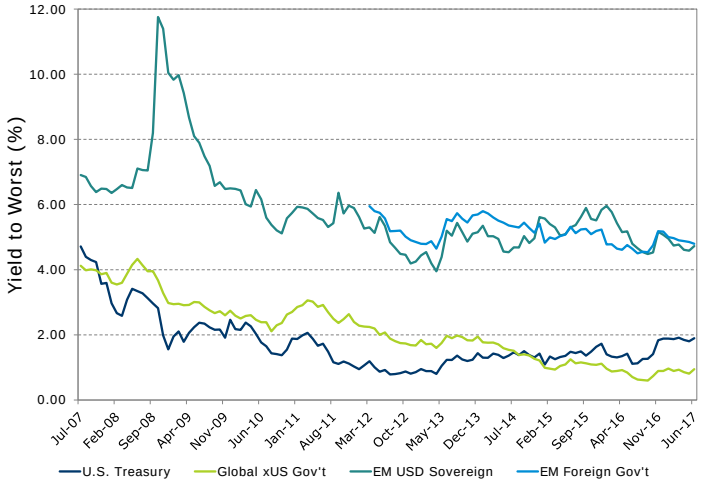
NON-U.S. FIXED INCOME

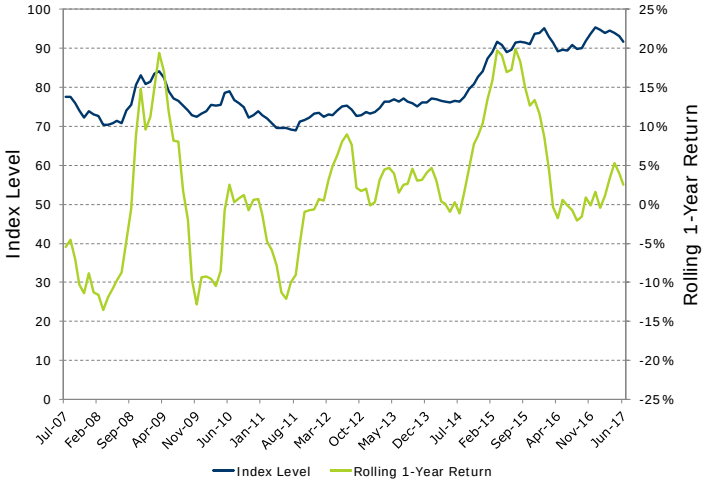
AS OF JUNE 30, 2017	QTR	YTD	1 YR	3 YR	5 YR	10 YR
DEVELOPED MARKETS						
BLMBRG BRCLYS GLBL AGGREGATE xUS	3.6	6.1	-3.8	-2.4	-0.4	3.0
BLMBRG BRCLYS GLBL AGGREGATE xUS *	0.6	0.7	-0.7	3.8	4.0	4.5
BLMBRG BRCLYS WORLD GOV'T xUS IL	3.8	5.2	2.0	-0.6	1.9	3.5
BLMBRG BRCLYS WORLD GOV'T xUS IL *	-0.8	-0.9	2.9	7.0	5.3	6.0
EMERGING MARKETS (HARD CURRENCY)						
BLMBRG BRCLYS EM USD AGGREGATE	1.8	5.1	5.6	4.5	5.3	7.1
EMERGING MARKETS (FOREIGN CURRENCY)						
BLMBRG BRCLYS EM LOCAL CURR. GOV'T	1.9	8.8	3.8	-1.8	1.2	n.a.
BLMBRG BRCLYS EM LOCAL CURR. GOV'T *	1.0	2.4	0.6	2.5	2.4	n.a.
EURO vs. DOLLAR	6.6	8.1	2.7	-5.9	-2.1	-1.7
YEN vs. DOLLAR	-0.8	3.8	-8.7	-3.4	-6.6	0.9
POUND vs. DOLLAR	3.9	5.1	-2.8	-8.8	-3.7	-4.3

* 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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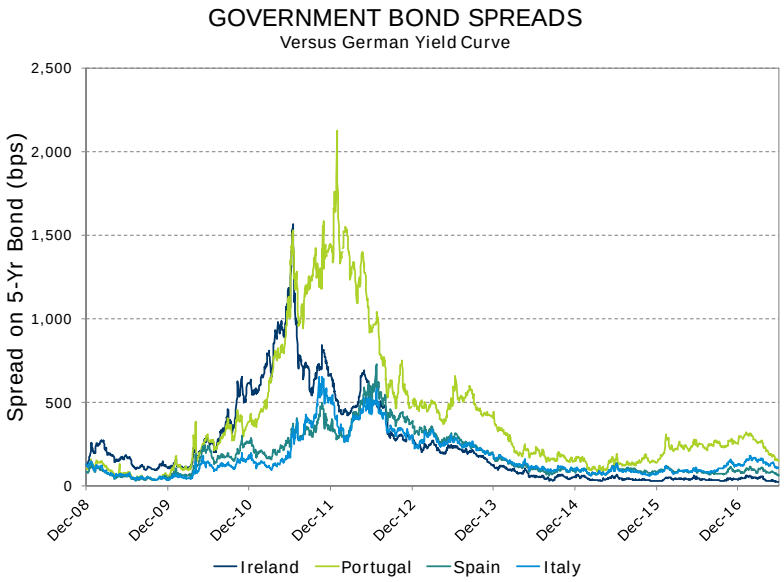
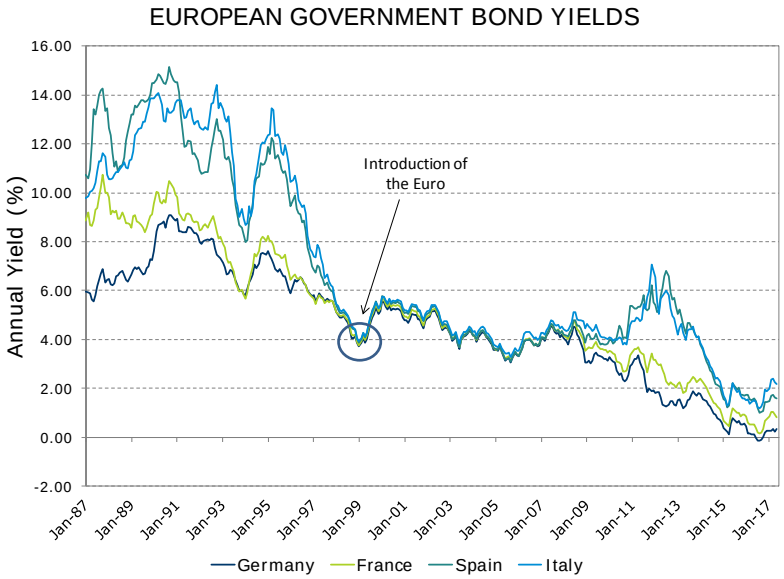
EUROPEAN DEBT

- Accelerating economic growth in Portugal has investors more optimistic on the country's future, driving down the government's yield spread



- Yields on government bonds have edged higher with German yields back above zero



Data sources: Bloomberg Barclays, International Monetary Fund

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Income – Performance

	Market Value	Qtr	1-Year	3-Year	5-Year	10-Year	VaR	5-year Sharpe Ratio	5-year Info Ratio
INCOME	**62.9**	**2.5%**	**0.3%**	**3.5%**	**3.4%**	**6.5%**	**$6.9 bil**	**0.7**	**1.5**
Income Policy BenchmarK		2.4%	-0.9%	2.8%	2.5%	5.8%		**0.5**	**0.0**
Value Added		0.1%	1.2%	0.7%	0.9%	0.7%			
U.S. Income	**56.4**	**2.3%**	**0.3%**	**4.3%**	**3.9%**	**6.8%**		**0.8**	**1.4**
U.S. Income Policy BenchmarK		2.2%	-0.9%	3.5%	2.9%	6.1%		**0.5**	**0.0**
Value Added		0.1%	1.2%	0.8%	1.0%	0.7%			
Non-U.S. Income	**6.5**	**4.4%**	**0.1%**	**-2.6%**	**-0.9%**	**3.8%**		**-0.2**	**0.8**
Non-US Income Policy Benchmark		4.1%	-1.1%	-3.4%	-1.6%	2.8%		**-0.2**	**0.0**
Value Added		0.3%	1.2%	0.8%	0.7%	1.0%			

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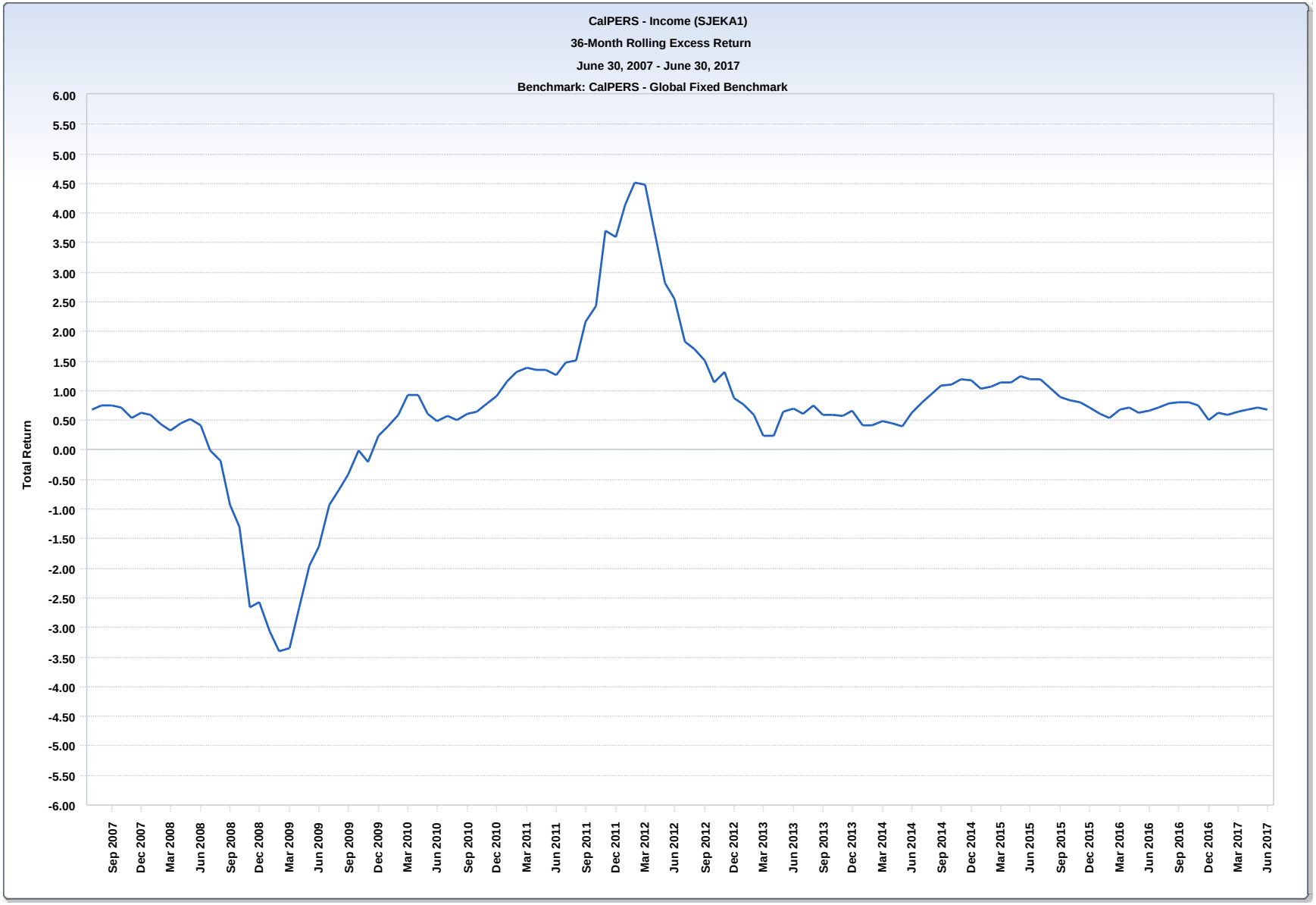
Income – Rolling Excess Returns



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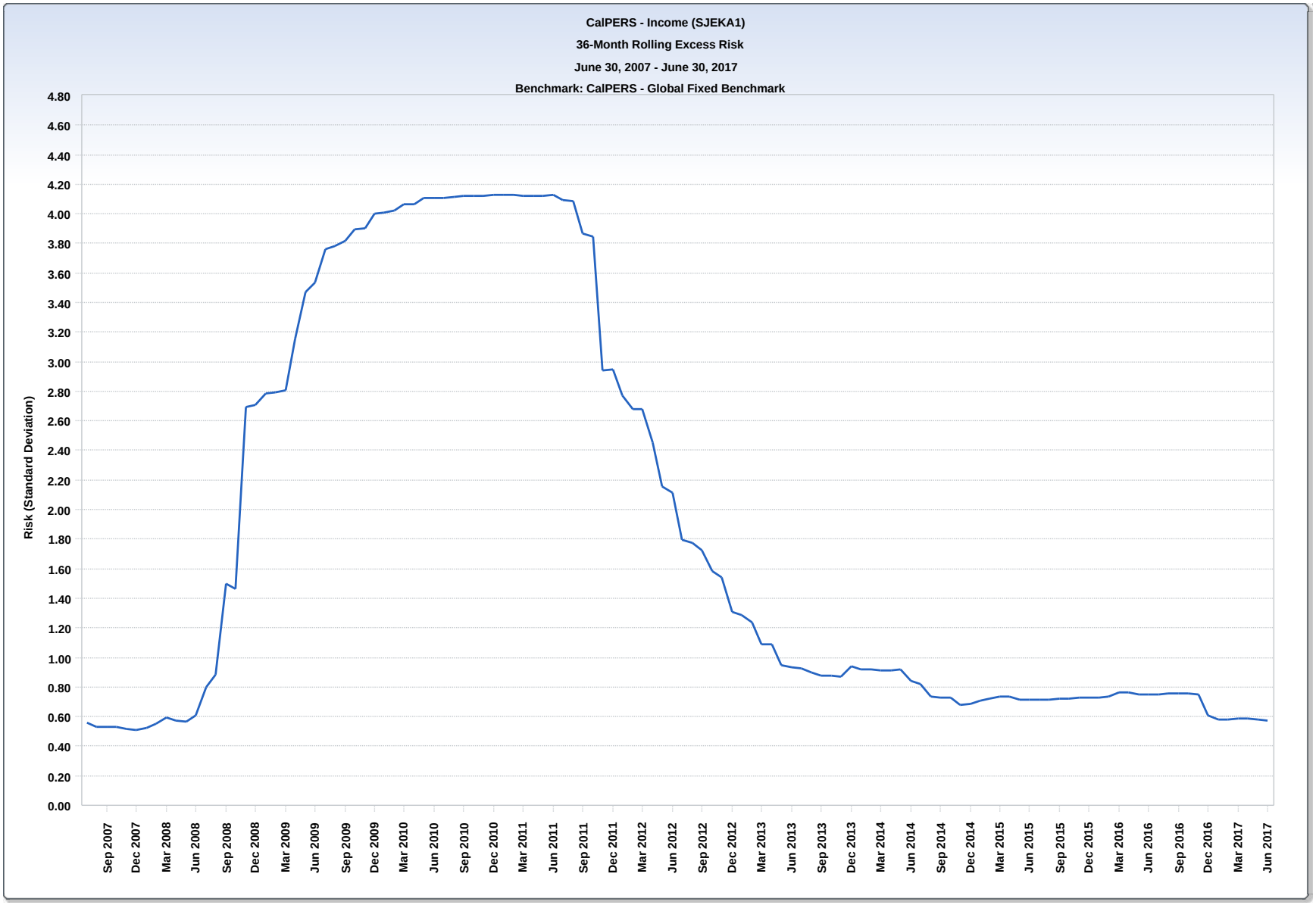
Income – Rolling Tracking Error



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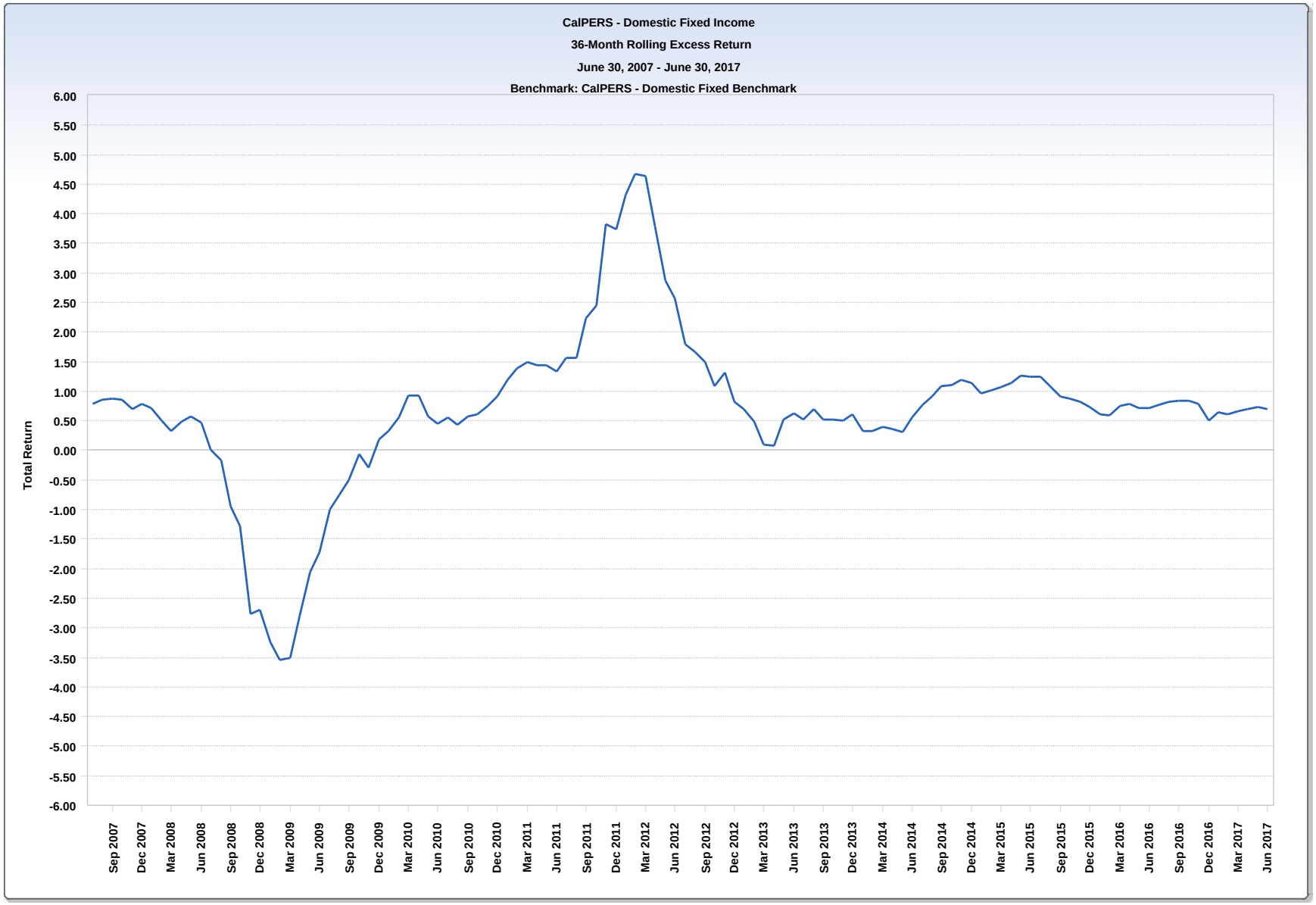
U.S. Income – Rolling Excess Returns



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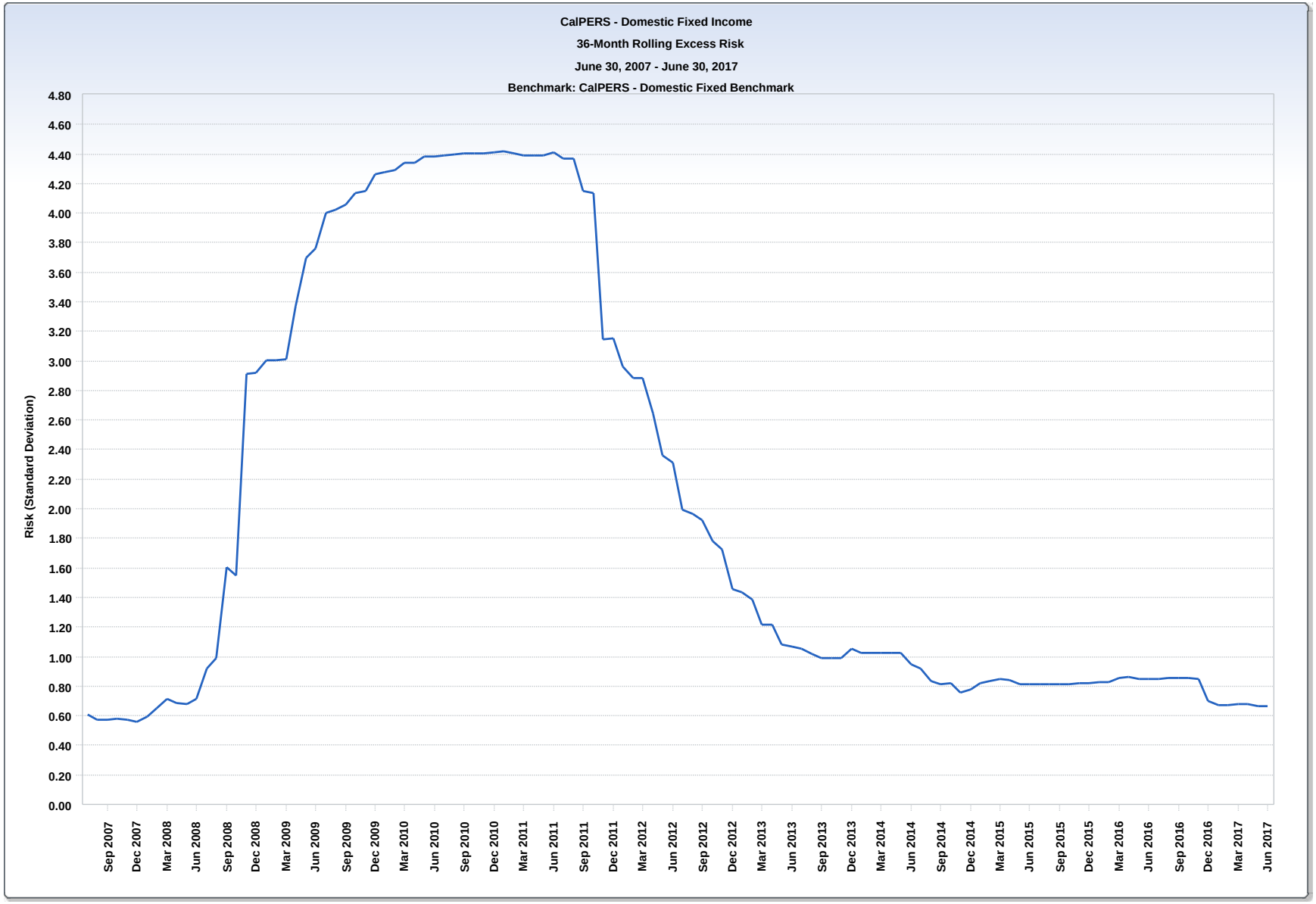
U.S. Income – Rolling Tracking Error



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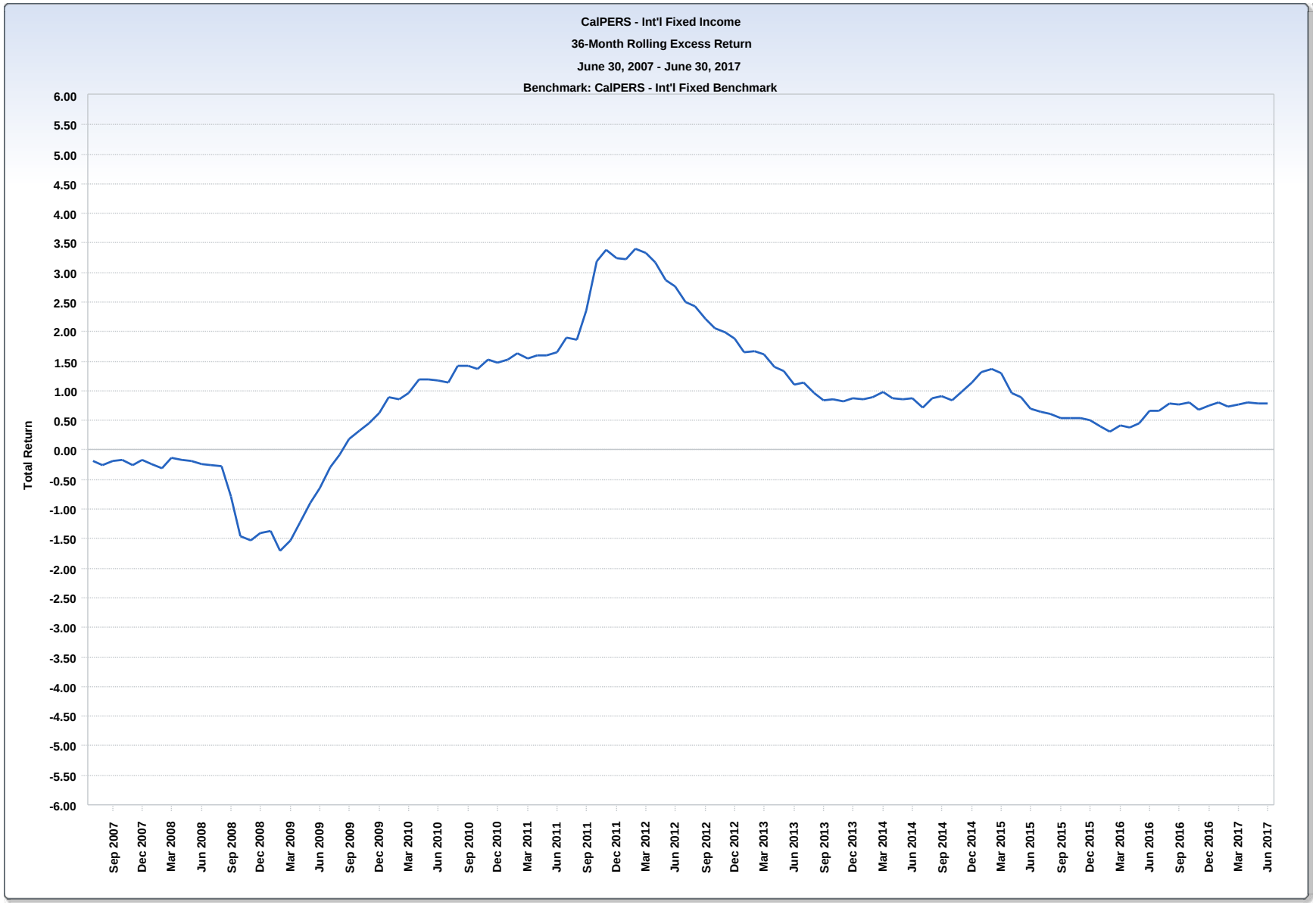
International Income – Rolling Excess Returns



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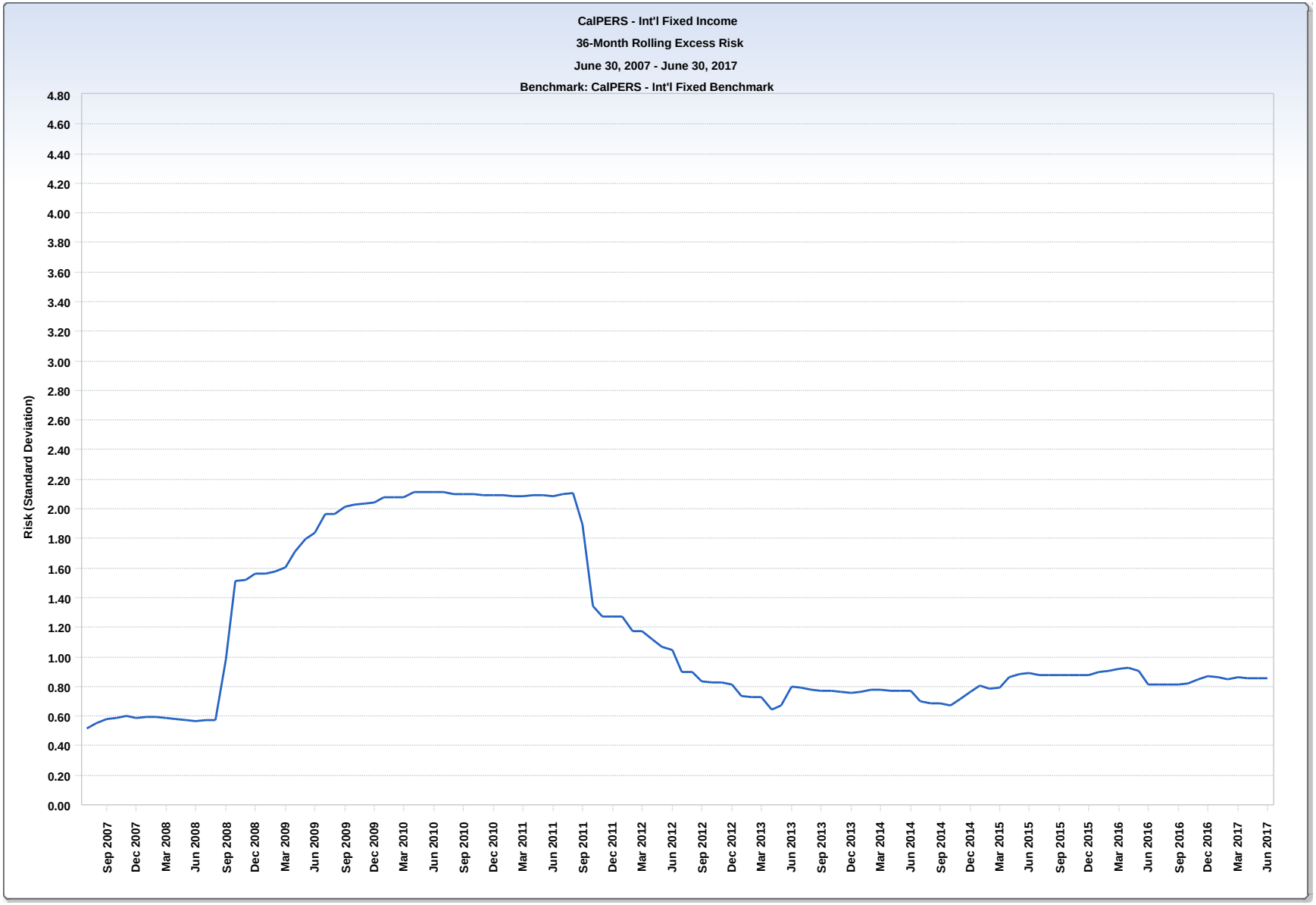
International Income – Rolling Tracking Error



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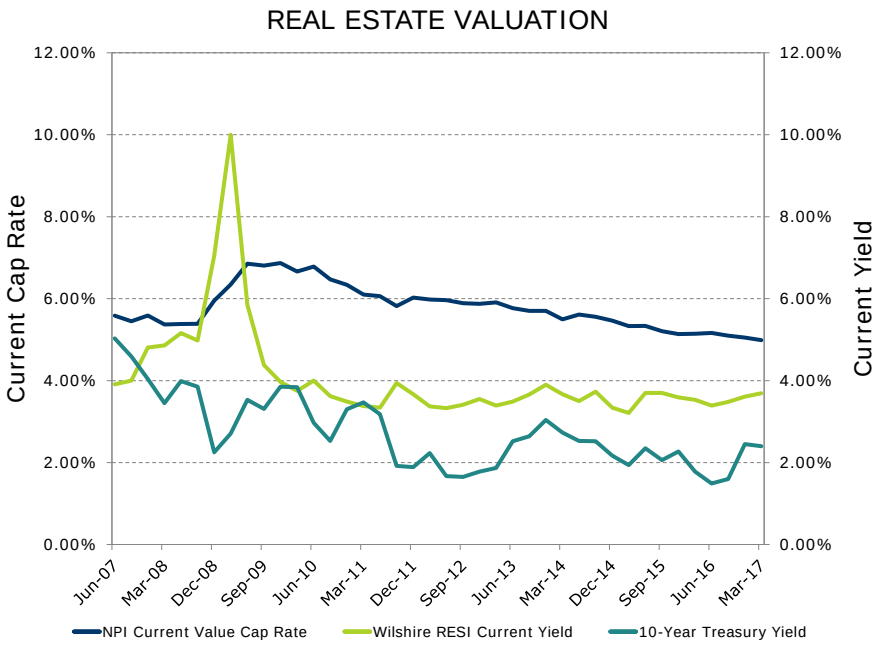
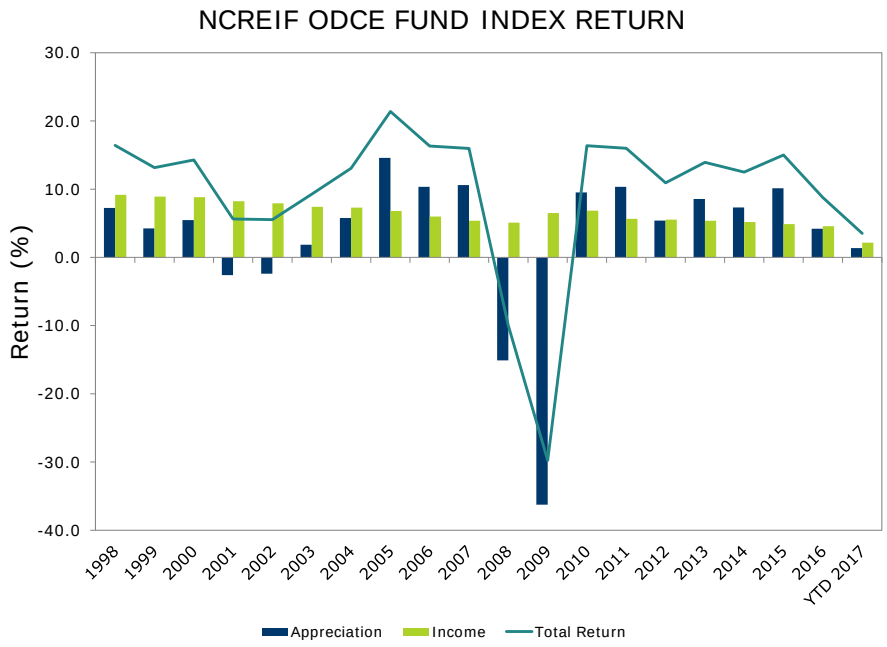
REAL ASSETS

AS OF JUNE 30, 2017	QTR	YTD	1 YR	3 YR	5 YR	10 YR
BLOOMBERG BARCLAYS U.S. TIPS	-0.4	0.9	-0.6	0.6	0.3	4.3
BLOOMBERG COMMODITY INDEX	-3.0	-5.3	-6.5	-14.8	-9.2	-6.5
WILSHIRE GLOBAL RESI INDEX	2.9	5.2	1.1	5.9	9.1	3.6
NCREIF ODCE FUND INDEX	1.7	3.5	7.9	11.3	11.8	5.3
NCREIF TIMBERLAND INDEX	0.7	1.5	3.4	5.5	7.2	5.5
ALERIAN MLP INDEX (OIL & GAS)	-6.4	-2.7	0.4	-11.2	1.8	5.7





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

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Inflation – Performance

	Market Value	Qtr	1-Year	3-Year	5-Year	10-Year	VaR	5-year Sharpe Ratio	5-year Info Ratio
INFLATION	**25.3**	**-0.7%**	**-2.7%**	**-6.0%**	**-2.1%**	**-.-%**	**$1.8 bil**	**-0.4**	**0.7**
Inflation Policy Benchmark		-0.6%	-1.8%	-6.7%	-2.7%	-.-%		**-0.5**	**0.0**
Value Added		-0.1%	-0.9%	0.7%	0.6%	-.-%			
Internal Commodities	**4.5**	**-5.4%**	**-9.2%**	**-24.7%**	**-13.9%**	**-.-%**			
GSCI Total Return Index		-5.5%	-9.0%	-24.8%	-13.7%	-.-%			
Value Added		0.1%	-0.2%	0.1%	-0.2%	-.-%			
Core Inflation Linked Bonds	**17.0**	**1.3%**	**0.5%**	**-0.2%**	**1.1%**	**-.-%**			
Custom Benchmark		1.2%	0.5%	-0.5%	0.8%	-.-%			
Value Added		0.1%	0.0%	0.3%	0.3%	-.-%			
Tactical Commodities	**1.9**	**-6.4%**	**-18.6%**	**-25.6%**	**-.-%**	**-.-%**			
GSCI Total Return Index		-5.5%	-9.0%	-24.8%	-.-%	-.-%			
Value Added		-0.9%	-9.6%	-0.8%	-.-%	-.-%			
Tactical TIPS	**1.9**	**-0.4%**	**-0.8%**	**0.5%**	**-.-%**	**-.-%**			
CalPERS TIPS		-0.4%	-0.6%	0.6%	-.-%	-.-%			
Value Added		0.0%	-0.2%	-0.1%	-.-%	-.-%			

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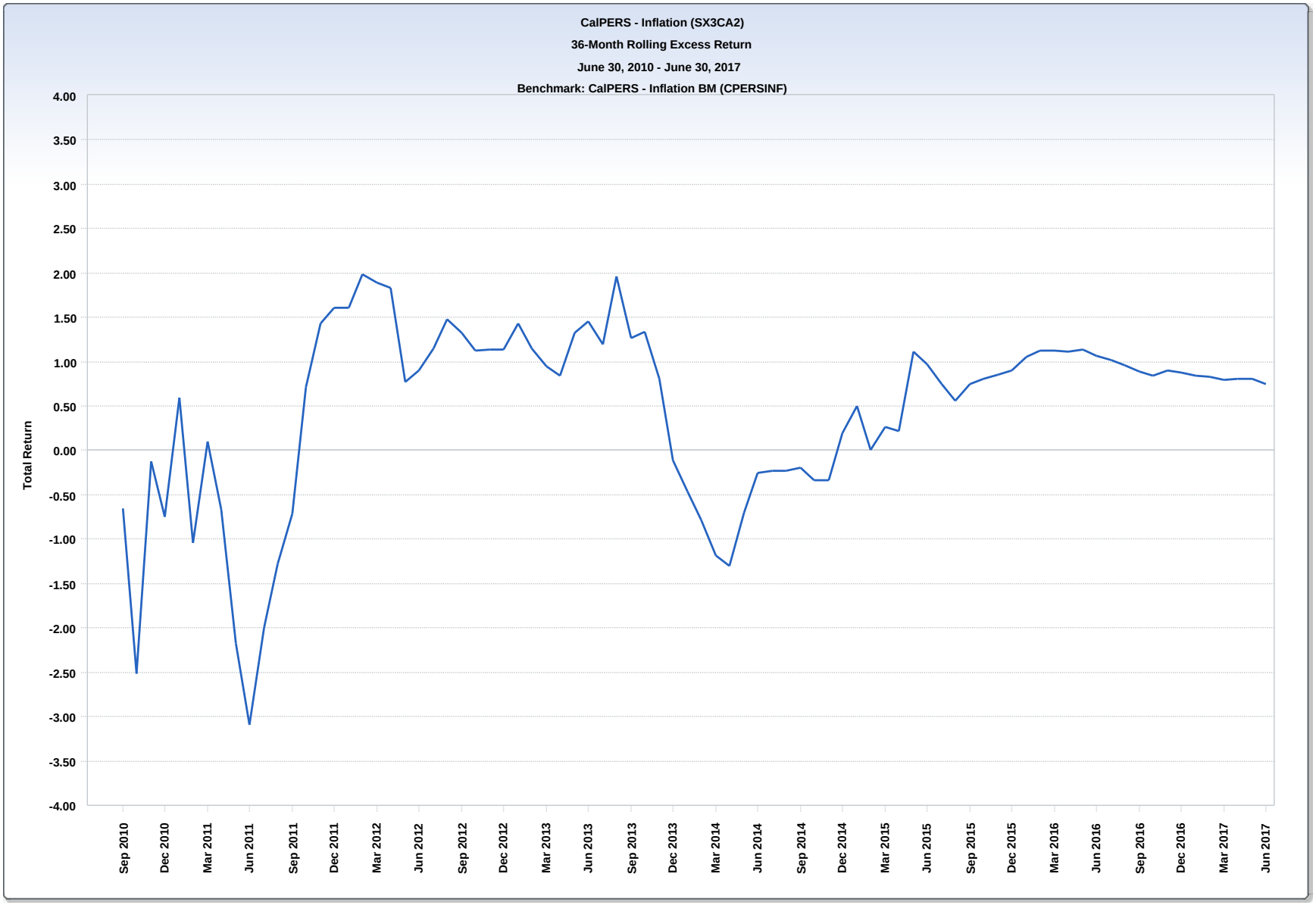
Inflation – Rolling Excess Returns



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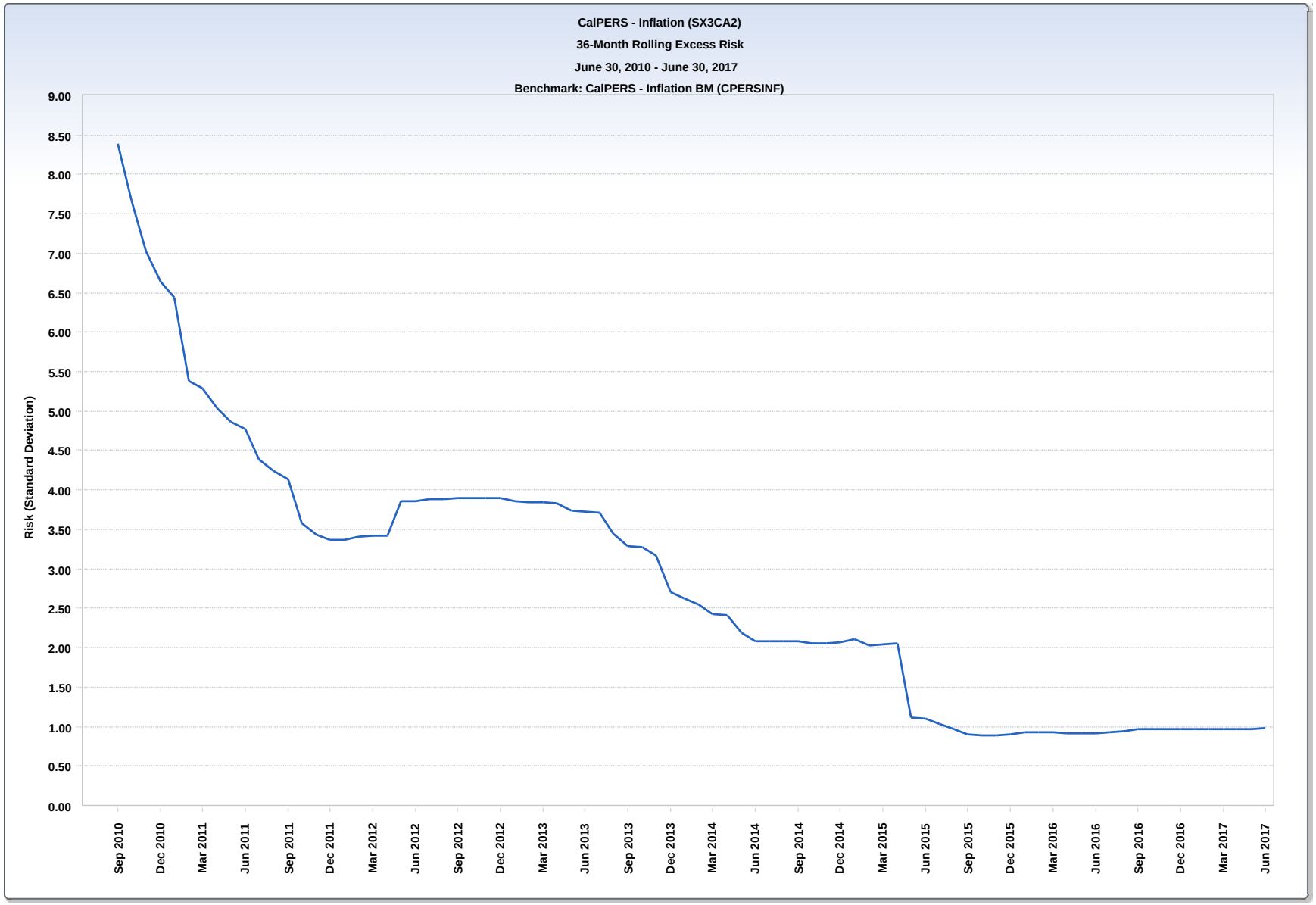
Inflation – Rolling Tracking Error



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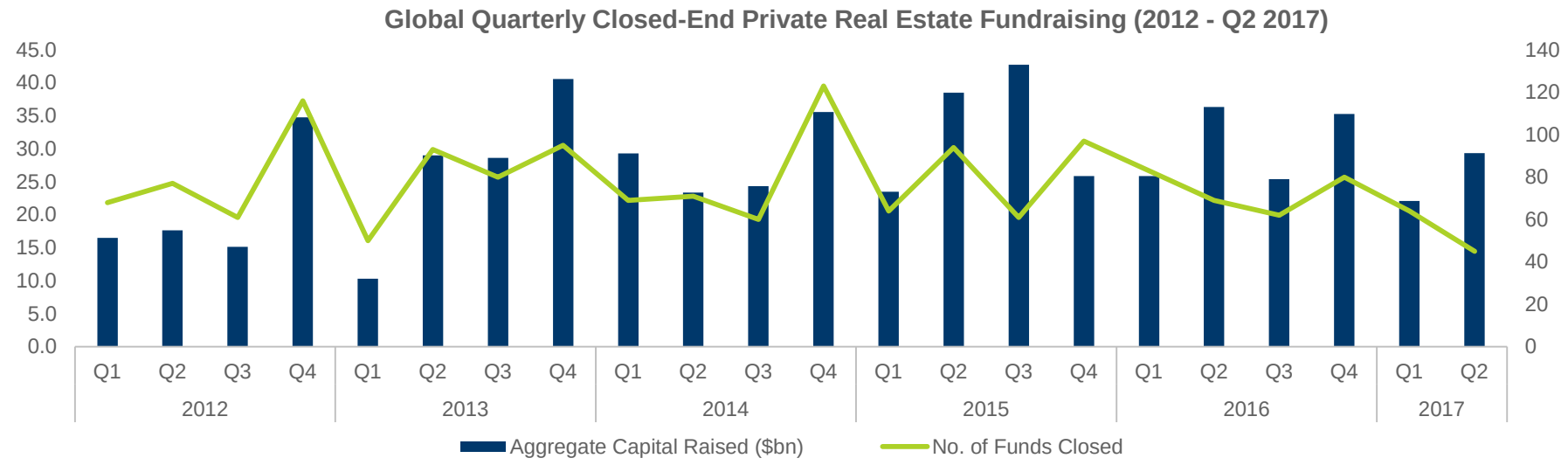
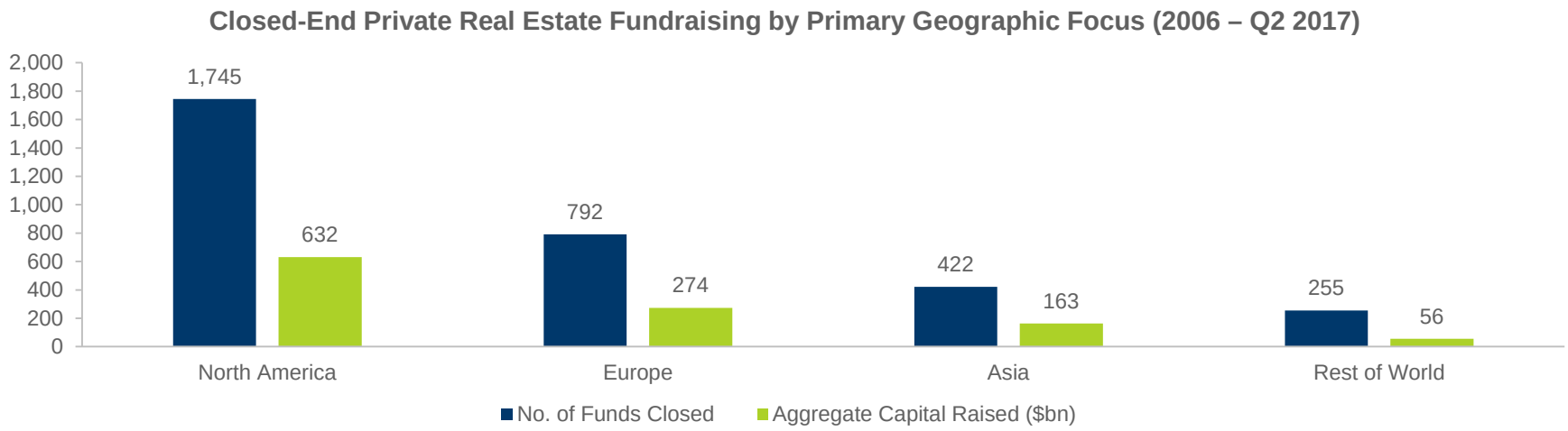
PRIVATE REAL ESTATE – FUNDRAISING ACTIVITY





Source: Preqin, as of June 30, 2017

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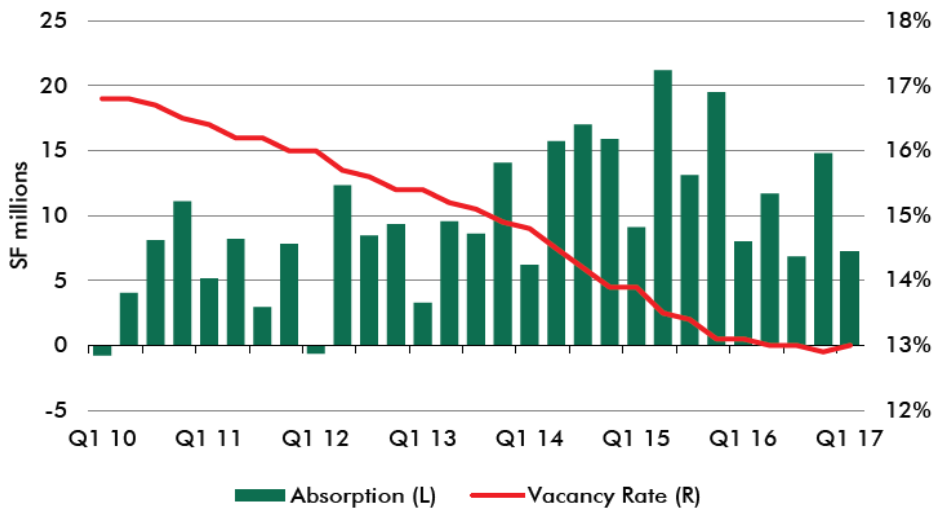
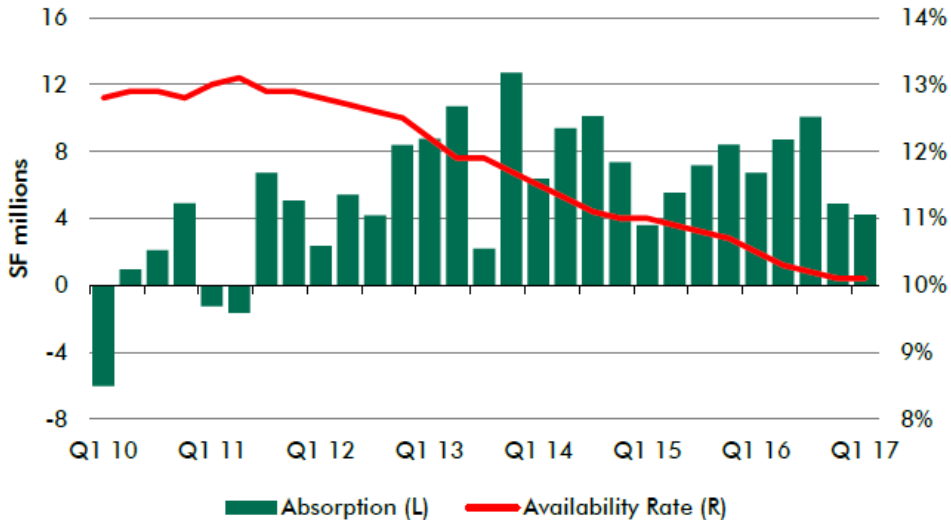
COMMERCIAL PROPERTY

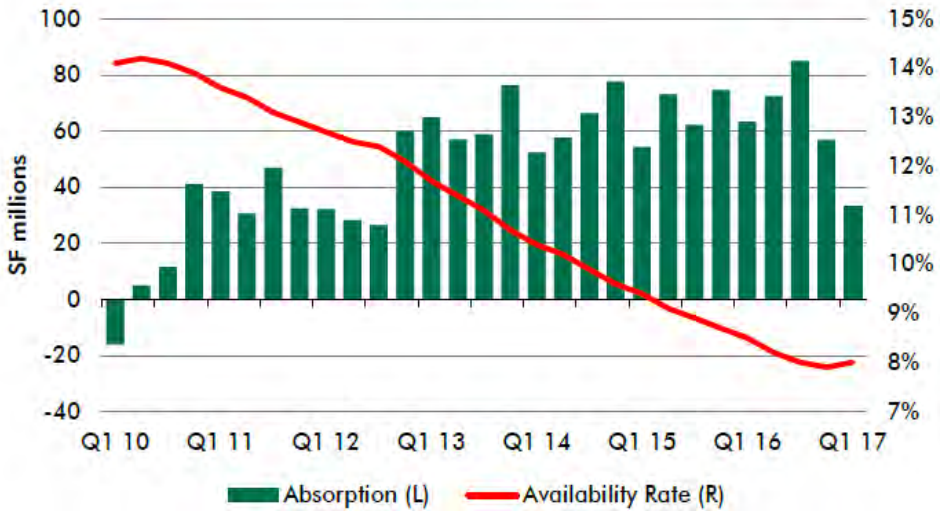
OFFICE



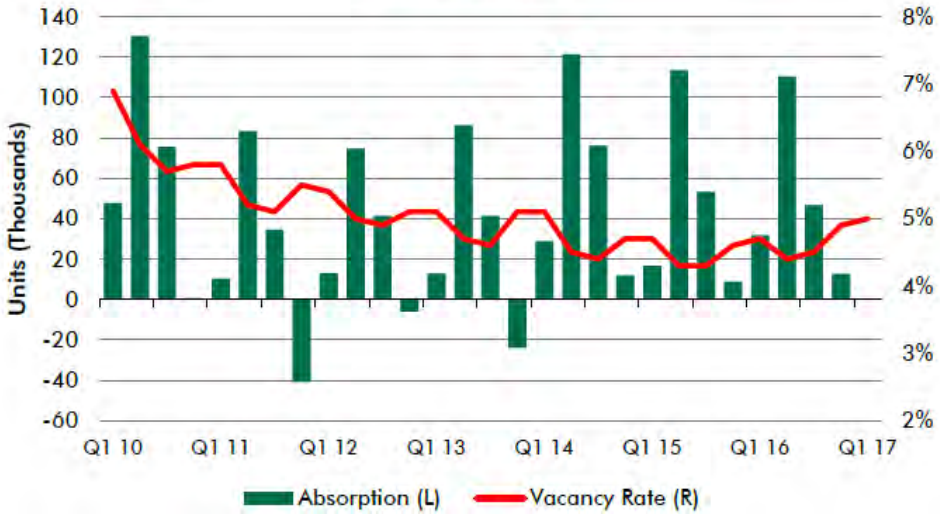
RETAIL



INDUSTRIAL



APARTMENTS



Data sources: CB Richard Ellis

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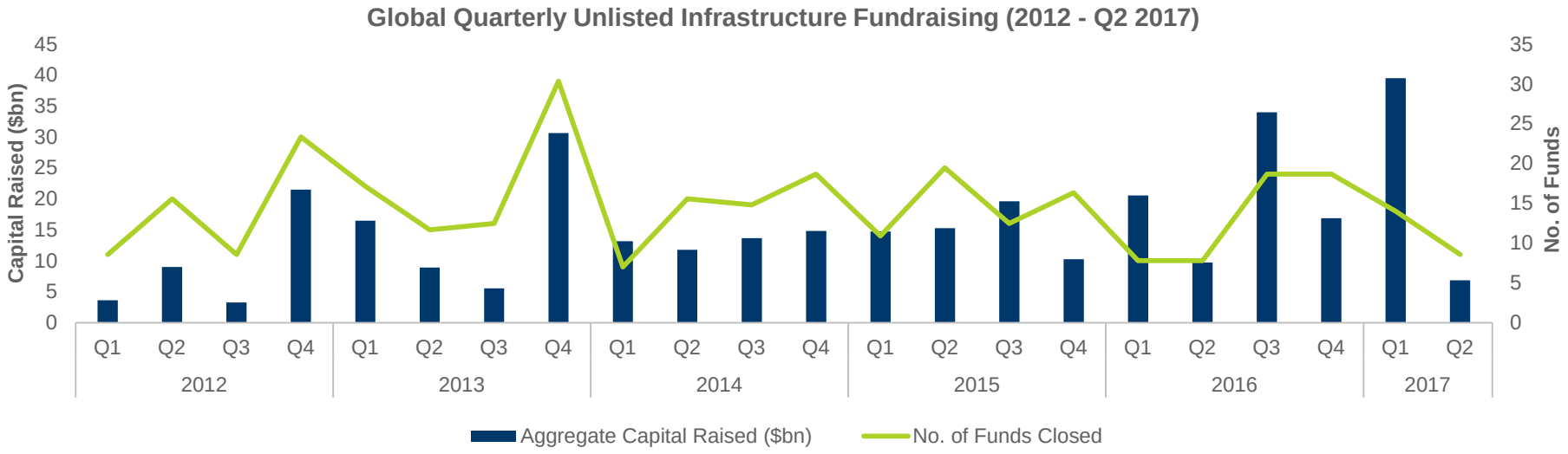
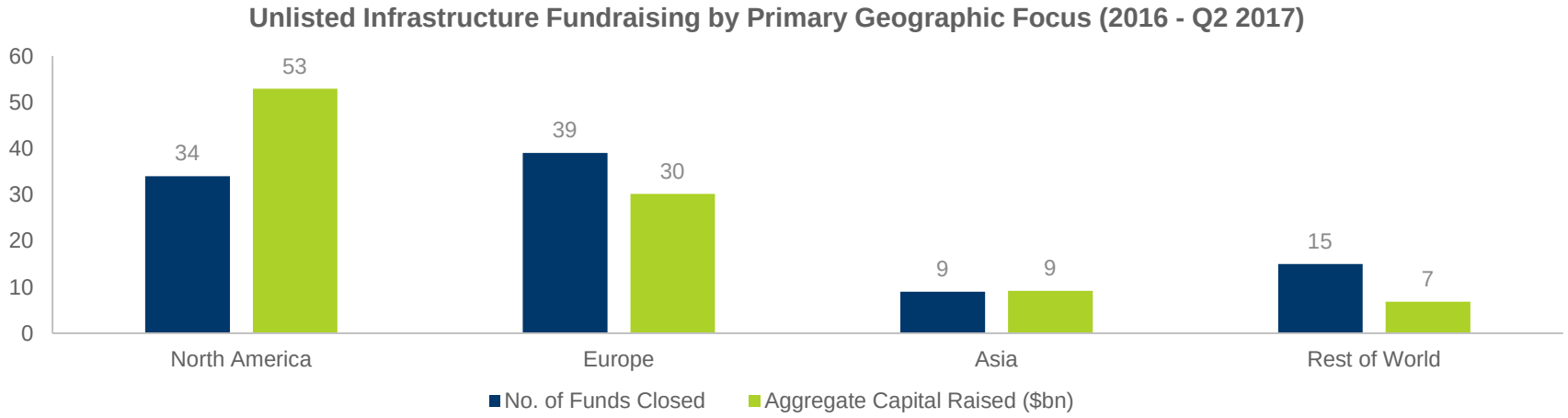
UNLISTED INFRASTRUCTURE – FUNDRAISING & INVESTMENT ACTIVITY





Source: Preqin, as of June 30, 2017

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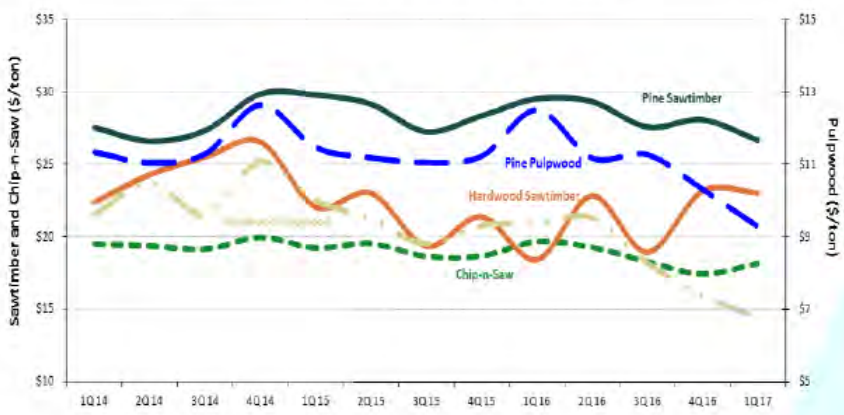
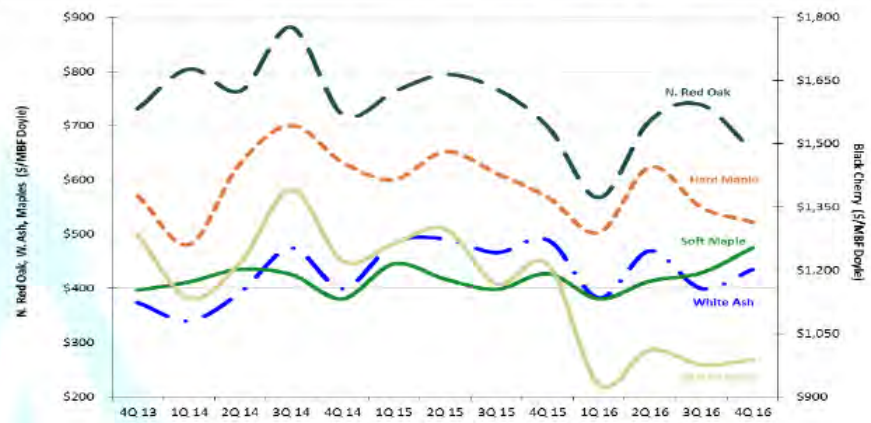
TIMBER

Southeastern Timber Prices



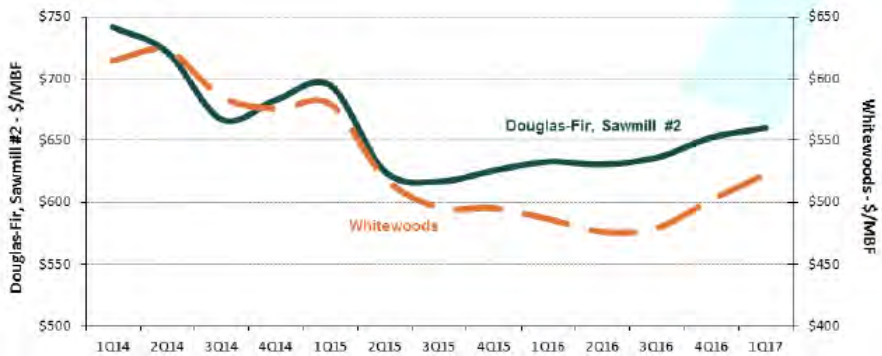
Source: Forest2Market®

Northeastern Hardwood Timber Prices



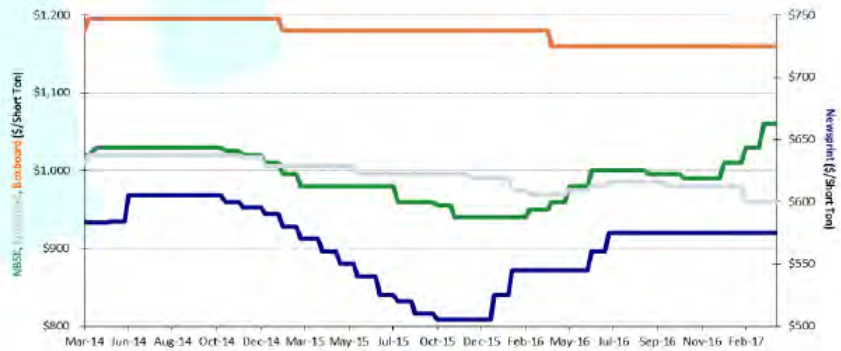
Source: Pennsylvania Woodlands Timber Market Report - Northwest Region

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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Real Assets – Performance

	Market Value	Qtr	1-Year	3-Year	5-Year	10-Year	VaR	5-year Sharpe Ratio	5-year Info Ratio
REAL ASSETS	**36.3**	**1.7%**	**7.4%**	**8.6%**	**10.0%**	**-0.9%**	**$5.4 bil**	**1.6**	**0.0**
Real Assets Policy Benchmark		1.5%	7.0%	9.9%	10.2%	6.9%		**2.5**	**0.0**
Value Added		0.2%	0.4%	-1.3%	-0.2%	-7.8%			
Real Estate	**30.5**	**1.8%**	**7.6%**	**9.4%**	**10.8%**	**-1.3%**	**$4.5 bil**	**1.6**	**-0.1**
Real Estate Policy Benchmark		1.5%	7.4%	10.8%	11.1%	7.8%		**2.4**	**0.0**
Value Added		0.3%	0.2%	-1.4%	-0.3%	-9.1%			
Forestland	**2.0**	**-0.2%**	**1.0%**	**-3.1%**	**-0.1%**	**-.-%**			
NCREIF Timberland Index		0.8%	3.6%	5.7%	7.1%	-.-%			
Value Added		-1.0%	-2.6%	-8.8%	-7.2%	-.-%			
Infrastructure	**3.8**	**2.0%**	**9.9%**	**10.7%**	**12.0%**	**-.-%**			
CPI + 400 BPS 1Qtr Lag		2.0%	6.5%	5.1%	5.3%	-.-%			
Value Added		0.0%	3.4%	5.6%	6.7%	-.-%			

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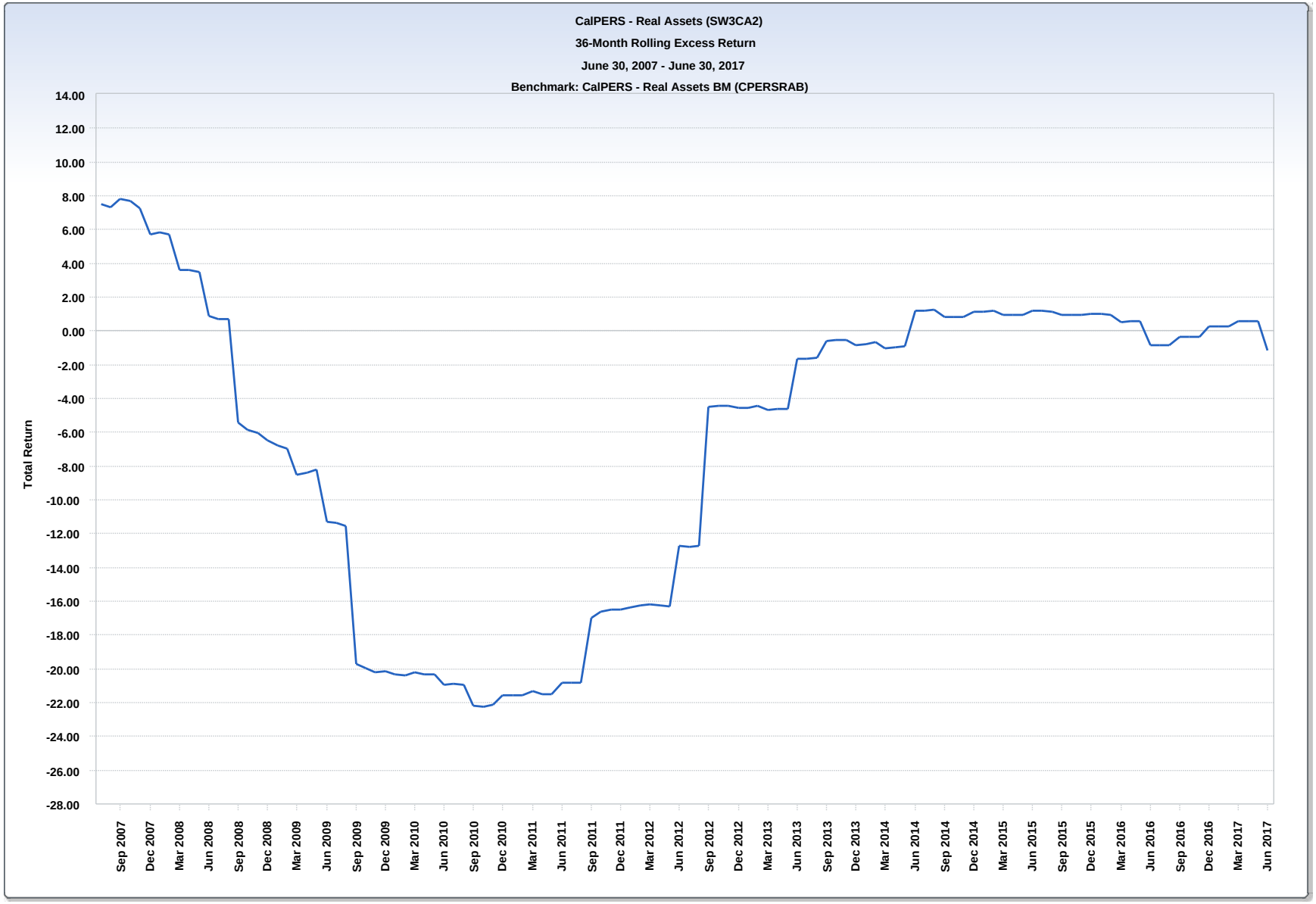
Real Assets – Rolling Excess Returns



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Real Assets – Rolling Tracking Error

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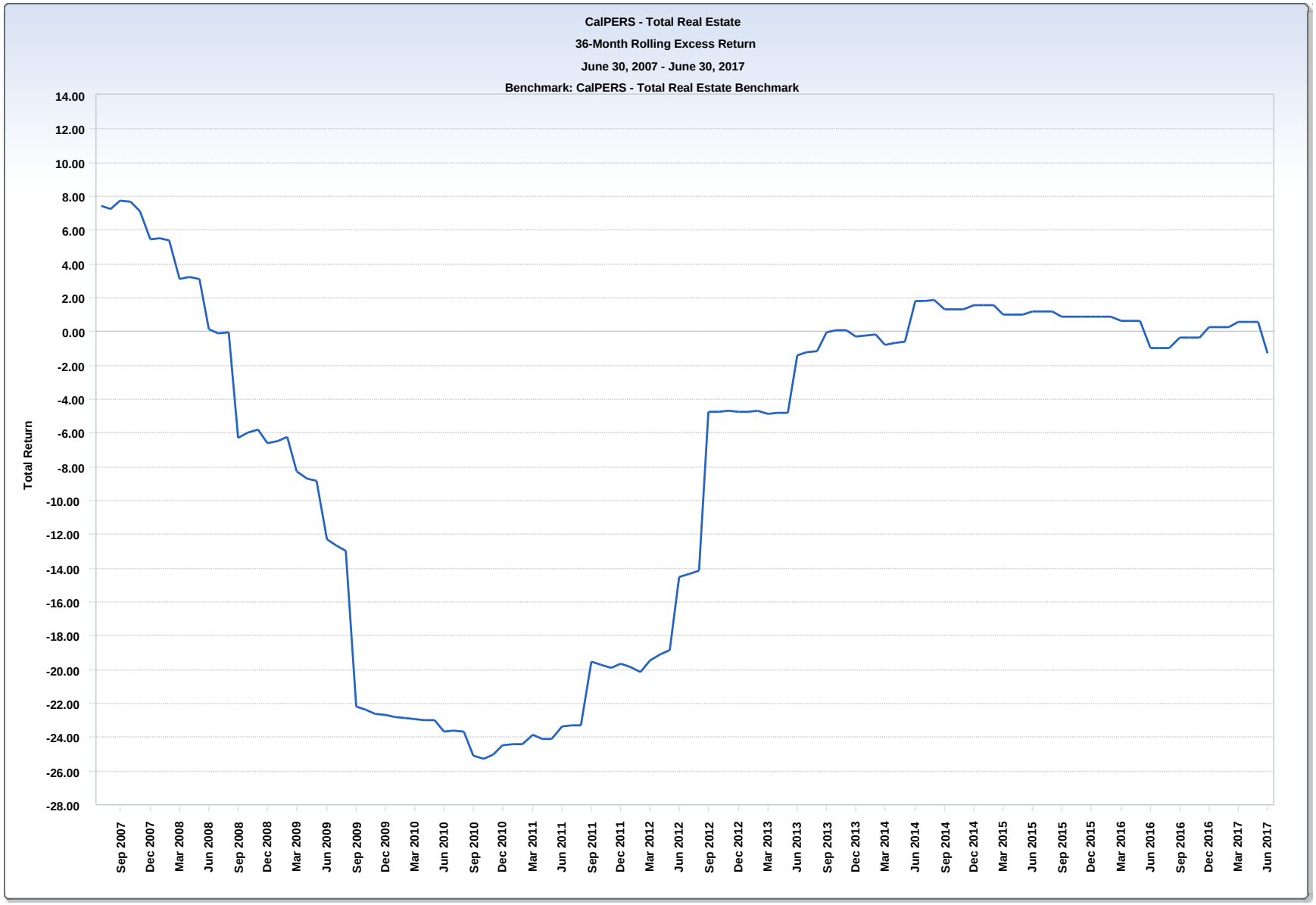
Real Estate – Rolling Excess Returns



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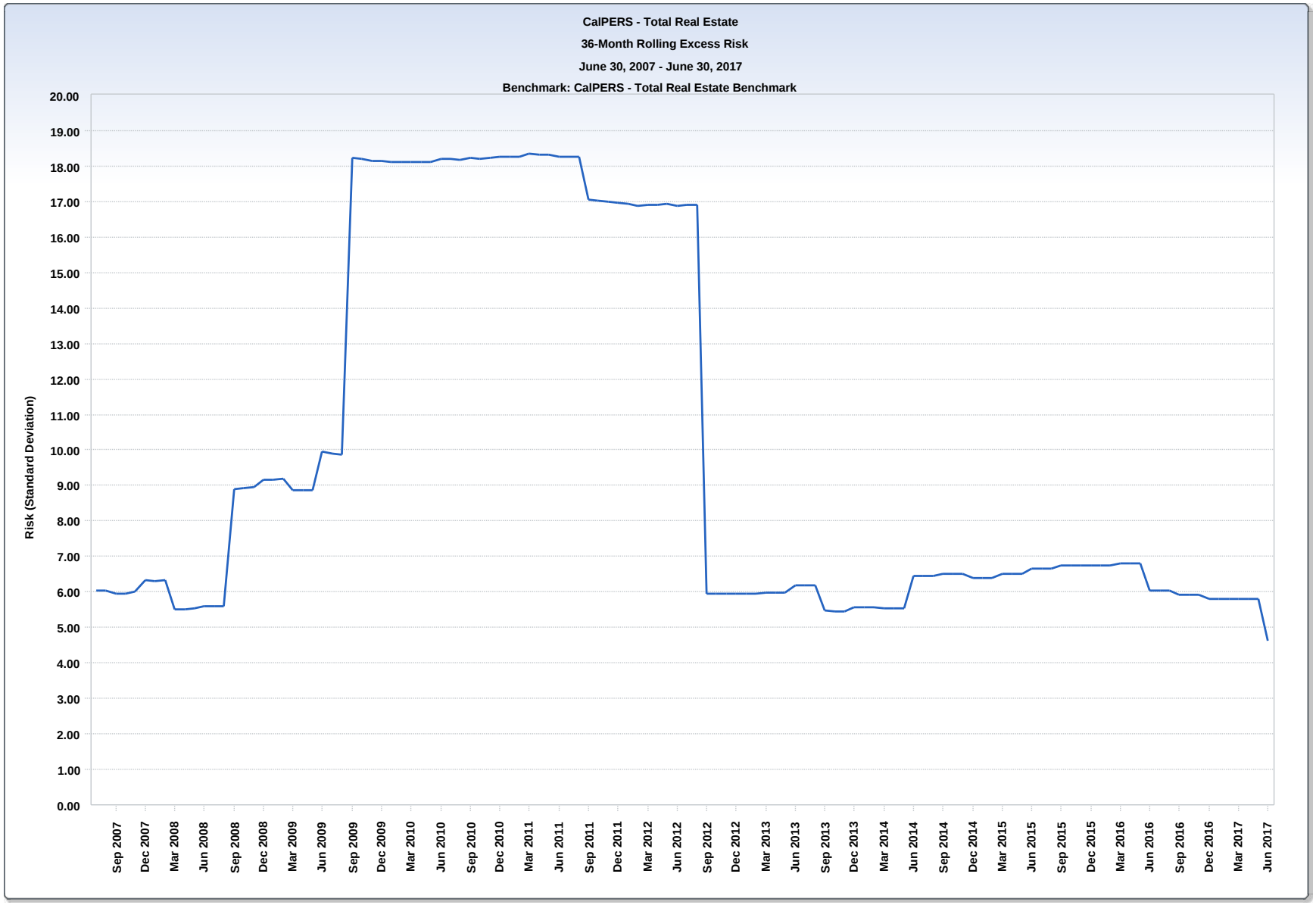
Real Estate – Rolling Tracking Error



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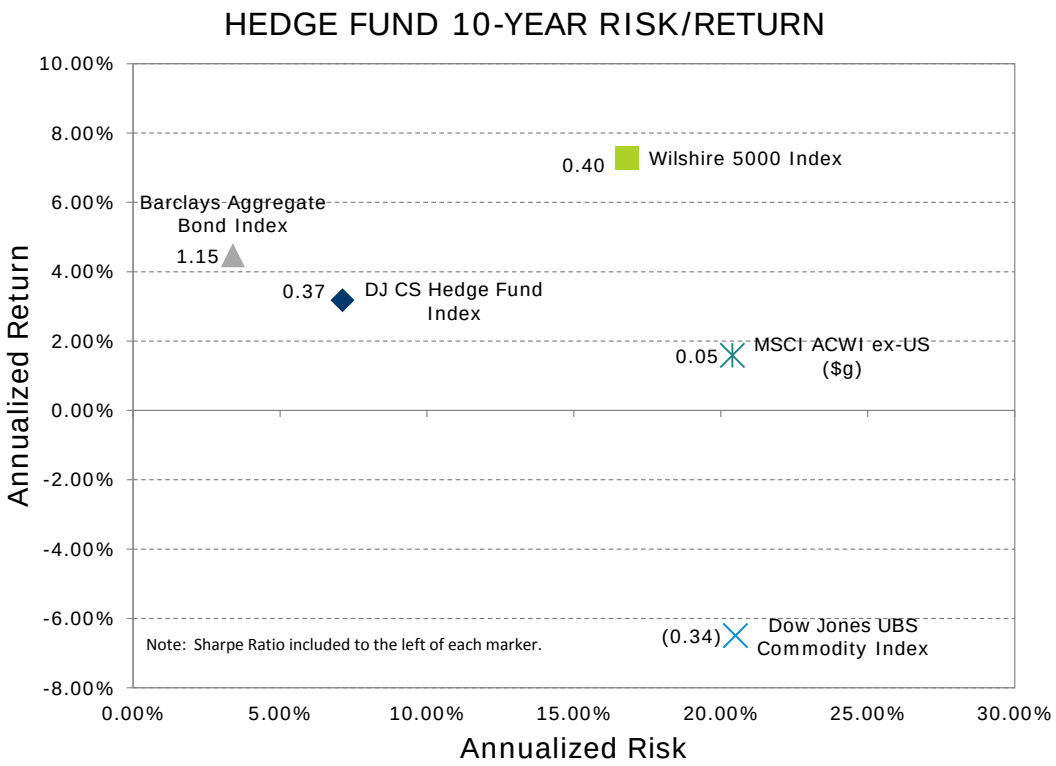
HEDGE FUND PERFORMANCE

AS OF JUNE 30, 2017	QTR	YTD	1 YR	3 YR	5 YR	10 YR
DJ CS HEDGE FUND INDEX	0.8	2.8	5.8	1.5	4.5	3.2
EVENT DRIVEN	1.1	3.8	9.3	-1.4	4.6	3.0
GLOBAL MACRO	-1.8	-1.5	3.6	1.4	2.8	4.8
LONG/SHORT EQUITY	3.1	6.6	8.4	3.0	7.0	3.7
MULTI-STRATEGY	2.3	5.1	9.0	5.5	7.4	4.9
WILSHIRE 5000	3.0	8.7	18.5	9.3	14.6	7.3
MSCI ACWI EX-US ($G)	6.0	14.4	21.0	1.3	7.7	1.6
BLOOMBERG BARCLAYS AGGREGATE	1.5	2.3	-0.3	2.5	2.2	4.5
DOW JONES UBS COMMODITY	-3.0	-5.3	-6.5	-14.8	-9.2	-6.5



Data sources: Wilshire Compass

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ARS – Distribution of Performance

	Market Value	Qtr	1-Year	3-Year	5-Year	10-Year	5-Year Info Ratio	Up Capture Ratio	5-Year Sharpe Ratio	5-Year Sortino Ratio
Absolute Return Strategies	**0.3**	**3.9%**	**-2.3%**	**1.0%**	**3.4%**	**1.5%**	**-0.4**	**0.6**	**0.8**	**1.1**
ARS Policy Benchmark		1.4%	5.4%	5.4%	5.4%	6.3%				
Value Added		2.5%	-7.7%	-4.4%	-2.0%	-4.8%				
Total Direct Investments	**0.3**	**3.7%**	**-2.6%**	**1.0%**	**3.3%**	**1.8%**				
Total Funds of Funds	**0.0**	**31.1%**	**21.3%**	**8.4%**	**8.4%**	**3.3%**				
HFRI Fund of Funds Index		0.6%	-0.4%	3.9%	2.1%	2.3%				

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