Arizona State Retirement System

Independent ASRS Investment Program Oversight for the Period Ending June 30, 2020

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NEPC, LLC

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DISCLOSURE

NEPC has developed reports for both the Investment Committee and Board designed to 1) provide the appropriate level of investment information for the purposes of independent oversight (ASRS SAAP compliance, Asset Class Committee minutes review, investment selection due diligence packet compliance and oversight of the investment program data used to compile NEPC and ASRS reporting); 2) provide ASRS investment program performance relative to its goals/objectives (presented quarterly); and 3) communicate NEPC's perspectives on the market environment, investment outlook or other initiatives or topics they believe are important to convey to the Board.

NEPC has completed a quarter-end quality control process and warrants that IMD Staff materials are accurate subject to the following process:

- Investment results were calculated using data provided by the Plan's custodian bank that is deemed "final" as of June 30, 2020.
- Investment performance oversight includes reconciliation and confirmation of portfolio level valuations, cash flows, transactions and composite construction including interpretation of investment accounting methods used to track IMD Staff instructed activities.
- Oversight of performance calculation includes verification of Staff data used to produce reporting as well verification of processes and procedures in custom investment performance calculations.
- NEPC performed tests of the data produced by IMD Staff and the Plan's custodian bank (book of record) using underlying financial records provided by the custodian bank and IMD Staff. The net effect of uncorrected misstatements is immaterial, and has been brought to the attention of IMD Staff.

ASRS INVESTMENT OBJECTIVES/PERFORMANCE

Note: All of the data shown on the following pages is as of June 30, 2020 and reflects the deduction of investment manager fees, unless otherwise noted.

ASRS INVESTMENT OBJECTIVES

Goal #4: Design, implement, and maintain an investment management program that maximizes rates of return for acceptable of levels of risk.

a) Develop, approve and implement an Asset Allocation program that is expected to achieve a 20-year rolling average annual return at or above the actuarial assumed return

Goal met: Yes

b) Achieve a total fund net return in the top quartile of the peer universe

Goal met: Partial

c) Achieve a 1 year total fund net return greater than the Strategic Asset Allocation Benchmark

Goal met: Yes

d) Achieve a 3-year total fund net return greater than the Strategic Asset Allocation Benchmark

Goal met: Yes

e) Achieve 1 year asset class net returns greater than the respective Asset Allocation Benchmarks

Goal met: Partial

f) Achieve 3 year asset class net returns greater than the respective Asset Allocation Benchmarks

Goal met: Partial

g) Sufficient cash will be maintained to meet all payment requirements

Goal met: Yes

Source: ASRS Strategic Plan, August 2018

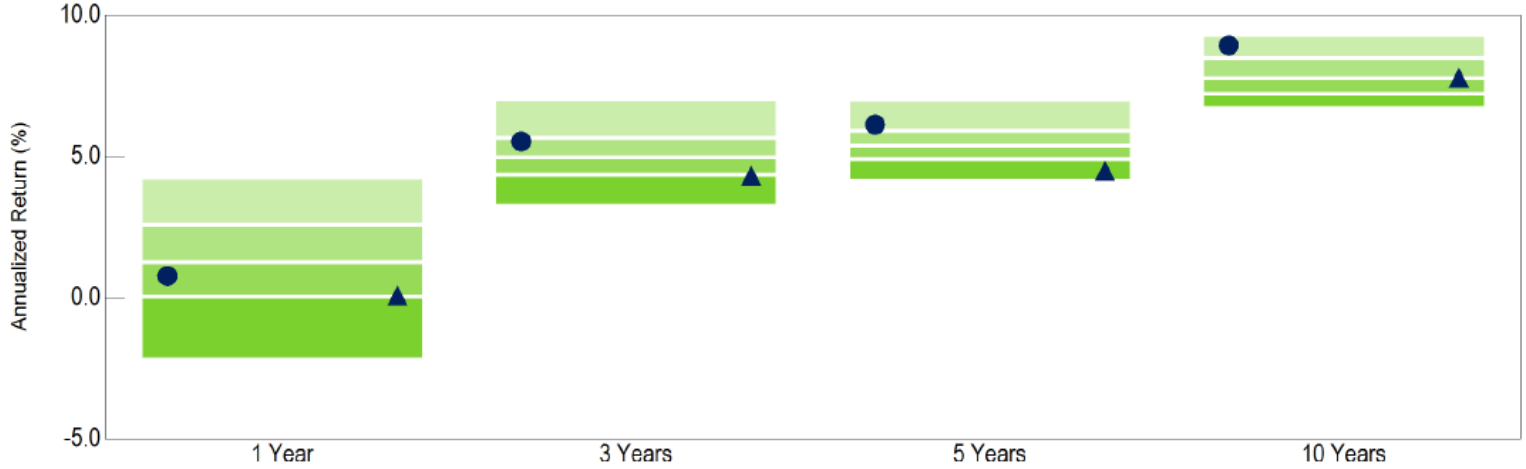
Arizona State Retirement System

TOTAL FUND PERFORMANCE

	3 Mo	YTD	1 Yr	3 Yrs	5 Yrs	10 Yrs	Inception	Inception Date
Total Fund	**5.0%**	**-4.6%**	**0.8%**	**5.5%**	**6.1%**	**8.9%**	**9.5%**	**Jul-75**
Interim SAA Policy	*3.3%*	*-5.4%*	*0.0%*	*4.3%*	*4.5%*	*7.8%*	*9.0%*	*Jul-75*
Excess Return	1.7%	0.8%	0.8%	1.2%	1.6%	1.1%	0.5%	

Composition of SAA Policy can be found in the appendix.

UNIVERSE COMPARISON



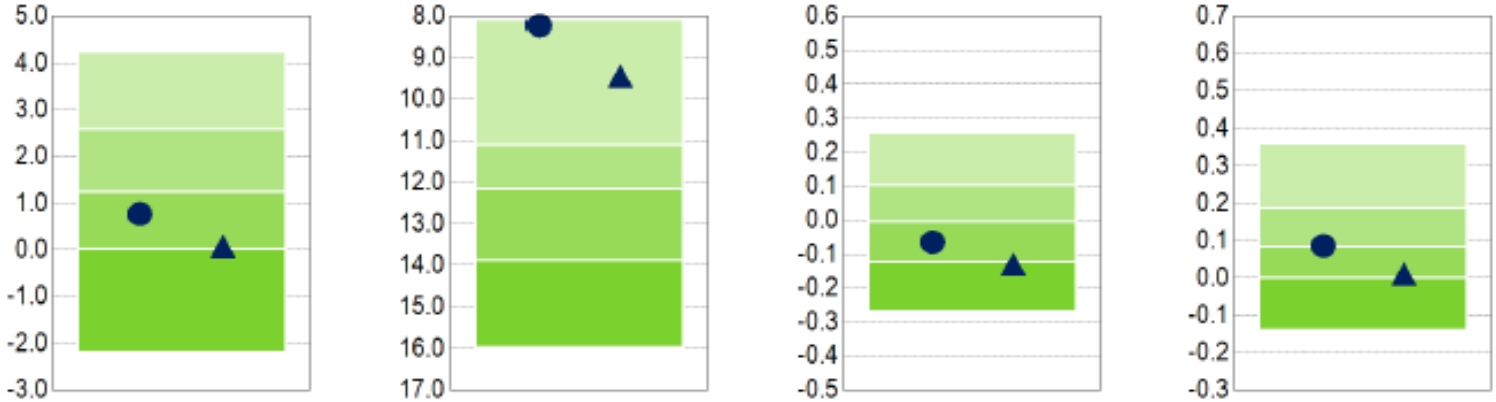
	Return (Rank)			
5th Percentile	4.2	7.0	7.0	9.3
25th Percentile	2.6	5.7	5.9	8.5
Median	1.3	5.0	5.4	7.8
75th Percentile	0.0	4.4	4.9	7.2
95th Percentile	-2.2	3.2	4.2	6.7

	1 Year	3 Years	5 Years	10 Years
● Total Fund	0.8	5.5	6.1	8.9
Total Fund Percentile Rank	59	26	22	10
Total Fund Ordinal Rank	42	18	15	6
Number of Funds In Universe	71	71	70	64
▲ Interim SAA Policy	0.0	4.3	4.5	7.8

UNIVERSE COMPARISON

InvMetrics Public DB > $1B Net (peer)

1 Year



	Anlzd Return	Anlzd Standard Deviation	Sharpe Ratio	Sortino Ratio
● Total Fund Return	0.8	8.2	-0.1	0.1
Percentile Rank	59	6	62	50
Ordinal Rank	42	4	44	36
▲ Interim SAA Policy Return	0.0	9.4	-0.1	0.0
Percentile Rank	76	14	82	76
Ordinal Rank	53	10	57	51

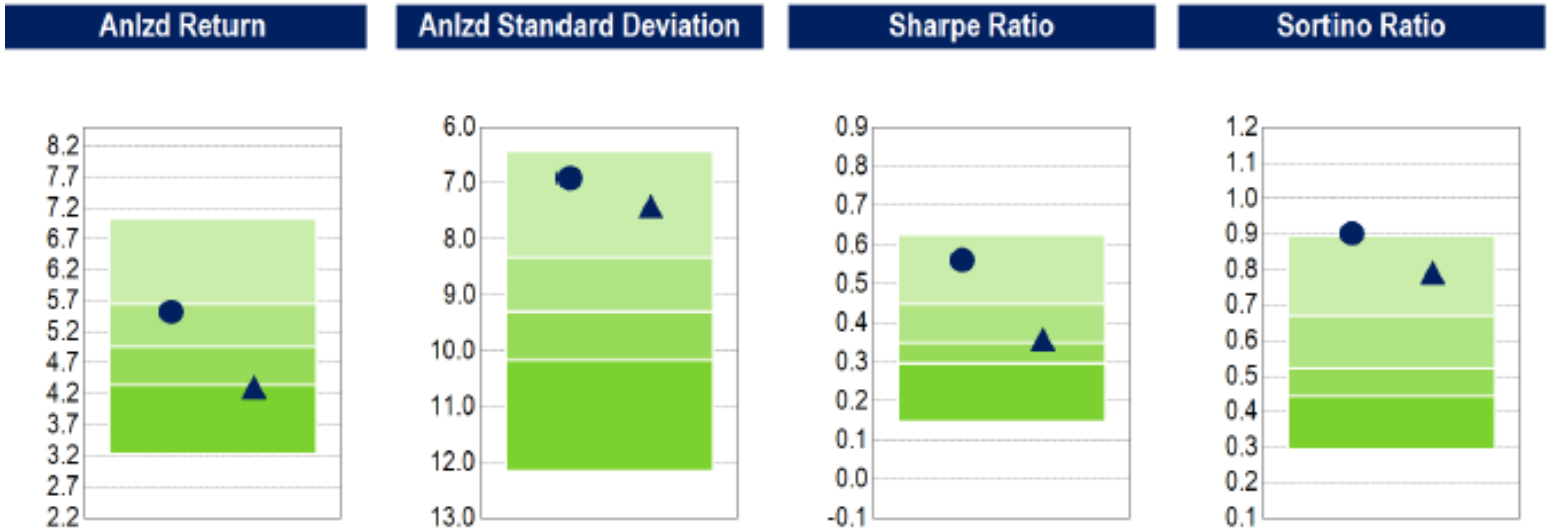
Universe		Universe		Universe		Universe	
5th %tile	4.2	5th %tile	8.1	5th %tile	0.3	5th %tile	0.4
25th %tile	2.6	25th %tile	11.1	25th %tile	0.1	25th %tile	0.2
Median	1.3	Median	12.1	Median	0.0	Median	0.1
75th %tile	0.0	75th %tile	13.9	75th %tile	-0.1	75th %tile	0.0
95th %tile	-2.2	95th %tile	15.9	95th %tile	-0.3	95th %tile	-0.1

Universes are constructed using net of fee returns; therefore, ASRS rank is based on net of fee returns.
Rankings are from highest (1) to lowest (100) in the InvMetrics Public Funds > $1 Billion Net Universe.
The InvMetrics Public Funds > $1 Billion Net Universe contains 71 observations for the period ending June 30, 2020.

UNIVERSE COMPARISON

InvMetrics Public DB > $1B Net (peer)

3 Year



	Anlzd Return	Anlzd Standard Deviation	Sharpe Ratio	Sortino Ratio
● Total Fund Return	5.5	6.9	0.6	0.9
Percentile Rank	28	9	14	5
Ordinal Rank	20	6	10	4
▲ Interim SAA Policy Return	4.3	7.4	0.4	0.8
Percentile Rank	79	14	48	12
Ordinal Rank	55	10	34	8

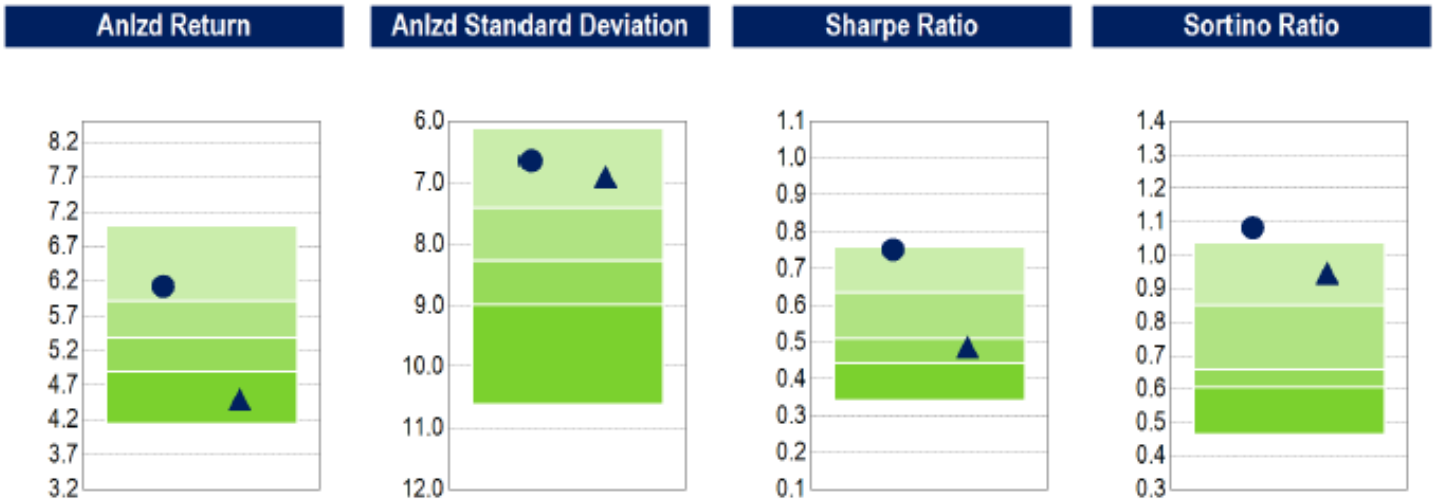
Universe		Universe		Universe		Universe	
5th %tile	7.0	5th %tile	6.4	5th %tile	0.6	5th %tile	0.9
25th %tile	5.7	25th %tile	8.3	25th %tile	0.4	25th %tile	0.7
Median	5.0	Median	9.3	Median	0.4	Median	0.5
75th %tile	4.4	75th %tile	10.2	75th %tile	0.3	75th %tile	0.4
95th %tile	3.2	95th %tile	12.1	95th %tile	0.1	95th %tile	0.3

Universes are constructed using net of fee returns; therefore, ASRS rank is based on net of fee returns.
Rankings are from highest (1) to lowest (100) in the InvMetrics Public Funds > $1 Billion Net Universe.
The InvMetrics Public Funds > $1 Billion Net Universe contains 71 observations for the period ending June 30, 2020.

UNIVERSE COMPARISON

InvMetrics Public DB > $1B Net (peer)

5 Year



Total Fund Return	6.1	6.6	0.6	1.1
Percentile Rank	22	11	8	3
Ordinal Rank	15	8	6	2

Interim SAA Policy Return	4.5	6.9	0.5	0.9
Percentile Rank	91	16	59	13
Ordinal Rank	64	11	41	9

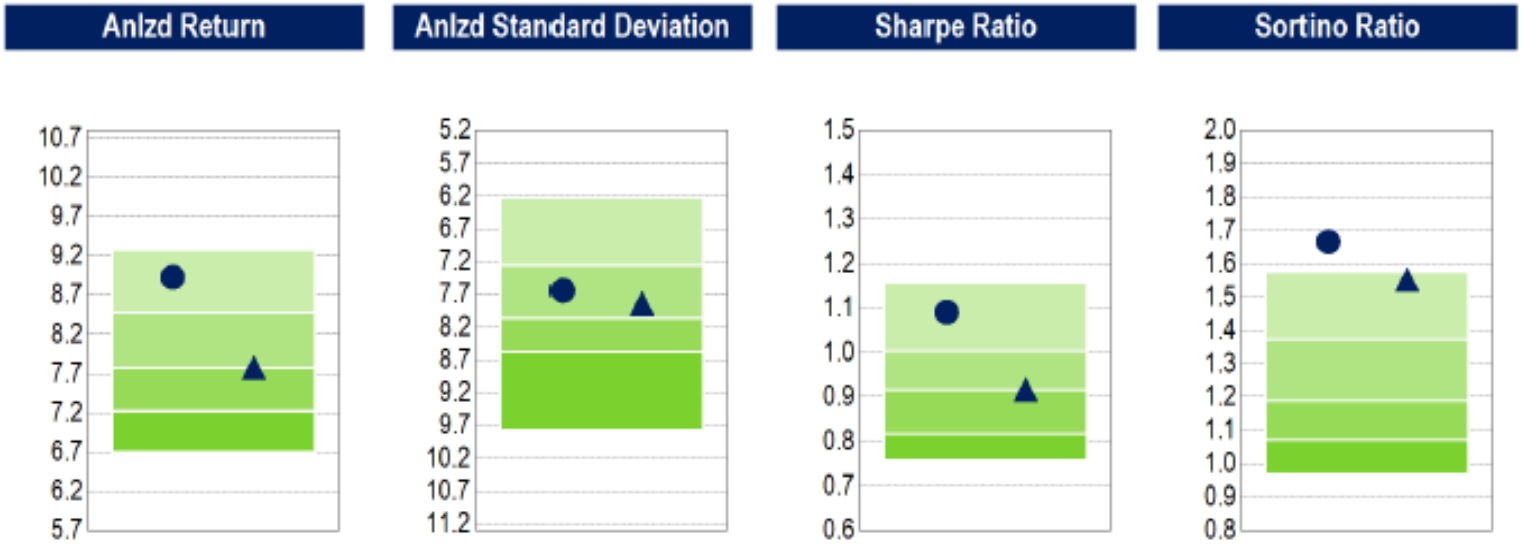
Universe		Universe		Universe		Universe	
5th %tile	7.0	5th %tile	6.1	5th %tile	0.8	5th %tile	1.0
25th %tile	5.9	25th %tile	7.4	25th %tile	0.6	25th %tile	0.9
Median	5.4	Median	8.3	Median	0.5	Median	0.7
75th %tile	4.9	75th %tile	9.0	75th %tile	0.4	75th %tile	0.6
95th %tile	4.2	95th %tile	10.6	95th %tile	0.3	95th %tile	0.5

Universes are constructed using net of fee returns; therefore, ASRS rank is based on net of fee returns.
Rankings are from highest (1) to lowest (100) in the InvMetrics Public Funds > $1 Billion Net Universe.
The InvMetrics Public Funds > $1 Billion Net Universe contains 71 observations for the period ending June 30, 2020.

UNIVERSE COMPARISON

InvMetrics Public DB > $1B Net (peer)

10 Year



	Anlzd Return	Anlzd Standard Deviation	Sharpe Ratio	Sortino Ratio
● Total Fund Return	8.9	7.6	1.1	1.7
Percentile Rank	10	42	12	2
Ordinal Rank	6	27	8	1
▲ Interim SAA Policy Return	7.8	7.8	0.9	1.6
Percentile Rank	51	46	52	7
Ordinal Rank	33	29	33	4
Universe				
5th %tile	9.3	6.2	1.2	1.6
25th %tile	8.5	7.3	1.0	1.4
Median	7.8	8.1	0.9	1.2
75th %tile	7.2	8.6	0.8	1.1
95th %tile	6.7	9.8	0.8	1.0

Universes are constructed using net of fee returns; therefore, ASRS rank is based on net of fee returns.
Rankings are from highest (1) to lowest (100) in the InvMetrics Public Funds > $1 Billion Net Universe.
The InvMetrics Public Funds > $1 Billion Net Universe contains 71 observations for the period ending June 30, 2020.

ASSET CLASS PERFORMANCE VS. BENCHMARK

	1 Year Return	3 Year Return
Total Equity (TWR)	-1.6%	5.0%
Custom Total Equity Benchmark (TWR)	-1.3%	4.8%
Excess Return	-0.3%	0.2%
Interest Rate Sensitive (TWR)	9.0%	5.4%
Bloomberg Barclays US Aggregate Bond Index (TWR)	8.7%	5.3%
Excess Return	0.3%	0.1%
Credit (TWR)	4.4%	7.3%
Custom Credit Benchmark (TWR)	-6.9%	1.5%
Excess Return	11.3%	5.8%
Real Estate (IRR)	-0.7%	4.6%
Custom Real Estate Benchmark (IRR)	3.8%	5.0%
Excess Return	-4.5%	-0.4%

Note: Composition of ASRS Custom Asset Class Benchmarks can be found in the appendix.

CASH MANAGEMENT

Month	External CFs	Last day of the Month Ending Balance*
Jun - 19	($97.3)	$368.0
Jul – 19	($163.9)	$465.2
Aug – 19	($108.9)	$467.2
Sep - 19	($108.2)	$365.2
Oct – 19	($87.3)	$676.3
Nov – 19	($96.1)	$404.2
Dec - 19	($75.4)	$521.9
Jan – 20	($63.6)	$412.7
Feb – 20	($107.4)	$376.8
Mar - 20	($95.8)	$730.4
Apr – 20	($98.8)	$1,210.7
May – 20	($56.7)	$1,034.2
Jun - 20	($68.6)	$853.8

***Includes assetized & unassetized cash balances (Inception of 1/26/15); represents monies to be used for funding needs that occur in subsequent month(s). Generally, monthly pension payments occur on the first day of month.**

INDEPENDENT OVERSIGHT/COMPLIANCE

Note: All of the data shown on the following pages is as of June 30, 2020 and reflects the deduction of investment manager fees, unless otherwise noted.

SAA POLICY COMPLIANCE

Assets	Current Mkt Value	Current Allocation	Interim SAAP	Interim SAAP Difference	Policy Range	Within Range	SAAP
Total Equity	$20,906,101,493	51.6%	54.5%	-2.9%	35% - 65%	Yes	50%
Interest Rate Sensitive	$3,773,316,644	9.3%	10.8%	-1.5%	0% - 20%	Yes	10%
Credit	$8,505,909,572	21.0%	19.2%	1.8%	10% - 30%	Yes	20%
Real Estate	$6,762,931,831	16.7%	15.5%	1.2%	10% - 30%	Yes	20%
Other	$366,909	0.0%		0.0%	0% - 10%		0%
Cash	$544,522,568	1.3%		1.3%	0% - 5%		0%
Total	$40,493,149,017	100%	100%				100%

Note:

Values shown for private markets portfolios include cash flows that occurred during 2Q 2020.

Total Equity market value includes futures positions.

Interim SAA Policy includes proration of unfunded Credit assets and unfunded in Real Estate assets. According to policy, the proration is applied 83.3% to Total Equity and 16.7% to Interest Rate Sensitive.

Policy Ranges shown are relative to the long-term SAAP and may cause some asset classes to be out of range while implementation of the long-term SAAP is in process.

Market values include manager held cash.

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PERFORMANCE SUMMARY - PUBLIC MARKETS

	Market Value ($)	% of Portfolio	3 Mo (%)	Rank	YTD (%)	Rank	1 Yr (%)	Rank	3 Yrs (%)	Rank	5 Yrs (%)	Rank	Inception (%)
Total Fund	**40,493,149,017**	**100.0**	**5.0**	**95**	**-4.6**	**62**	**0.8**	**59**	**5.5**	**26**	**6.1**	**22**	**9.5**
Interim SAA Policy			*3.3*	*99*	*-5.4*	*77*	*0.0*	*76*	*4.3*	*79*	*4.5*	*91*	*9.0*
Over/Under			1.7		0.8		0.8		1.2		1.6		0.5
InvMetrics Public DB > $1B Net Median			*10.1*		*-4.3*		*1.3*		*5.0*		*5.4*		--
Total Public Equity	**17,136,224,022**	**42.3**	**19.7**	**57**	**-8.3**	**80**	**-0.2**	**81**	**4.8**	**75**	**5.8**	**67**	**6.6**
ASRS Custom Total Public Equity Benchmark			*19.9*	*46*	*-6.9*	*41*	*1.5*	*41*	*5.9*	*32*	*6.6*	*22*	*6.3*
Over/Under			-0.2		-1.4		-1.7		-1.1		-0.8		0.3
InvMetrics Public DB > $1 Billion Total Equity Net Median			*19.9*		*-7.1*		*0.9*		*5.1*		*6.0*		*5.9*
Total Domestic Equity	**9,642,387,523**	**23.8**	**22.1**	**49**	**-6.0**	**60**	**3.6**	**54**	**8.2**	**59**	**9.0**	**46**	**11.0**
ASRS Custom Domestic Equity Benchmark			*22.3*	*42*	*-3.3*	*11*	*6.7*	*11*	*10.2*	*13*	*10.4*	*5*	*11.3*
Over/Under			-0.2		-2.7		-3.1		-2.0		-1.4		-0.3
InvMetrics Public DB > $1 Billion US Equity Net Median			*21.8*		*-4.8*		*4.0*		*8.7*		*9.0*		--
Total International Equity	**7,493,796,099**	**18.5**	**16.8**	**71**	**-11.1**	**69**	**-4.8**	**70**	**0.9**	**69**	**2.1**	**77**	**5.6**
ASRS Custom Int'l Equity Benchmark			*17.0*	*70*	*-11.2*	*70*	*-4.7*	*70*	*0.9*	*69*	*2.3*	*72*	*5.4*
Over/Under			-0.2		0.1		-0.1		0.0		-0.2		0.2
InvMetrics Public DB > $1 Billion Global ex-US Equity Net Median			*17.6*		*-10.4*		*-3.2*		*1.5*		*2.8*		--
Interest Rate Sensitive Fixed Income	**3,773,316,644**	**9.3**	**3.0**	**93**	**6.4**	**17**	**9.0**	**14**	**5.4**	**14**	**4.6**	**22**	**7.9**
BBgBarc US Aggregate TR			*2.9*	*94*	*6.1*	*25*	*8.7*	*22*	*5.3*	*33*	*4.3*	*39*	--
Over/Under			0.1		0.3		0.3		0.1		0.3		
InvMetrics Public DB > $1 Billion US Fixed Income Net Median			*4.8*		*4.7*		*7.2*		*4.9*		*4.3*		--
Other	**366,909**	**0.0**											

Note: See appendix for custom benchmark definitions.

PERFORMANCE SUMMARY – PRIVATE MARKETS ONE QUARTER LAGGED IRR

	Market Value ($)	% of Portfolio	3 Mo (%)	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	Inception (%)	Since
Total Fund (TWR)	**40,493,149,017**	**100**	**5.0**	**0.8**	**5.5**	**6.1**	**8.9**	**9.5**	**Jul-75**
Interim SAA Policy			*3.3*	*0.0*	*4.3*	*4.5*	*7.8*	*9.0*	*Jul-75*
Over/Under			1.7	0.8	1.2	1.6	1.1	0.5	
Private Equity (IRR)	**3,769,877,471**	**9.3**	**-12.2**	**-7.3**	**6.5**	**8.6**	**10.9**	**10.2**	
MSCI ACWI Blended			*-22.4*	*-13.0*	*0.0*	*2.8*	*8.0*	*8.4*	
Over/Under			10.2	5.7	6.5	5.8	2.9	1.8	
Credit (IRR)	**8,505,909,572**	**21.0**	**-2.5**	**4.0**	**6.9**	**9.3**	**8.6**	**9.0**	
S&P LSTA/Leveraged Loan Index + 2.5%			*-12.3*	*-6.9*	*1.4*	*3.4*	*4.5*	*5.2*	
Over/Under			9.8	10.9	5.5	5.9	4.1	3.8	
Real Estate (IRR)	**6,762,931,831**	**16.7**	**-2.9**	**-0.7**	**4.6**	**7.1**	**9.9**	**7.5**	
NCREIF ODCE 1 QTR Lagged (net)			*0.8*	*3.8*	*5.0*	*6.8*	*9.1*	*6.5*	
Over/Under			-3.7	-4.5	-0.4	0.3	0.8	1.0	

Note: See appendix for custom benchmark definitions
Private Equity, Credit sub-asset classes and Real Estate returns are money-weighted (IRR) and one-quarter lagged
Market Values include cash flows within 2Q 2020
Total Fund performance is shown on a time-weighted return (TWR) basis

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PUBLIC MARKET ASSET CLASS ANALYSIS

	3 Years Ending June 30, 2020												
	% of Tot	Anlzd Ret	Rank	Anlzd Std Dev	Rank	Tracking Error	Rank	Info Ratio	Rank	Anlzd AJ	Rank	Beta	Sharpe Ratio
Total Public Equity	42.3%	4.8%	75	16.9%	65	0.8%	9	-1.5	92	-1.1%	71	1.0	0.2
ASRS Custom Total Public Equity Benchmark	--	5.9%	32	16.7%	63	--	--	--	--	--	38	--	0.3
Total Domestic Equity	23.8%	8.2%	59	18.2%	55	1.3%	42	-1.5	80	-2.2%	62	1.0	0.4
ASRS Custom Domestic Equity Benchmark	--	10.2%	13	17.7%	37	--	--	--	--	--	17	--	0.5
Total International Equity	18.5%	0.9%	69	16.0%	44	0.6%	1	0.0	58	0.0%	57	1.0	0.0
ASRS Custom Int'l Equity Benchmark	--	0.9%	69	16.3%	54	--	--	--	--	--	57	--	0.0
Interest Rate Sensitive Fixed Income	9.3%	5.4%	14	3.2%	10	0.1%	1	0.8	5	0.1%	31	1.0	1.2
BBgBarc US Aggregate TR	--	5.3%	33	3.3%	10	--	--	--	--	--	40	--	1.1

Note: Performance is reported net of fees.
Underlying composites do not add up to 100% because the chart excludes private market composites.
Ranks for statistics shown above are based on the respective universe against which the portfolio is ranked on the asset class performance summary that precedes this section of the analysis.
Rankings are from highest (1) to lowest (100) in the eVestment Universe.
Composition of Interim SAA Policy and ASRS Custom Benchmarks can be found in the appendix.

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PUBLIC MARKET ASSET CLASS ANALYSIS

	5 Years Ending June 30, 2020												
	% of Tot	Anlzd Ret	Rank	Anlzd Std Dev	Rank	Tracking Error	Rank	Info Ratio	Rank	Anlzd AJ	Rank	Beta	Sharpe Ratio
Total Public Equity	42.3%	5.8%	67	14.8%	60	0.7%	10	-1.1	98	-0.8%	70	1.0	0.3
ASRS Custom Total Public Equity Benchmark	--	6.6%	22	14.8%	61	--	--	--	--	--	34	--	0.4
Total Domestic Equity	23.8%	9.0%	46	15.6%	49	1.1%	31	-1.2	81	-1.5%	59	1.0	0.5
ASRS Custom Domestic Equity Benchmark	--	10.4%	5	15.4%	29	--	--	--	--	--	15	--	0.6
Total International Equity	18.5%	2.1%	77	14.9%	39	0.7%	1	-0.3	90	-0.2%	83	1.0	0.1
ASRS Custom Int'l Equity Benchmark	--	2.3%	72	15.1%	62	--	--	--	--	--	71	--	0.1
Interest Rate Sensitive Fixed Income	9.3%	4.6%	22	3.1%	13	0.3%	5	0.9	3	0.2%	43	1.0	1.1
BBgBarc US Aggregate TR	--	4.3%	39	3.1%	11	--	--	--	--	--	82	--	1.0

Note: Performance is reported net of fees.
Underlying composites do not add up to 100% because the chart excludes private market composites.
Ranks for statistics shown above are based on the respective universe against which the portfolio is ranked on the asset class performance summary that precedes this section of the analysis.
Rankings are from highest (1) to lowest (100) in the eVestment Universe.
Composition of Interim SAA Policy and ASRS Custom Benchmarks can be found in the appendix.

ASSET CLASS COMMITTEE MEETING

- **June 4, 2020 – Combined Asset Class Committee**
  - Real Estate manager investment recommendation ($14.5mm)
    - Extension consultant and staff recommendation to commit new capital to an existing investment management relationship
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation
  - Real Estate manager recommendation
    - Extension consultant and staff recommendation to change investment guidelines within an existing investment management relationship
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation
  - 2020 Public Equity asset class implementation
    - Staff recommendation to implement public equity according to strategic initiatives outlined in the plan
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation

- **June 23, 2020 – Combined Asset Class Committee**
  - Monthly Real Estate report reviewed
  - Real Estate manager recommendation
    - Extension consultant and staff recommendation to sell an asset
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation
  - Real Estate manager recommendation
    - Extension consultant and staff recommendation to sell an asset
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation

ASSET CLASS COMMITTEE MEETING

- **June 23, 2020 – Combined Asset Class Committee**
  - Real Estate manager recommendation
    - Extension consultant and staff recommendation to terminate an existing investment management relationship
    - Extension consultant and staff replacing legacy manager as operator of the assets
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation

- **July 7, 2020 – Combined Asset Class Committee**
  - Real Estate manager investment recommendation ($400mm)
    - Extension consultant and staff recommendation to commit new capital to an existing investment management relationship
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation
  - Private Equity manager investment recommendation (€50mm)
    - Extension consultant and staff recommendation to commit new capital to a new investment manager relationship
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation

- **July 14, 2020 – Combined Asset Class Committee**
  - Public Equity initiative
    - Staff recommendation to participate in industry associations associated with public markets trading
  - Monthly Real Estate report reviewed

ASSET CLASS COMMITTEE MEETING

- **July 14, 2020 – Combined Asset Class Committee**
  - Real Estate manager recommendation
    - Extension consultant and staff recommendation to sell a portion of an existing asset
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation
  - Private Equity manager investment recommendation (€50mm)
    - Extension consultant and staff recommendation to commit new capital to a new investment manager relationship
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation

- **July 21, 2020 – Combined Asset Class Committee**
  - Real Estate manager recommendation
    - Extension consultant and staff recommendation to terminate a manager via redemption of manager's interest in the form of a maximum of 2 properties from the 17 property portfolio
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation
  - Real Estate manager recommendation
    - Extension consultant and staff recommendation to terminate a manger and sale of the portfolio to the manager
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation

- **July 28, 2020 – Combined Asset Class Committee**
  - Real Estate manager variance request
    - Extension consultant and staff recommendation for a variance to investment guidelines to invest in a private placement security
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation

ASSET CLASS COMMITTEE MEETING

- **August 11, 2020 – Combined Asset Class Committee**
  - Real Estate manager recommendation
    - Extension consultant and staff recommendation to market and sell a portfolio with subsequent termination of the manager
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation

- **September 8, 2020 – Combined Asset Class Committee**
  - Credit manager recommendation ($100mm)
    - Staff recommendation to commit new capital to an existing investment manager relationship
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation
  - Real Estate manager recommendation
    - Extension consultant and staff recommendation to change investment guidelines within an existing investment management relationship
    - Guideline changes include a change to investable markets and return objectives
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation
  - Real Estate manager recommendation
    - Extension consultant and staff recommendation to sell an asset
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation
  - Real Estate monthly report reviewed
  - Private Equity manager investment recommendation ($50mm)
    - Extension consultant and staff recommendation to commit new capital to an existing investment manager relationship
    - Due diligence process was followed in accordance with SIP 006 – Investment Manager, Partner, and Co-Investment Selection and Oversight
    - Committee approved the recommendation

ASSET CLASS COMMITTEE MEETING

- **September 8, 2020 – Combined Asset Class Committee**
  - Staff reviewed rationale for current positioning in public markets
    - Review of market valuation metrics and economic health metrics
  - Public Equity recommendation to direct brokerage services to a vendor
    - The committee reviewed the cost benefit analysis of pursuing the relationship
    - The committee directed staff to execute on the vendor relationship

GENERAL OBSERVATIONS

- **Staff continues to manage the portfolio through the economic crisis caused by the pandemic well**
  - Liquidity study performed and focus on efficient asset management has resulted in benefits to the Plan

- **Staff is proactive in driving change in the public equity portfolio and driving operational efficiency throughout the portfolio**
  - Notably, staff has taken over operational oversight of real estate assets

- **The Plan is outperforming its Strategic Asset Allocation Policy (SAAP) benchmark in the short-run and over longer periods outperforming both the SAAP and actuarial rate of return**

- **Public Equity has contributed negatively to performance over the past five years**
  - Longer-term (5 year) Public Equity relative performance contributing negatively to relative performance; strategic plans in 2020 are aimed at addressing this underperformance

- **Private markets contributing to positive longer-term results**
  - Real Estate is contributing positively to relative performance over the long-term (5 years and longer)
  - Private Equity program has contributed positively in absolute terms and benchmark-relative terms
  - Real Estate as an asset class is 3.3% underweight (based on NAV) but has approximately $4.0 billion in remaining capital commitments as of Q1 2020 (or approximately 9.9% of Total Fund NAV); strategic implementation plan accounts for shorter-term underweight positioning
  - Credit is a strong performer against its benchmark in the short and long-run and is overwieght vs. policy

- **Current positioning is consistent with IMD House Views and strategic implementation plans**

INDEPENDENT OVERSIGHT/COMPLIANCE: LTD

Note: All of the data shown on the following pages is as of June 30, 2020 and reflects the deduction of investment manager fees, unless otherwise noted.

NEPC, LLC

LONG TERM DISABILITY PERFORMANCE

	Quarter	1 Year	3 Years	5 Years	10 Years	Since Inception (July-02)
Long Term Disability	5.1%	0.8%	5.5%	5.8%	8.5%	6.3%
LTD SAA Policy[1]	3.3%	0.0%	4.3%	5.2%	8.1%	6.4%
Excess Return	1.8%	0.8%	1.2%	0.6%	0.4%	-0.1%

[1]LTD SAA Policy composition can be found in the appendix.

MARKET ENVIRONMENT UPDATE AND OUTLOOK

NEPC, LLC

ECONOMIC ENVIRONMENT

- **Q2 Real GDP (advance estimate) plunged at an annual rate of -32.9%.**
  - Retail sales ended May at -1.3% on a YoY basis (April retail sales were down 15.5% YoY). In the same period last year the YoY growth rate was 5.7%.
  - Corporate profits (ended January) as a percent of GDP decreased to 7.6% from 8.7% (in October) and remain elevated relative to historical levels.
  - The inventory-to-sales ratio ended May at 1.5 up from 1.4 in December. Levels have remained relatively constant since early 2010 with a spike to 1.7 in April.
  - The U.S. trade deficit widened (ended May) as the value of exports decreased by 4.4%.

- **The unemployment rate spiked up to 11.1% ended June, up from 4.4% in Q1; U-6, a broader measure of unemployment, increased to 18.0% in Q2 from 8.7% in Q1.**

- **The Case-Shiller Home Price Index (ended May) increased to 218.9 from 215.2 (in March) and remains at levels higher than that of pre-financial crisis levels of 150.9.**

- **Rolling 12-month seasonally-adjusted CPI saw a down-tick to 0.71% in Q2 from 1.52% ended Q1; Capacity Utilization decreased to 68.6 in Q2 from 73.5% in Q1.**

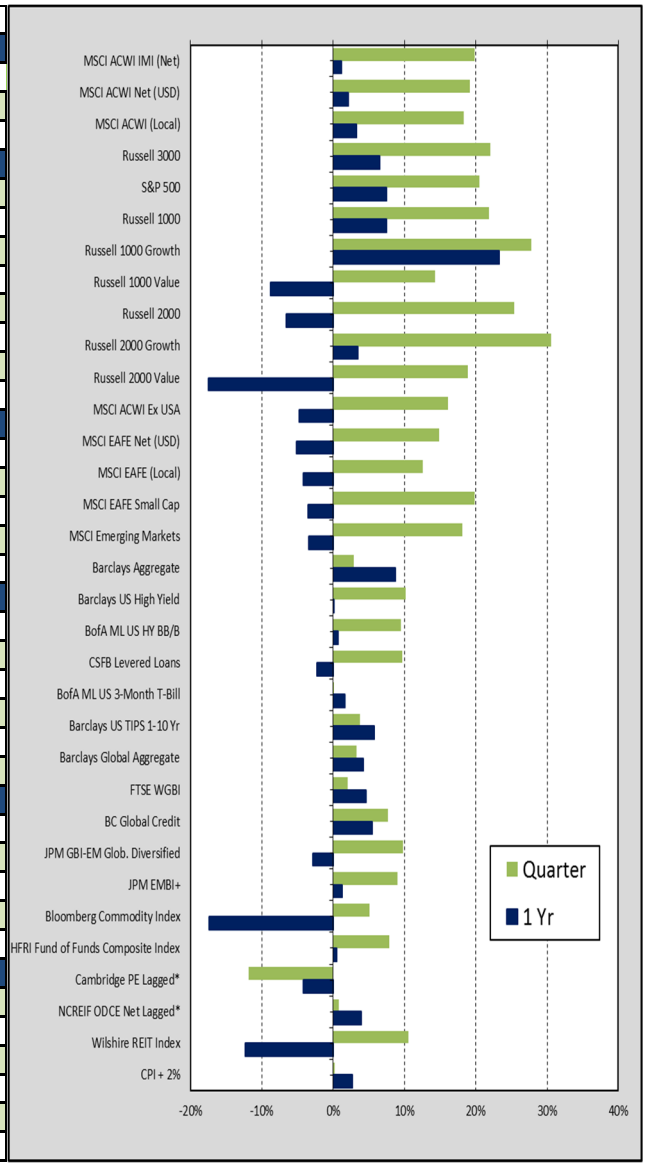
- **Fed Funds rate remains at a targeted range of 0.00%-to-0.25%. The 10-year Treasury Yield (constant maturity) finished Q2 down to 0.7% from 0.9% in Q1.**

- **The Fed remains committed to continuing stimulative action as needed to support the US economy. The Fed's balance sheet continues to grow in wake of the pandemic.**

- **S&P valuations increased in Q2 to 29.96x, and is higher than the 10-year average of 25.9x.**
  - Cyclically adjusted Shiller PE ratio remains above the long-term average of 16.7x

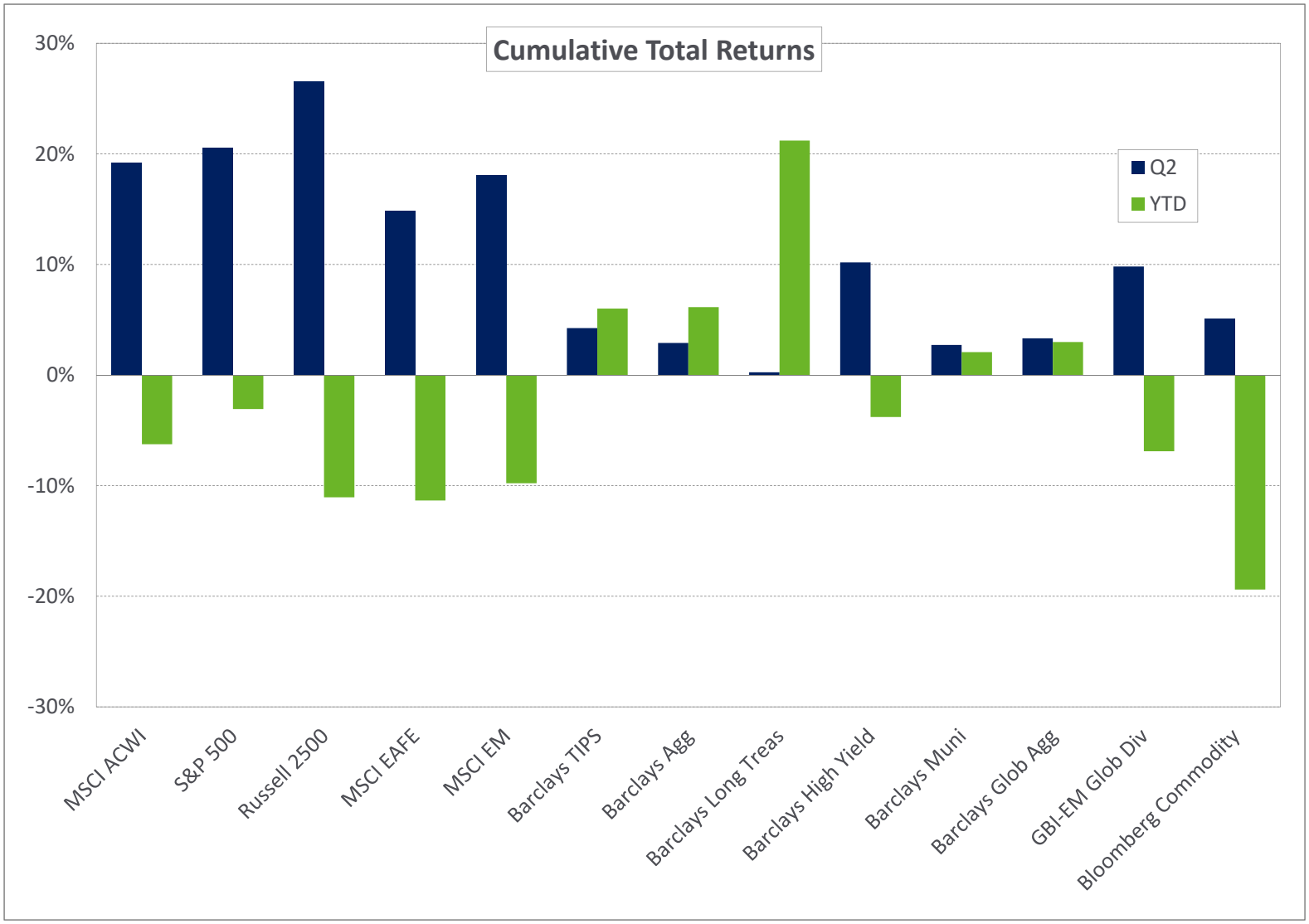
MARKET ENVIRONMENT – Q2 2020 OVERVIEW

		Qtr.	1 Yr.	3 Yr.	5 Yr.	10 Yr.
World Equity Benchmarks						
MSCI ACWI IMI (Net)	World with Small Cap	19.83%	1.17%	5.55%	6.11%	9.10%
MSCI ACWI Net (USD)	World W/O Small Cap	19.22%	2.11%	6.14%	6.46%	9.16%
MSCI ACWI (Local)	World (Local Currency)	18.27%	3.27%	6.45%	6.78%	9.82%
Domestic Equity Benchmarks						
Russell 3000	Domestic All Cap	22.03%	6.53%	10.04%	10.03%	13.72%
S&P 500	Large Core	20.54%	7.50%	10.73%	10.73%	13.99%
Russell 1000	Large Core	21.82%	7.48%	10.64%	10.47%	13.97%
Russell 1000 Growth	Large Growth	27.84%	23.28%	18.99%	15.89%	17.23%
Russell 1000 Value	Large Value	14.29%	-8.84%	1.82%	4.64%	10.41%
Russell 2000	Small Core	25.42%	-6.63%	2.01%	4.29%	10.50%
Russell 2000 Growth	Small Growth	30.58%	3.48%	7.86%	6.86%	12.92%
Russell 2000 Value	Small Value	18.91%	-17.48%	-4.35%	1.26%	7.82%
International Equity Benchmarks						
MSCI ACWI Ex USA	World ex-US	16.12%	-4.80%	1.13%	2.26%	4.97%
MSCI EAFE Net (USD)	Int'l Developed	14.88%	-5.13%	0.81%	2.05%	5.73%
MSCI EAFE (Local)	Int'l Developed (Local Currency)	12.60%	-4.24%	1.26%	2.63%	6.86%
MSCI EAFE Small Cap	Small Cap Int'l	19.88%	-3.52%	0.53%	3.81%	8.02%
MSCI Emerging Markets	Emerging Equity	18.08%	-3.39%	1.90%	2.86%	3.27%
Domestic Fixed Income Benchmarks						
Barclays Aggregate	Core Bonds	2.90%	8.74%	5.32%	4.30%	3.82%
Barclays US High Yield	High Yield	10.18%	0.03%	3.33%	4.79%	6.68%
BofA ML US HY BB/B	High Yield	9.52%	0.69%	3.67%	4.81%	6.57%
CSFB Levered Loans	Bank Loans	9.71%	-2.27%	2.13%	2.94%	4.33%
BofA ML US 3-Month T-Bill	Cash	0.02%	1.63%	1.77%	1.19%	0.64%
Barclays US TIPS 1-10 Yr	Inflation	3.76%	5.75%	3.94%	2.97%	2.66%
Global Fixed Income Benchmarks						
Barclays Global Aggregate	Global Core Bonds	3.32%	4.22%	3.79%	3.55%	2.81%
FTSE WGBI	World Gov. Bonds	2.04%	4.60%	3.98%	3.70%	2.37%
BC Global Credit	Global Bonds	7.68%	5.49%	4.49%	4.23%	4.26%
JPM GBI-EM Glob. Diversified	Em. Mkt. Bonds (Local Currency)	9.82%	-2.82%	1.14%	2.34%	1.64%
JPM EMBI+	Em. Mkt. Bonds	9.06%	1.23%	2.66%	4.91%	5.53%
Alternative Benchmarks						
Bloomberg Commodity Index	Commodities	5.08%	-17.38%	-6.14%	-7.69%	-5.82%
HFRI Fund of Funds Composite Index	Fund of Hedge Funds	7.90%	0.49%	2.26%	1.50%	2.79%
Cambridge PE Lagged*	Private Equity	-11.88%	-4.18%	7.89%	8.72%	11.88%
NCREIF ODCE Net Lagged*	Real Estate	0.75%	3.93%	5.85%	7.48%	10.42%
Wilshire REIT Index	REIT	10.56%	-12.31%	0.23%	3.98%	9.22%
CPI + 2%	Inflation/Real Assets	0.21%	2.72%	3.81%	3.63%	3.74%



* As of 3/31/2020

RISK ASSETS RALLIED SIGNIFICANTLY IN Q2



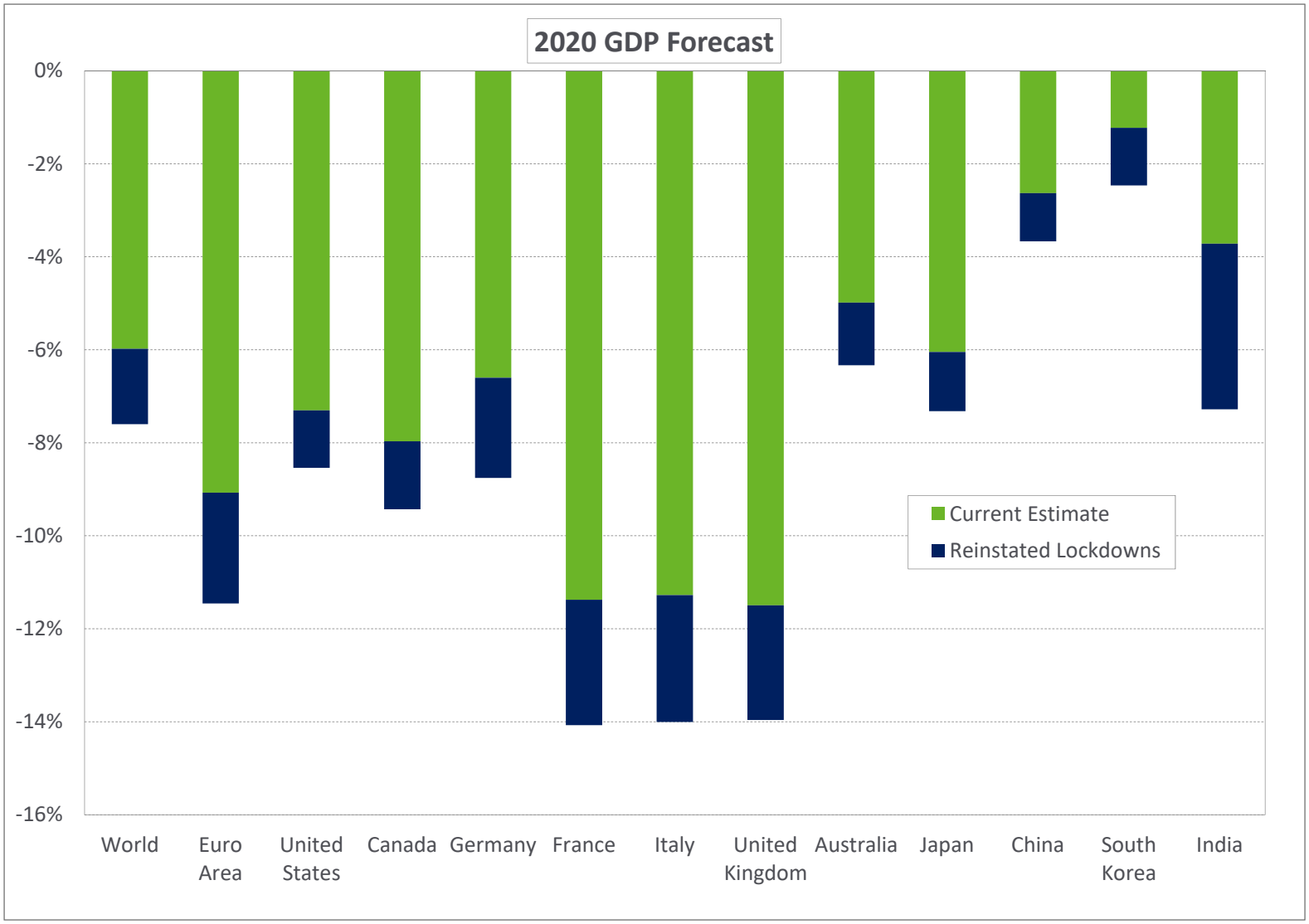
Source: S&P, Russell, MSCI, JPM, Bloomberg, FactSet

THE ECONOMIC BACKDROP IS CHALLENGED

Metric	12/31/19	03/31/20	06/30/20	Trend
S&P 500 CY 2020 Earnings Estimate	$177.81	$160.40	$126.89	
US Real GDP (QoQ%)	2.1%	-5.0%	-33.4%*	
US CY 2020 Real GDP Growth Consensus	1.8%	-0.7%	-5.2%	
US Unemployment Rate	3.5%	4.4%	11.1%	
Continued Claims for Unemployment	1.7M	3.5M	19.1M	
Federal Reserve Balance Sheet as % of Nominal GDP	19.2%	24.4%	32.9%	

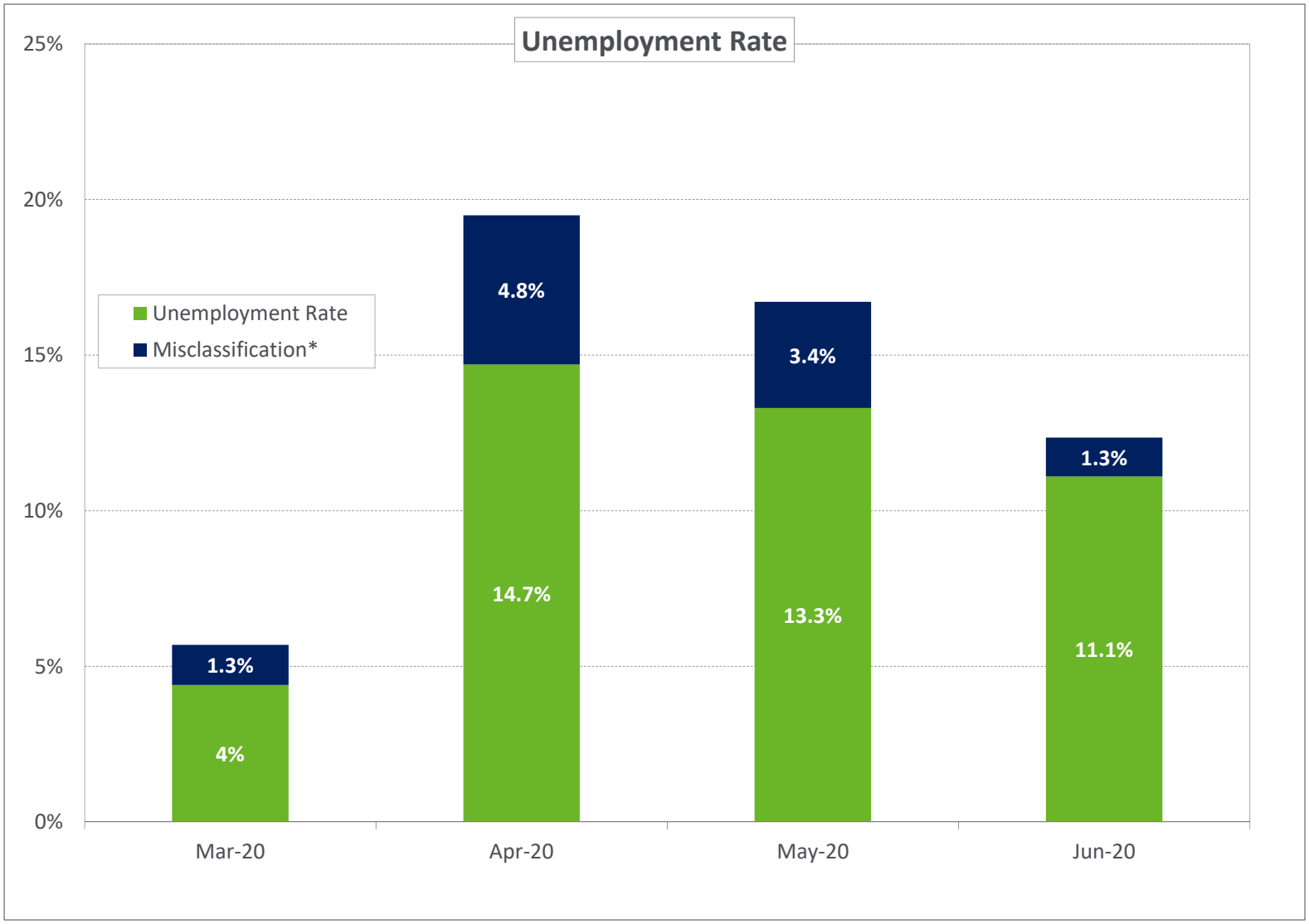
Source: US Bureau of Labor Statistics, Federal Reserve, FactSet, NEPC
*The 06/30/20 real GDP figure represents the consensus estimate from FactSet

COVID WEIGHS ON GROWTH FORECASTS



Source: OECD
The additional decline in economic growth from reinstated lockdowns represents a renewed outbreak of infections that forces economies to re-implement restrictions.

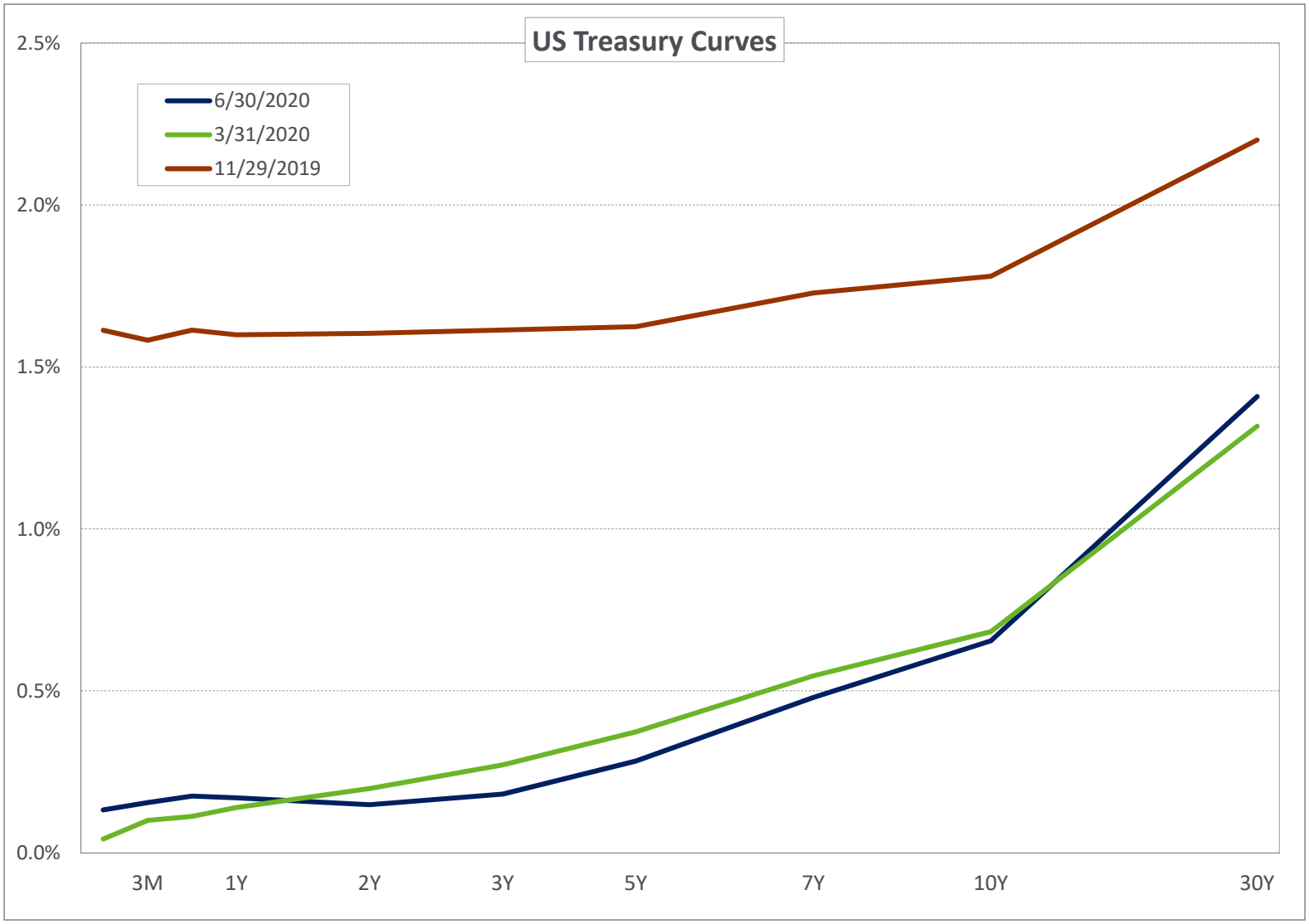
UNEMPLOYMENT MAY BE WORSE THAN REPORTED



Source: Department of Labor

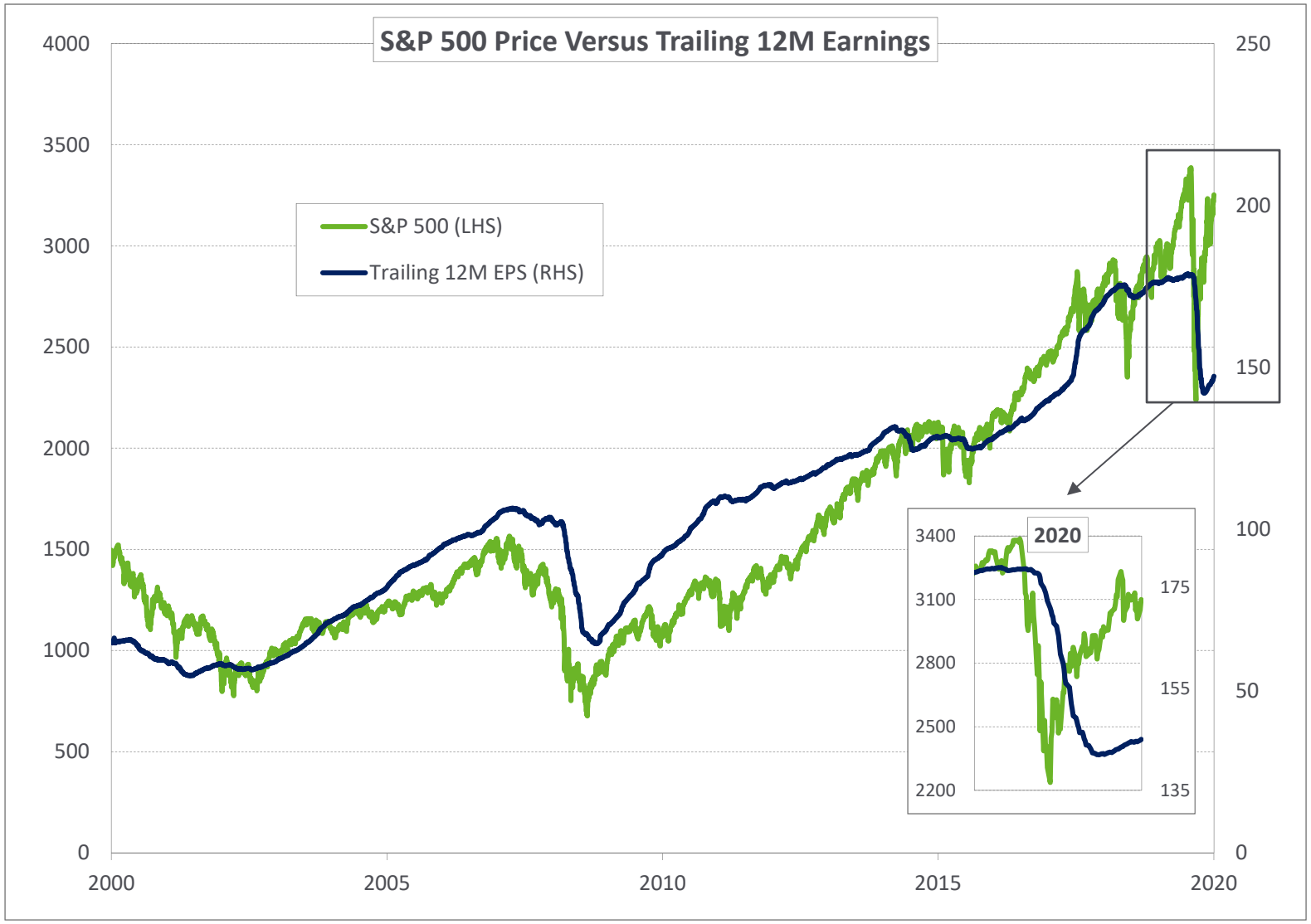
Misclassification* represents an estimate of "unemployed on temporary leave" mislabeled as "employed but absent from work"

INTEREST RATES REFLECT ECONOMIC CONCERNS



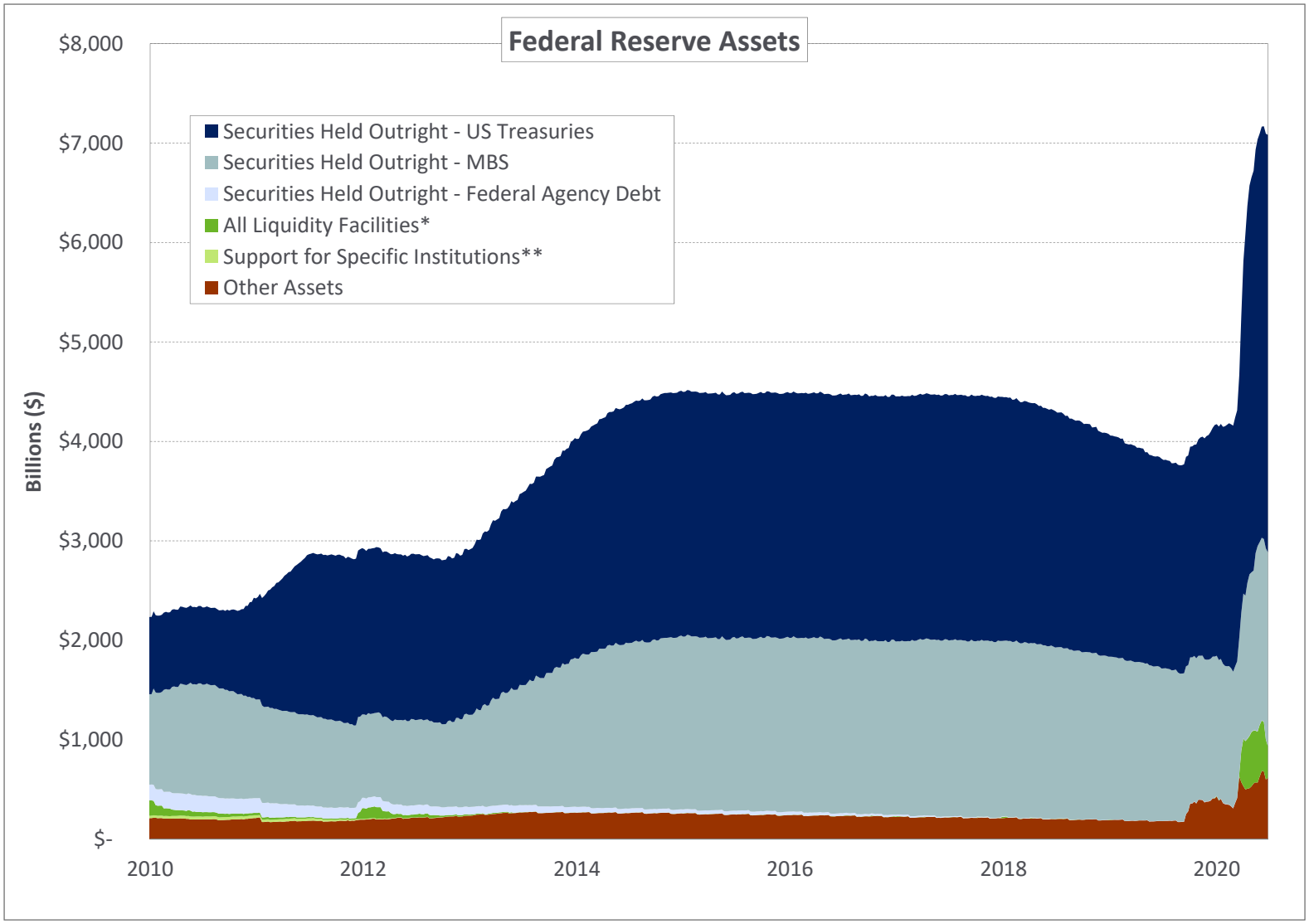
Source: FactSet

EQUITY PRICES DETACHED FROM FUNDAMENTALS



Source: S&P, FactSet
Data as of 7/20/2020

FED BALANCE SHEET GROWTH

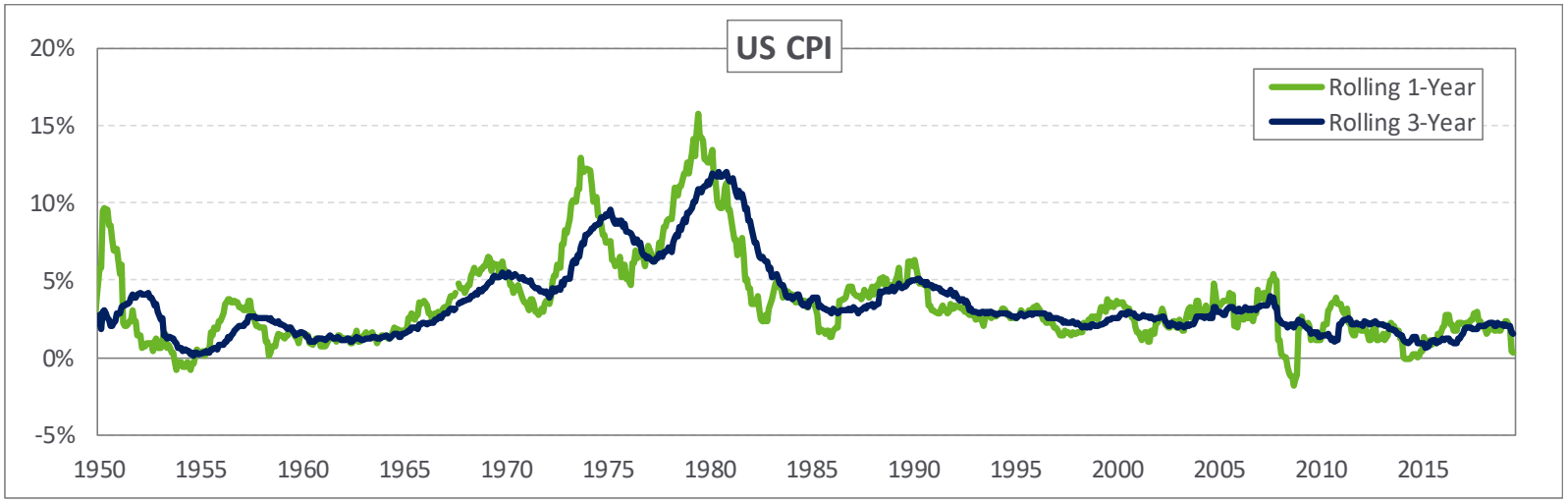


Sources: Federal Reserve, FactSet, NEPC; *All Liquidity Facilities includes term auction credit, primary credit, secondary credit, seasonal credit, Primary Dealer Credit Facility, Asset-Backed Commercial Paper, Money Market Mutual Fund Liquidity Facility, and central bank liquidity swaps; **Support for Specific Institutions includes credit extended to AIG and Maiden Lane LLCs

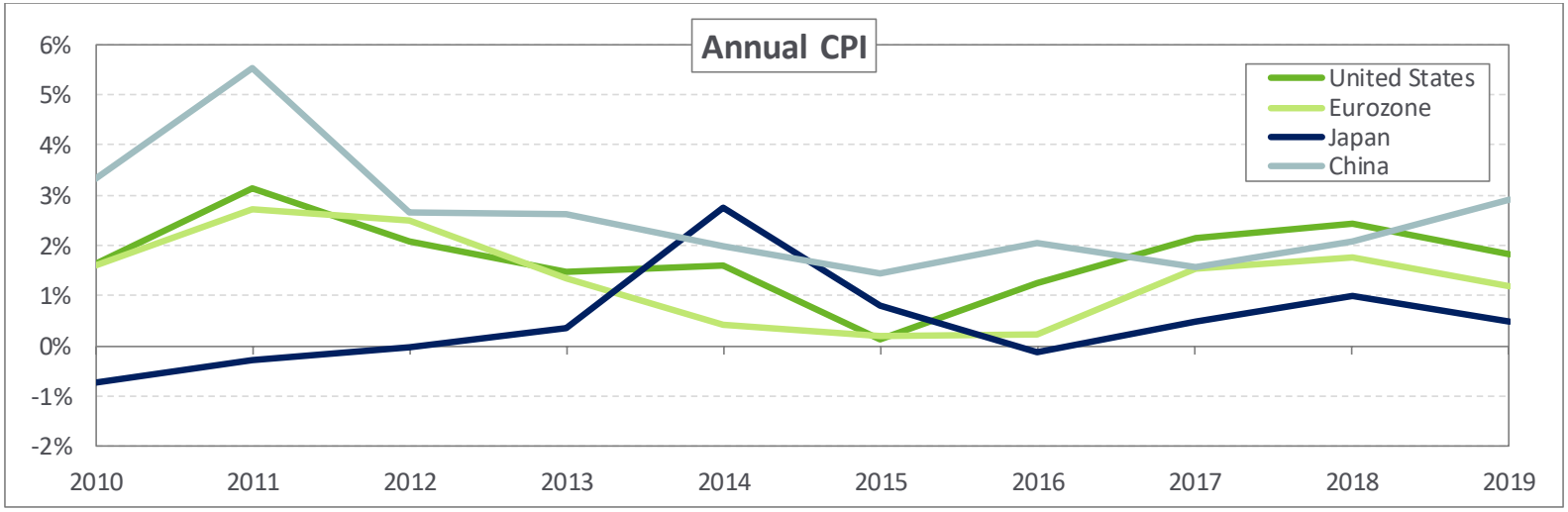
MACRO

NEPC, LLC

INFLATION

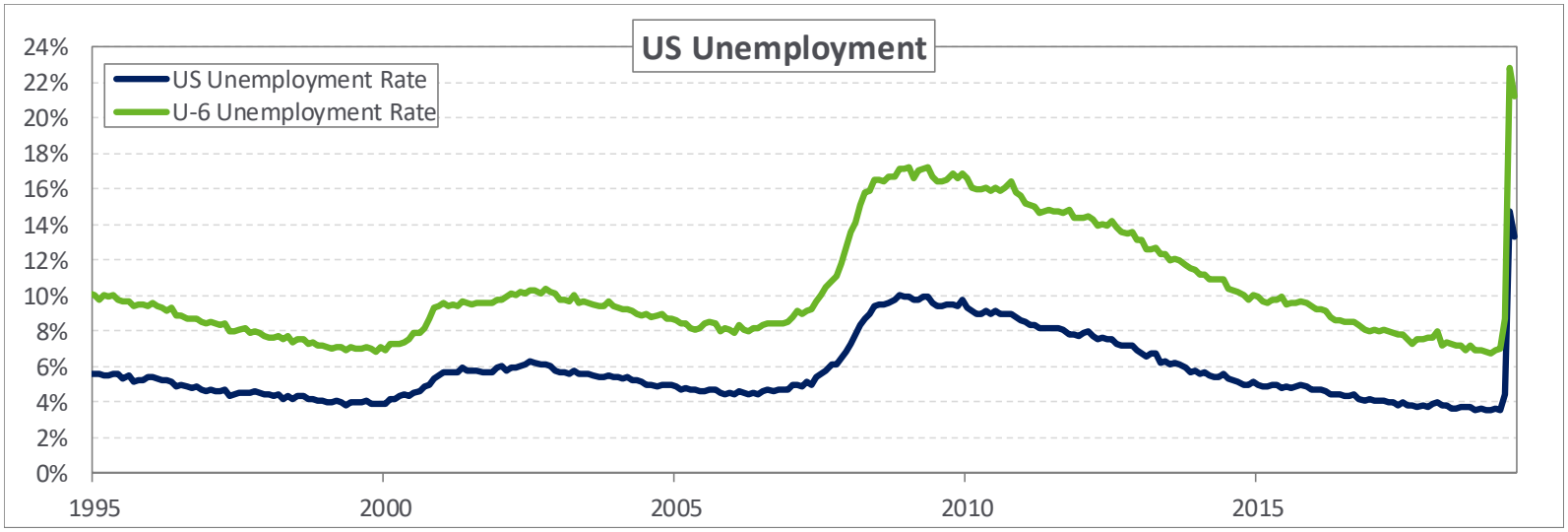


Source: Bureau of Labor Statistics, FactSet

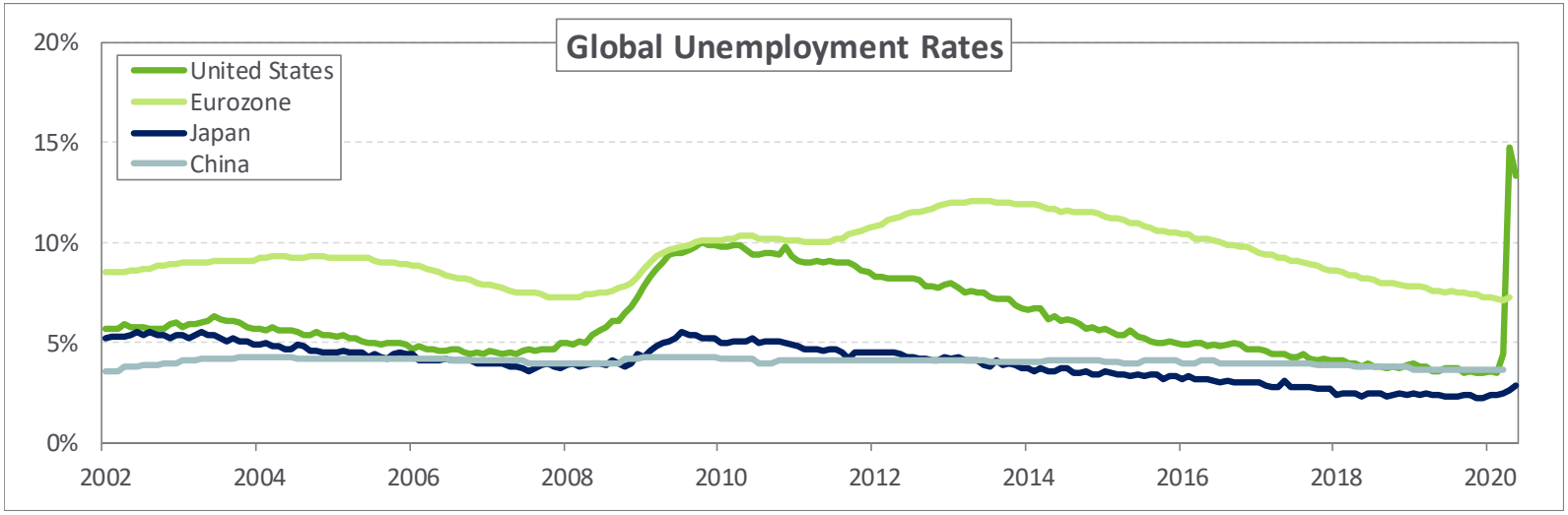


Source: FactSet

UNEMPLOYMENT

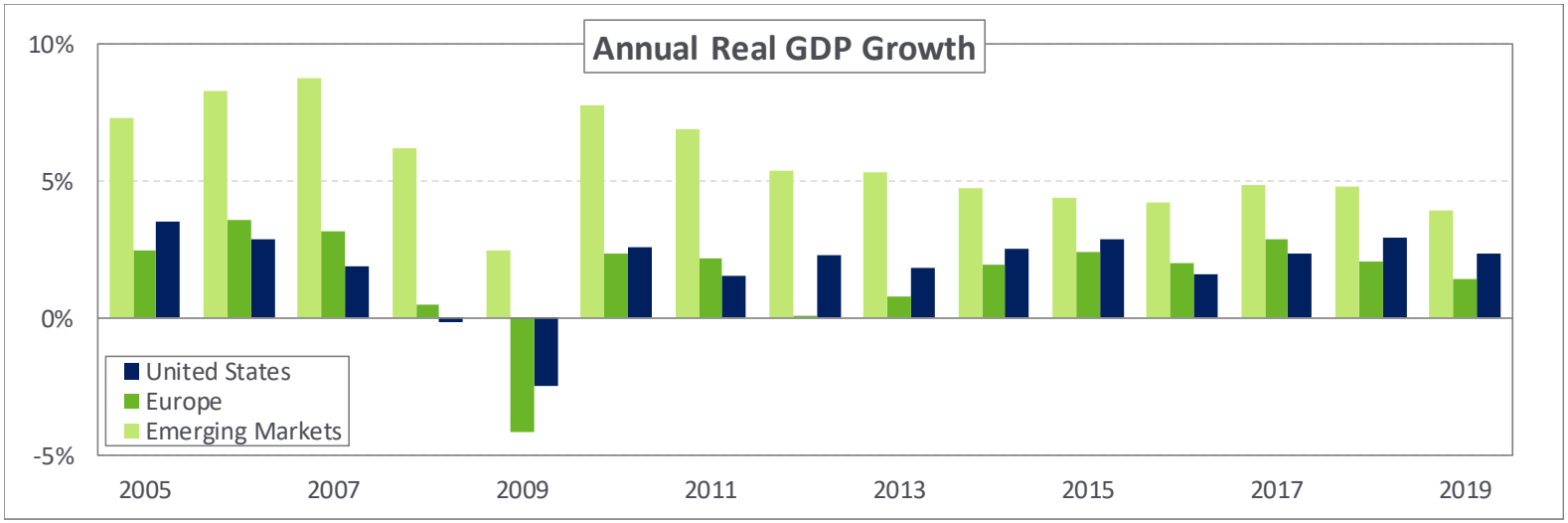


Source: FactSet

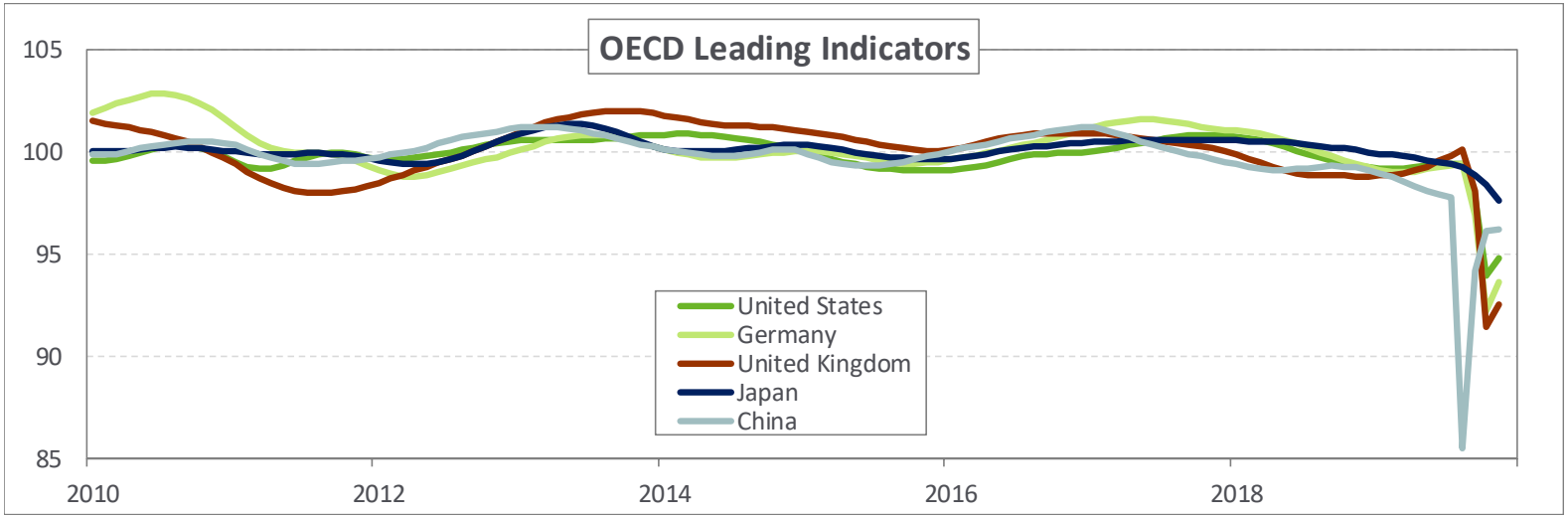


Source: FactSet

ECONOMIC INDICATORS

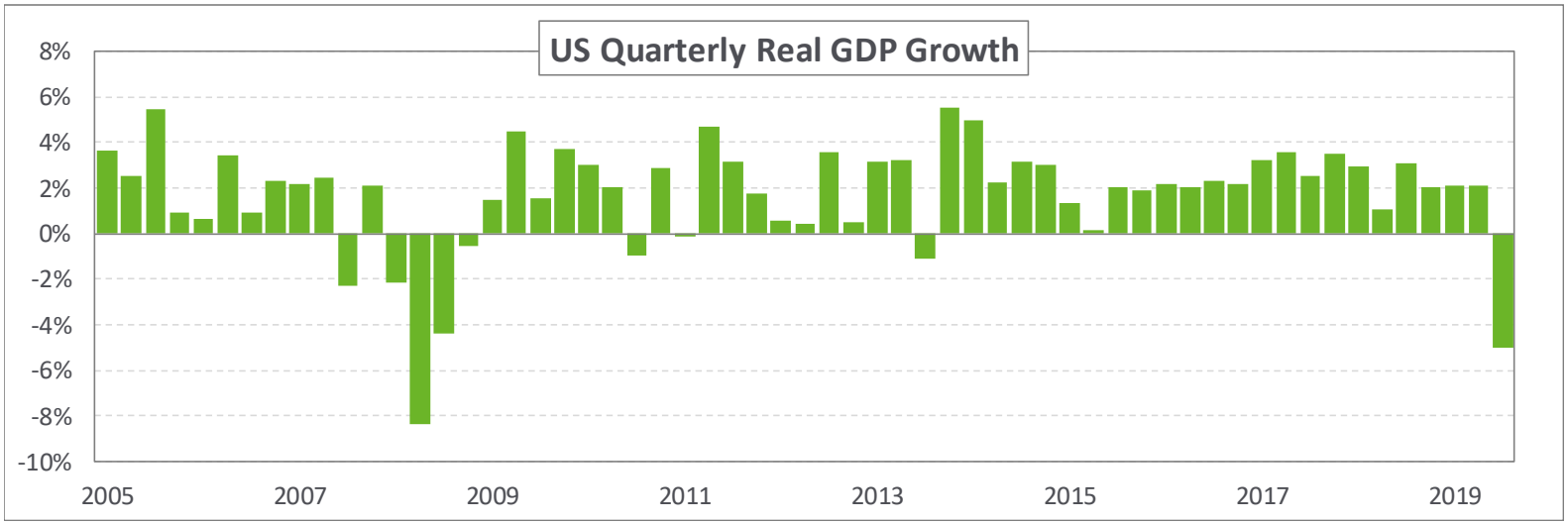


Source: Bureau of Economic Analysis, Oxford Economics, FactSet

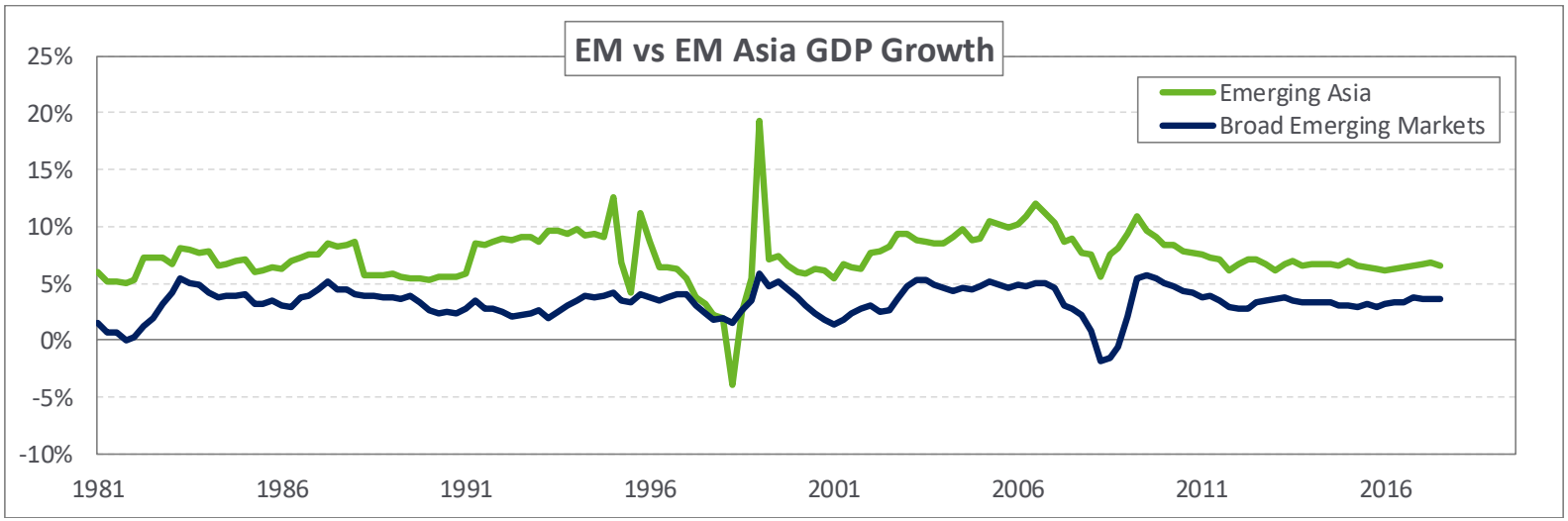


Source: OECD, FactSet

GROSS DOMESTIC PRODUCT

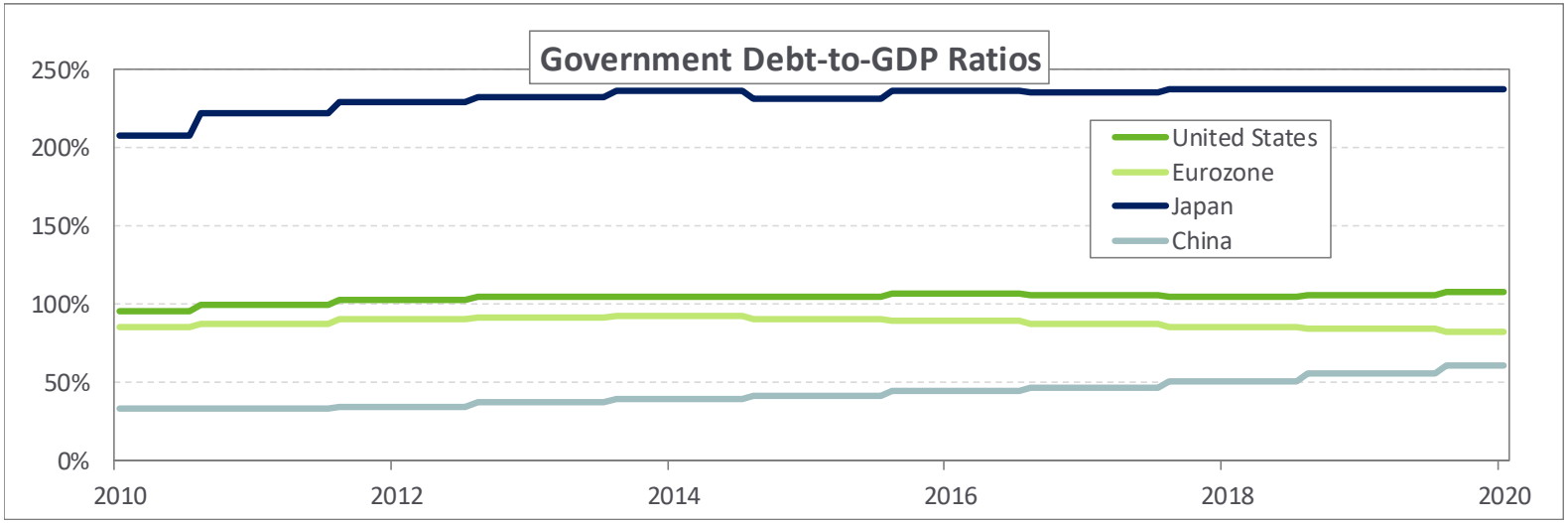


Source: Bureau of Economic Analysis, FactSet

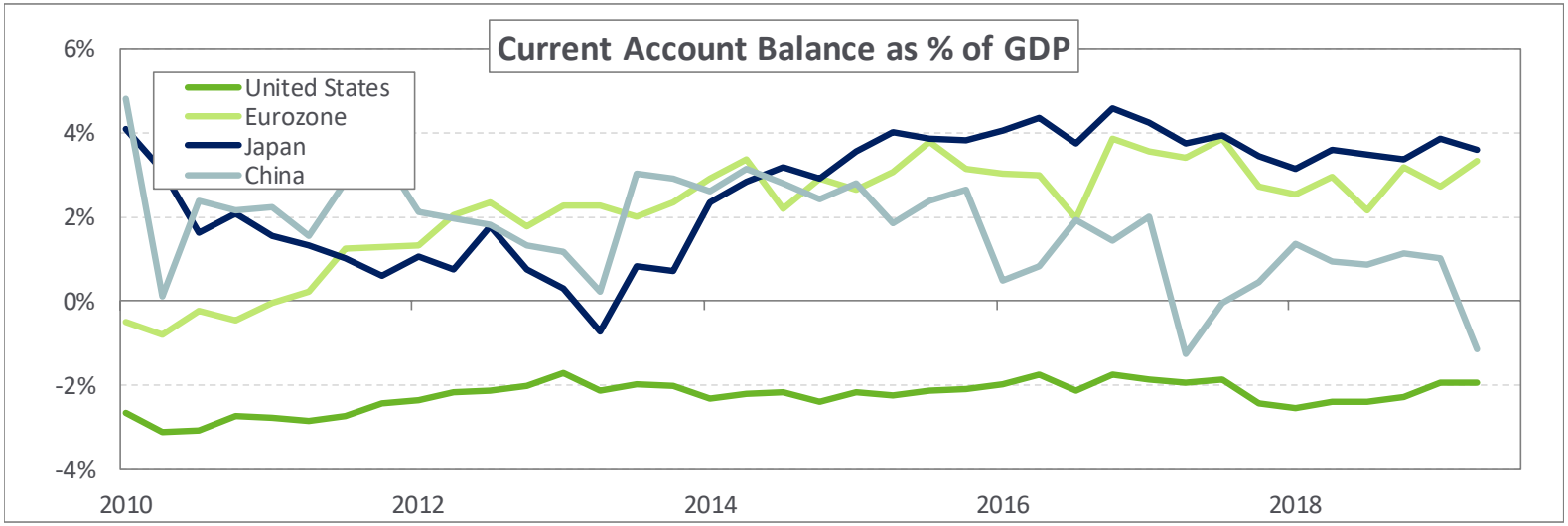


Source: IMF, FactSet

GROSS DOMESTIC PRODUCT METRICS

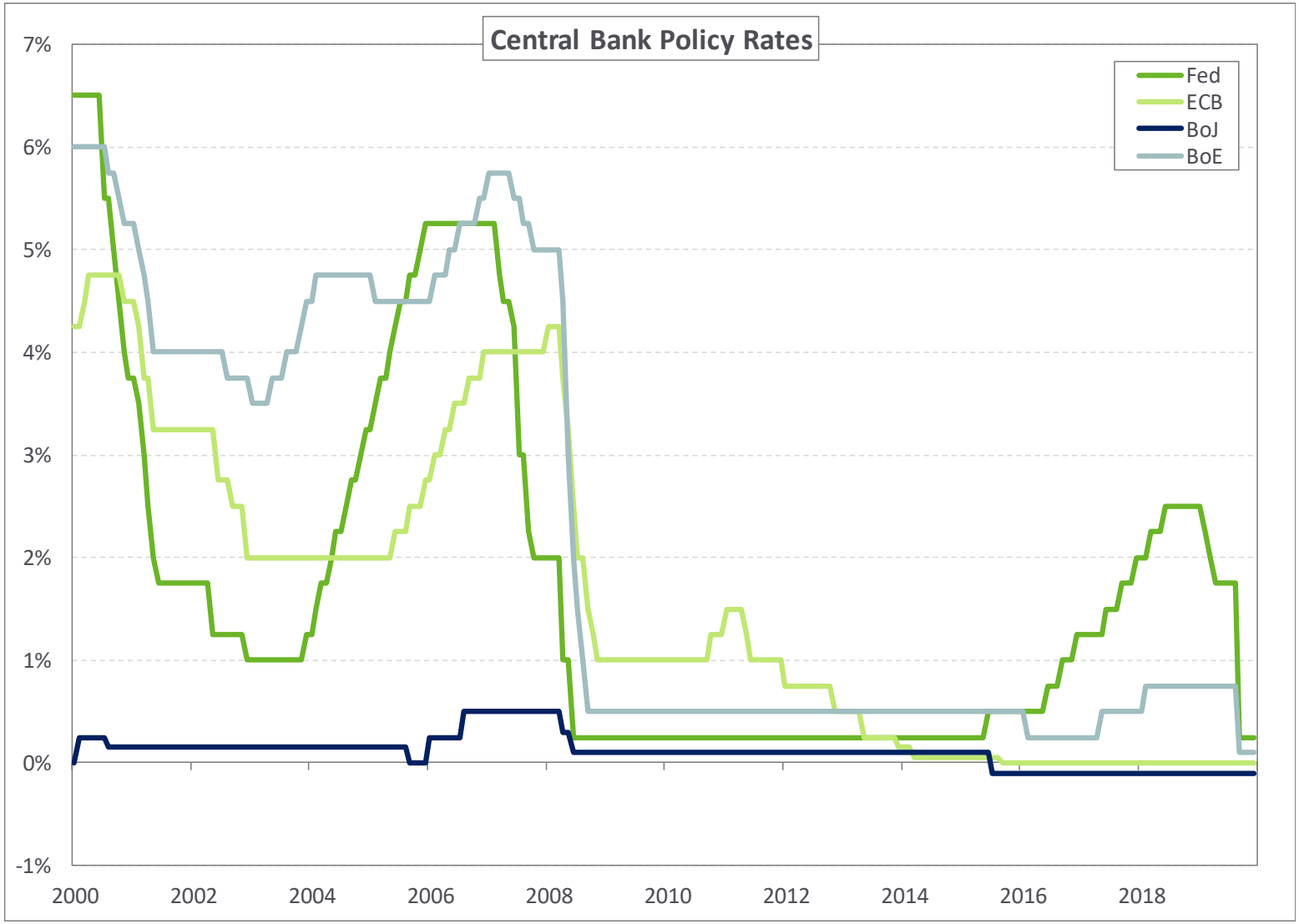


Source: IMF, FactSet



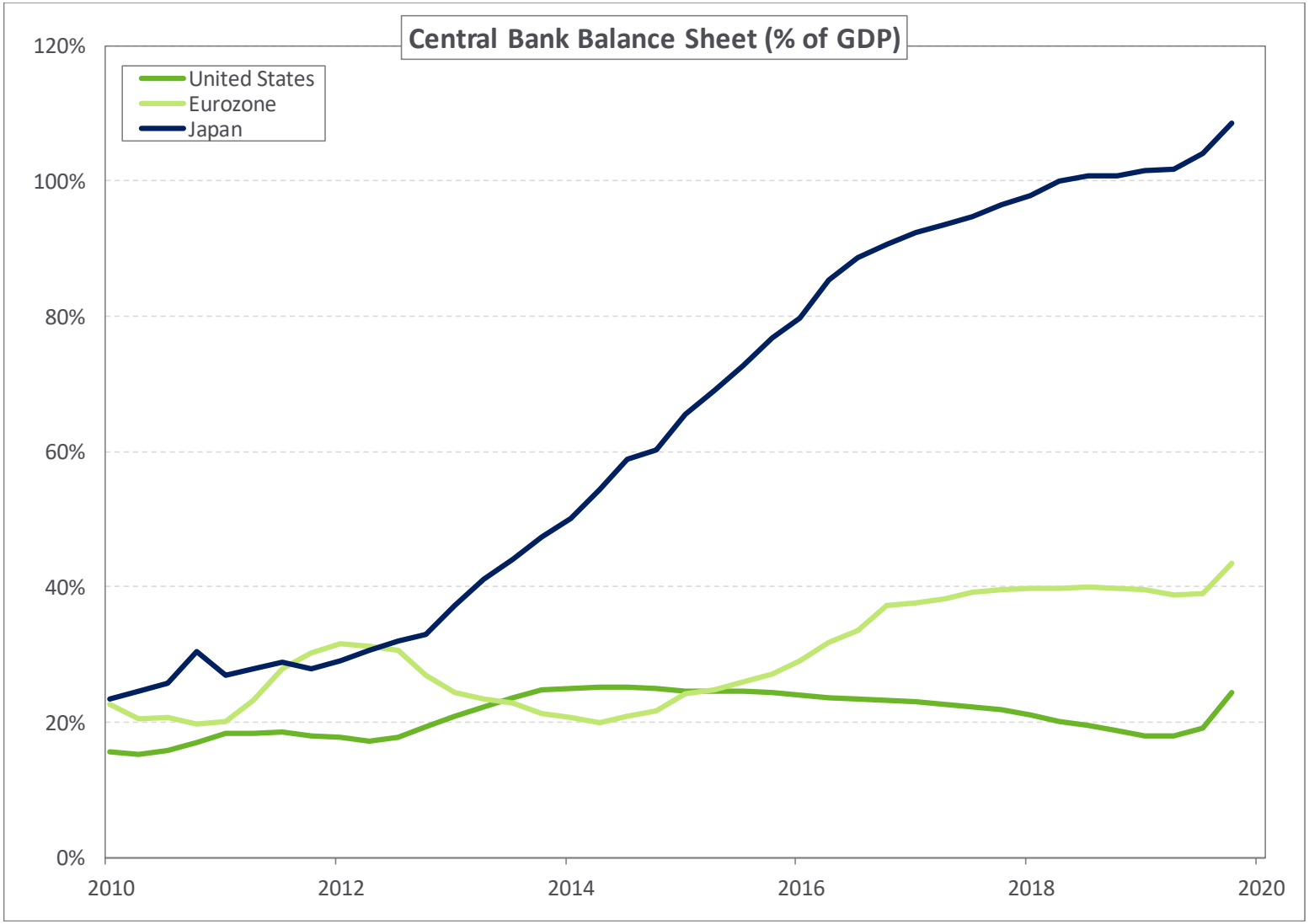
Source: FactSet

CENTRAL BANK RATES



Source: Federal Reserve, ECB, Bank of Japan, Bank of England, FactSet

CENTRAL BANK BALANCE SHEETS

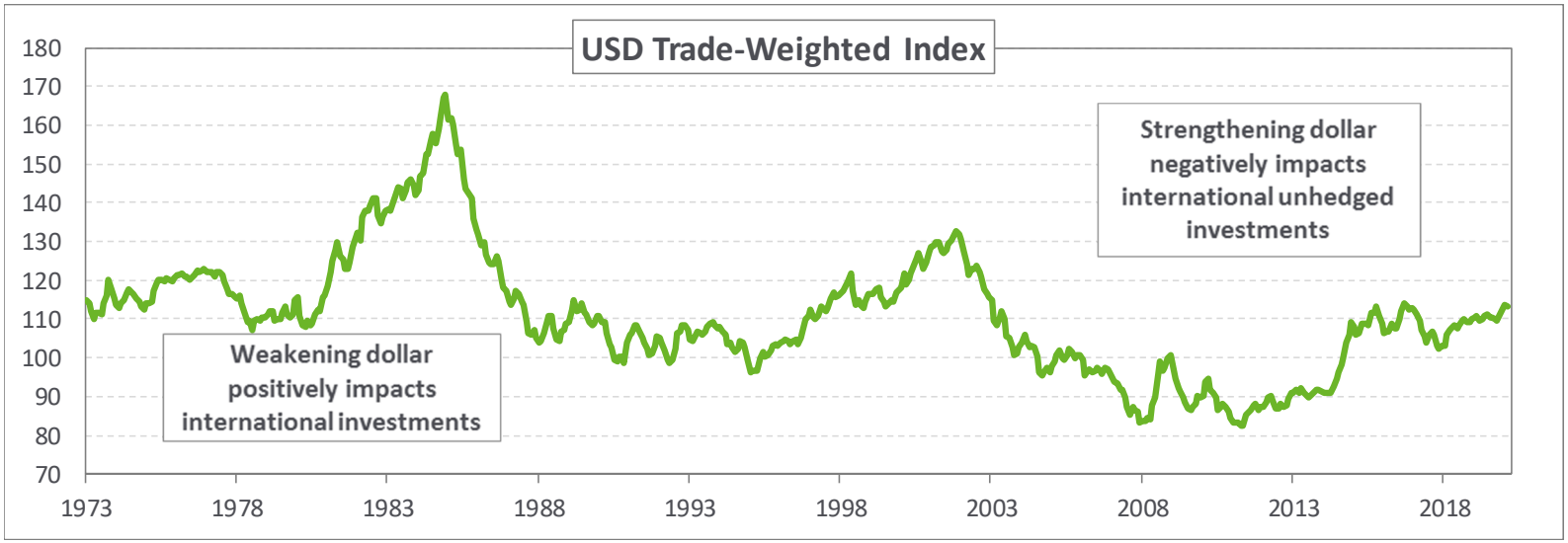


Source: FactSet

CURRENCIES

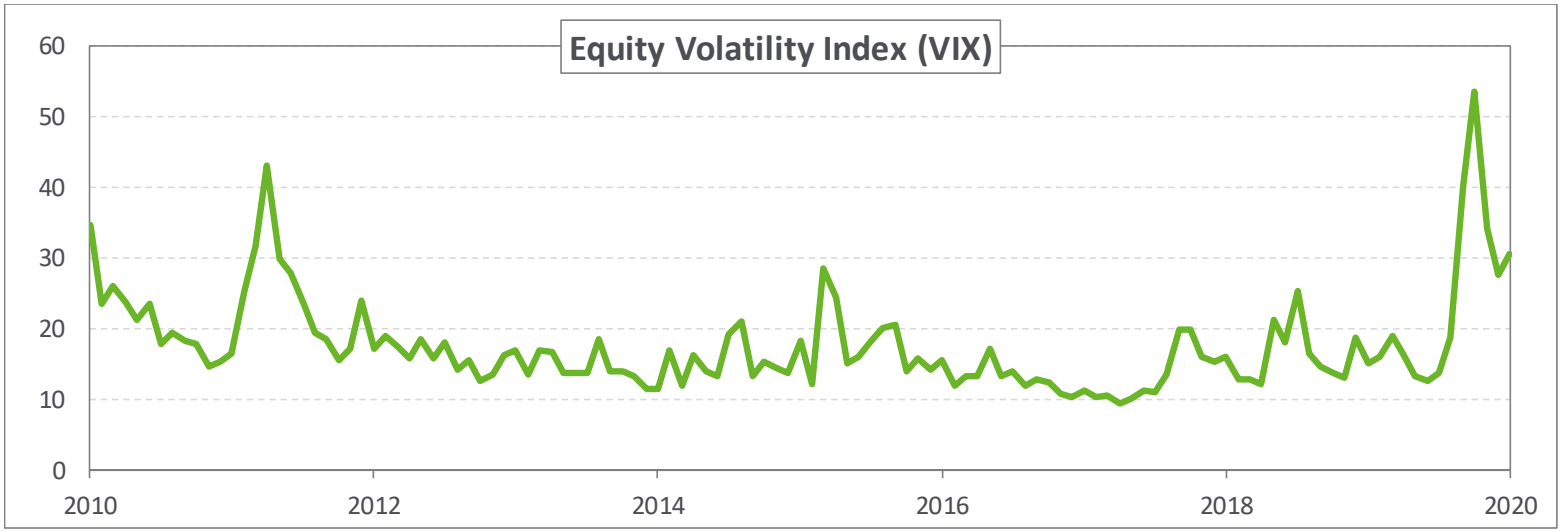
		% Change Relative to USD		
Currencies	**Spot**	**1 Month**	**YTD**	**1 Year**
Euro	**1.12**	1.0%	0.1%	-1.4%
British Pound	**1.24**	-0.1%	-6.7%	-2.9%
Japanese Yen	**107.89**	-0.1%	0.7%	-0.1%
Swiss Franc	**0.95**	1.4%	2.2%	2.9%
Australian Dollar	**0.69**	3.7%	-2.1%	-1.9%
Chinese Yuan	**7.07**	1.0%	-1.5%	-2.9%
Brazilian Real	**5.49**	-1.1%	-26.7%	-30.2%
Russian Ruble	**71.25**	-0.9%	-12.8%	-11.5%
Indian Rupee	**75.50**	0.1%	-5.5%	-8.6%
Mexican Peso	**23.11**	-4.2%	-18.3%	-16.9%
South African Rand	**17.38**	1.5%	-19.5%	-18.8%

Source: FactSet

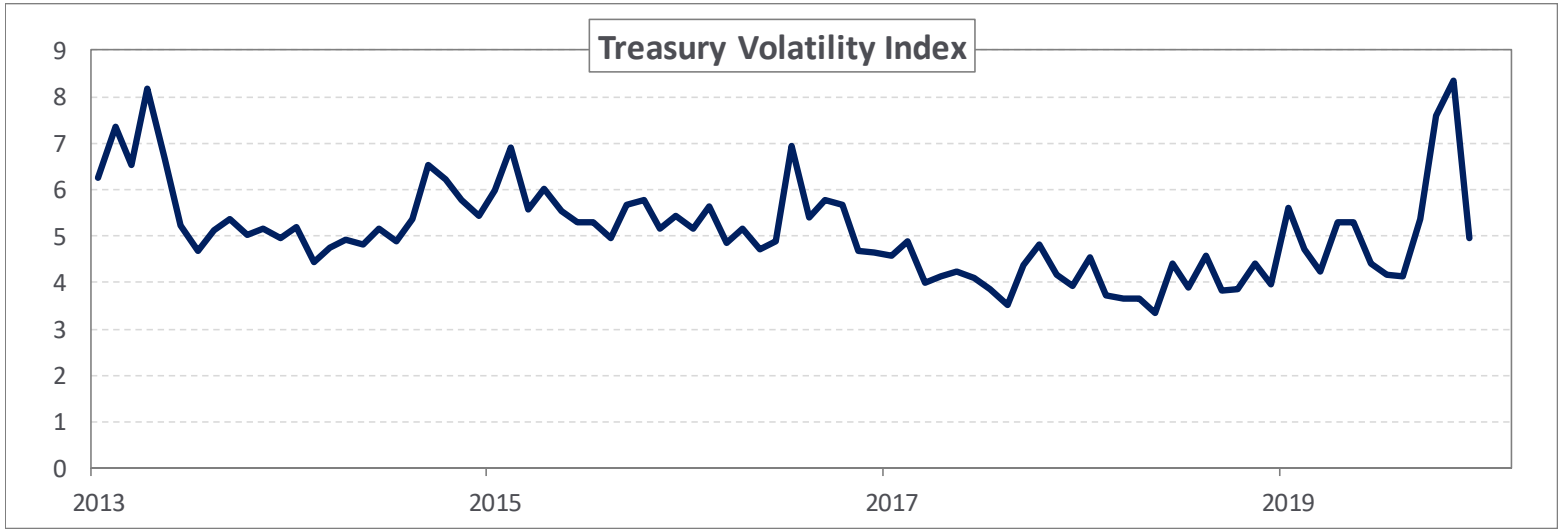


Source: FactSet

VOLATILITY



Source: CBOE, FactSet

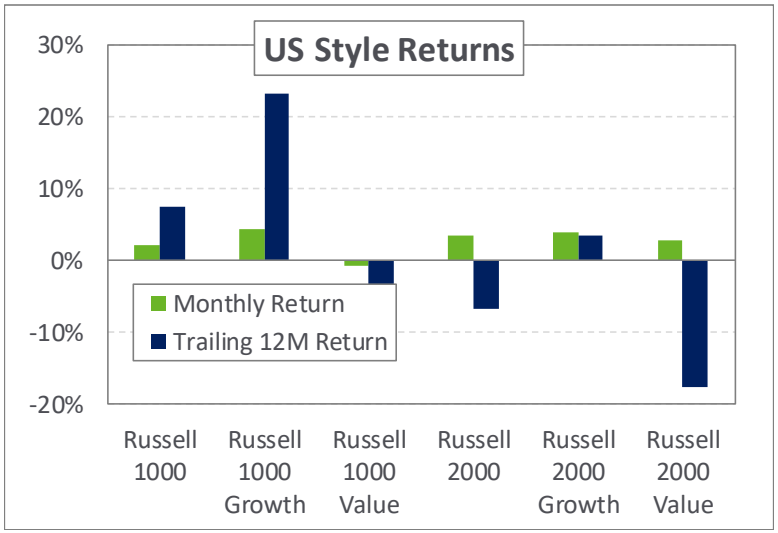


Source: Merrill Lynch, FactSet

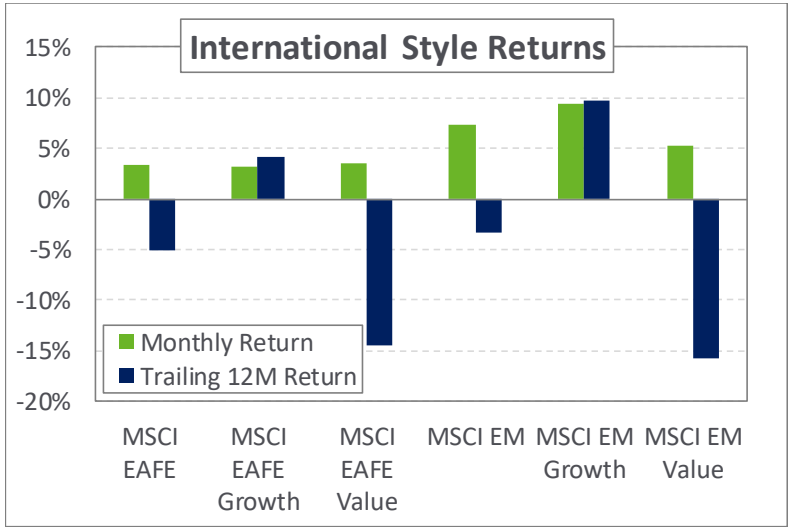
EQUITY

NEPC, LLC

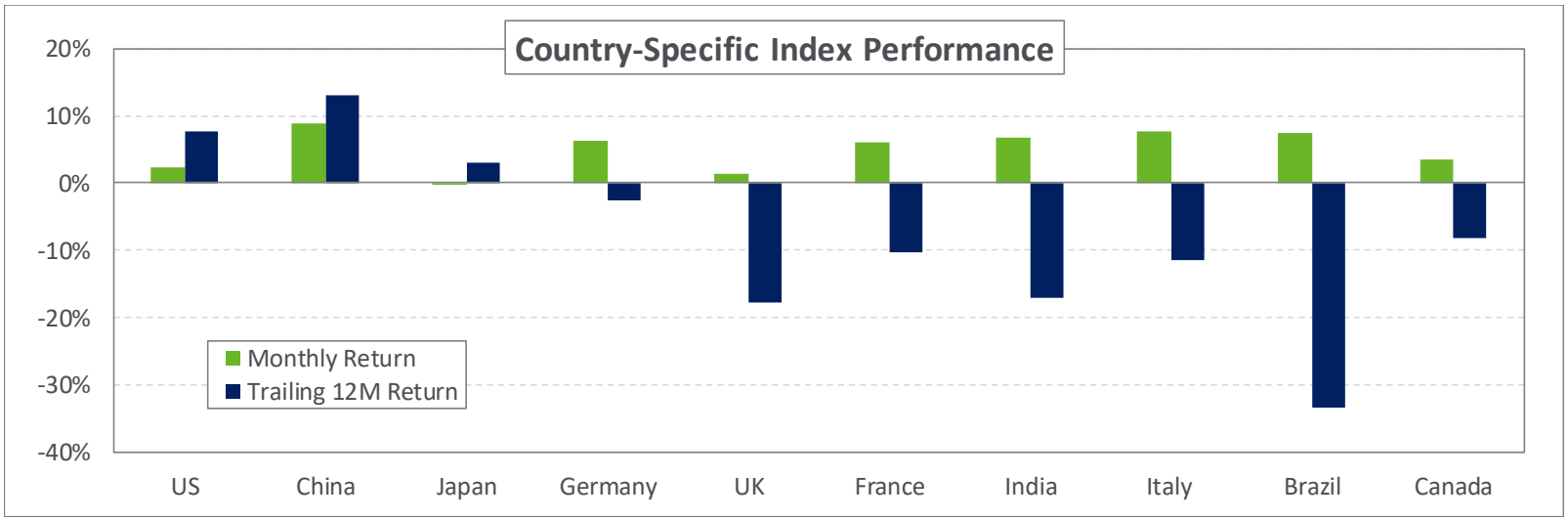
EQUITY INDEX PERFORMANCE



Source: Russell, FactSet



Source: MSCI, FactSet



Source: MSCI, FactSet
Represents returns in USD

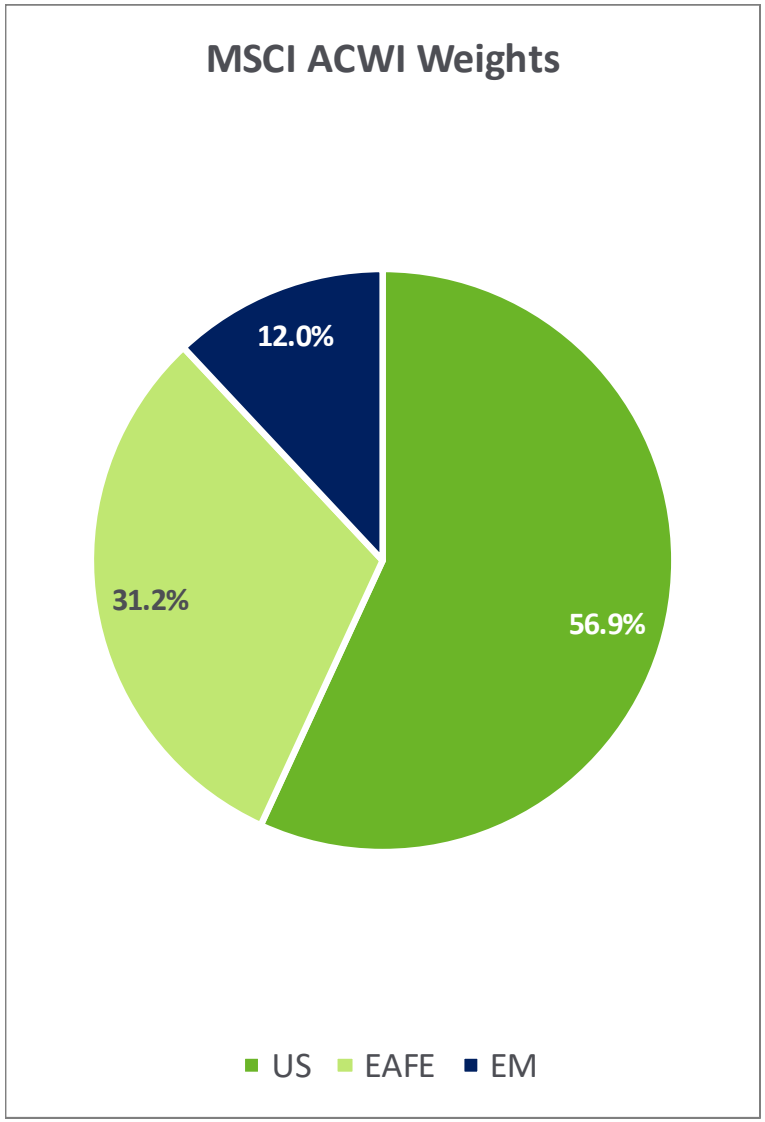
INDEX COMPOSITION

	MTD	QTD	YTD	Index Weight
S&P 500	**2.0%**	**20.5%**	**-3.1%**	**100.0%**
Communication Services	-0.1%	2.2%	0.0%	10.8%
Consumer Discretionary	0.5%	3.1%	1.0%	10.8%
Consumer Staples	0.0%	0.7%	-0.6%	7.0%
Energy	0.0%	0.9%	-1.5%	2.8%
Financials	0.0%	1.4%	-3.5%	10.1%
Health Care	-0.4%	2.2%	0.0%	14.6%
Industrials	0.2%	1.4%	-1.5%	8.0%
Information Technology	1.8%	7.5%	4.3%	27.5%
Materials	0.1%	0.6%	-0.2%	2.5%
Real Estate	0.0%	0.4%	-0.5%	2.8%
Utilities	-0.1%	0.1%	-0.6%	3.1%

Source: S&P, FactSet

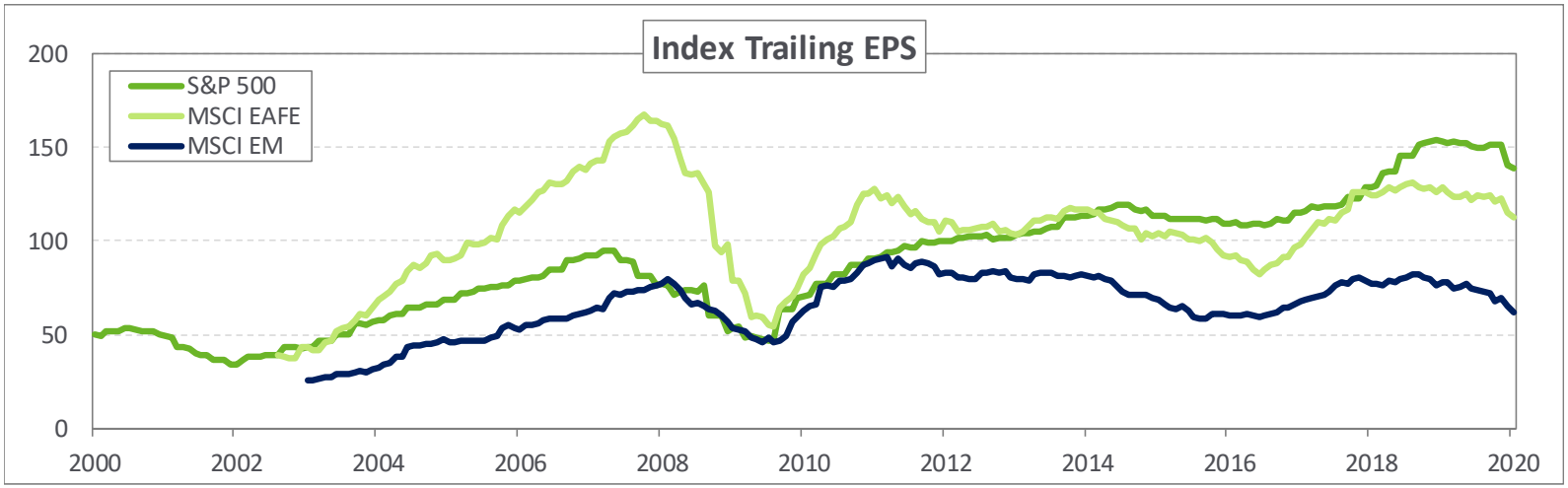
	MTD	QTD	YTD	Index Weight
MSCI ACWI	**3.2%**	**19.2%**	**-6.3%**	**100.0%**
Communication Services	0.2%	1.9%	0.2%	9.4%
Consumer Discretionary	0.6%	3.1%	0.4%	11.8%
Consumer Staples	0.1%	0.8%	-0.6%	8.1%
Energy	0.0%	0.7%	-1.7%	3.6%
Financials	0.5%	1.6%	-4.7%	13.4%
Health Care	-0.1%	2.2%	0.5%	12.9%
Industrials	0.2%	1.6%	-1.5%	9.4%
Information Technology	1.5%	5.6%	2.8%	20.7%
Materials	0.2%	1.1%	-0.3%	4.6%
Real Estate	0.1%	0.4%	-0.8%	2.9%
Utilities	0.0%	0.2%	-0.5%	3.2%

Source: MSCI, FactSet

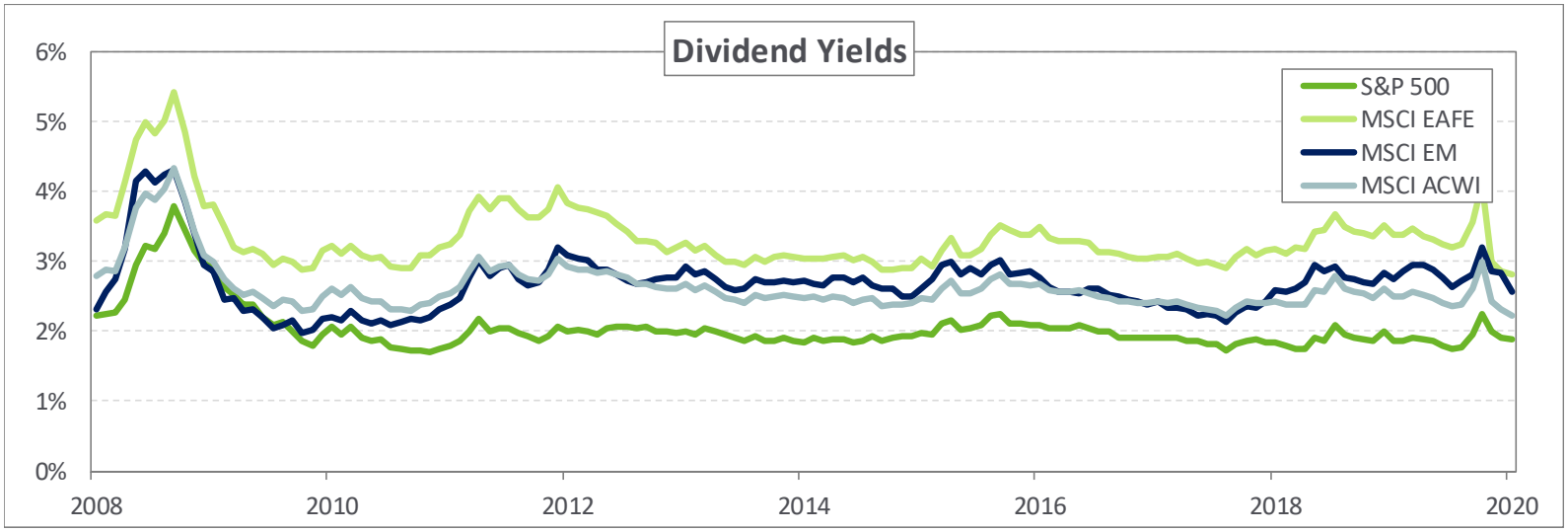


Source: MSCI, FactSet

EARNINGS & YIELDS

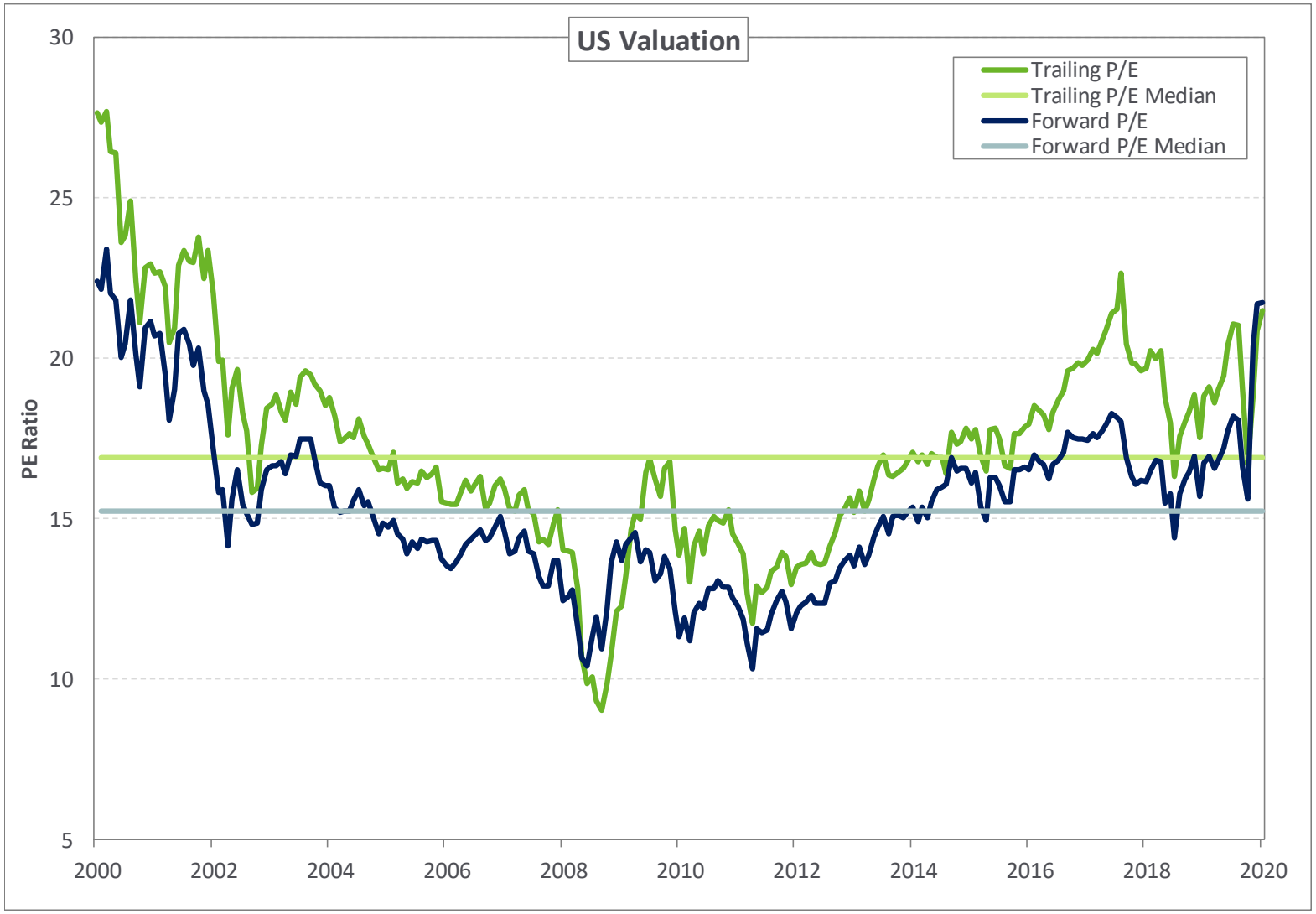


Source: FactSet



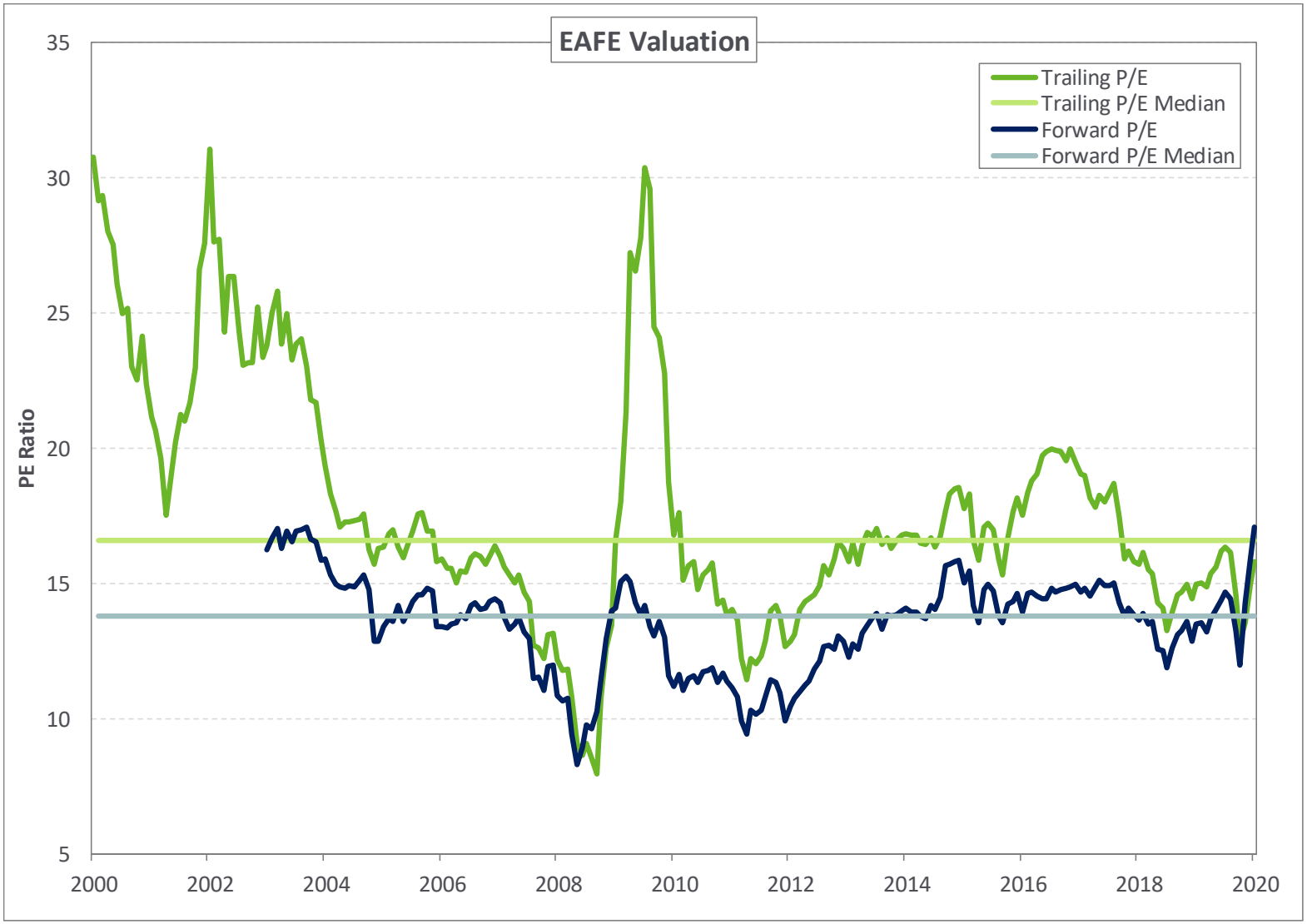
Source: FactSet

US EQUITY VALUATIONS



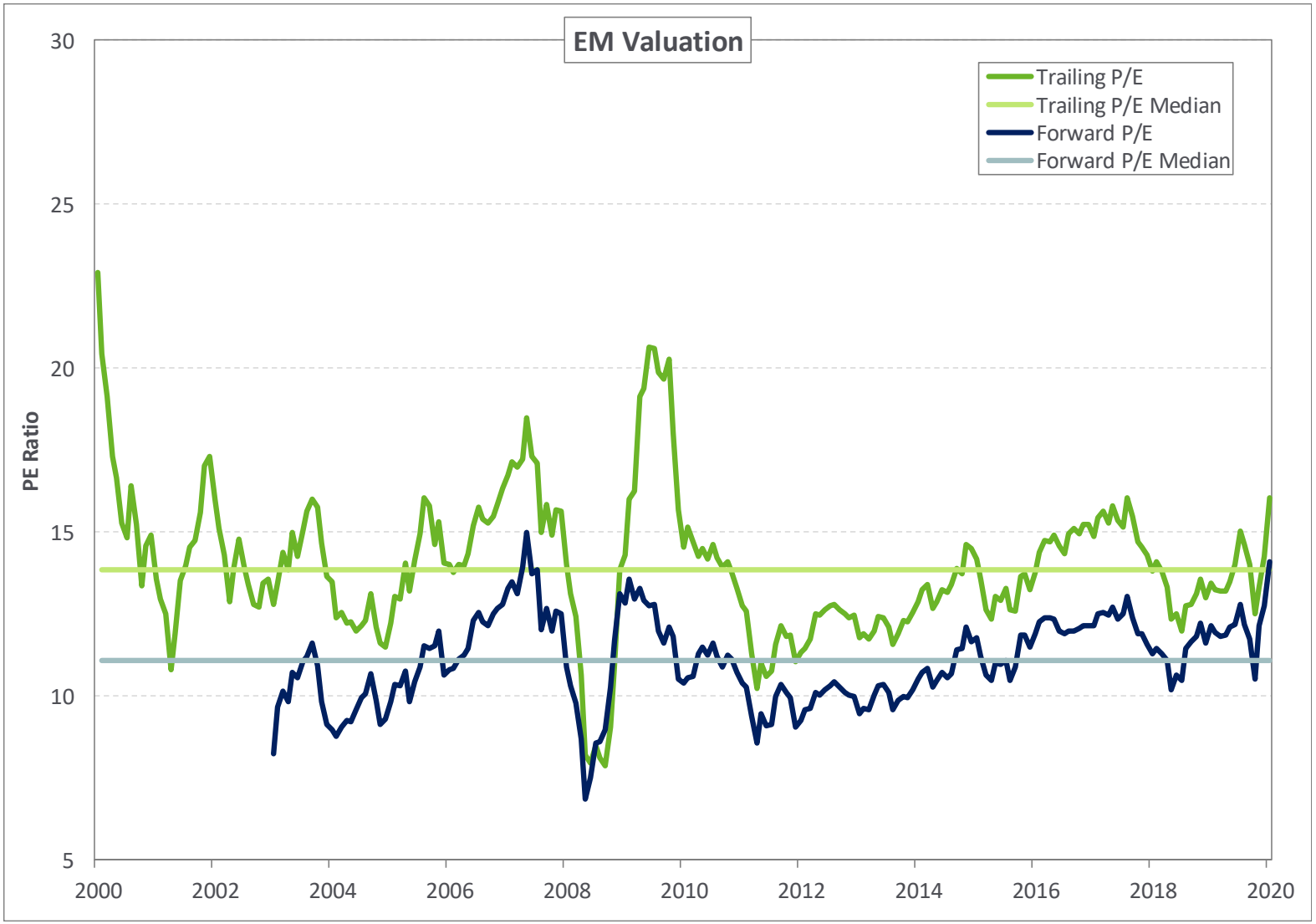
Source: S&P, FactSet

EAFE EQUITY VALUATIONS



Source: MSCI, FactSet

EM EQUITY VALUATIONS



Source: MSCI, FactSet

CREDIT

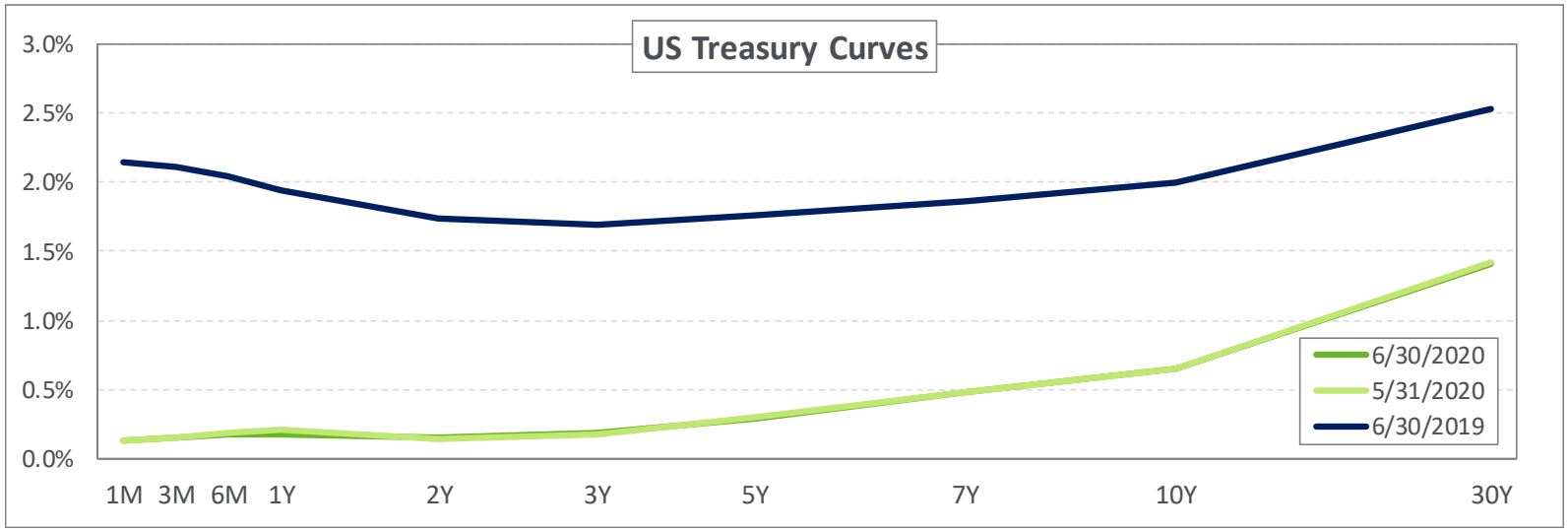
NEPC, LLC

FIXED INCOME CHARACTERISTICS

	Averages			Total Returns (%)		
	Yield to Worst	Spread (bps)	Duration (Years)	1-Month	YTD	1-Year
Barclays Aggregate	1.25%	68	6.0	0.6%	6.1%	8.7%
Barclays Treasury	0.50%	-	7.2	0.1%	8.7%	10.4%
Barclays Agency	0.54%	21	3.7	0.2%	5.1%	6.7%
Barclays MBS	1.36%	70	2.1	-0.1%	3.5%	5.6%
Barclays ABS	0.85%	68	2.1	1.1%	3.3%	4.6%
Barclays CMBS	1.18%	77	5.7	1.1%	7.6%	9.0%
Barclays Corp IG	2.15%	150	8.5	2.0%	5.0%	9.4%
Barclays Muni	1.50%	-	5.4	0.8%	2.1%	4.4%
Barclays HY Muni	4.89%	-	9.5	4.0%	-2.6%	1.0%
Barclays TIPS	0.72%	-	4.4	1.1%	6.0%	8.2%
Barclays HY	6.87%	626	3.9	1.0%	-3.8%	0.0%
Barclays Global Agg	0.95%	58	7.3	0.9%	3.0%	4.2%
JPM EMBI Glob Div	-	474	7.7	3.5%	-2.8%	0.5%
JPM GBI - EM	4.29%	-	5.6	0.5%	-6.9%	-2.8%

Source: Barclays, JP Morgan, FactSet

TREASURIES

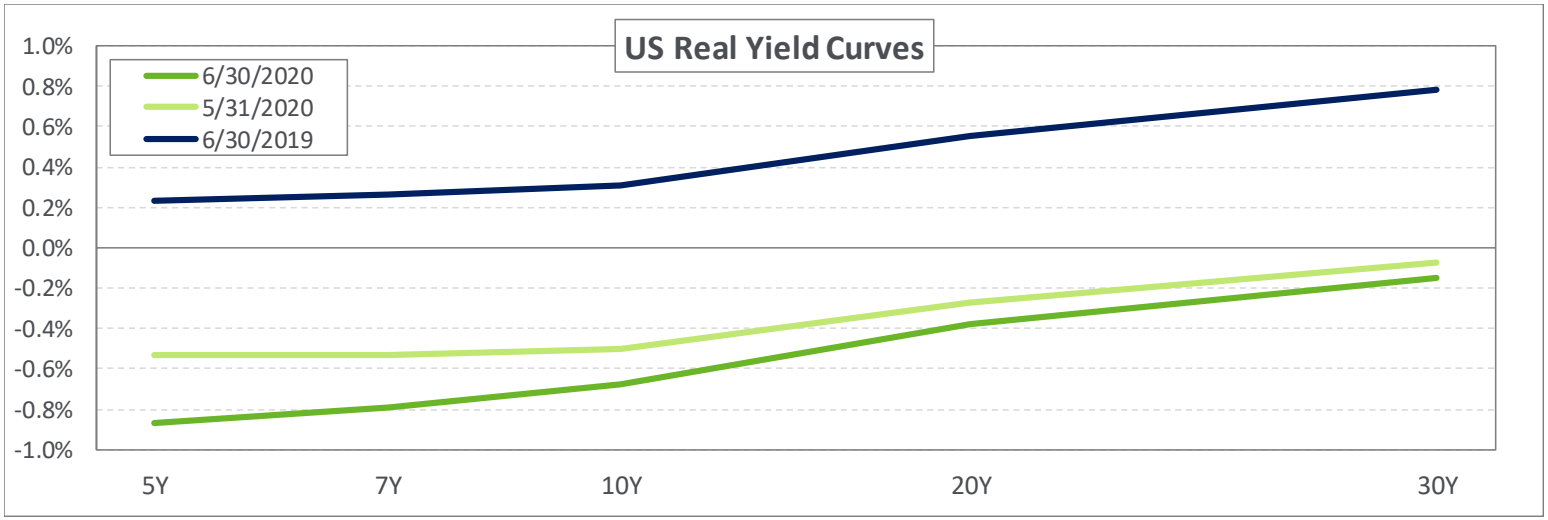


Source: FactSet

	Yield (%)			Total Return (%)	
	Current	1 Month Ago	12 Months Ago	1 Month	12 Months
3M Treasury	0.16%	0.15%	2.12%	0.01%	1.63%
6M Treasury	0.18%	0.18%	2.04%	0.02%	2.11%
2Y Treasury	0.15%	0.14%	1.73%	0.00%	3.96%
5Y Treasury	0.28%	0.30%	1.75%	0.17%	8.44%
10Y Treasury	0.65%	0.65%	2.00%	-0.01%	14.21%
30Y Treasury	1.41%	1.42%	2.53%	-0.04%	29.60%

Source: FactSet

REAL YIELDS

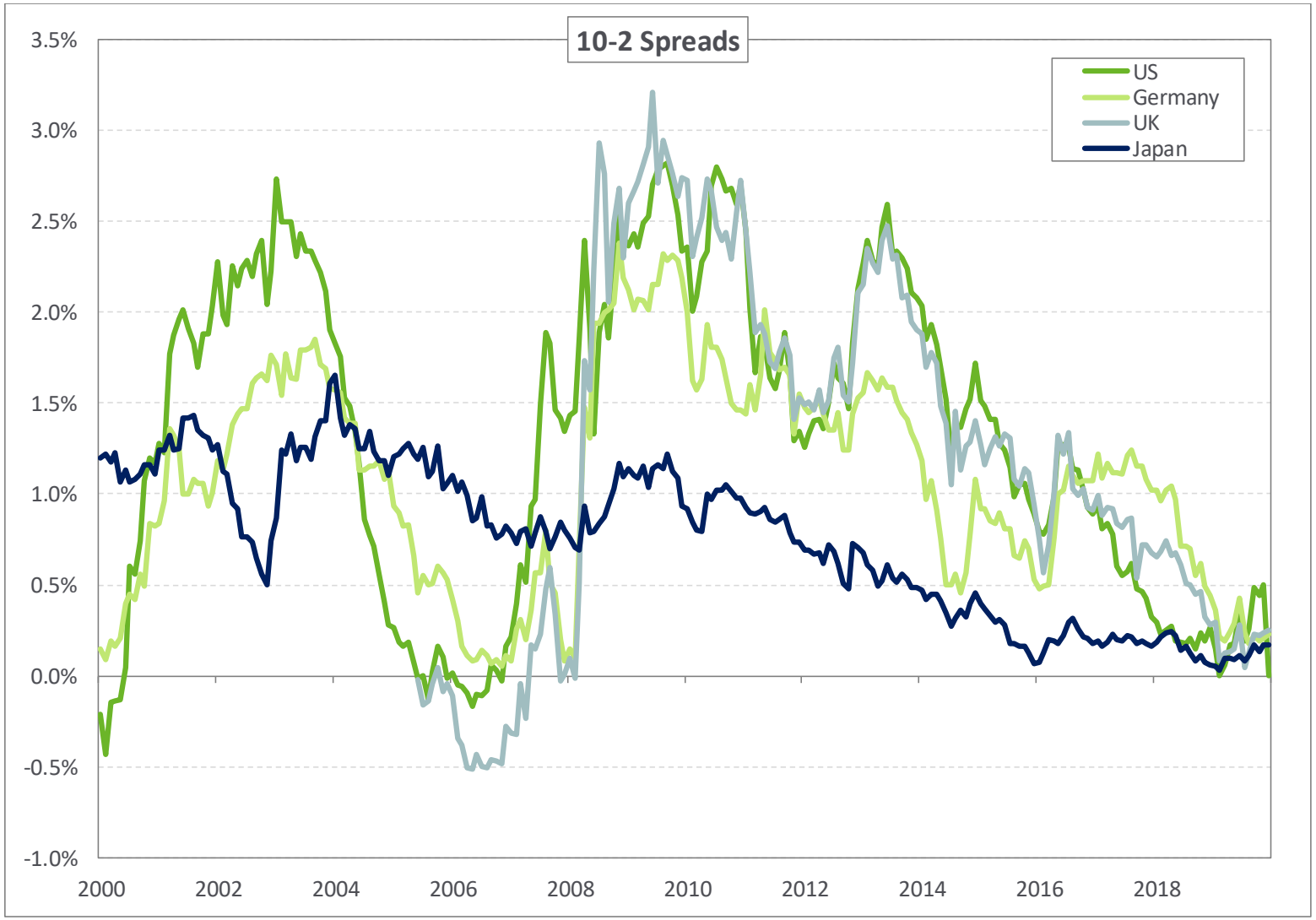


Source: FactSet

	Real Rates			Breakeven Rates	
	Current	**1 Month Ago**	**12 Months Ago**	**Current**	**12 Months**
5-Year	-0.87%	-0.53%	0.23%	1.15%	1.52%
7-Year	-0.79%	-0.53%	0.26%	1.27%	1.61%
10-Year	-0.68%	-0.50%	0.31%	1.33%	1.69%
30-Year	-0.15%	-0.07%	0.78%	1.56%	1.75%

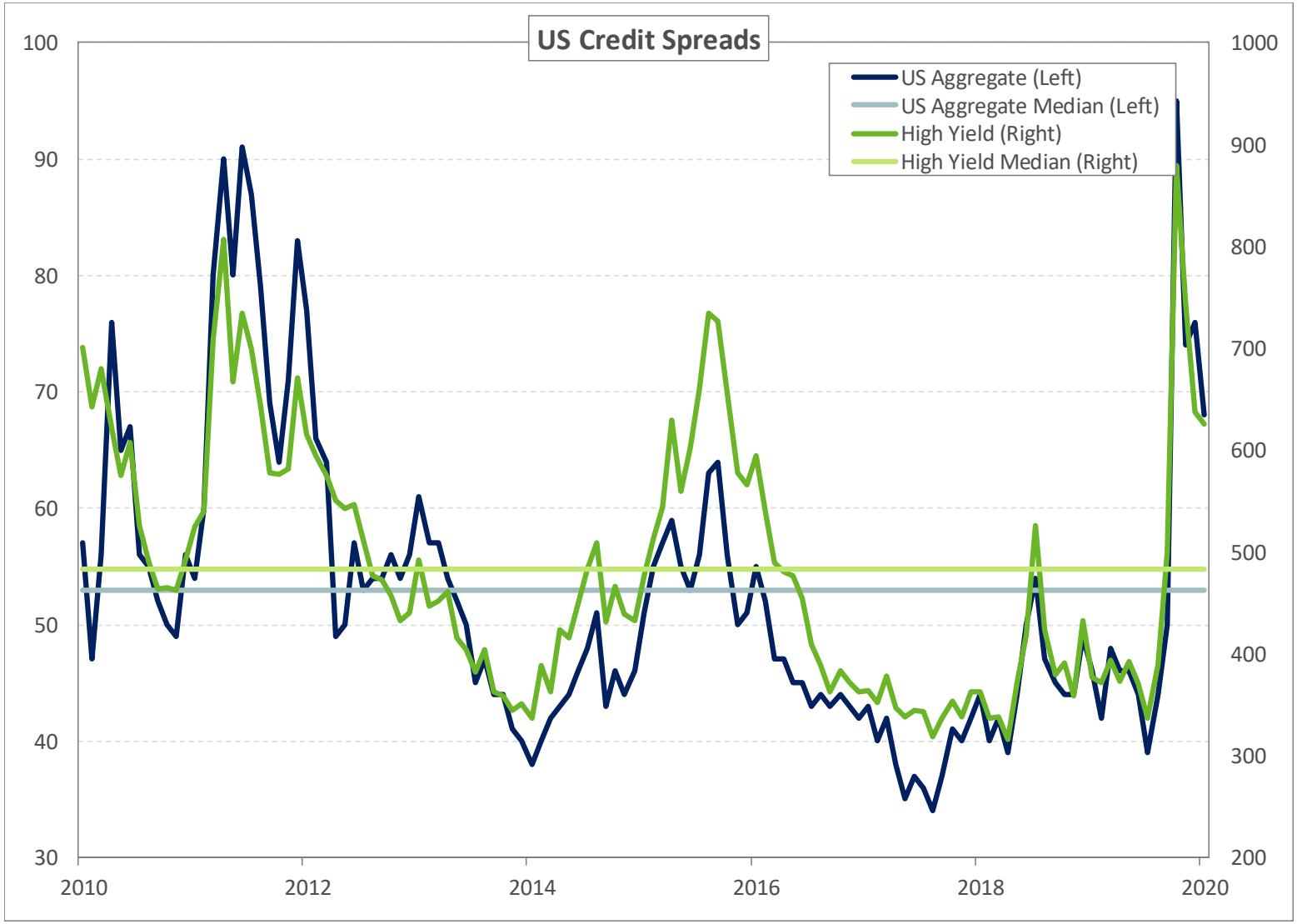
Source: FactSet

NOMINAL YIELDS



Source: FactSet

CREDIT SPREADS

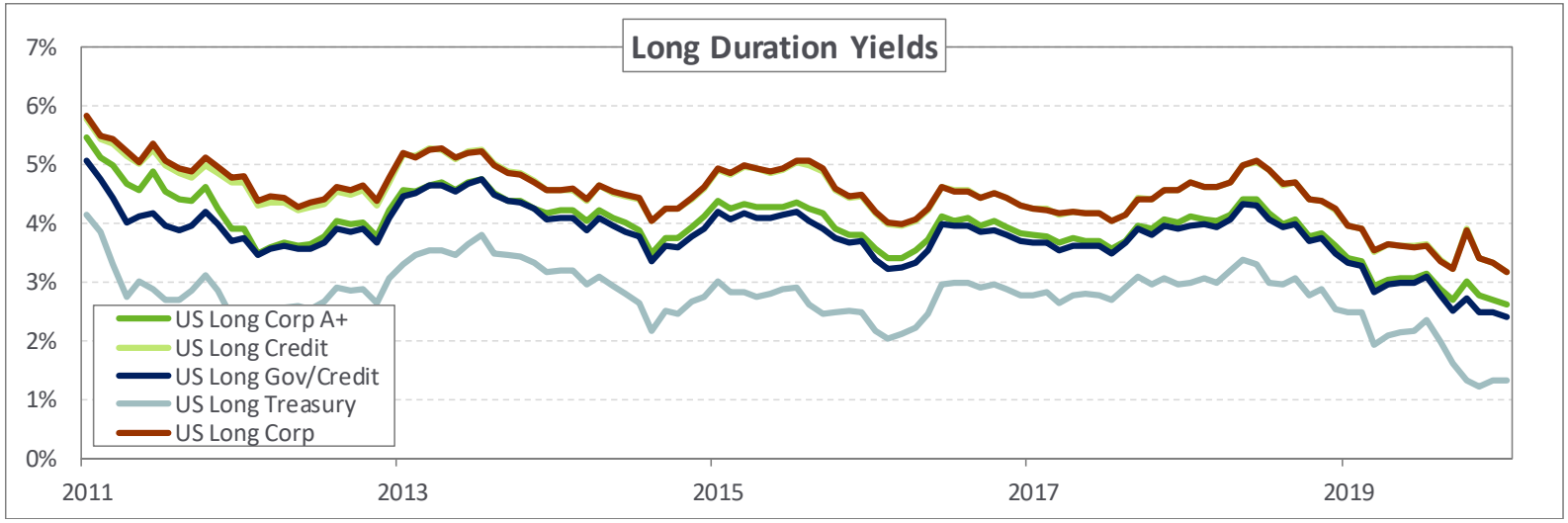


Source: Barclays, FactSet

LONG DURATION

Index	Current	1 Month Ago	12 Months Ago	Duration
Barclays Long Treasury	1.3%	1.3%	2.5%	19.4
Barclays 20+ STRIPS	1.5%	1.5%	2.6%	27.3
Barclays Long Credit	3.1%	3.3%	3.9%	14.8
Barclays Long Gov/Credit	2.4%	2.5%	3.3%	16.6
Barclays Long Corp A+	2.8%	2.9%	3.6%	15.8

Source: Barclays, FactSet



Source: Barclays, FactSet

REAL ASSETS

NEPC, LLC

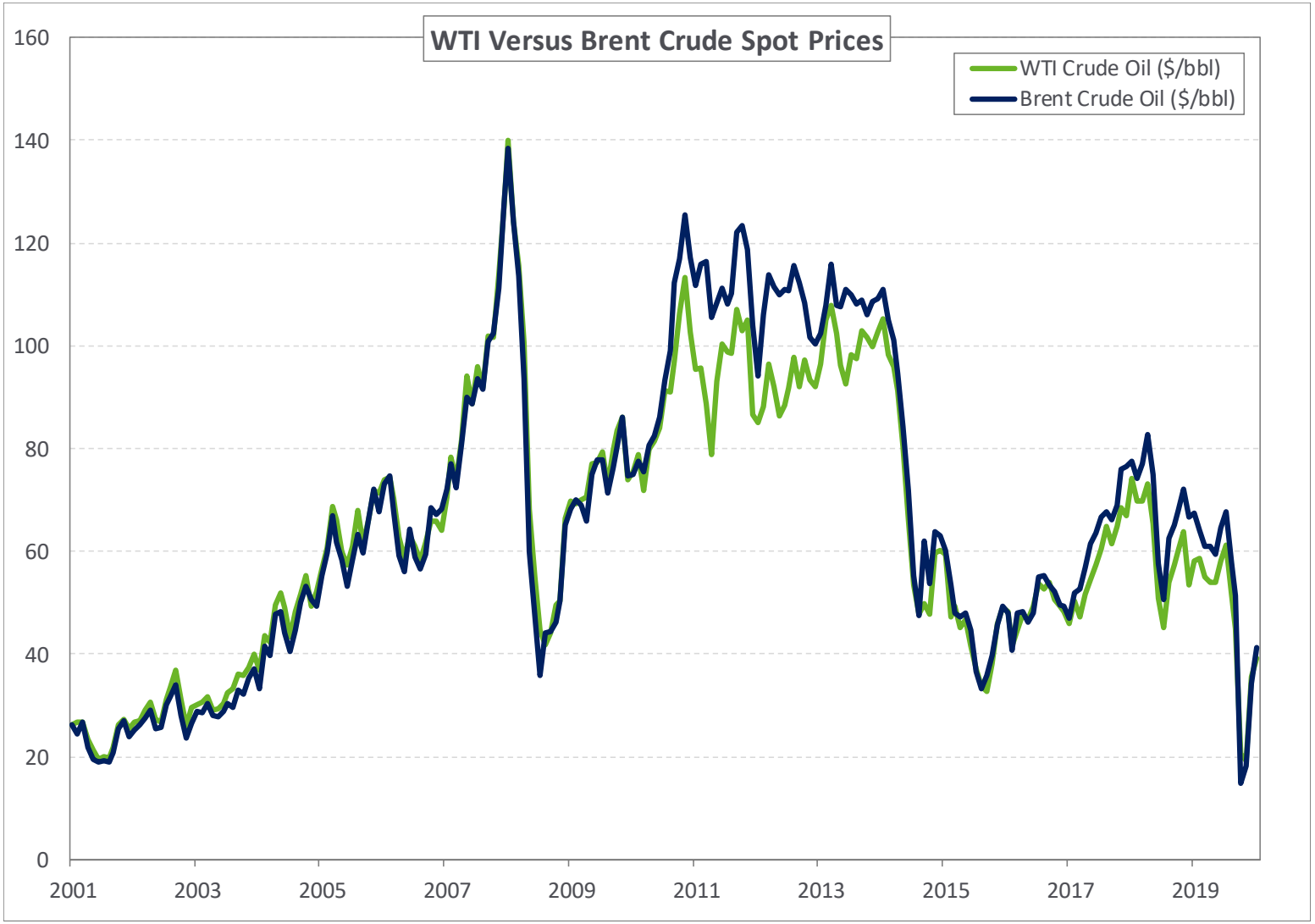
REAL ASSETS INDEX PERFORMANCE

Index	1 Month	3 Month	YTD	1 Year	3 Year	5 Year
Bloomberg Commodity Index	**2.3%**	**5.1%**	**-19.4%**	**-17.3%**	**-6.1%**	**-7.7%**
Bloomberg Sub Agriculture Index	**1.8%**	**-4.8%**	**-14.2%**	**-13.7%**	**-10.5%**	**-9.6%**
Coffee	3.0%	-17.8%	-25.5%	-16.4%	-16.1%	-14.2%
Corn	3.3%	-2.8%	-15.4%	-25.3%	-13.0%	-13.2%
Cotton	6.6%	19.5%	-12.0%	-9.6%	-4.3%	-2.5%
Soybean	3.5%	-2.6%	-10.6%	-9.4%	-8.0%	-7.3%
Soybean Oil	1.9%	1.9%	-21.5%	-6.0%	-8.9%	-7.6%
Sugar	8.5%	12.8%	-9.8%	-11.5%	-10.2%	-6.7%
Wheat	-6.6%	-14.5%	-12.7%	-8.0%	-9.9%	-13.1%
Bloomberg Sub Energy	**2.2%**	**9.8%**	**-46.3%**	**-45.5%**	**-14.4%**	**-18.9%**
Brent Crude	8.1%	31.3%	-42.6%	-37.0%	-3.0%	-12.4%
Heating Oil	11.1%	6.4%	-46.9%	-43.2%	-8.3%	-14.0%
Natural Gas	-10.8%	-14.2%	-37.8%	-49.1%	-30.8%	-28.8%
Unleaded Gas	9.1%	69.5%	-45.9%	-41.1%	-9.9%	-14.7%
WTI Crude Oil	8.7%	23.6%	-58.6%	-55.8%	-17.0%	-22.6%
Bloomberg Sub Industrial Metals	**6.9%**	**12.3%**	**-8.4%**	**-6.4%**	**-1.4%**	**0.0%**
Aluminum	4.0%	4.0%	-13.5%	-13.4%	-6.8%	-2.9%
Copper	11.9%	21.2%	-3.5%	-0.3%	-0.5%	-0.2%
Nickel	3.7%	10.8%	-9.6%	0.9%	10.6%	0.6%
Zinc	2.6%	6.8%	-10.6%	-16.7%	-5.4%	2.4%
Bloomberg Sub Precious Metals	**2.2%**	**15.0%**	**13.8%**	**24.0%**	**9.8%**	**6.7%**
Gold	2.8%	12.1%	17.1%	25.4%	12.1%	8.0%
Silver	-0.3%	29.2%	1.9%	18.0%	2.2%	2.0%
Bloomberg Sub Livestock	**-8.5%**	**-8.6%**	**-34.3%**	**-33.5%**	**-16.6%**	**-11.0%**
Lean Hogs	-19.1%	-23.9%	-51.9%	-57.4%	-30.6%	-19.4%
Live Cattle	-3.3%	-0.6%	-23.1%	-16.4%	-8.7%	-6.6%

Source: Bloomberg, FactSet

Bloomberg subindex total return indices reflects the return of the underlying one month commodity futures price movements

OIL MARKETS



Source: FactSet

APPENDIX: SAA POLICY HISTORY

NEPC, LLC

STRATEGIC ASSET ALLOCATION POLICY HISTORY

- 7/1/75 – 12/31/79 – 40% S&P 500/60% Barclays Capital Aggregate
- 1/1/80 – 12/31/83 – 50% S&P 500/50% Barclays Capital Aggregate
- 1/1/84 – 12/31/91 – 60% S&P 500/40% Barclays Capital Aggregate
- 1/1/92 – 12/31/94 – 50% S&P 500/10% MSCI EAFE/40% Barclays Capital Aggregate
- 1/1/95 – 6/30/97 – 45% S&P 500/15% MSCI EAFE/40% Barclays Capital Aggregate
- 7/1/97 – 12/31/99 – 50% S&P 500/15% MSCI EAFE/35% Barclays Capital Aggregate
- 1/1/00 – 9/30/03 – 53% S&P 500/17% MSCI EAFE/30% Barclays Capital Aggregate
- 10/1/03 – 12/31/06 – 53% S&P 500/15% MSCI EAFE/ACWI ex-U.S.[1]/26% Barclays Capital Aggregate/6% NCREIF ODCE (lagged one quarter)
- 1/1/07 – 10/31/2009 – 31% S&P 500/7% S&P 400/7% S&P 600/18% MSCI ACWI ex-U.S./5% Russell 2000 (lagged one quarter)/26% Barclays Capital Aggregate/6% NCREIF ODCE (lagged one quarter)
- 11/1/2009 – 6/30/2012 – 28% S&P 500/6% S&P 400/6% S&P 600/13% MSCI EAFE/2% MSCI EAFE Small Cap/3% MSCI Emerging Markets/7% Russell 2000 (lagged one quarter)/24% Barclays Capital Aggregate/2% Barclays Capital High Yield/6% NCREIF ODCE (lagged one quarter)/3% Dow Jones/UBS Commodities Index
- 7/1/2012 – 3/31/2015 – 23% S&P 500/5% S&P 400/5% S&P 600/14% MSCI EAFE/3% MSCI EAFE Small Cap/6% MSCI Emerging Markets/7% Russell 2000 (lagged one quarter)/13% Barclays Capital Aggregate/5% Barclays Capital High Yield/4% JP Morgan GBI-EM Global Diversified/3% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter)/8% NCREIF ODCE (lagged one quarter)/4% Dow Jones/UBS Commodities Index
- 4/1/2015 – 3/31/2017 – 20% S&P 500/3% S&P 400/3% S&P 600/17% MSCI EAFE/2% MSCI EAFE Small Cap/5% MSCI Emerging Markets/8% Russell 2000 (lagged one quarter)/11% Barclays Capital Aggregate/4% Barclays Capital High Yield/10% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter)/10% NCREIF ODCE (lagged one quarter)/2% Bloomberg Commodities Index TR/5% Multi-Asset Class Custom Index
- 4/1/2017 – 6/30/2018 – 20% S&P 500/3% S&P 400/3% S&P 600/17% MSCI EAFE/2% MSCI EAFE Small Cap/5% MSCI Emerging Markets/8% Russell 2000 (lagged one quarter)/11% Barclays Capital Aggregate/2% Barclays Capital High Yield/12% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter)/10% NCREIF ODCE (lagged one quarter)/2% Bloomberg Commodities Index TR/5% Multi-Asset Class Custom Index
- **7/1/2018 – Present – 50% MSCI ACWI IMI Net w/ USA Gross, 20% NCREIF ODCE, 20% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter), 10% Barclays US Capital Aggregate**

***Interim SAA Policy:** 54.5% MSCI ACWI IMI Net w/ USA Gross, 10.8% BBG Barclays US Aggregate Bond Index, 15.5% NCREIF ODCE, 19.2% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter)

Note: Interim SAA Policy includes proration of a total of Credit and Real Estate. Unfunded amounts were allocated 83.3% to Equity and 16.7% to Interest Sensitive Fixed Income. Recently approved Strategic Asset Allocation Policy effective July 1, 2018.

[1]MSCI EAFE/ACWI ex-U.S. Benchmark is the MSCI EAFE Index prior to 10/1/2005 and the MSCI ACWI ex-U.S. thereafter.

Note: All MSCI indices changed from Gross to Net dividend withholding taxes effective 1/1/2014.

LONG TERM DISABILITY STRATEGIC ASSET ALLOCATION POLICY HISTORY

- 7/1/2002 – 12/31/2004 - 53% S&P 500/17% MSCI EAFE/30% Barclays Capital Aggregate Bond Index
- 1/1/2005 – 2/28/2007 - 53% Russell 3000/15% MSCI EAFE/26% Barclays Capital Aggregate Bond Index/6% DJ Wilshire Real Estate Securities Index
- 3/1/2007 – 12/31/2010 - 50% Russell 3000/18% MSCI EAFE/26% Barclays Capital Aggregate Bond Index/6% DJ Wilshire Real Estate Securities Index
- 1/1/2011 – 12/31/2012 - 40% Russell 1000/7% Russell 2000/13% MSCI EAFE/2% MSCI EAFE Small Cap/3% MSCI Emerging Markets/24% Barclays Capital Aggregate/2% Barclays Capital High Yield/6% DJ Wilshire Real Estate Securities Index/3% Bloomberg Commodity Index
- 1/1/2013 – 2/28/2016 - 34% Russell 1000/6% Russell 2000/14% MSCI EAFE/3% MSCI EAFE Small Cap/6% MSCI Emerging Markets/13% Barclays Capital Aggregate/8% Barclays Capital High Yield/4% JP Morgan GBI-EM Global Diversified/8% DJ Wilshire Real Estate Securities Index/4% Bloomberg Commodity Index
- 2/29/2016 – 7/26/2017 - 24% Russell 1000/12% Russell 2000/18% MSCI EAFE/2% MSCI EAFE Small Cap/5% MSCI Emerging Markets/19% Barclays Capital Aggregate/7% Barclays Capital High Yield/11% DJ Wilshire Real Estate Securities Index/2% Bloomberg Commodity Index
- 7/27/2017 – 6/30/2018 – 20% S&P 500/3% S&P 400/3% S&P 600/17% MSCI EAFE/2% MSCI EAFE Small Cap/5% MSCI Emerging Markets/8% Russell 2000 (lagged one quarter)/11% Barclays Capital Aggregate/2% Barclays Capital High Yield/12% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter)/10% NCREIF ODCE (lagged one quarter)/2% Bloomberg Commodities Index TR/5% Multi-Asset Class Custom Index

- **7/1/2018 – Present – 50% MSCI ACWI IMI Net w/ USA Gross, 20% NCREIF ODCE, 20% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter), 10% Barclays US Capital Aggregate**

***Interim SAA Policy:** 54.5% MSCI ACWI IMI Net w/ USA Gross, 10.8% BBG Barclays US Aggregate Bond Index, 15.5% NCREIF ODCE, 19.2% S&P/LSTA Levered Loan Index + 250 basis points (lagged one quarter)

Note: All MSCI indices changed from Gross to Net of dividend withholding taxes effective 1/1/2014.

CUSTOM ASSET CLASS BENCHMARK HISTORY

- **ASRS Custom Total Public Equity Benchmark** was 77% S&P 500, 23% MSCI EAFE through 12/31/1999; 76% S&P 500, 24% MSCI EAFE through 9/30/2003; 78% S&P 500, 22% MSCI EAFE/ACWI ex-U.S.[1] through 12/31/2006; 49% S&P 500, 11% S&P 400, 11% S&P 600, 29% MSCI ACWI ex-U.S. through 10/31/2009; 48% S&P 500, 10% S&P 400, 10% S&P 600, 23% MSCI EAFE, 4% MSCI EAFE Small Cap, 5% MSCI Emerging Markets through 6/30/2012; 41% S&P 500, 9% S&P 400, 9% S&P 600, 25% MSCI EAFE, 5% MSCI EAFE Small Cap, 11% MSCI Emerging Markets through 3/31/2015; 40% S&P 500, 6% S&P 400, 6% S&P 600, 34% MSCI EAFE, 4% MSCI EAFE Small Cap, 10% MSCI Emerging Markets through 6/30/2018; Asset weighted ACWI IMI w/USA Gross (Net) (public equity assets) and ACWI IMI w/USA Gross (Net) 1 qtr Lagged (private equity assets) thereafter
- **ASRS Custom Domestic Equity Benchmark** was S&P 500 through 12/31/2006; 74% S&P 500, 13% S&P 400, 13% S&P 600 through 12/31/2010; 70% S&P 500, 15% S&P 400, 15% S&P 600 through 3/31/2015.; 77% S&P 500, 11.5% S&P 400, 11.5% S&P 600 through 6/30/2018; 100% MSCI USA IMI thereafter.
- **ASRS Custom Domestic Large Cap Equity Benchmark** was the S&P 500 Index through 6/30/2018; MSCI USA Large Cap Index thereafter.
- **ASRS Custom Domestic Mid Cap Equity Benchmark** was the S&P 400 Index through 6/30/2018; MSCI USA Mid Cap Index thereafter.
- **ASRS Custom Small Cap Equity Benchmark** was the Russell 2000 Index through 12/31/2006; S&P 600 Index through 6/30/2018; MSCI USA Small Cap Index thereafter.
- **ASRS Custom International Equity Benchmark** was MSCI EAFE through 9/30/2005; MSCI ACWI ex-U.S. through 12/31/2010; 72% MSCI EAFE, 11% MSCI EAFE Small Cap and 17% MSCI Emerging Markets through 6/30/2012; 61% MSCI EAFE, 13% MSCI EAFE Small Cap and 26% MSCI Emerging Markets through 3/31/2015; 71% MSCI EAFE, 8% MSCI EAFE Small Cap and 21% MSCI Emerging Markets through 6/30/2018; MSCI ACWI IMI ex USA thereafter.
- **ASRS Custom Private Equity Benchmark** was the Russell 2000 Index 1 quarter lagged from inception to 6/30/2018; MSCI ACWI IMI Net w/ USA Gross 1 quarter lagged thereafter.

[1]MSCI EAFE/ACWI ex-U.S. Benchmark is the MSCI EAFE Index prior to 10/1/2005 and the MSCI ACWI ex-U.S. thereafter.

Note: All MSCI indices changed from Gross to Net of dividend withholding taxes effective 1/1/2014.

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- The client's custodian bank is NEPC's preferred data source unless otherwise directed. NEPC generally reconciles custodian data to manager data. If the custodian cannot provide accurate data, manager data may be used.
- Trailing time period returns are determined by geometrically linking the holding period returns, from the first full month after inception to the report date. Rates of return are annualized when the time period is longer than a year. Performance is presented gross and/or net of manager fees as indicated on each page.
- For managers funded in the middle of a month, the "since inception" return will start with the first full month, although actual inception dates and cash flows are taken into account in all Composite calculations.
- This report may contain forward-looking statements that are based on NEPC's estimates, opinions and beliefs, but NEPC cannot guarantee that any plan will achieve its targeted return or meet other goals.