WILSHIRE ASSOCIATES

Wilshire Consulting

California Public Employees' Retirement System

Performance Review – June 30, 2020

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ASSET CLASS EXPECTATIONS

- Although Treasury yields did not fall much, fixed income returns are down meaningfully
  - Falling yields increases duration
  - Forward curve was up, meaning higher future yields and falling bond prices
  - Credit spreads tightened
- Real asset assumptions are mostly down on lower yields
- Equity forecasts are down after a return of 22% during Q2
- Private equity is down but less than public equity as leverage conditions improved

	TOTAL RETURN (%)			RISK (%)
	MAR 2020	CHANGE	JUNE 2020	
INFLATION	1.15	0.35	1.50	1.75
CASH EQUIVALENTS	0.70	0.05	0.75	1.25
TREASURIES	0.65	-0.30	0.35	5.00
CORE BONDS	1.80	-0.55	1.25	5.15
LT CORE BONDS	2.70	-0.60	2.10	10.00
HIGH YIELD BONDS	5.40	-1.40	4.00	9.85
GLOBAL RE SECURITIES	5.80	-0.50	5.30	15.80
PRIVATE REAL ESTATE	7.00	-0.20	6.80	14.00
U.S. STOCKS	6.75	-0.75	6.00	17.00
DEV. EX-U.S. STOCKS	7.25	-0.75	6.50	18.00
EMERGING MARKET STOCKS	7.25	-0.75	6.50	26.00
PRIVATE EQUITY	8.40	-0.25	8.15	28.00
GLOBAL 60/40 (ACWI/U.S. Core)	5.35	-0.70	4.65	10.85

	RELATIVE RETURN CHANGES (%)		
	MAR 2020	CHANGE	JUNE 2020
CASH - INFLATION	-0.45	-0.30	-0.75
TREASURY - CASH	-0.05	-0.35	-0.40
CORE - TREASURY	1.15	-0.25	0.90
LONG-TERM CORE - CORE	0.90	-0.05	0.85
HIGH YIELD - CORE	3.60	-0.85	2.75
GLOBAL RESI - CORE	4.00	0.05	4.05
U.S. STOCKS - CORE	4.95	-0.20	4.75
PRIVATE EQUITY - U.S. STOCKS	1.65	0.50	2.15
RETURNS MINUS INFLATION			
U.S. STOCKS	5.60	-1.10	4.50
U.S. BONDS	0.65	-0.90	-0.25
CASH EQUIVALENTS	-0.45	-0.30	-0.75

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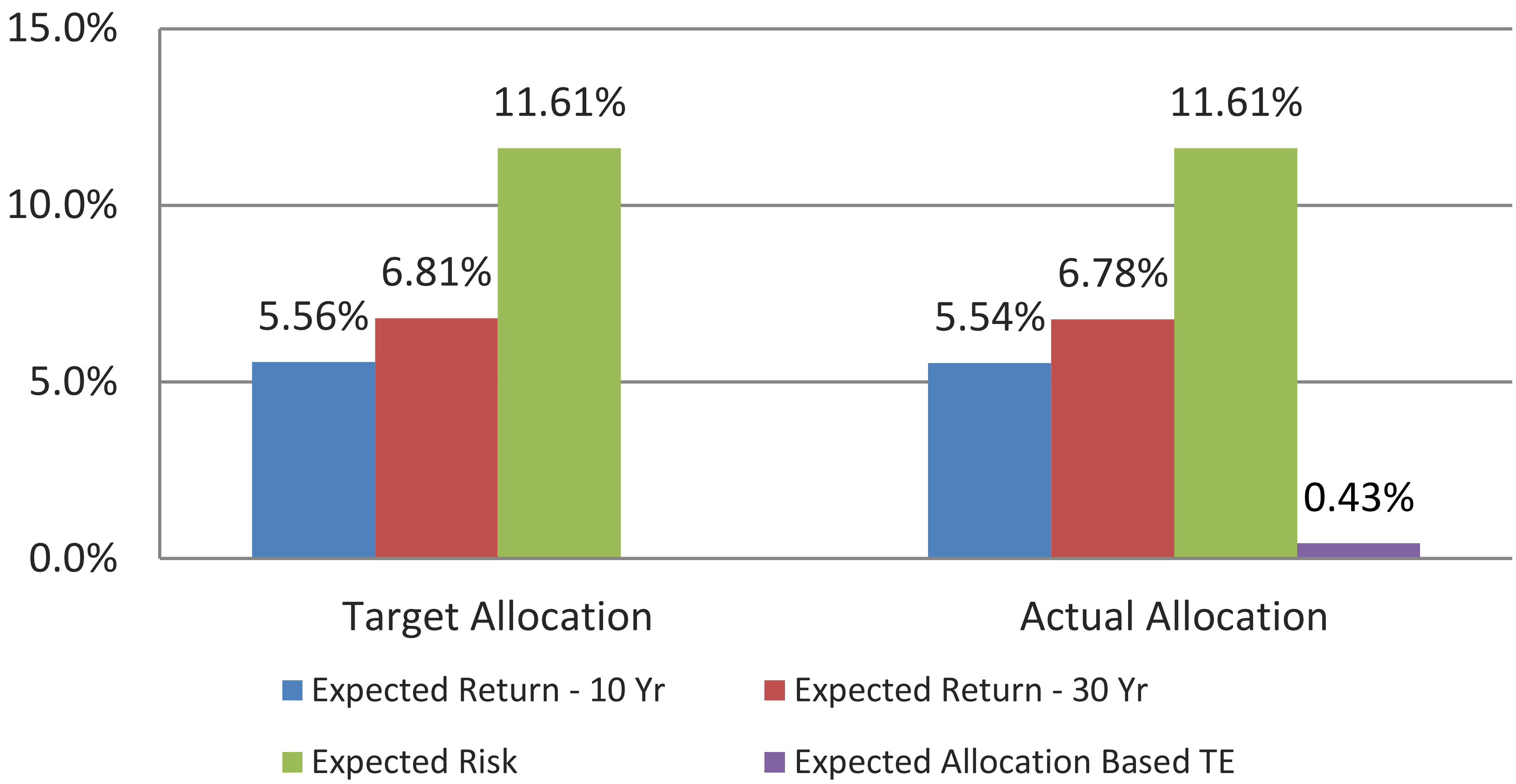
CalPERS Expected Return and Risk Estimates



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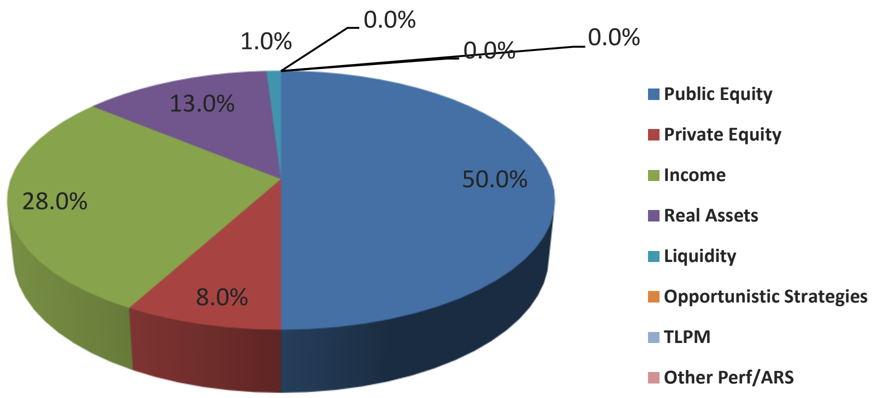
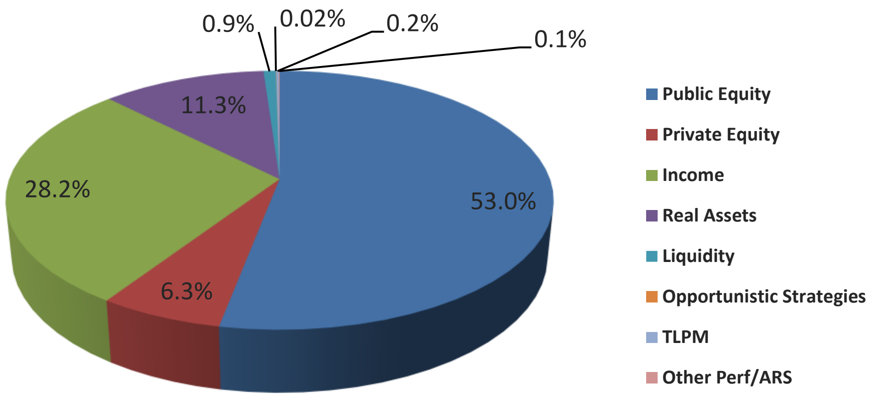
CalPERS Asset and Risk Allocation

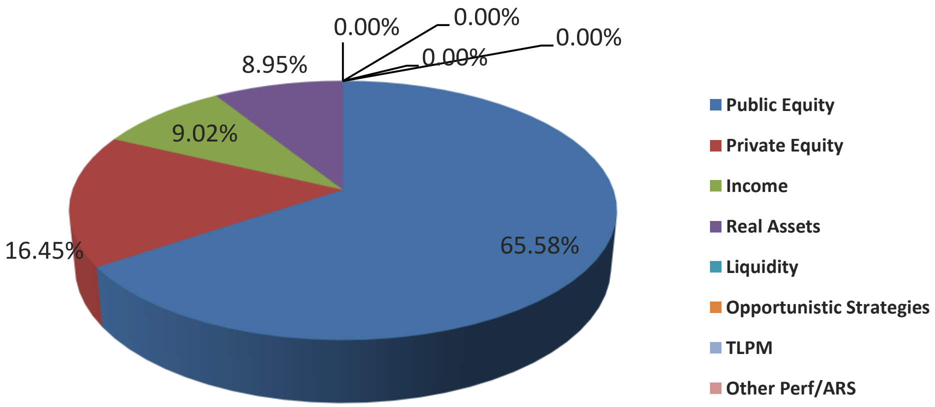
Target Asset Allocation



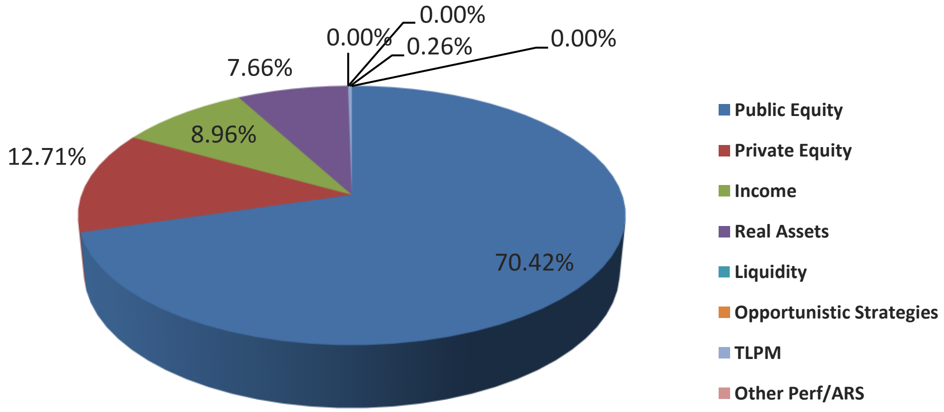
Actual Asset Allocation



Contribution to Total Risk - Target Allocation



Contribution to Total Risk - Actual Allocation



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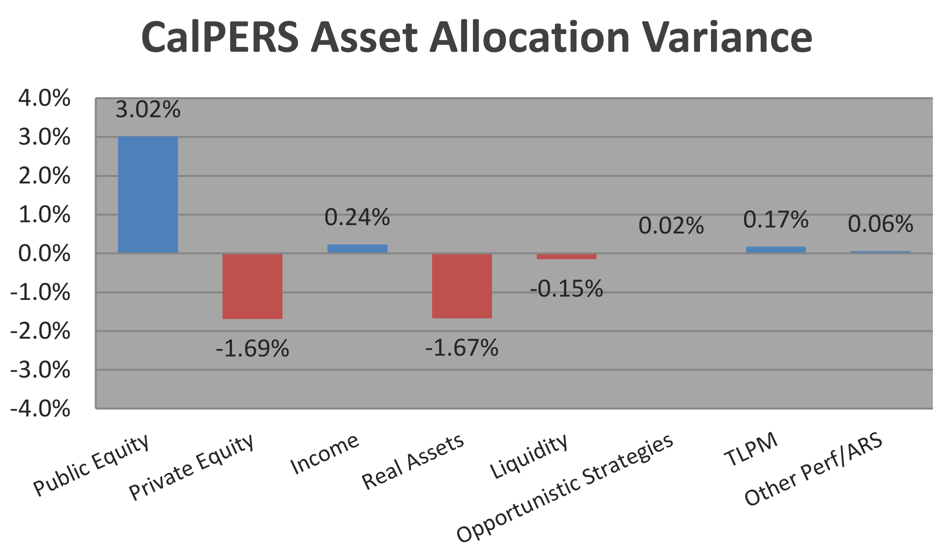
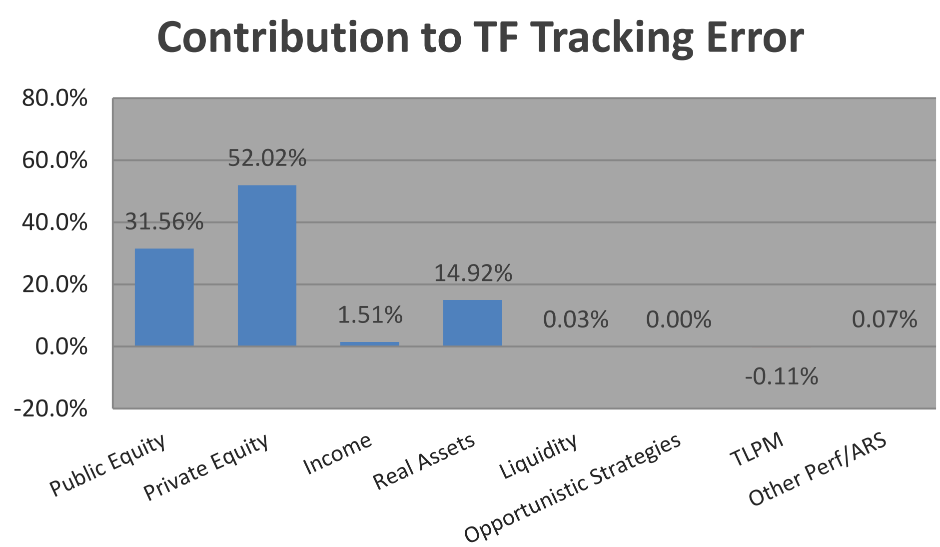
CalPERS Drivers of Expected Excess Risk





- 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	$	389.0	9.1%	4.7%	6.6%	6.3%	8.5%	$	52.7	0.7	-0.1
Total Fund Policy Benchmark			8.6%	4.3%	6.7%	6.4%	8.4%			0.7	0.0
Actuarial Rate			1.8%	7.3%	7.3%	7.4%	7.5%				
PUBLIC EQUITY	$	206.2	18.0%	0.6%	6.0%	6.6%	9.7%	$	40.7	0.4	0.1
Public Equity Policy Benchmark			17.8%	0.4%	6.1%	6.6%	9.5%			0.4	0.0
PRIVATE EQUITY	$	24.6	-10.2%	-5.1%	5.9%	6.6%	10.4%	$	10.0	1.0	0.1
Private Equity Policy Benchmark			-22.1%	-11.0%	3.2%	5.6%	10.2%			0.3	0.0
INCOME	$	109.9	4.5%	12.5%	7.4%	6.3%	5.9%	$	11.6	1.0	1.1
Income Policy Benchmark			4.2%	12.3%	7.1%	5.9%	5.2%			0.9	0.0
REAL ASSETS	$	44.1	-1.6%	4.6%	5.4%	5.9%	8.8%	$	6.3	1.8	-0.5
Real Assets Policy Benchmark			0.8%	3.9%	5.7%	7.0%	9.6%			1.9	0.0
LIQUIDITY	$	3.3	0.1%	1.6%	2.0%	1.4%	1.3%	$	0.04	0.8	4.4
Liquidity Policy Benchmark			0.0%	1.3%	1.6%	1.1%	1.3%			-0.5	0.0
OPPORTUNISTIC STRATEGIES	$	0.1	-.-%	-.-%	-.-%	-.-%	-.-%			N/A	N/A
Custom Opp. Strategies Benchmark			-.-%	-.-%	-.-%	-.-%	-.-%			N/A	N/A
TRUST LEVEL PORTFOLIO MGMT *	$	0.7	NM	NM	NM	-.-%	-.-%	$	0.1	N/A	N/A
CalPERS Reference Portfolio Benchmark			14.5%	3.7%	6.2%	-.-%	-.-%			N/A	N/A
OTHER PERF **	$	0.2	NM	NM	NM	NM	NM			N/A	N/A
TERMINATED AGENCY POOL	$	0.2	3.9%	16.1%	8.3%	6.5%	-.-%			N/A	N/A
TOTAL FUND PLUS TAP	$	389.2	9.1%	4.7%	6.6%	6.3%	8.5%			N/A	N/A

* More detail of the TLPM return can be found in the program section, page 52.

** More detail of the OTHER PERF return can be found in the program section, page 53.

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Total Fund – Attribution (Quarter)

As of 6/30/2020

Asset Class	Actual (%) Weight *	Actual (%) Return	Benchmark (%) Weight *	Benchmark (%) Return	Difference (%) Weight	Difference (%) Return	Total Fund Return Contribution (%) Actual Allocation	Total Fund Return Contribution (%) Active Management	Total Fund Return Contribution (%) Total
Public Equity	50.91	17.95	52.22	17.75	-1.31	0.19	-0.08	0.09	0.00
Public Equity - Cap Weighted	36.44	20.43	36.99	20.24	-0.56	0.19	-0.05	0.07	0.02
Public Equity - Factor Weighted	14.47	12.02	15.23	11.87	-0.75	0.15	-0.03	0.02	-0.01
Private Equity	7.16	-10.18	7.32	-22.44	-0.15	12.27	0.13	0.75	0.88
Income	28.89	4.49	27.50	4.23	1.39	0.26	-0.01	0.02	0.01
Treasury	9.37	0.52	9.81	0.47	-0.45	0.05	0.04	0.00	0.04
Spread	16.63	6.09	14.70	5.88	1.93	0.21	-0.05	0.04	-0.01
High Yield	2.90	8.23	2.99	8.79	-0.09	-0.55	0.00	-0.02	-0.02
Real Assets	12.02	-1.59	12.01	0.78	0.01	-2.37	0.00	-0.30	-0.30
Inflation	0.00	0.00	0.00	7.25	0.00	-7.25	0.00	0.00	0.00
Liquidity	0.84	0.07	0.96	0.02	-0.11	0.06	0.00	0.00	0.00
Opportunistic Strategies	0.01	0.96	0.00	1.13	0.01	-0.17	0.00	0.00	0.00
TLPM	0.12	NM**	0.00	14.47	0.12	NM**	0.01	-0.02	-0.01
Other PERF/ARS	0.05	NM***	0.00	0.00	0.05	NM***	0.00	0.02	0.01
Monthly Linked Return	**100.00**	**9.16**	**100.00**	**8.58**		**0.58**	**0.04**	**0.56**	**0.60**
Residual		-0.03		0.00		-0.02			**-0.04**
Total		***9.13***		***8.58***		***0.56***			***0.56***

* Average period weight displayed.

** More detail of the TLPM return can be found in the program section, page 52.

*** More detail of the OTHER PERF return can be found in the program section, page 53.

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Total Fund – Attribution (Fiscal Year 2020)

As of 6/30/2020

Asset Class	Actual (%)		Benchmark (%)		Difference (%)		Total Fund Return Contribution (%)		
	Weight *	Return	Weight *	Return	Weight	Return	Actual Allocation	Active Management	Total
Public Equity	50.98	0.58	50.84	0.37	0.14	0.21	0.04	0.08	0.11
Public Equity - Cap Weighted	36.26	1.80	35.83	1.66	0.43	0.15	0.07	0.05	0.12
Public Equity - Factor Weighted	14.72	-2.57	15.01	-2.74	-0.29	0.17	-0.03	0.03	-0.01
Private Equity	6.93	-5.07	7.49	-11.65	-0.57	6.58	0.16	0.05	0.20
Income	29.10	12.53	28.40	12.34	0.70	0.19	-0.11	0.06	-0.05
Treasury	10.54	19.97	10.38	20.59	0.16	-0.61	-0.05	-0.08	-0.13
Spread	15.54	8.84	15.02	7.85	0.51	0.99	-0.06	0.15	0.09
High Yield	3.02	-1.10	3.00	-0.87	0.03	-0.23	0.00	-0.01	-0.01
Real Assets	11.37	4.60	12.28	3.87	-0.91	0.73	0.11	0.08	0.19
Inflation	0.00	0.00	0.00	-4.00	0.00	4.00	0.00	0.00	0.00
Liquidity	0.95	1.61	0.99	1.28	-0.04	0.33	0.00	0.00	0.01
Opportunistic Strategies	0.00	0.96	0.00	1.13	0.00	-0.17	0.00	0.00	0.00
TLPM	0.63	NM**	0.00	3.67	0.63	NM**	0.00	-0.07	-0.07
Other PERF/ARS	0.05	NM***	0.00	0.00	0.05	NM***	0.00	0.01	0.01
Monthly Linked Return	**100.00**	**4.65**	**100.00**	**4.33**		**0.32**	**0.19**	**0.21**	**0.40**
Residual		0.05		0.00		0.05			**-0.03**
Total		***4.70***		***4.33***		***0.37***			***0.37***

* Average period weight displayed.

** More detail of the TLPM return can be found in the program section, page 52.

*** More detail of the OTHER PERF return can be found in the program section, page 53.

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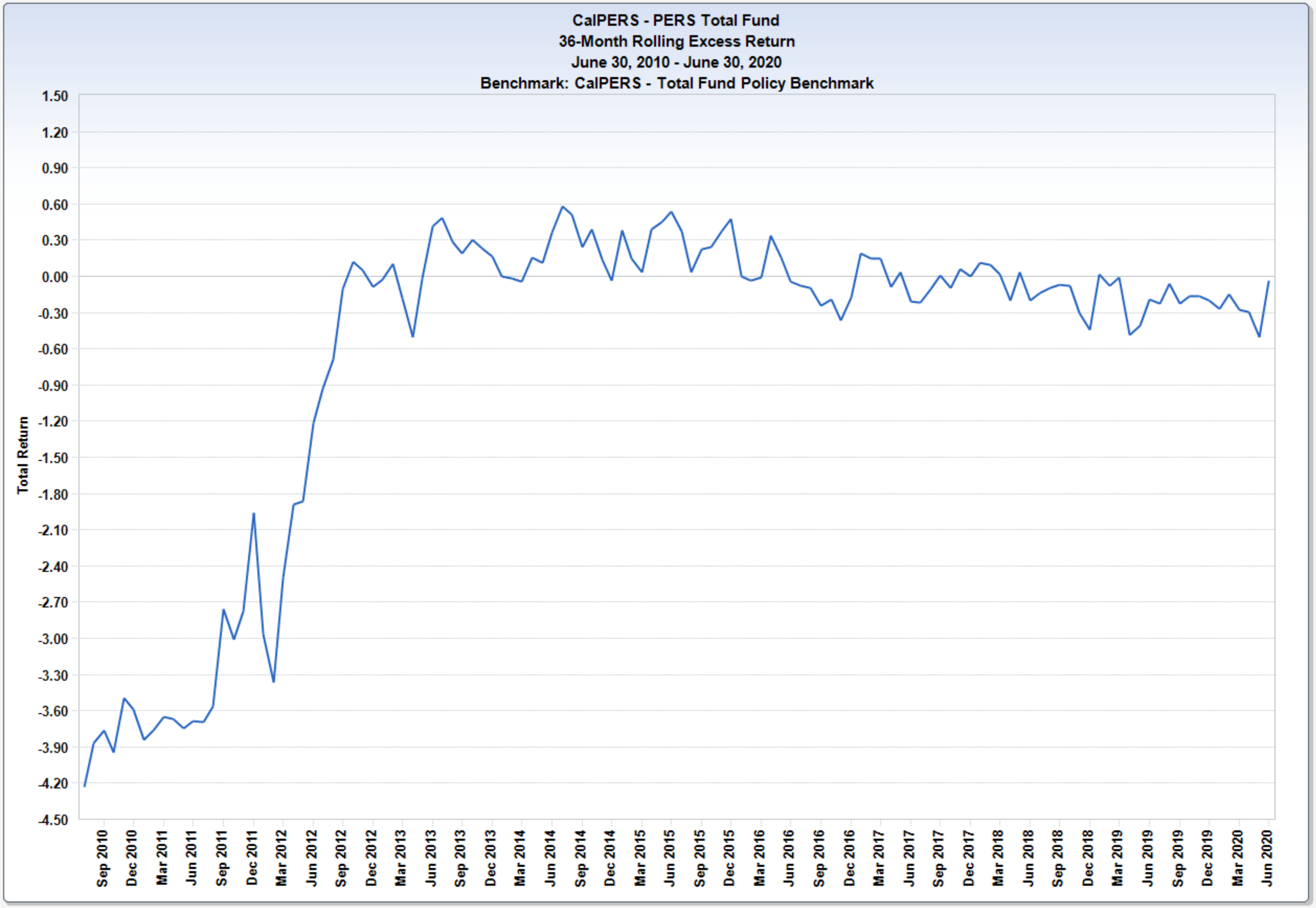
Total Fund – Rolling Excess Returns



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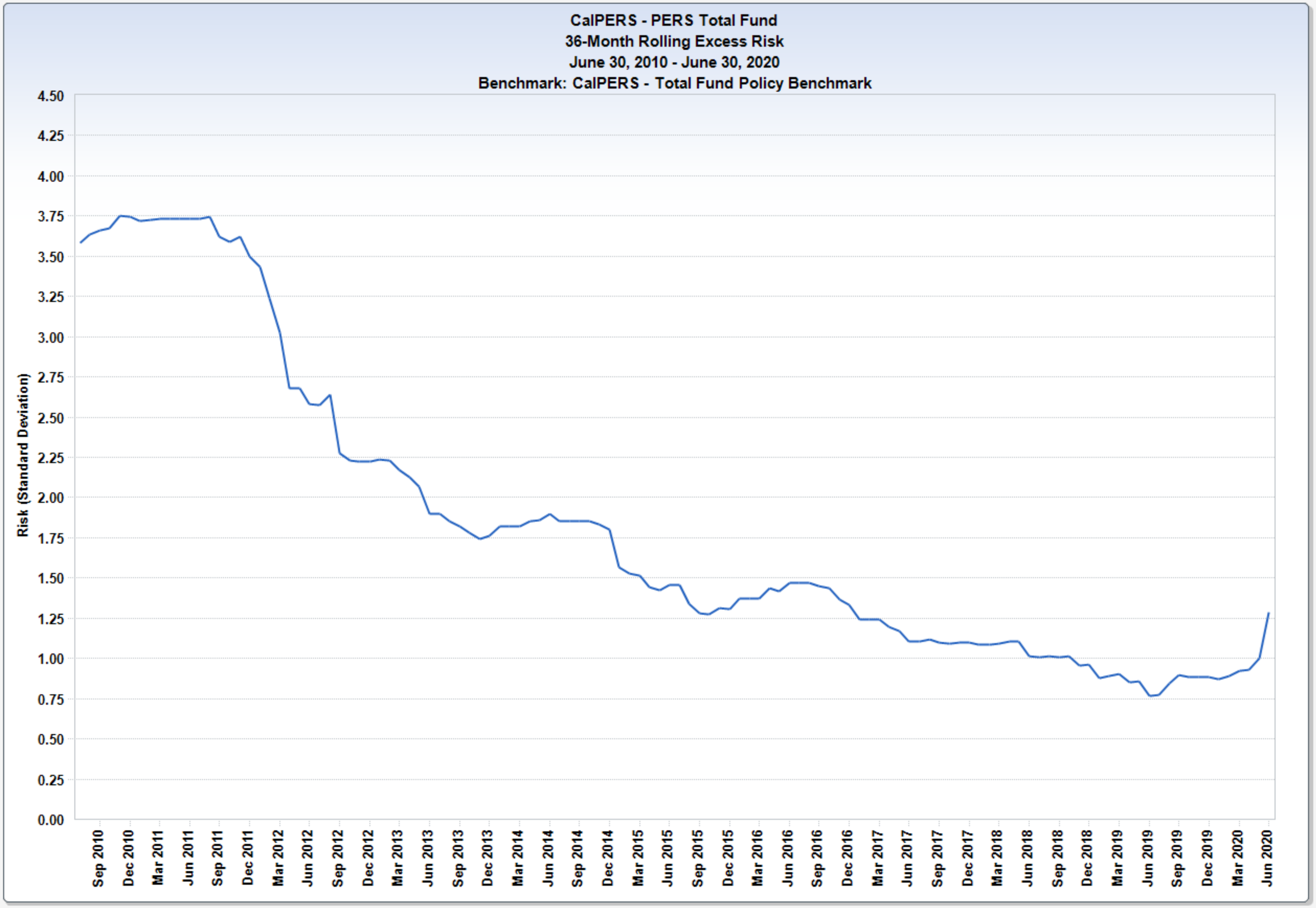
Total Fund – Rolling Tracking Error



APPENDIX: ECONOMIC AND PERFORMANCE DETAIL

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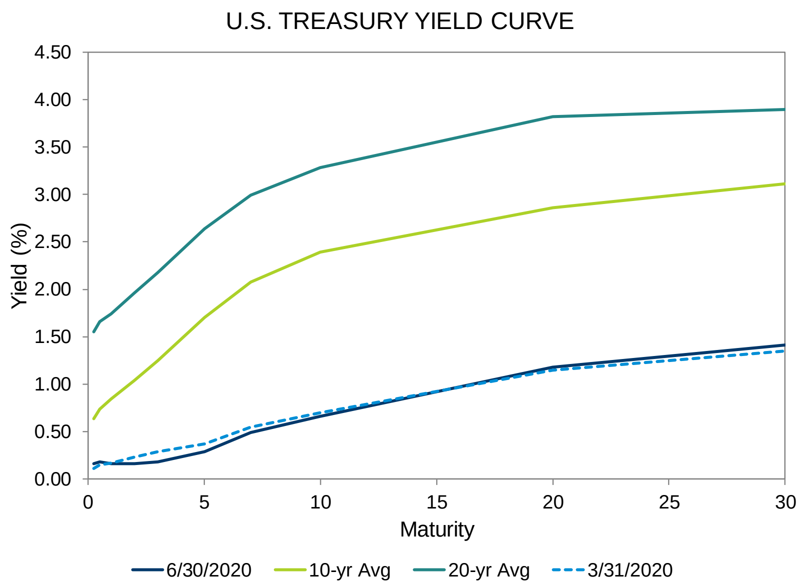
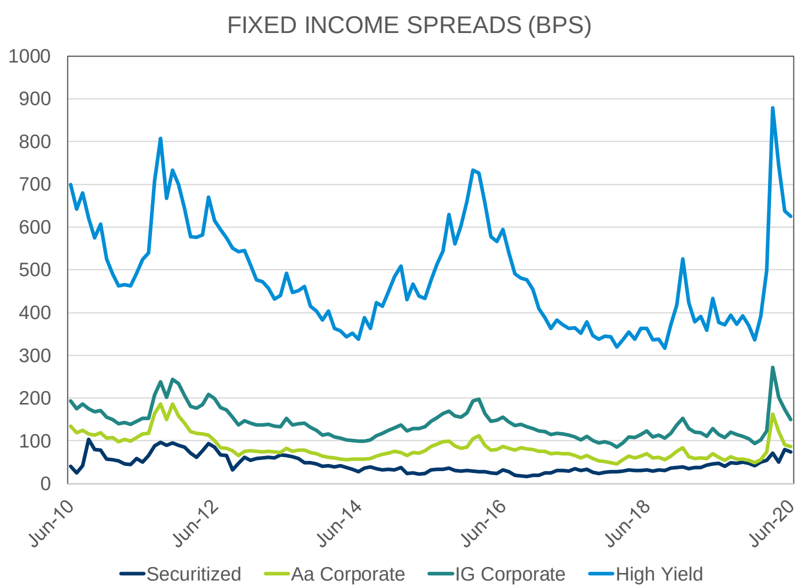
FIXED INCOME





INFLATION & FIXED INCOME		MAR 2020	CHANGE	JUN 2020
INFLATION	10-Year Treasury	0.70	-0.04	0.66
	10-Year Real	-0.17	-0.51	-0.68
	Breakeven	0.87	0.47	1.34
	Wilshire ACA	1.15	0.35	1.50
CASH	91-Day T-Bill	0.08	0.05	0.13
	Yield Forecast in Year 10	1.00	0.25	1.25
	Wilshire ACA	0.70	0.05	0.75
CORE	U.S. Treasury Index	0.58	-0.08	0.50
	Yield Forecast in Year 10	1.65	0.20	1.85
	Wilshire ACA	0.65	-0.30	0.35
SPREAD	U.S. Corporate Spread	2.76	-1.26	1.50
	Spread Forecast in Year 10	1.64	0.00	1.64
	Wilshire ACA	3.25	-1.45	1.80
	Core Bonds ACA	1.80	-0.55	1.25
	High Yield Spread	8.99	-2.45	6.54
	Spread Forecast in Year 10	5.91	0.00	5.91
	Wilshire ACA	5.40	-1.40	4.00
DURATION	Long-Term Treasury	1.31	0.01	1.32
	Yield Forecast in Year 10	1.90	0.05	1.95
	Wilshire ACA	1.15	-0.30	0.85
	Long G/C ACA	2.70	-0.60	2.10

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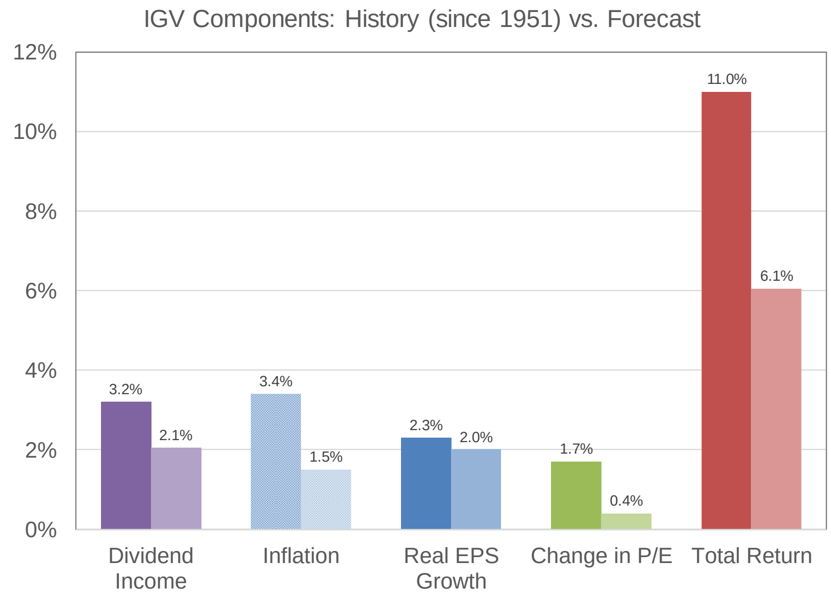
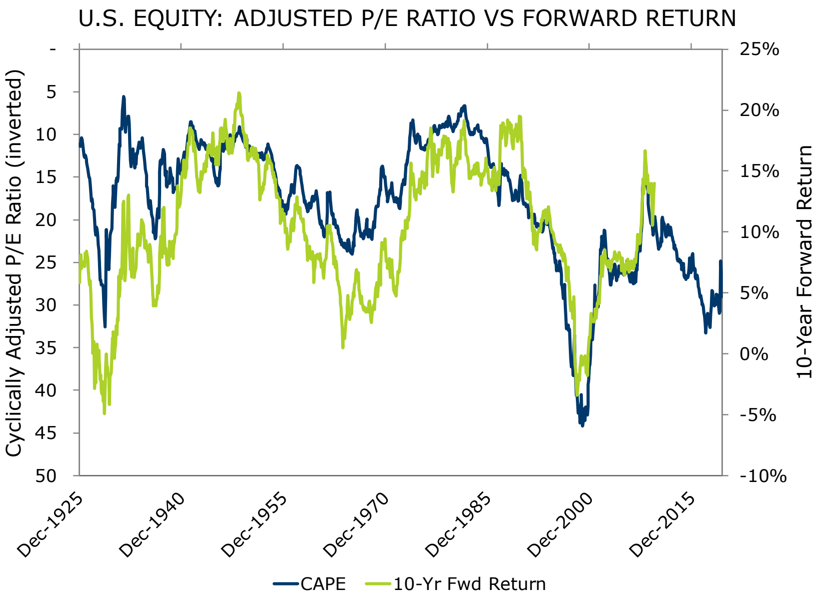
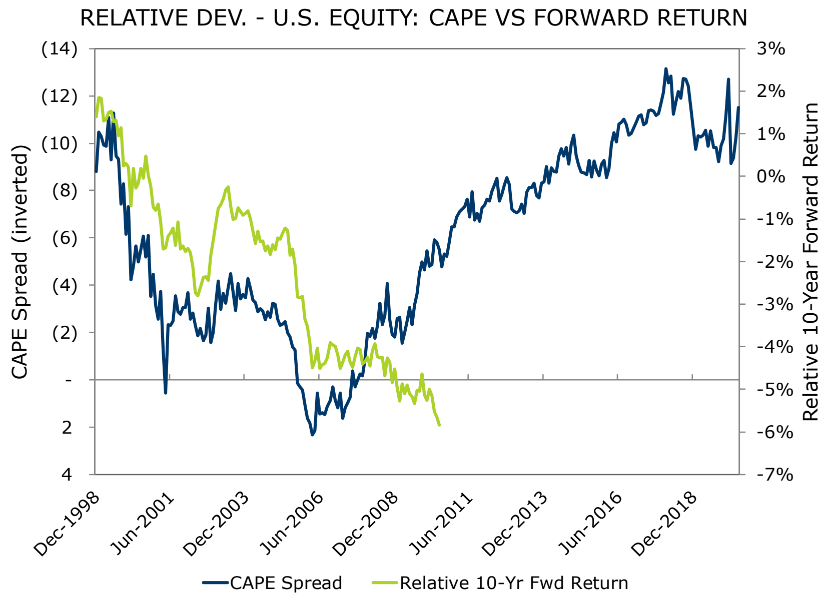
EQUITY MARKETS

EQUITY: PUBLIC & PRIVATE		MAR 2020	CHANGE	JUN 2020
US EQUITY	DDM	6.50	-0.75	5.75
	IGV	7.95	-1.90	6.05
	CAPE	9.00	-2.60	6.40
	Wilshire ACA	6.75	-0.75	6.00
	Global ex-US ACA	7.50	-0.75	6.75
PRIVATE	Cost of Debt - Public	3.05	0.00	3.05
	Cost of Debt - Private	6.25	-0.80	5.45
	Wilshire ACA	8.40	-0.25	8.15







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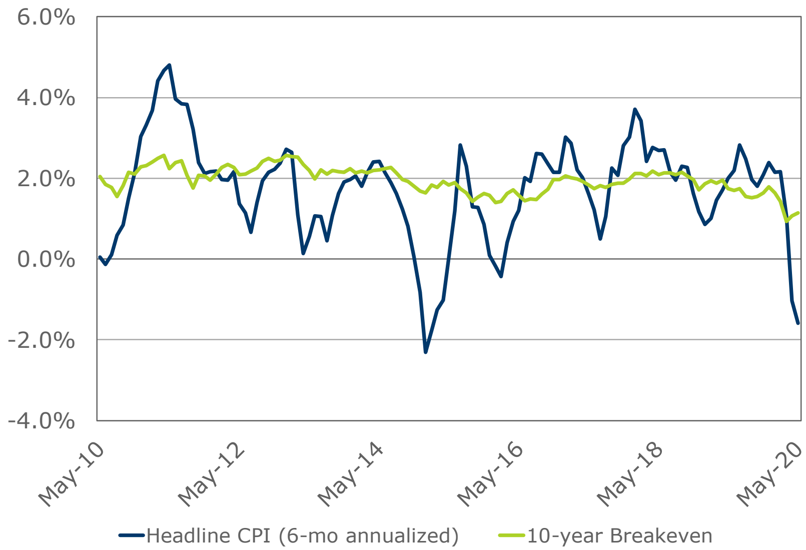
REAL ASSETS

- Breakeven dipped to 0.5% in mid-March and has been steadily increasing since then
- Assumption of 1.5% is higher than actual BE, but closer than in Q1
- Yields are lower across real assets

	TOTAL RETURN (%)			RISK (%)
	MAR 2020	CHANGE	JUNE 2020	
U.S. TIPS	0.70	-0.40	0.30	6.00
GLOBAL RE SECURITIES	5.80	-0.50	5.30	15.80
PRIVATE REAL ESTATE	7.00	-0.20	6.80	14.00
COMMODITIES	1.85	0.40	2.25	15.00
INFLATION	1.15	0.35	1.50	1.75

INFLATION: ACTUAL & EXPECTED



REAL ASSETS		MAR 2020	CHANGE	JUN 2020
LISTED	Inflation Capture	0.86	0.26	1.13
	REIT Yield	4.75	-0.78	3.97
	Midstream Yield	12.36	-2.72	9.64
	Infrastructue Yield	5.13	-1.41	3.72
	Commodities (π + Cash)	1.85	0.40	2.25
PRIVATE	RE Assumed Cap Rate	4.79	-0.42	4.37
	Cost of Debt - Private	3.22	0.08	3.30
	Infrastructure Prm/Dsct	0.38	-0.63	-0.25
	Leverage vs. Real Estate	2.5	0.00	2.5

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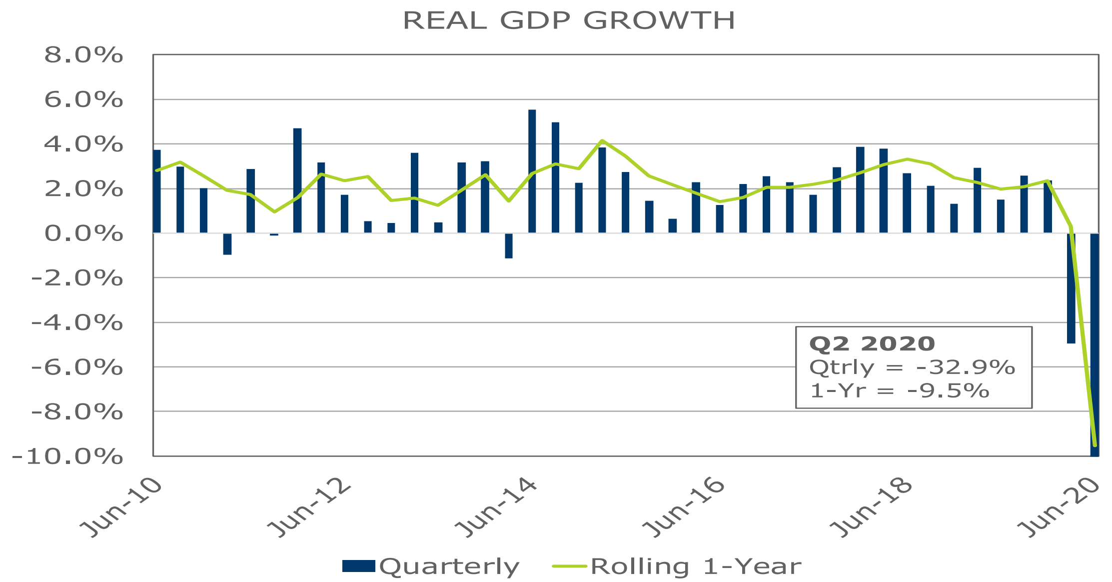
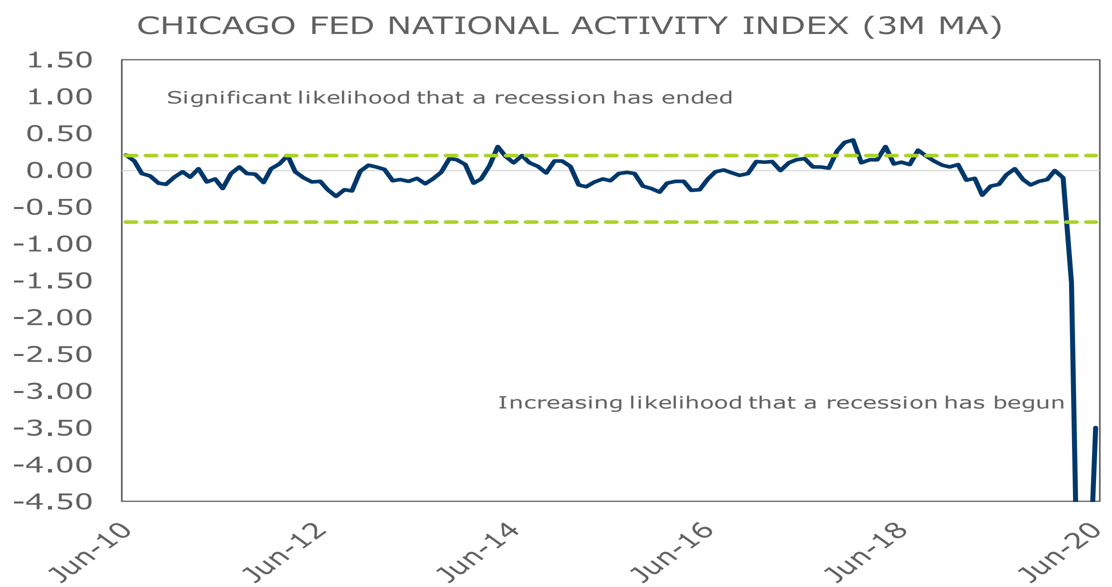
ECONOMIC GROWTH





Data source: Bloomberg

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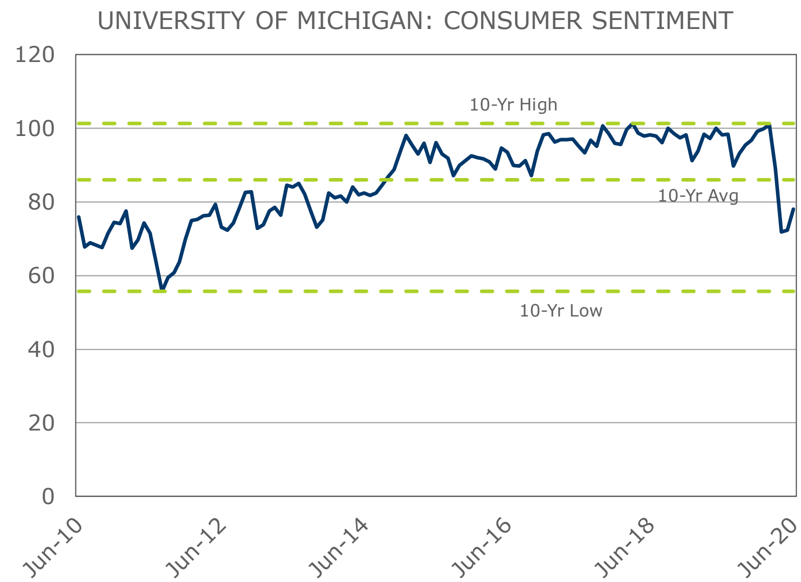
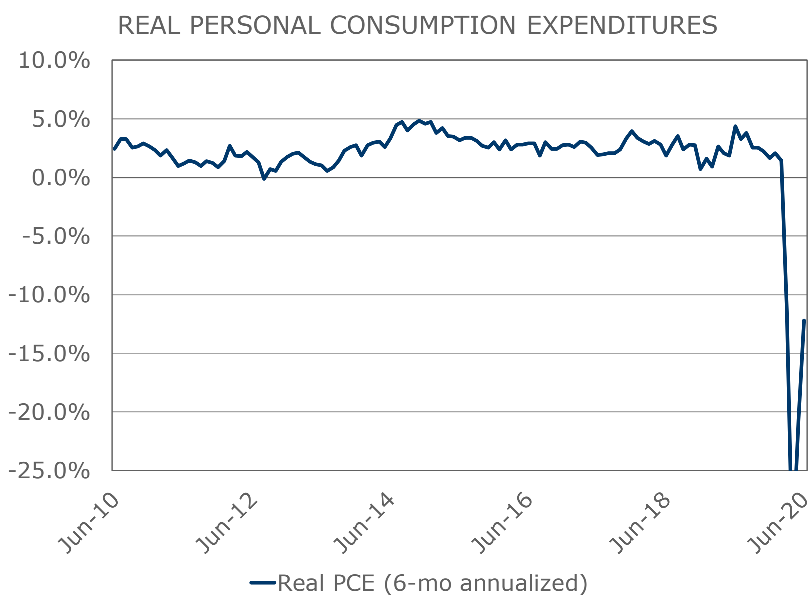
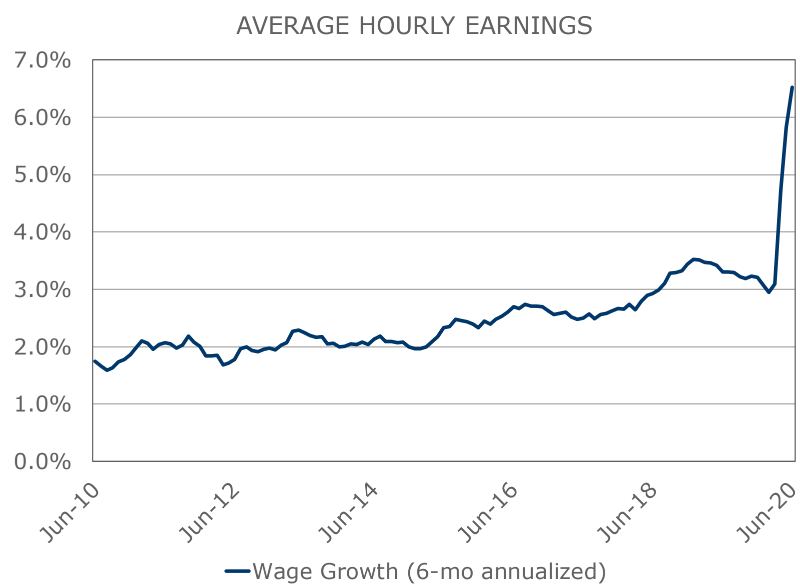
CONSUMER ACTIVITY







Data source: Bloomberg

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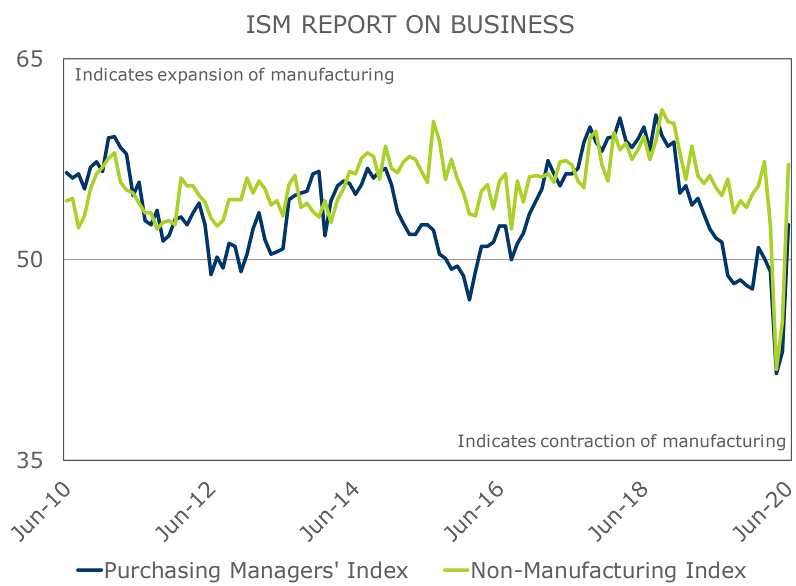
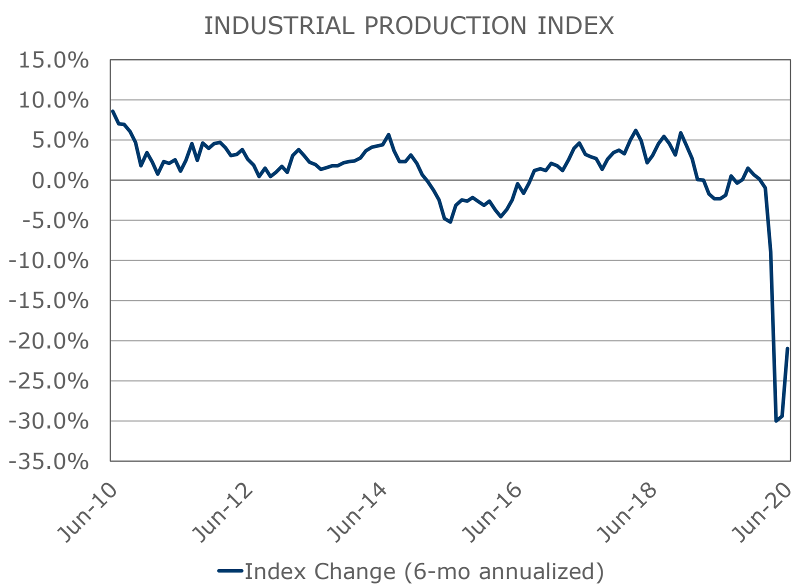
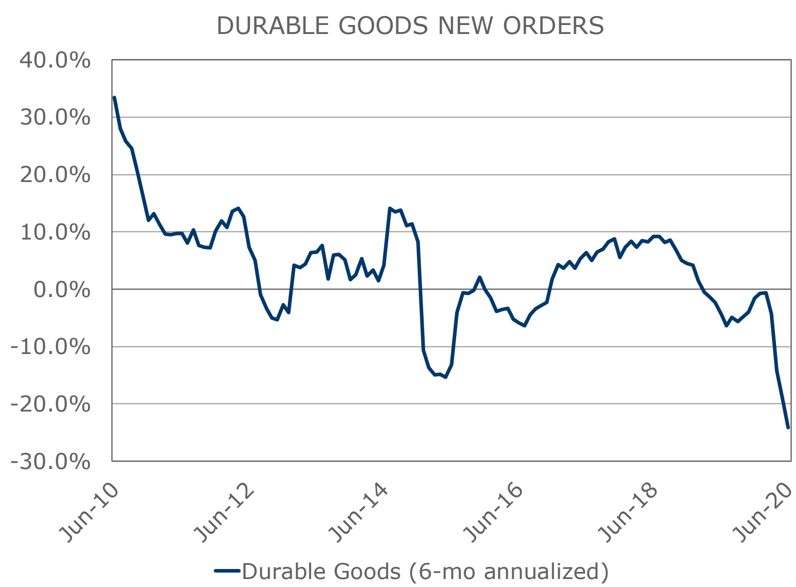
BUSINESS ACTIVITY







Data source: Bloomberg

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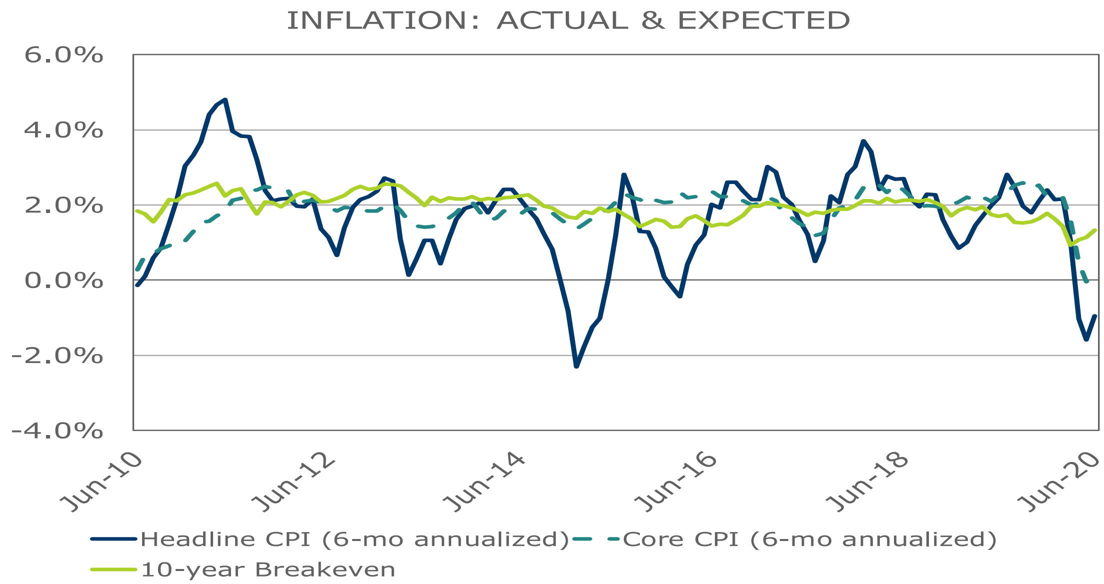
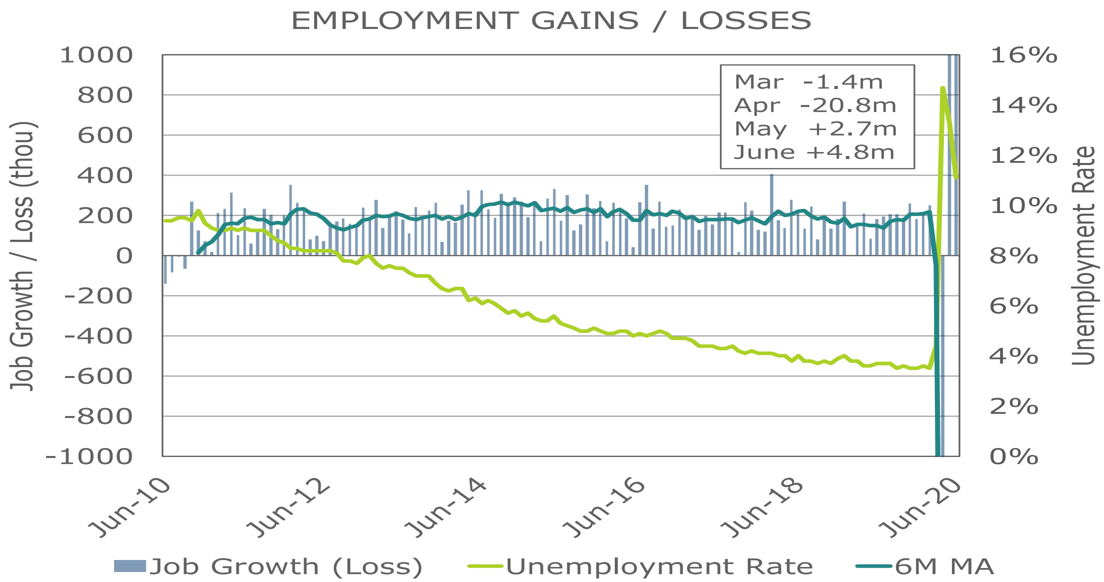
INFLATION AND EMPLOYMENT





Data source: Bloomberg

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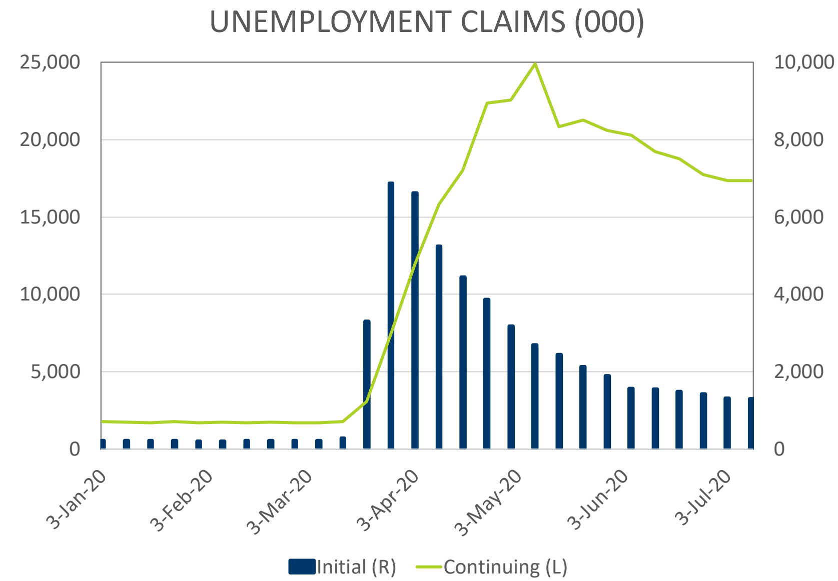
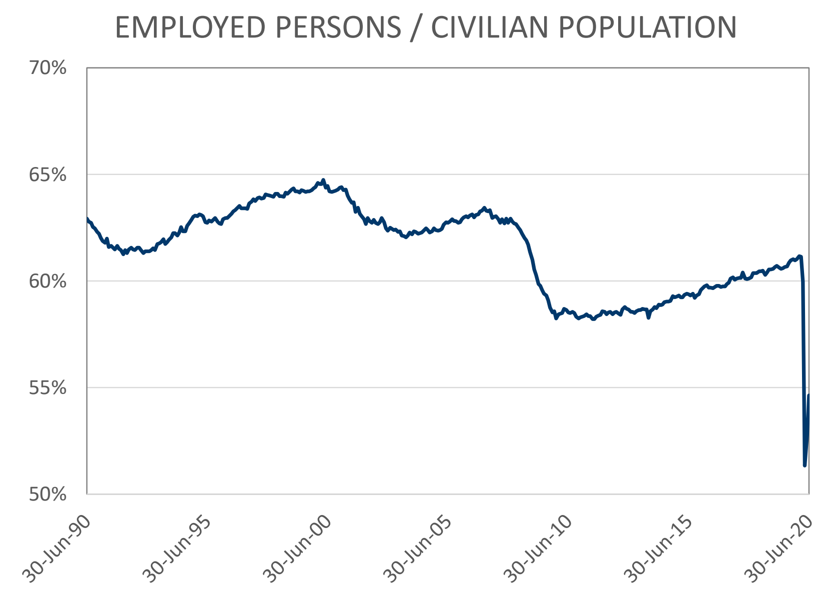
U.S. EMPLOYMENT

- Employment conditions have been volatile this year with massive gains and losses, as seen on the previous page
- Unemployment claims have been declining with continued claims currently at 17 million



- Employment as a percent of the civilian, non-institutional population dropped to nearly 50%
- The ratio has never been that low in the post-WWII history



Data sources: Federal Reserve, Bloomberg

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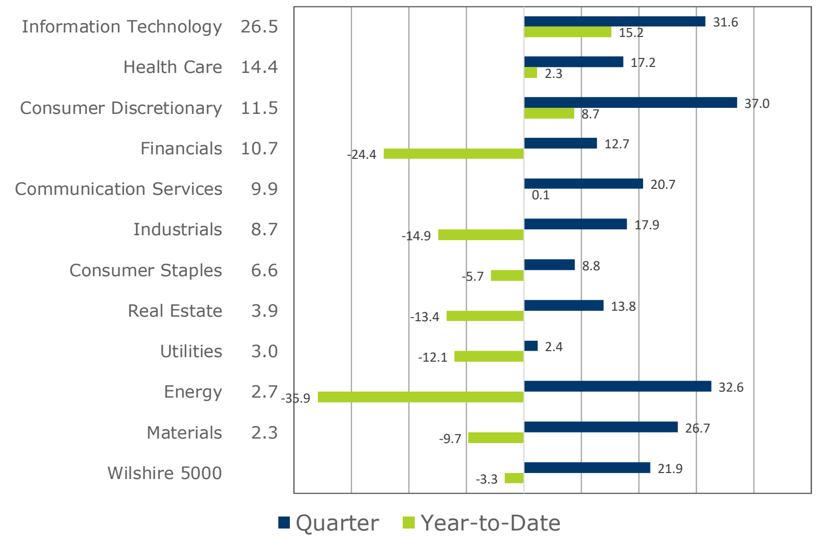
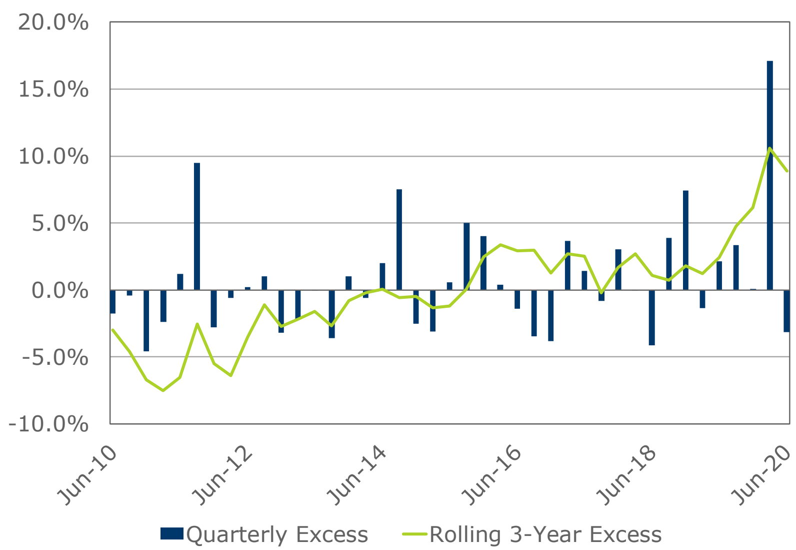
U.S. EQUITY MARKET

AS OF 6/30/2020	QTR	YTD	1 YR	3 YR	5 YR	10 YR
WILSHIRE 5000 INDEX	21.9	-3.3	6.8	10.1	10.3	13.7
WILSHIRE U.S. LARGE CAP	21.6	-2.3	8.2	11.0	10.9	14.0
WILSHIRE U.S. SMALL CAP	25.6	-13.8	-7.7	1.9	4.3	11.0
WILSHIRE U.S. LARGE GROWTH	27.3	5.5	18.3	15.9	13.7	16.2
WILSHIRE U.S. LARGE VALUE	15.6	-10.0	-1.5	6.1	7.9	11.8
WILSHIRE U.S. SMALL GROWTH	29.9	-6.7	0.0	6.6	6.2	12.6
WILSHIRE U.S. SMALL VALUE	21.3	-20.5	-14.9	-2.7	2.1	9.3
WILSHIRE REIT INDEX	10.6	-17.8	-12.3	0.2	4.0	9.2
MSCI USA MIN. VOL. INDEX	12.9	-6.5	0.5	9.8	11.0	14.0
FTSE RAFI U.S. 1000 INDEX	18.1	-13.1	-4.3	4.3	6.3	11.7

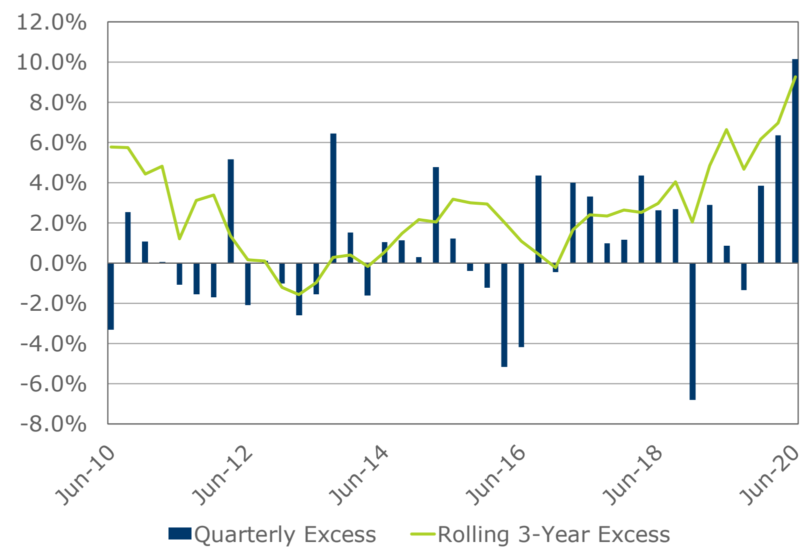
U.S. SECTOR WEIGHT AND RETURN (%)



LARGE CAP VS SMALL CAP



LARGE GROWTH VS LARGE VALUE



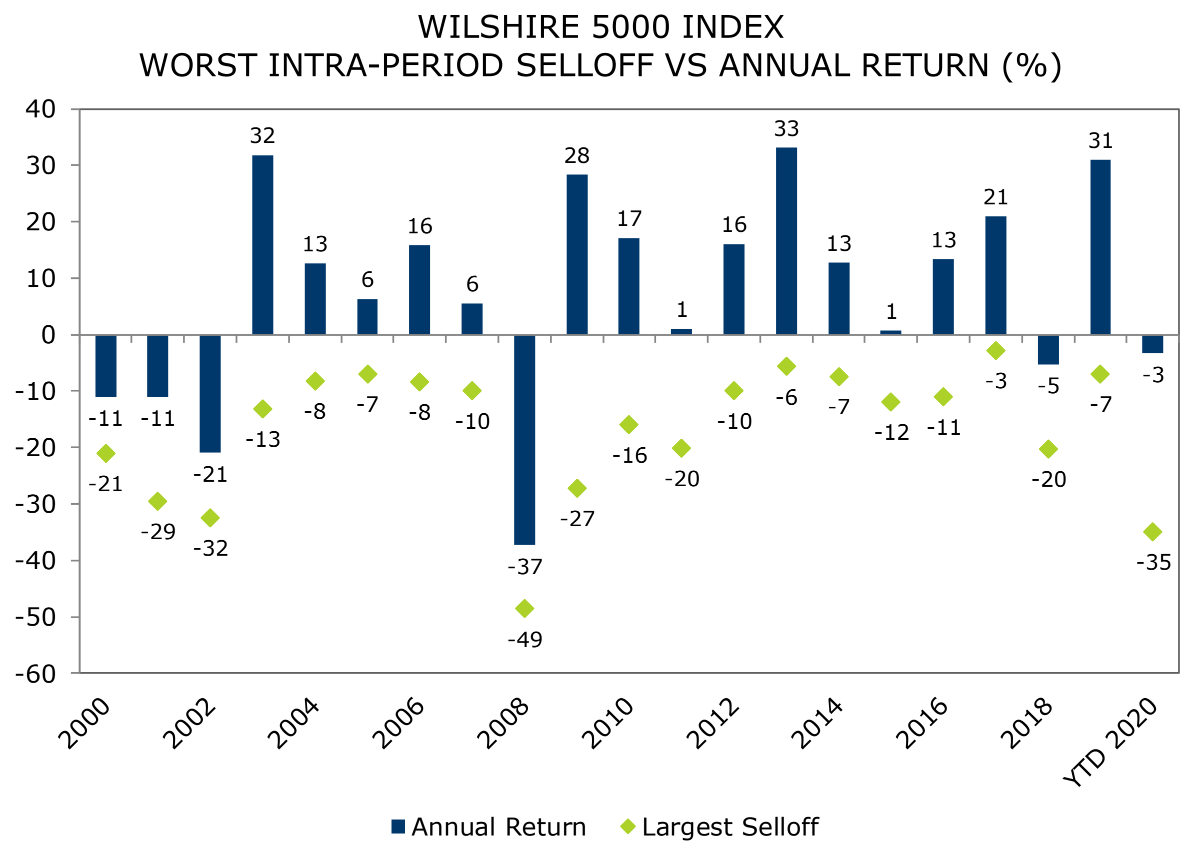
Data sources: Bloomberg, Wilshire Atlas

Wilshire Consulting

Wilshire

ANNUAL RETURNS

- Coronavirus sell-off began in late February and reached -35% in late March
- Q2 return of 21.9% was the strongest quarterly return in 21 years

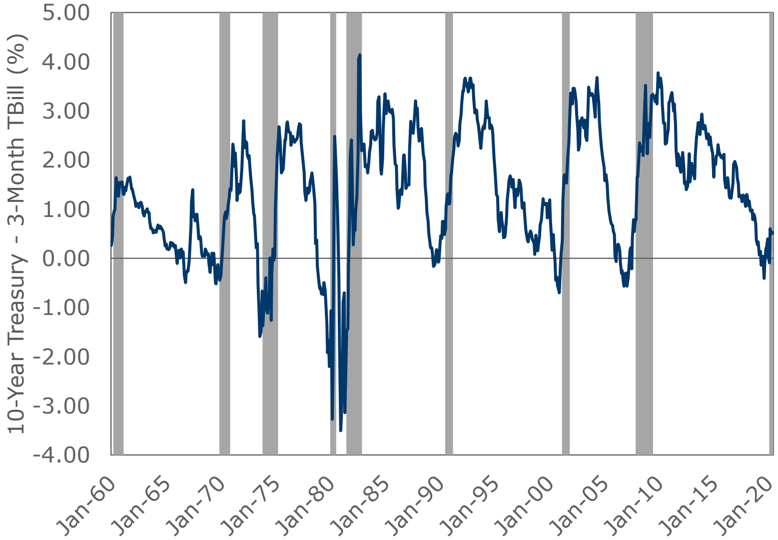


Data sources: Wilshire Associates

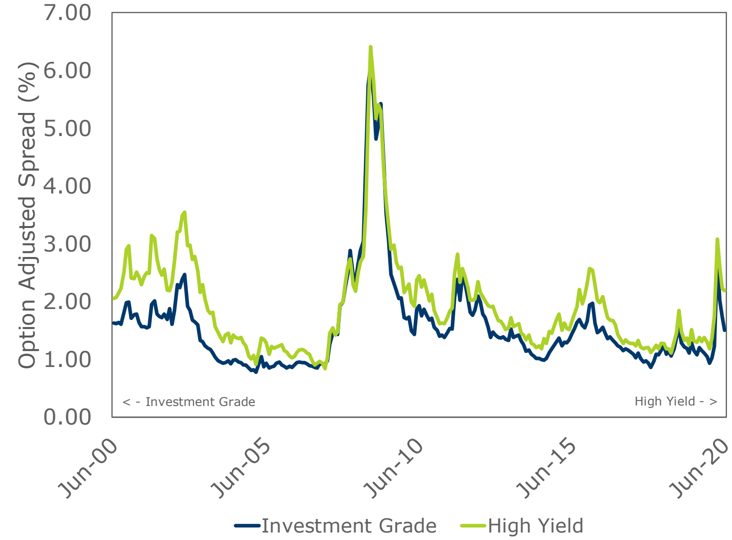
Wilshire Consulting

RISK MONITOR

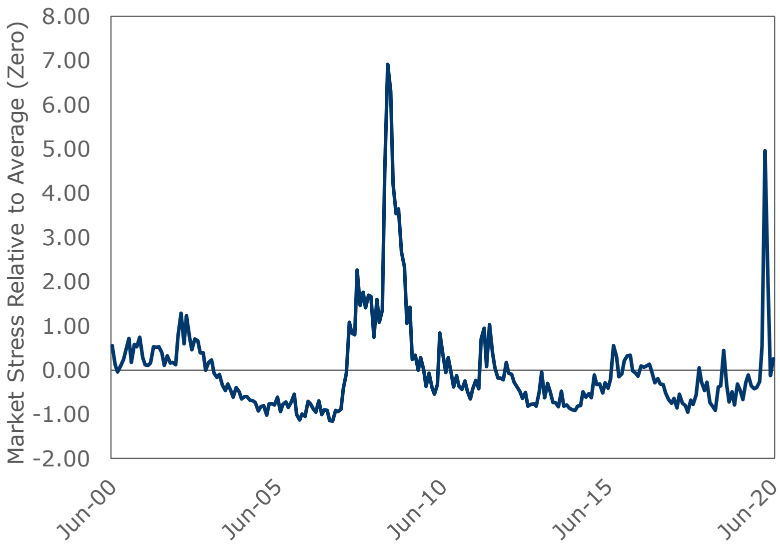
YIELD CURVE SLOPE VS RECESSIONS (IN GRAY)



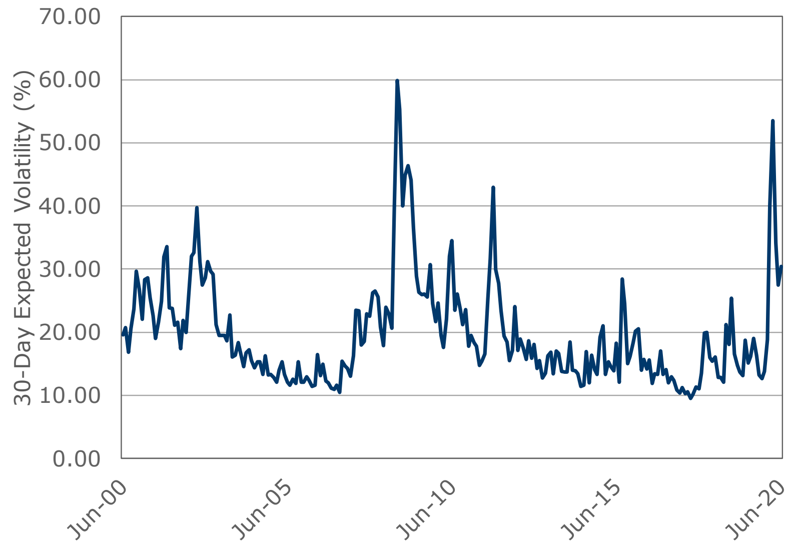
BLOOMBERG BARCLAYS CREDIT INDEXES



ST. LOUIS FED FINANCIAL STRESS INDEX



CBOE VOLATILITY INDEX

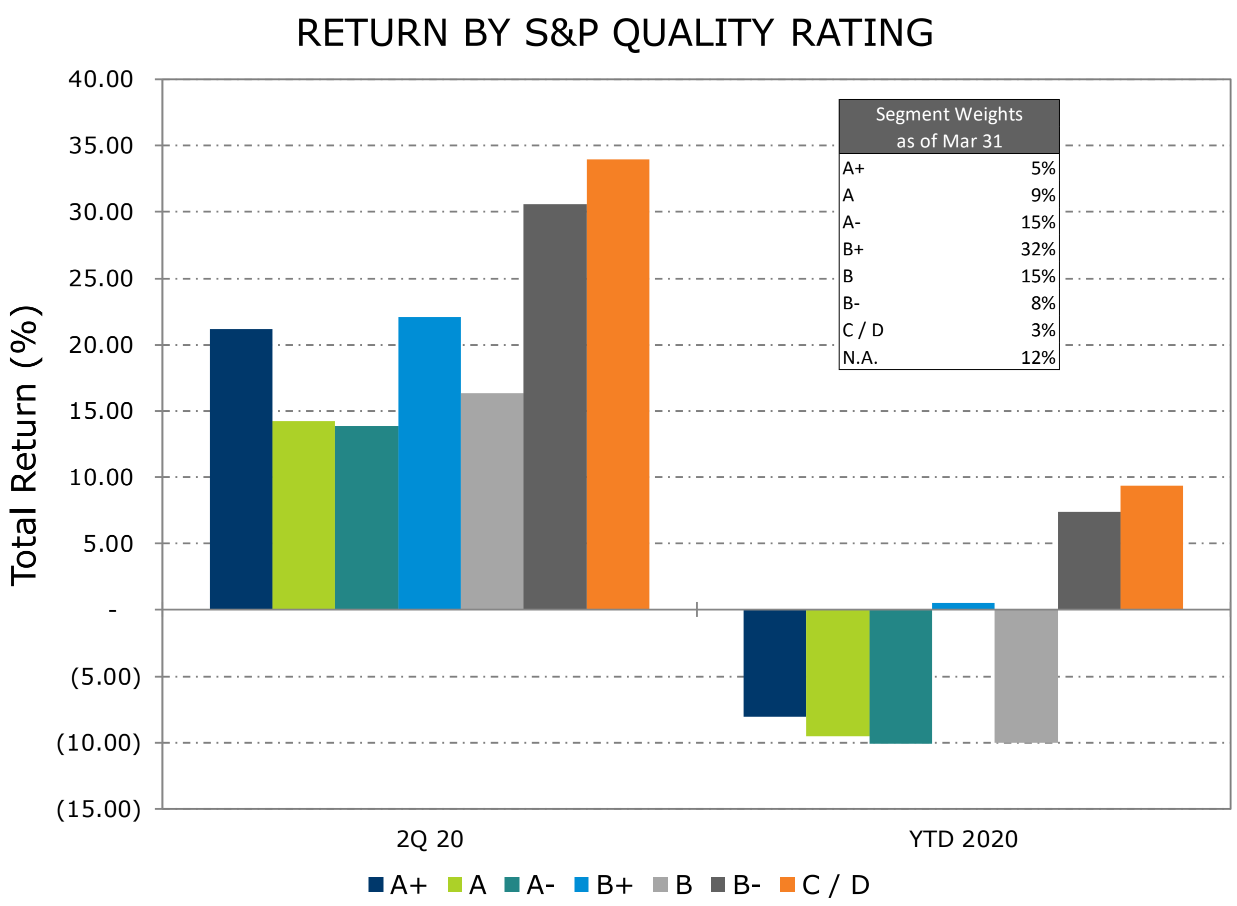


Data sources: Bloomberg

Wilshire Consulting

RETURNS BY QUALITY SEGMENT

Lower quality names led the rebound and are up for the year

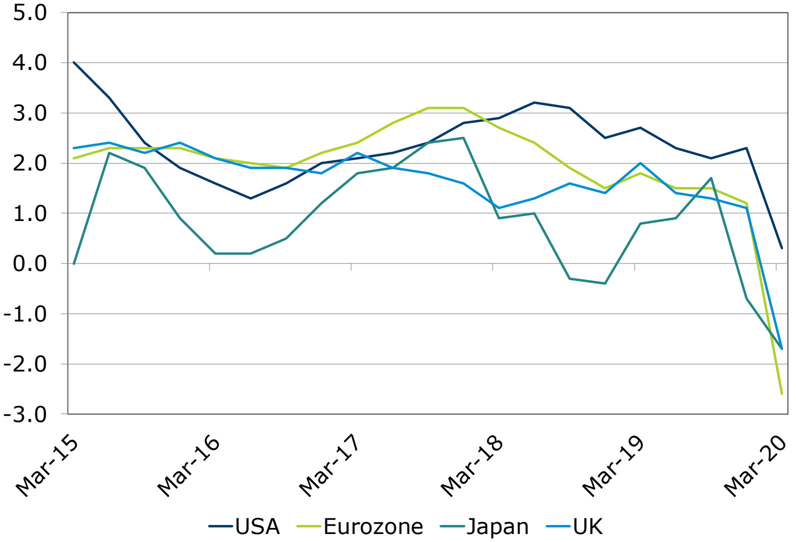


Data sources: Wilshire Atlas

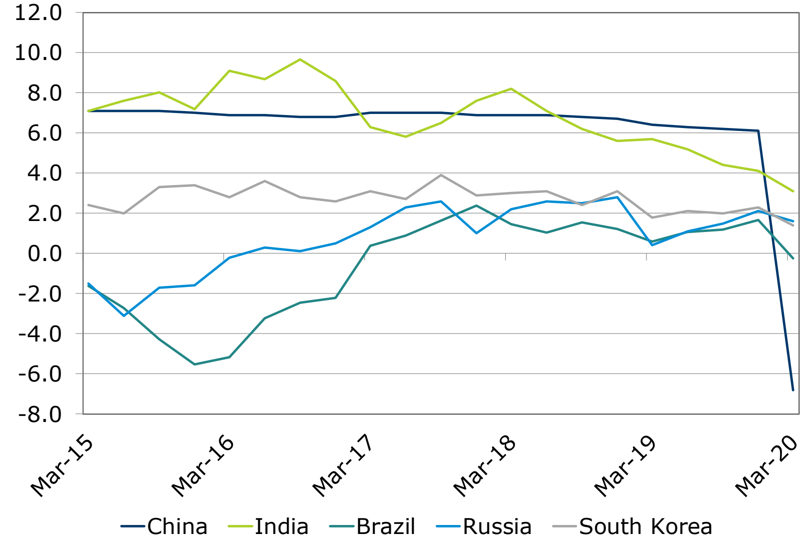
Wilshire Consulting

NON-U.S. GROWTH AND INFLATION

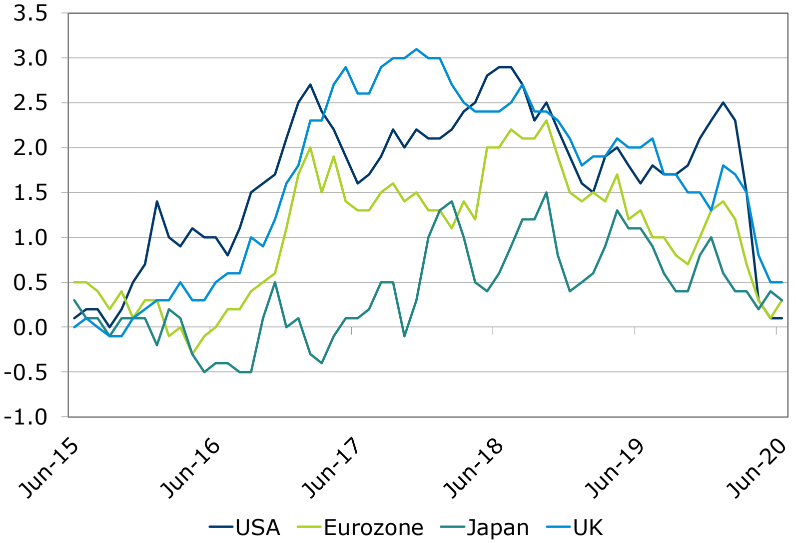
DEVELOPED MARKETS REAL GDP GROWTH YoY (%)



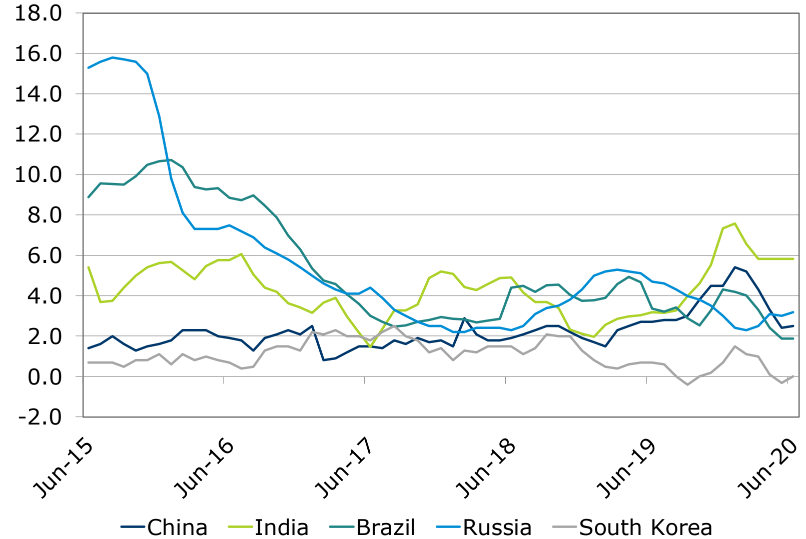
EMERGING MARKETS REAL GDP GROWTH YoY (%)



DEVELOPED MARKETS CPI GROWTH YoY (%)



EMERGING MARKETS CPI GROWTH YoY (%)



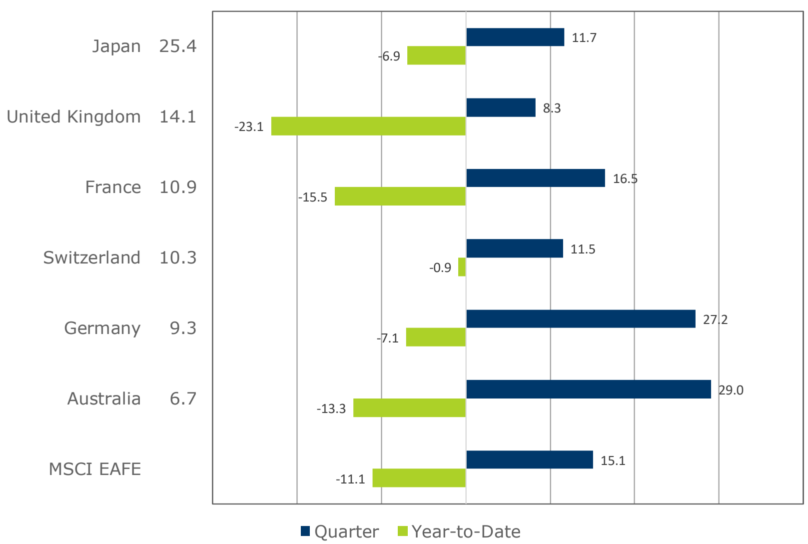
Data sources: Bloomberg

Wilshire Consulting

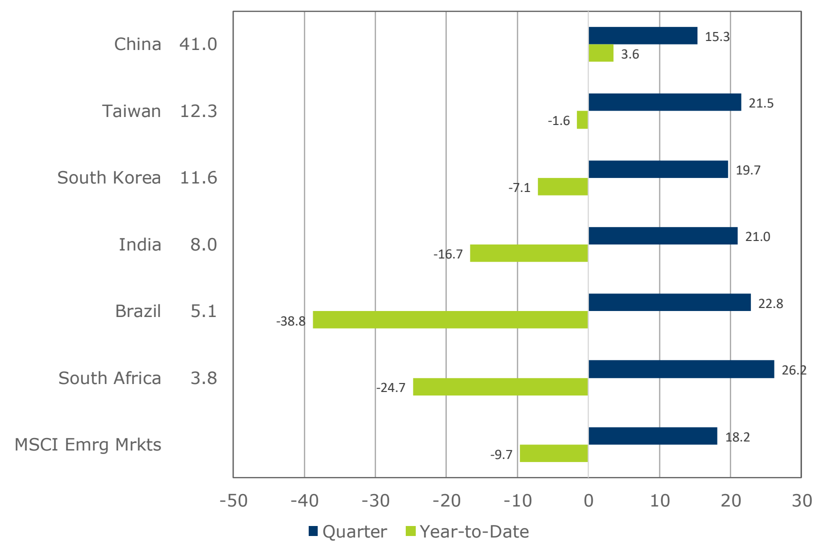
NON-U.S. EQUITY MARKET

AS OF 6/30/2020	QTR	YTD	1 YR	3 YR	5 YR	10 YR
MSCI ACWI EX-US ($G)	16.3	-10.8	-4.4	1.6	2.7	5.5
MSCI EAFE ($G)	15.1	-11.1	-4.7	1.3	2.5	6.2
MSCI EMERGING MARKETS ($G)	18.2	-9.7	-3.0	2.3	3.2	3.6
MSCI FRONTIER MARKETS ($G)	16.2	-20.4	-20.7	-4.5	-2.4	1.9
MSCI ACWI EX-US GROWTH ($G)	19.2	-2.4	6.1	6.4	6.0	7.4
MSCI ACWI EX-US VALUE ($G)	13.7	-19.2	-14.4	-3.4	-0.4	3.6
MSCI ACWI EX-US SMALL ($G)	23.0	-12.6	-4.0	0.2	2.9	6.4
MSCI ACWI MINIMUM VOLATILITY	9.9	-7.5	-1.9	6.4	7.6	10.4
MSCI EAFE MINIMUM VOLATILITY	7.5	-10.0	-5.1	2.2	4.0	7.6
FTSE RAFI DEVELOPED EX-US	13.8	-17.6	-12.1	-2.7	0.1	4.2
MSCI EAFE LC (G)	12.8	-10.3	-3.8	1.7	3.1	7.4
MSCI EMERGING MARKETS LC (G)	16.8	-5.4	1.7	4.9	5.5	6.4

DEVELOPED MARKETS WEIGHT AND RETURN (%)



EMERGING MARKETS WEIGHT AND RETURN (%)



Data sources: Bloomberg

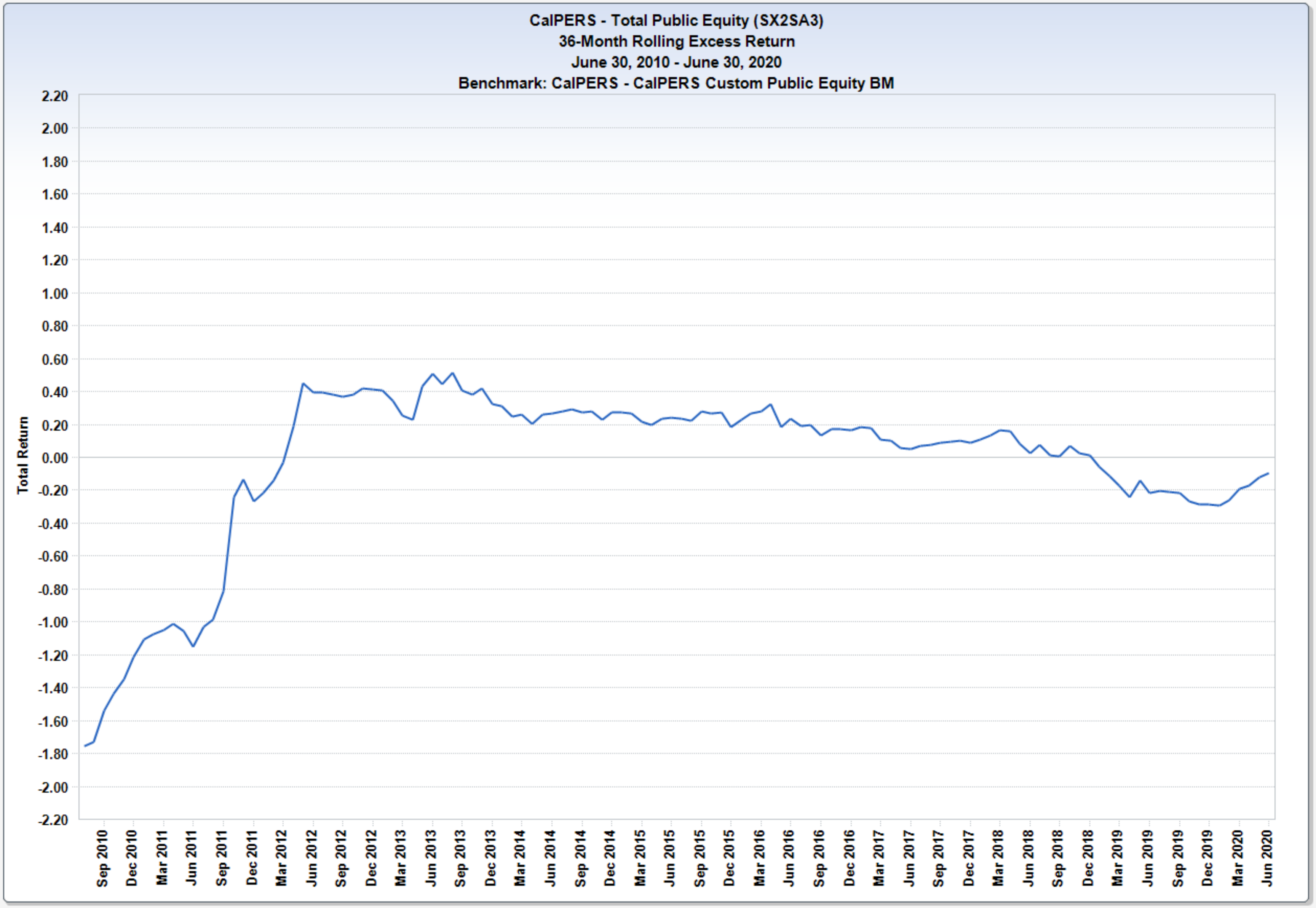
Wilshire Consulting

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	**$ 206.2**	**18.0%**	**0.6%**	**6.0%**	**6.6%**	**9.7%**	**$ 40.7**	**0.4**	**0.1**
Public Equity Policy Benchmark		17.8%	0.4%	6.1%	6.6%	9.5%		**0.4**	**0.0**
Public Equity - Cap Weighted	**$ 148.3**	**20.4%**	**1.8%**	**6.1%**	**6.6%**	**9.7%**	**$ 32.2**	**0.4**	**0.0**
FTSE Global All Cap Custom Index Net		20.2%	1.7%	6.2%	6.6%	9.5%		**0.4**	**0.0**
Public Equity - Factor Weighted	**$ 57.9**	**12.0%**	**-2.6%**	**-.-%**	**-.-%**	**-.-%**	**$ 9.2**	**N/A**	**N/A**
MSCI ACWI Select Factor Weighted Index		11.9%	-2.7%	-.-%	-.-%	-.-%		**N/A**	**N/A**

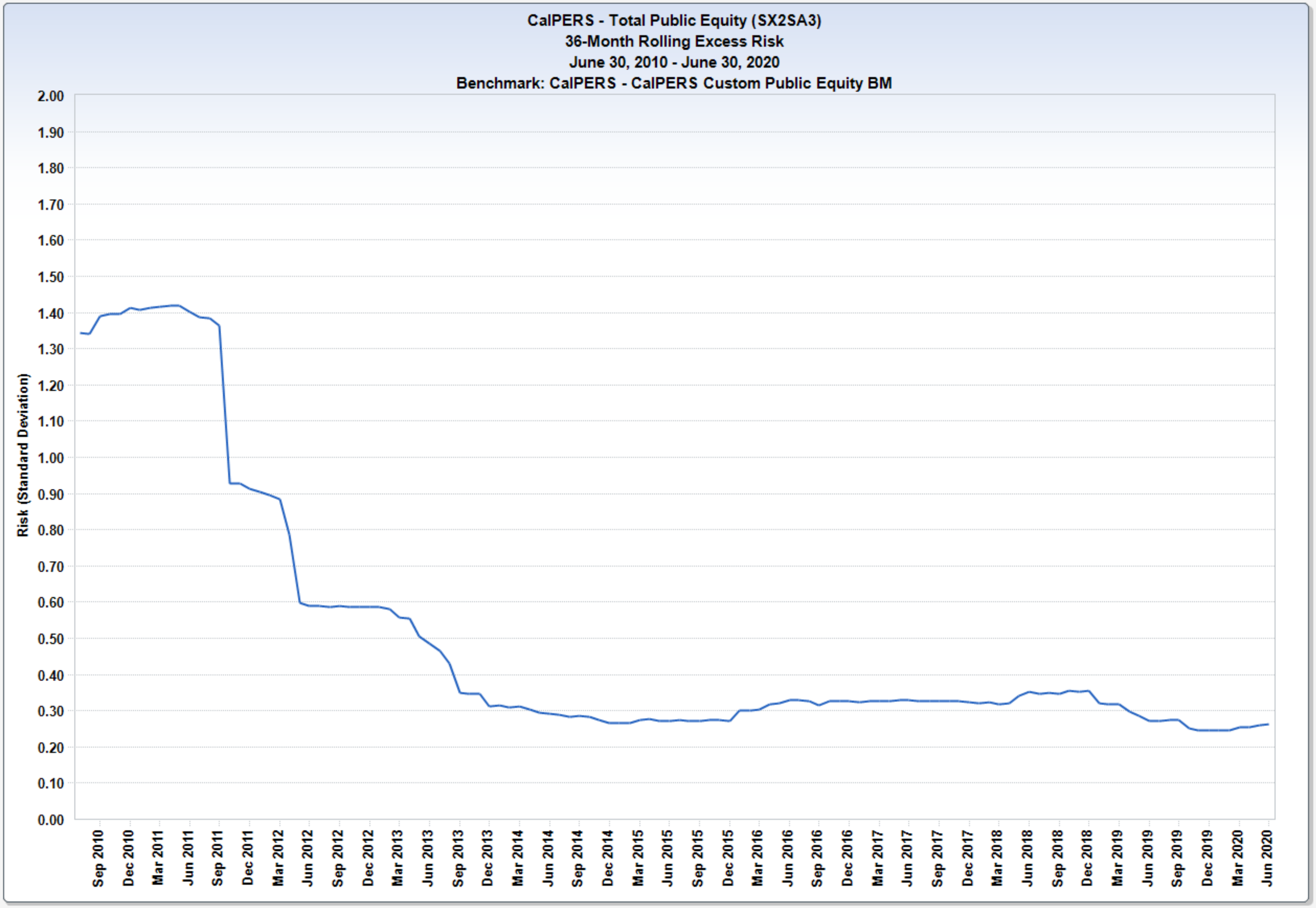
Wilshire Consulting

CalPERS Public Equity – Rolling Excess Returns



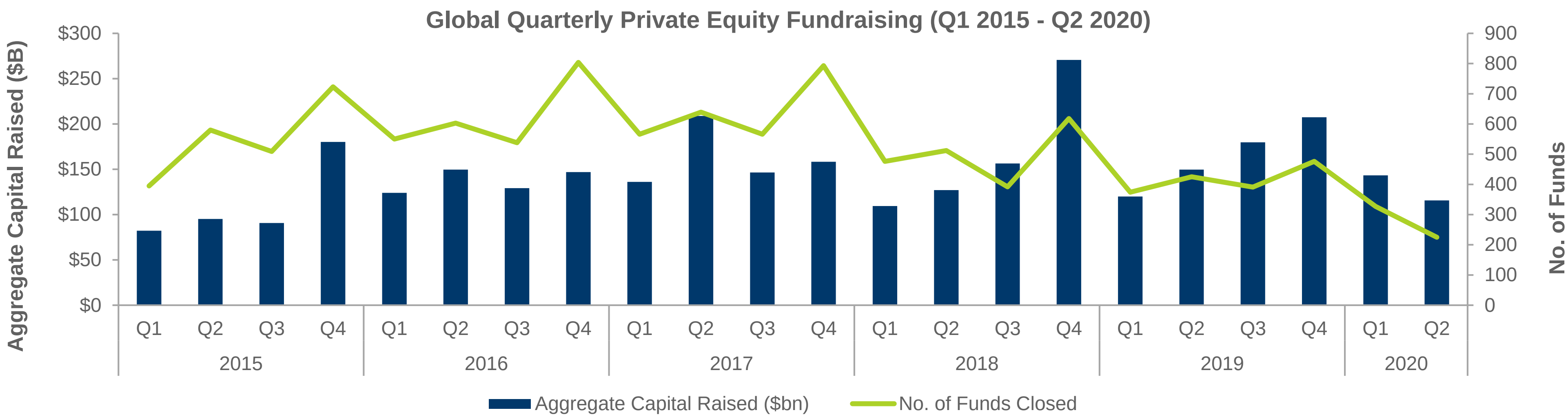
Wilshire Consulting

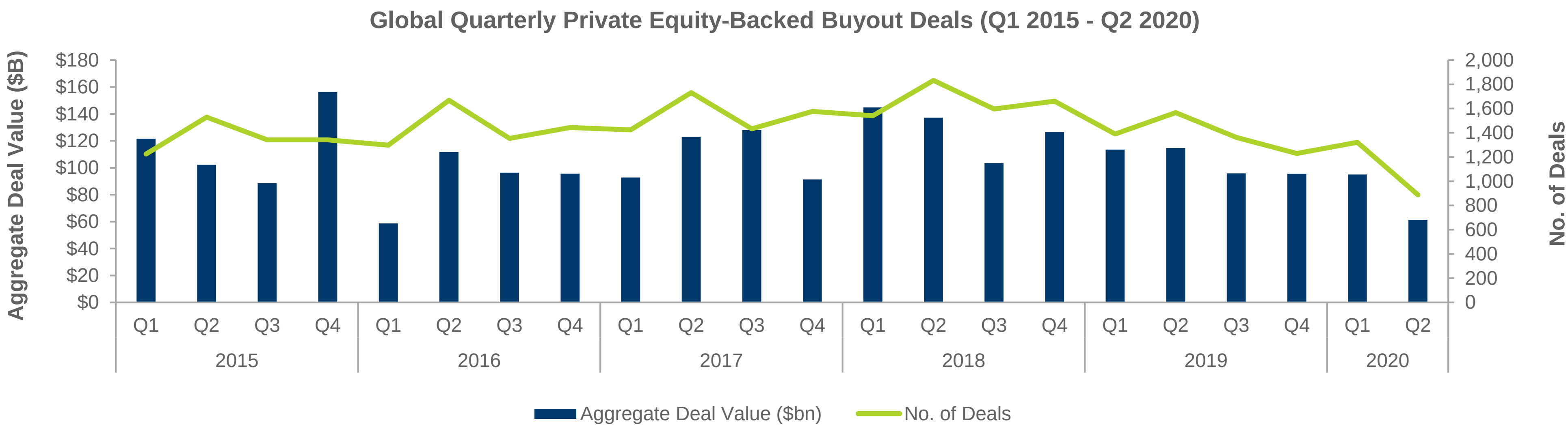
CalPERS Public Equity – Rolling Tracking Error



Wilshire Private Markets

PRIVATE EQUITY – FUNDRAISING & INVESTMENT ACTIVITY

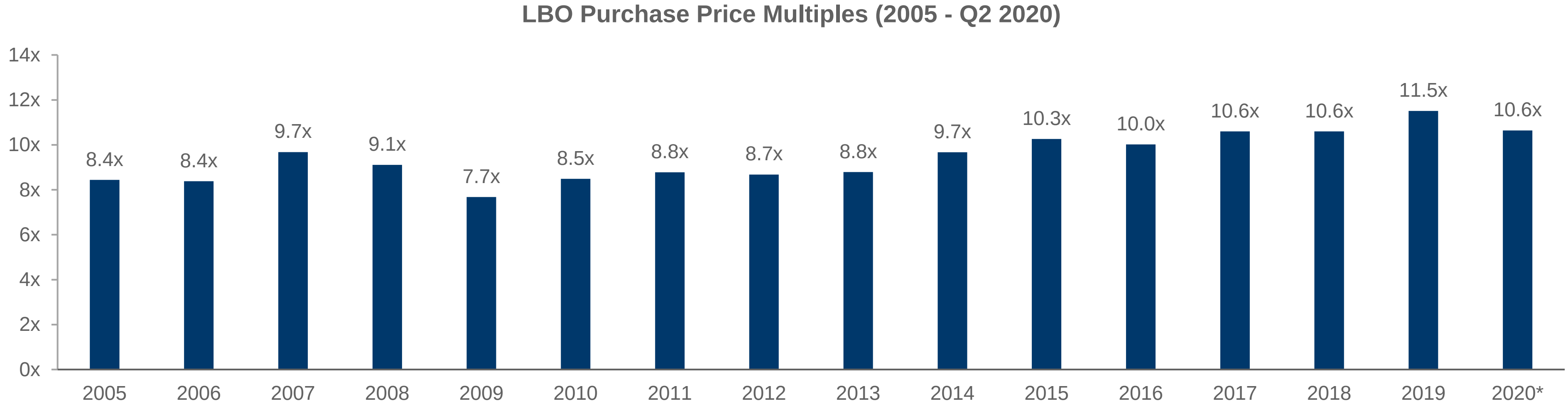


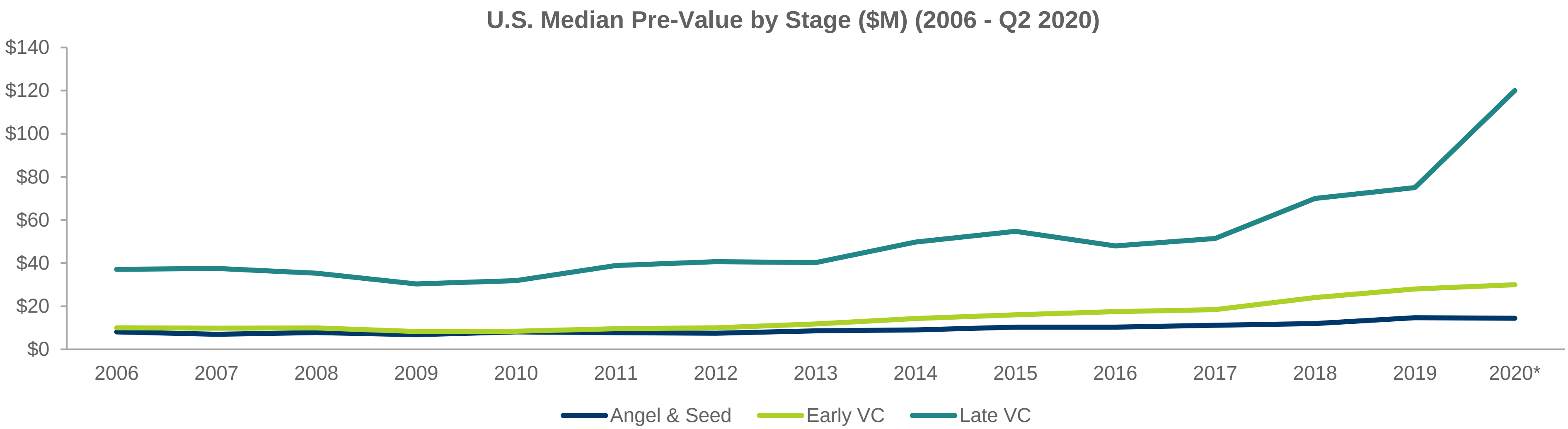


Source: Preqin, as of June 30, 2020.

Wilshire Private Markets

PRIVATE EQUITY – PRICING & VALUATIONS

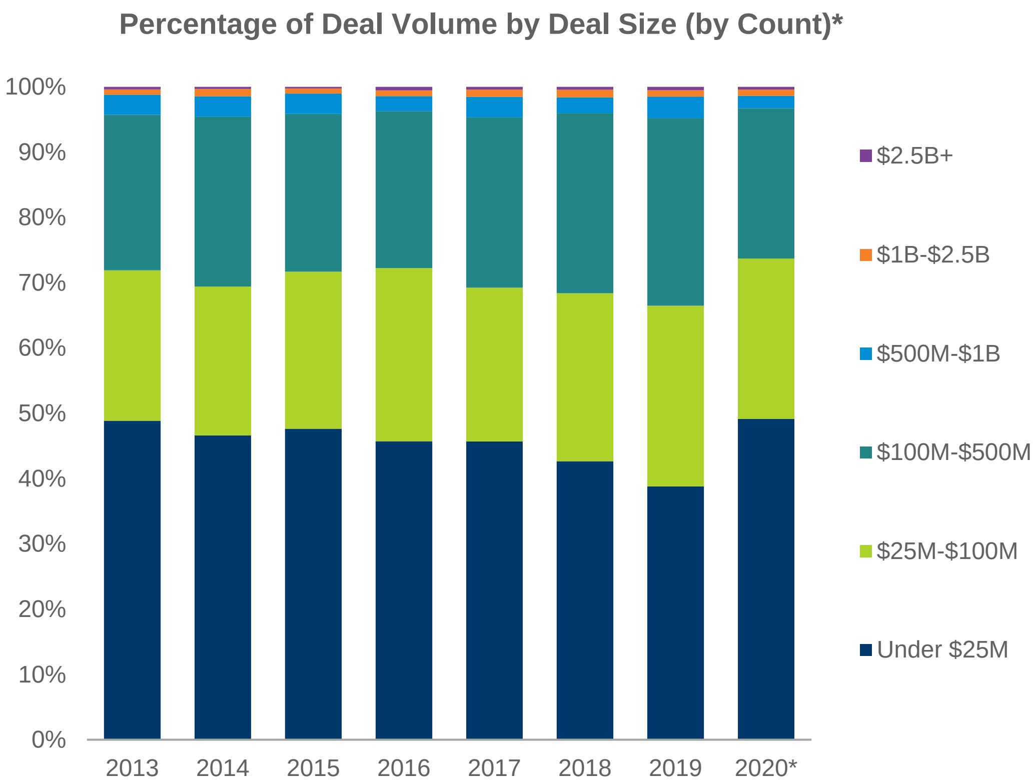


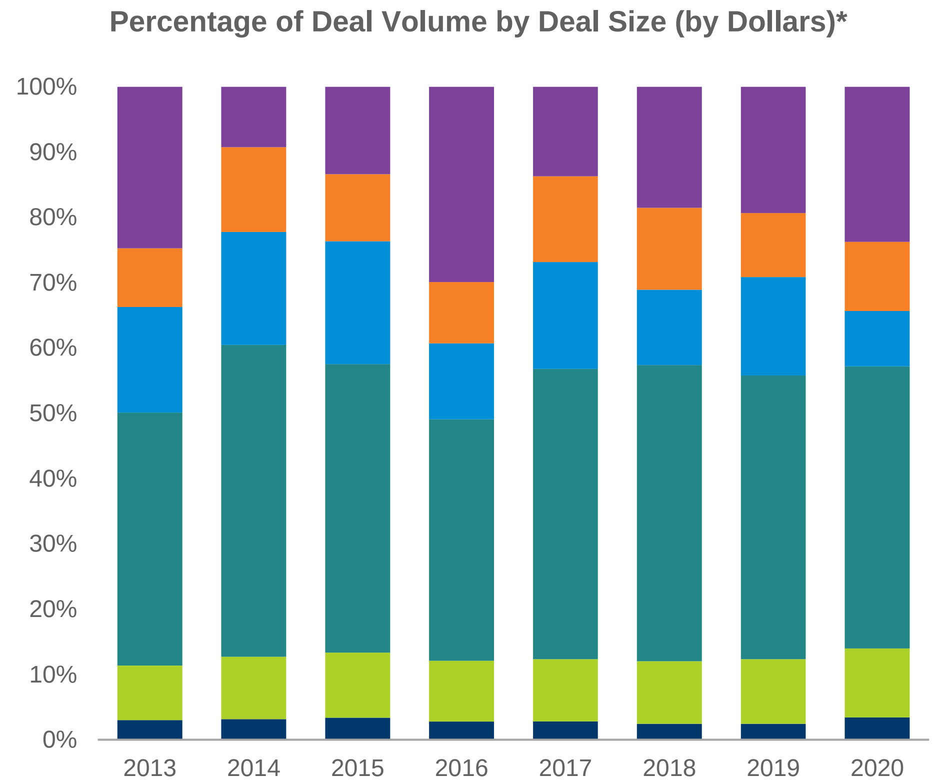


Source: S&P LBO; PitchBook, *as of June 30, 2020.

Wilshire Private Markets

U.S. INVESTMENT ACTIVITY BY DEAL SIZE



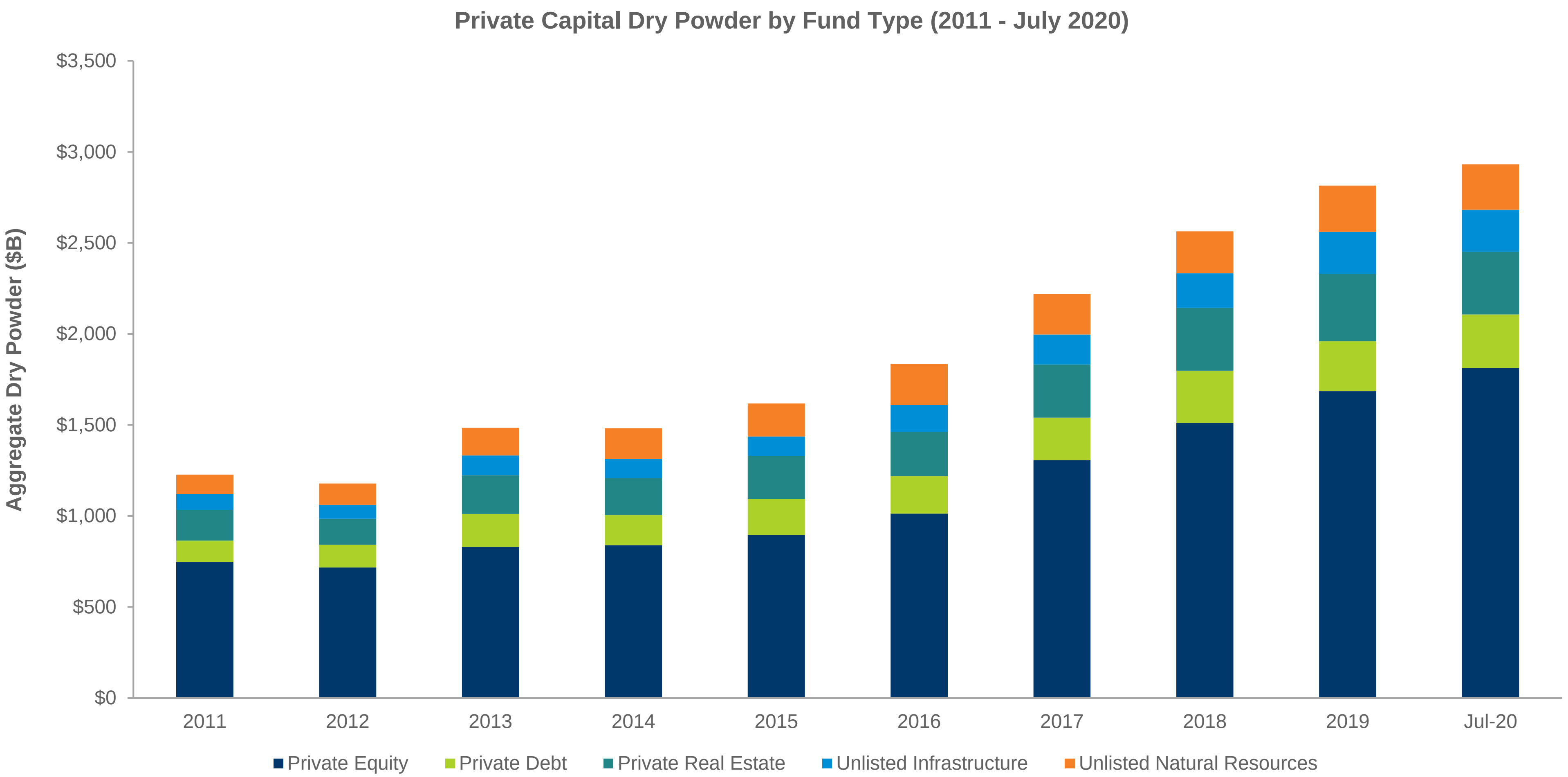


- Deal volume continues to be dominated by lower middle market deals with investment sizes below $100 million through the second quarter of 2020
- However, deals with below $100 million check sizes comprised only 14% of all deal volume by amount of capital invested in the second quarter of 2020

Source: PitchBook, *as of June 30, 2020.

Wilshire Private Markets

PRIVATE CAPITAL DRY POWDER

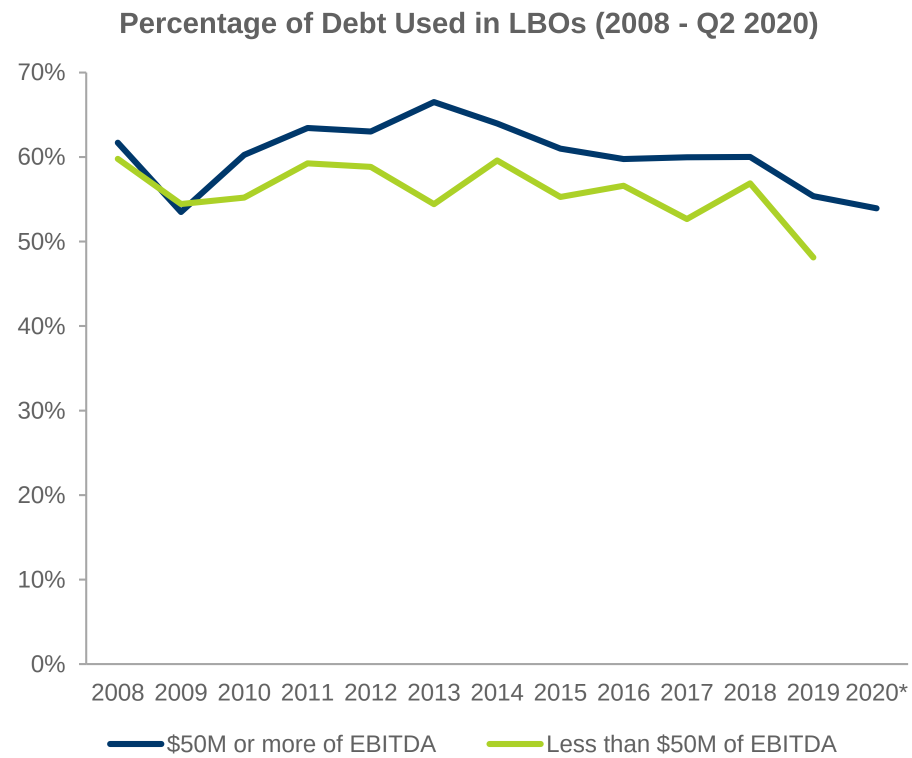


- Global private capital dry powder continues to increase, topping $2.9 trillion across all fund types
- Private equity comprises just over 60% of total dry powder in the market as of July 2020

Source: Preqin, as of July 27, 2020.

Wilshire Private Markets

PRIVATE EQUITY - U.S. DEBT MARKETS



- 2020 has generated approximately $38 billion in loan volume so far and is on pace to see a slight decrease in loan volume from 2019
- As debt multiples continue to increase, the percentage of debt used to finance leveraged buyouts through the second quarter of 2020 has dropped from 2019 marks

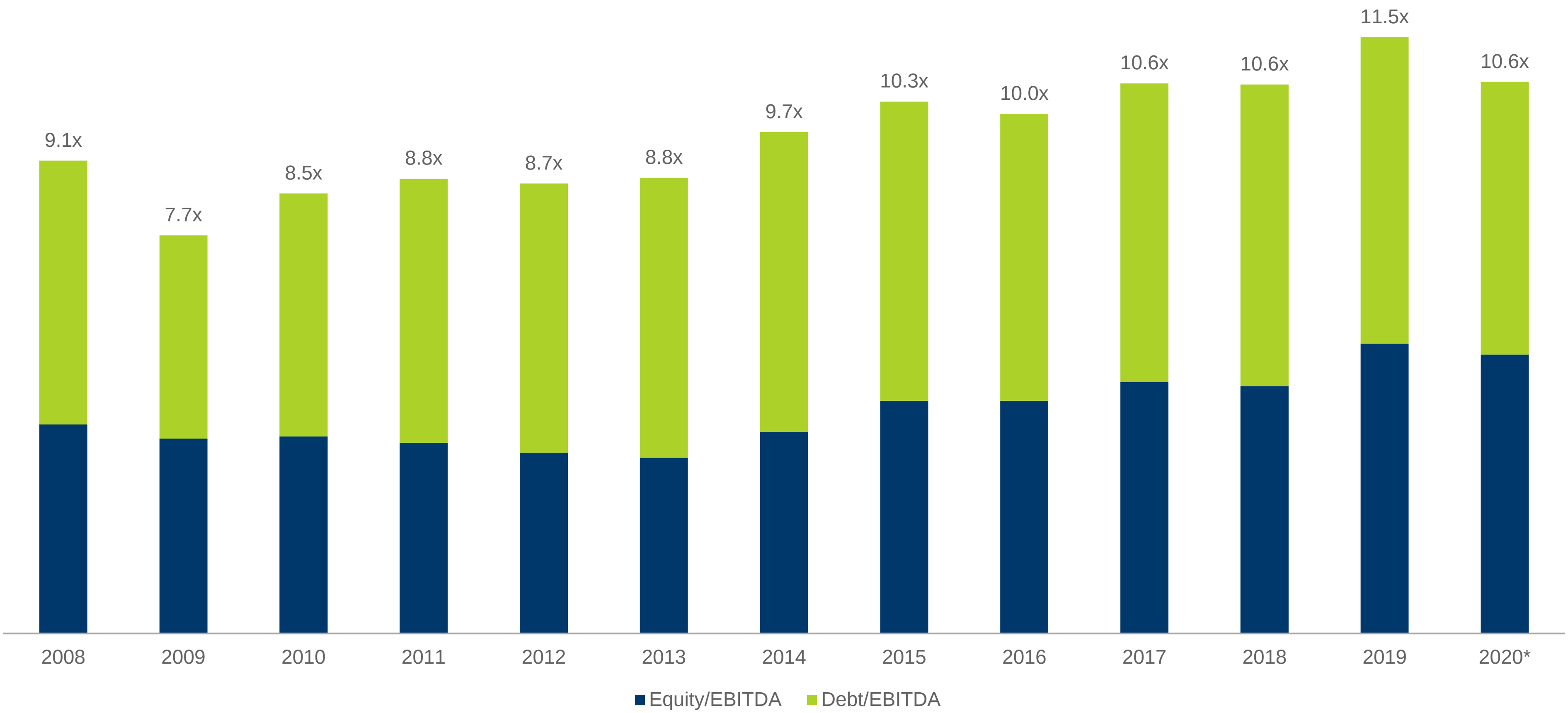
Source: S&P LBO, *as of June 30, 2020. "Less than $50M of EBITDA" data for 2020 not yet available

Wilshire Private Markets

Wilshire

PRIVATE EQUITY - U.S. LBO PURCHASE PRICE MULTIPLES

Purchase Price Multiples of U.S. LBO Transactions (2008 - Q2 2020)



- Purchase price multiples for U.S. LBOs have slightly decreased through Q2 2020, relative to 2019 levels

Source: S&P LBO, *as of June 30, 2020.

Wilshire Consulting

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	**$**	**24.6**	**-10.2%**	**-5.1%**	**5.9%**	**6.6%**	**10.4%**	**$**	**10.0**	**1.0**	**0.1**
CalPERS Custom Private Equity Benchmark			-22.1%	-11.0%	3.2%	5.6%	10.2%			**0.3**	**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	**$**	**24.5**	**-10.2%**	**-5.0%**	**5.9%**	**6.7%**	**10.5%**		**N/A**	**N/A**
Private Equity Distribution Stock	**$**	**0.0**	**-5.7%**	**-21.6%**	**13.2%**	**-5.8%**	**-10.8%**		**N/A**	**N/A**

Wilshire Consulting

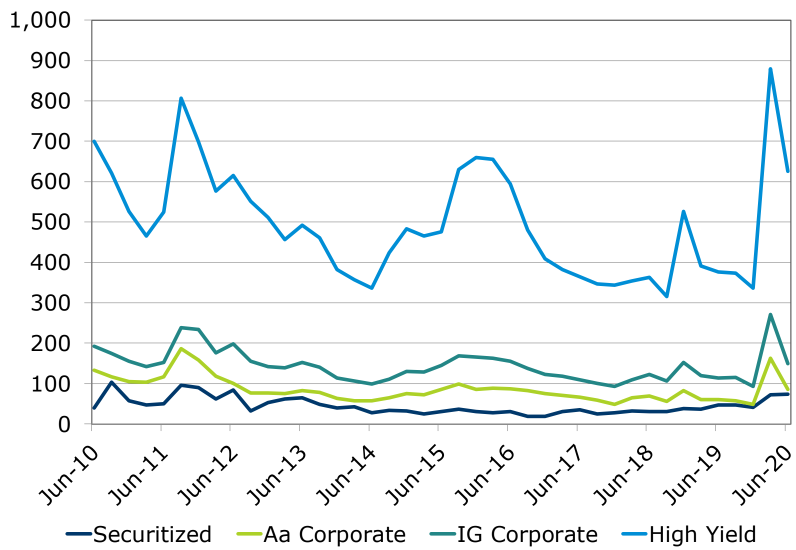
Wilshire

U.S. FIXED INCOME

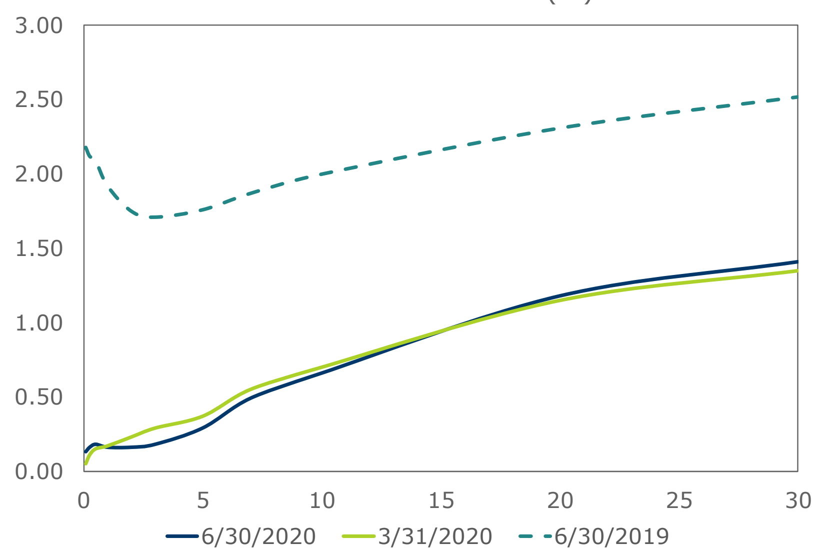
AS OF 6/30/2020	YTW	DUR.	QTR	YTD	1 YR	3 YR	5 YR	10 YR
BLOOMBERG BARCLAYS AGGREGATE	1.3	6.0	2.9	6.1	8.7	5.3	4.3	3.8
BLOOMBERG BARCLAYS TREASURY	0.5	7.2	0.5	8.7	10.4	5.6	4.1	3.4
BLOOMBERG BARCLAYS GOV'T-REL.	1.3	6.0	3.4	3.9	6.6	4.8	3.9	3.5
BLOOMBERG BARCLAYS SECURITIZED	1.4	2.3	0.9	3.6	5.7	4.0	3.3	3.2
BLOOMBERG BARCLAYS CORPORATE	2.1	8.5	9.0	5.0	9.5	6.3	5.8	5.5
BLOOMBERG BARCLAYS LT G/C	2.4	16.8	6.2	12.8	18.9	10.3	9.0	7.8
BLOOMBERG BARCLAYS LT TREASURY	1.3	19.4	0.2	21.2	25.4	12.0	9.3	7.7
BLOOMBERG BARCLAYS LT GOV't-REL.	2.9	13.5	8.2	4.3	10.0	8.0	7.1	7.2
BLOOMBERG BARCLAYS LT CORP.	3.2	15.2	11.4	6.3	13.8	8.8	8.8	7.8
BLOOMBERG BARCLAYS U.S. TIPS *	0.6	7.8	4.2	6.0	8.3	5.0	3.7	3.5
BLOOMBERG BARCLAYS HIGH YIELD	6.9	3.9	10.2	-3.8	0.0	3.3	4.8	6.7
TREASURY BILLS	0.1	0.3	0.0	0.7	1.7	1.8	1.2	0.7

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

FIXED INCOME OPTION ADJUSTED SPREAD (BPS)



TREASURY YIELD CURVE (%)



Data sources: Bloomberg

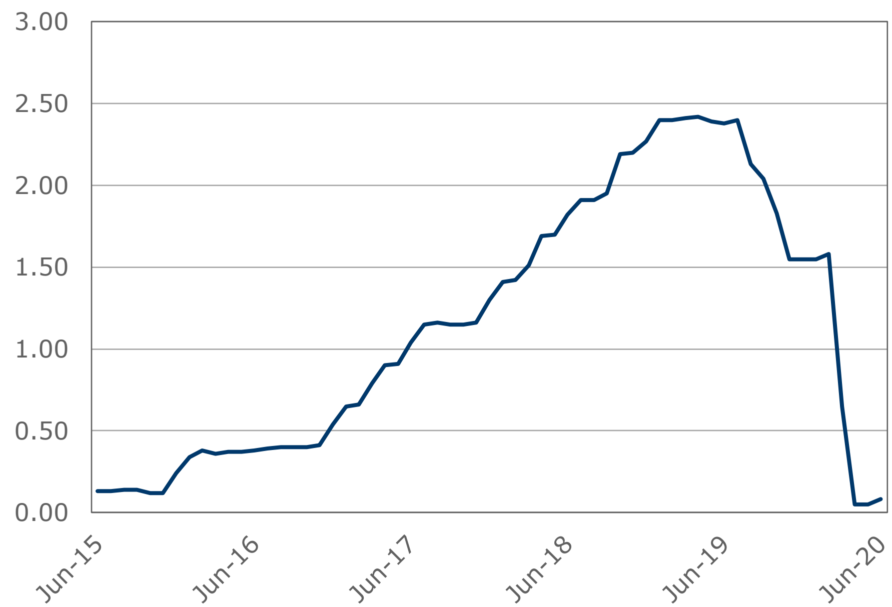
Wilshire Consulting

FEDERAL RESERVE

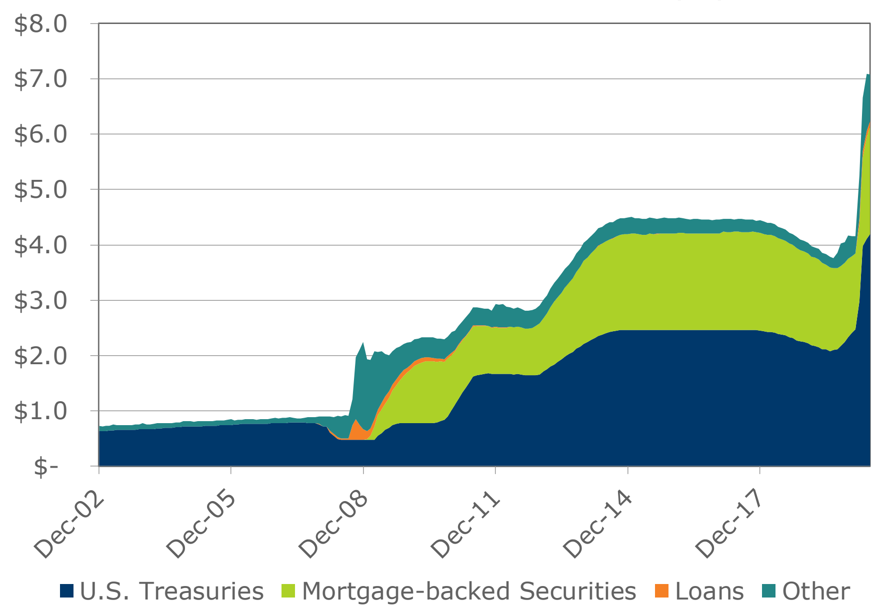
- Current expectation for the Fed-funds rate is to remain near zero through 2022
- Federal Reserve has added nearly $3 trillion in assets to their balance sheet just this year
- Unlike after the GFC, the Fed is also buying corporate and municipal bonds in addition to Treasuries and MBS

	Announced	Closed	Amount (bil)
QE1	11/25/2008	3/31/2010	$1,403
QE2	11/3/2010	6/29/2012	$568
QE3	9/13/2012	10/29/2014	$1,674
QE4	3/23/2020		$2,924

FEDERAL FUNDS RATE (%)



FEDERAL RESERVE BALANCE SHEET ($T)



Data Source: Bloomberg, JP Morgan

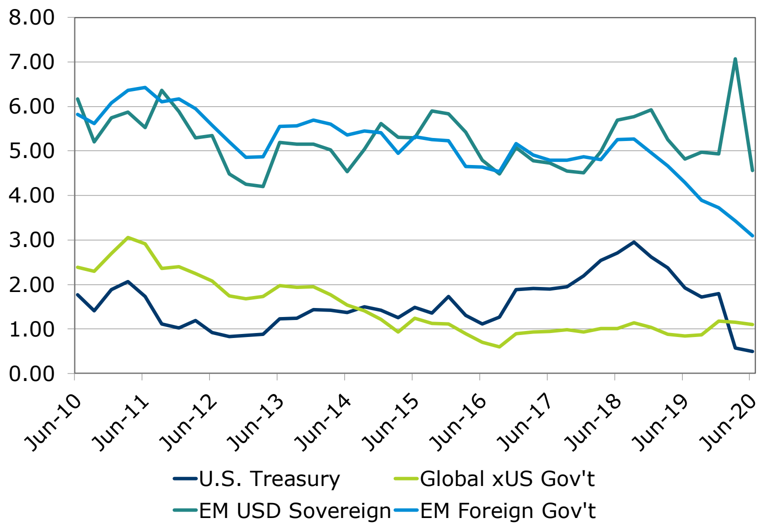
Wilshire Consulting

NON-U.S. FIXED INCOME

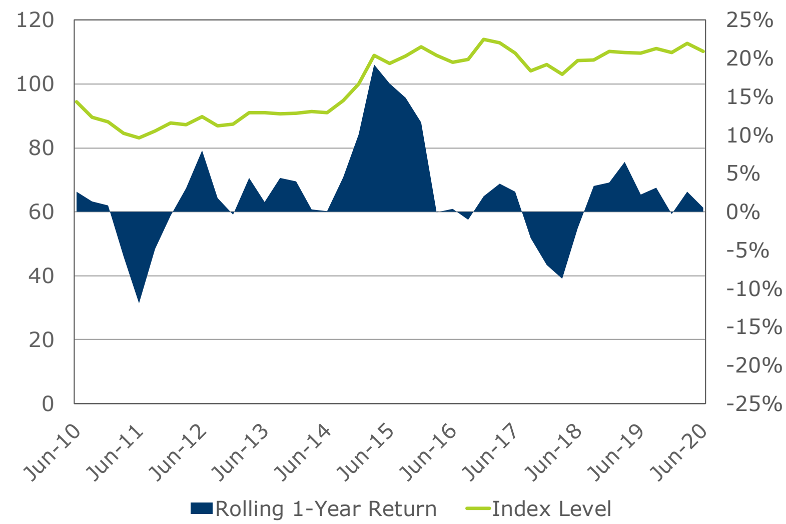
AS OF 6/30/2020	QTR	YTD	1 YR	3 YR	5 YR	10 YR
DEVELOPED MARKETS						
BLMBRG BRCLYS GLBL AGGREGATE xUS	3.4	0.6	0.7	2.5	2.9	2.0
BLMBRG BRCLYS GLBL AGGREGATE xUS *	1.8	2.3	4.0	4.9	4.5	4.2
BLMBRG BRCLYS GLOBAL INF LNKD xUS	8.3	2.0	3.4	3.5	2.8	4.2
BLMBRG BRCLYS GLOBAL INF LNKD xUS *	7.4	6.7	7.3	6.5	6.6	6.3
EMERGING MARKETS (HARD CURRENCY)						
BLMBRG BRCLYS EM USD AGGREGATE	10.0	-0.4	3.0	4.2	5.2	6.0
EMERGING MARKETS (FOREIGN CURRENCY)						
BLMBRG BRCLYS EM LOCAL CURR. GOV'T	4.5	-3.4	-0.1	2.4	2.8	2.9
BLMBRG BRCLYS EM LOCAL CURR. GOV'T *	2.2	2.9	6.3	5.0	4.2	3.6
EURO vs. DOLLAR	1.8	0.2	-1.2	-0.6	0.2	-0.9
YEN vs. DOLLAR	-0.4	0.6	-0.1	1.4	2.6	-2.0
POUND vs. DOLLAR	-0.2	-6.5	-2.3	-1.6	-4.6	-1.8

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

GLOBAL FIXED INCOME YIELD TO WORST (%)



U.S. DOLLAR INDEX: ADVANCED ECONOMIES



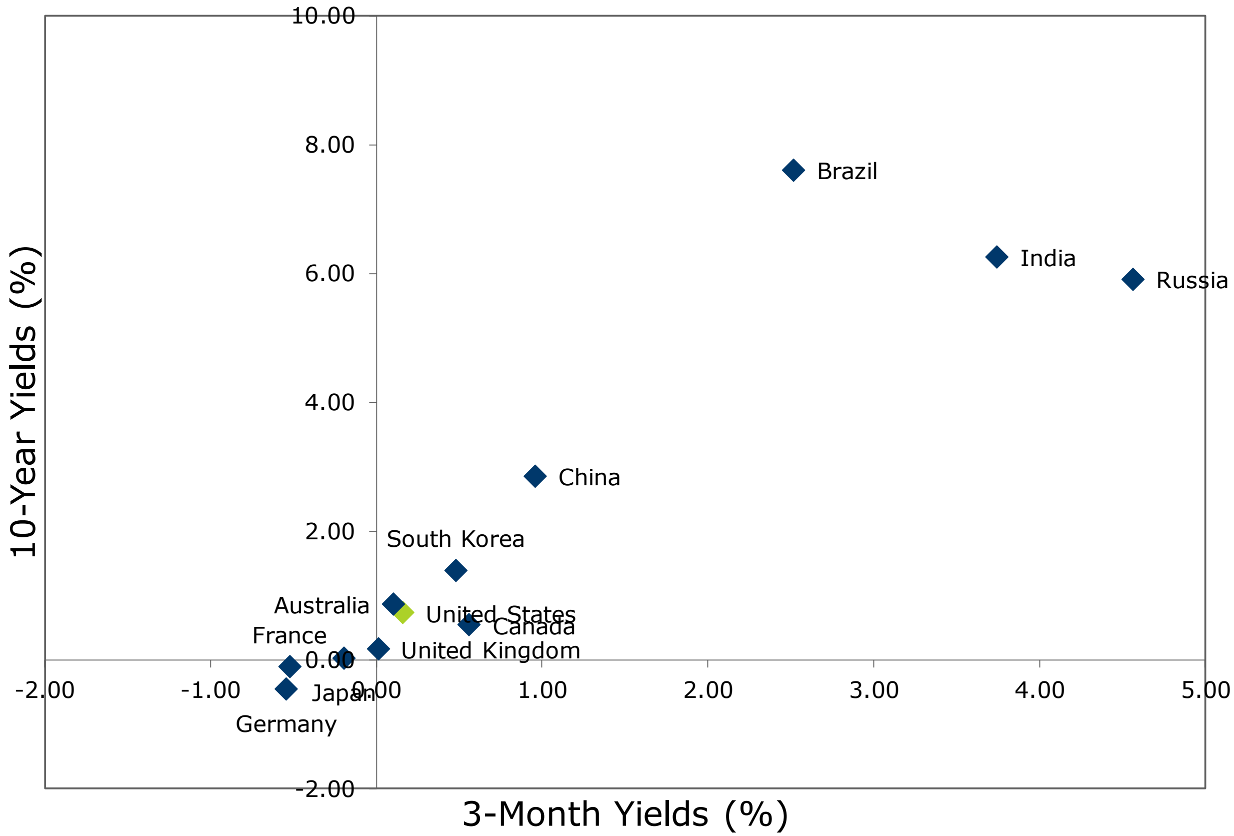
Data sources: Bloomberg

Wilshire Consulting

GLOBAL INTEREST RATES

Negative rates found in Germany and France; low but positive rates, and at similar levels, in the U.S. and Australia while the U.K. approaches zero in both the short and long-term

GOVERNMENT BOND YIELDS

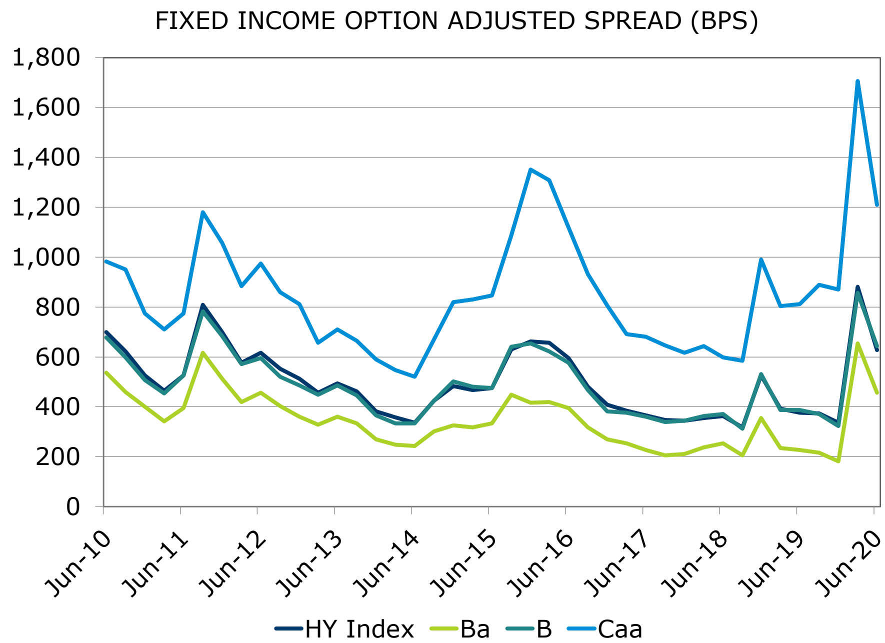


Data sources: Bloomberg

Wilshire Consulting

HIGH YIELD BOND MARKET

AS OF 6/30/2020		YTW	QTR	YTD	1 YR	3 YR	5 YR	10 YR
BLOOMBERG BARCLAYS HIGH YIELD		6.9	10.2	-3.8	0.0	3.3	4.8	6.7
S&P LSTA LEVERAGE LOAN INDEX		6.1	6.6	-3.9	-0.5	2.5	3.0	4.1
HIGH YIELD QUALITY DISTRIBUTION	WEIGHT							
Ba U.S. HIGH YIELD	55.2%	5.2	11.5	0.2	4.7	5.0	5.8	7.2
B U.S. HIGH YIELD	31.9%	7.1	8.6	-5.5	-1.4	3.0	4.1	6.3
Caa U.S. HIGH YIELD	12.2%	12.6	9.1	-13.3	-11.7	-1.9	2.6	5.8
Ca to D U.S. HIGH YIELD	0.7%	29.6	2.1	-28.3	-38.0	-10.3	-3.9	-5.7
Non-Rated U.S. HIGH YIELD	0.0%	0.0	6.1	-6.5	-5.2	0.4	-1.0	4.3



Data sources: Bloomberg

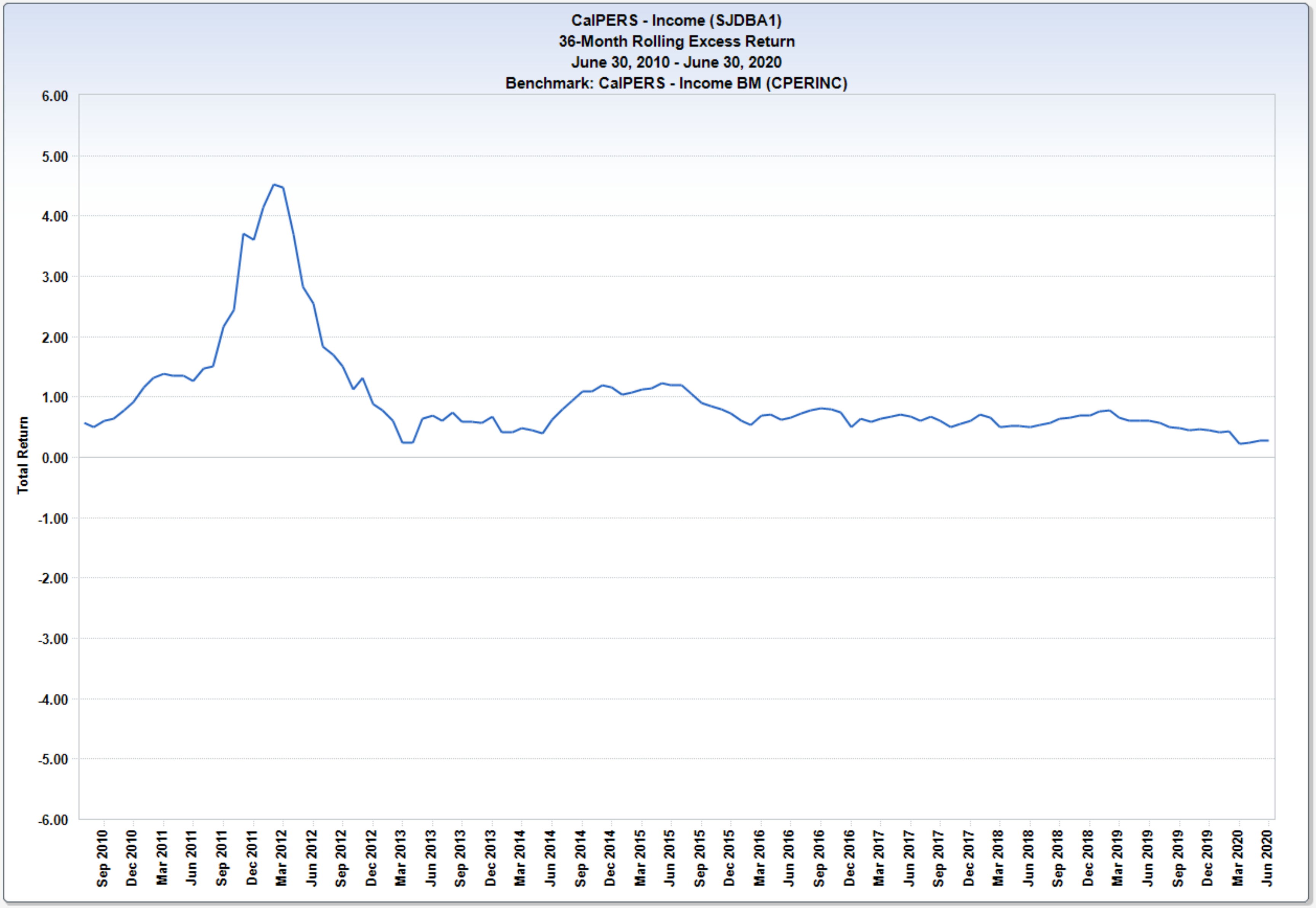
Wilshire Consulting

CalPERS Income – Performance

	Asset Value ($Billion)	Quarter	1-Year	3-Year	5-Year	10-Year	VaR ($Billion)	5-Year Ratios Sharpe	Info
INCOME	**$ 109.9**	**4.5%**	**12.5%**	**7.4%**	**6.3%**	**5.9%**	**$ 11.6**	**1.0**	**1.1**
Income Policy Benchmark		4.2%	12.3%	7.1%	5.9%	5.2%		**0.9**	**0.0**
Spread	**$ 64.0**	**6.1%**	**8.8%**	**-.-%**	**-.-%**	**-.-%**	**$ 6.1**	**N/A**	**N/A**
BBG Barc Custom Global Long Spread Index		5.9%	7.9%	-.-%	-.-%	-.-%		**N/A**	**N/A**
Treasury	**$ 34.5**	**0.5%**	**20.0%**	**-.-%**	**-.-%**	**-.-%**	**$ 5.3**	**N/A**	**N/A**
CalPERS Custom Treasury Benchmark		0.5%	20.6%	-.-%	-.-%	-.-%		**N/A**	**N/A**
High Yield	**$ 11.3**	**8.2%**	**-1.1%**	**-.-%**	**-.-%**	**-.-%**	**$ 1.4**	**N/A**	**N/A**
BBG Barclays US High Yield BB/B Liquid Index		8.8%	-0.9%	-.-%	-.-%	-.-%		**N/A**	**N/A**

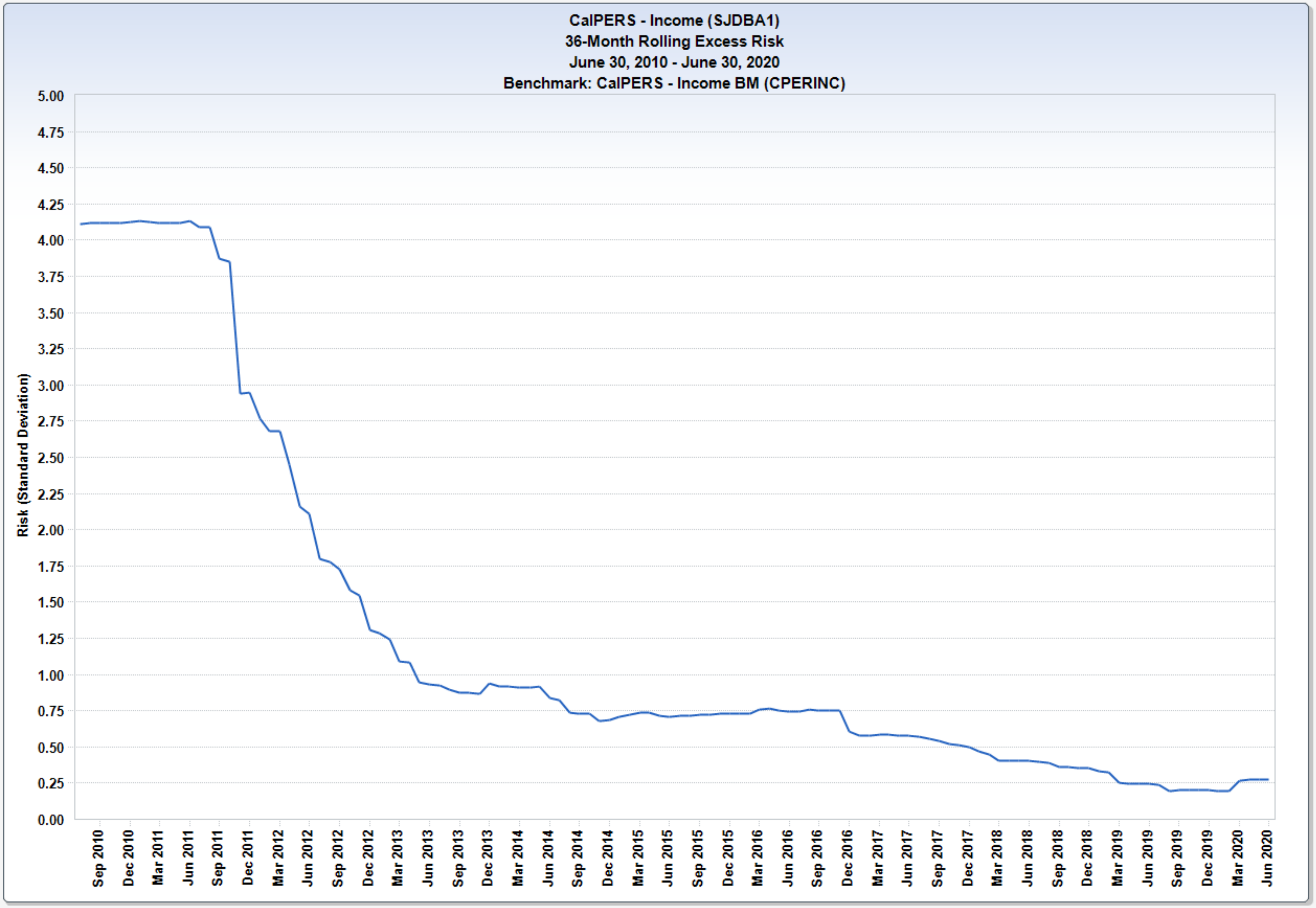
Wilshire Consulting

CalPERS Income – Rolling Excess Returns



Wilshire Consulting

CalPERS Income – Rolling Tracking Error



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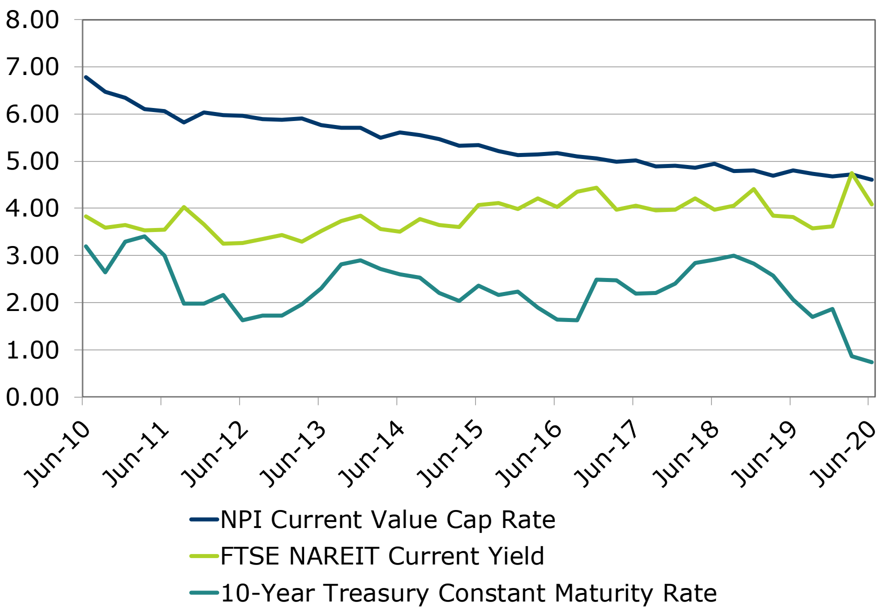
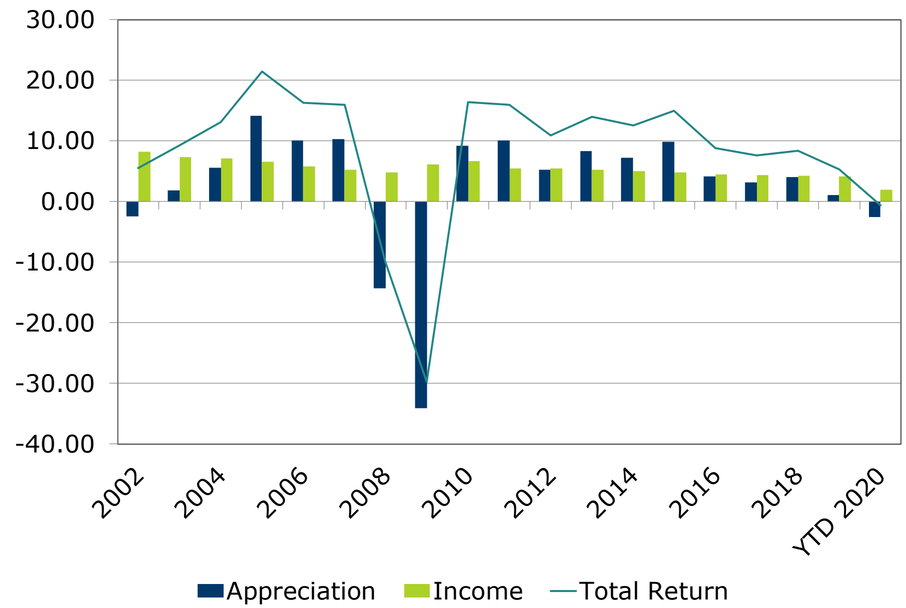
REAL ASSETS

AS OF 6/30/2020	QTR	YTD	1 YR	3 YR	5 YR	10 YR
BLOOMBERG BARCLAYS U.S. TIPS	4.2	6.0	8.3	5.0	3.7	3.5
BLOOMBERG COMMODITY INDEX	5.1	-19.4	-17.4	-6.1	-7.7	-5.8
WILSHIRE GLOBAL RESI INDEX	9.5	-20.3	-15.2	-0.7	2.6	8.3
NCREIF ODCE FUND INDEX	-1.6	-0.6	2.2	5.7	7.3	10.8
NCREIF TIMBERLAND INDEX	0.1	0.2	0.3	2.3	2.8	4.4
ALERIAN MIDSTREAM ENERGY	32.6	-29.6	-29.4	-8.9	-8.0	n.a.

REAL ESTATE VALUATION (%)



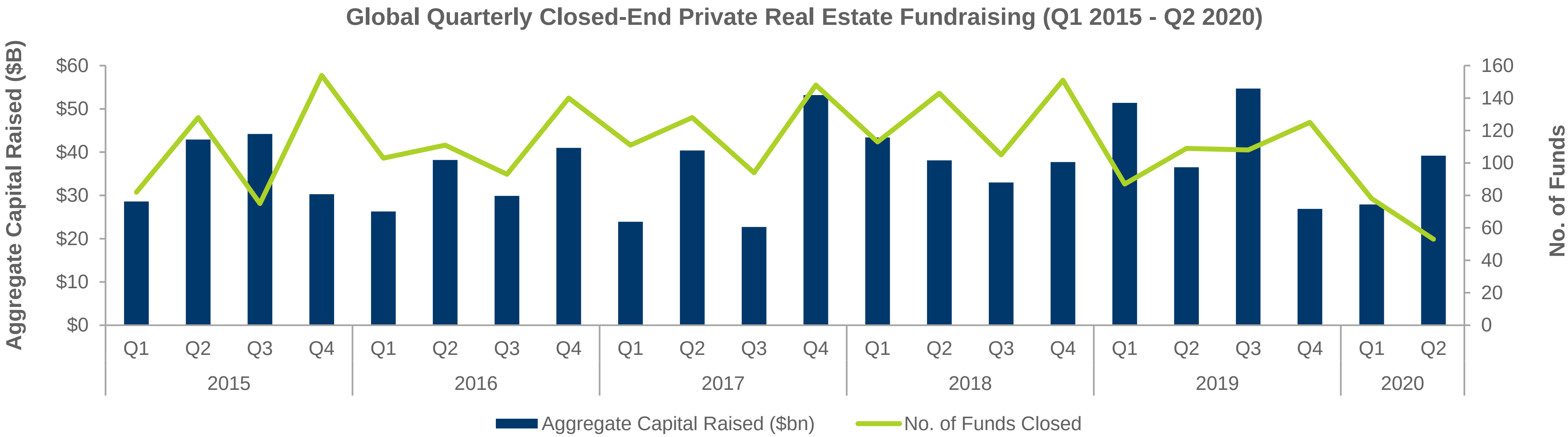
NCREIF ODCE FUND INDEX RETURN (%)

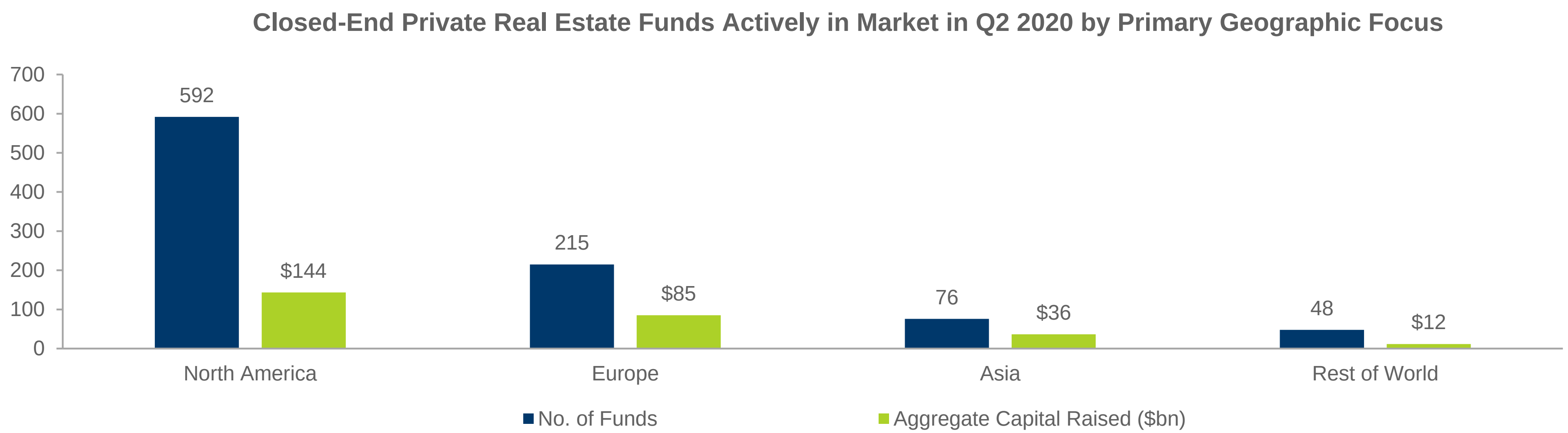


Data sources: Bloomberg, National Council of Real Estate Investment Fiduciaries

Wilshire Private Markets

PRIVATE REAL ESTATE – FUNDRAISING ACTIVITY

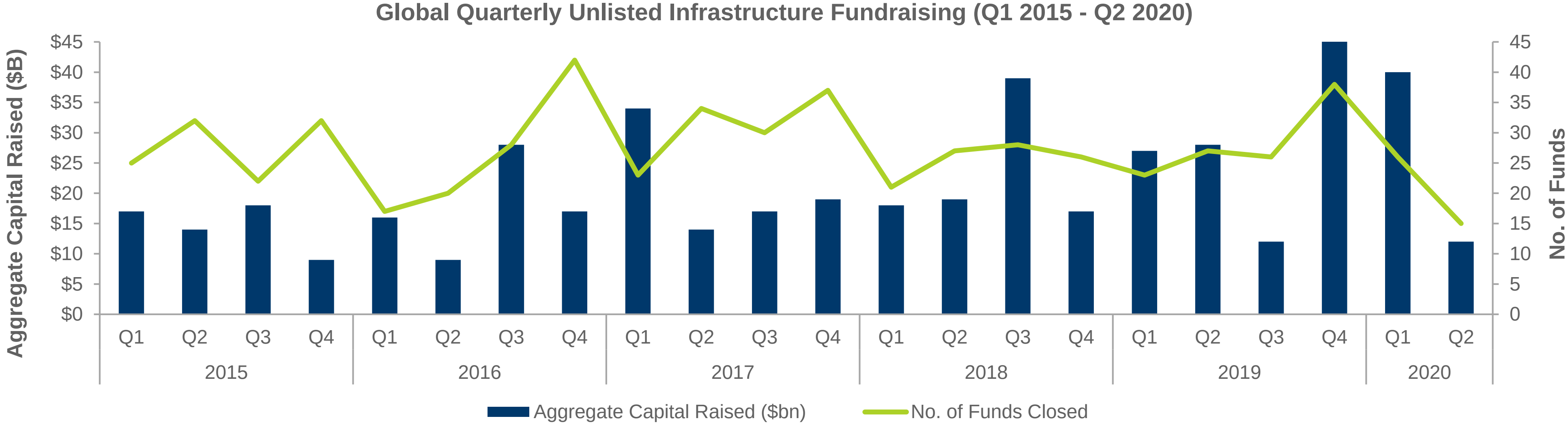


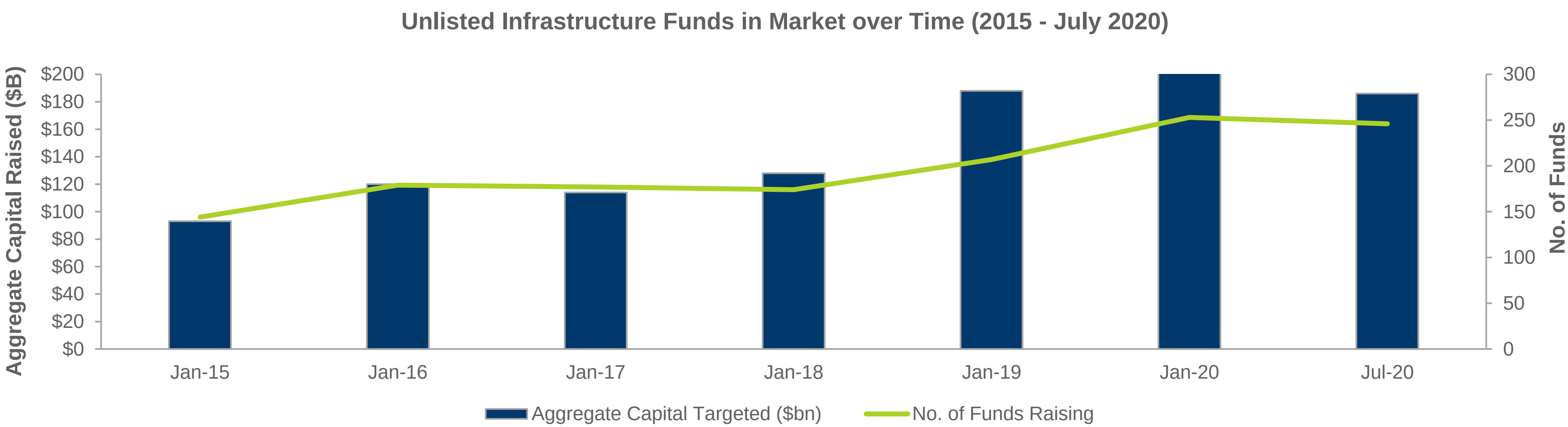


Source: Preqin, as of June 30, 2020.

Wilshire Private Markets

UNLISTED INFRASTRUCTURE – FUNDRAISING & INVESTMENT ACTIVITY



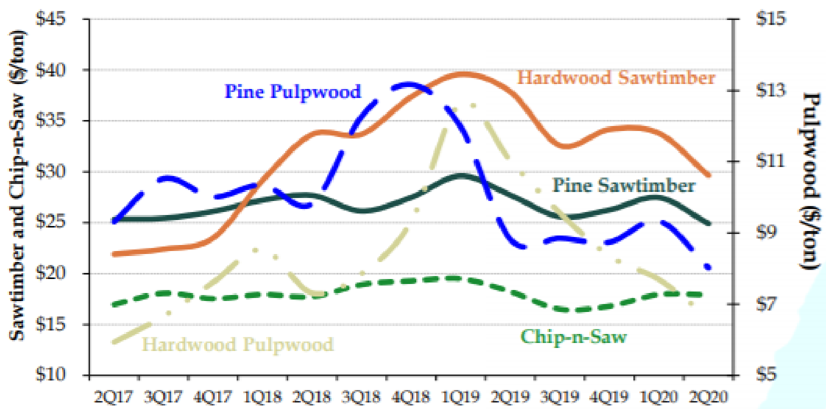


Source: Preqin, as of June 30, 2020.

Wilshire Consulting

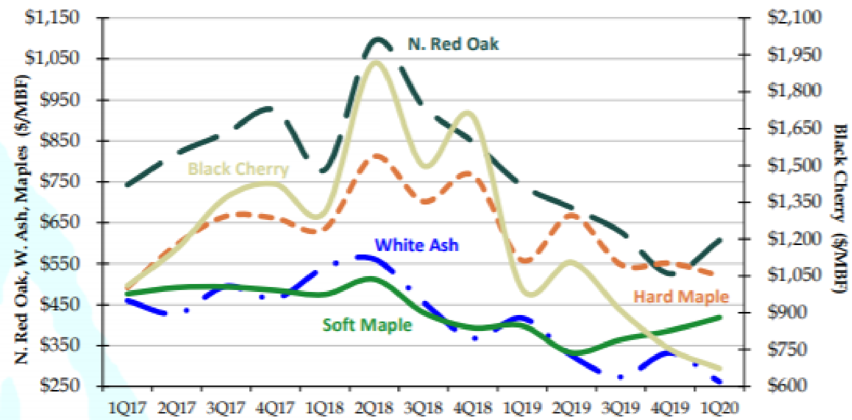
TIMBER

Southeastern Timber Prices



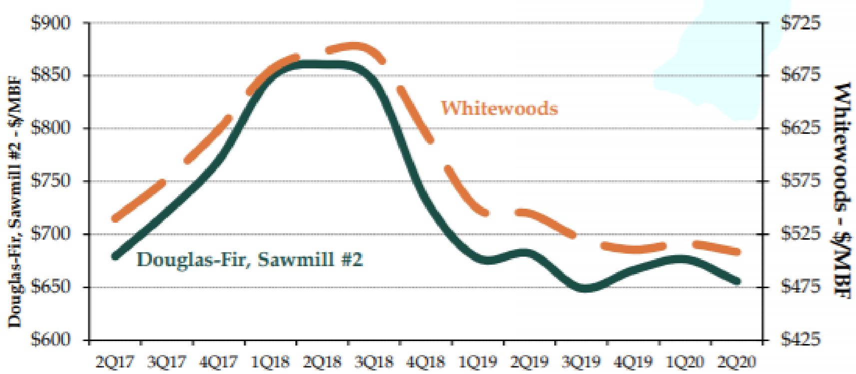
Source: Forest2Market®

Northeastern Hardwood Timber Prices



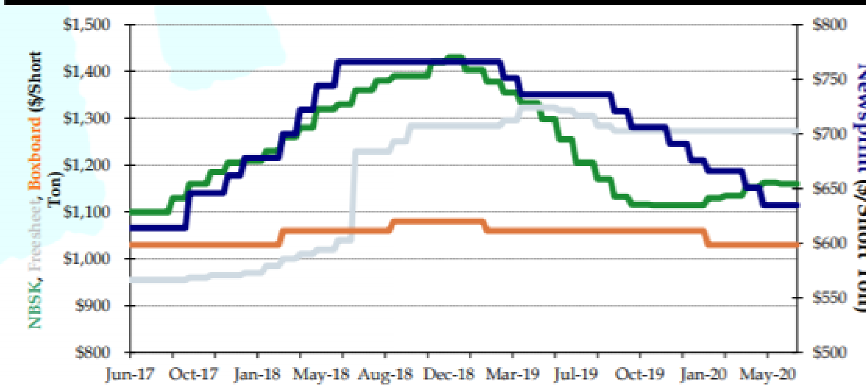
Source: Pennsylvania Woodlands Timber Market Report - Northwest Region

Pacific Northwest Timber Prices



Source: Fastmarkets RISI - Log Lines®

Pulp and Paper



Source: Fastmarkets RISI

Data sources: Forest Investment Associates

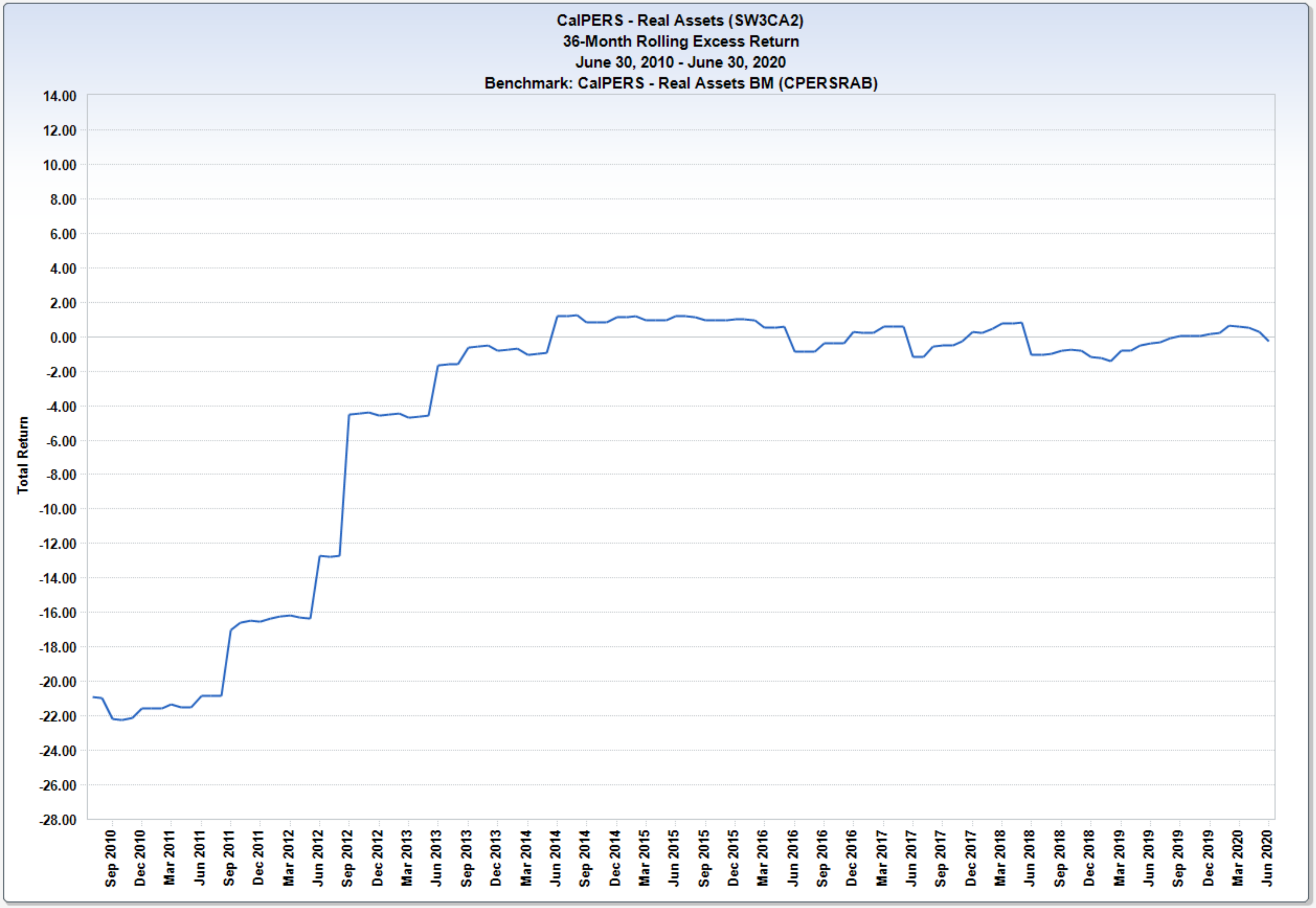
Wilshire Consulting

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	**$ 44.1**	**-1.6%**	**4.6%**	**5.4%**	**5.9%**	**8.8%**	**$ 6.3**	**1.8**	**-0.5**
Real Assets Policy Benchmark		0.8%	3.9%	5.7%	7.0%	9.6%		**1.9**	**0.0**
Real Estate	**$ 37.4**	**-0.8%**	**5.5%**	**5.2%**	**6.1%**	**9.5%**	**$ 5.3**	**1.8**	**-0.5**
CalPERS Custom Real Estate Benchmark		0.8%	3.9%	5.8%	7.5%	10.5%		**1.8**	**0.0**
Infrastructure	**$ 5.4**	**-6.2%**	**0.2%**	**10.3%**	**10.0%**	**13.8%**	**$ 0.8**	**1.4**	**0.7**
CalPERS Custom Infrastructure Benchmark		0.8%	3.9%	5.6%	5.6%	5.9%		**2.8**	**0.0**
Forestland	**$ 1.3**	**-3.3%**	**-0.1%**	**-3.1%**	**-3.7%**	**-2.4%**	**$ 0.2**	**-0.7**	**-1.1**
CalPERS Custom Forestland Benchmark		0.8%	3.9%	4.7%	4.1%	5.2%		**1.5**	**0.0**

Wilshire Consulting

CalPERS Real Assets – Rolling Excess Returns



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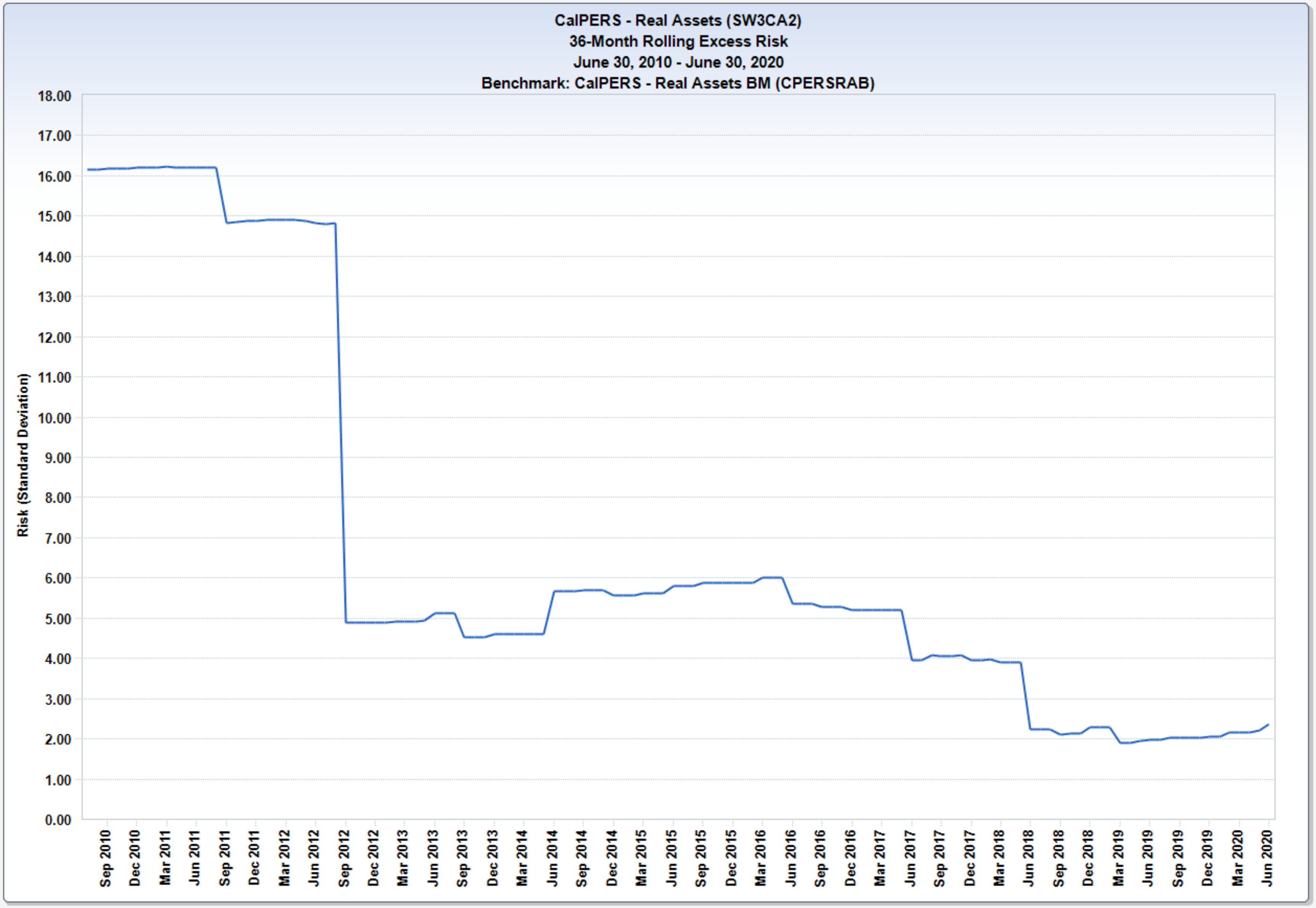
CalPERS Real Assets – Rolling Tracking Error



Wilshire Consulting

Wilshire

CalPERS Liquidity – Performance

	Asset Value ($Billion)	Quarter	1-Year	3-Year	5-Year	10-Year	VaR ($Billion)	5-Year Ratios Sharpe	Info
LIQUIDITY	**$ 3.3**	**0.1%**	**1.6%**	**2.0%**	**1.4%**	**1.3%**	**$ 0.04**	**0.8**	**4.4**
Liquidity Policy Benchmark		0.0%	1.3%	1.6%	1.1%	1.3%		**-0.5**	**0.0**
Internal Short Term Cash Portfolio	**$ 3.3**	**0.1%**	**1.6%**	**2.0%**	**1.4%**	**0.8%**	**$ 0.04**	**0.8**	**4.4**
CalPERS Short Term Benchmark		0.0%	1.3%	1.6%	1.1%	0.6%		**-0.5**	**0.0**

CalPERS Opportunistic Strategies – Performance

	Asset Value ($Billion)	Quarter	1-Year	3-Year	5-Year	10-Year	VaR ($Billion)	5-Year Ratios Sharpe	Info
OPPORTUNISTIC STRATEGIES	**$ 0.1**	**-.-%**	**-.-%**	**-.-%**	**-.-%**	**-.-%**	**$ -**	**N/A**	**N/A**
Custom Opp. Strategies Benchmark		-.-%	-.-%	-.-%	-.-%	-.-%		**N/A**	**N/A**

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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	5-Year Ratios Info
TRUST LEVEL PORTFOLIO MGMT	**$ 0.7**	**-1.3%**	**2.3%**	**2.3%**	**-.-%**	**-.-%**	**$ 0.1**	**N/A**	**N/A**
CalPERS Reference Portfolio Benchmark		14.5%	3.7%	6.2%	-.-%	-.-%		**N/A**	**N/A**
External Multi-Asset Class	**$ 0.4**	**-2.0%**	**-19.5%**	**-4.9%**	**-1.9%**	**-.-%**		**N/A**	**N/A**
CalPERS Reference Portfolio Benchmark		14.5%	3.7%	6.2%	6.1%	-.-%		**N/A**	**N/A**
TLPM Overlay	**$ 0.3**	**-.-%**	**-.-%**	**-.-%**	**-.-%**	**-.-%**		**N/A**	**N/A**
CalPERS Reference Portfolio Benchmark		-.-%	-.-%	-.-%	-.-%	-.-%		**N/A**	**N/A**
TLPM Transition	**$ 0.0**	**-.-%**	**-.-%**	**-.-%**	**-.-%**	**-.-%**		**N/A**	**N/A**

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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**	**48.9%**	**51.0%**	**7.9%**	**3.9%**	**4.5%**		**0.1**	**-0.1**
Total ARS Program Blended Benchmark		1.2%	8.0%	7.4%	6.6%	6.0%		**8.9**	**0.0**

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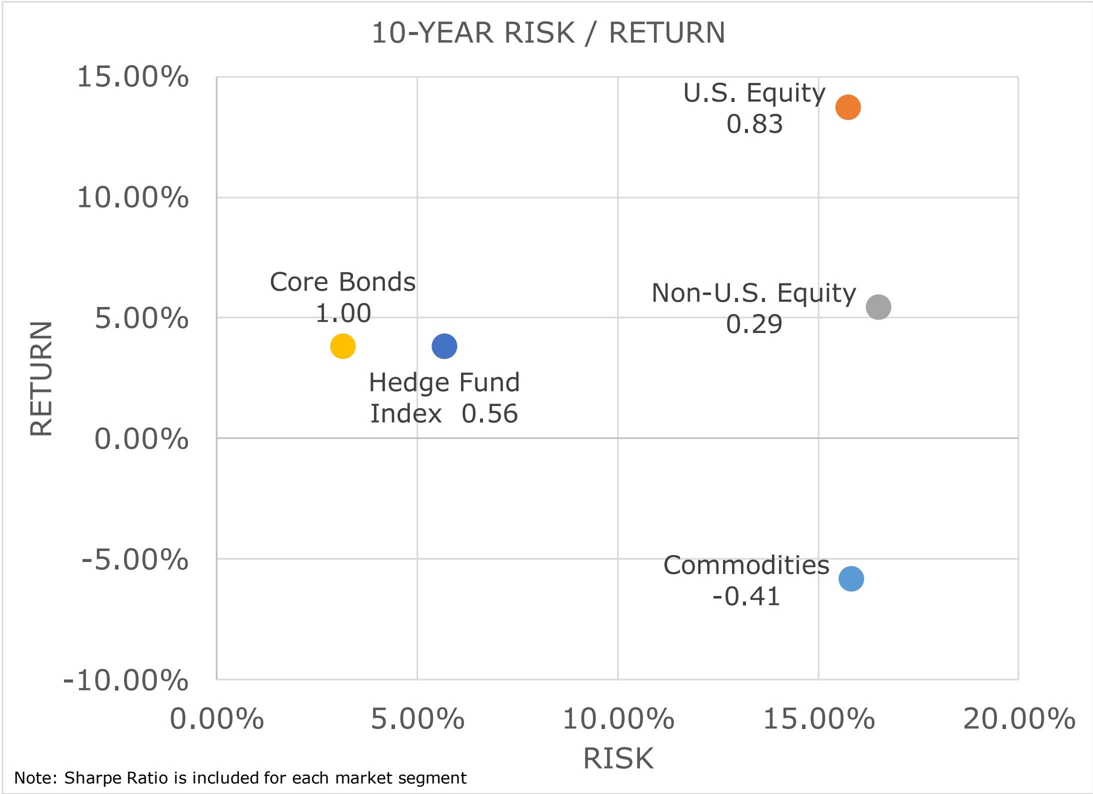
HEDGE FUND PERFORMANCE

AS OF 6/30/2020	QTR	YTD	1 YR	3 YR	5 YR	10 YR
DJ CS HEDGE FUND INDEX	6.2	-3.3	-0.7	2.1	1.6	3.8
EVENT DRIVEN	9.8	-7.6	-6.9	-0.5	-0.7	2.5
GLOBAL MACRO	4.6	-3.9	-1.1	3.2	1.8	3.9
LONG/SHORT EQUITY	9.8	-2.5	2.6	3.5	2.7	5.2
MULTI-STRATEGY	3.9	-2.8	-0.9	1.6	3.0	5.7
WILSHIRE 5000	21.9	-3.3	6.8	10.1	10.3	13.7
MSCI ACWI EX-US ($G)	16.3	-10.8	-4.4	1.6	2.7	5.5
BLOOMBERG BARCLAYS AGGREGATE	2.9	6.1	8.7	5.3	4.3	3.8
BLOOMBERG COMMODITY INDEX	5.1	-19.4	-17.4	-6.1	-7.7	-5.8



Data sources: Bloomberg

Wilshire Consulting

JUNE 2020 ASSET CLASS ASSUMPTIONS

	EQUITY						FIXED INCOME						REAL ASSETS					
													Real Estate					
	US Stock	Dev ex-US Stock	Emg Stock	Global ex-US Stock	Global Stock	Private Equity	Cash	Core Bond	LT Core Bond	TIPS	High Yield	Dev ex-US Bond (Hdg)	US RES	Global RES	Private RE	Cmdty	Real Assets	US CPI
COMPOUND RETURN (%)	6.00	6.50	6.50	6.75	6.45	8.15	0.75	1.25	2.10	0.30	4.00	0.40	5.10	5.30	6.80	2.25	5.45	1.50
ARITHMETIC RETURN (%)	7.30	7.95	9.45	8.35	7.80	11.50	0.75	1.40	2.55	0.50	4.50	0.45	6.45	6.45	7.70	3.30	5.80	1.50
EXPECTED RISK (%)	17.00	18.00	26.00	18.95	17.10	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	3.00	2.50	2.85	2.40	0.00	0.75	1.85	2.65	1.15	7.00	1.10	4.00	4.00	2.60	0.75	2.25	0.00
GROWTH EXPOSURE	8.00	9.00	7.50	8.60	8.25	14.00	0.00	-0.90	-2.30	-3.00	4.00	-1.00	8.00	8.00	5.50	0.00	1.90	0.00
INFLATION EXPOSURE	0.00	3.00	12.00	5.45	2.40	1.00	0.00	-2.50	-6.70	2.50	1.00	-3.00	0.00	1.35	0.00	12.00	4.40	1.00
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	0.87	1.00														
Global Stock	0.95	0.92	0.83	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	0.78	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