

# How ASRS employees deliver service with

# PRIDE

## PROFESSIONALISM

*"We promote, strive for and expect individuals, teams, and divisions to possess professional qualities and skills to lead the organization"*

- Friendly, respectful and courteous
- Proactive and responsive
- Good communicator / active listener
- Trusted contributor / teammate
- Personally accountable
- Subject matter expert
- Critical thinker
- Honest, fair, non-judgmental
- Adaptable to change
- Adheres to the Code of Conduct

## RESULTS

*"We treasure the achievements of individuals, teams, divisions and the agency that energize the organization"*

- Completes projects
- Attains individual accomplishments
- Meets goals and objectives
- Satisfies customers
- Produces quality work products
- Manages risks successfully

## IMPROVEMENT

*"We appreciate individuals, teams or divisions who drive the agency forward with new, innovative ideas and solutions"*

- Promotes new ideas
- Enhances morale
- Enhances outcomes and performance
- Improves relationships
- Solves problems
- Increases efficiency, effectiveness or reduces costs

## DIVERSITY

*"We recognize that utilizing different talents, strengths and points of view, strengthens the agency and helps propel outcomes greater than the sum of individual contributor"*

- Encourages the free flow of ideas and opinions
- Treats all people with dignity and respect
- Works effectively with dissimilar individuals
- Recognizes and promotes new skills in others

## EXCELLENCE

*"We celebrate individuals, teams and divisions who exceed expectations and deliver service with a PRIDE that permeates the organization"*

- Surpasses expectations
- Engenders a positive public image
- Celebrates /rewards accomplishments and contributions of others
- Embraces change in a manner which inspires others
- Promotes teamwork /collaboration through communication
- Accepts personal responsibility and challenges with enthusiasm

**AGENDA**

**NOTICE OF PUBLIC MEETING  
OF THE ARIZONA STATE RETIREMENT SYSTEM  
INVESTMENT COMMITTEE**

September 21, 2020  
1:30 p.m.

Pursuant to A.R.S. § 38-431.02(F), notice is hereby given to the Trustees of the Arizona State Retirement System (ASRS) Investment Committee (IC) and to the general public that the ASRS IC will hold a **telephonic** meeting open to the public on Monday, September 21, 2020, beginning at 1:30 p.m. To help prevent community spread of COVID-19, no members of the public will be permitted to attend the meeting in-person. **Trustees of the Committee and the public may attend by telephone conference call at 877-820-7831, using Participant Passcode: 682491#.**

This is a regularly scheduled meeting of the IC; however, due to possible attendance by other ASRS Board Trustees, this meeting may technically become a meeting of the Board or one of its Committees. Actions taken will be consistent with IC governance procedures. Actions requiring Board authority will be presented to the full Board for final decision.

Pursuant to A.R.S. § 38-431.03(A)(3), the ASRS IC may vote to go into executive session, which will not be open to the public, for the purpose of obtaining legal advice on any item on the Agenda.

The Chair may take public comment during any agenda item.

The following agenda topics are proposed action items: 2, 3, and 9

The Agenda for the meeting is as follows:

1. Call to Order; Roll Call; Opening Remarks (*Estimated time 4 minutes*) ..... Mr. Michael Lofton  
Chair, Investment Committee

2. Approval of the Minutes of the June 15, 2020 Public Meeting of the ASRS IC (*Action item; estimated time 1 minute*) ..... Mr. Michael Lofton

*Proposed Action Item: The Board may decide whether to amend and approve the minutes, approve the minutes as written, or not approve the minutes at this time.*

3. Presentation, Discussion, and Appropriate Action Regarding Investment Related Matters in the ASRS Board Governance Policy Handbook (*Action item; estimated time 20 minutes*) .....  
 ..... Mr. Paul Matson  
 Director  
 ..... Mr. Karl Polen  
 Chief Investment Officer (CIO), ASRS

*Proposed Action Item: The Board may consider staff's recommendation; provide an alternate motion, or make no motion.*

4. Presentation, Discussion, and Appropriate Action Regarding Portfolio Positioning, House Views and General Discussion (*Informational and discussion item; estimated time 30 minutes*)  
..... Mr. Karl Polen  
..... Mr. Al Alaimo  
..... Sr. Portfolio Manager of Fixed Income, ASRS  
..... Mr. Samer Ghaddar  
..... Sr. Portfolio Manager of Equities, ASRS  
..... Mr. Micheal Copeland  
..... Portfolio Manager, Private Markets  
..... Mr. Taylor Mammen  
..... Sr. Managing Director, Director of Institutional Advisory Services, RCLCO

Objective:

The CIO and portfolio managers of ASRS and Mr. Taylor Mammen of RCLCO will present their investment views and the committee will discuss the current economic and investment environment. *No action is expected on this item, but the IC may express views or offer guidance on the matters discussed.*

5. Presentation, Discussion, and Appropriate Action Regarding Investment Performance (*Informational and discussion item; estimated time 30 minutes*) ..... Mr. Karl Polen  
..... Mr. Al Alaimo  
..... Mr. Samer Ghaddar  
..... Mr. Micheal Copeland  
..... Mr. Taylor Mammen

Objective:

The CIO and portfolio managers of ASRS and Mr. Mammen of RCLCO will report on investment performance and performance attribution in each of the portfolios. The discussion will include returns and holdings based performance analysis and a review of current strategies for the portfolios. *No action is expected on this item, but the IC may express views or offer guidance on the matters discussed.*

6. Presentation, Discussion, and Appropriate Action Regarding Independent Reporting, Monitoring and Oversight (*Informational and discussion item; estimated time 20 minutes*) .....  
..... Mr. Allan Martin  
..... Partner, NEPC

Objective:

NEPC will present total fund performance results for the period ending June 30, 2020 and will report on their monitoring of IMD activities. *No action is expected on this item, but the IC may express views or offer guidance on the matters discussed.*

7. Presentation, Discussion, and Appropriate Action Regarding Risk Management (*Informational and discussion item; estimated time 10 minutes*) ..... Mr. Karl Polen

Objective:

The CIO will present the MSCI risk management report. *No action is expected on this item, but the IC may express views or offer guidance on the matters discussed.*

8. Presentation, Discussion, and Appropriate Action Regarding Compliance (*Informational and discussion item; estimated time 10 minutes*) ..... Ms. Kerry White  
..... Assistant Chief Investment Officer for Reporting, Compliance & Administration

Objective:

The Assistant CIO will report on compliance activities. *No action is expected on this item, but the IC may express views or offer guidance on the matters discussed.*

9. Presentation, Discussion, and Appropriate Action Regarding the 2021 Investment Committee Meeting Calendar (*Action item; estimated time 5 minutes*) ..... Mr. Michael Lofton

*Proposed Action Item: The Board may consider staff's recommendation; provide an alternate motion, or make no motion.*

10. Request for Future Agenda Items (*Discussion item; estimated time 5 minutes*).....  
..... Mr. Michael Lofton  
..... Mr. Karl Polen

11. Call to the Public ..... Mr. Michael Lofton

Those wishing to address the ASRS IC will be requested to do so telephonically. Trustees of the Committee are prohibited by A.R.S. § 38-431.01(H) from discussing or taking legal action on matters raised during an open call to the public unless the matters are properly noticed for discussion and legal action. As a result of public comment, the IC may direct staff to study and/or reschedule the matter for discussion and decision at a later date.

12. The next ASRS Investment Committee Meeting is scheduled for Monday, December 21, 2020 at 1:30 p.m.

13. Adjournment of the ASRS IC Meeting.

A copy of the agenda background material provided to IC Trustees (with the exception of material relating to possible executive sessions) is available for public inspection at the ASRS offices located at 3300 North Central Avenue, 14th Floor, Phoenix, Arizona, and 4400 East Broadway Boulevard, Suite 200, Tucson, Arizona. The agenda is subject to revision up to 24 hours prior to meeting. These materials are also available on the ASRS website <https://www.azasrs.gov/content/board-and-committee-meetings> approximately 48 hours prior to the meeting.

Persons with disabilities may request alternate formats of this document by contacting Tracy Darmer, ADA Coordinator at (602) 240-5378 in Phoenix, at (520) 239-3100, ext. 5378 in Tucson or 1-800-621-3778, ext. 5378 outside metro Phoenix or Tucson. Requests should be made as early as possible to allow time to arrange the accommodations.

Dated September 14, 2020

ARIZONA STATE RETIREMENT SYSTEM

Signed Copy on File

Joyce Williams  
Committee Administrator

Signed Copy on File

Karl Polen  
Chief Investment Officer

# Agenda Item #2

## MINUTES

### PUBLIC MEETING OF THE ARIZONA STATE RETIREMENT SYSTEM INVESTMENT COMMITTEE

June 15, 2020  
1:30 p.m.

The Arizona State Retirement System (ASRS) Investment Committee (IC) met telephonically.

Mr. Michael Lofton, Chair of the IC, called the meeting to order at 1:40 p.m.

#### 1. Call to Order; Roll Call; Opening Remarks

Present: Mr. Michael Lofton, Chair – via teleconference  
Mr. Kevin McCarthy, Vice-chair – via teleconference  
Mr. Clark Partridge – via teleconference

A quorum of the IC was present for the purpose of conducting business.

Ms. Joyce Williams, ASRS Board Administrator, provided all attendees with telephonic meeting guidelines.

#### 2. Approval of the Minutes of the March 23, 2020 Public Meeting of the ASRS IC

**Motion:** Mr. Clark Partridge moved to approve the minutes of the March 23, 2020 public IC meeting. Mr. Kevin McCarthy seconded the motion.

By a roll call vote of 3 in favor, 0 opposed, 0 abstentions, 0 excused and 0 vacancies, the motion was approved. The trustee votes were as follows:

Mr. Michael Lofton – approved  
Mr. Kevin McCarthy – approved  
Mr. Clark Partridge – approved

#### 3. Presentation, Discussion, and Appropriate Action Regarding Portfolio Positioning, House Views and General Discussion

Mr. Karl Polen, Chief Investment Officer (CIO), introduced the topic noting that the ASRS is currently positioned neutrally with all asset classes within 1% of their strategic asset allocation target. He further noted that equity markets have held up surprisingly, given uncertainties on both economic and policy fronts.

Mr. Samer Ghaddar, Sr. Portfolio Manager of Equities, presented a macro overview and equity markets

information. He reported that consensus forecasts are for a gradual recovery from the virus pandemic with unemployment levels remaining above 5% through 2022. Economic effects of the pandemic have been mitigated through unprecedented fiscal and monetary stimulus targeted to protect incomes, stabilize credit markets, maintain liquidity, and support asset prices. With respect to equity markets, Mr. Ghaddar noted that the S&P500 is down only 7% for the calendar year while earnings are projected to be down 30%. The markets reflect both the effect of lower interest rates on required returns and a consensus view of an orderly return to normal earnings conditions. Private equity has seen a large reduction in deal volume but the rapid recovery in public equity markets is expected to be reflected in both deal volume and valuations in coming quarters.

Mr. Al Alaimo, Sr. Portfolio Manager of Fixed Income, provided an outlook on credit markets, noting that public credit markets declined precipitously in the first calendar quarter while well managed private credit portfolios held up relatively well and significantly outperformed in that time frame. He noted that the process will, to some extent, reverse in the current with a rapid recovery in public credit. He further reviewed interest rate markets with near record low rates for United States Treasury Securities, which are expected to continue for the foreseeable future.

Mr. Taylor Mammen, Sr. Managing Director and Director of Institutional Advisory Services, presented real estate outlook noting differential impacts by property type. He noted that multi-family properties have held up well in this recession with collections and leasing activity experiencing only minor impacts. Stay at home orders have accelerated the trend toward e-commerce and this is having a positive effect on industrial properties. Office properties have seen limited impact so far with generally long-term leases, but there is uncertainty regarding office utilization if physical distancing standards remain an expectation in the longer term. Retail and hotel are seeing severe impacts with low occupancy in hotels and many store closures leading to rent collection problems.

#### **4. Presentation, Discussion, and Appropriate Action Regarding Investment Performance**

Mr. Polen provided an update on the most recent information, with preliminary results available on 80% to 90% of investment funds and assuming flat public markets for the balance of the year, estimated returns for the fiscal year would be approximately 1% compared to benchmark returns of approximately 0%. He then reported final results for periods ending March 31, 2020. He noted that total fund returns of -1.1%, 4.9%, 5.2% and 7.7% for the one-, three-, five- and ten-year periods were 2% below the benchmark for the one-year period and .8%, 1.3% and 1% above the benchmark for the three-, five- and ten-year periods.

Mr. Ghaddar and Mr. Micheal Copeland, Assistant Portfolio Manager of Real Estate, presented information regarding equities performance. Total equity performance was -9.1%, 2.4% and 3.9% for the one-, three- and five-year periods. This performance underperformed benchmarks by 3.2%, .4% and .3% for these time periods. Mr. Copeland explained that private equity returns are quarter lagged and the one-year benchmark was 27% for periods ending 12/31/2019, which was well in excess of the portfolio return of 11%. He noted, however, that private equity relative performance is expected to substantially improve in the coming quarter with expected outperformance for the one-year period ended 3/31/2020 of approximately 4.8%.

Mr. Mammen reported real estate results, which, like private equity, are quarter lagged. For periods ending 12/31/2019, real estate earned 4.3%, 6.8%, 8.5% and 11% for the one-, three-, five-, and ten-year periods. These returns trailed the benchmark by .3% for the one-year period and exceeded the benchmark by 1.4%, 1.2% and 1.7% for the three-, five-, and ten-year periods. Mr. Mammen provided an estimate for the one-year period ending 3/31/2020 of -.8%, which trails the benchmark by 4.6%. This underperformance is driven largely by poor performance in a credit portfolio, which held positions in REIT credits, which sold off heavily in the first quarter. The manager of this portfolio has forecast substantial recovery of these losses in coming quarters.

Mr. Alaimo reported credit results for periods ended 3/31/2020 of 9.3%, 9.2%, 8.3%, and 7.7% for the one-, three-, five-, and ten-year periods. These results underperformed the benchmark by 2% for the one-year period and outperformed by 2.4%, 1.9% and 2.5% for the three-, five-, and ten-year periods. The credit portfolio is a

blend of public and quarter lagged private positions. However, in recent years it has transitioned to substantially all private positions and, as such, nearly all the positions are benchmarked against public market indices with an effective period end of 12/31/2019. The public benchmarks surged in that time frame. Mr. Alaimo provided an estimate of performance for the portfolio for periods ended 3/31/2020. During this quarter, public markets collapsed while the private portfolio experienced only minor losses. Mr. Alaimo estimated that the portfolio will earn a return of 4% for the one-year period ended 3/31/2020 while the benchmark lost 6.9% for an outperformance of 10.9% for the year.

Mr. Alaimo continued his presentation with a discussion of the interest rate sensitive portfolio. He reported that this portfolio earned 9.1%, 4.9% and 3.7% for the one-, three- and five-year periods, which outperformed the benchmark by .2%, .1% and .3% for the same time periods. The internal portfolios performed exceptionally well recently with outperformance of .6% in the most recent one-year period. This outperformance was achieved by unusual trading opportunities during March when spreads on high quality corporate credit widened substantially. The ASRS team capitalized on these opportunities generating substantial profits.

## **5. Presentation, Discussion, and Appropriate Action Regarding the Equities Implementation Plan and Private Equity Liquidity Compliance**

Mr. Ghaddar and Mr. Copeland presented the equity implementation plan. They reviewed the prior implementation plan and described the focus on internal management, risk factors, alpha overlay, index selection and private markets as return drivers. While internal management and private equities have delivered results in line with expectations, the other strategies have underperformed and the equities team has recommended discontinuing them.

Mr. Copeland updated the committee on private equity pacing. With the drop in equity values earlier this year, private equity peaked at 22% of the total equity portfolio exceeding the 20% limit established in the 2018 strategic asset allocation. As a result of this, the team reevaluated the pacing plan and set lower targets which are expected to return the portfolio to compliance with this liquidity limit.

Mr. Ghaddar concluded the presentation by describing the excess return and tracking error expectations for each of the components of the portfolio in the implementation plan, noting that the portfolio will be managed with a goal of achieving 91bp per year of excess return with tracking error of 2.1%.

## **6. Presentation, Discussion, and Appropriate Action Regarding Independent Reporting, Monitoring and Oversight**

Mr. Allan Martin, Partner, NEPC, presented the NEPC oversight. He noted that they review ASRS team calculations as presented to the IC to confirm their accuracy and consistency with the State Street official book of record. He reviewed compliance with ASRS noting full or partial compliance in all cases. He commended the ASRS team for liquidity management during financial turmoil related to the onset of the pandemic maintaining high liquidity throughout. He also noted that ASRS performance compared to other pension plans placed it in the top decile for all of the one-, three-, five-, and ten-year periods.

## **7. Presentation, Discussion, and Appropriate Action Regarding Risk Management**

Mr. Polen presented the risk report from MSCI, noting that risk increased to 28% during the first quarter of the year.

## **8. Presentation, Discussion, and Appropriate Action Regarding Compliance**

Ms. Kerry White, Assistant Chief Investment Officer for Reporting, Compliance, and Administration, presented the compliance report, noting that there were no instances of non-compliance to report for the period.

## **9. Request for Future Agenda Items**

No requests for future agenda items were made.

## **10. Call to the Public**

No members of the public requested to speak.

## **11. The next ASRS Investment Committee Meeting is scheduled for Monday, September 21, 2020 at 1:30 p.m.**

Mr. Lofton noted the next IC meeting is scheduled for Monday, September 21, 2020 at 1:30 p.m.

## **12. Adjournment of the ASRS IC Meeting.**

**Motion:** Mr. Clark Partridge moved to adjourn the meeting. Mr. Kevin McCarthy seconded the motion.

Mr. Michael Lofton adjourned the meeting at 3:54 p.m.

Respectfully submitted by:

Joyce Williams/Karl Polen  
Investment Committee Administrator/Chief Investment Officer  
ARIZONA STATE RETIREMENT SYSTEM

# Agenda Item #3

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## MEMORANDUM

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**TO:** Arizona State Retirement System (ASRS) Investment Committee (IC)

**FROM:** Mr. Paul Matson, Director

**DATE:** September 15, 2020

**RE:** **Agenda Item #3:** Presentation, Discussion, and Appropriate Action Regarding Investment Related Matters in the ASRS Board Governance Policy Handbook

### Purpose

To present recommended revisions to the ASRS Board Governance Policy Handbook.

### Recommendation

Action item: In order to ensure compliance with open meeting law, staff will provide its recommendation during the presentation.

### Background

Section H of the Handbook states, the IC's duties and responsibilities include, "Review and recommend to the Board changes in investment-related sections of the ASRS Board Governance Policy Handbook."

The revisions to the handbook are being submitted for IC consideration.

Many of the recommended modifications are technical or of a clarifying nature.

Attachments: Redlined version of ASRS Board Governance Policy Handbook

## Investment Committee Charter

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### General

The Investment Committee (~~IC~~) is a standing committee of the Board responsible for assisting the Board in overseeing the ASRS investment program.

### Composition

The ~~IC~~ Investment Committee is composed of three or four members at the discretion of the Board Chair. Committee members are appointed by the Board Chair.

### Duties and Responsibilities

1. Recommend to the Board the ASRS investment goals and objectives.
2. Recommend to the Board the ASRS strategic asset allocation policy which is expected to achieve the investment goals and objectives.
3. Recommend to the Board ASRS Strategic Investment Policies and review annually the ASRS Investment Policy Statement (IPS).
4. Review and recommend to the Board changes in investment-related sections of the ASRS Board Governance Policy Handbook.
5. ~~By proxy, the General Investment Consultant will R~~review the asset class committee's activities and asset class presentations.
6. ~~By proxy, the General Investment Consultant will R~~receive and review asset class committee minutes.
7. Review recommendations regarding changes to asset class performance benchmarks. Subsequent approval by the Board is required.
8. Review the Tactical Fund Positioning/Portfolio Rebalancing actions.
9. Recommend to the Board the selection, and termination of the ASRS general investment consultant(s) and oversee their performance.
10. Receive and discuss ASRS investment risk and compliance reports.
11. Review annually the administration of the third-party administrator for the Supplemental Retirement Savings Plan (~~SRSR~~) and annually report any issues to the Board.
12. Review annually the administration of the third-party administrator for the Supplemental Salary Deferral Plan (~~SSDP~~) and annually report any issues to the Board.
13. Review and comment if necessary on compliance reporting related to investment management.

## I. ASSET CLASS COMMITTEES

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### Purpose

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Asset class committees are designed to:

1. Provide authority and responsibility to the Director, Chief Investment Officer (~~CI~~), and Investment Management Division (IMD) staff regarding the implementation of the ASRS Strategic Asset Allocation Policy (SAAP), associated selection of investment managers, and approval of investments.
2. Provide authority for the hiring of staff extension consultants.
3. Improve the efficiency and effectiveness of the ASRS investment decision-making process.
4. Provide consistency and uniformity in investment decision-making frameworks.

Asset class committees are not deemed to constitute a sub-committee of the Investment Committee (~~IC~~) or full Board.

### Duties and Responsibilities

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The Director is delegated responsibility for the management of the asset class committees. The Director may establish one or more asset class committee to perform functions described herein.

The asset class committees will meet periodically to review investment recommendations from the ~~IMD~~ [Investment Management Division](#) portfolio managers. All such reviews, including the hiring and termination of investment managers and the acquisition of investments will be conducted in accordance with the requirements of SIP006.

Asset class committees will hire a Real Estate Consultant, a Private Equity Consultant and other staff extension consultants to aid the committees in the identification, diligence and monitoring of investments.

### Organizational Structure/Composition/Voting Protocol

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The ASRS may operate with one or more asset class committees.

Each committee will include as its voting members the Director, the ~~CI~~ [Chief Investment Officer](#), the Assistant ~~CI~~ [Chief Investment Officer](#) and the Senior Portfolio Managers. All decisions of the asset class committee require concurrence of both the Director and the ~~CI~~ [Chief Investment Officer](#). Other members of the ~~IMD~~ [Investment Management Division](#) and the staff extension consultants may attend the meetings as non-voting members.

To ensure the timely flow of information, the ~~CI~~ [Chief Investment Officer](#) or the [General Investment Consultant](#) will communicate to the ~~IC~~ [Investment Committee](#), information regarding activities of the asset class committees.

### Staff-extension Investment Consultants

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Staff-extension investment consultants are considered as an extension of the ~~CI~~ [Chief Investment Officer](#) and ~~IMD~~ [Investment Management Division](#) staff. Responsibility to assign investment tasks to the staff extension consultants is delegated to the ~~CI~~ [Chief Investment Officer](#).

Staff-extension investment consultants will be utilized by the ~~CI~~ [Chief Investment Officer](#) and ~~IMD~~ [Investment Management Division](#) staff to assist in the investment manager searches and other activities pertaining to the selection and monitoring of investment managers.

Selection of a particular staff-extension investment consultant will be based on those available from the approved pool of consultants and their particular strengths and ability to add value to the ASRS.

# Agenda Item #4

# House Views and Portfolio Positioning

Arizona State Retirement System

September 21, 2020

# Outline

- 1 Summary View and Positioning
- 2 Macro Environment
- 3 Public Equity
- 4 Private Equity
- 5 Credit
- 6 Interest Rate Sensitive
- 7 Real Estate
- 8 Historic Data

# Outline

- 1 Summary View and Positioning
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## Summary View

- We are positioned neutrally with equities within 1% of policy weight and underweights in core bonds offset by cash balances.
  - Global economy is steadily recovering from pandemic impacts though with differential impacts across industries.
  - Markets are discounting continued recovery with a vaccine or other cure in due course.
  - Delays in the vaccine or renewed shutdowns could shock markets.
  - Additionally, election year dynamics typically are associated with increased market volatility and we expect that in coming months.
- Extraordinary fiscal and monetary support have resulted in extremely rapid recovery in stock and bond markets.
  - The market expects interest rates to remain low for an extended period of time.
  - High deficits and unprecedented expansion of central bank balance sheets have not been inflationary because of low demand but the path for normalization of these policies could create destabilizing imbalances.
- Private markets are seeing improved spreads in both credit and real estate.
  - We may see distressed buying opportunities in impacted sectors.

## Summary View and Positioning

Macro Environment

Public Equity

Private Equity

Credit

Interest Rate Sensitive

Real Estate

Historic Data

## Current Positioning 9/11/2020

### Total Fund Positioning

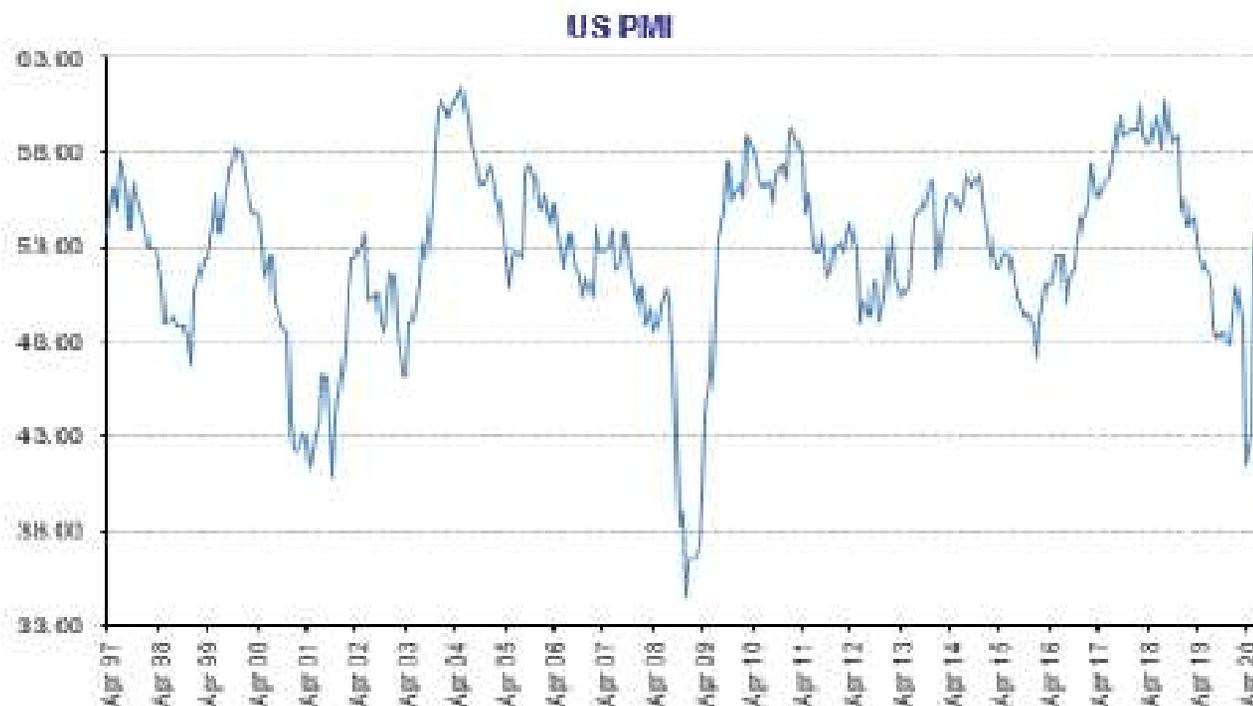
	NAV w/ Notional (\$ mm)	NAV Exposure (%)	Target (%)	Active Weight (%)	Active Weight (\$ mm)
Cash	779.9	1.9	0.0	1.9	779.9
Bonds	3806.2	9.1	10.4	-1.3	-558.7
Credit	8662.9	20.6	20.0	0.6	268.9
Equity	21908.9	52.2	52.3	-0.1	-41.5
Real Estate	6811.9	16.2	17.3	-1.1	-448.9
Other	0.4	0.0	0.0	0.0	0.4
<b>Total Fund</b>	<b>41970.3</b>	<b>100.0</b>	<b>100.0</b>	<b>0.0</b>	<b>0.0</b>

# Outline

- 1 Summary View and Positioning
- 2 Macro Environment
- 3 Public Equity
- 4 Private Equity
- 5 Credit
- 6 Interest Rate Sensitive
- 7 Real Estate
- 8 Historic Data

## US Macro

- The US economy is showing signs of a recovery:
  - US GDP growth has been revised upward for 2020
    - The economy is now projected to contract by around 5.0% in 2020, compared to a growth rate of 2.2% for 2019
- Latest PMI figures are above 50, which is back into expansion territory

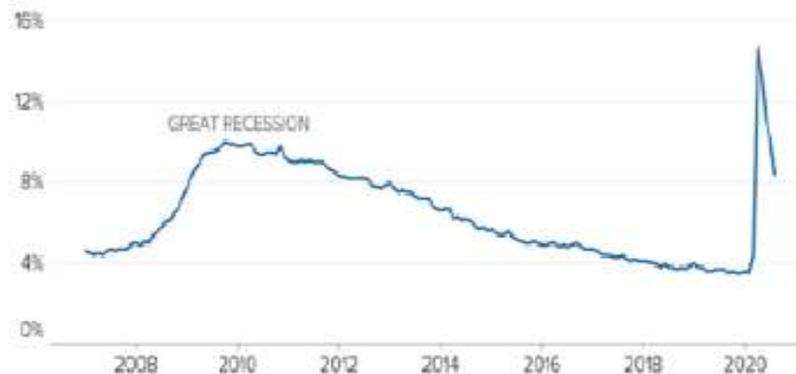


## US Macro

- Unemployment in the US stands at 8.4%, compared to 11% earlier in the summer and 15% at the start of the COVID 19 pandemic
- Initial jobless claims are still stubbornly high, which makes the recovery not as pervasive

### Jobless rate drops to 8.4% in August

Monthly unemployment rate, seasonally adjusted

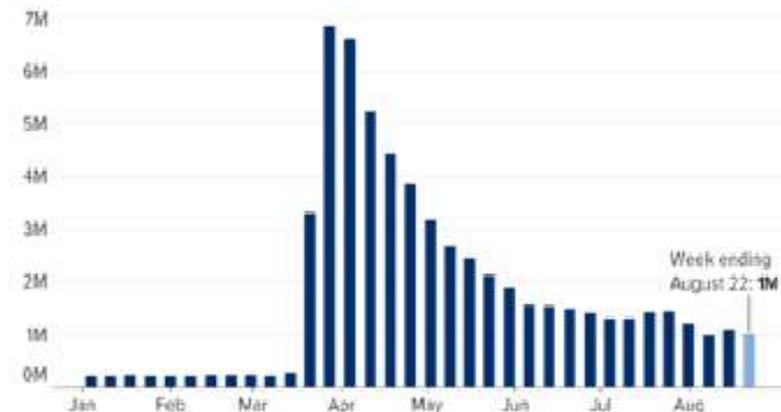


SOURCE: Bureau of Labor Statistics. 1948 is earliest data available from BLS.



### Initial claims for unemployment insurance

Weekly in 2020

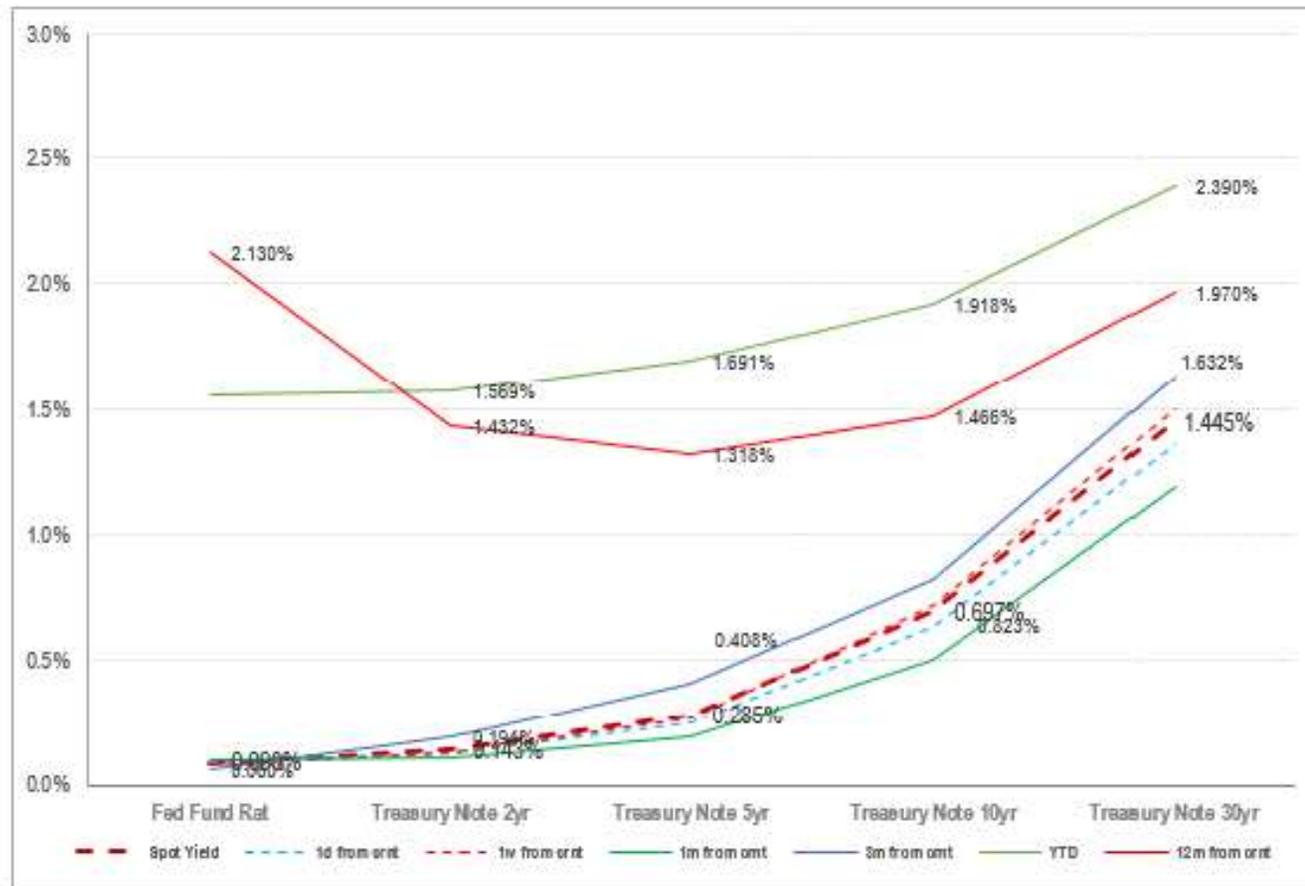


SOURCE: Department of Labor. Data is seasonally adjusted. Data through August 22, 2020.



# US Macro

- The yield curve is starting to steepen after fiscal/monetary stimuli and better economic figures



## Global Macro

- Latest global GDP forecasts have edged down from last update
- European Union GDP growth to reach -8% in 2020, and projected to rebound to a 5.6% growth rate in 2021
- Emerging Markets GDP growth to reach -1% in 2020, and projected to rebound to a 5.0% growth rate in 2021

EU Macro Forecasts	2020	21	22
European Union GDP Economic Fo	-8.0	5.6	2.6
European Union Unemployment Ra	8.1	5.6	2.6
European Union CPI Economic Fo	0.7	1.3	1.5
Emerging Markets Macro Forecasts	2020	21	22
Emerging Economies GDP Economi	-1.0	5.0	4.8
Emerging Economies Unemploymen	6.2	5.8	5.5
Emerging Economies CPI Economi	3.5	3.6	3.5

# Outline

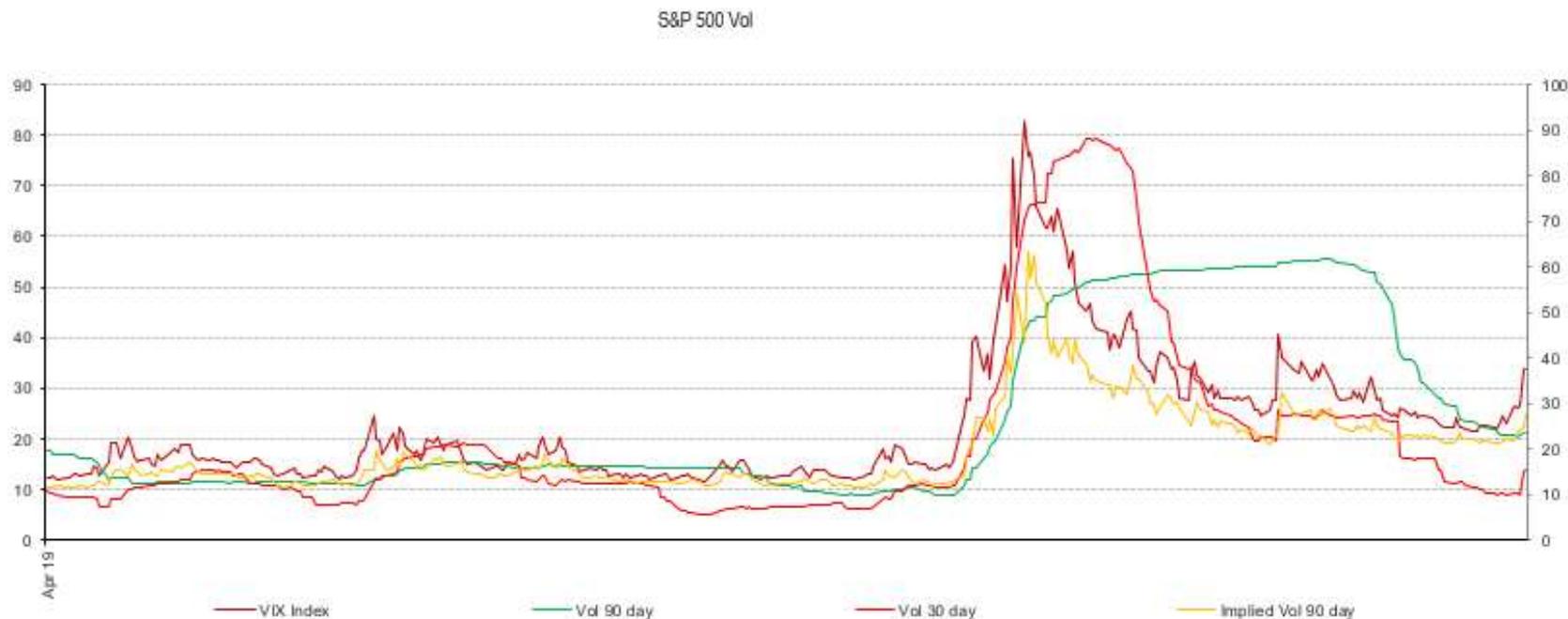
- 1 Summary View and Positioning
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## Current Positioning

- We have positioned our public equity portfolio to be at equal weight to our interim SAA:
  - We are 0.25% underweight in domestic equities, proportional to our MSCI USA IMI benchmark:
    - 0.2% underweight in US LC, 0.1% underweight in US MC & equal weight in US SC.
  - We are 0.25% overweight in international equities:
    - 0.1% overweight in World ex-US LC, 0.1% overweight in World ex-US SC & and 0.1% overweight Emerging Markets.

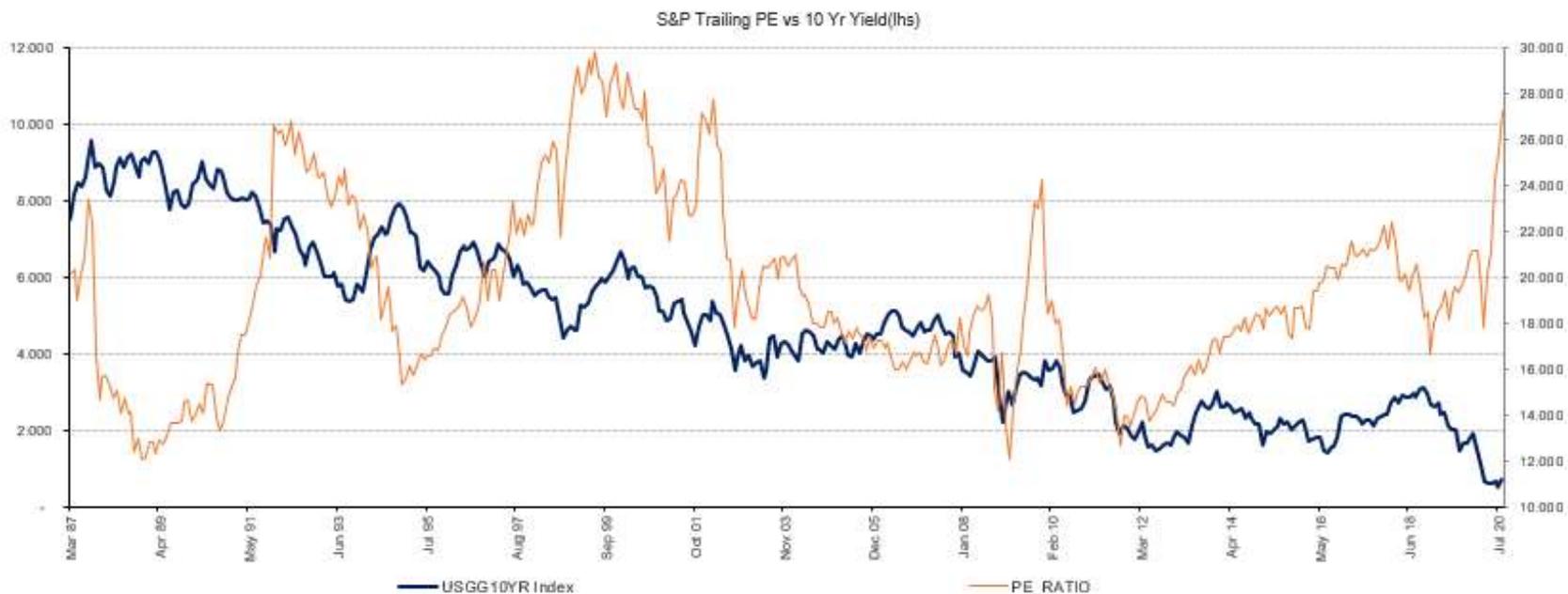
## Equity Markets

- Equity markets - and the US markets in particular - saw an exceptional rally this summer
- The rally was primarily driven by the Tech sector, which led to a valuation expansion
- Market volatility indicators are showing signs of stress, increasing the potential for a correction across markets
  - The Tech sector - and the NASDAQ Index in particular - appear stretched with a high potential for a correction



## Equity Markets

- Lower yields have been the main driver of the market rally and expansion in valuations
- Current S&P 500 trailing PE ratio stands at 26x, while the 10-year yield is at an all time low
- The S&P is now up 5% YTD, while earnings per share are projected to be down by around -30% for 2020



## Equity Conclusion

- Given how quickly the market recovered, we are less constructive on the equity markets in general, and the United States in particular
- We believe that while the asset class could outperform in the coming 9-12 months, the fourth quarter of 2020 market will likely be trading sideways

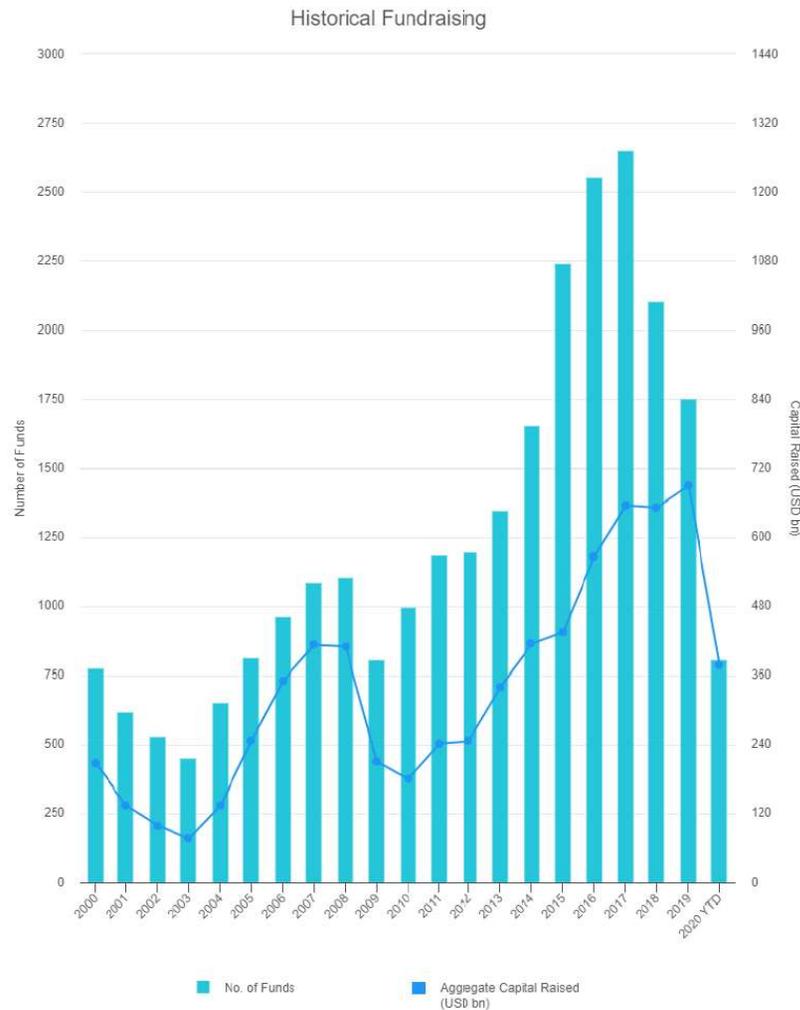
# Outline

- 1 Summary View and Positioning
- 2 Macro Environment
- 3 Public Equity
- 4 Private Equity**
- 5 Credit
- 6 Interest Rate Sensitive
- 7 Real Estate
- 8 Historic Data

## Private Equity Environment

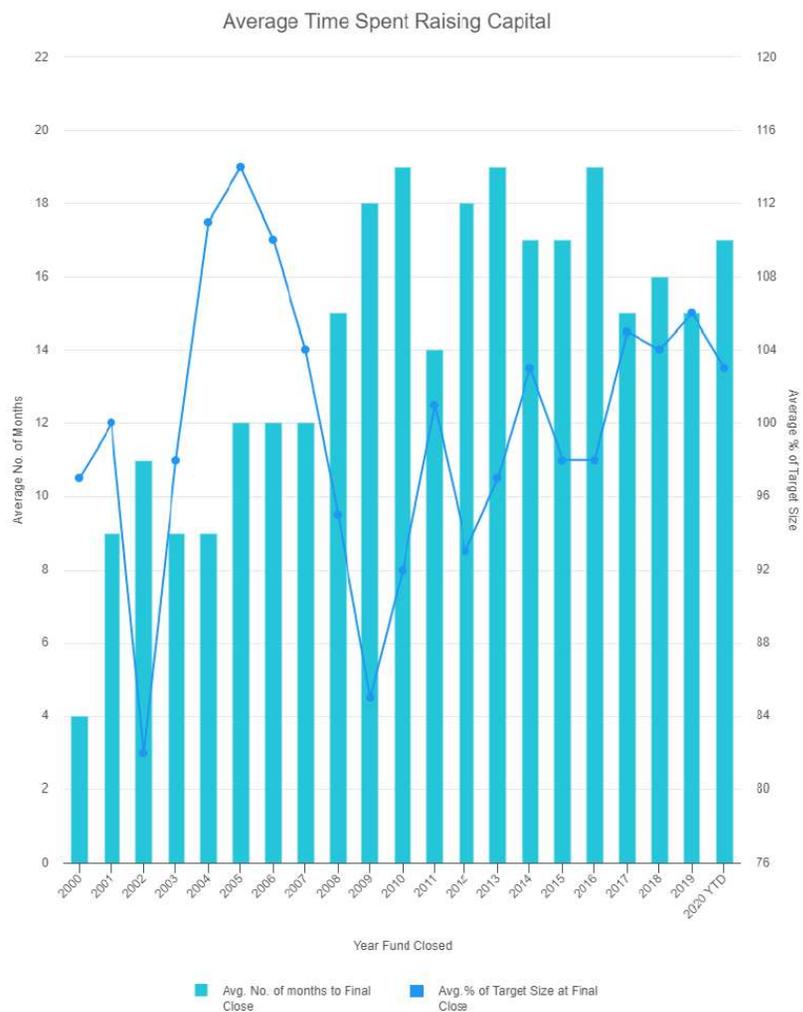
- As with the macro environment as well as the public markets, COVID-19 has had significant impacts on Private Equity
  - Transactions have declined precipitously; which is similar in nature with what occurred during the 2009 Global Financial Crisis
  - Multiples were at or close to cyclical highs but the severity and duration of a contraction in multiples is unclear
  - Leverage is high with 75% of deals completed in 2019 at  $> 6 \times$ 
    - Similar to prior crises, high leverage combined with severe drops in revenue/cash flow creates opportunities
- Buyout dry powder has steadily risen as the asset class has also grown and successful managers have raised ever increasing fund sizes
- Given the long-dated nature of funds we do not attempt to time cycles but are paying close attention to the partners we select and their operational capabilities

# Private Equity Fund Raising



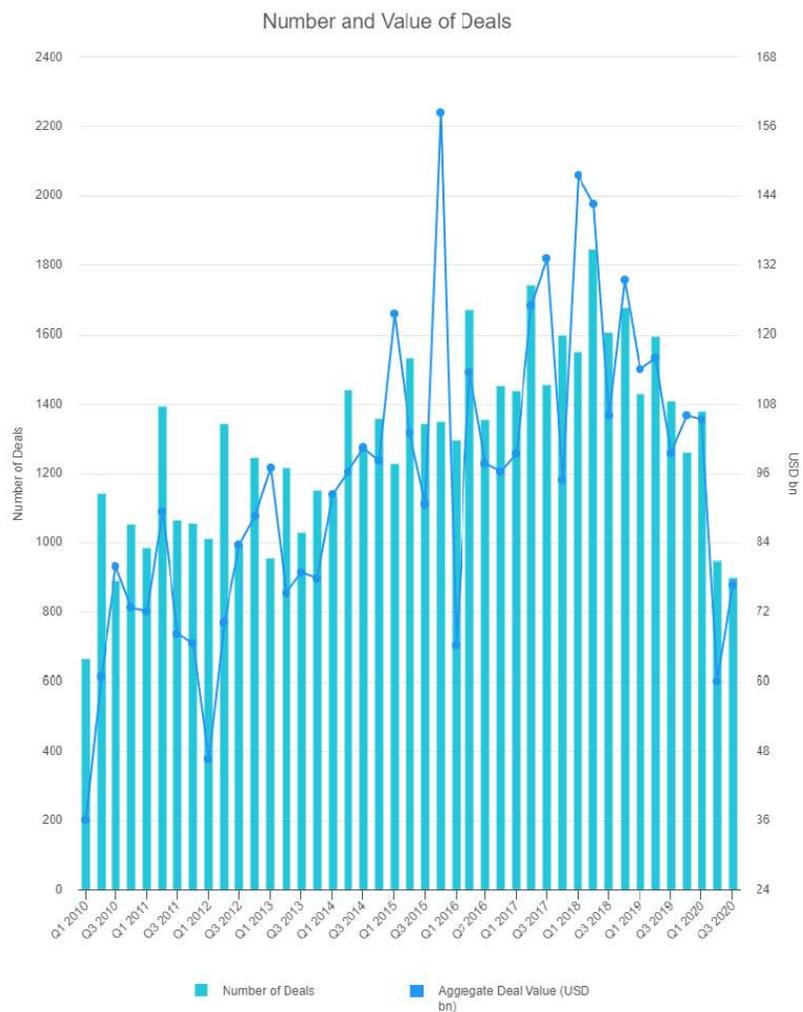
Source: Preqin

# Private Equity Average Fund Raising Time



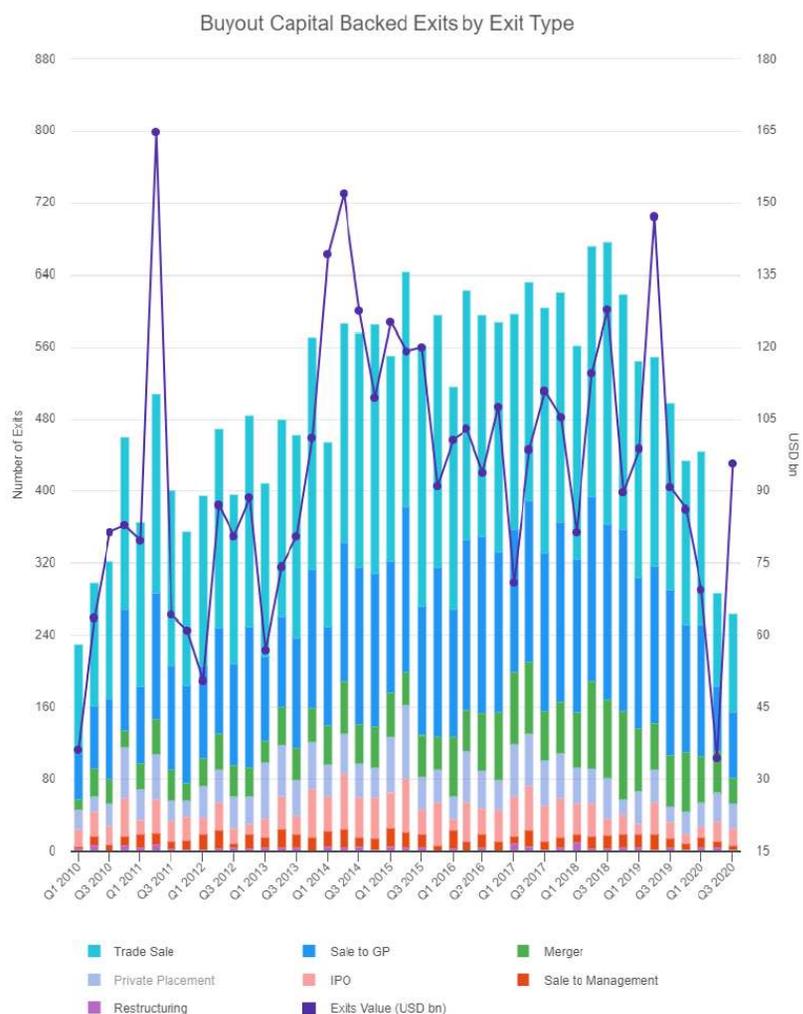
Source: Preqin

# Private Equity Buyouts

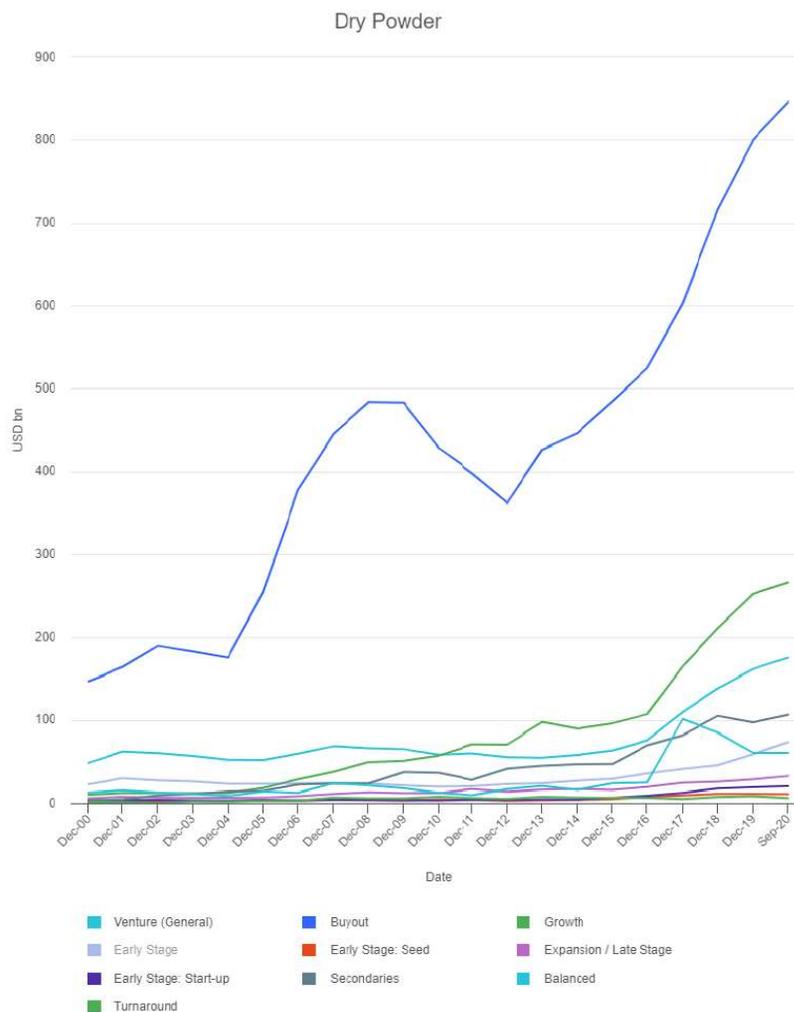


Source: Preqin

# Private Equity Exits



# Private Equity Dry Powder



Source: Preqin

# Outline

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## Commentary

- As of August 31, 2020, we had \$8.6 billion invested in the Credit asset class representing a 20.1% allocation versus an SAA target of 20.0%. Our commitments to partnerships in the Credit asset class, net of partnerships in liquidation (or pending liquidation), represent approximately 22.9% of the total fund.
- With the Credit asset class, we are allocated as follows:

	% of Total Fund
Private Debt	14.4%
Distressed Debt	3.6%
Other Credit	2.1%
Total Credit	20.1%

- The benchmark for the Credit asset class is the S&P/LSTA Leveraged Loan Index plus 250 bps (per annum).

## Summary of Credit Asset Class

	Manager Commitments <sup>1</sup> (\$MM)	Commitments in In Liquidation or Pending Liquidation (\$MM)	Manager Commitments Net of Commitments In Liquidation (\$MM)	Invested Capital (\$MM)
Private Debt				
US Corporate	\$4,493	\$793	\$3,700	\$4,037
Real Estate and Asset-Backed	\$1,375	\$0	\$1,375	\$1,166
European Credit	\$1,200	\$0	\$1,200	\$966
Total Private Debt	\$7,068	\$793	\$6,275	\$6,169
Distressed Debt	\$1,661	\$242	\$1,419	\$1,534
Other Credit	\$2,137	\$19	\$2,118	\$885
Total Credit (\$MM)	\$10,866	\$1,054	\$9,812	\$8,588
Total Credit (% of Total Fund)	25.4%	2.5%	22.9%	20.1%

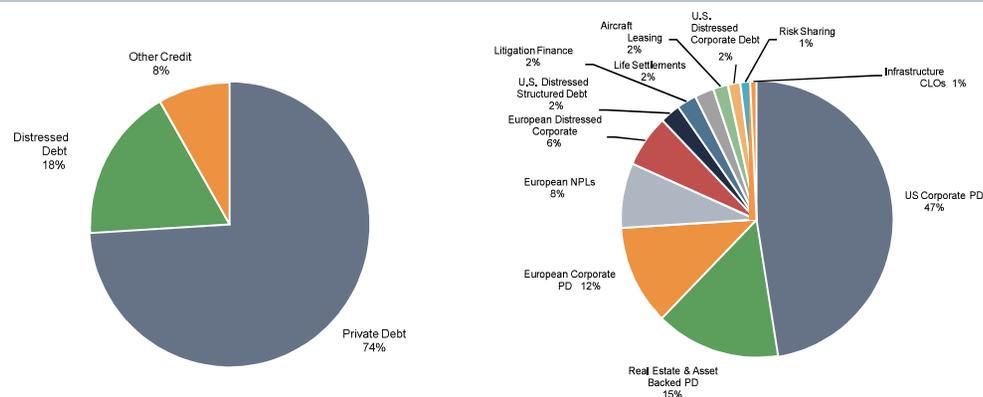
<sup>1</sup> Excludes reinvested income.

## Commentary

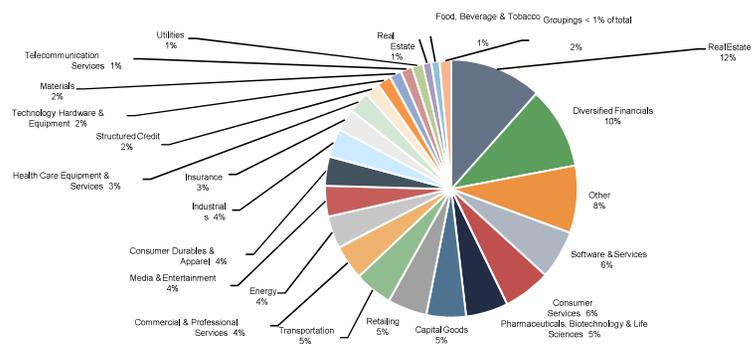
- For Credit, our house view is the following:
  - There are compelling investment opportunities to exceed the performance of the Credit asset class benchmark over time in Private Debt, Distressed Debt and Other Credit. These opportunities are almost exclusively in private rather than public markets or are in areas of the market, such as distressed debt, which typically require investments in locked-up vehicles with limited liquidity.
  - The economic disruption caused by COVID-19 has created the most attractive environment for private credit investment opportunities in recent years.
  - We generally do not believe that public credit markets (such high yield bonds, leveraged loans and asset-backed securities) offer as attractive investment opportunities in comparison to the private markets as public market opportunities will likely not meet the return of the Credit asset class benchmark over an extended, multi-year period of time. Moreover, in contrast to the private markets, the public credit markets do not provide investors with the opportunity for full due diligence and bespoke tailoring of deal terms.

# Credit Asset Class Strategy & Industry Exposure as of May 31, 2020

## Strategy Exposure

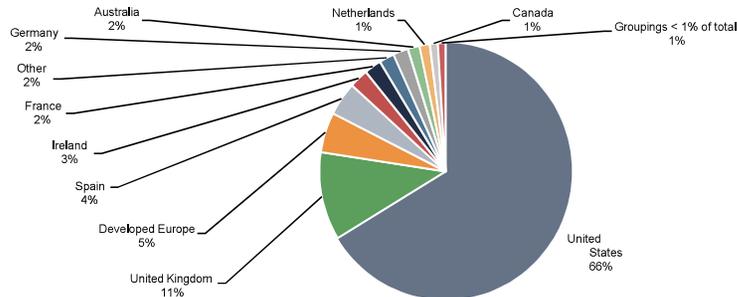


## Industry Exposure

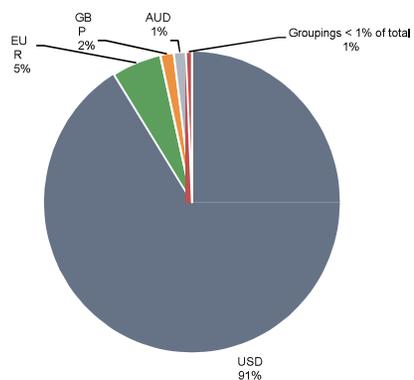


# Credit Asset Class Geographic & Currency Exposure as of May 31, 2020

Geographic Exposure



Currency Exposure

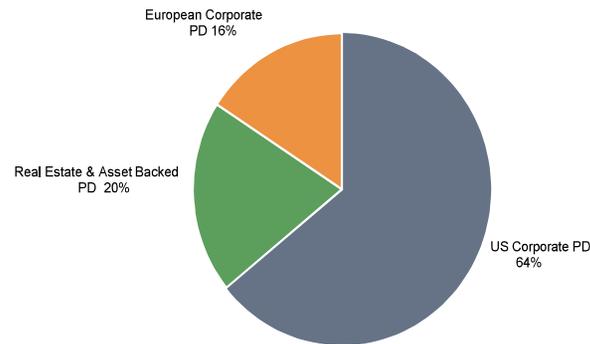


## Private Debt

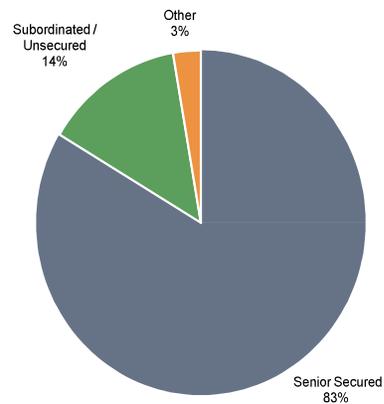
- We believe Private Debt asset offers the most attractive opportunity in the fixed income markets with double-digit expected returns available for investors willing to accept illiquidity, and when appropriate, employ leverage. Private Debt offers significantly higher expected returns than the public credit markets with lower volatility.
- The market opportunity is principally driven by regulatory constraints that make it unattractive for banks to hold illiquid loans or other debt of below investment-grade credit quality.
- The economic disruption from COVID-19 will undoubtedly lead to an increase in bankruptcies and restructurings of investments in Private Debt made prior to the pandemic. However, over 80% of ASRS's investments are senior secured and should hold up relatively well. Only 4% of the Private Debt portfolio has experienced an event of default. We believe that unrealized losses in our Private Debt portfolio stemming from the economic disruption will largely be recovered if the economy returns to a more normal level of business activity.
- Meanwhile, the market for new private debt offerings is significantly more attractive with expected returns from higher spreads and fees increasing by 100 bps or more depending on the strategy with lower deal leverage and better covenants.

# Private Debt Strategy & Security Exposure as of May 31, 2020

## Strategy Exposure

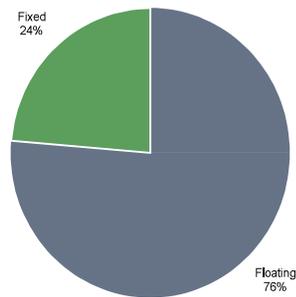


## Security Exposure

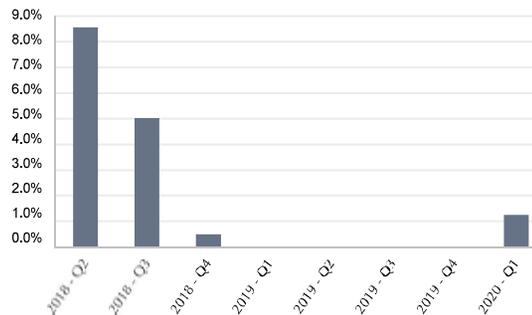
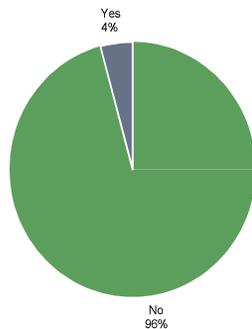


# Private Debt Fixed/Floating Exposure & Event of Default/Payment Default as of May 31, 2020

Fixed / Floating Exposure



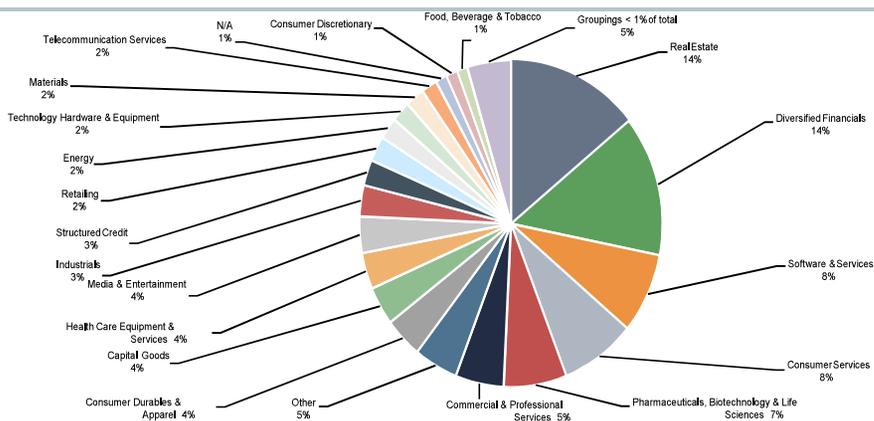
Event of Default / Payment Default During Life of Investment



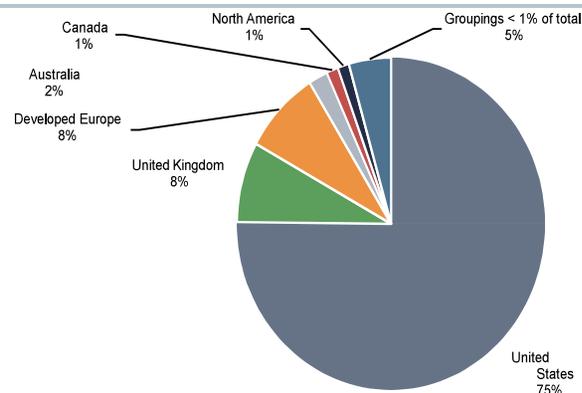
Please note: the table shows % of the deals underwritten in each quarter that have experienced a default.

# Private Debt Industry & Geographic Exposure as of May 31, 2020

## Industry Exposure

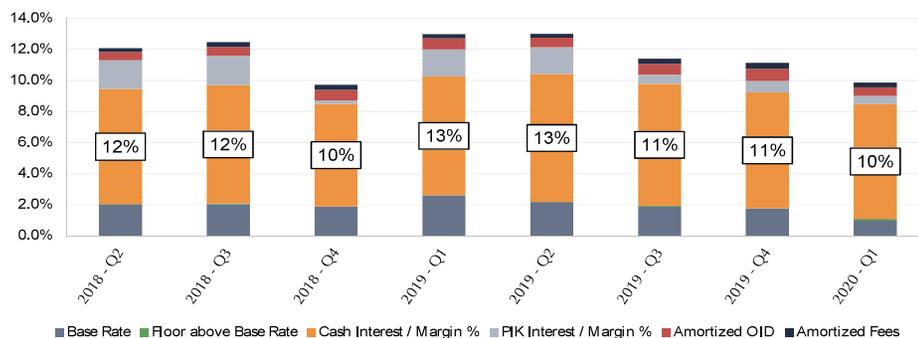


## Geographic Exposure

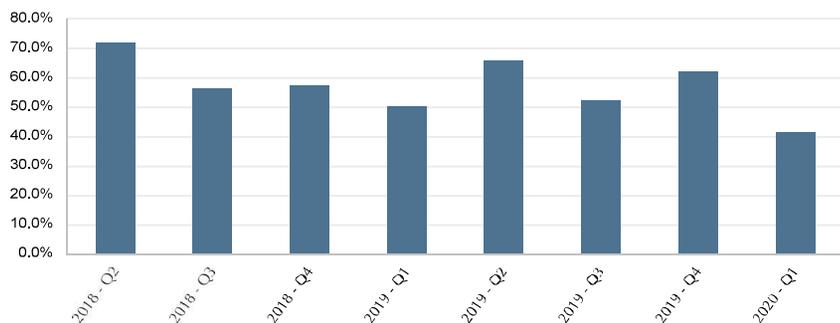


# Private Debt Yield Components & Underwritten LTV % as of May 31, 2020

Yield Components of Transactions Underwritten – by Quarter

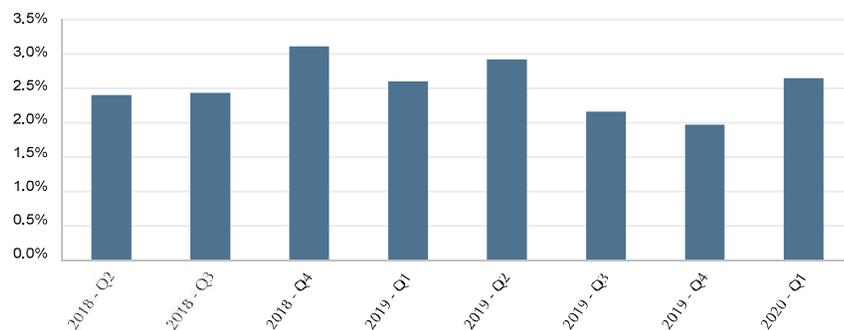


Underwritten LTV % – Weighted Average by Quarter

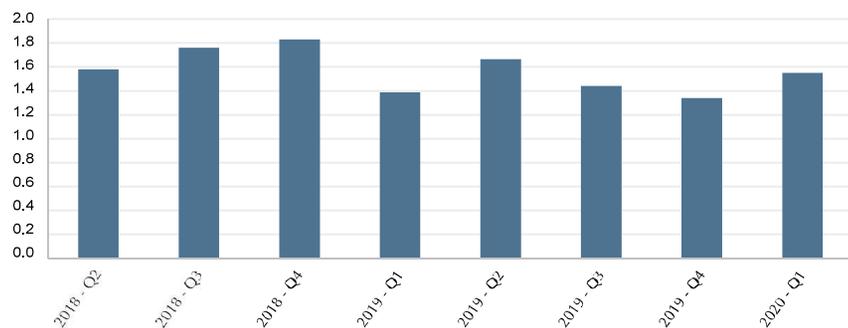


# Private Debt Return/Unit of Leverage & Financial Maintenance Covenants as of May 31, 2020

Return / Unit of Leverage – Weighted Average by Quarter



Financial Maintenance Covenants – Weighted Average by Quarter

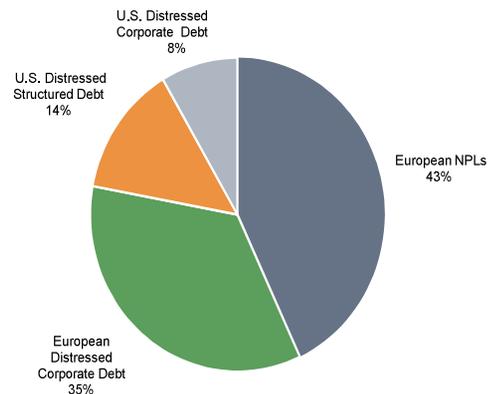


## Distressed Debt as of May 31, 2020

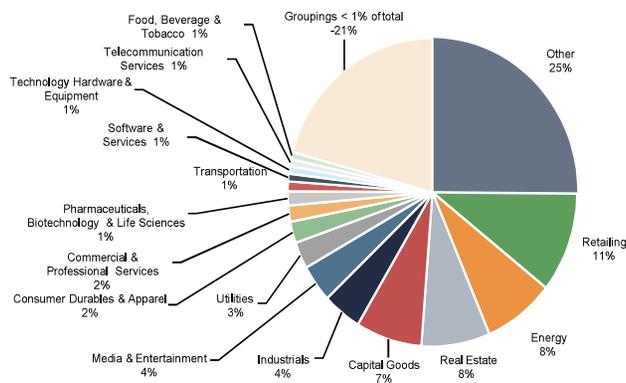
- We have three fund-of-one partnerships in Europe which are actively investing in distressed opportunities. One partnership is targeting distressed corporate loans while the other two are targeting pools of small non-performing loans (“NPLs”). In addition, we are invested in a credit fund that opportunistically invests in U.S. and European distressed debt, both corporate and structured credit, as opportunities arise.
- In many ways, the distressed debt environment is the most attractive it has been since the Global Financial Crisis in 2008-2009 as the economic disruption from COVID-19 will lead to a substantial increase in bankruptcies and restructurings. That being said, a substantial rally in the high yield and leveraged loan markets in the past few months will likely dampen the potential return opportunities in the tradable markets.
- Some investments made prior to the pandemic face a challenging economic environment or have been repriced with higher required returns by the financial markets.

# Distressed Debt Strategy & Industry Exposure as of May 31, 2020

## Strategy Exposure

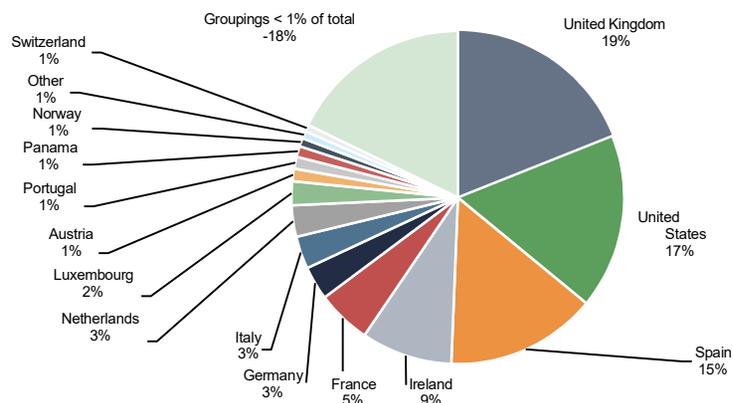


## Industry Exposure



# Distressed Debt Geographic Exposure as of May 31, 2020

## Geographic Exposure

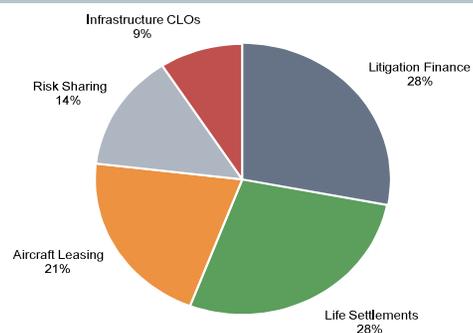


## Other Credit as of May 31, 2020

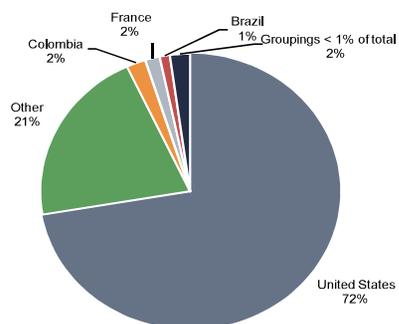
- We believe that select opportunities exist to achieve attractive returns in Other Credit, a sub-asset class which we characterize as credit opportunities that are not encompassed in Private Debt, Distressed Debt or High Yield, and offer an expected return which will likely meet or exceed the Credit asset class benchmark.
- Currently, our Other Credit strategies include partnerships that invest in niche market opportunities that we believe are attractive including aircraft leasing, equipment leasing, life settlements, infrastructure loans, litigation finance and risk sharing transactions.
- The economic disruption from COVID-19, the repricing of risk in the credit markets, and the impaired liquidity and exit of some market participants (such as hedge funds) have meaningfully increased the expected return on new investments in Other Credit.
- That being said, some investments made prior to the pandemic such as aircraft leasing face a very tough economic environment. Aircraft leasing is a relatively small percentage of Other Credit. Meanwhile, other strategies such as life settlements and litigation finance, which represent larger investments for Other Credit, will be less affected the adverse economic environment.

# Other Credit Strategy & Geography Exposure as of May 31, 2020

Strategy Exposure



Geography Exposure



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## Commentary

- As of August 31, 2020, we are underweight Interest Rate Sensitive Fixed Income with an allocation of 8.9% versus a 10.4% Interim SAA target. Earlier this year, we reduced our weighting in the asset class to raise cash to meet the overall funding needs (benefit payments and capital calls) of the total fund.
- Since the beginning of 2020, interest rates have plunged due to the adverse global economic impact caused the outbreak of the COVID-19 virus and related policy responses (ex. lockdowns). Furthermore, in response to the severe economic impact to the U.S. economy, the Federal Reserve has essentially renewed the playbook it employed following the 2008-2009 Global Financial Crisis: lowering its target for short-term interest rates to essentially zero, launching quantitative easing to purchase U.S. Treasury bonds and agency mortgage-backed securities, and adding a number of programs to support the credit markets.
- Moreover, the Fed has indicated that it will likely keep short-term rates low for at least the next few years. As a consequence, we believe long-term rates will remain quite low for the foreseeable future.
- Long-term U.S. treasury rates are now close to their lowest levels ever with the 10 year U.S. Treasury bond yielding only 0.7%.

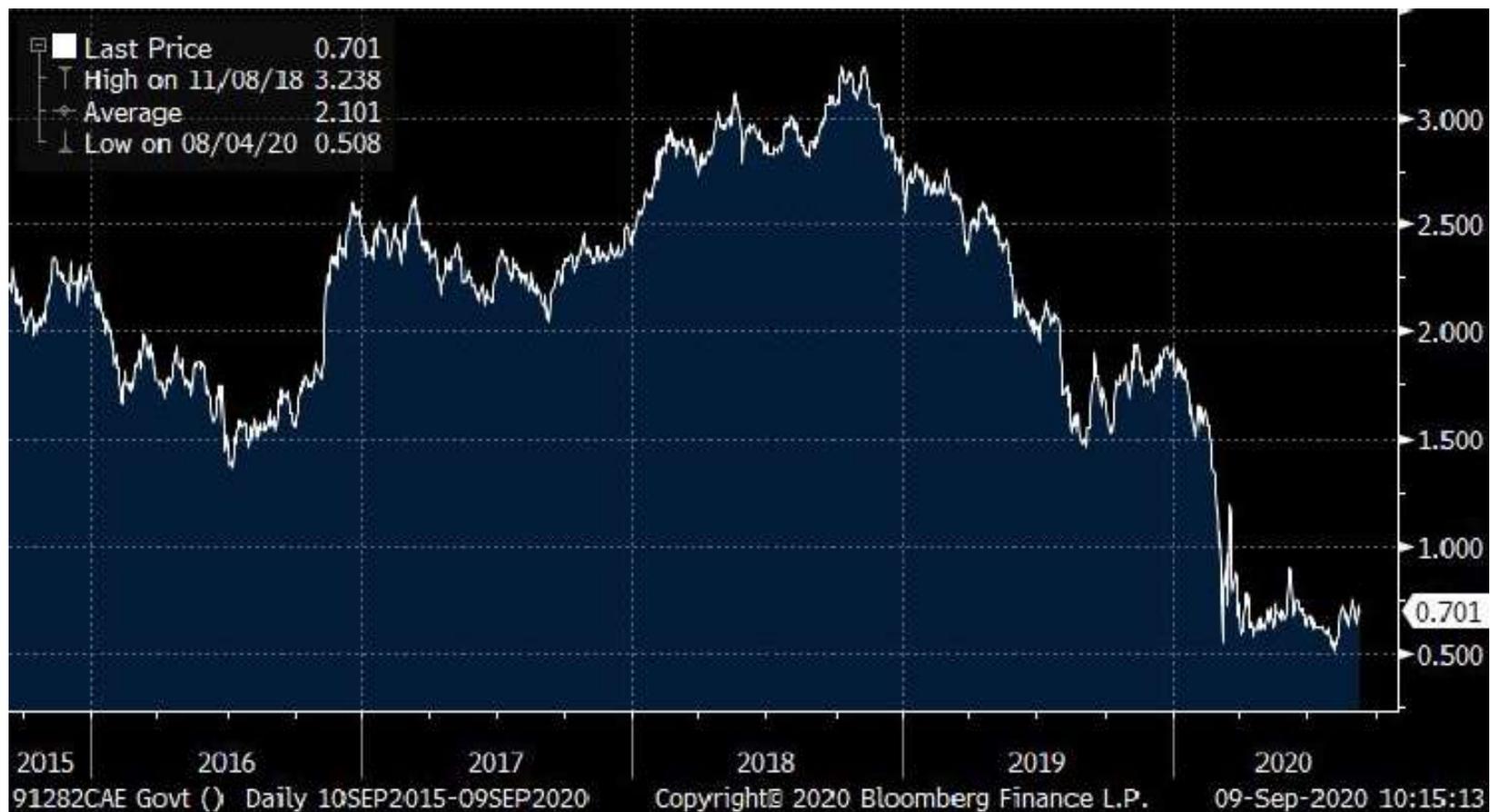
## Commentary

- The Bloomberg Barclays U.S. Aggregate Bond Index, the benchmark for Interest Rate Sensitive Fixed Income, is now yielding only 1.2% vs. 2.3% at the beginning of 2020. The yield of the index has historically been a good indicator of long-term expected returns of the asset class.
- With this low yield, we do not expect attractive returns in the asset class going forward relative to the total fund's target return.
- However, we expect to maintain a meaningful investment in the asset class to use as a source of liquidity to meet the total fund's needs and to serve as a counter-balance to potential sell-offs in risky assets such as equities.
- That being said, the efficacy of the asset class as a counter-balance to potential sell-offs in risky assets has likely diminished. The asset class has less room to appreciate in value as it has during past sell-offs as rates have little capacity to fall further unless negative rates are adopted in the U.S. Based on comments from the Fed, we do not believe negative rates will be implemented.

# Bloomberg Barclays U.S. Aggregate Yield-to-Worst



# 10 Year US Treasury Yield



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# Property Types Outlook

<u>Multifamily</u>	<u>Office</u>	<u>Retail</u>	<u>Industrial</u>	<u>Hotel</u>	<u>Single-Family</u>
<i>Shifting long-term demand</i>	<i>Bifurcated market</i>	<i>E-Commerce headwinds</i>	<i>E-Commerce tailwinds</i>	<i>Deep distress</i>	<i>Abundant demand, supply constraints</i>
While multifamily is experiencing a short-term correction, long-term returns are projected to perform well. Demographic trends, along with deteriorating consumer balance sheets, will increase demand for rentership in the coming years, particularly among the 30-45 and 65+ age cohorts.	The pandemic has created uncertainty for the future of office, specifically whether an increase in telecommuting will be offset by greater distancing among employees. Expect a flight to quality among tenants in terms of product (new buildings) and location (growing employment cores).	The COVID-19 outbreak has accelerated long-term trends that challenge brick and mortar retail, particularly malls and power centers. Rental collections have rebounded from April lows, however, and grocery anchored retail is, and should continue to be, a resilient subset of this property type.	The shift towards e-commerce has been accelerated by COVID-19, resulting in increased demand for industrial space. Rent growth and occupancy rates remain strong, and industrial will likely continue to outperform other asset classes through 2022.	Hotels have been severely impacted by the stay-at-home orders, losing billions of dollars and operating with reduced staffs. RevPAR is currently at 41% of pre-crisis levels, leading to opportunities to provide attractive recapitalizations and/or acquire from distressed sellers.	The aging of the Millennials, and their growing needs for better schools and yard space, favor lower-density housing, both for-sale and rental. Single-family housing is generally undersupplied (both owner and renter SFD is at historically high occupancy), leading to a range of investment opportunities.

# Real Estate Property Markets (2Q 2020)

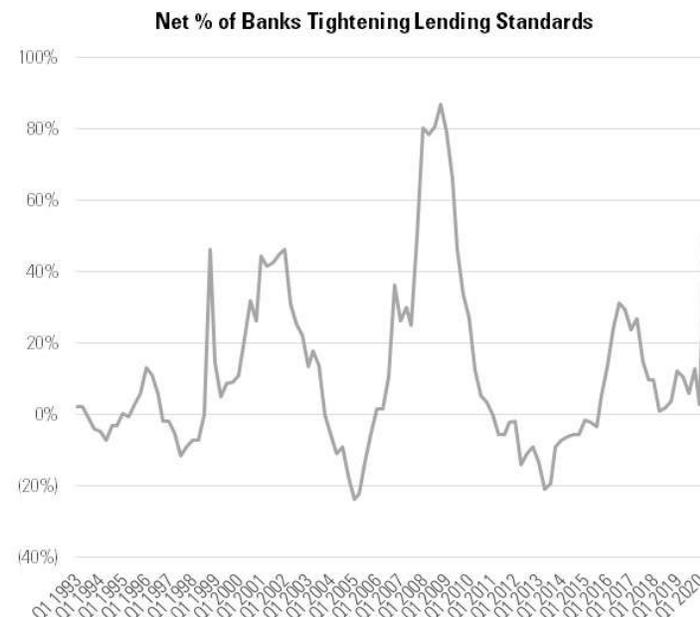
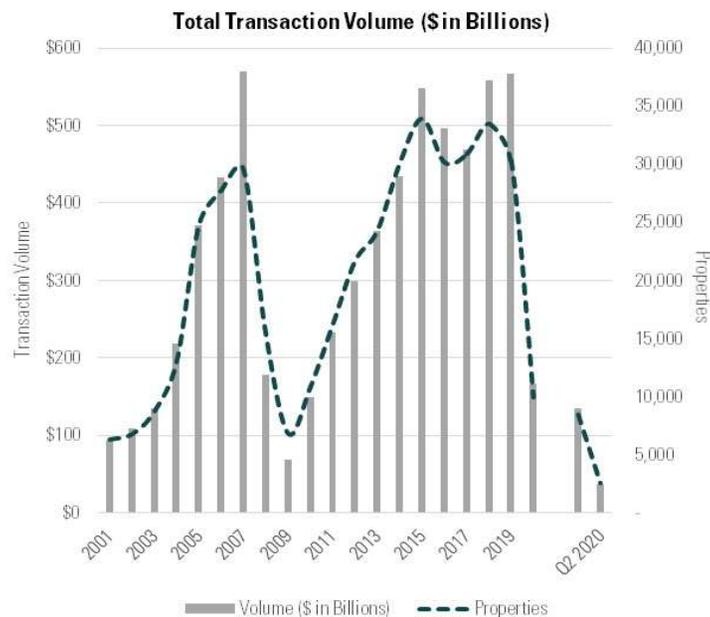
- Late cycle conditions going into the crisis.

<u>Multifamily</u> 7.4% Vacant -0.2% YoY Rent Growth	<u>Office</u> 13.4% Vacant 2.9% YoY Rent Growth	<u>Retail</u> 8.4% Vacant 0.6% YoY Rent Growth	<u>Industrial</u> 7.0% Vacant 3.8% YoY Rent Growth	<u>Hotel</u> 51.1% Vacant RevPAR 41.1% below pre-crisis	<u>Single-Family</u> 0.9% Vacant (Owner) 5.2% Vacant (Rental)
<p>Vacancy has trended upward over the prior four quarters, increasing by nearly 100 bps nationally. Vacancy exceeds the long-term average (since 2001) by 110 bps.</p> <p>Rent growth was slightly negative in Q2 for the first time since 2011, and will likely continue to be through 2020, likely rebounding by 2022.</p>	<p>Vacancy increased by 27 bps over the prior quarter, but remains slightly below the long-term average. Class B Vacancy increased more significantly (90 bps YoY).</p> <p>Office rent growth tends to be less elastic due to long-term leases; rents likely decline over the near term.</p>	<p>Thanks to very little construction, retail vacancy remains well below the long term average of 9.7%, but has started to trend up.</p> <p>Rent growth remains positive likely due to long-term leases. Declines expected over the near term.</p>	<p>Due to construction, vacancy has trended upward since 2018, but is still 2% below the long-term average.</p> <p>Rent growth has moderated from recent highs, but remains healthy at nearly 4% YoY; expected to continue to be positive.</p>	<p>Vacancy increased to a high of about 80% in early April, but has since steadily decreased to about 50%.</p> <p>RevPAR dropped by 74% between February and March, and has since recovered to half of the pre-crisis average of about \$80. Recovery continues as long as economy can open.</p>	<p>Both owner and renter single-family housing have historically low vacancy, with vacancies declining even during COVID. For-sale housing inventory is well below 20-year averages.</p> <p>Prices increased for existing homes in 2Q, but declined for new homes. SFR rent growth has remained positive (and should continue to do so).</p>

Source: CoStar, RCA, STR

# Real Estate Capital Markets (2Q 2020)

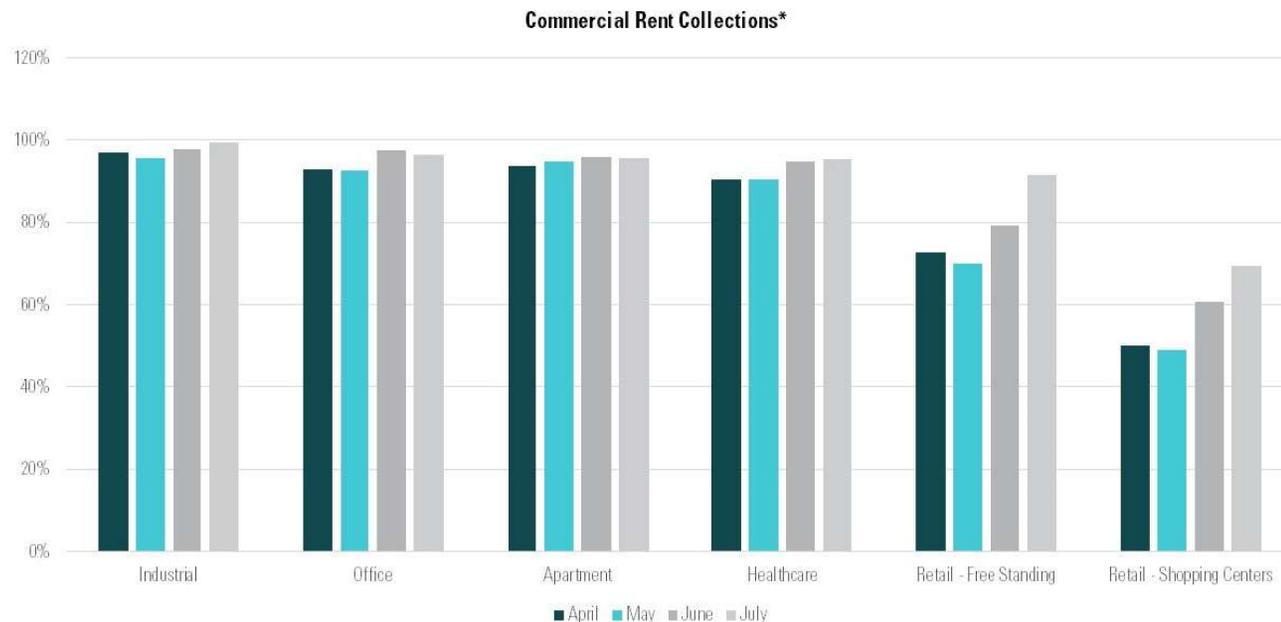
- Severely reduced transactions, tightened credit.
- Transaction volume plummeted in 2Q, especially for hotel and retail.
- Both equity and debt investors continue to be cautious, particularly with construction or other risky strategies, but financing is still available - at record-low rates for well-leasued multifamily and industrial properties.



Source: RCA, Federal Reserve

# Commercial Rent Collections

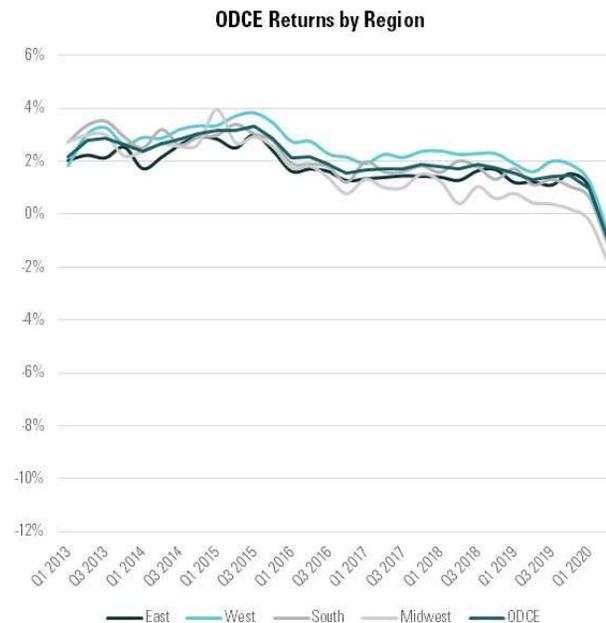
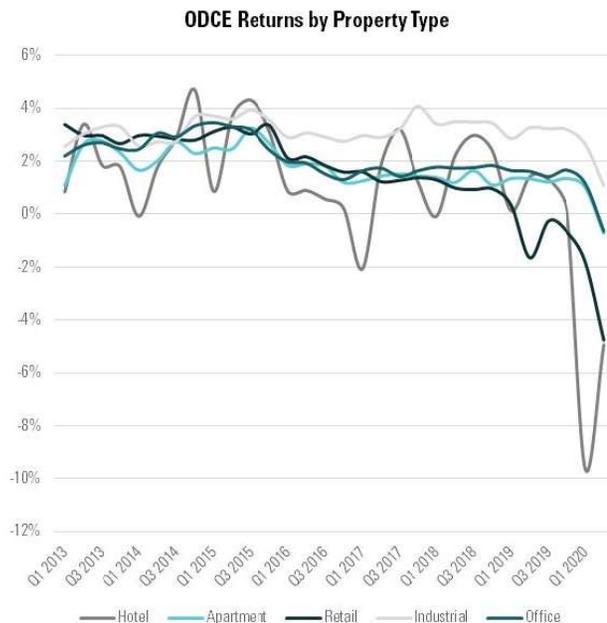
- Retail sees lowest collection rates.
- Commercial real estate has seen relatively positive performance of rent collections, with all property types except for retail consistently collection above 90%. Retail has performed poorly, but significantly improved since its May trough as the economy has re-opened.



\*Data is percentage of typical rent received. July data is as of July 20<sup>th</sup>.  
 Source: NCREIF

# NCREIF ODCE Returns Decline

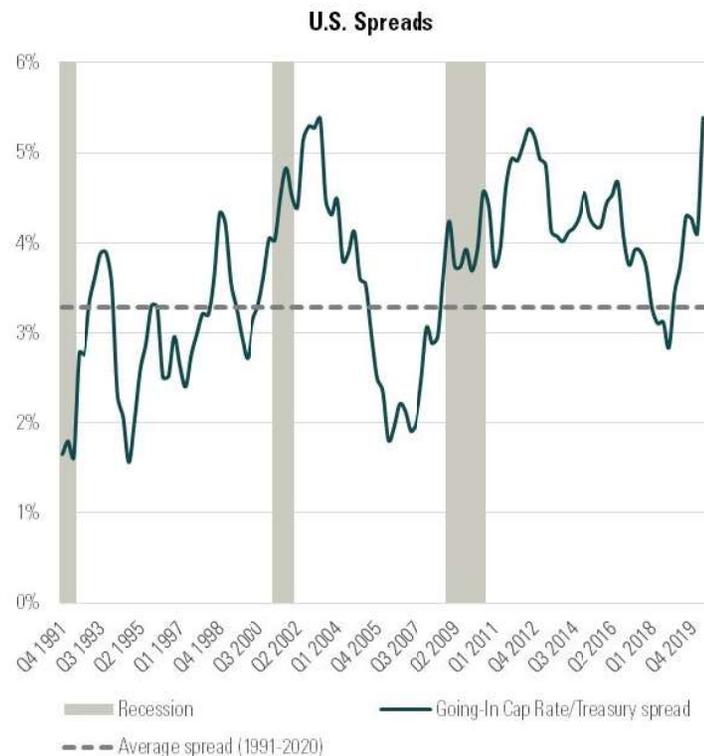
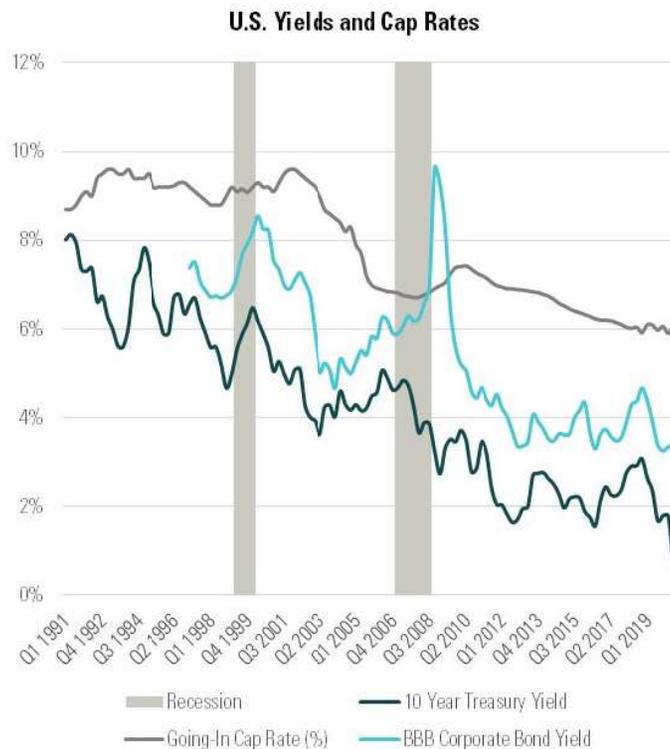
- Hotel and retail returns run sharply negative.
- Total ODCE returns were -1.5% for Q2 2020, with hotel and retail recording the worst returns of -4.9% and -4.8%, respectively. Industrial managed to be the only positive performing asset type with returns of 1.09%.



Source: NCREIF

# Cap Rate to Treasury Spreads

- Cap Rate to Treasury spreads increase above long-term average.
- Cap rates decline slowly, while 10-year Treasuries fall below 1%.



Source: RCA; FRED

# Cap Rates

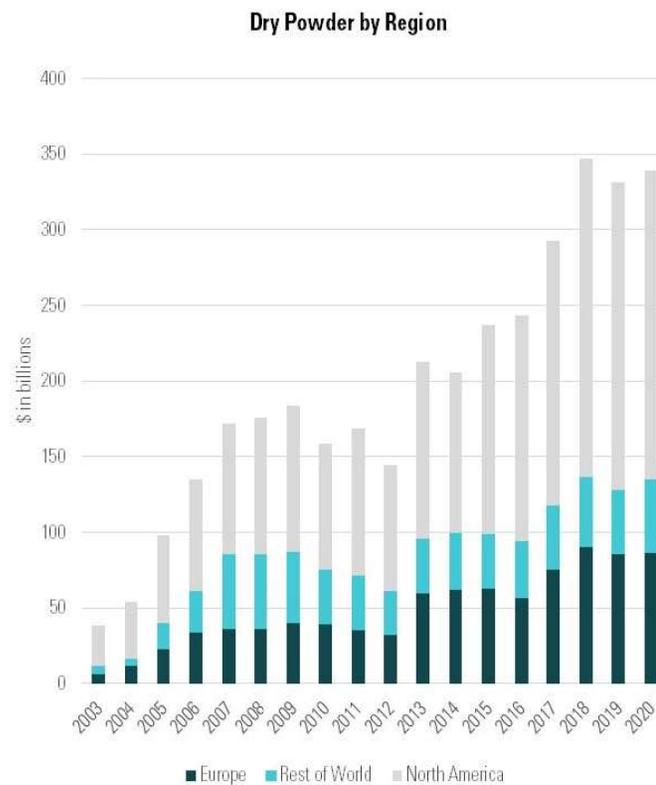
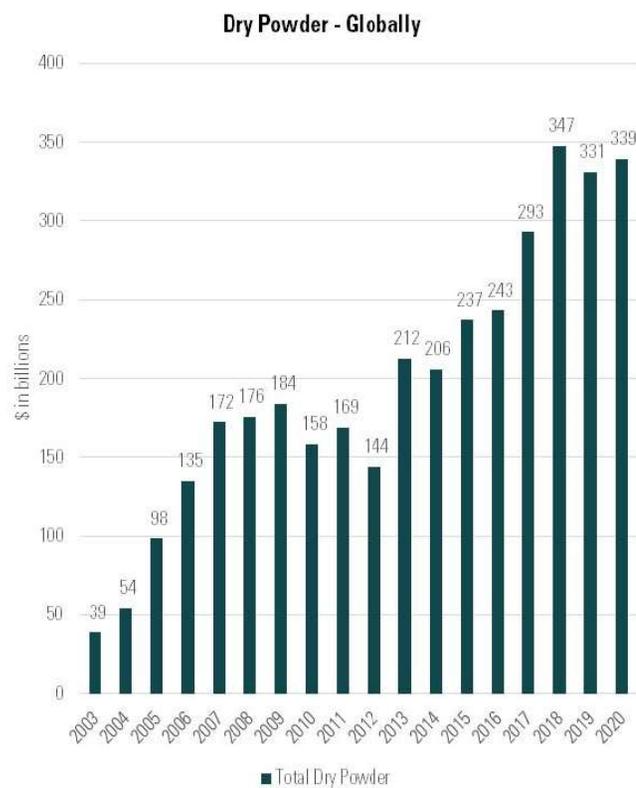
- Vary widely across markets and property types.



Source: RCA

# Dry Powder

- Dry Powder has slightly increased YOY largely due to declining transaction volume.

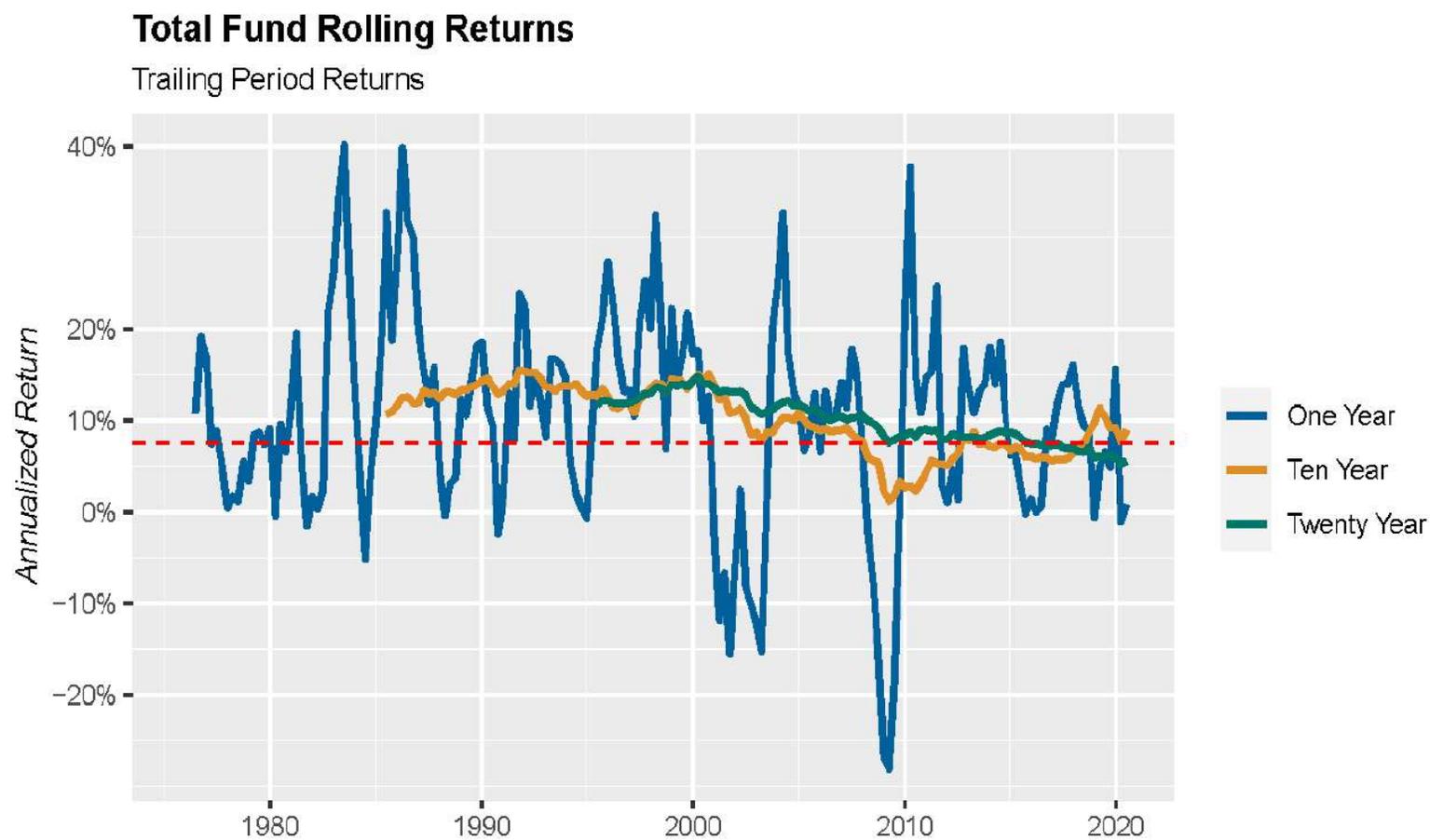


Source: Preqin

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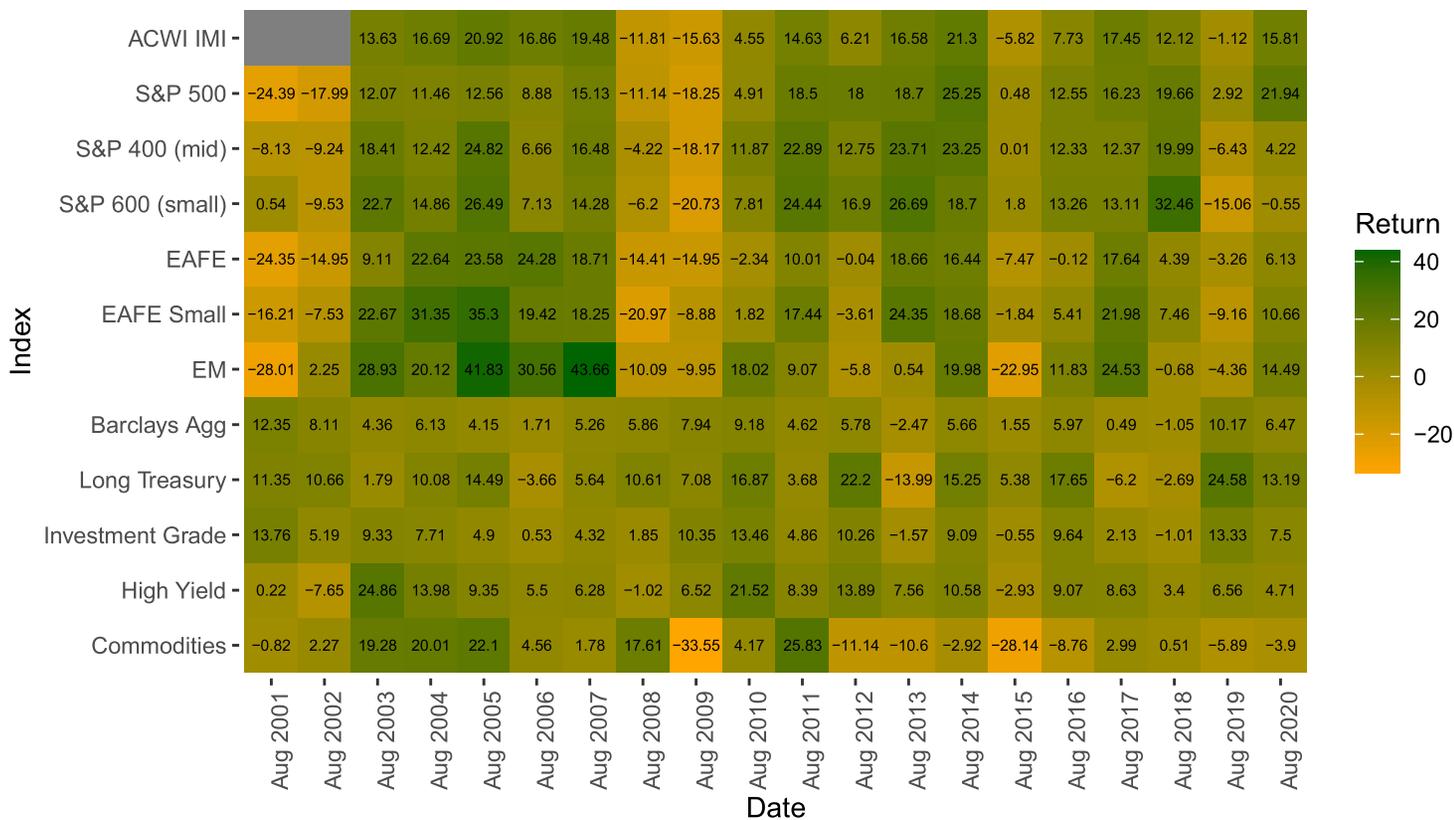
# ASRS Returns



Source: NEPC data, ASRS graphics

# Asset Class One Year Returns

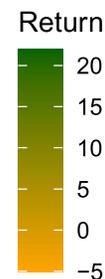
One Year Returns  
 for indicated end dates



# Asset Class Hold Period Returns

Annualized Returns and Growth of a Dollar  
 for hold periods ending Aug 2020

Index	Hold Period					
	1 Year	3 Year	5 Year	10 Year	18 Year	20 Year
ACWI.IMI -	15.81/1.16	8.69/1.28	10.19/1.62	10.17/2.63	8.83/4.59	NA/NA
S.P.500 -	21.94/1.22	14.52/1.5	14.46/1.96	15.16/4.1	9.95/5.51	6.34/3.42
S.P.400..mid. -	4.22/1.04	5.38/1.17	8.11/1.48	12.05/3.12	10.1/5.65	8.06/4.71
S.P.600..small. -	-0.55/0.99	3.82/1.12	7.47/1.43	12.31/3.19	10.03/5.58	8.47/5.08
EAFE -	6.13/1.06	2.34/1.07	4.72/1.26	5.88/1.77	6.43/3.07	3.46/1.98
EAFE.Small -	10.66/1.11	2.61/1.08	6.79/1.39	8.58/2.28	9.52/5.14	7.15/3.98
EM -	14.49/1.14	2.83/1.09	8.66/1.51	3.76/1.45	10.14/5.69	7.43/4.19
Barclays.Agg -	6.47/1.06	5.09/1.16	4.33/1.24	3.65/1.43	4.49/2.21	5.05/2.68
Long.Treasury -	13.19/1.13	11.12/1.37	8.65/1.51	7.2/2	7.41/3.62	7.76/4.46
Investment.Grade -	7.5/1.08	6.45/1.21	6.2/1.35	5.25/1.67	5.79/2.75	6.15/3.3
High.Yield -	4.71/1.05	4.88/1.15	6.45/1.37	6.9/1.95	8.52/4.36	7.22/4.03
Commodities -	-3.9/0.96	-3.13/0.91	-3.1/0.85	-5.05/0.6	-0.57/0.9	-0.44/0.91

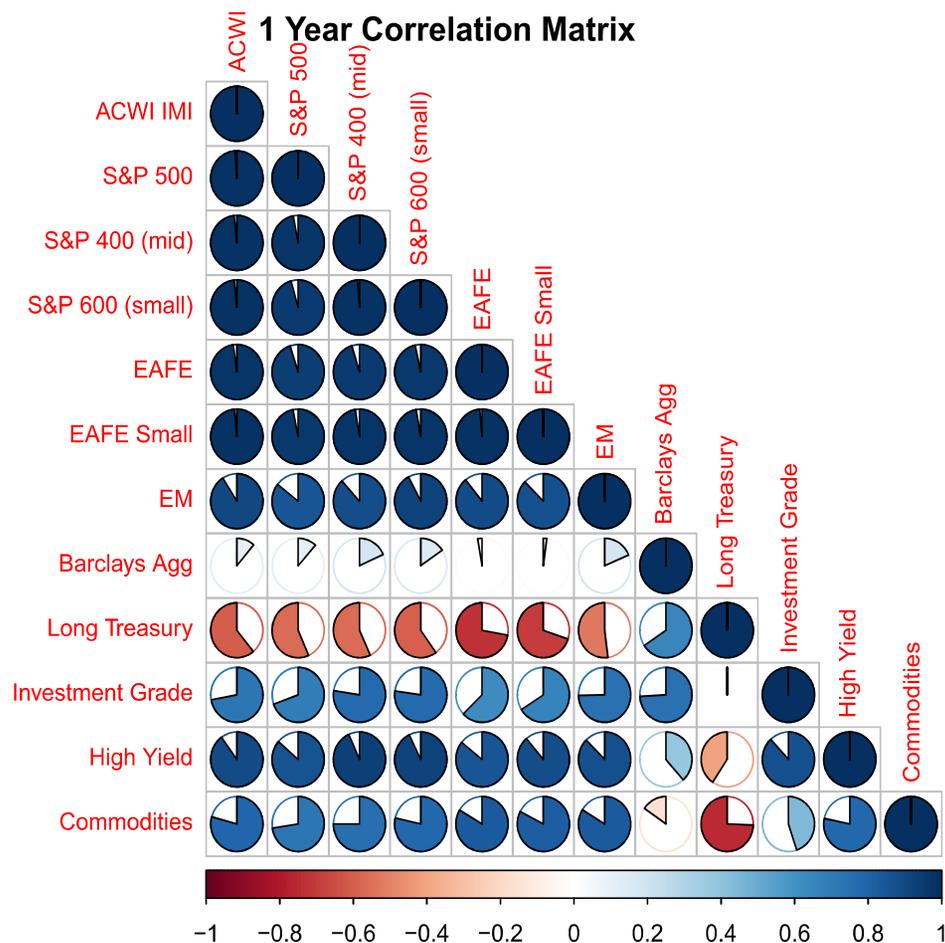


# Asset Class Volatility

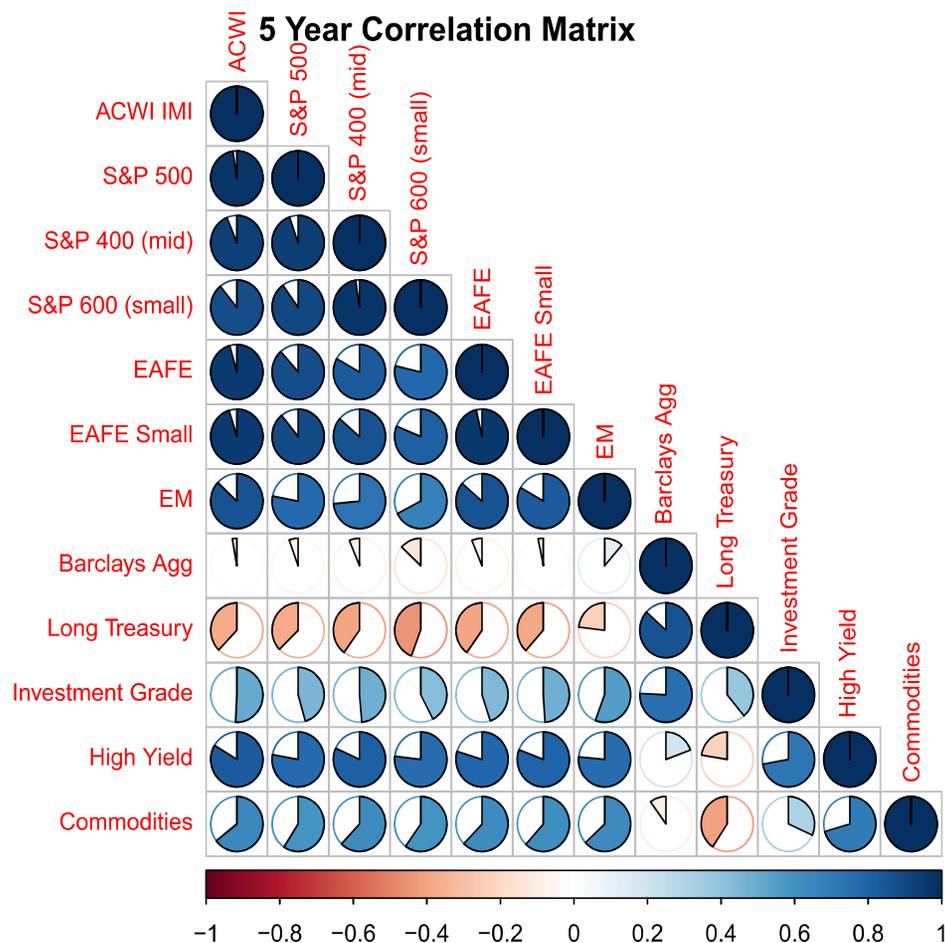
Volatility  
 for hold periods ending Aug 2020



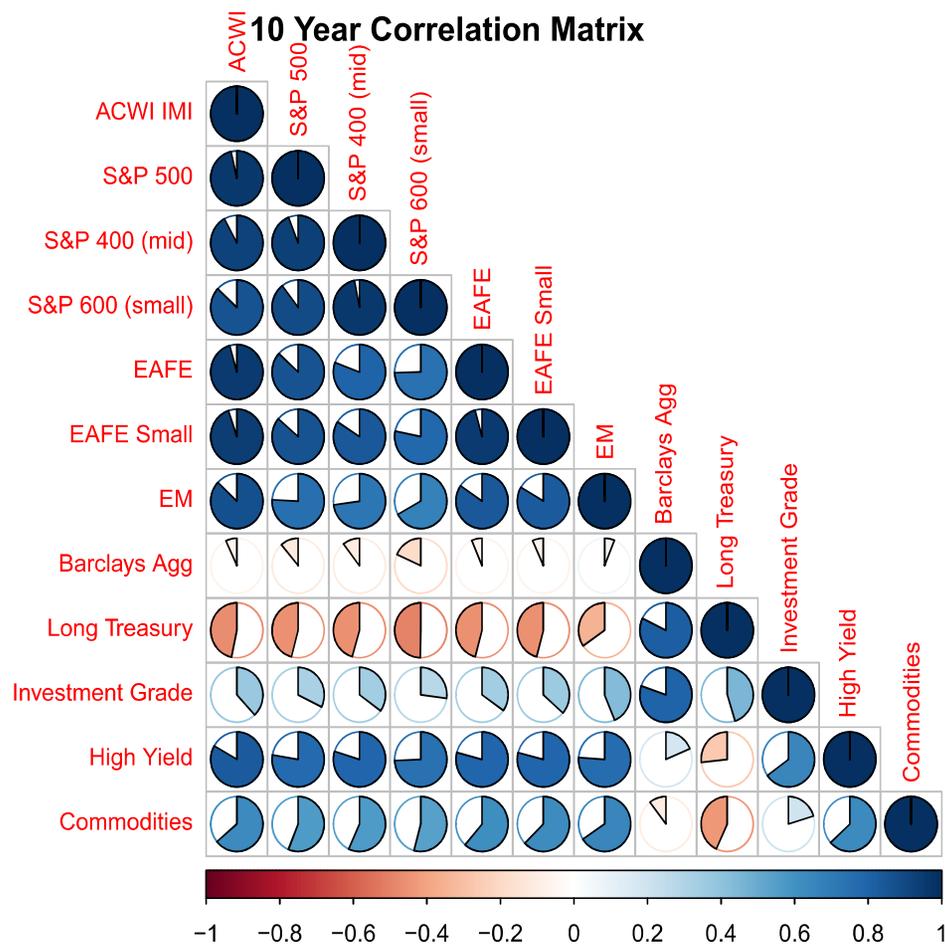
# 1 Year Correlation



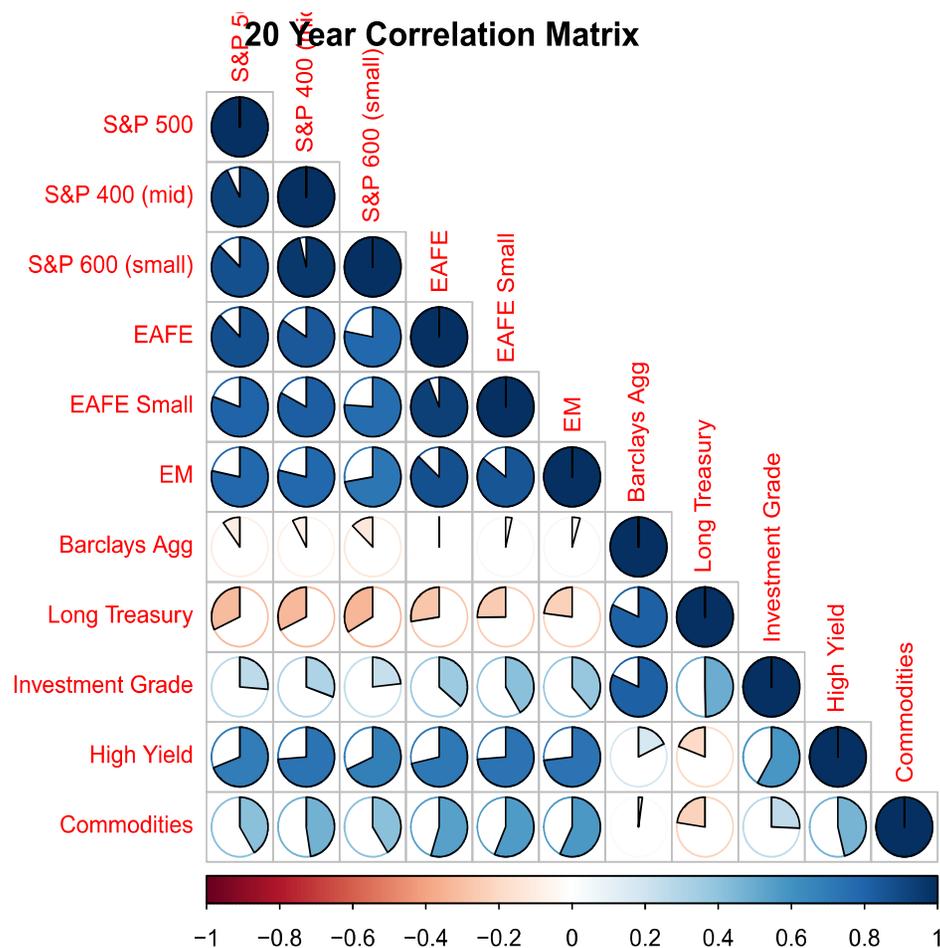
# 5 Year Correlation



# 10 Year Correlation



# 20 Year Correlation



# Agenda Item #5

# Quarterly Performance Report

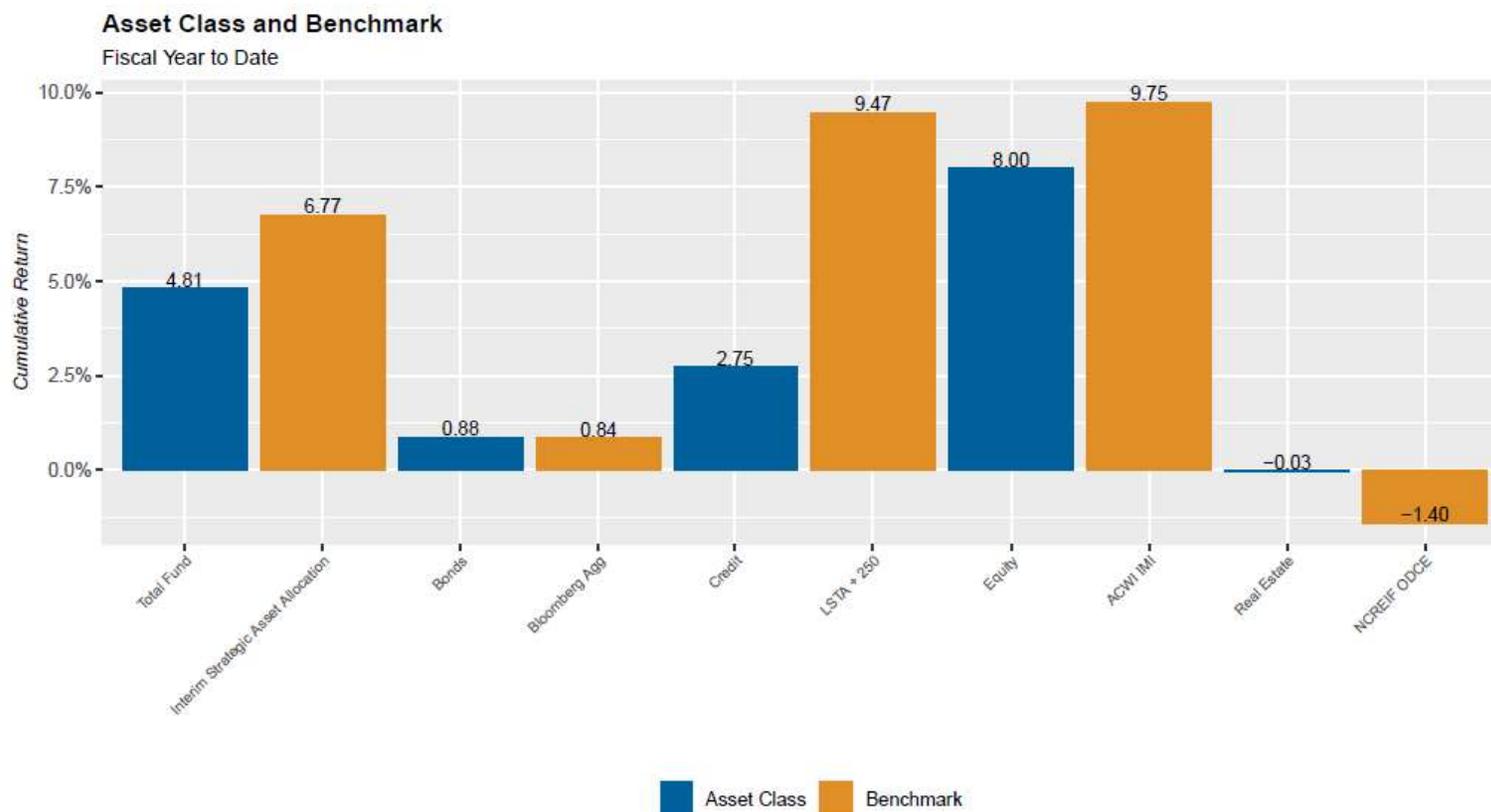
For Period Ended June 30, 2020

Arizona State Retirement System

September 21, 2020

# Interim Performance Update

# Fiscal Year to Date Total Fund Returns through 9/11/2020



# Quarterly Performance

## External Reports

# State Street Performance Summary for the period ended 6/30/2020

ARIZONA STATE RETIREMENT SYSTEM  
 Investment Management Division  
 Jun-30-2020  
 Net Returns  
 Final

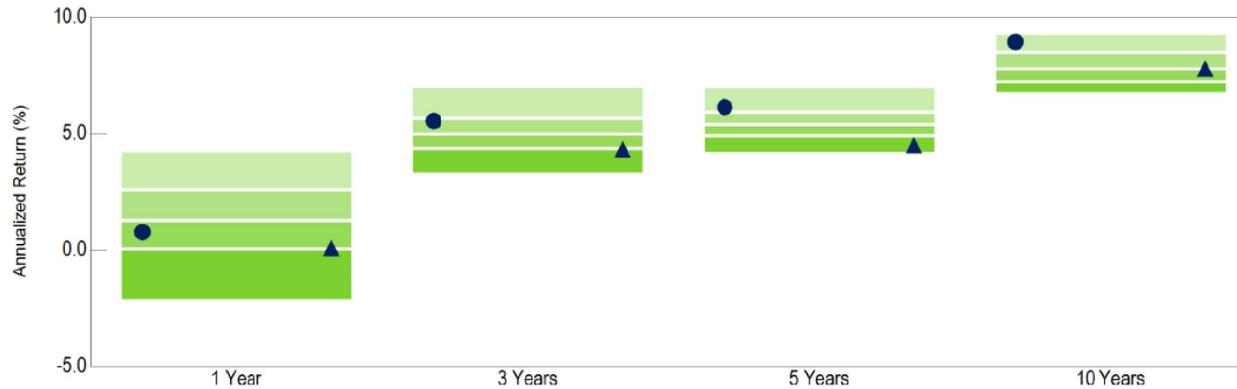
ASRS Performance Summary



	Benchmark	Market Value (\$mil.)	1 Mth	3 Mth	FYTD	1 Year	3 Year	5 Year	ITD	Inception Date
<b>TOTAL PLAN</b>	<b>INTERIM SAA POLICY</b>	40,493	1.43	5.05	0.76	0.76	5.53	6.12	9.45	07-01-1975
Excess			3.93	1.74	0.77	0.77	1.24	1.65	0.43	
<b>TOTAL EQUITY W/P E and Opp</b>	<b>LEGACY Total Equity BM</b>	20,906	2.41	12.08	-1.61	-1.61	4.98	6.15	7.94	07-01-2013
Excess			2.58	1.98	-0.31	-0.31	0.23	0.17	-0.09	
US EQUITY	COMBINED DOMESTIC EQUITY INDEX	9,642	2.10	22.10	3.64	3.64	8.21	9.04	11.04	07-01-1975
Excess			-0.27	-0.17	-3.10	-3.10	-1.97	-1.32	-0.23	
INTERNATIONAL EQUITY	INTERNATIONAL EQUITY INDEX	7,494	4.20	16.84	-4.76	-4.76	0.91	2.15	5.59	04-01-1987
Excess			-0.15	-0.12	-0.02	-0.02	-0.01	-0.20	0.24	
PRIVATE EQUITY	MSCI ACWI IMI w/USA GROSS (NET) LAGGED	3,770	-0.21	-13.35	-7.17	-7.17	6.72	8.48	6.39	09-01-2007
Excess			14.15	9.02	5.28	5.28	6.71	5.84	1.36	
<b>INTEREST RATE SENSITIVE</b>	<b>BBG BARC Agg (Dly)</b>	3,773	0.58	2.97	9.02	9.02	5.43	4.60	7.89	07-01-1975
Excess			-0.35	0.08	0.29	0.29	0.11	0.29		
<b>CREDIT</b>	<b>LEGACY Total Credit BM</b>	8,506	0.44	-2.34	4.41	4.41	7.30	7.50	7.03	07-01-2013
Excess			12.33	10.13	11.27	11.27	5.80	4.09		
PRIVATE DEBT	S&P LEVERAGED LOAN INDEX LAGGED + 250BPS	6,150	0.48	-0.96	6.17	6.17	8.54	9.48	11.10	10-01-2012
Excess			12.37	11.54	13.06	13.06	6.85	5.82	6.02	
DISTRESSED DEBT	S&P LEVERAGED LOAN INDEX LAGGED + 250BPS	1,451	0.56	-6.76	-0.64	-0.64			3.90	07-01-2018
Excess			12.75	5.75	6.25	6.25			4.77	
OTHER CREDIT	S&P LEVERAGED LOAN INDEX LAGGED + 250BPS	904	-0.10	-4.19	0.21	0.21			6.91	07-01-2018
Excess			12.39	8.31	7.20	7.20			7.78	
<b>REAL ESTATE</b>	<b>Custom ASRS ODCE (Net)</b>	6,763	0.02	-3.53	-0.42	-0.42	4.86	8.23	5.99	12-01-2005
Excess			-0.25	-4.28	-4.27	-4.27	-1.25	0.60	-0.39	
<b>CASH</b>	<b>CASH CUSTOM INDEX</b>	545	0.04	0.21	2.37	2.37	4.00	2.78	3.97	04-01-1990
Excess			0.33	0.18	0.74	0.74	0.07	-0.67	0.66	
<b>OTHER</b>	<b>ICE BofA US 3-Month Treasury Bill</b>	0	23.44	24.24	1,715.25	1,715.25	168.12	78.21	54.25	07-01-2013
Excess			23.43	24.21	1,713.62	1,713.62	166.35	77.02	53.39	

# ASRS Returns Compared to Public Fund Universe for the period ended 6/30/2020

InvMetrics Public DB > \$1B Net Return Comparison  
 Ending June 30, 2020



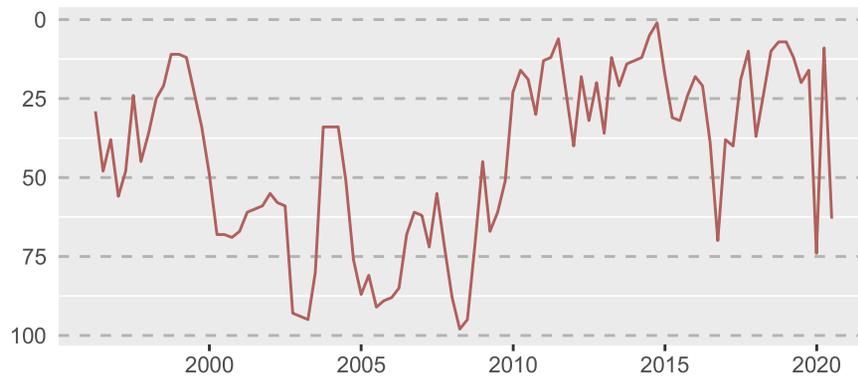
	Return (Rank)			
	1 Year	3 Years	5 Years	10 Years
5th Percentile	4.2	7.0	7.0	9.3
25th Percentile	2.6	5.7	5.9	8.5
Median	1.3	5.0	5.4	7.8
75th Percentile	0.0	4.4	4.9	7.2
95th Percentile	-2.2	3.2	4.2	6.7

	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

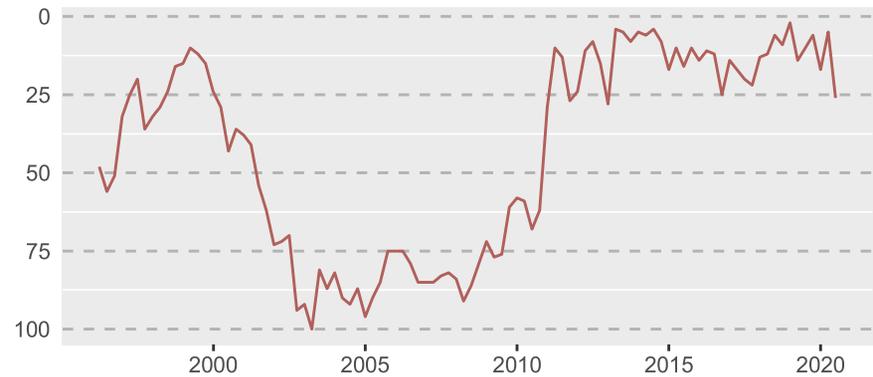


# Total Fund Rolling Percentile Rankings for the period ended 6/30/2020

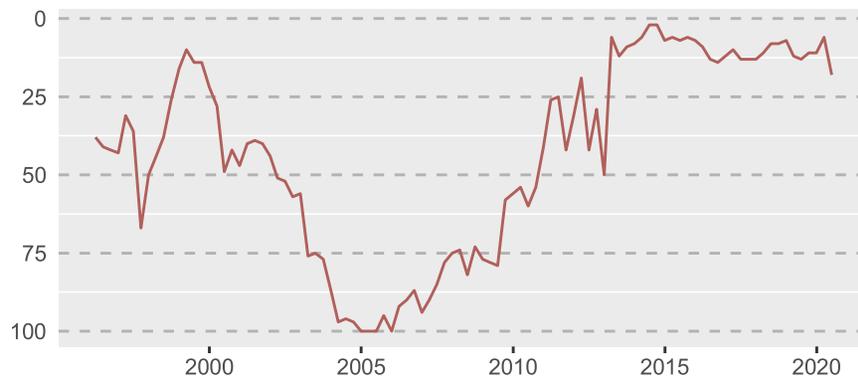
Total Fund One Year Rolling Percentile Rankings



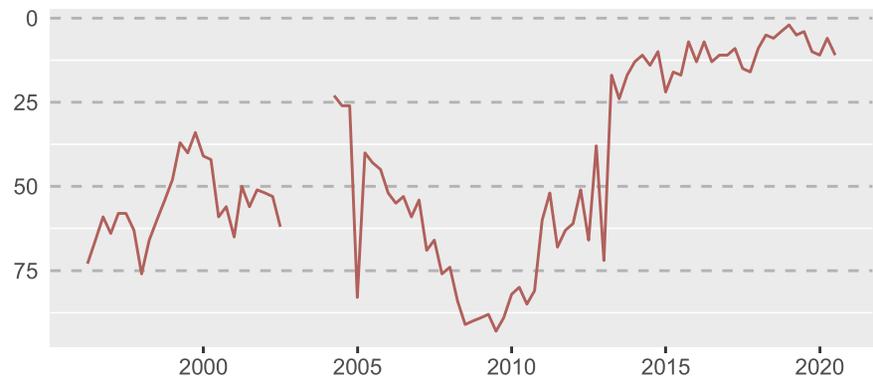
Total Fund Three Year Rolling Percentile Rankings



Total Fund Five Year Rolling Percentile Rankings

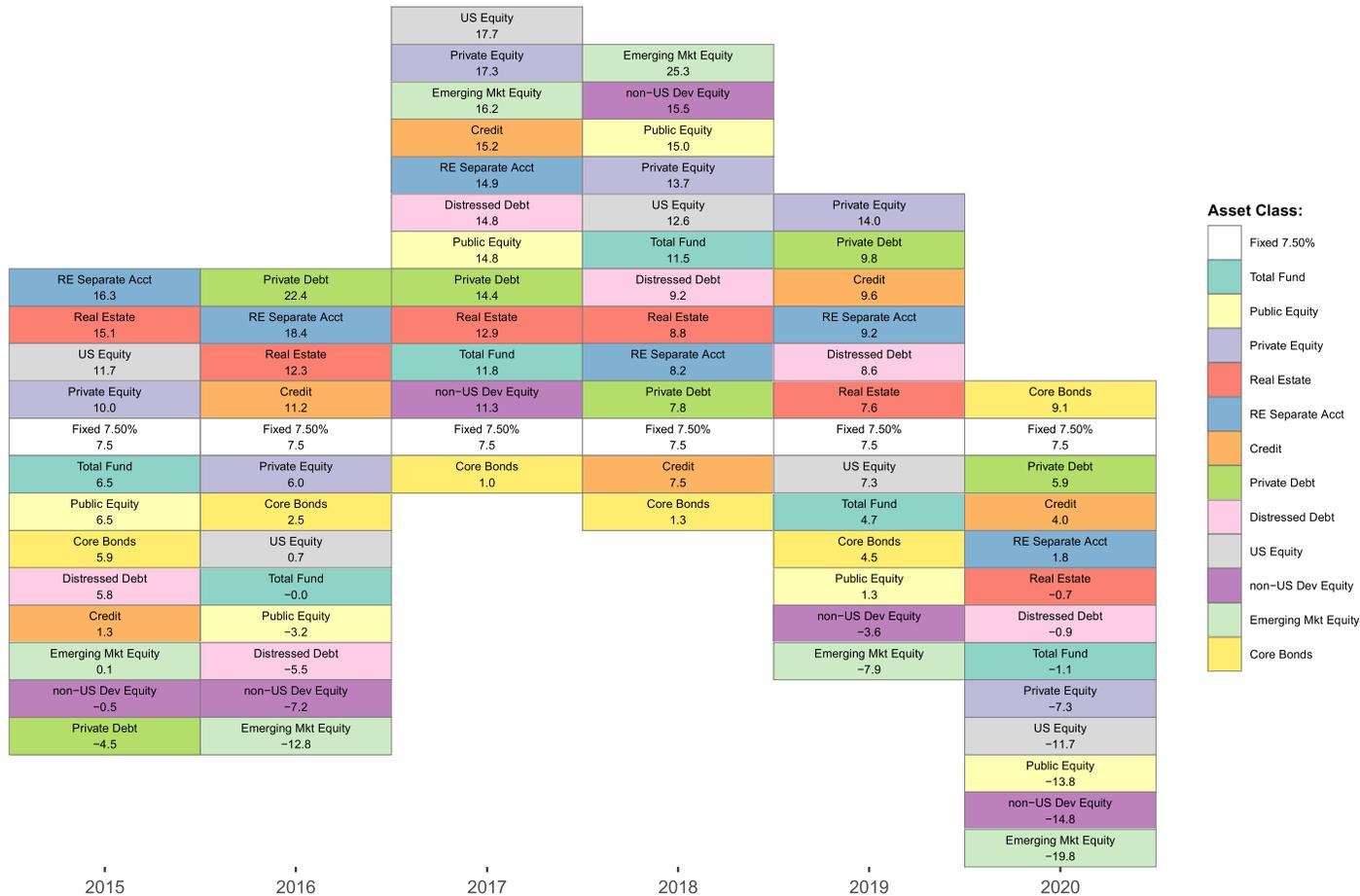


Total Fund Ten Year Rolling Percentile Rankings



# Annual returns for years ended 3/31/2020

ASRS Asset Class Net Returns  
 1-Year Returns ending March 31



# ASRS Goals Met for the period ended 6/30/2020

## 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

# NEPC Compliance Review for the period ended 6/30/2020

## 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.

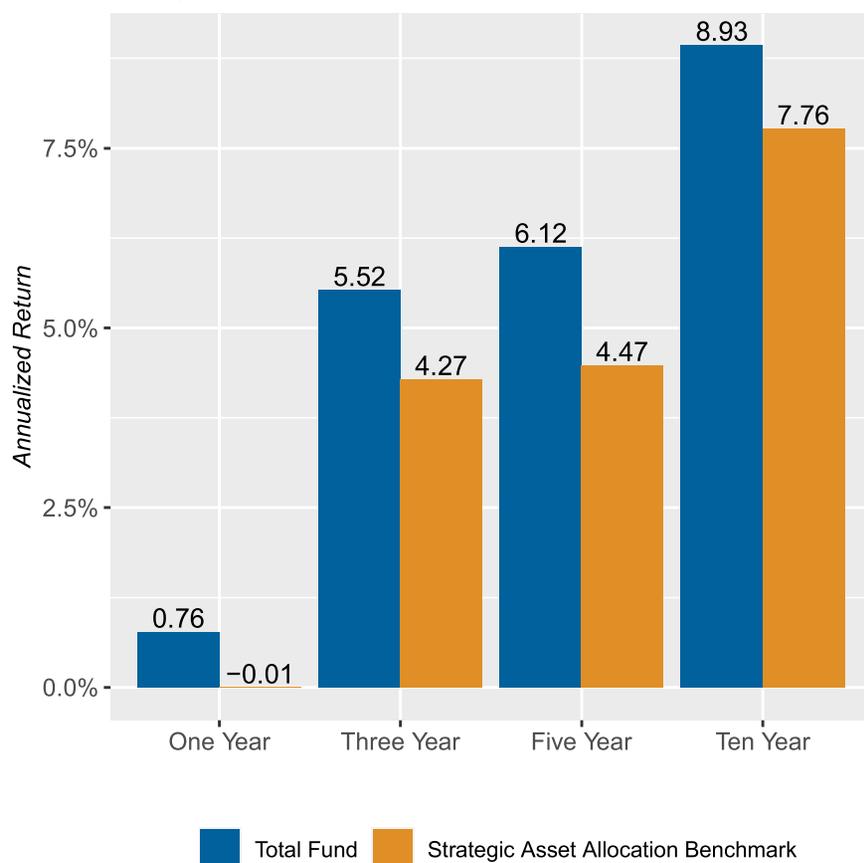


# Total Fund

# Trailing Returns & Dollar Value Add for the period ended 6/30/2020

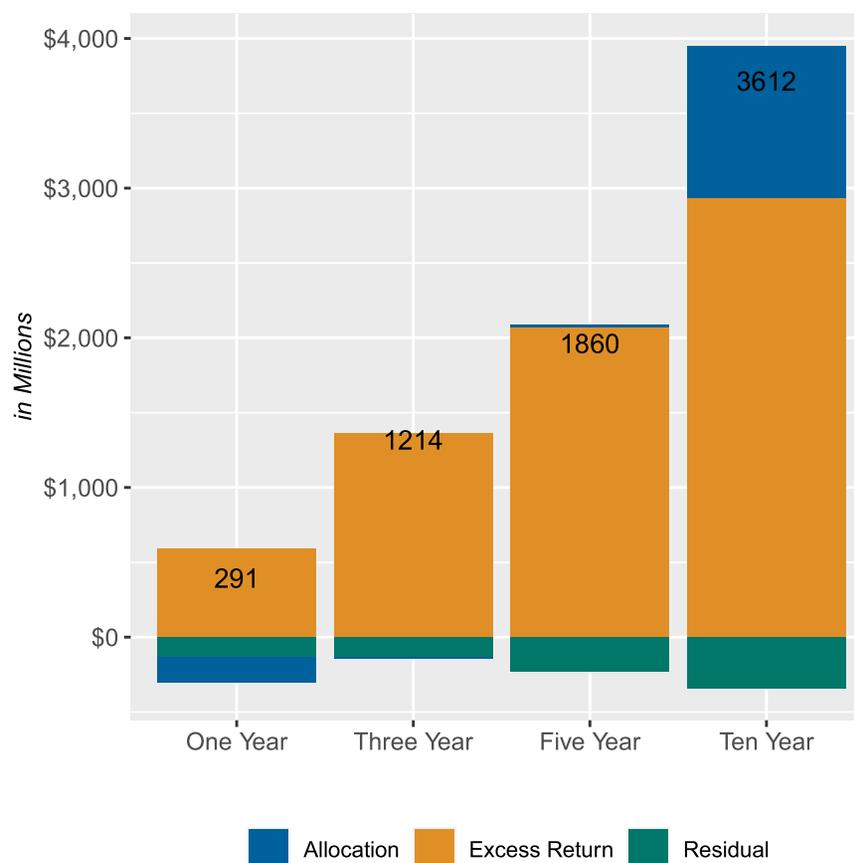
**Total Fund and Strategic Asset Allocation Benchmark**

Trailing Period Returns



**Total Fund Dollar Value Add**

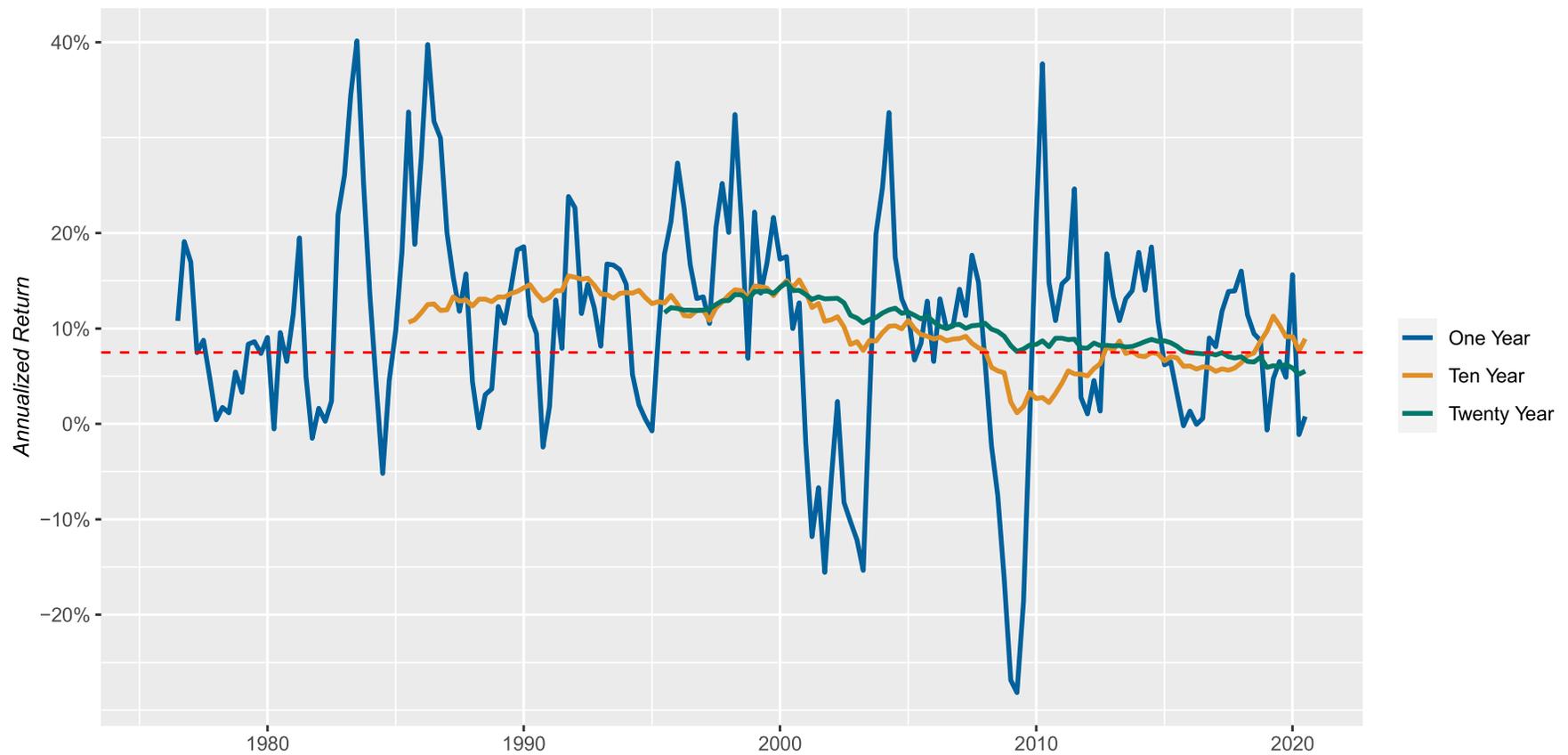
Relative to Strategic Asset Allocation Benchmark



# Total Fund Returns for the period ended 6/30/2020

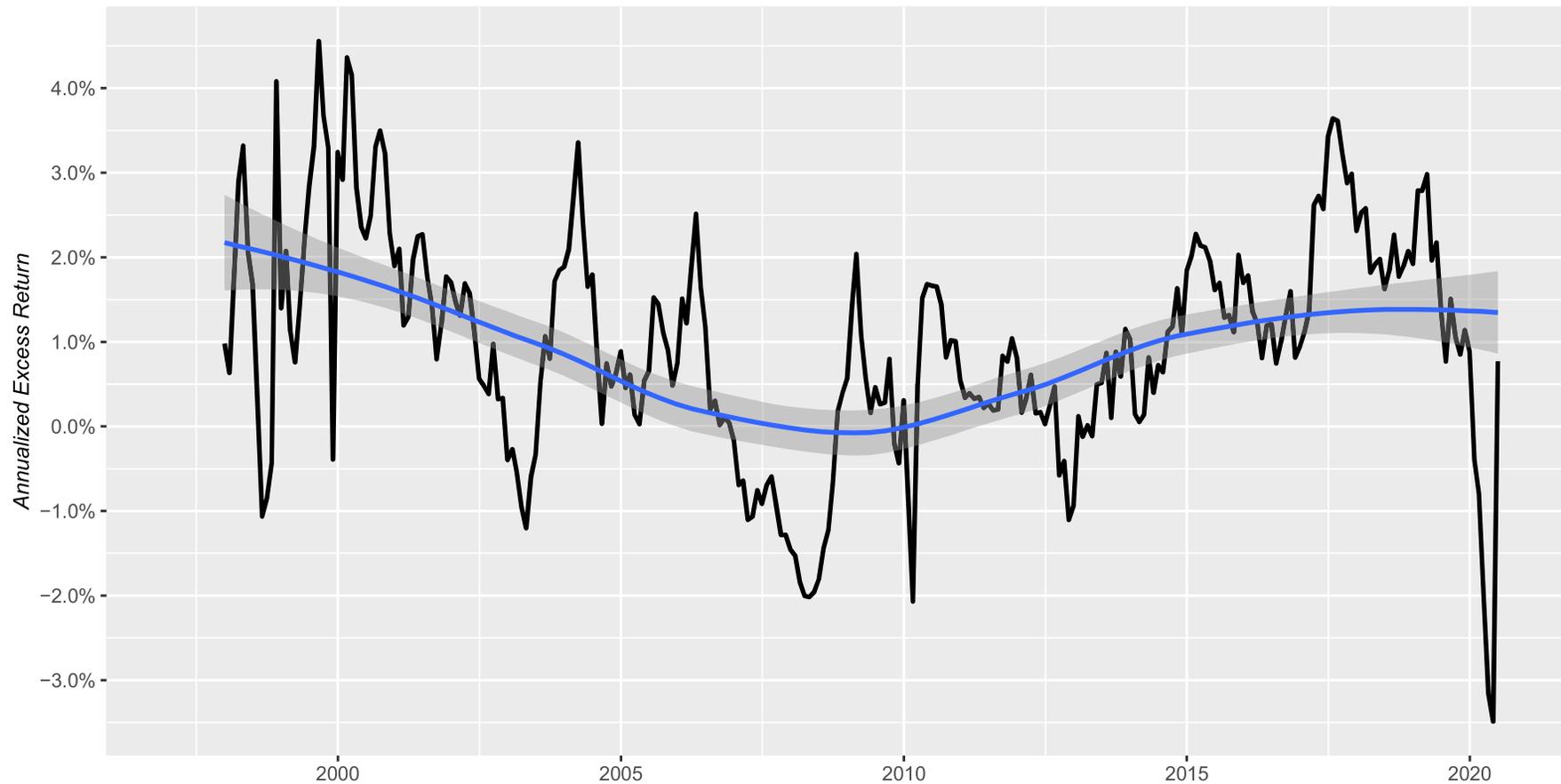
## Total Fund Rolling Returns

Trailing Period Returns



# Total Fund Rolling 1 Year Excess Return for the period ended 6/30/2020

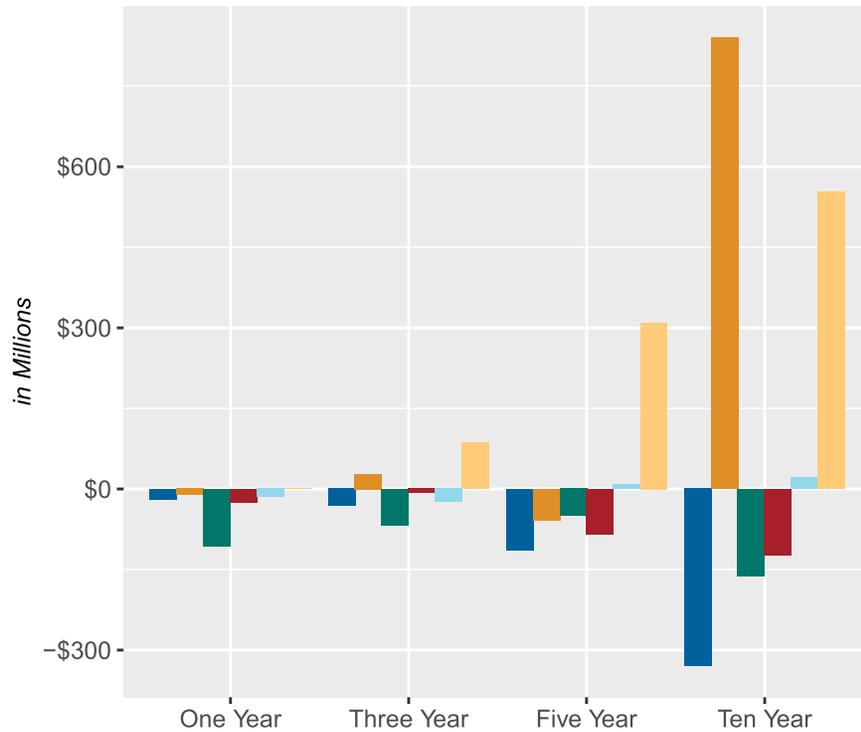
Total Fund Rolling 1 Year Excess



# Allocation Effect for the period ended 6/30/2020

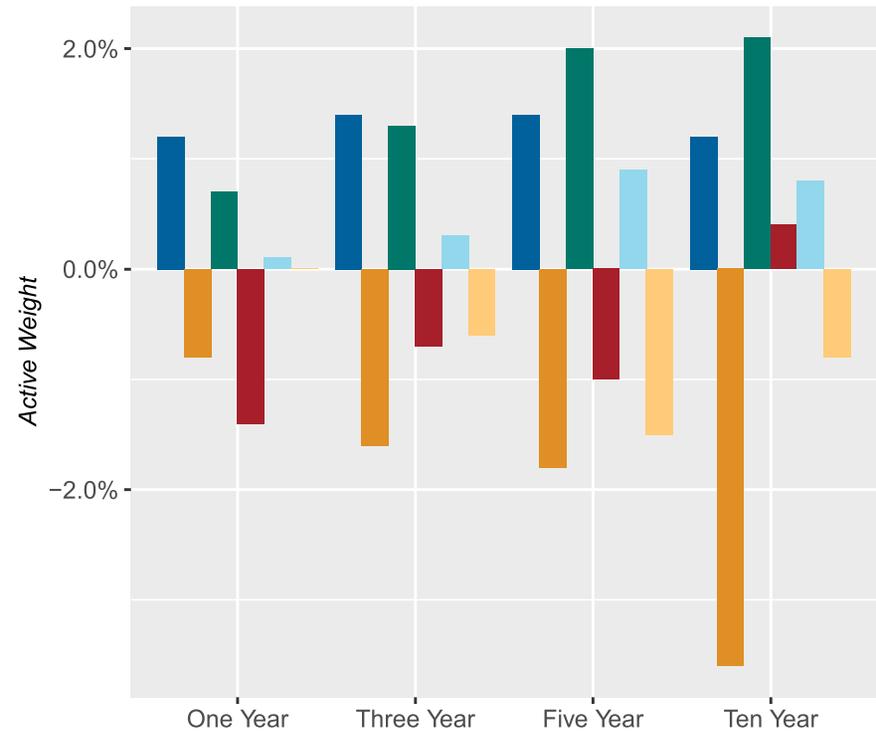
## Allocation Effect by Asset Class

Relative to Strategic Asset Allocation Benchmark



## Asset Class Average Active Weights

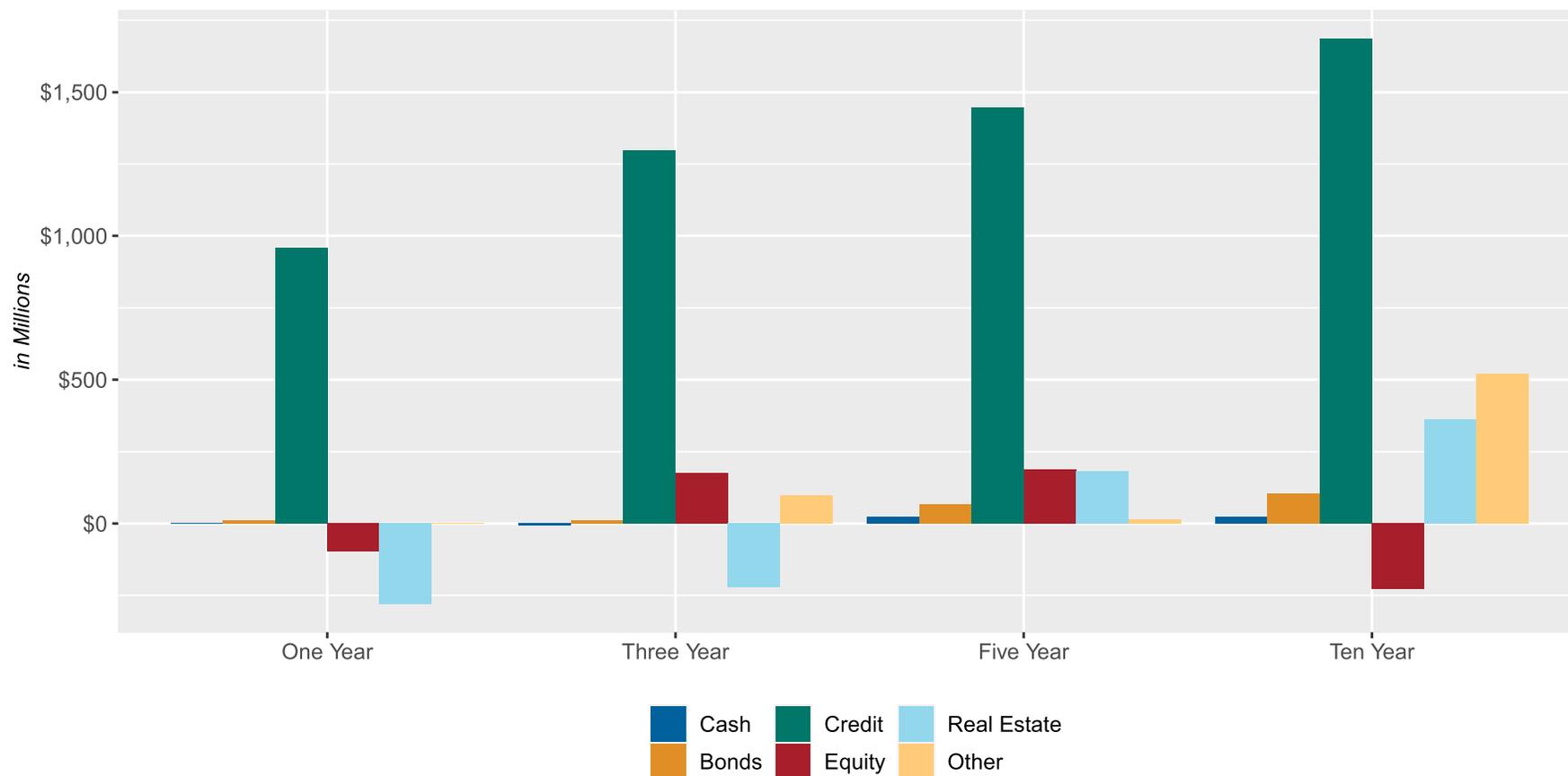
Relative to Strategic Asset Allocation Policy



# Excess Return by Asset Class for the period ended 6/30/2020

## Excess Return by Asset Class

Relative to Strategic Asset Allocation Benchmark



# Equity

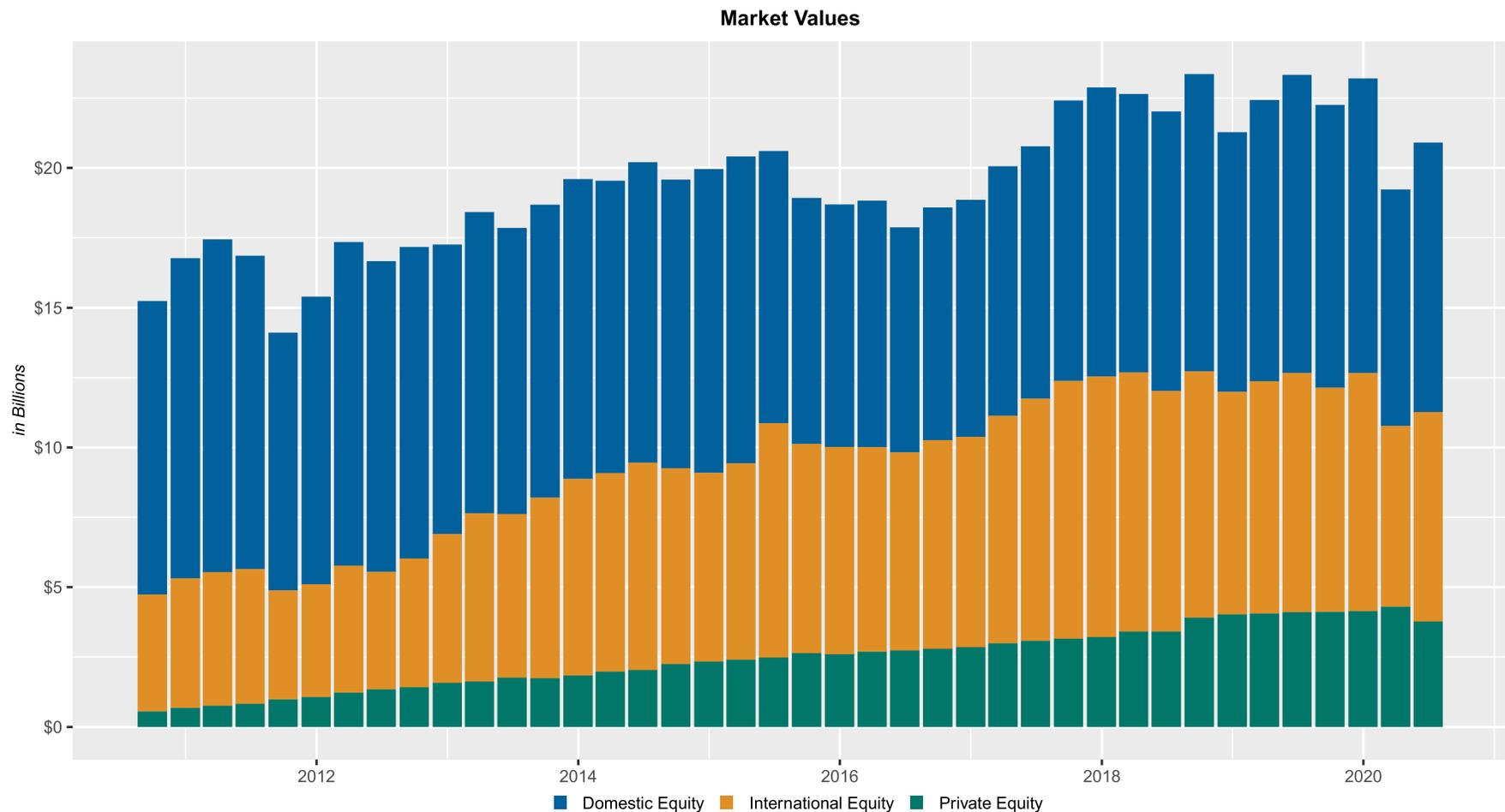
# Total Equity

# Total Equities for the period ended 6/30/2020

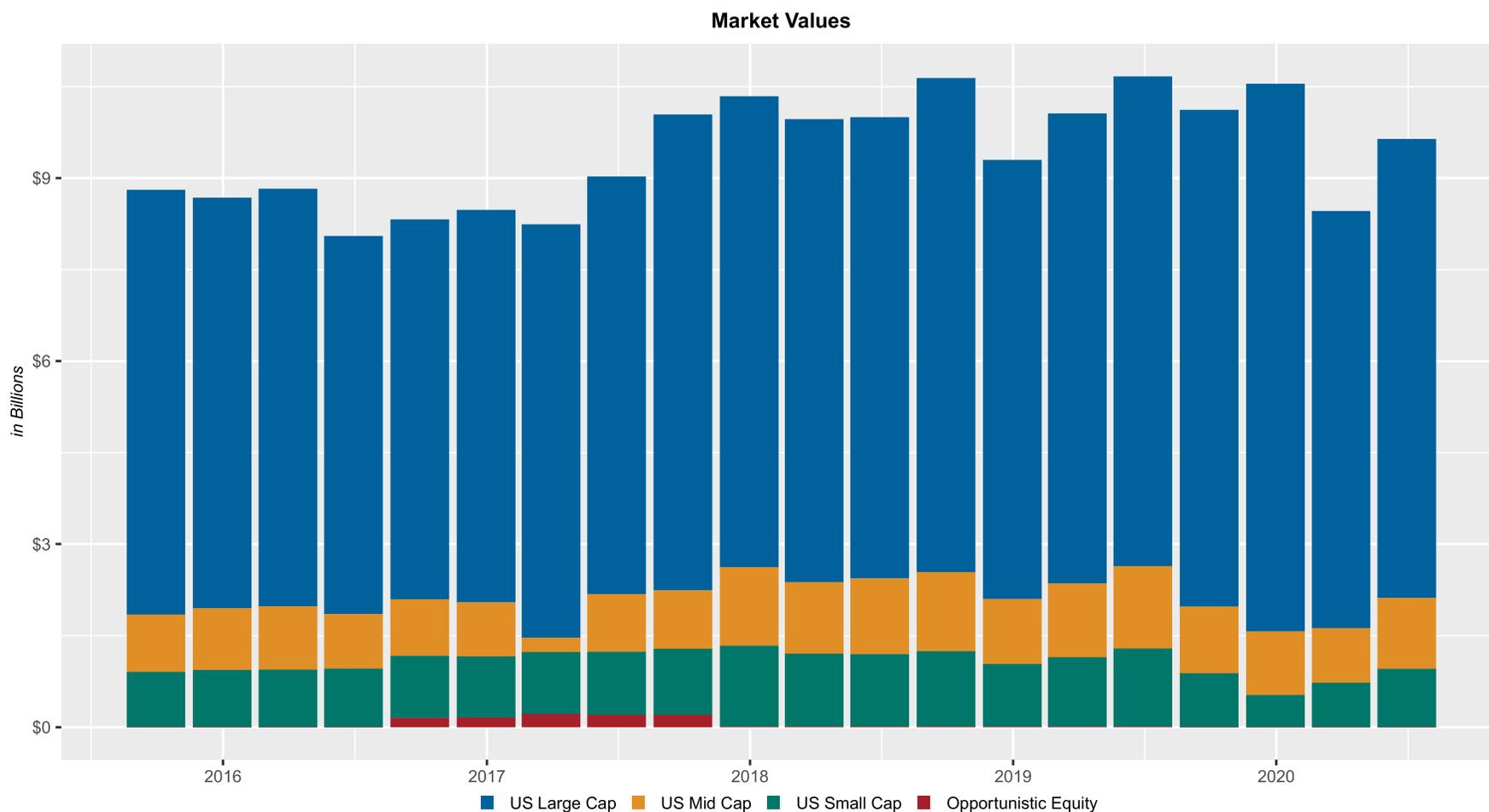
## Returns for the period ended 6/30/2020

	Composite	Quarter	One Year	Three Year	Five Year
Equity	12.08	-1.61	4.97	6.15	
Benchmark	10.10	-1.30	4.74	5.98	
Excess	1.98	-0.31	0.23	0.17	
Public Equity	19.71	-0.19	4.76	5.84	
Benchmark	19.93	1.50	5.88	6.63	
Excess	-0.21	-1.69	-1.11	-0.78	
US Equity	22.10	3.64	8.24	9.06	
Benchmark	22.27	6.73	10.18	10.37	
Excess	-0.17	-3.10	-1.94	-1.31	
International Equity	16.84	-4.76	0.88	2.13	
Benchmark	16.96	-4.74	0.92	2.35	
Excess	-0.12	-0.02	-0.04	-0.22	
Private Equity	-12.17	-7.31	6.54	8.56	
Index IRR	-22.39	-12.97	-0.04	2.78	
Excess	10.23	5.66	6.59	5.78	

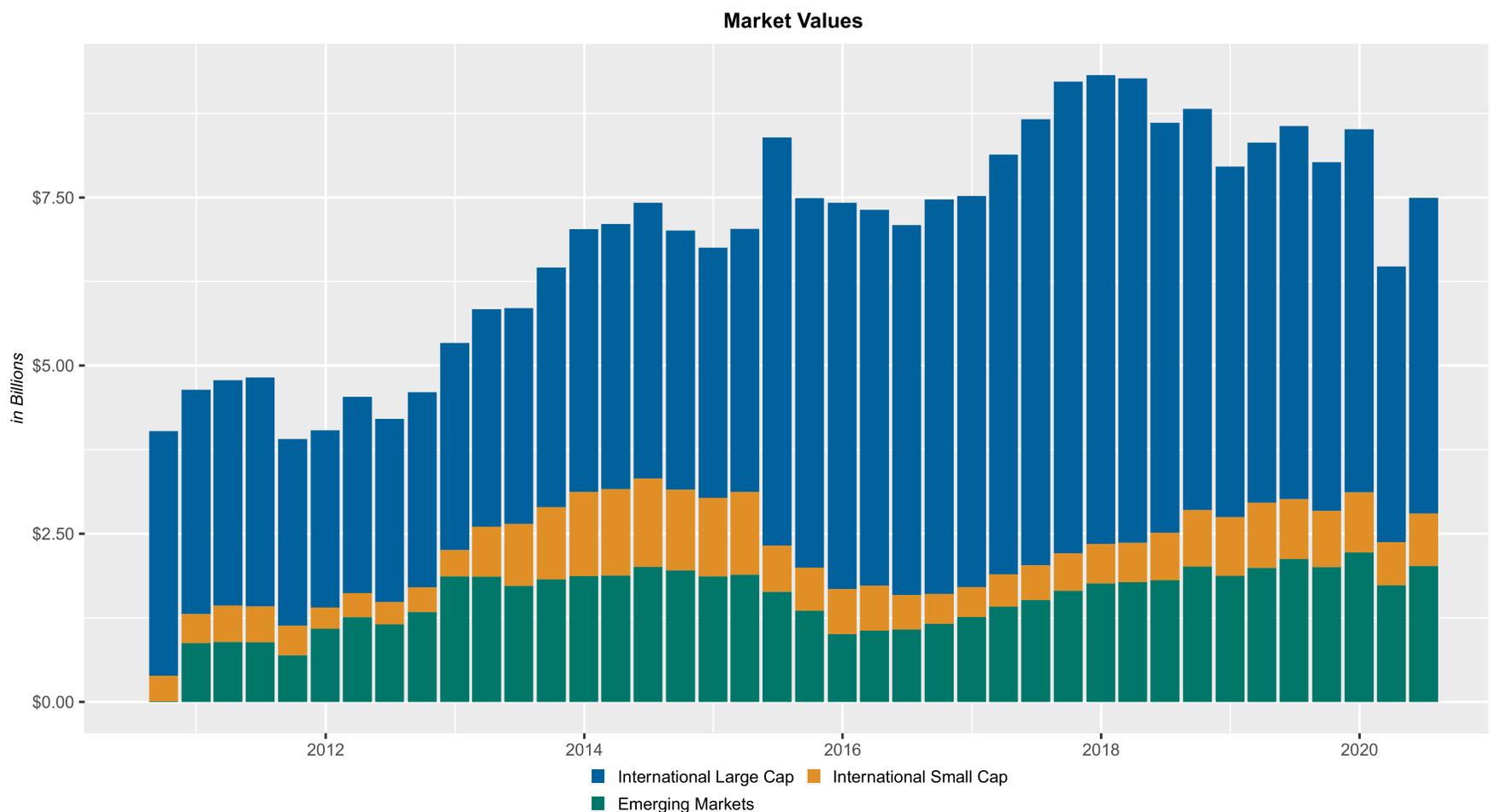
# Total Equity Market Values for the period ended 6/30/2020



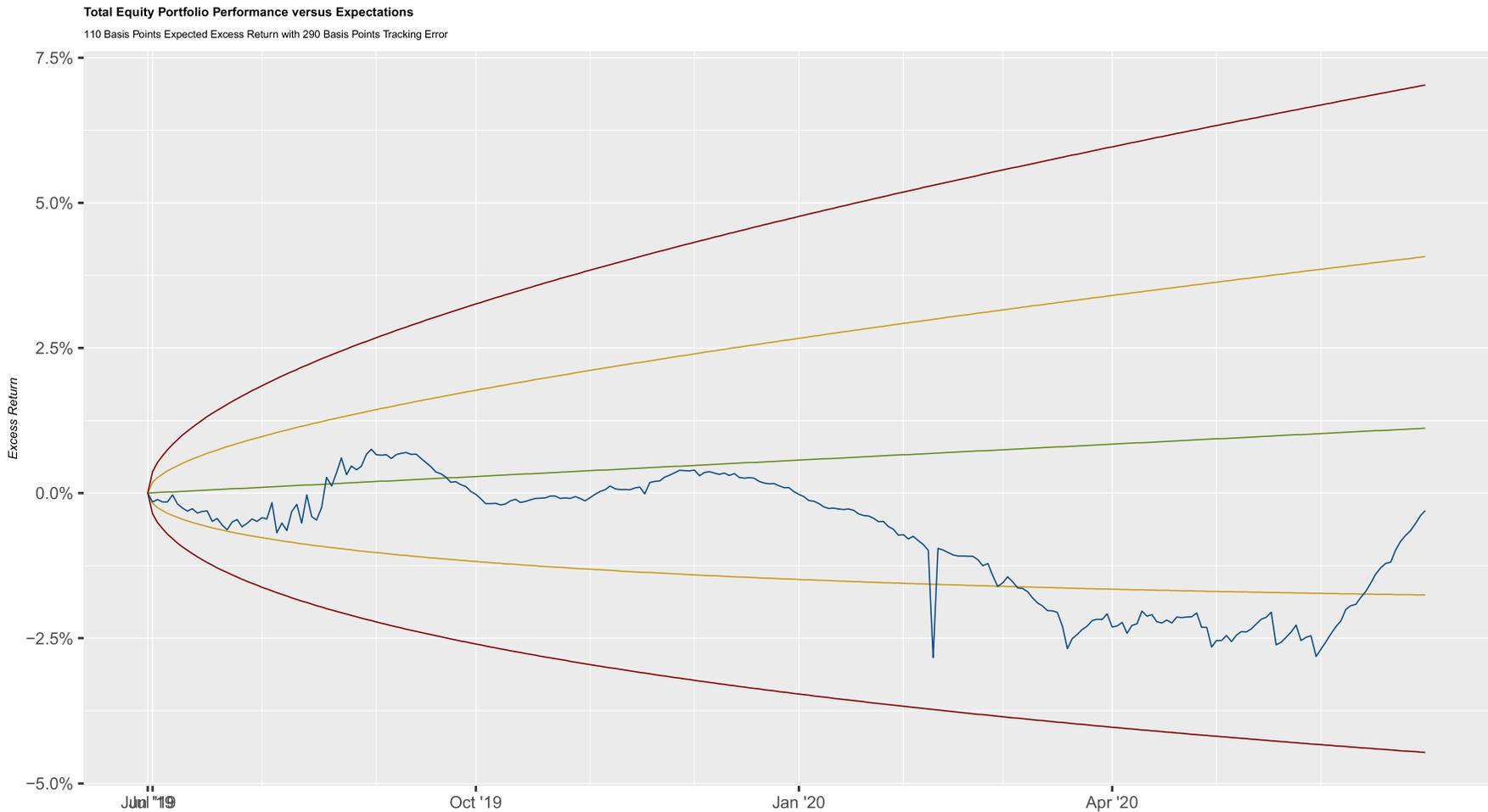
# Domestic Equity Market Values for period ended 6/30/2020



# International Equity Market Values for period ended 6/30/2020

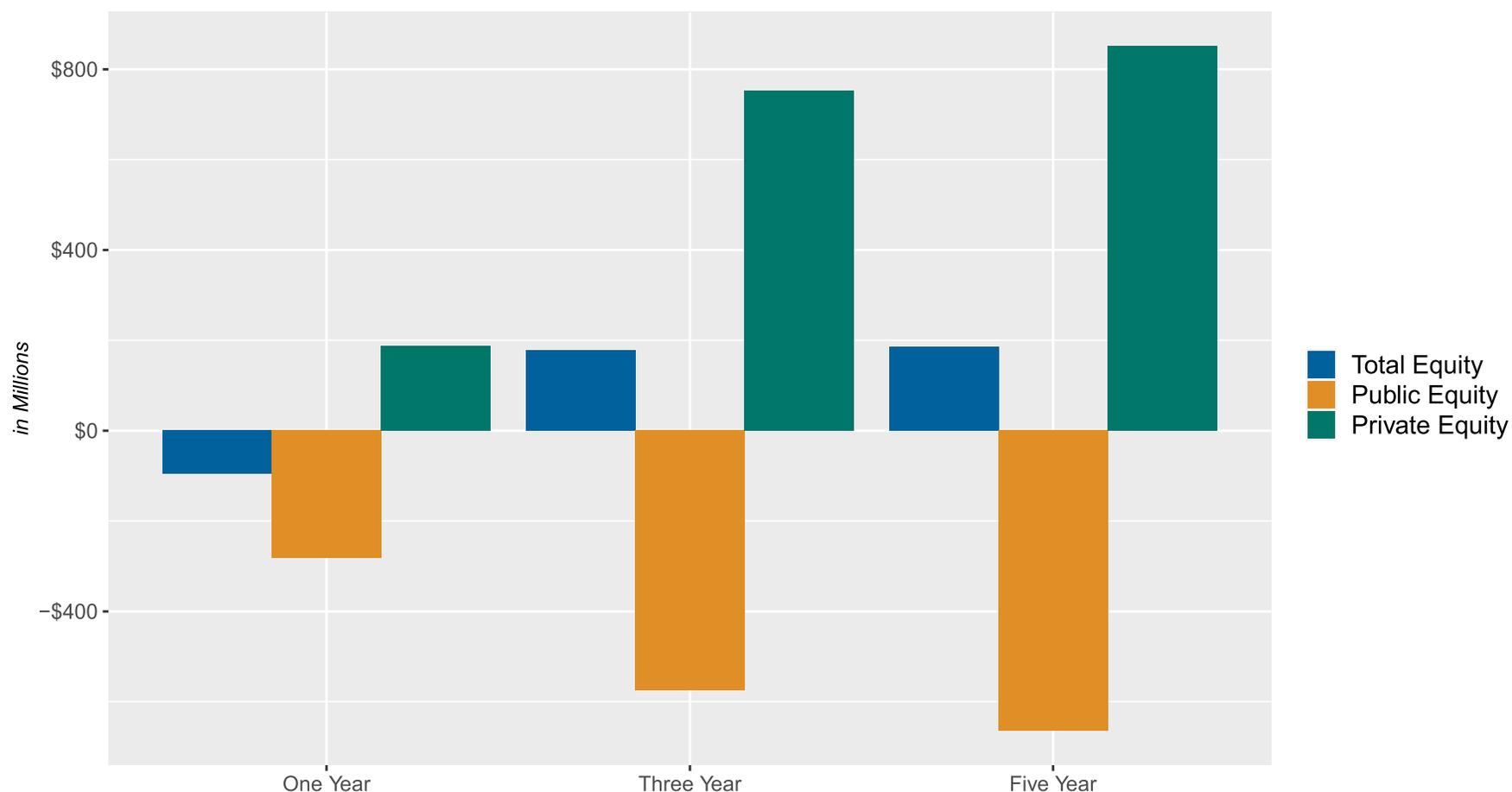


# Total Equity Performance for period ended 6/30/2020

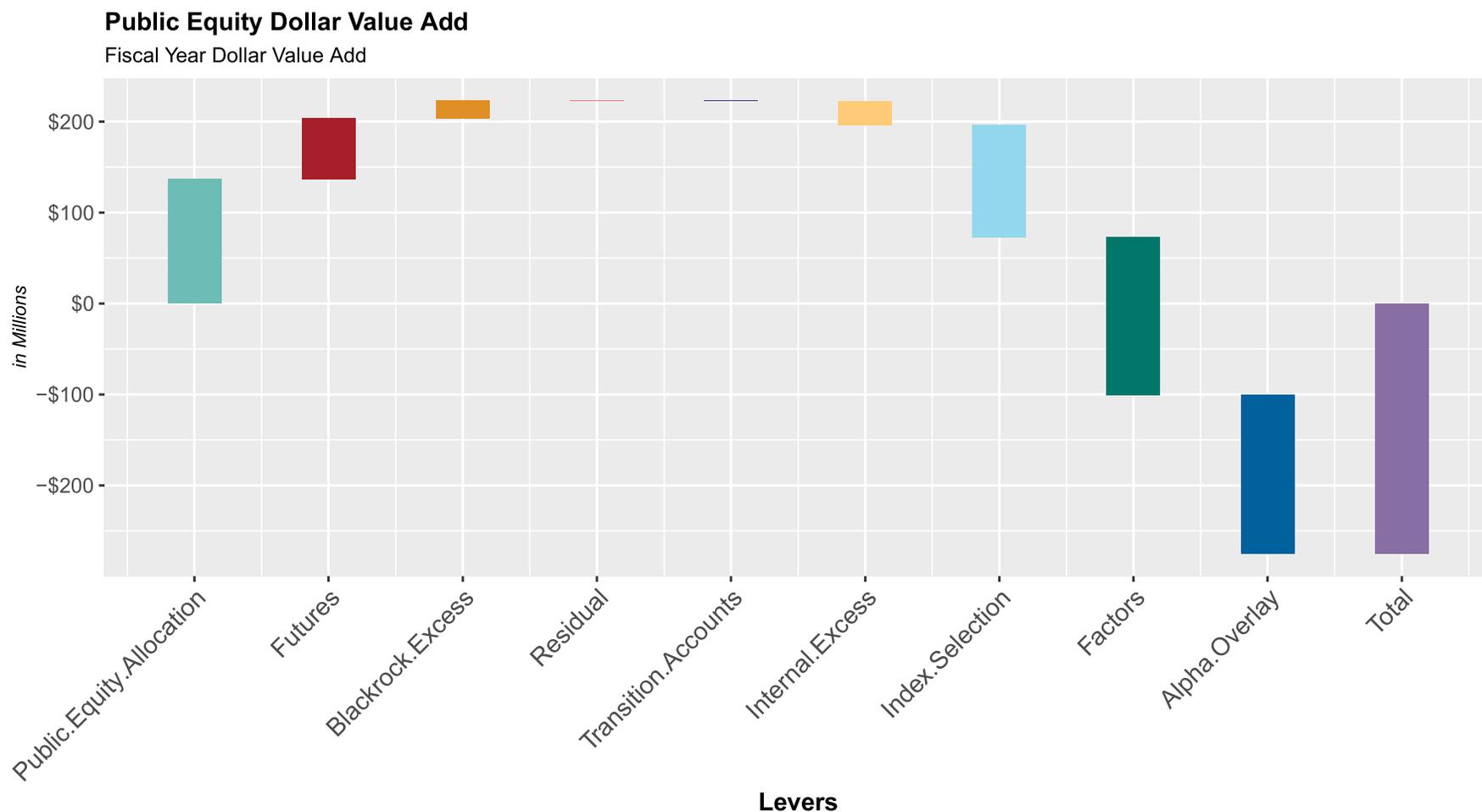


## Public Equity

# Total Equity Returns and Dollar Value Add for the period ended 6/30/2020



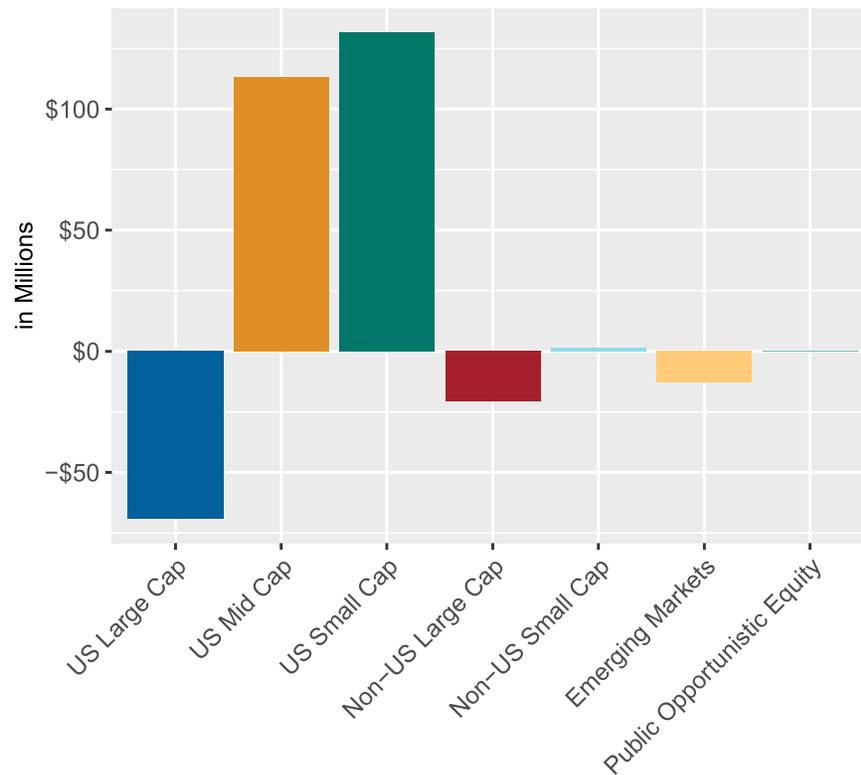
# Public Equity “Levers” for the period ended 6/30/2020



# Public Equity Allocation for the period ended 6/30/2020

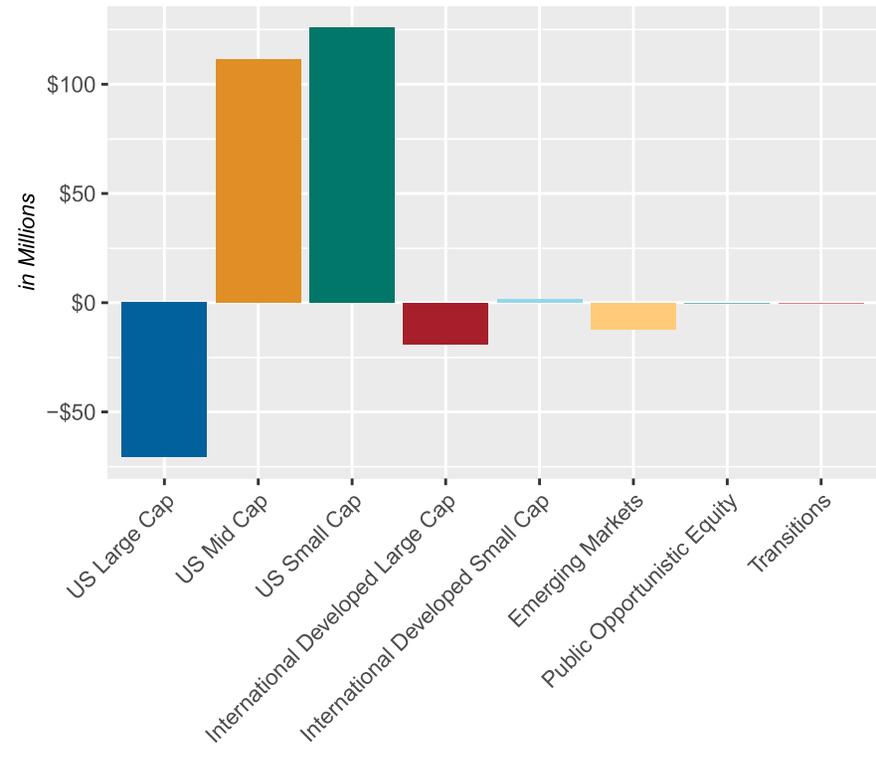
**Allocation Effect by Sub Asset Classes**

Relative to Target Weight – One Year



**Allocation Effect by ACWI Subcomponents**

Relative to ACWI IMI



■ US Large Cap   
 ■ US Small Cap   
 ■ Non-US Small Cap   
 ■ Public Opportunistic Equity  
■ US Mid Cap   
 ■ Non-US Large Cap   
■ Emerging Markets

# Private Equity

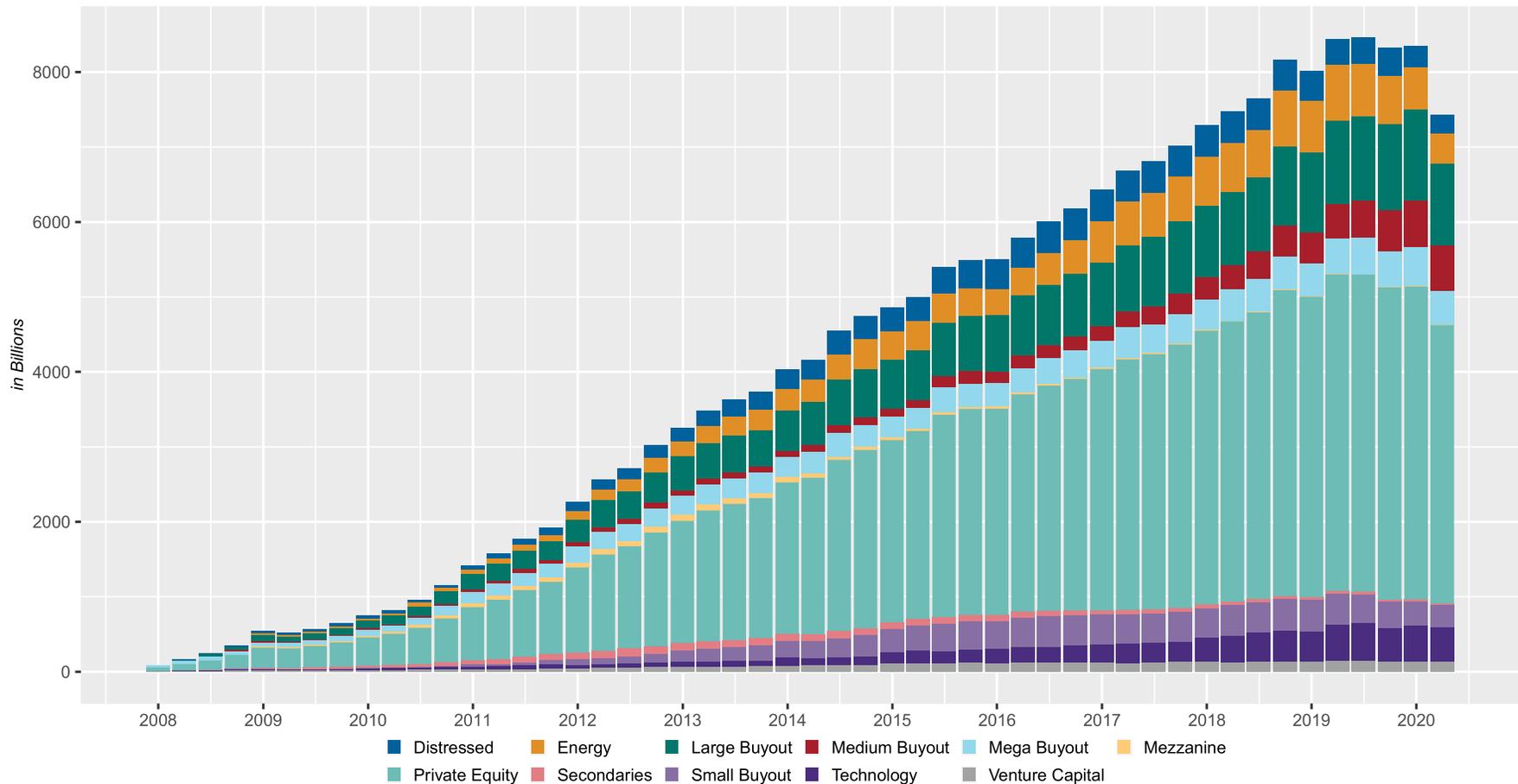
# Private Equity Performance Overview & Allocation for the period ended 3/31/2020

## Private Equity Internal Rate of Return

Composite	Quarter	One Year	Three Year	Five Year	Ten Year
Private Equity	-12.17	-7.31	6.54	8.56	10.94
Index IRR	-22.39	-12.97	-0.04	2.78	7.99
Excess	10.23	5.66	6.59	5.78	2.94
Distressed	-12.19	-17.68	-4.76	-1.66	3.04
Energy	-34.57	-47.10	-17.15	-9.26	-3.86
Large Buyout	-11.17	2.53	11.00	11.30	12.86
Medium Buyout	-4.93	7.13	13.72	13.79	15.28
Mega Buyout	-12.46	-3.07	9.34	13.30	13.90
Mezzanine	-8.11	32.87	9.96	7.22	9.84
Secondaries	-11.20	-13.36	4.00	3.53	10.79
Small Buyout	-5.24	4.59	16.75	18.37	15.83
Technology	-4.98	6.85	20.11	18.36	19.21
Venture Capital	-0.31	8.83	16.19	10.82	12.99
Private Equity	-12.17	-7.31	6.54	8.56	10.94

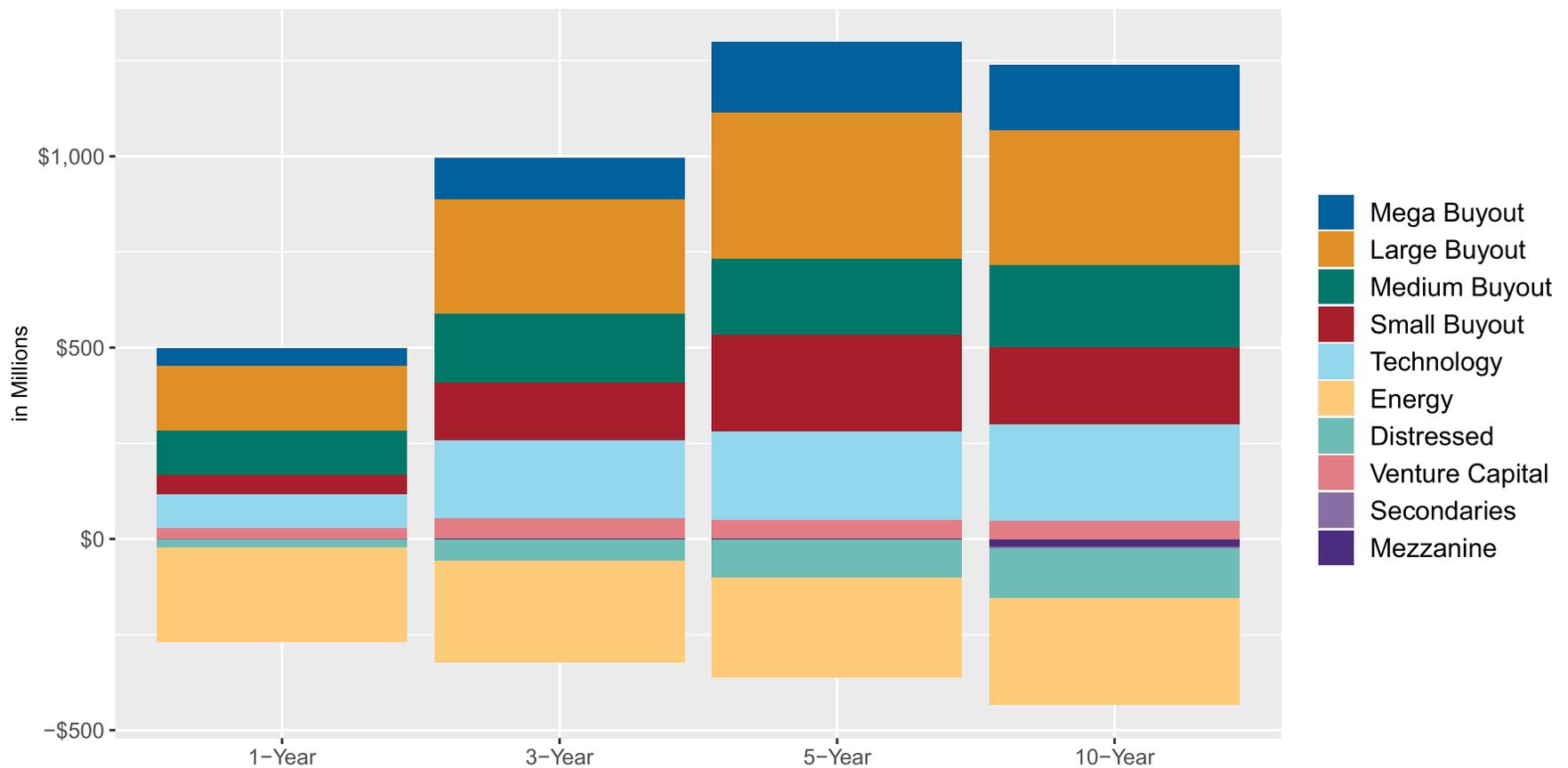
# Private Equity Decomposition for the period ended 3/31/2020

Net Asset Value by Strategy



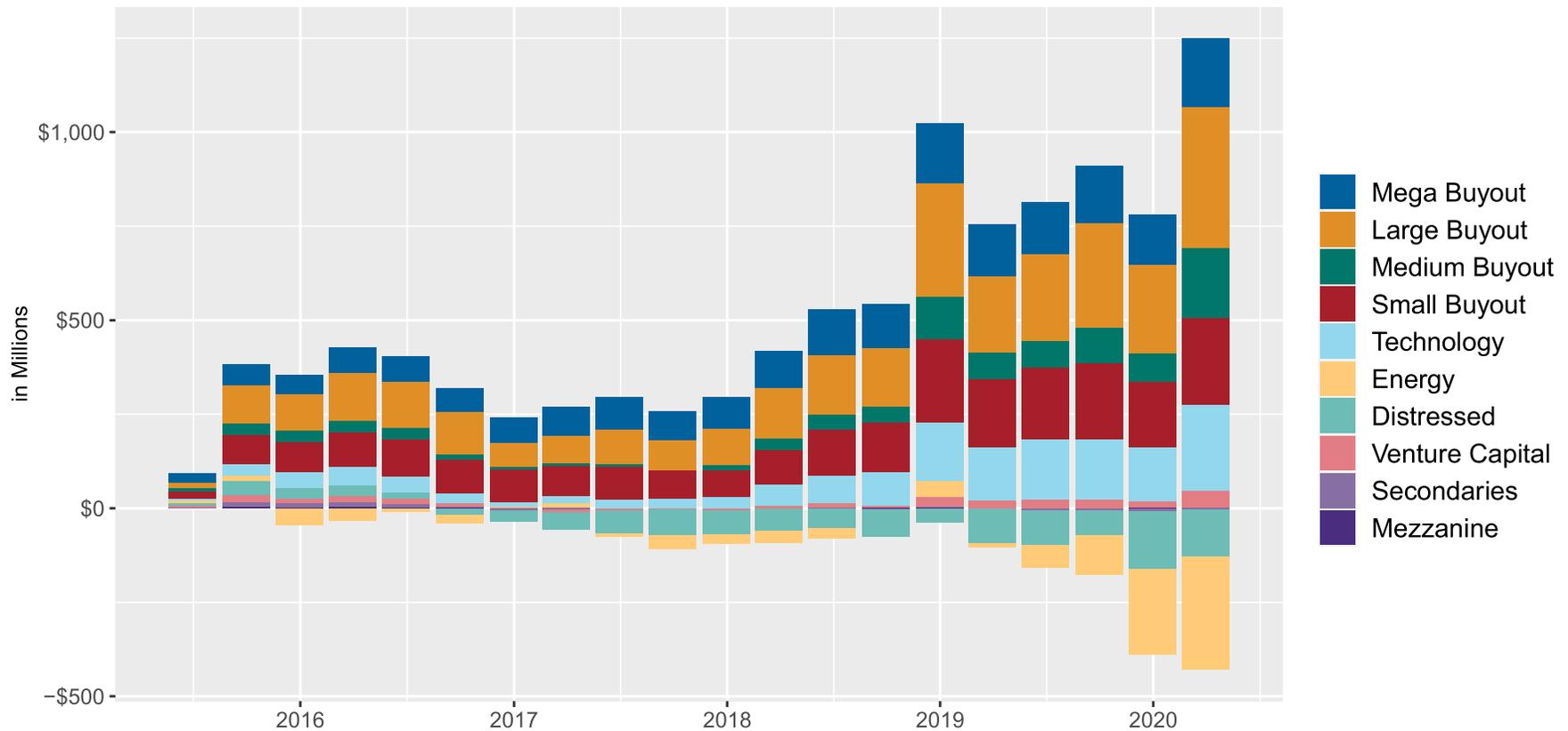
# Private Equity Dollar Value Add for the period ended 3/31/2020

Private Equity Dollar Value Add



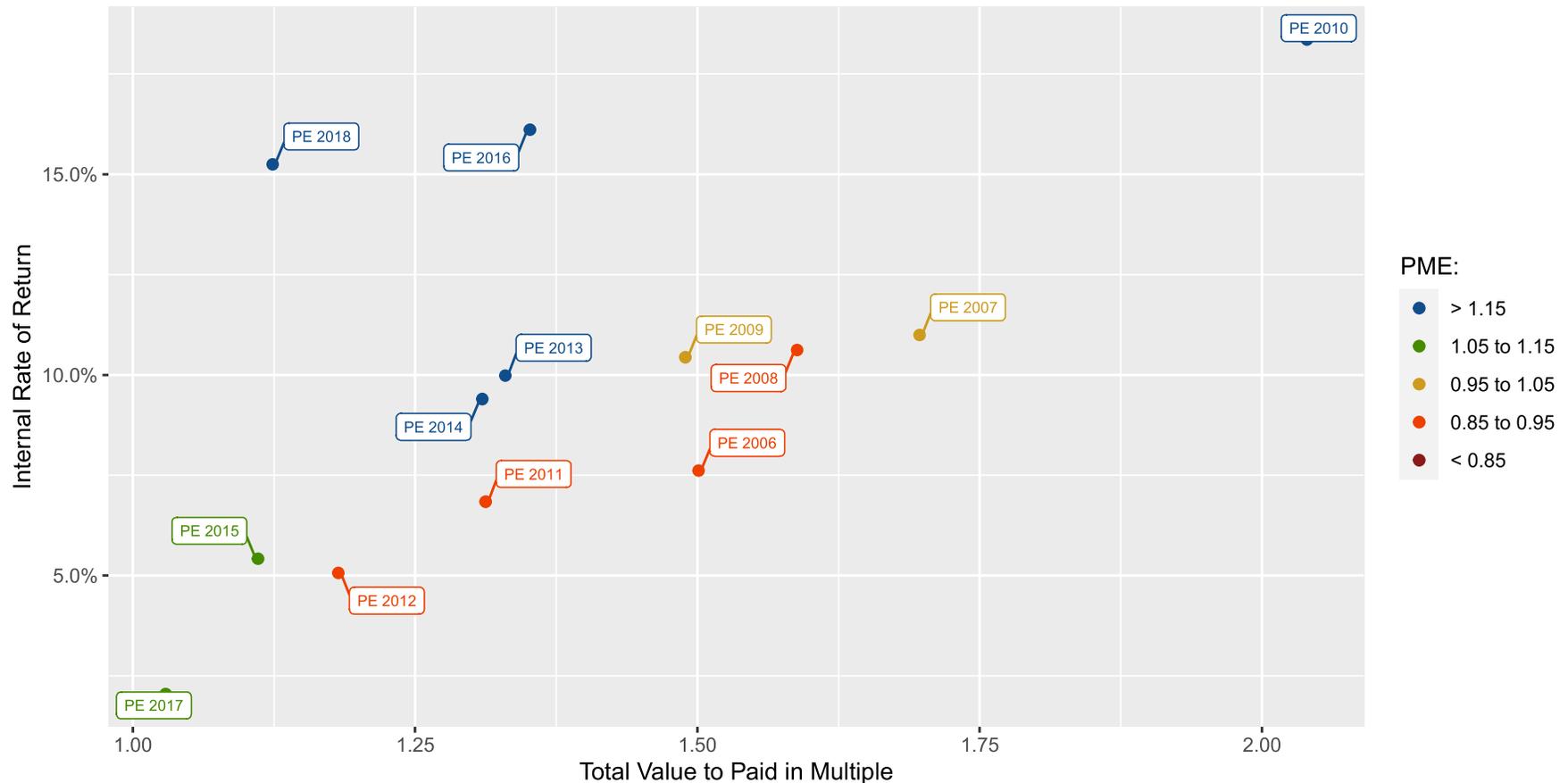
# Private Equity 5 Year Dollar Value Add for the period ended 3/31/2020

**Private Equity 5 Year**  
 Cumulative Dollar Value Add



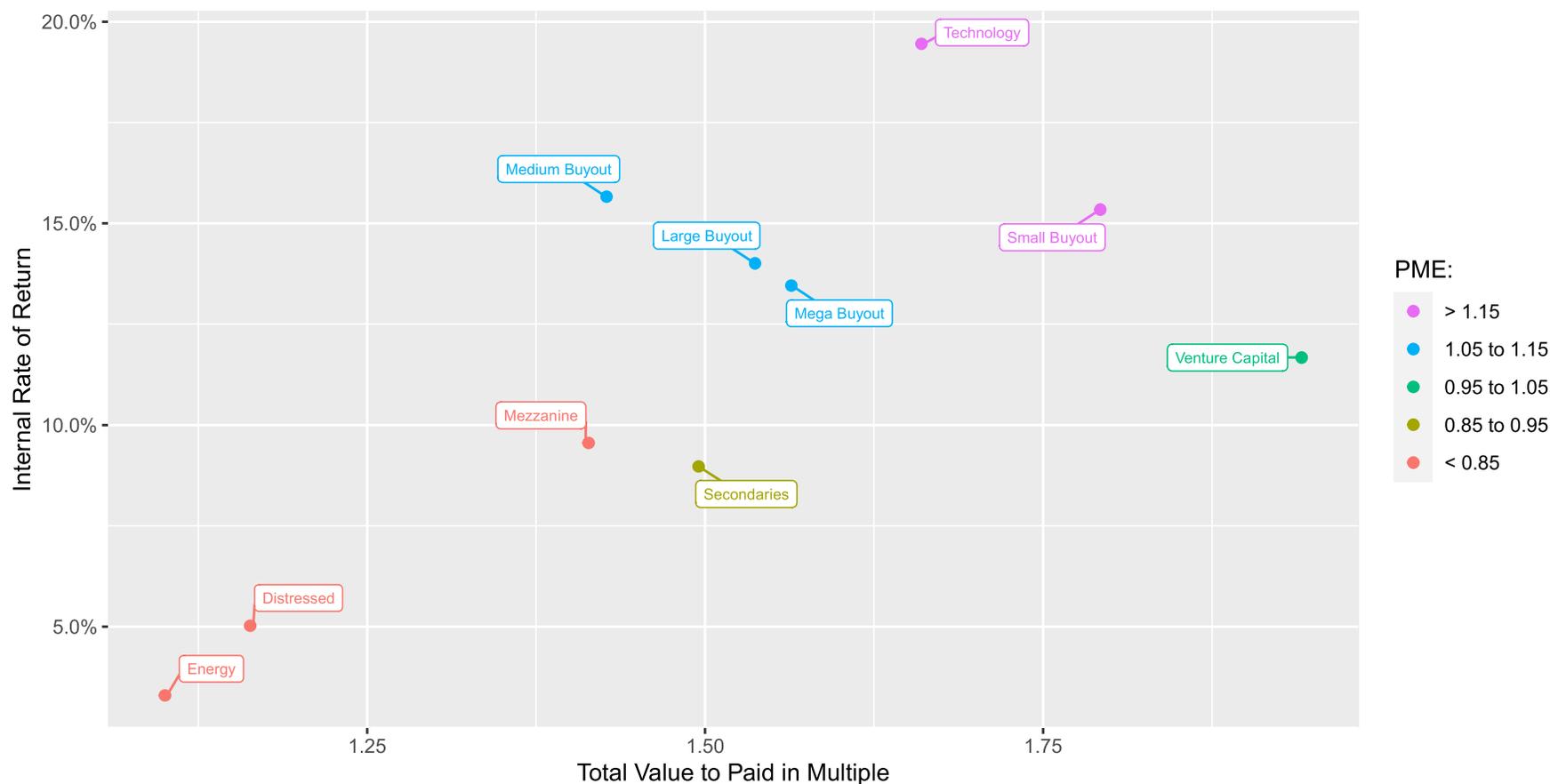
# Private Equity Performance by Vintage for the period ended 3/31/2020

Comparison of Private Equity by Vintage



# Private Equity Performance by Category for the period ended 3/31/2020

Comparison of Private Equity Composites

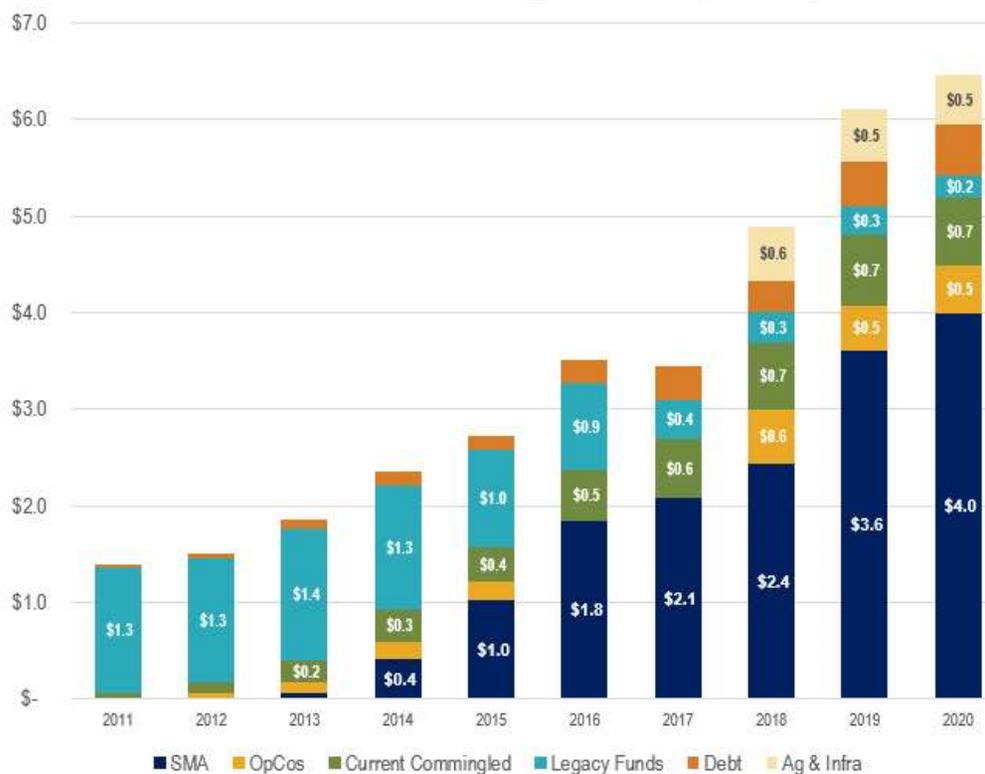


# Real Estate

# Real Estate Portfolio Composition for periods ending 3/31/2020

- ▶ As of one year ending 3/31/2020 ("YE 3/31/2020"), the portfolio has grown significantly since 2011 from approximately \$1.3 Billion to \$6.5 Billion
- ▶ The portfolio's composition has also shifted in favor of investments that afford ASRS significant control features, i.e., Separate Accounts ("SMAs") and Operating Companies ("OpCos").
  - » SMAs grew from a very minimal amount in 2011 to approximately \$4 Billion as of year ending 3/31/2020 and now comprises nearly 60% of total RE NAV.
  - » Investments in OpCos currently comprise approximately \$0.5 Billion, or 8% of total RE NAV.

ASRS RE Portfolio Year Ending Mar 31, 2020 (\$ Billions)

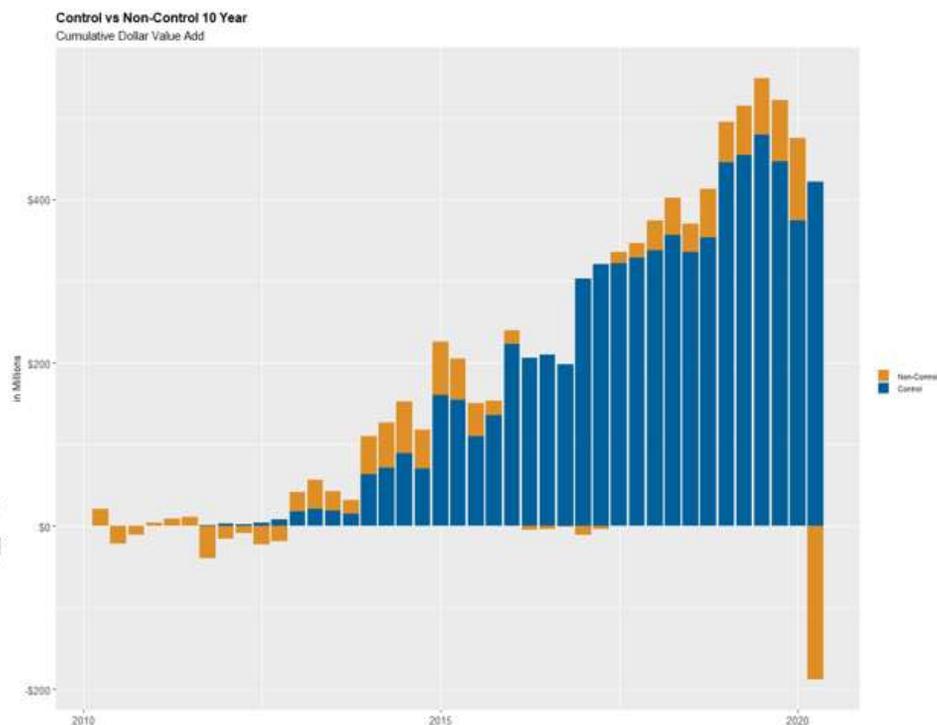


# Real Estate Portfolio Internal Rates of Return for periods ending 3/31/2020

MANAGER	1-YEAR	3-YEAR	5-YEAR	INCEPTION TO DATE
Real Estate Portfolio	-0.80%	4.60%	7.10%	7.50%
Index IRR	3.80%	5.00%	6.80%	6.50%
<i>Excess Return</i>	-4.60%	-0.50%	0.30%	1.00%
Separate Accounts (SMAs)	1.80%	5.80%	9.00%	10.20%
Index IRR	3.80%	5.00%	6.60%	7.00%
<i>Excess Return</i>	-2.00%	0.80%	2.40%	3.20%
Current Commingled	-0.30%	5.60%	7.50%	9.40%
Index IRR	3.80%	5.20%	7.30%	8.50%
<i>Excess Return</i>	-4.10%	0.40%	0.30%	0.90%
Operating Company (OpCos)	11.00%	8.00%	7.30%	15.60%
Index IRR	3.90%	4.50%	5.40%	6.30%
<i>Excess Return</i>	7.20%	3.50%	2.00%	9.40%
Debt	-27.80%	-12.10%	-5.60%	-1.50%
Index IRR	3.70%	4.90%	6.30%	7.10%
<i>Excess Return</i>	-31.50%	-17.00%	-11.90%	-8.70%
Agriculture & Infrastructure	1.90%	8.10%	7.70%	6.90%
Index IRR	3.80%	5.00%	5.30%	5.30%
<i>Excess Return</i>	-1.90%	3.10%	2.50%	1.60%
Legacy Commingled	-4.60%	1.40%	4.80%	5.70%
Index IRR	3.90%	5.40%	9.60%	6.00%
<i>Excess Return</i>	-8.50%	-4.10%	-4.80%	-0.40%

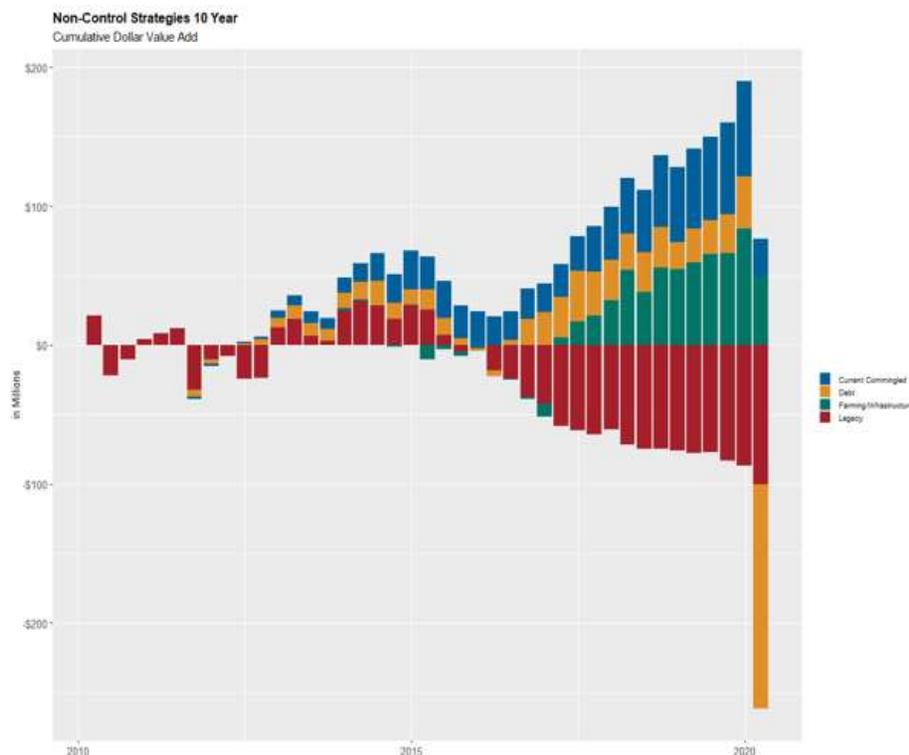
# Real Estate Excess Returns & Dollar Value Add for periods ending 3/31/2020

- ▶ Control investments consisting of Separate Accounts and Operating Companies where ASRS has significant rights on governance and investment matters have been the strongest performers in the real estate portfolio with approximately \$530 Million of dollar value added compared to benchmarks since inception.
- ▶ Non-control investments consisting of various Commingled Funds have shown disappointing performance with approximately -\$120 Million of dollar value added compared to benchmarks since inception with the larger underperformance coming from Debt and Legacy Commingled Funds.



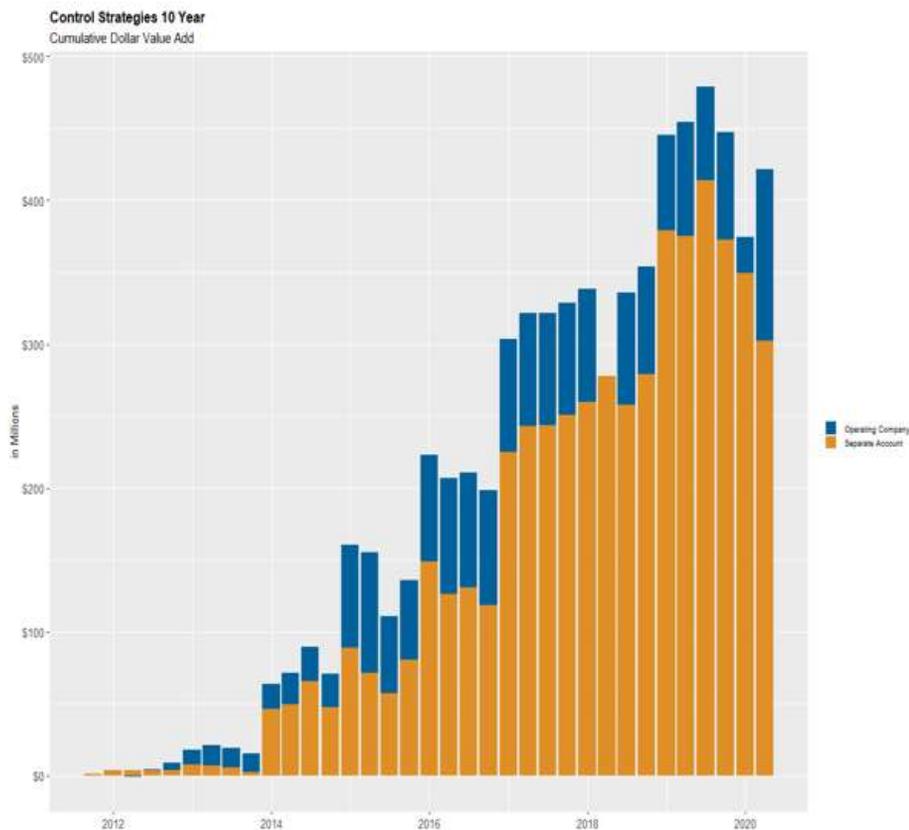
# Real Estate Non-Control Investments for periods ending 3/31/2020

- ▶ Debt investments have been the biggest detractor with the largest component of debt placed with a distressed manager exposed to retail and hospitality REITs with well over -\$100 Million in dollar value add.
  - » These investments are semi-liquid and follow a mark-to-market valuation methodology resulting in dramatic write-downs at 3/31/2020.
  - » The manager has expressed a view that these positions will recover over time.
- ▶ Current commingled investments date from mid-2010 and later:
  - » These investments had added approximately \$81 Million in dollar value up to the end of 2019 but were marked down due to COVID considerations.
  - » The markdown shrank the dollar value add as of 3/31/2020 to approximately \$40 Million.
- ▶ Agriculture and Infrastructure investments had added approximately \$86 Million in dollar value add to the end of 2019 but were also marked down due to COVID considerations; dollar value add as of 3/31/2020 shrank to approximately \$52 Million.

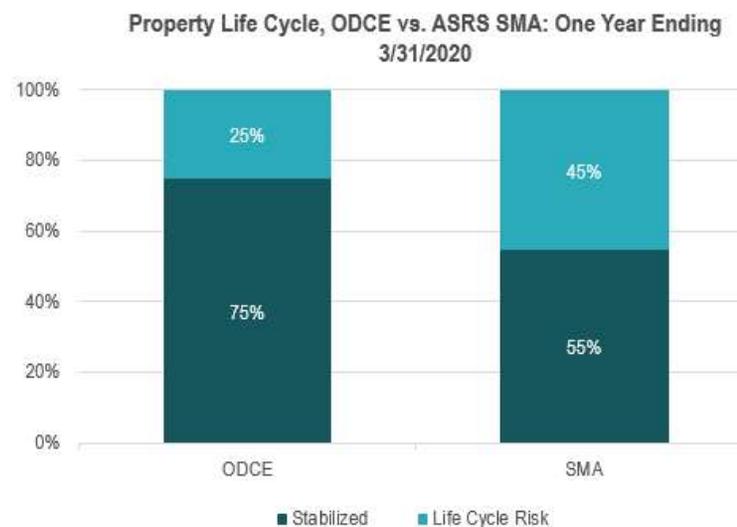


# Real Estate Control Investments for periods ending 3/31/2020

- ▶ Separate Account investments contributed over \$380 Million in dollar value add compared to the benchmark since inception.
- ▶ Operating Companies contributed over \$140 Million in dollar value add compared to the benchmark since inception.



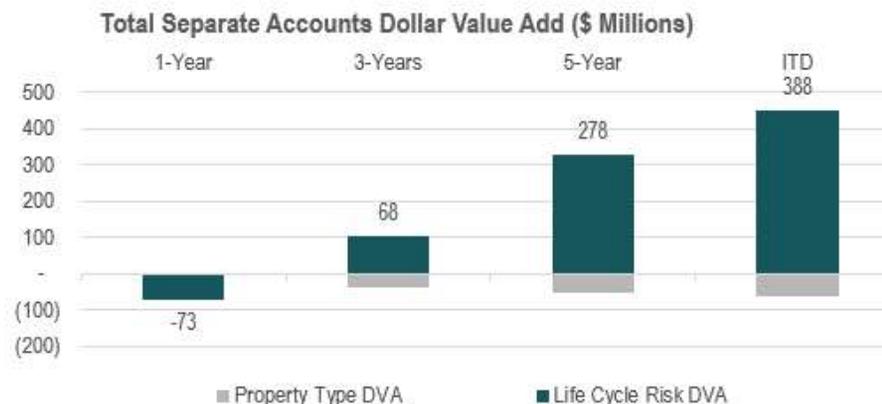
# Real Estate Separate Account Portfolio to ODCE



- ▶ The SMA portfolio constructed to outperform the ODCE benchmark.
- ▶ Primary differences are:
  - » SMAs target to be overweight Live and underweight Work and Shop on a 65%/17.5%/17.5% basis, respectively, to take advantage of sustained demand drivers.
  - » The SMA portfolio targets a higher allocation to Life Cycle Risk (i.e., construction, lease-up, etc.) to take advantage of attractive value-creation spreads.
- ▶ Performance attribution analyzes the portfolio's performance based on these two primary differences to understand value drivers.

# Separate Account Attribution for periods ending 3/31/2020

- ▶ The SMA portfolio has generated meaningful outperformance in terms of Life Cycle Risk Dollar Value Add (i.e., undertaking value creation activities including construction and repositioning).
- ▶ Property Type Dollar Value Add, which results from the relative difference of the portfolio vis-à-vis ODCE (i.e., overweight Live) has had a slightly negative impact on performance relative to the benchmark. We expect this to reverse going forward given sustained demand for residential relative to other properties.



# Separate Account Attribution for periods ending 3/31/2020

- Value creation investments from earlier in the cycle contribute meaningfully to SMA portfolio outperformance. A deliberate shift toward a more stabilized portfolio starting in 2018 in anticipation of a slowdown has left fewer opportunities for meaningful outperformance but also likely mitigated risk of overpaying on any acquisitions.



# Separate Account Attribution for periods ending 3/31/2020

- » Recent underperformance is largely due to a handful of underperforming stabilized properties and delays in achieving the benefit of value creation activities due to the current pandemic and economic slowdown.
- » We expect to benefit from value creation going forward by ramping up investments at very favorable bases and completing value creation activities over the next few years.



# Credit

# Total Credit

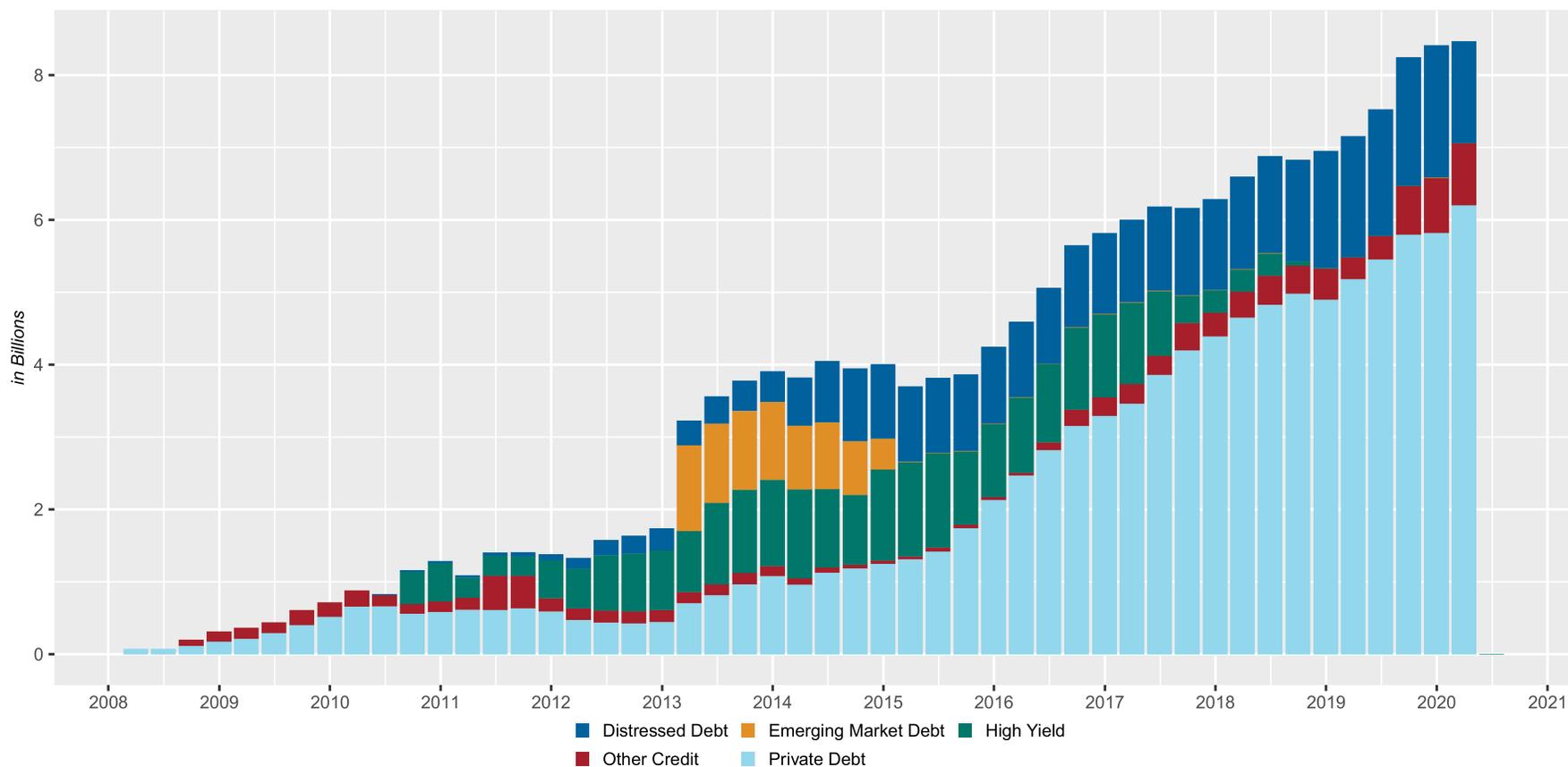
# Total Credit for the period ended 6/30/2020

## Credit Annualized Returns

Category	Quarter	One Year	Three Year	Five Year	Ten Year	Inception
Total Credit (TWR)	-2.34	4.41	7.30	7.50	7.03	7.03
Blended Benchmark	-12.47	-6.86	1.49	3.41	2.95	2.95
Total Credit Excess	10.13	11.26	5.80	4.09	4.08	4.08
Private Debt	-0.88	5.93	7.78	11.31	9.88	10.35
Index IRR	-12.33	-6.87	1.40	3.27	4.30	5.29
Excess	11.45	12.79	6.38	8.03	5.58	5.06
Distressed Debt	-7.98	-0.89	5.23	4.71	5.71	5.71
Index IRR	-11.90	-5.02	2.23	4.39	5.26	5.26
Excess	3.92	4.13	3.00	0.32	0.45	0.45
Other Credit	-3.53	-0.96	1.96	5.83	5.73	7.73
Index IRR	-12.74	-13.02	-1.73	-0.16	3.77	4.40
Excess	9.21	12.06	3.69	5.99	1.96	3.33

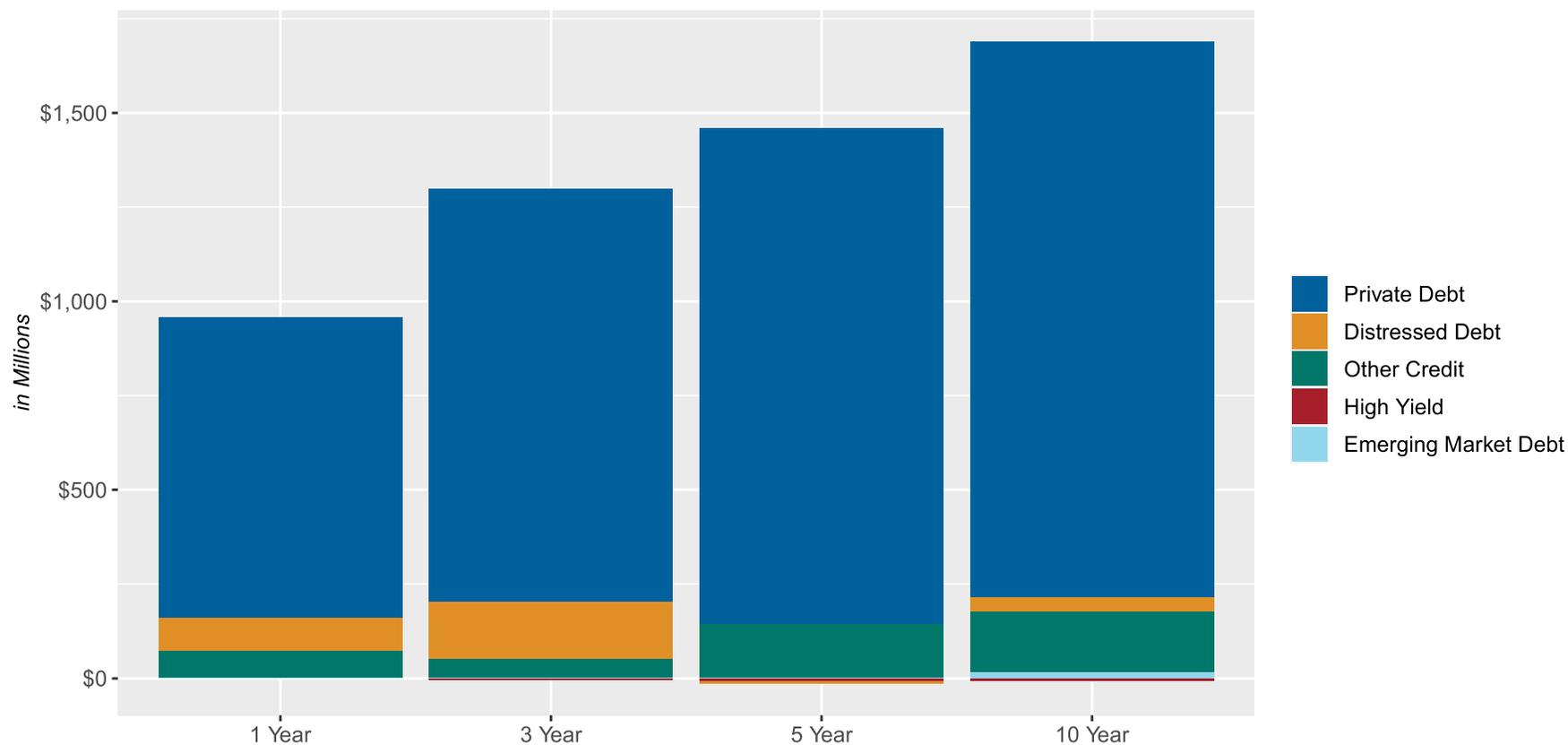
# Credit Market Values and Performance for the period ended 6/30/2020

Credit Market Values



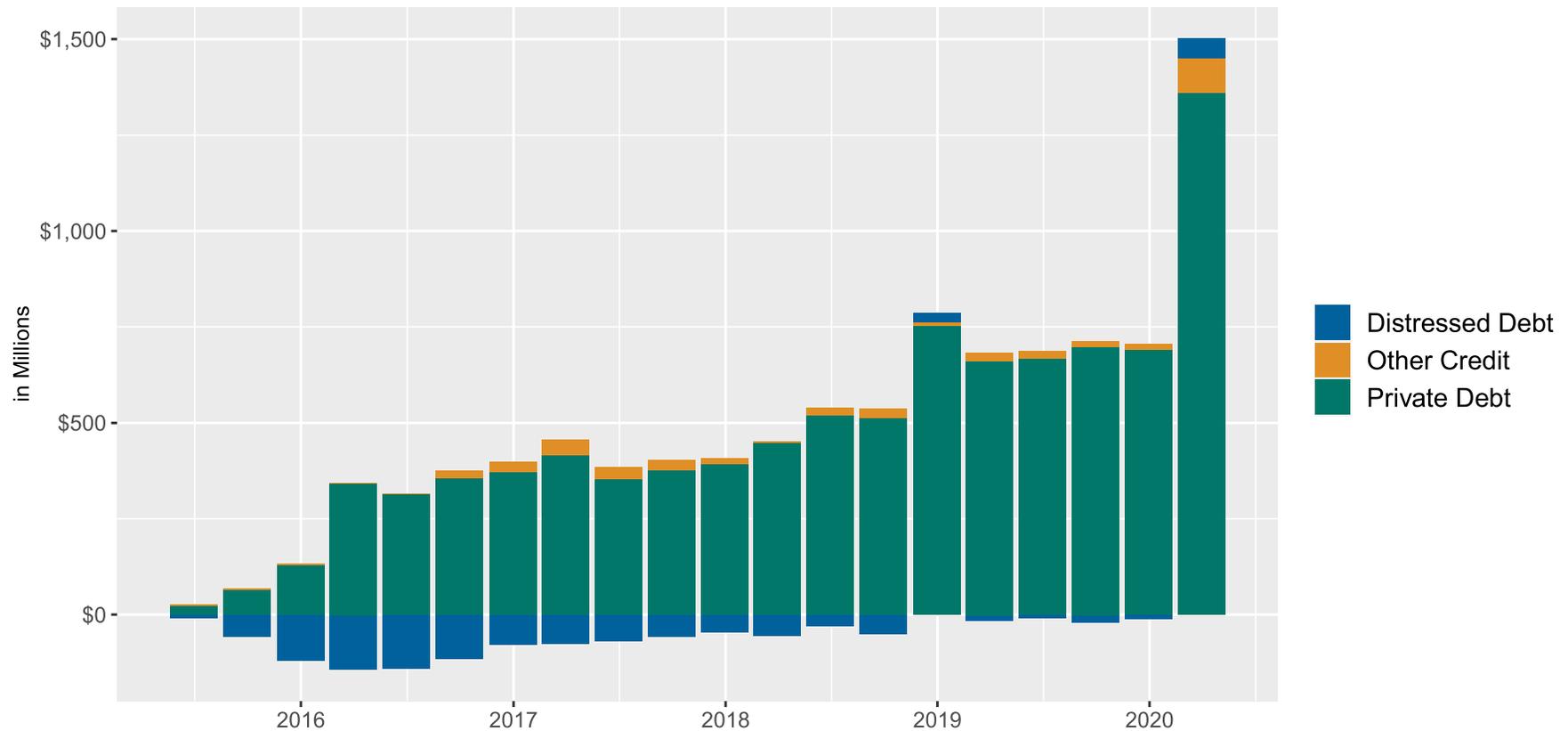
# Credit Dollar Value Add for the period ended 6/30/2020

Credit Dollar Value Add versus Benchmark



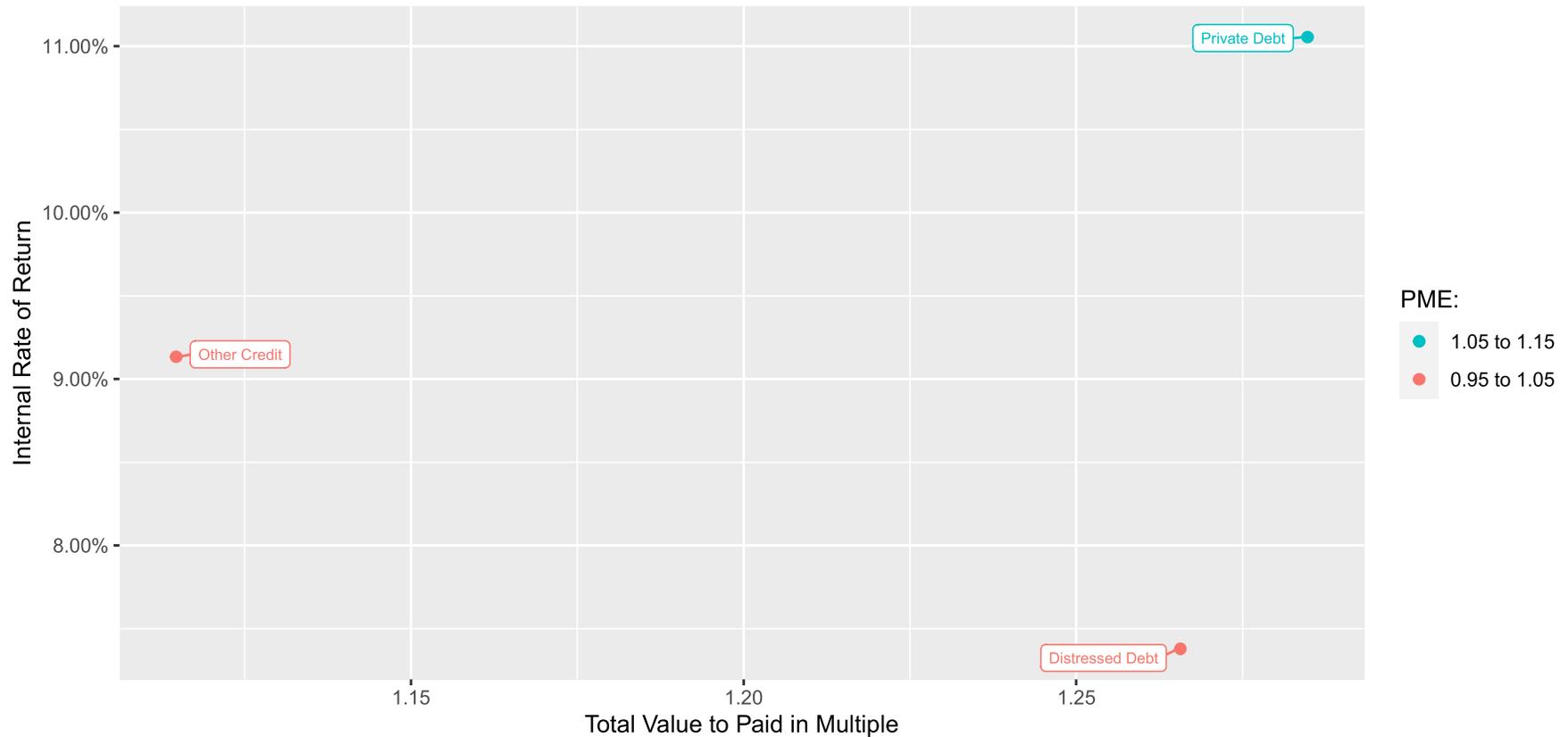
# Credit 5 Year Dollar Value Add for the period ended 6/30/2020

**Private Credit 5 Year**  
Cumulative Dollar Value Add



# Credit: Total Value to Paid in Multiple & Public Market Equivalent for the period ended 6/30/2020

Comparison of Real Estate Composites



# Credit Performance for the period ended 6/30/2020

**Total Credit Portfolio Performance versus Expectations**

150 Basis Points Expected Excess Return with 350 Basis Points Tracking Error



# Core Bonds

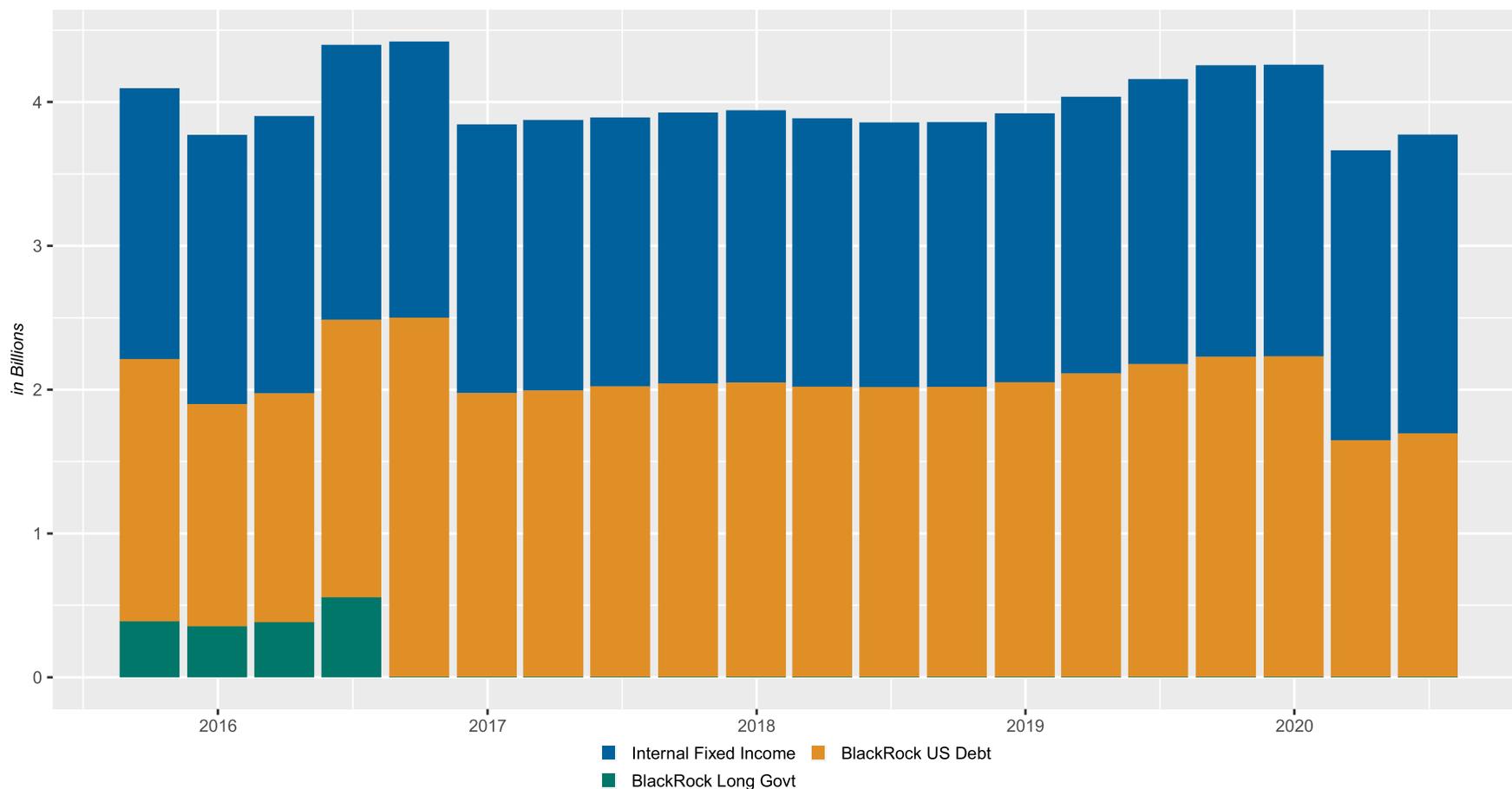
# Core Fixed Income for the period ended 6/30/2020

## Annualized Time-Weighted Returns

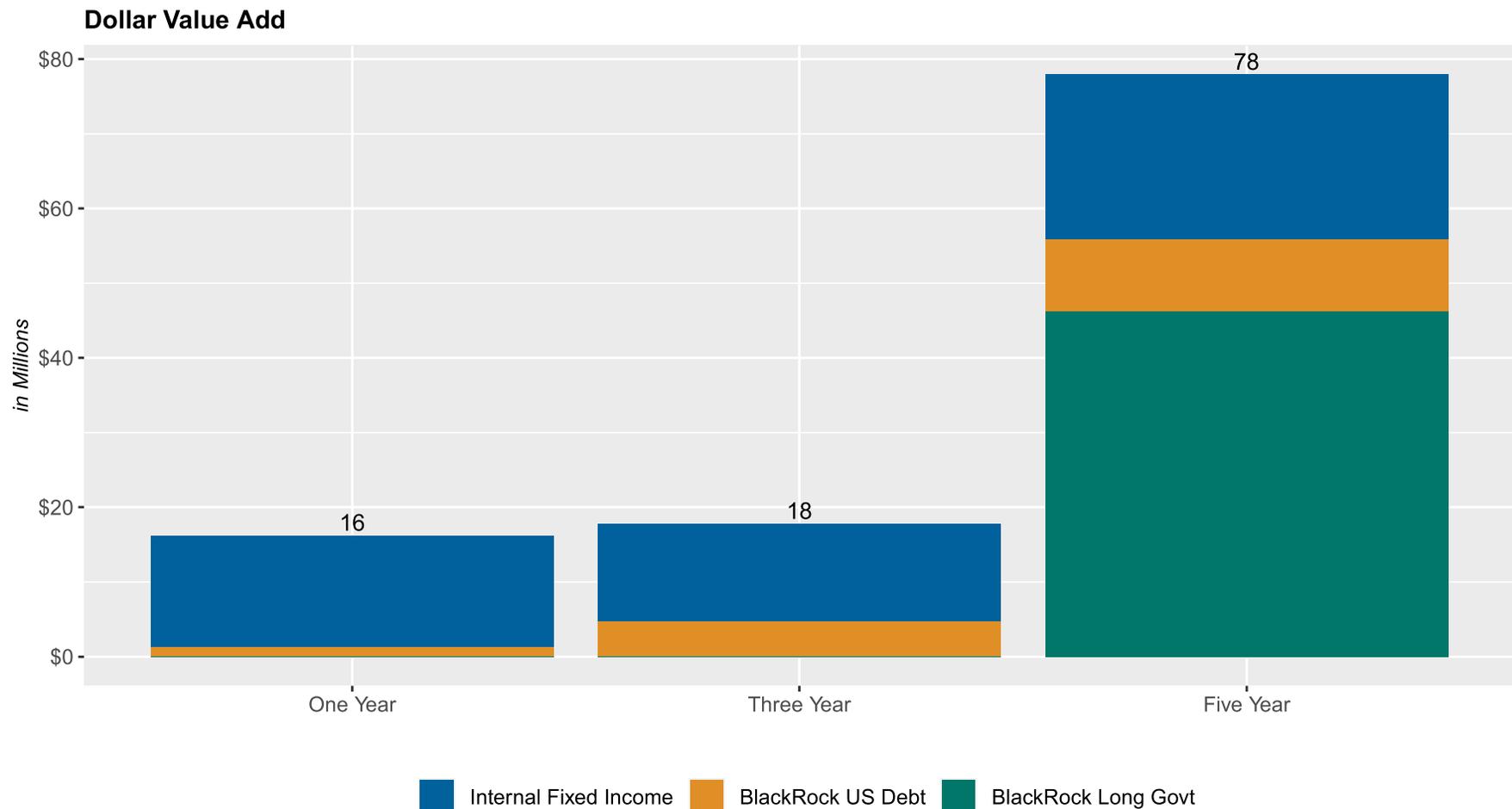
	Quarter	One Year	Three Year	Five Year
Core Bond Composite	2.97	9.02	5.43	4.60
Barclay's Aggregate	2.90	8.74	5.32	4.30
Core Composite Excess	0.08	0.29	0.11	0.29
Internal Fixed Income	2.96	9.50	5.54	4.51
Barclay's Aggregate	2.90	8.74	5.32	4.30
Internal Fixed Income Excess	0.07	0.76	0.22	0.21
BlackRock US Debt Fund	2.98	8.82	5.40	4.40
Barclay's Aggregate	2.90	8.74	5.32	4.30
BlackRock Excess	0.08	0.08	0.08	0.09

# Core Fixed Income Decomposition for the period ended 6/30/2020

Core Bonds Market Values

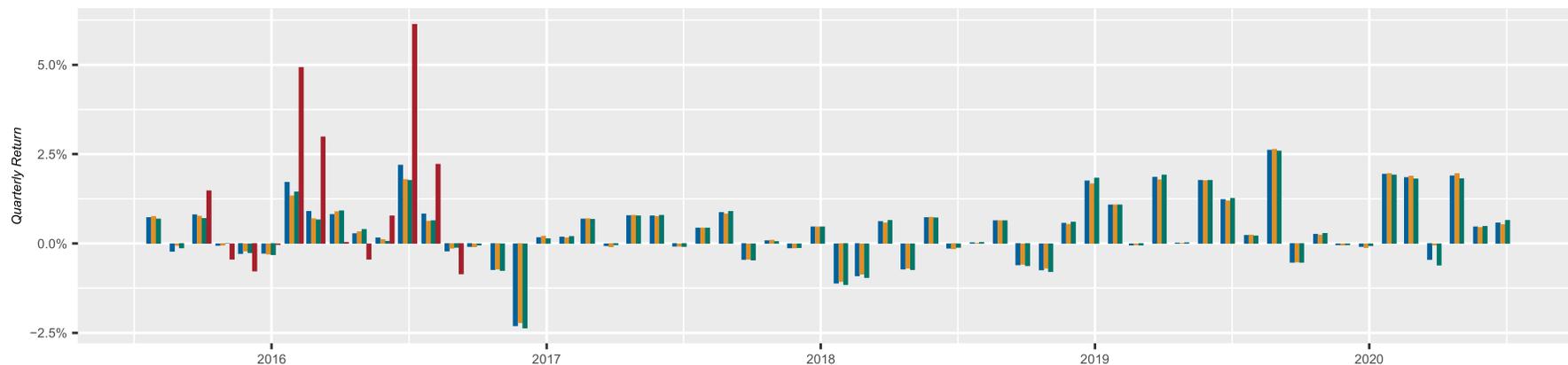


# Core Fixed Income Dollar Value Added for the period ended 6/30/2020

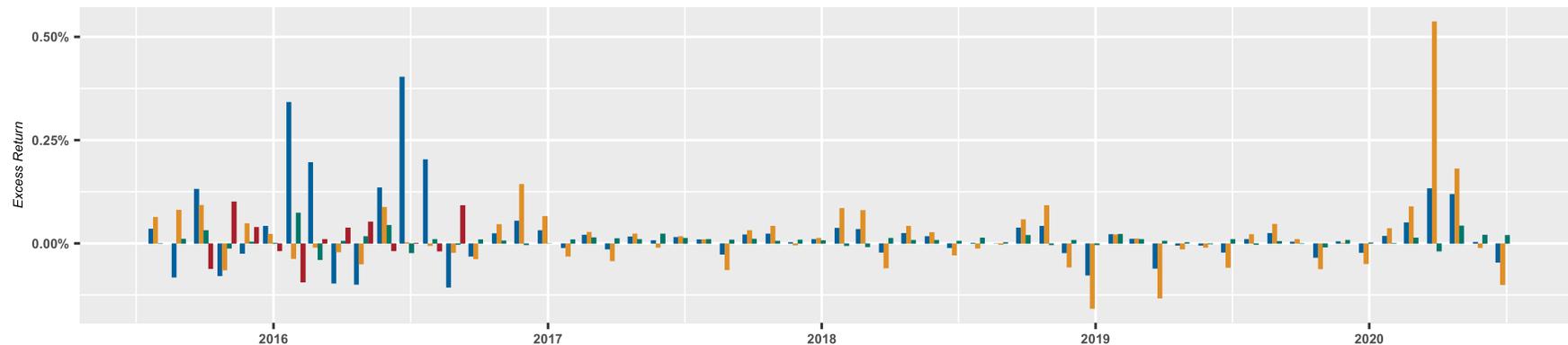


# Core Fixed Income Quarterly Returns for the period ended 6/30/2020

Core Bonds Quarterly Return



Core Bonds Quarterly Excess Return

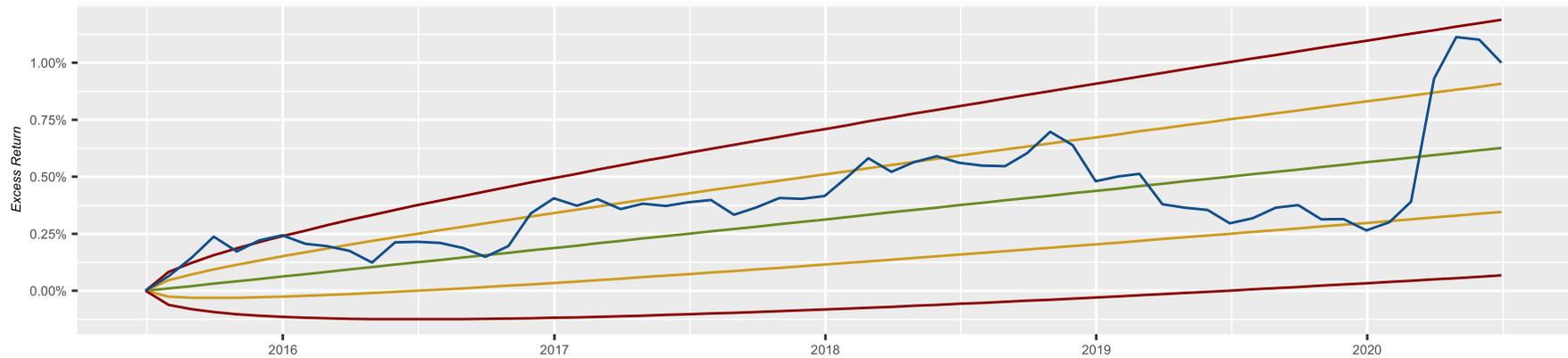


■ Core Bonds ■ Internal Fixed Income ■ BlackRock US Debt ■ BlackRock Long Govt

# Core Fixed Income Performance for the period ended 6/30/2020

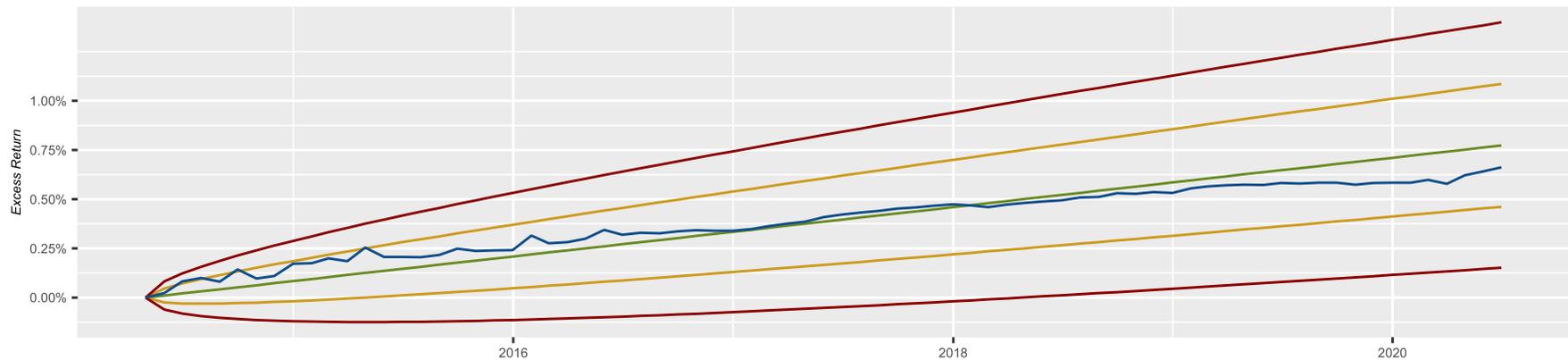
## Internal Fixed Income Portfolio Performance versus Expectations

12.5 Basis Points Expected Excess Return with 12.5 Basis Points Expected Tracking Error



## Blackrock US Debt Portfolio Performance versus Expectations

12.5 Basis Points Expected Excess Return with 12.5 Basis Points Expected Tracking Error



# Agenda Item #6

# Arizona State Retirement System

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

Allan Martin, Partner, NEPC  
John Krimmel, Partner, NEPC  
Michael Malchenko, Sr. Analyst, NEPC



# CONTENTS

- ASRS Investment Objectives/Performance
- Independent Oversight/Compliance
  - SAA Policy Compliance
  - Total Fund and Asset Class Performance
  - Asset Class Committee Monitoring
- Market Environment Update and Outlook
- Appendix: SAA Policy History

# 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 I 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

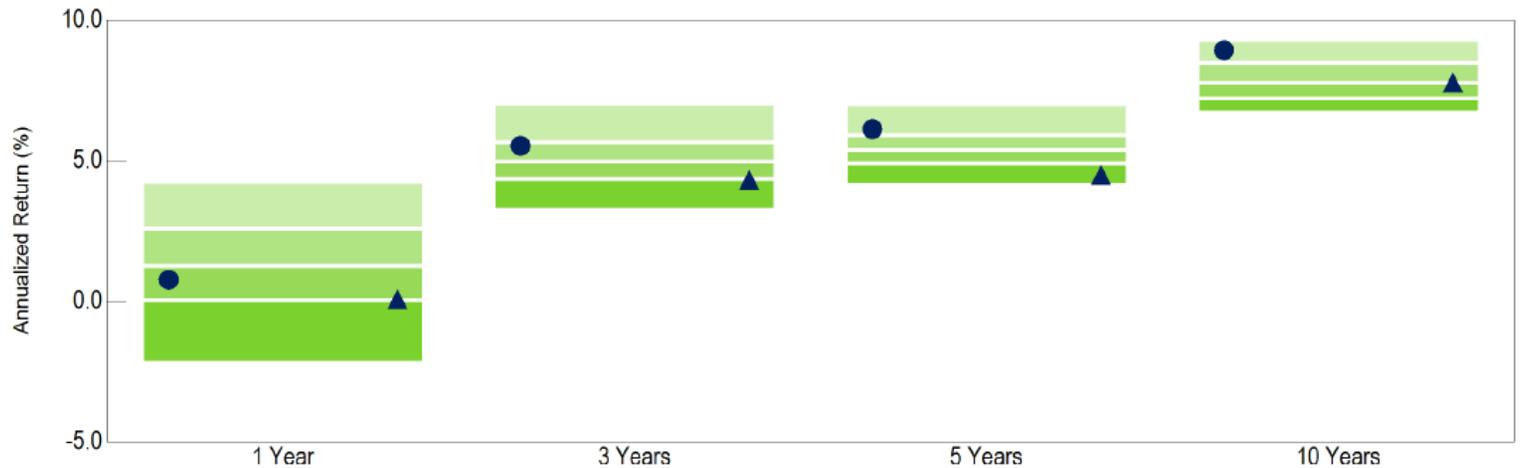
	3 Mo	YTD	1 Yr	3 Yrs	5 Yrs	10 Yrs	Inception	Inception Date
<b>Total Fund</b>	<b>5.0%</b>	<b>-4.6%</b>	<b>0.8%</b>	<b>5.5%</b>	<b>6.1%</b>	<b>8.9%</b>	<b>9.5%</b>	<b>Jul-75</b>
<i>Interim SAA Policy</i>	<u>3.3%</u>	<u>-5.4%</u>	<u>0.0%</u>	<u>4.3%</u>	<u>4.5%</u>	<u>7.8%</u>	<u>9.0%</u>	<i>Jul-75</i>
Excess 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

InvMetrics Public DB > \$1B Net Return Comparison  
Ending June 30, 2020



	Return (Rank)			
	1 Year	3 Years	5 Years	10 Years
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



●	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

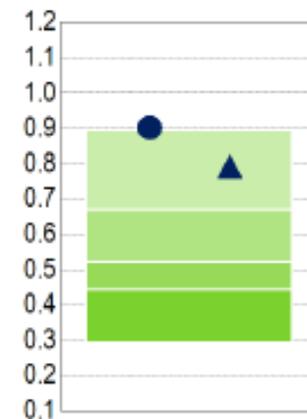
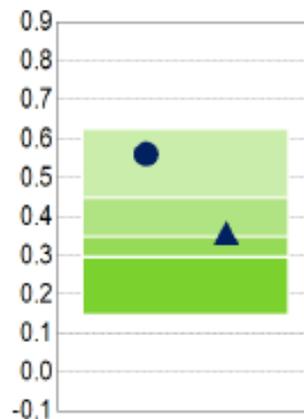
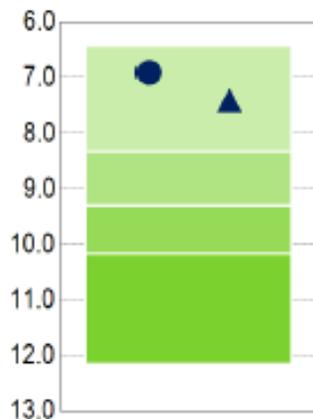
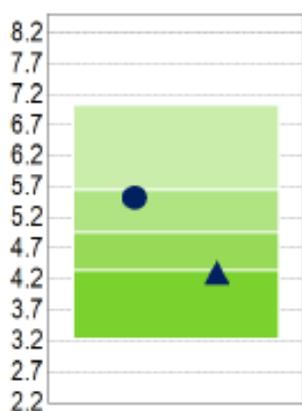


Universes are constructed using net of fee returns; therefore, ASRS rank is based on net of fee returns. Rankings are from highest (1) to lowest (100) in the InvMetrics Public Funds > \$1 Billion Net Universe. The InvMetrics Public Funds > \$1 Billion Net Universe contains 71 observations for the period 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
25th %tile	5.9	25th %tile	7.4
Median	5.4	Median	8.3
75th %tile	4.9	75th %tile	9.0
95th %tile	4.2	95th %tile	10.6
		5th %tile	0.8
		25th %tile	0.6
		Median	0.5
		75th %tile	0.4
		95th %tile	0.3
		5th %tile	1.0
		25th %tile	0.9
		Median	0.7
		75th %tile	0.6
		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	Universe	Universe	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.



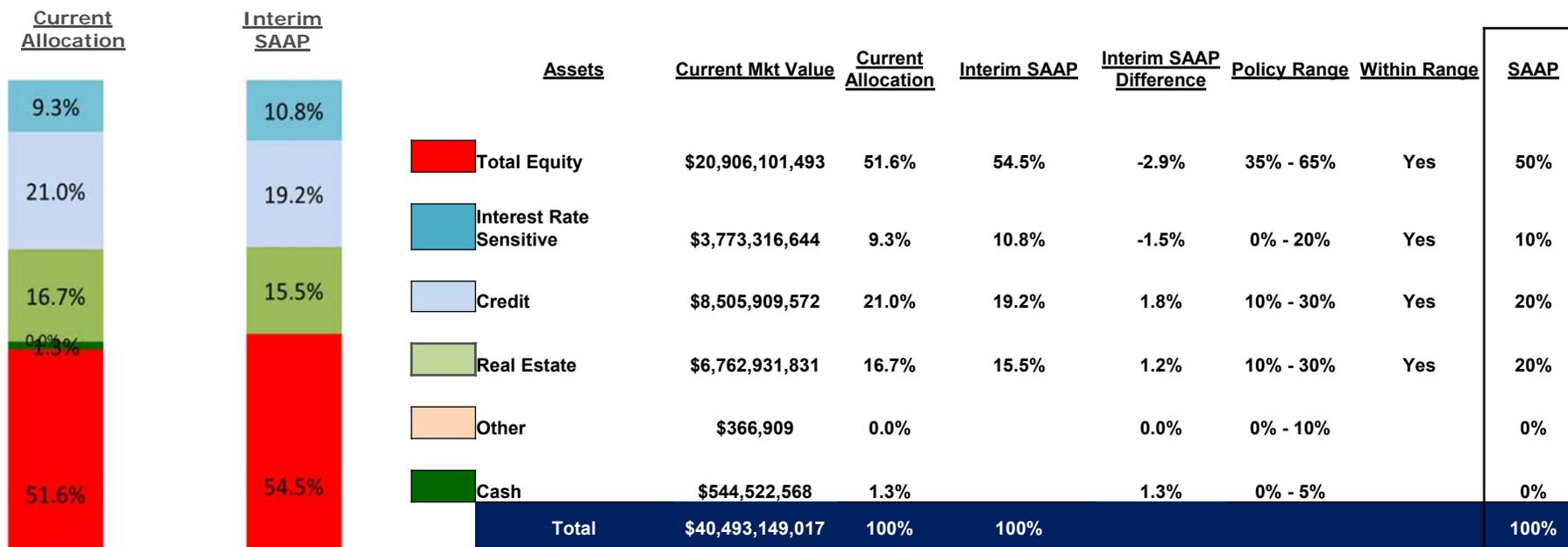
# INDEPENDENT OVERSIGHT/COMPLIANCE

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.

NEPC, LLC

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# SAA POLICY COMPLIANCE



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.*

- Interest Rate Sensitive
- Real Estate
- Cash
- Credit
- Other
- Total Equity



## Arizona State Retirement System

# PERFORMANCE SUMMARY - PUBLIC MARKETS

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

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



## Arizona State Retirement System

# 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.



## Arizona State Retirement System

# 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 eInvestment 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 manager 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 overweight 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

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# LONG TERM DISABILITY PERFORMANCE

	<b>Quarter</b>	<b>1 Year</b>	<b>3 Years</b>	<b>5 Years</b>	<b>10 Years</b>	<b>Since Inception (July-02)</b>
Long Term Disability	5.1%	0.8%	5.5%	5.8%	8.5%	6.3%
LTD SAA Policy <sup>1</sup>	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%



<sup>1</sup>LTD SAA Policy composition can be found in the appendix.

# MARKET ENVIRONMENT UPDATE AND OUTLOOK

NEPC, LLC

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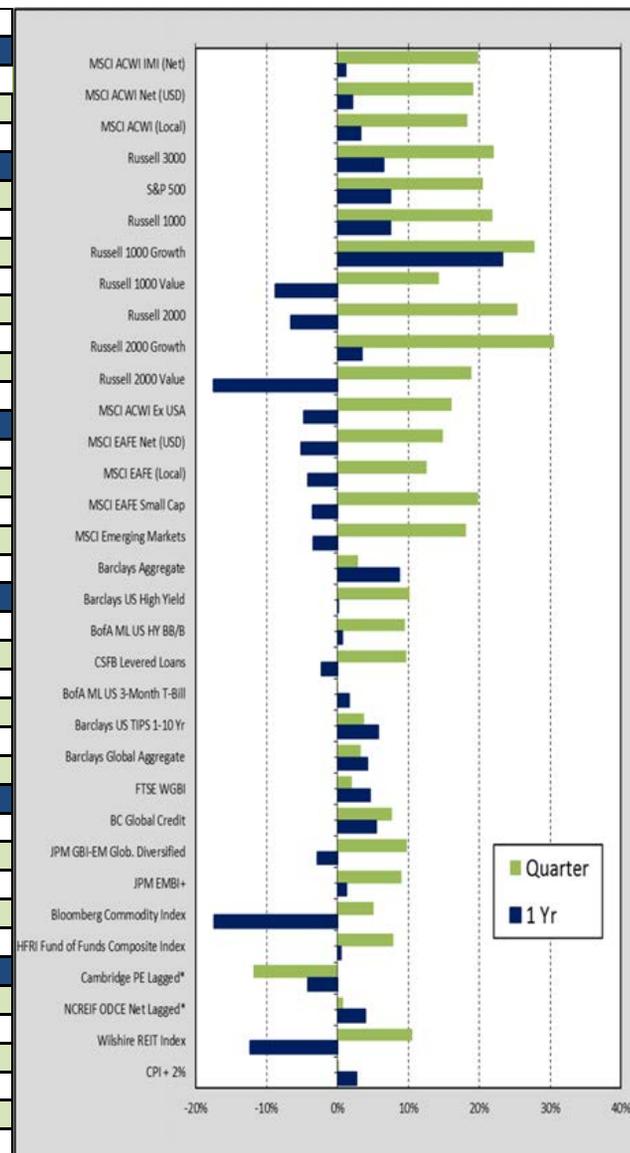
# ECONOMIC ENVIRONMENT

- **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



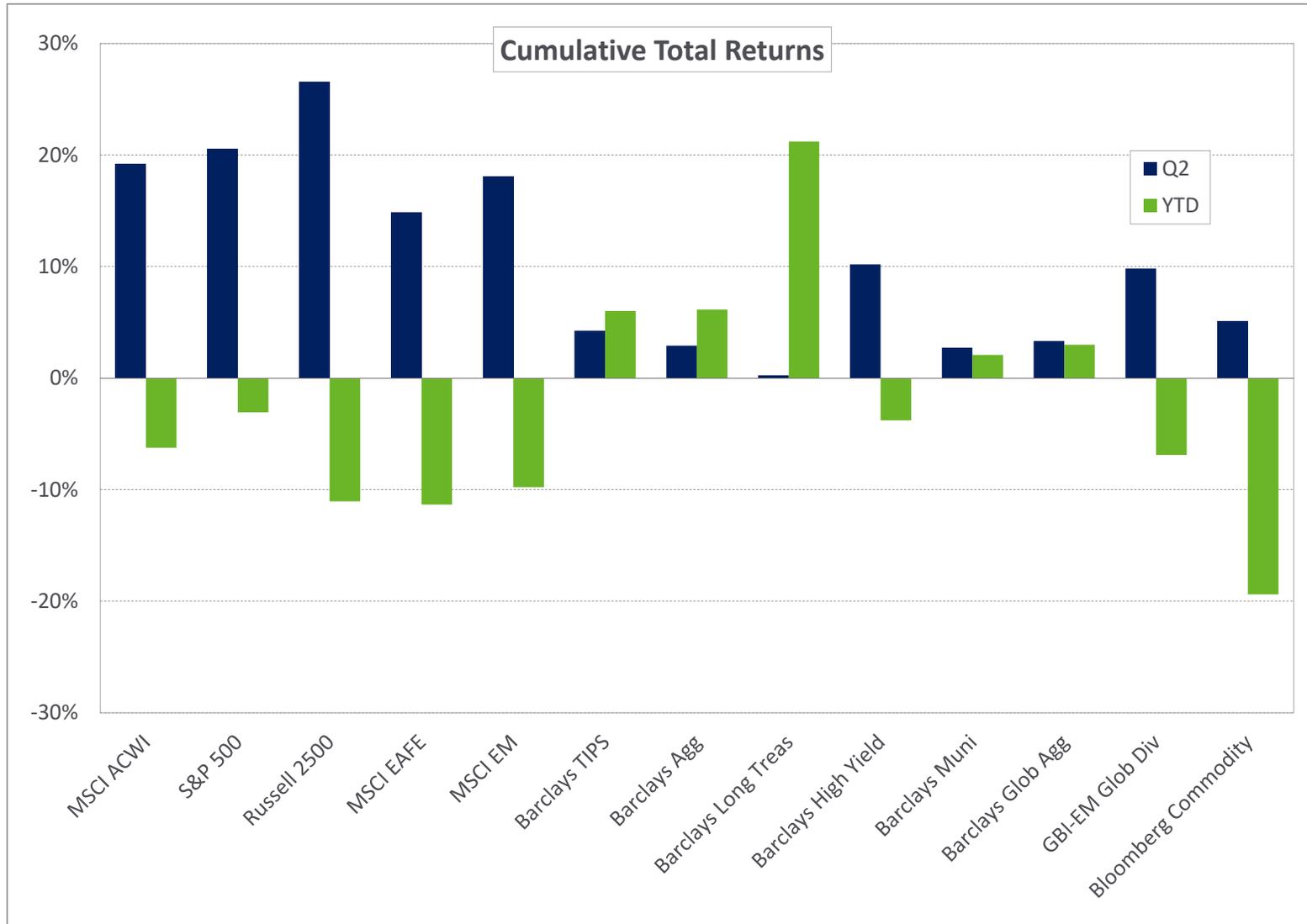
# MARKET ENVIRONMENT – Q2 2020 OVERVIEW

		Qtr.	1 Yr.	3 Yr.	5 Yr.	10 Yr.
<b>World Equity Benchmarks</b>						
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%
<b>Domestic Equity Benchmarks</b>						
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%
<b>International Equity Benchmarks</b>						
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%
<b>Domestic Fixed Income Benchmarks</b>						
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%
<b>Global Fixed Income Benchmarks</b>						
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%
<b>Alternative Benchmarks</b>						
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%
Wishire 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

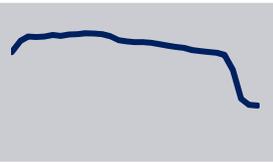
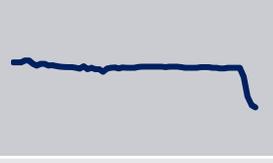
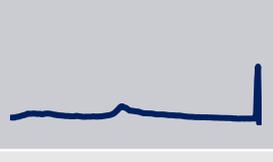
# RISK ASSETS RALLIED SIGNIFICANTLY IN Q2



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



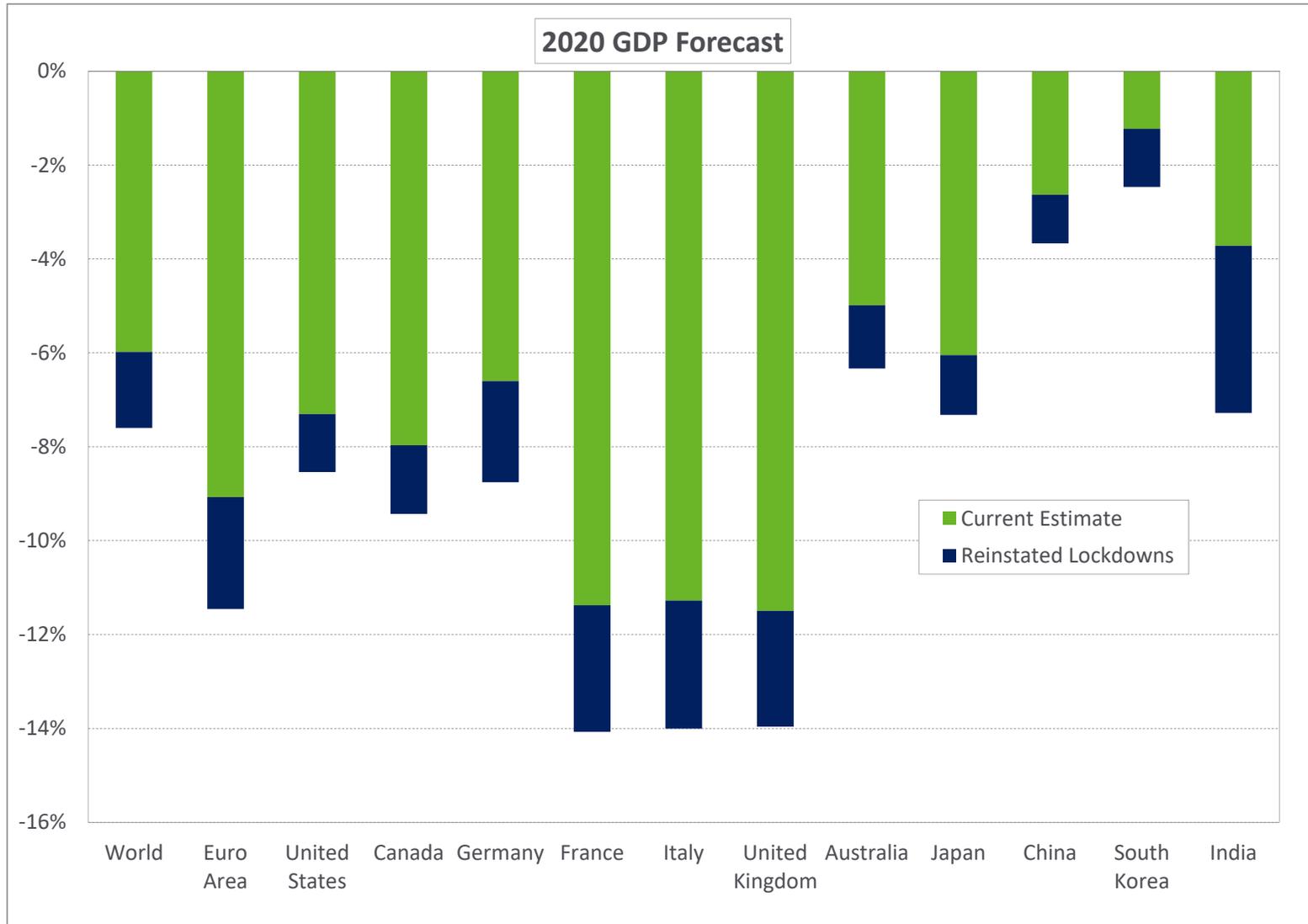
# THE ECONOMIC BACKDROP IS CHALLENGED

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

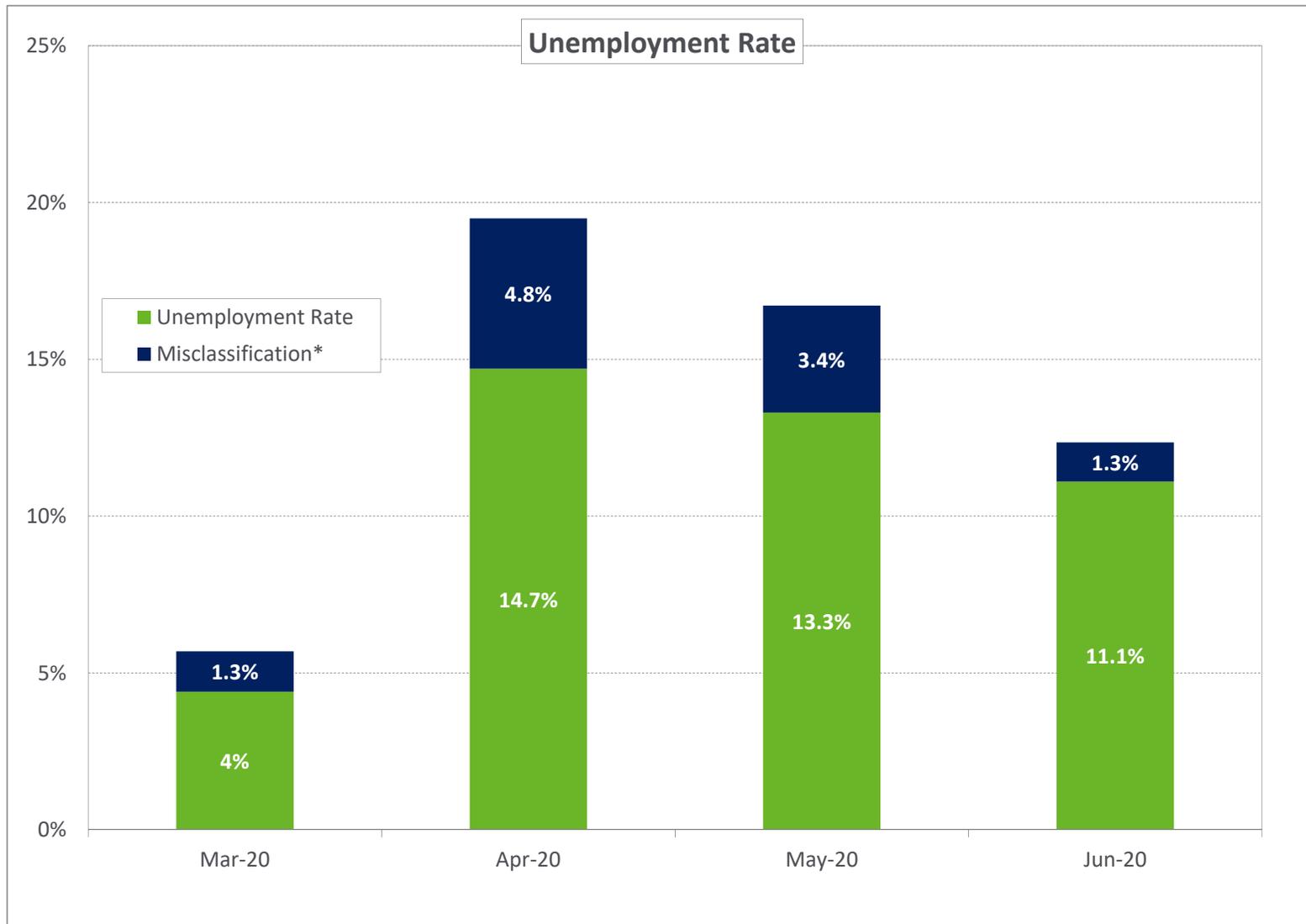


Source: OECD

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

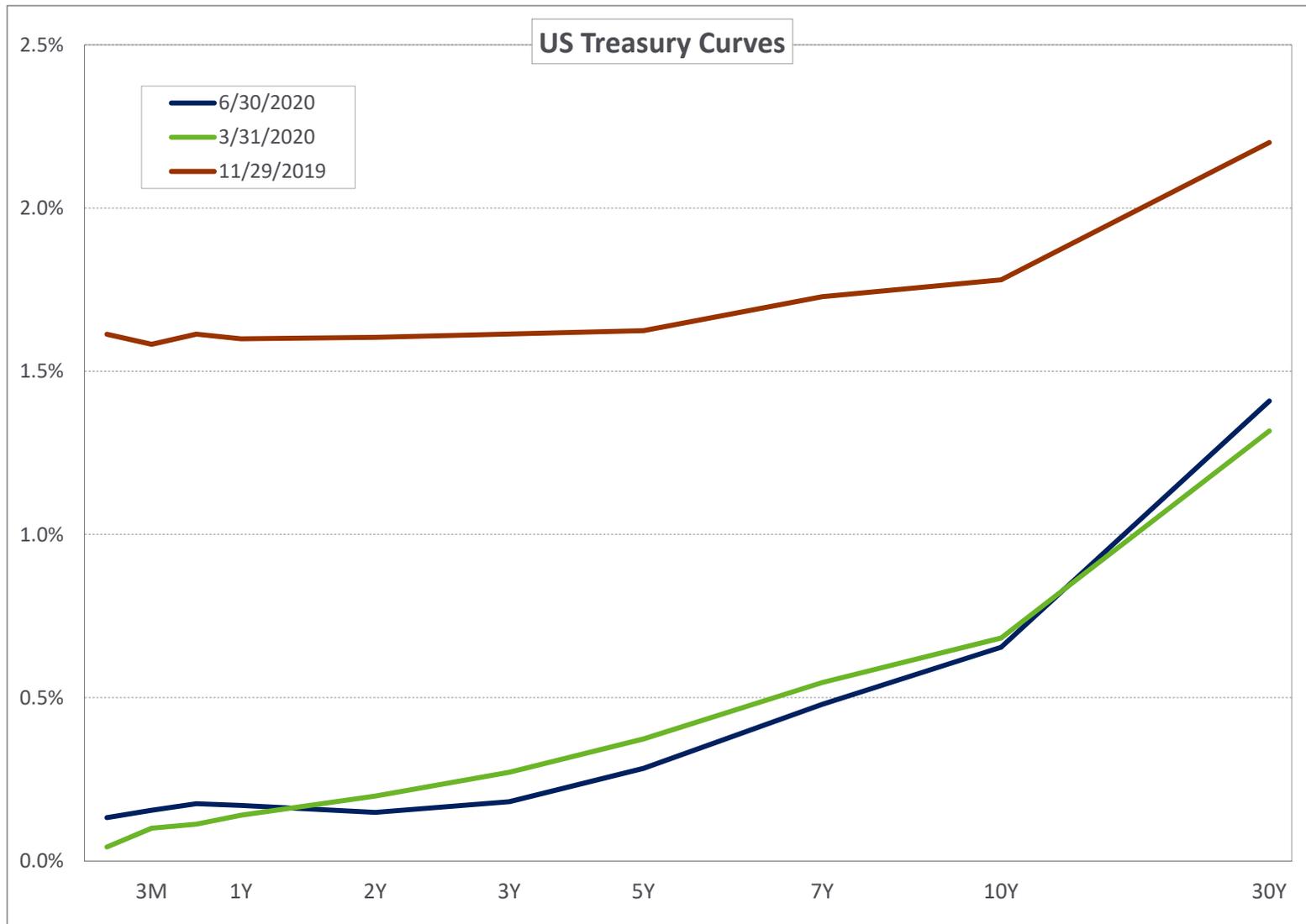


Source: Department of Labor

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



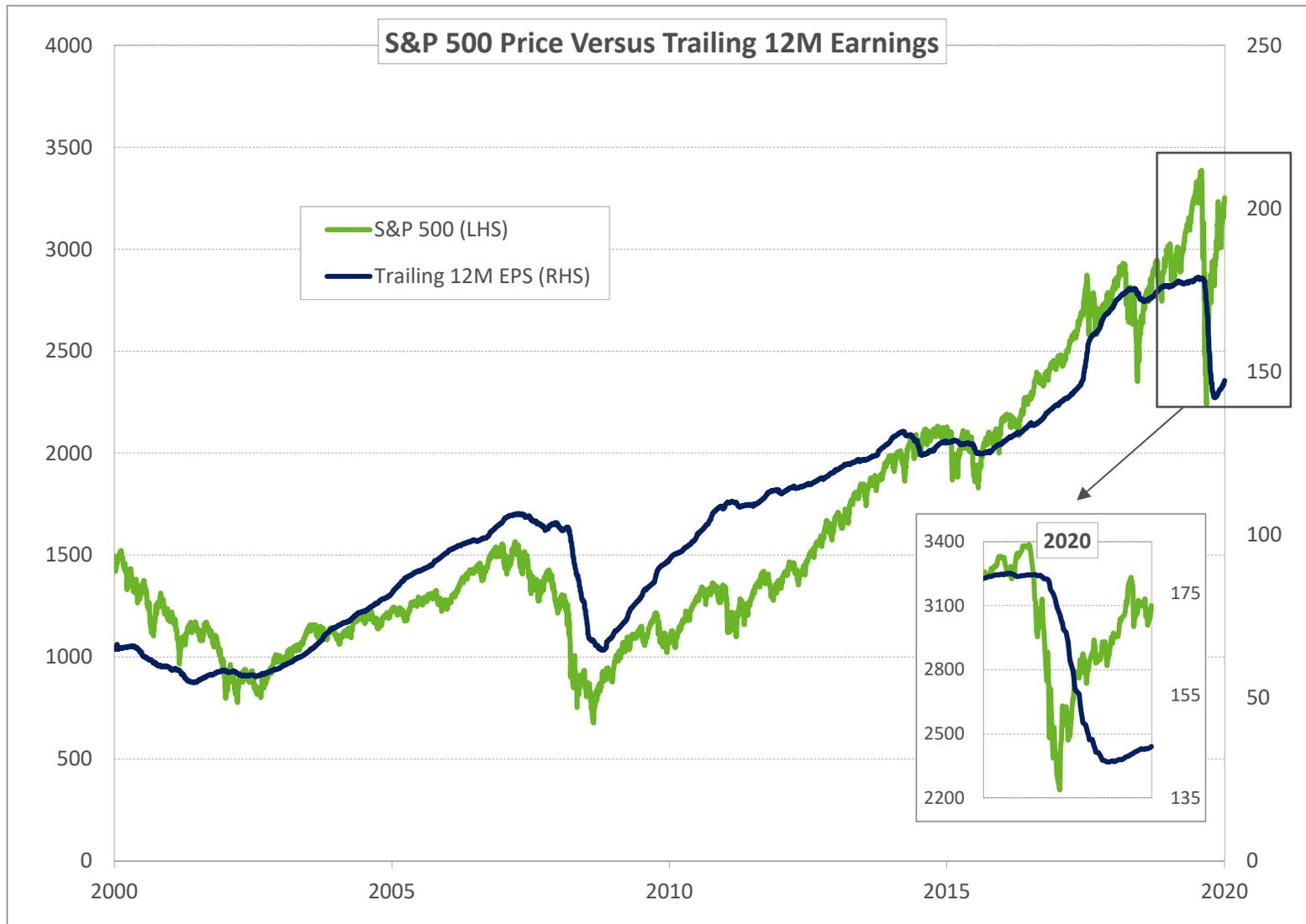
# INTEREST RATES REFLECT ECONOMIC CONCERNS



Source: FactSet



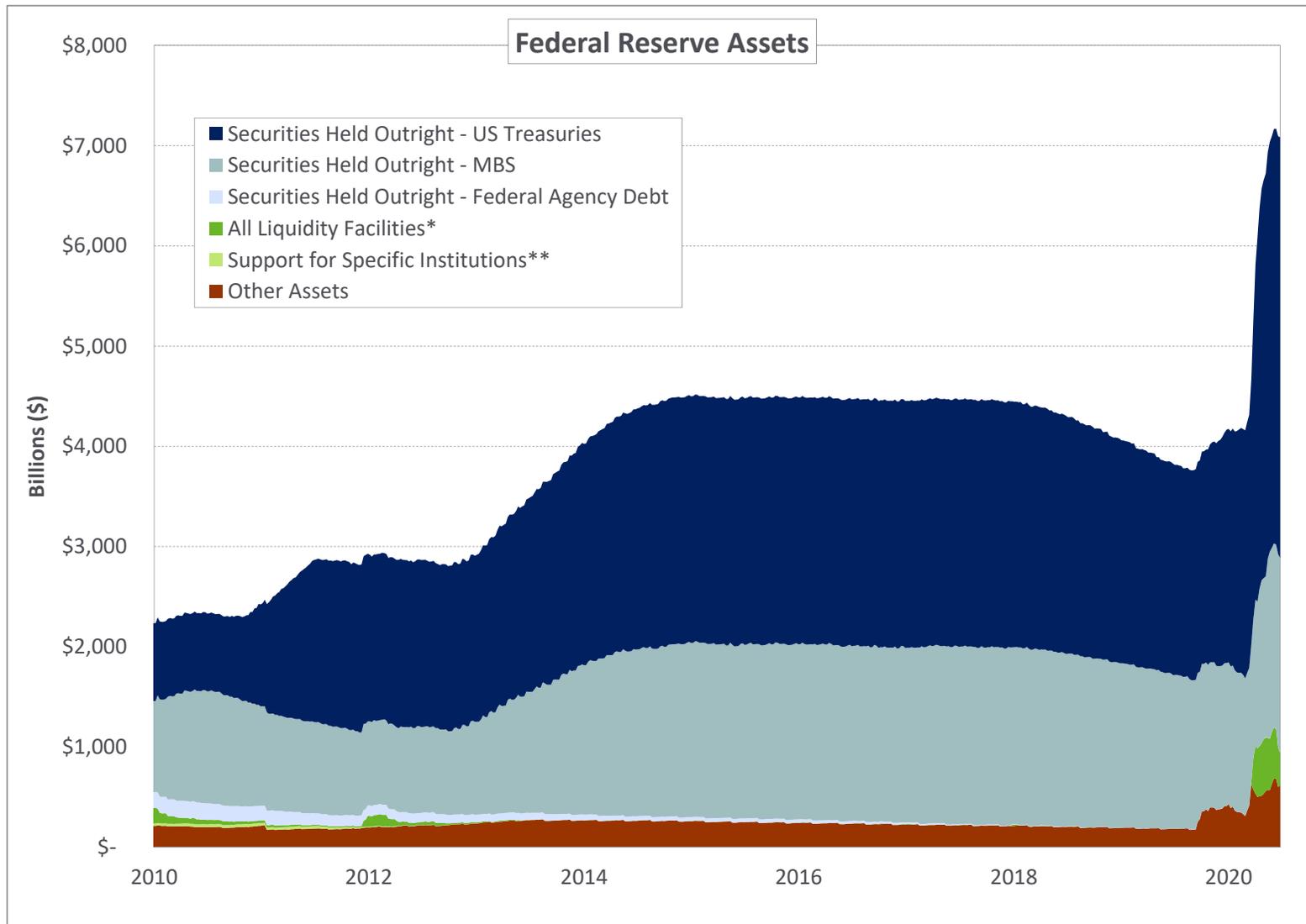
# EQUITY PRICES DETACHED FROM FUNDAMENTALS



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

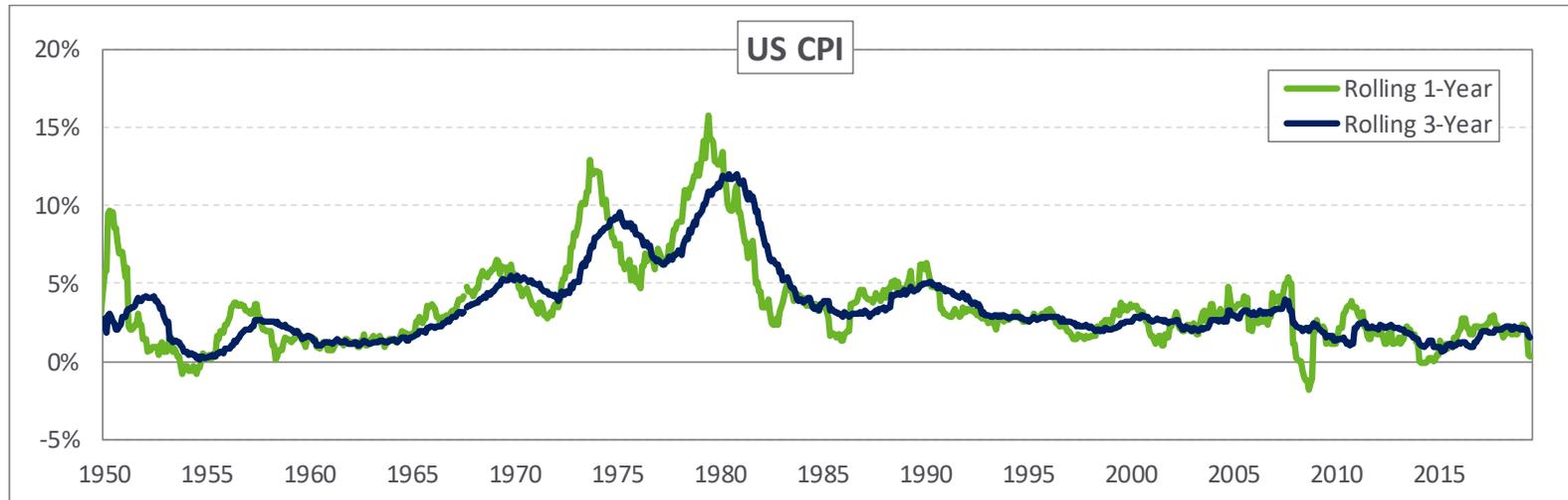


# MACRO

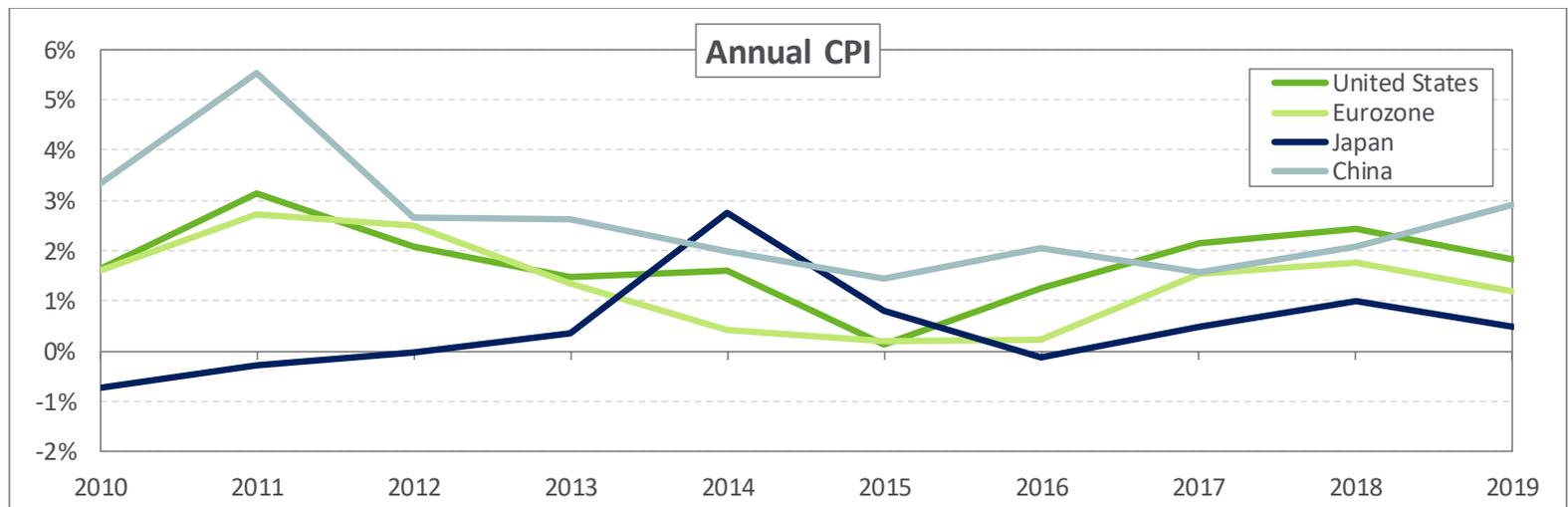
NEPC, LLC

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# INFLATION



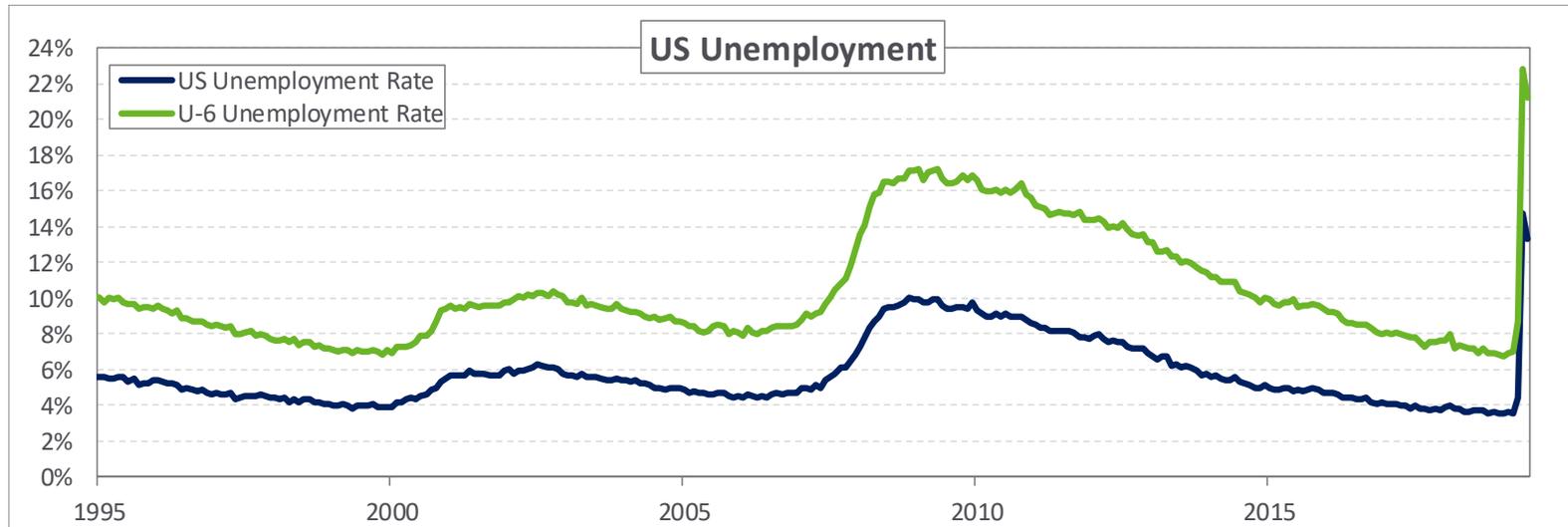
Source: Bureau of Labor Statistics, FactSet



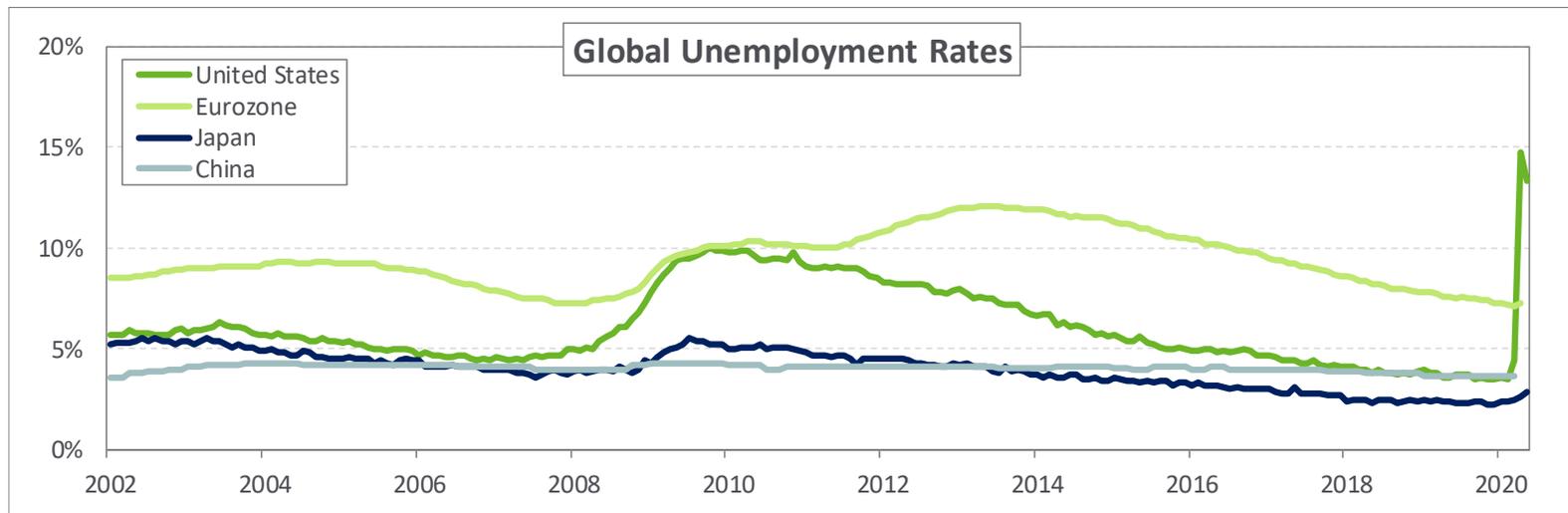
Source: FactSet



# UNEMPLOYMENT



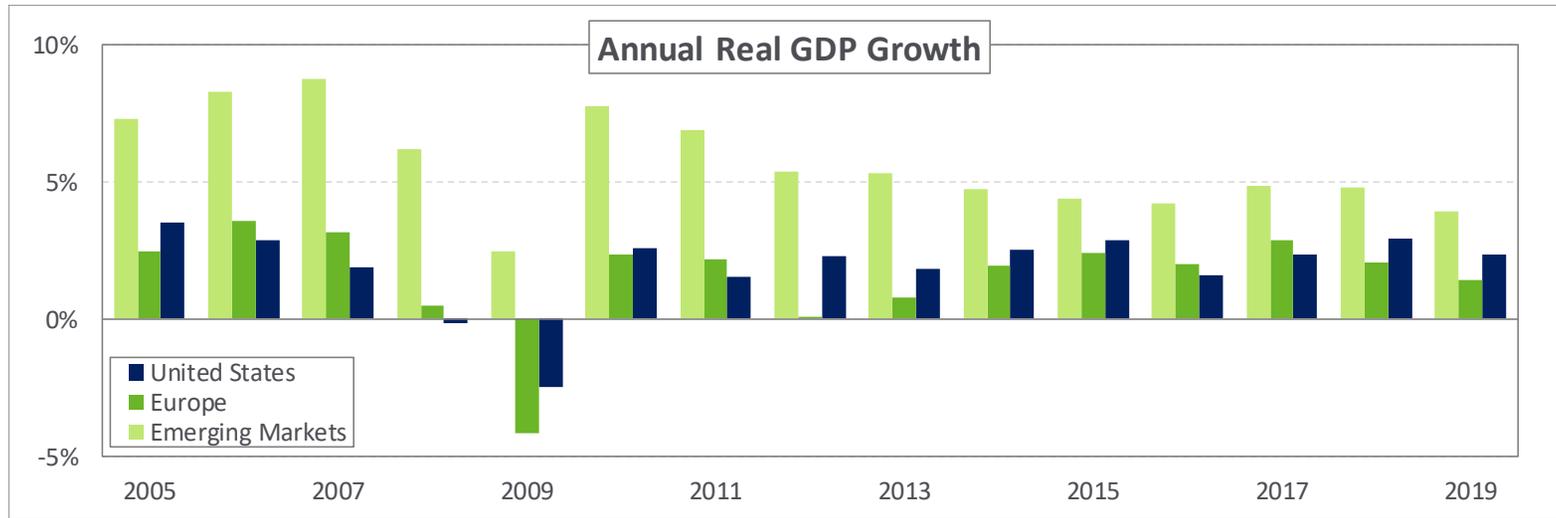
Source: FactSet



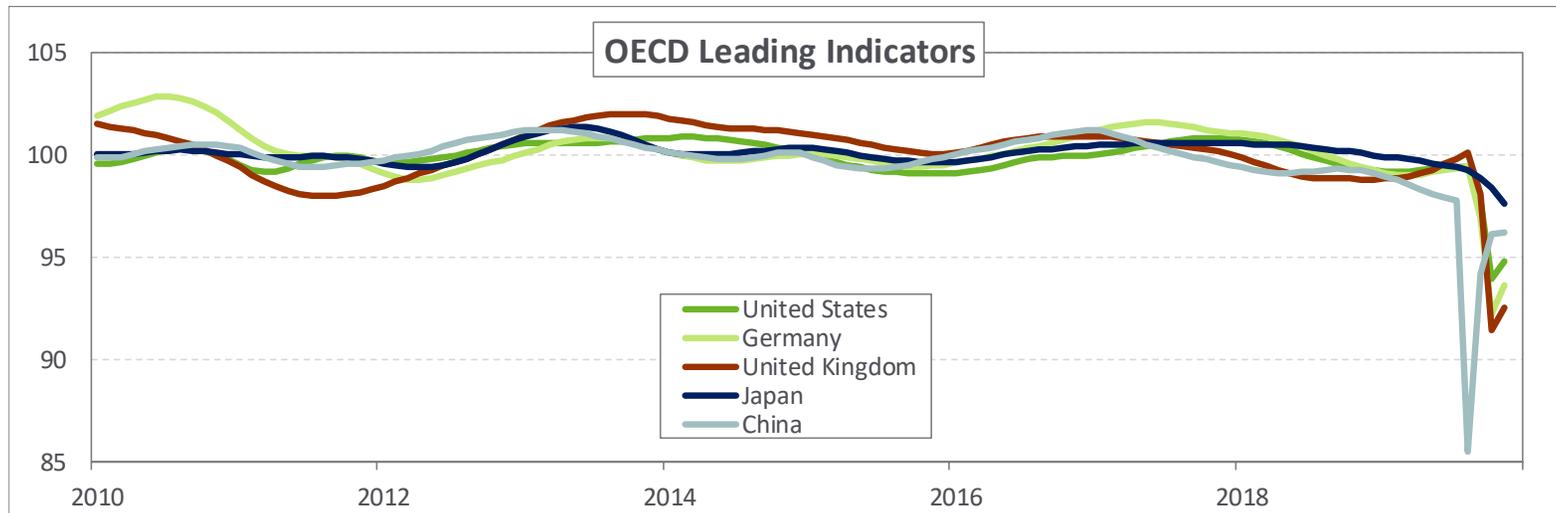
Source: FactSet



# ECONOMIC INDICATORS



Source: Bureau of Economic Analysis, Oxford Economics, FactSet



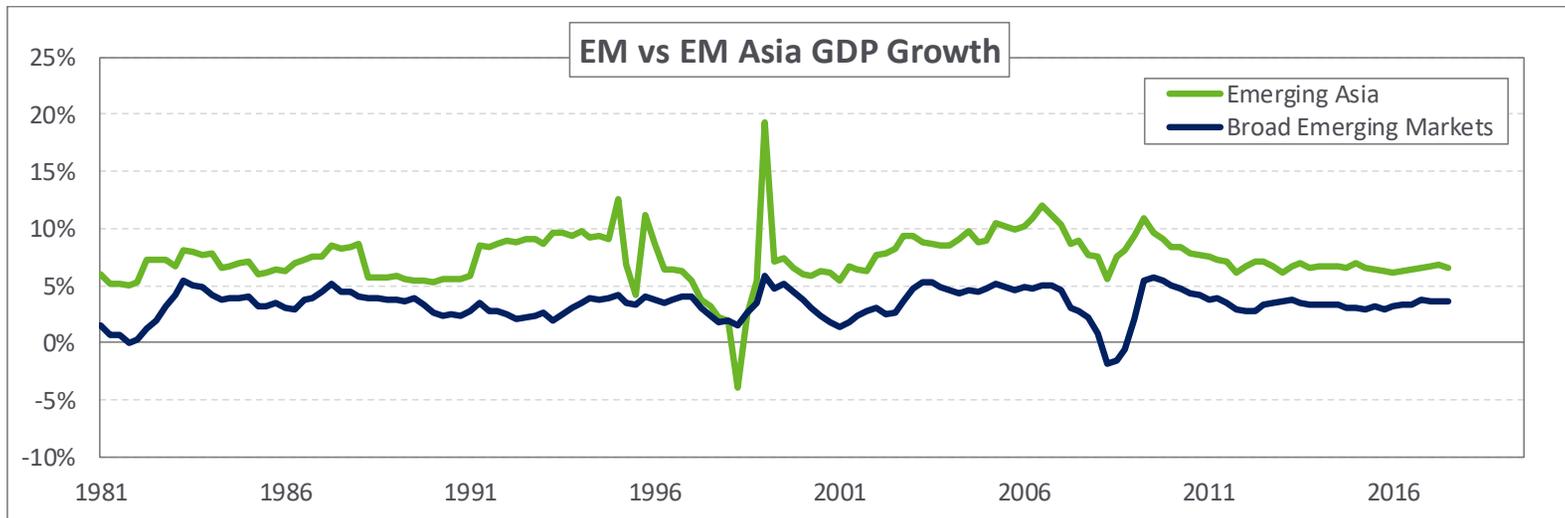
Source: OECD, FactSet



# GROSS DOMESTIC PRODUCT



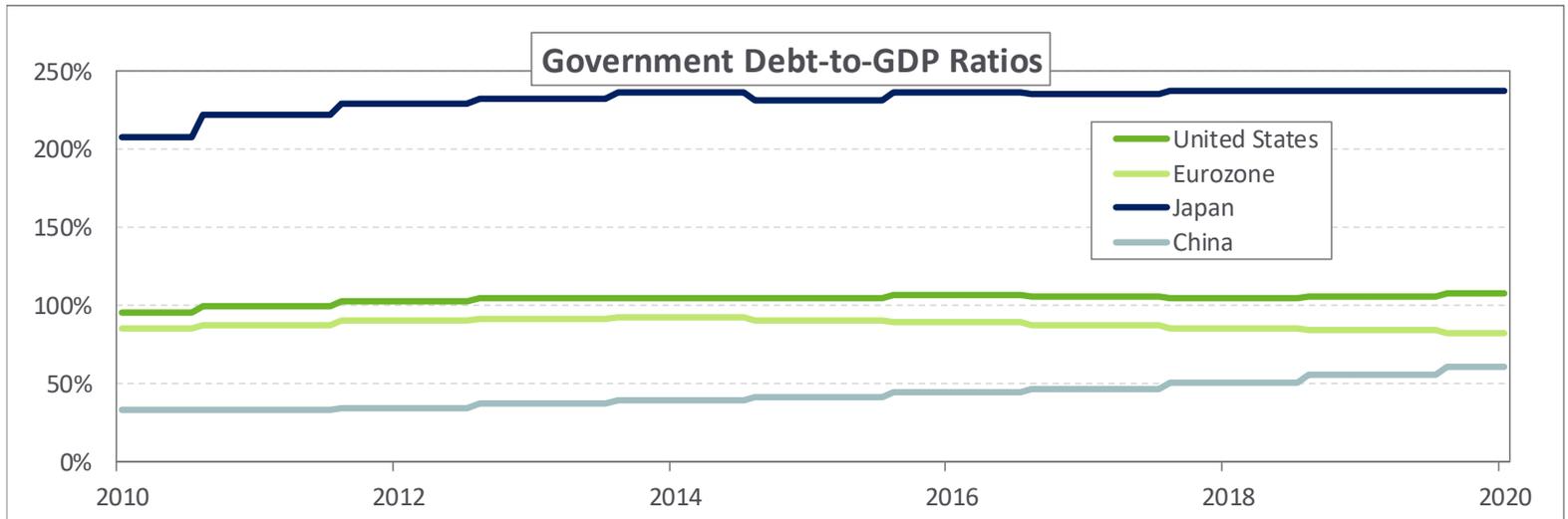
Source: Bureau of Economic Analysis, FactSet



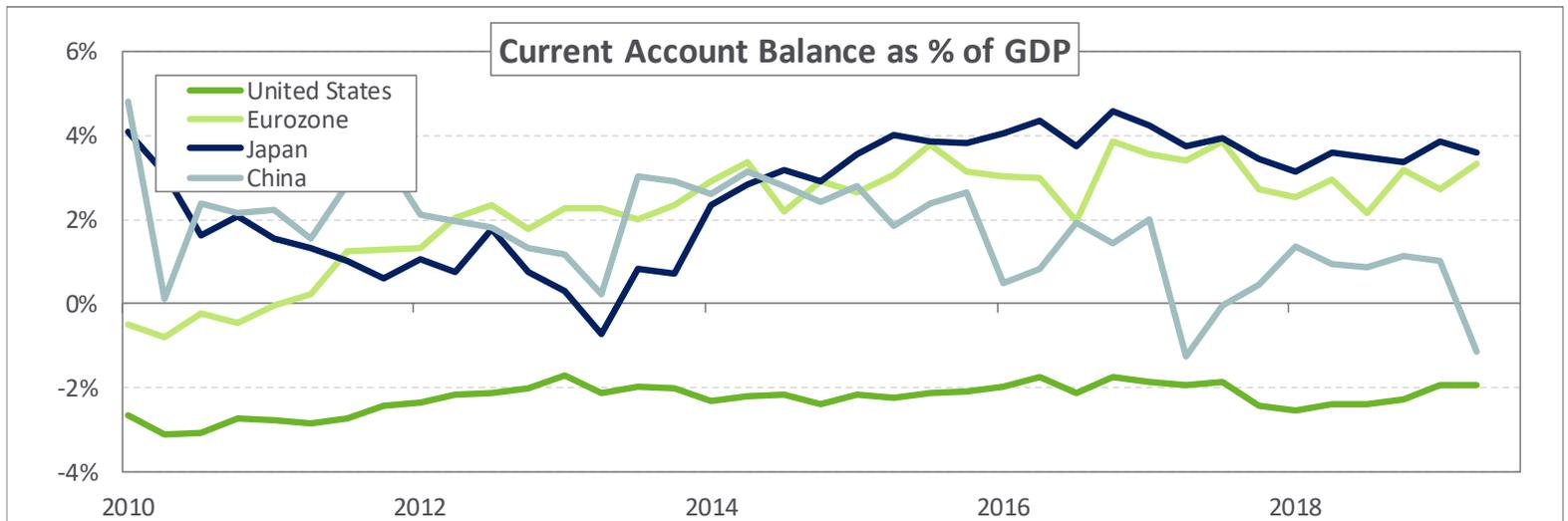
Source: IMF, FactSet



# GROSS DOMESTIC PRODUCT METRICS



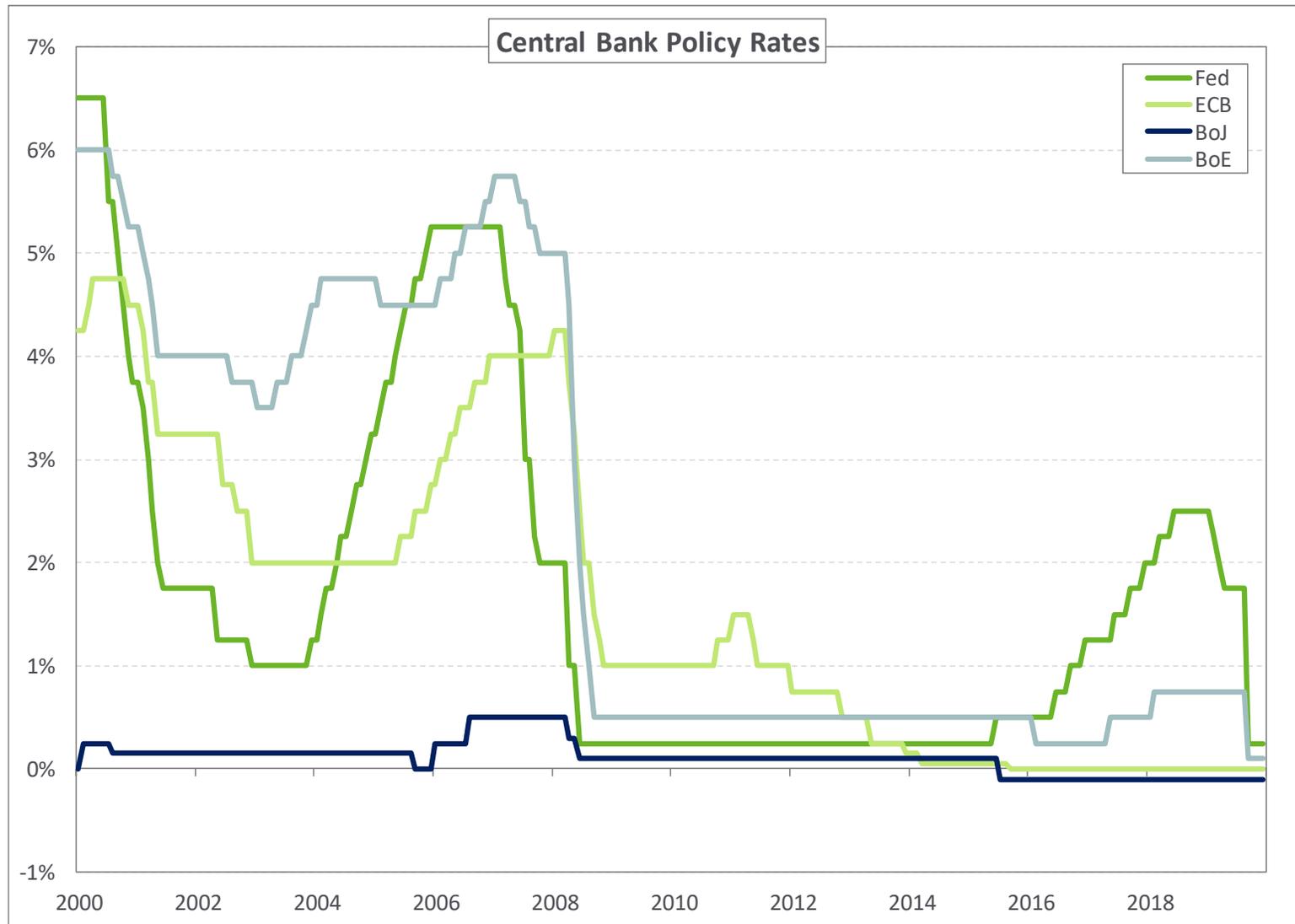
Source: IMF, FactSet



Source: FactSet



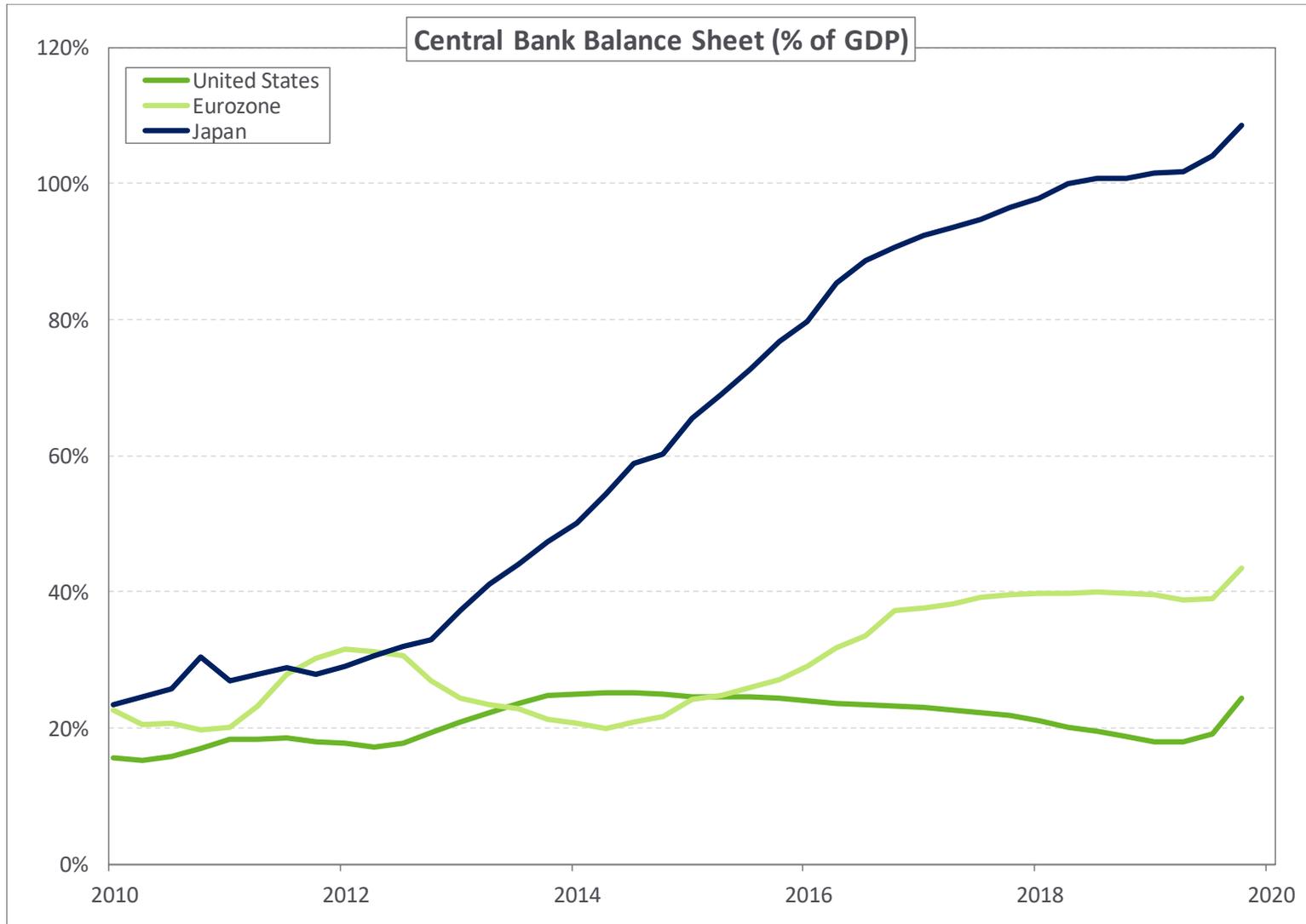
# CENTRAL BANK RATES



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



# CENTRAL BANK BALANCE SHEETS



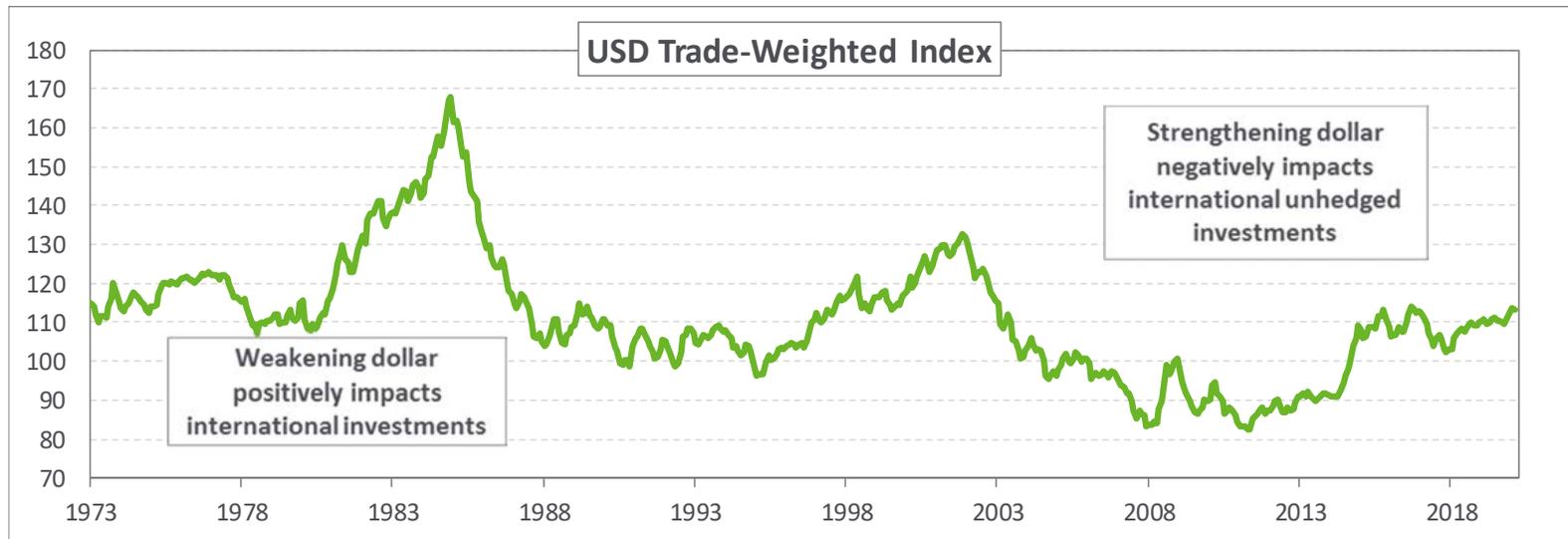
Source: FactSet



# CURRENCIES

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

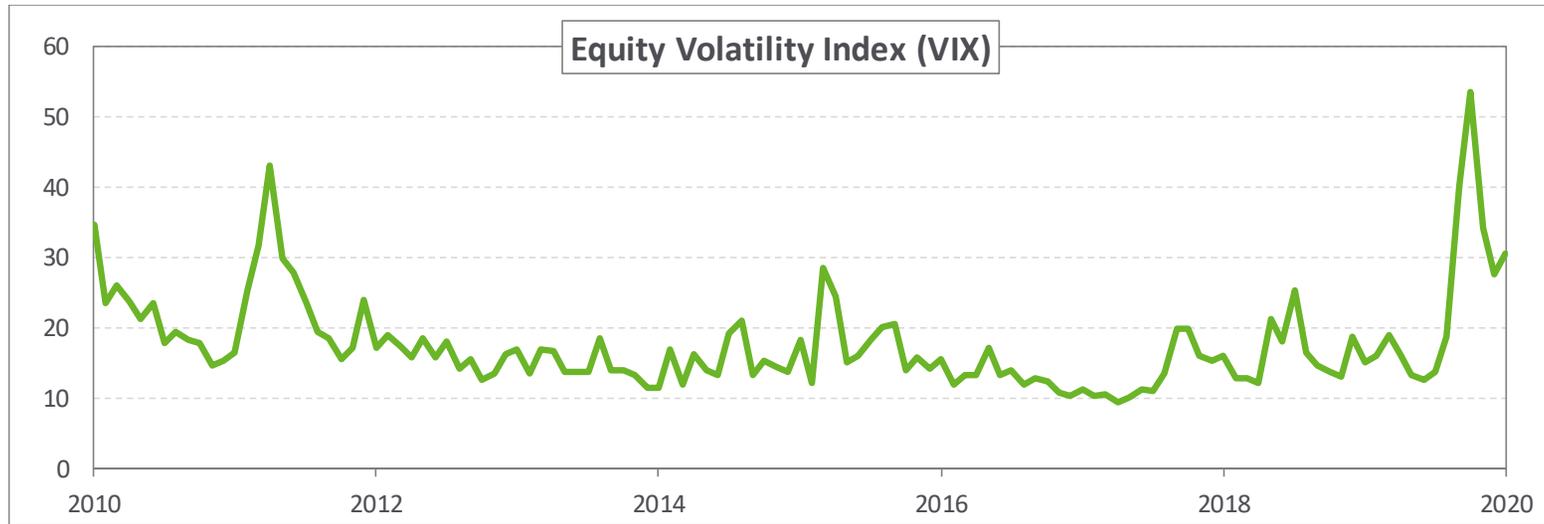
Source: FactSet



Source: FactSet



# VOLATILITY



Source: CBOE, FactSet



Source: Merrill Lynch, FactSet

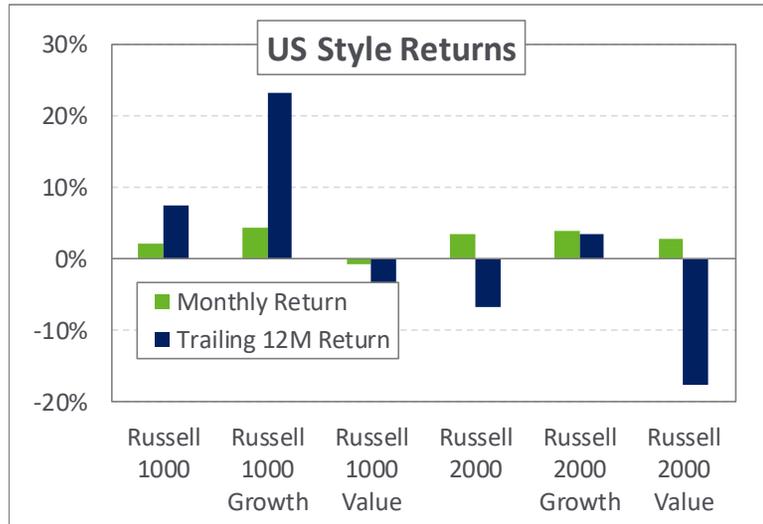


# EQUITY

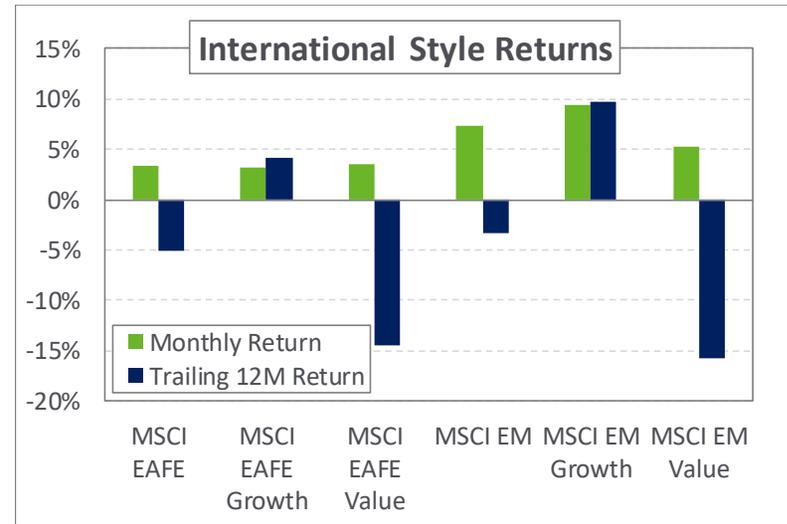
NEPC, LLC

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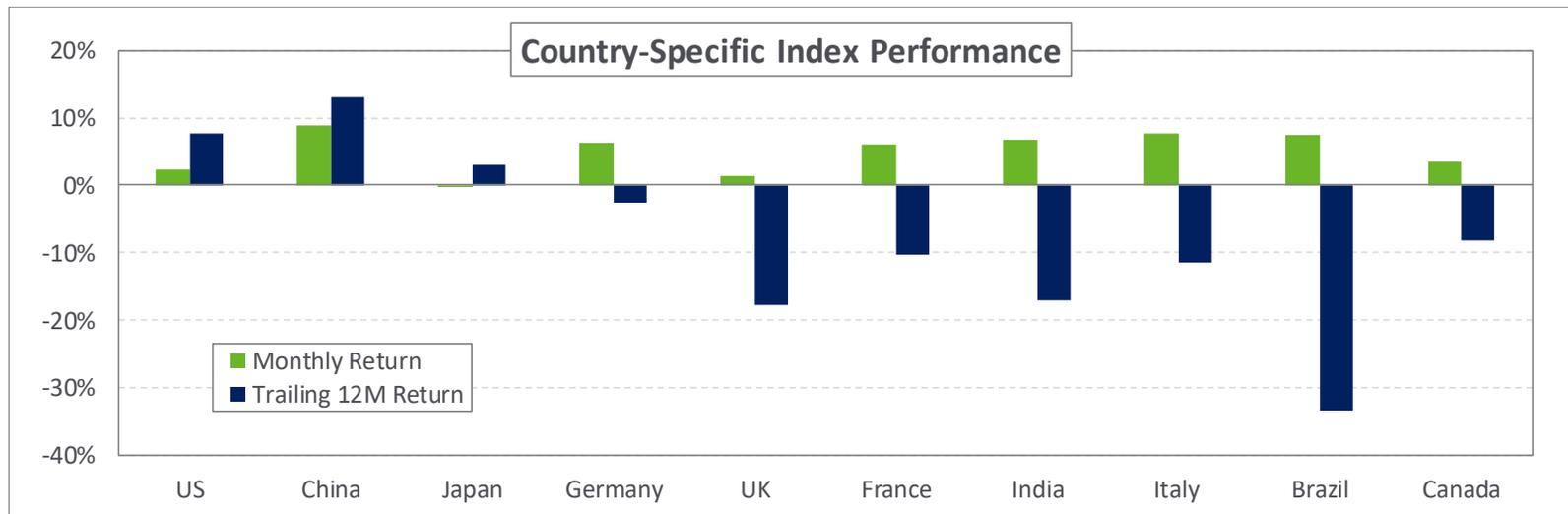
# EQUITY INDEX PERFORMANCE



Source: Russell, FactSet



Source: MSCI, FactSet



Source: MSCI, FactSet  
Represents returns in USD



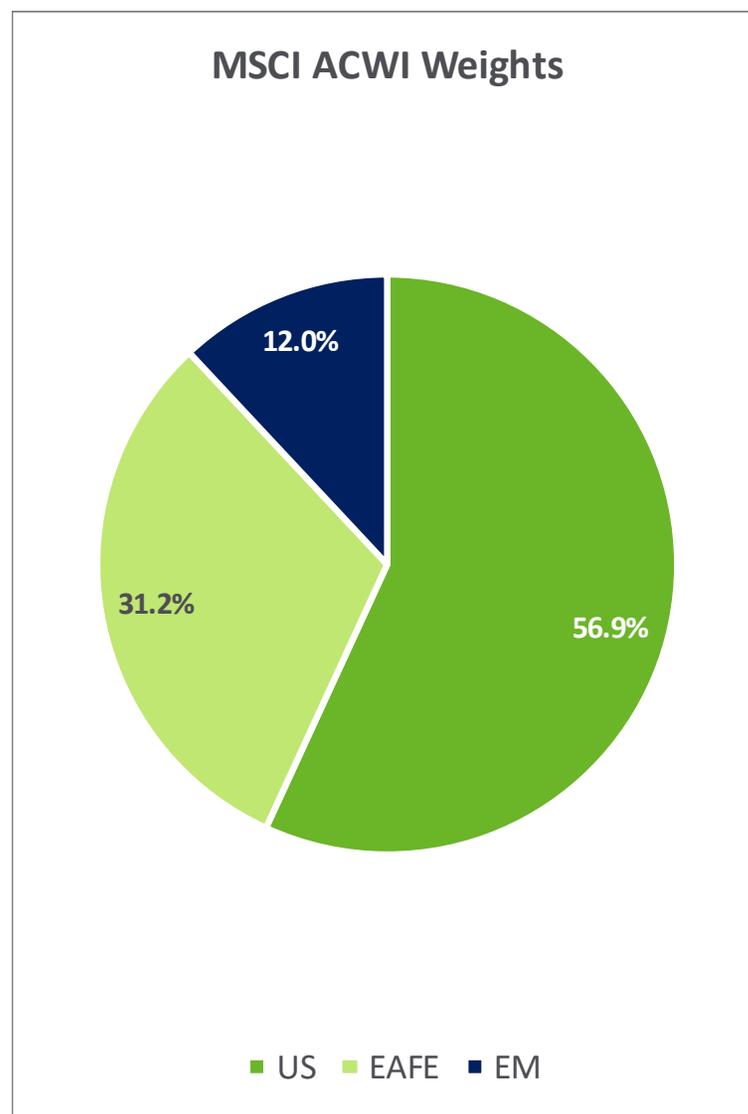
# INDEX COMPOSITION

	MTD	QTD	YTD	Index Weight
<b>S&amp;P 500</b>	<b>2.0%</b>	<b>20.5%</b>	<b>-3.1%</b>	<b>100.0%</b>
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
<b>MSCI ACWI</b>	<b>3.2%</b>	<b>19.2%</b>	<b>-6.3%</b>	<b>100.0%</b>
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%

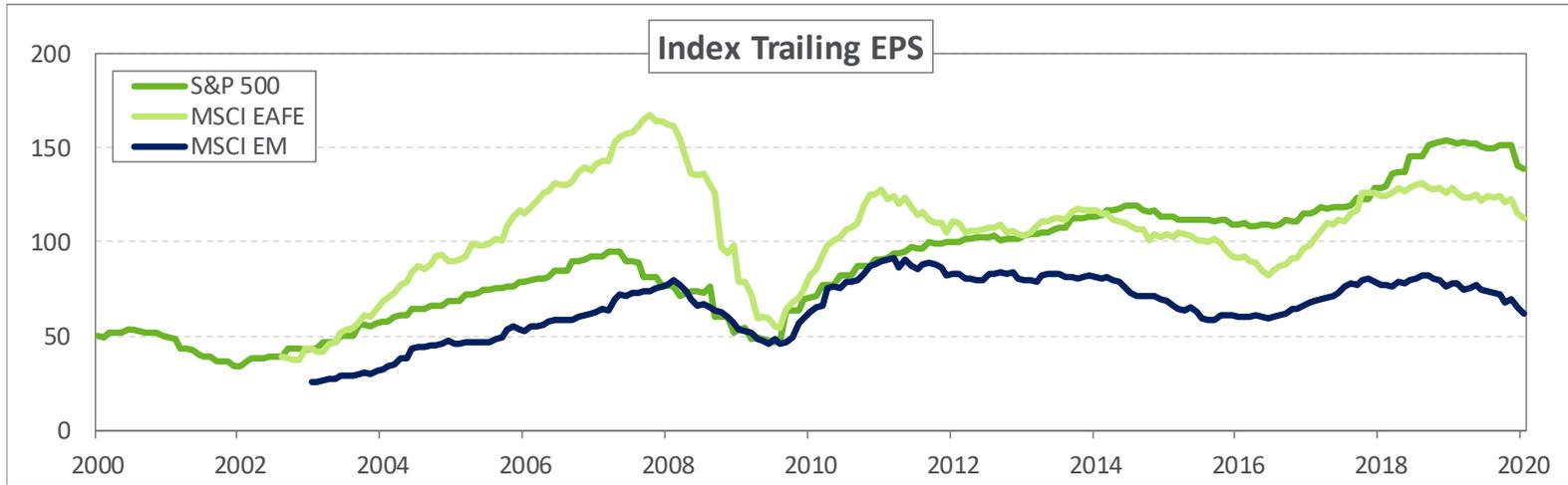
Source: MSCI, FactSet



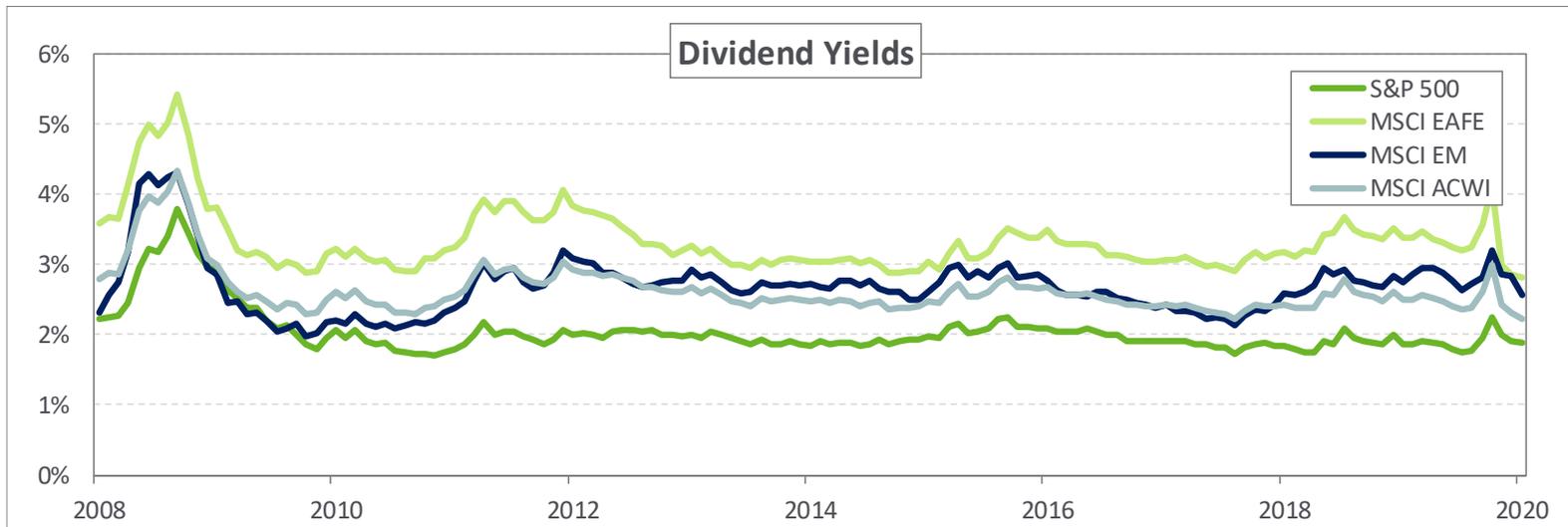
Source: MSCI, FactSet



# EARNINGS & YIELDS



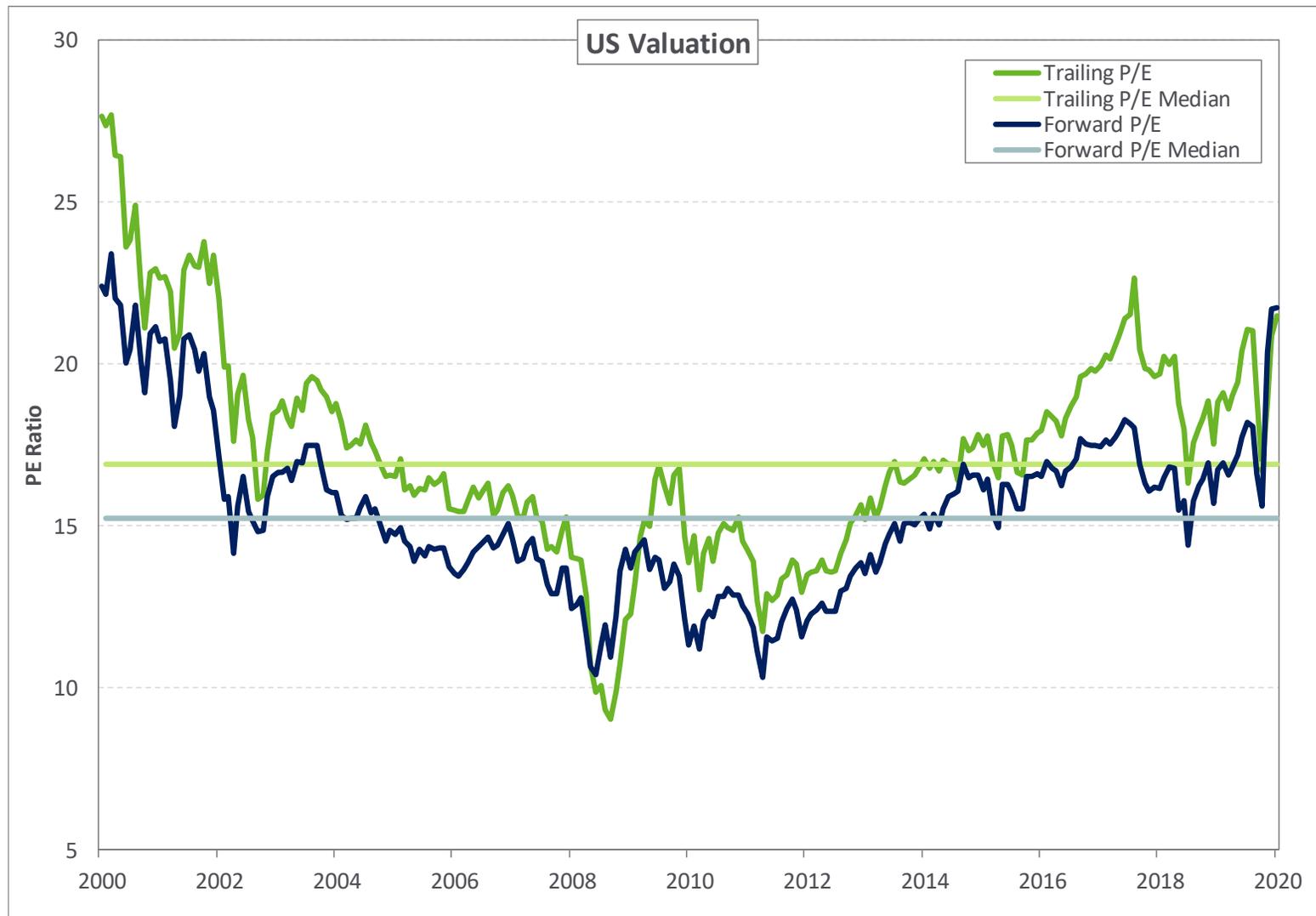
Source: FactSet



Source: FactSet



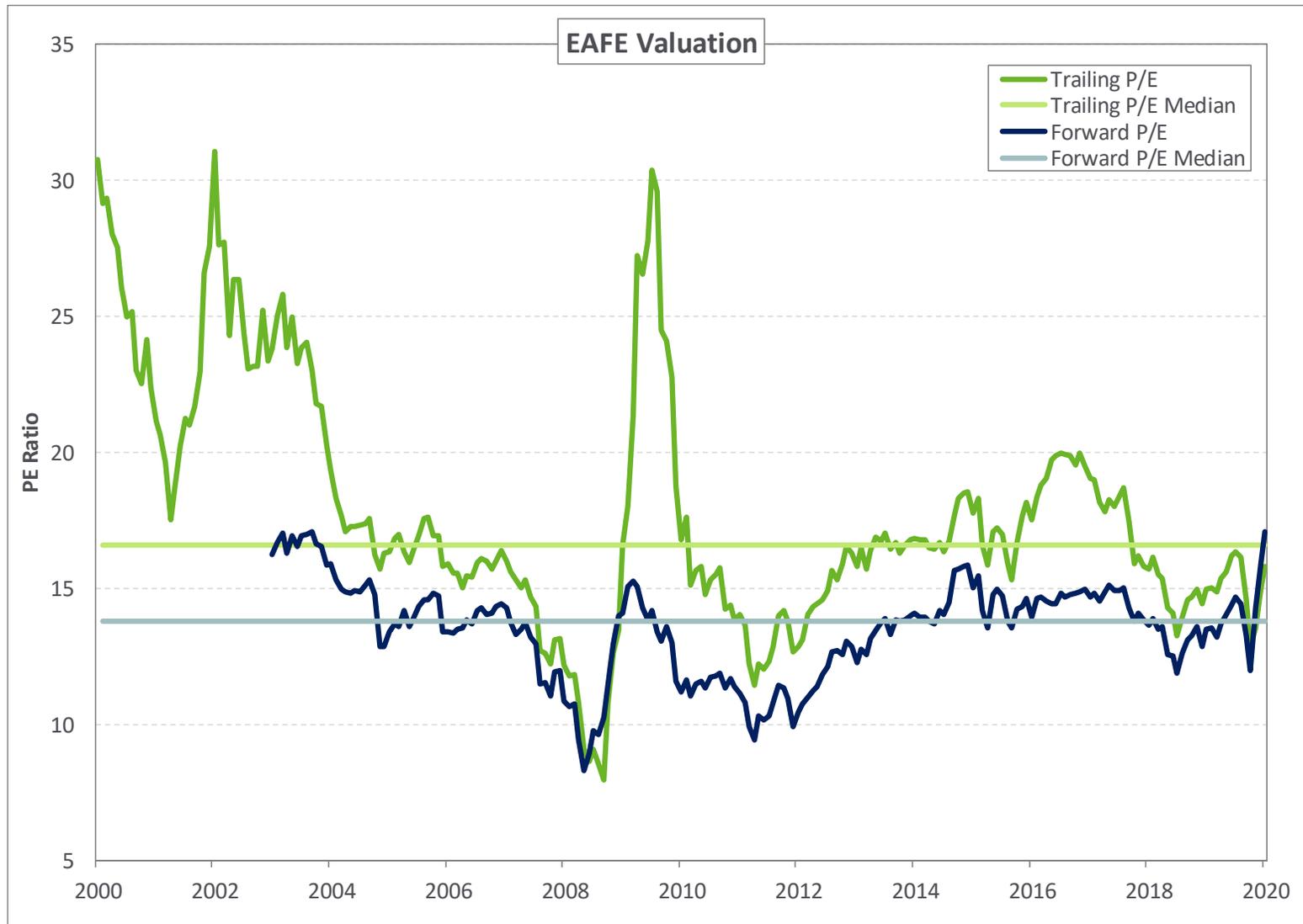
# US EQUITY VALUATIONS



Source: S&P, FactSet



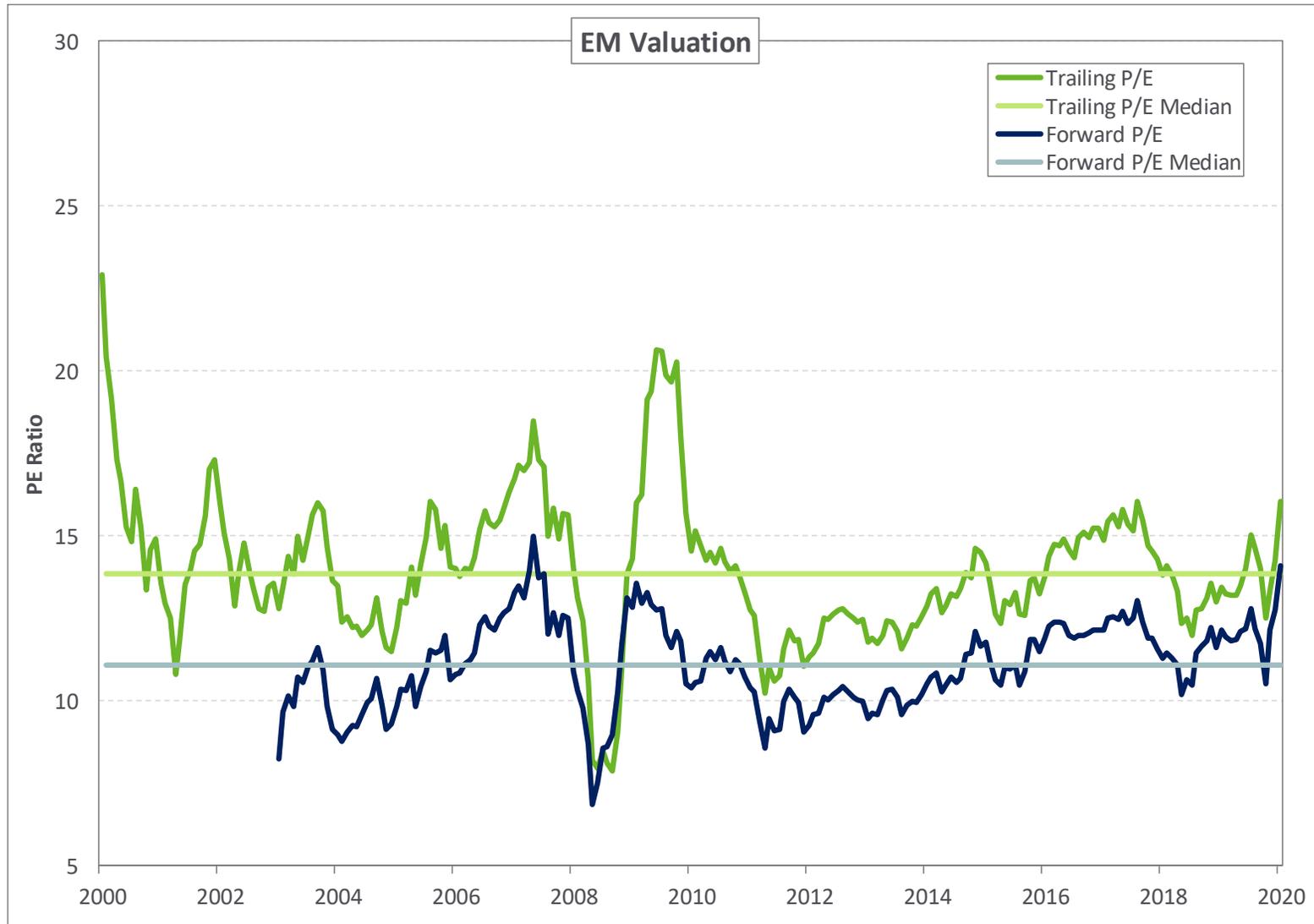
# EAFE EQUITY VALUATIONS



Source: MSCI, FactSet



# EM EQUITY VALUATIONS



Source: MSCI, FactSet



# CREDIT

NEPC, LLC

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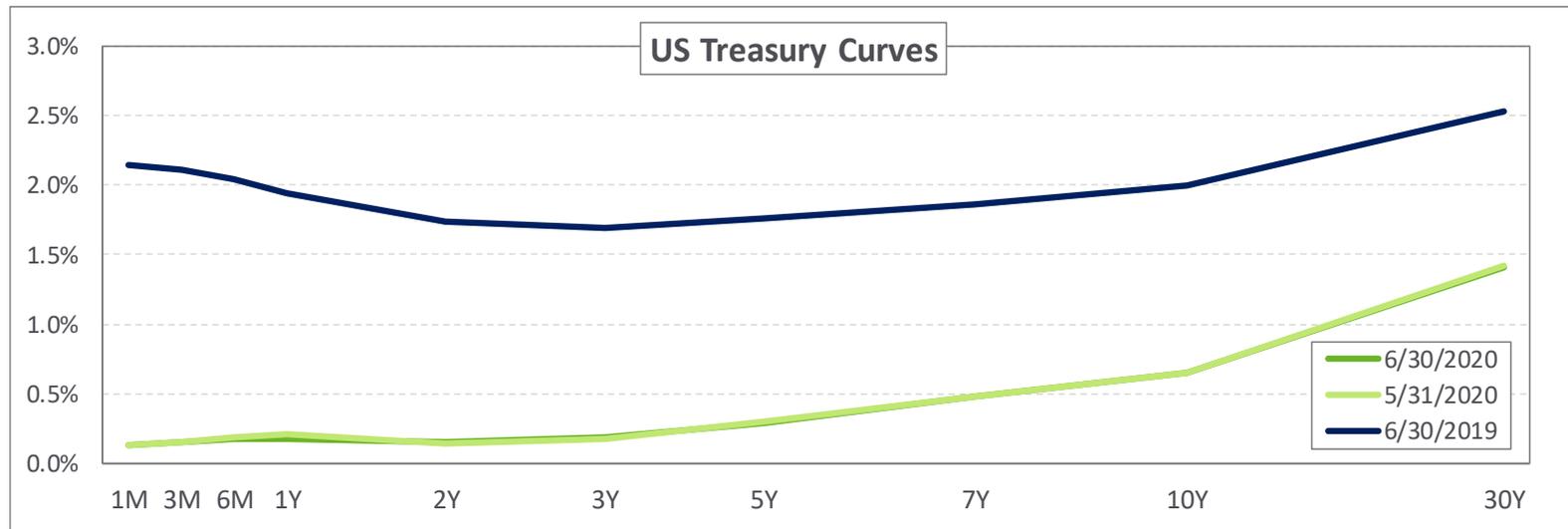
# FIXED INCOME CHARACTERISTICS

	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



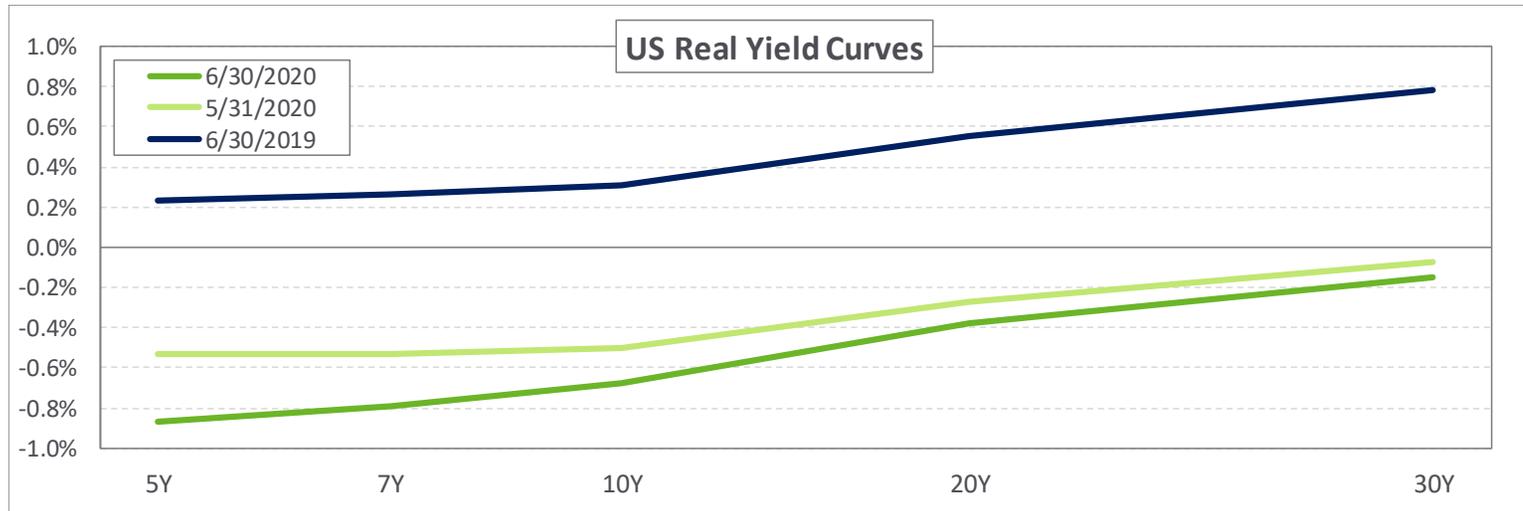
Source: FactSet

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

Source: FactSet



# REAL YIELDS



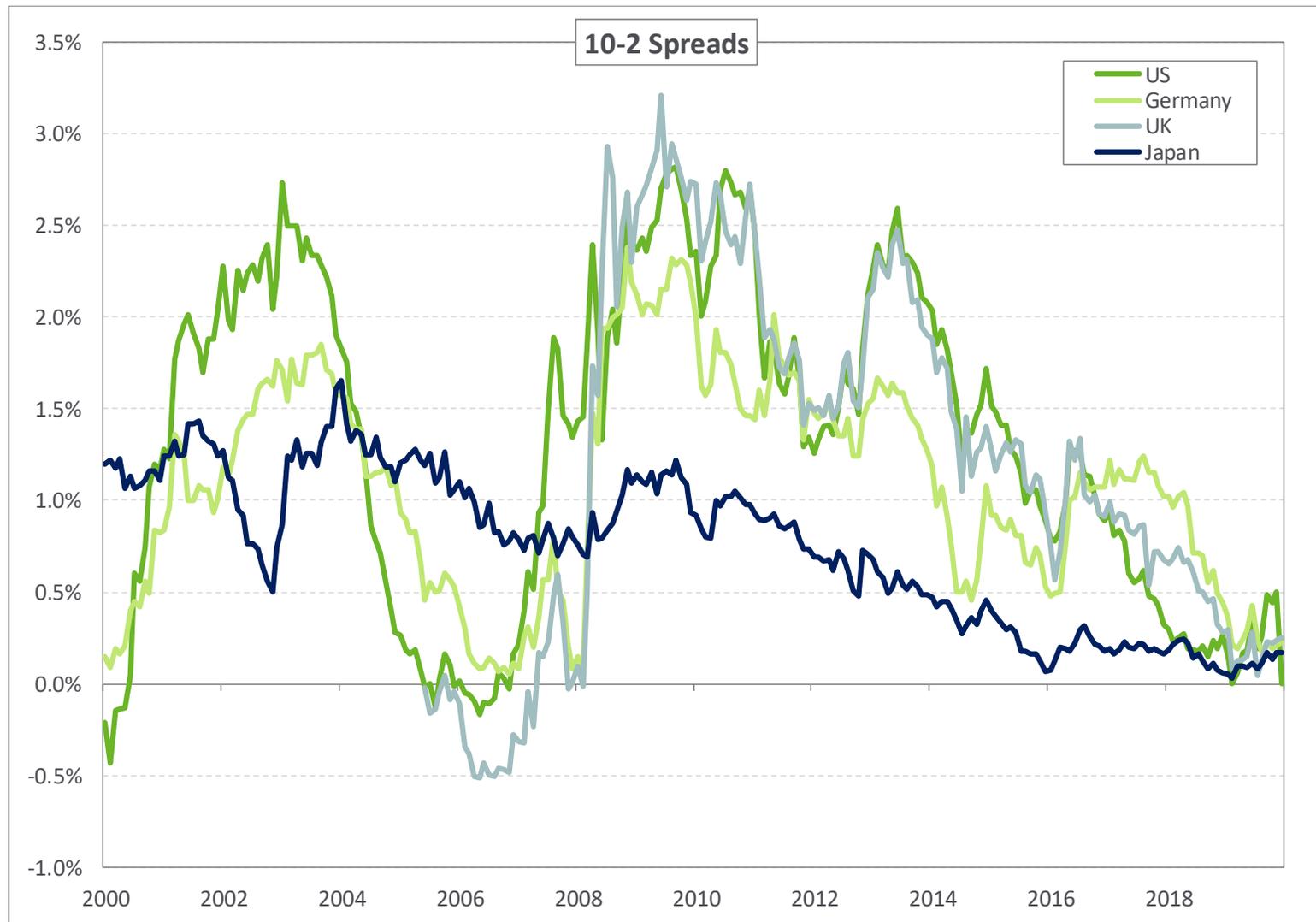
Source: FactSet

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

Source: FactSet



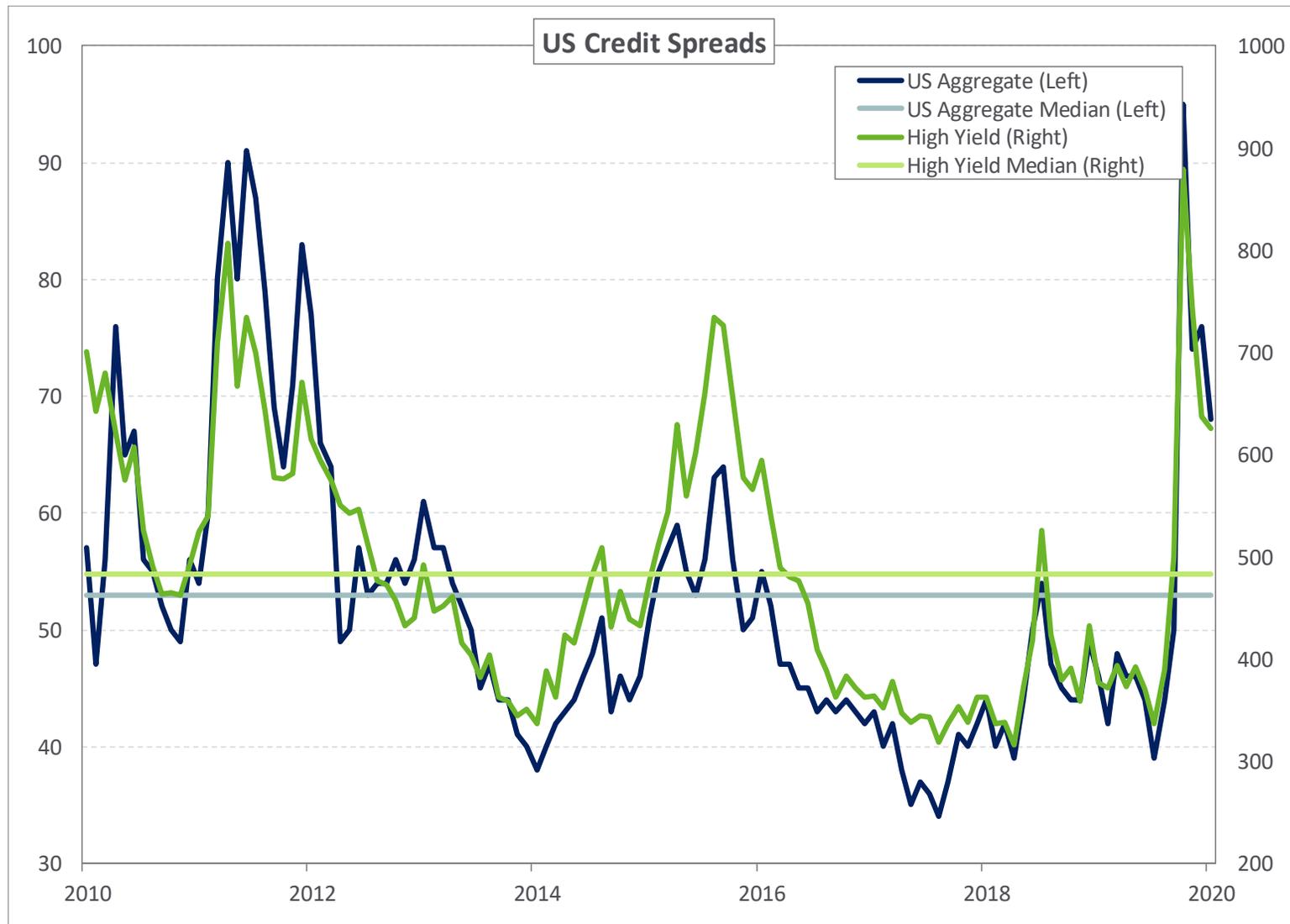
# NOMINAL YIELDS



Source: FactSet



# CREDIT SPREADS



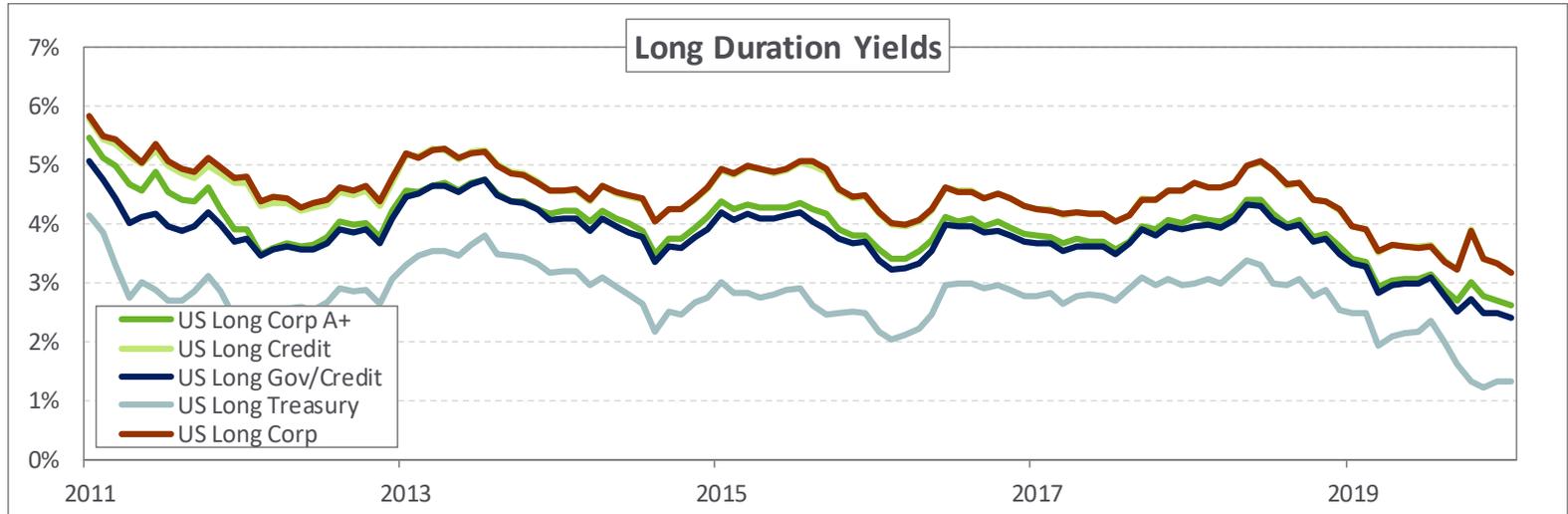
Source: Barclays, FactSet



# 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

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# REAL ASSETS INDEX PERFORMANCE

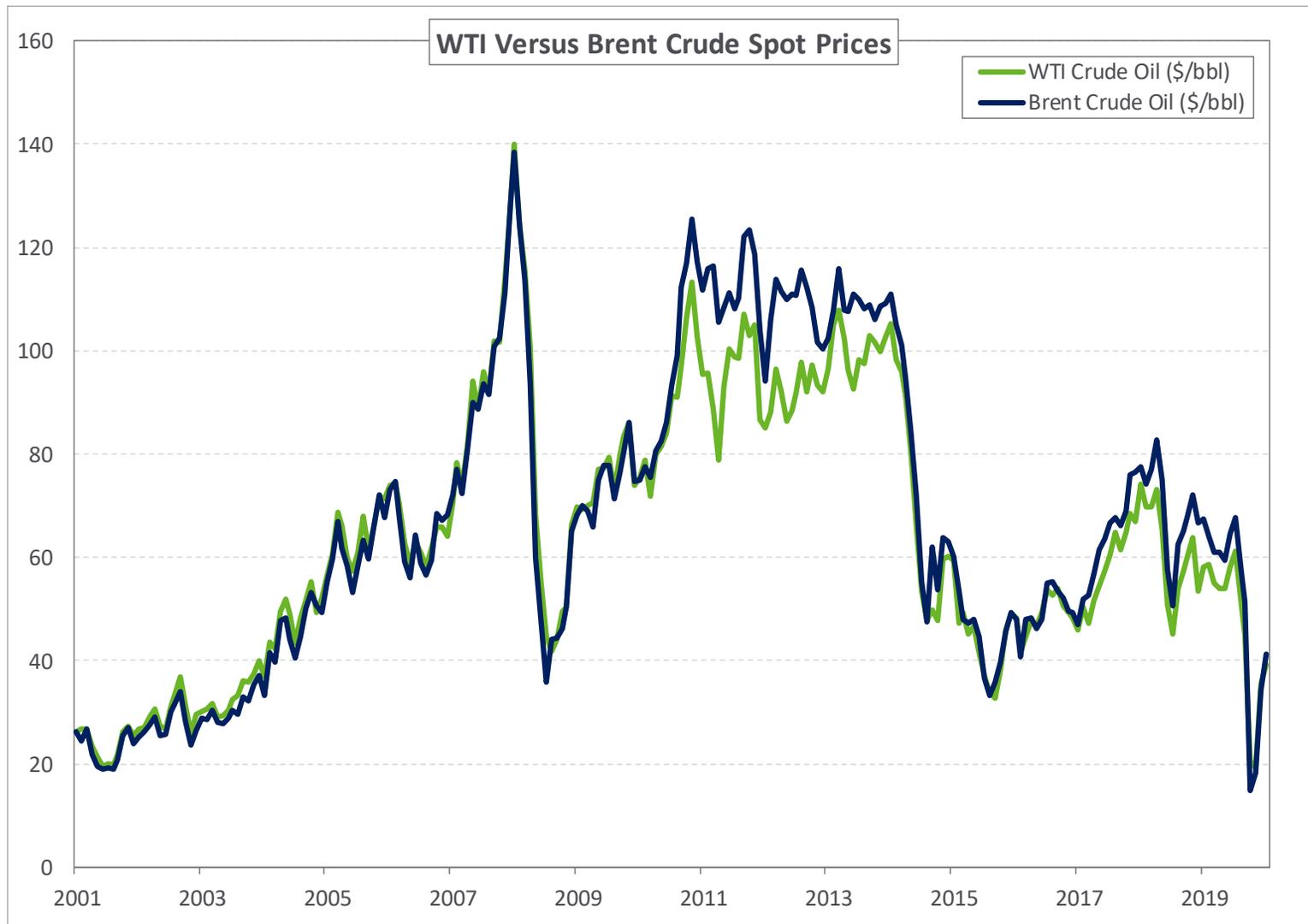
Index	1 Month	3 Month	YTD	1 Year	3 Year	5 Year
<b>Bloomberg Commodity Index</b>	<b>2.3%</b>	<b>5.1%</b>	<b>-19.4%</b>	<b>-17.3%</b>	<b>-6.1%</b>	<b>-7.7%</b>
<b>Bloomberg Sub Agriculture Index</b>	<b>1.8%</b>	<b>-4.8%</b>	<b>-14.2%</b>	<b>-13.7%</b>	<b>-10.5%</b>	<b>-9.6%</b>
Coffee	3.0%	-17.8%	-25.5%	-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%
<b>Bloomberg Sub Energy</b>	<b>2.2%</b>	<b>9.8%</b>	<b>-46.3%</b>	<b>-45.5%</b>	<b>-14.4%</b>	<b>-18.9%</b>
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%
<b>Bloomberg Sub Industrial Metals</b>	<b>6.9%</b>	<b>12.3%</b>	<b>-8.4%</b>	<b>-6.4%</b>	<b>-1.4%</b>	<b>0.0%</b>
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%
<b>Bloomberg Sub Precious Metals</b>	<b>2.2%</b>	<b>15.0%</b>	<b>13.8%</b>	<b>24.0%</b>	<b>9.8%</b>	<b>6.7%</b>
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%
<b>Bloomberg Sub Livestock</b>	<b>-8.5%</b>	<b>-8.6%</b>	<b>-34.3%</b>	<b>-33.5%</b>	<b>-16.6%</b>	<b>-11.0%</b>
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

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# 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.<sup>1</sup>/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.*



<sup>1</sup>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.<sup>1</sup> 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.



<sup>1</sup>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.

## Information Disclaimer

- Past performance is no guarantee of future results.
- All investments carry some level of risk. Diversification and other asset allocation techniques are not guaranteed to ensure profit or protect against losses.
- NEPC's source for portfolio pricing, calculation of accruals, and transaction information is the plan's custodian bank. Information on market indices and security characteristics is received from other sources external to NEPC. While NEPC has exercised reasonable professional care in preparing this report, we cannot guarantee the accuracy of all source information contained within.
- Some index returns displayed in this report or used in calculation of a policy, allocation or custom benchmark may be preliminary and subject to change.
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## Reporting Methodology

- 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.



# Agenda Item #7

# Arizona State Retirement System

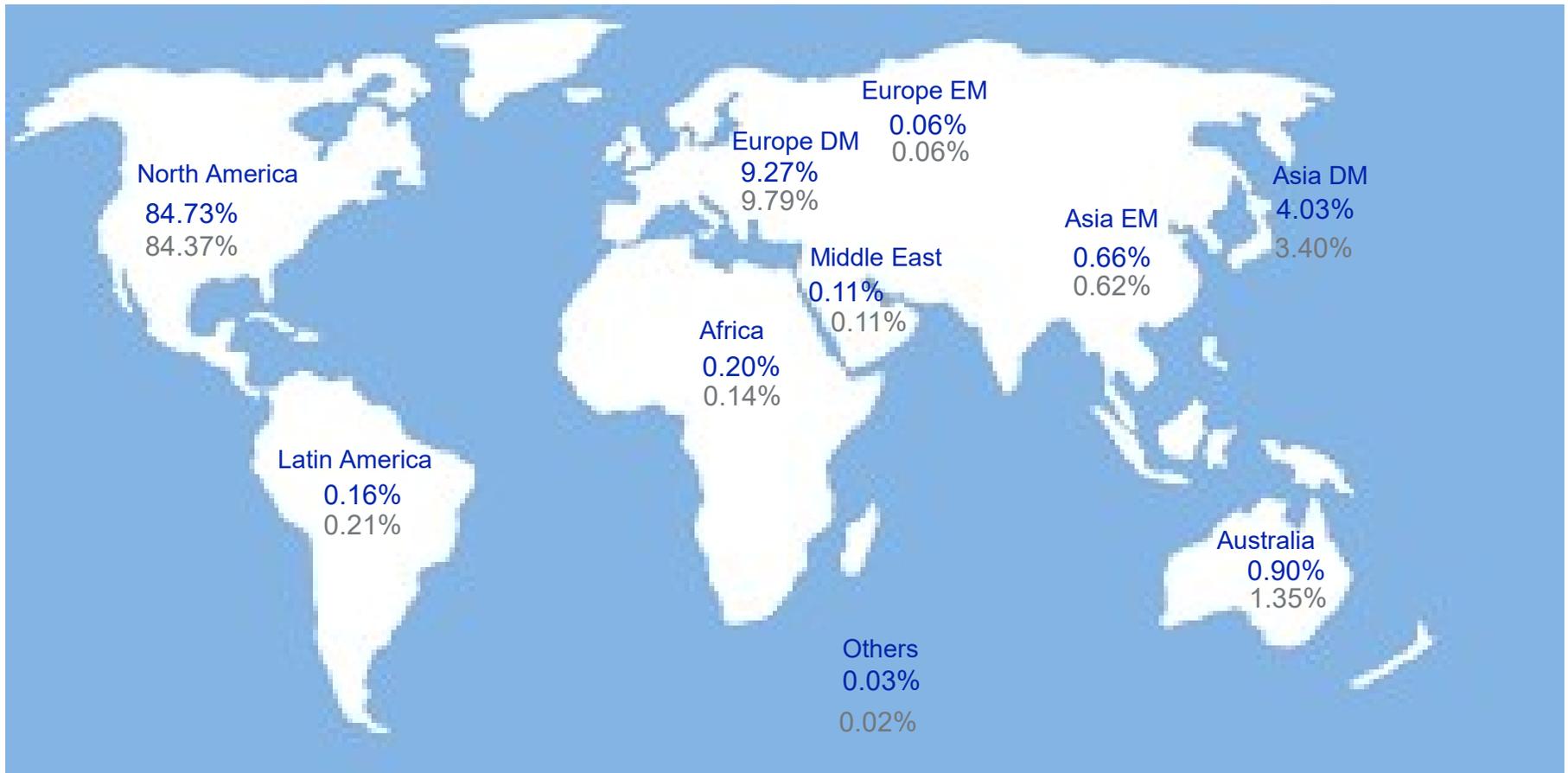
Total Plan Risk and Exposure Report

June 2020

## ▀ Agenda

- Country Diversification
- Asset Class Diversification
- Exposure Analysis
- Asset Class Correlation
- Asset Class Risk Contribution
- Total Portfolio Value-At-Risk (VAR)
- Stress Test and Tail Risk Summary

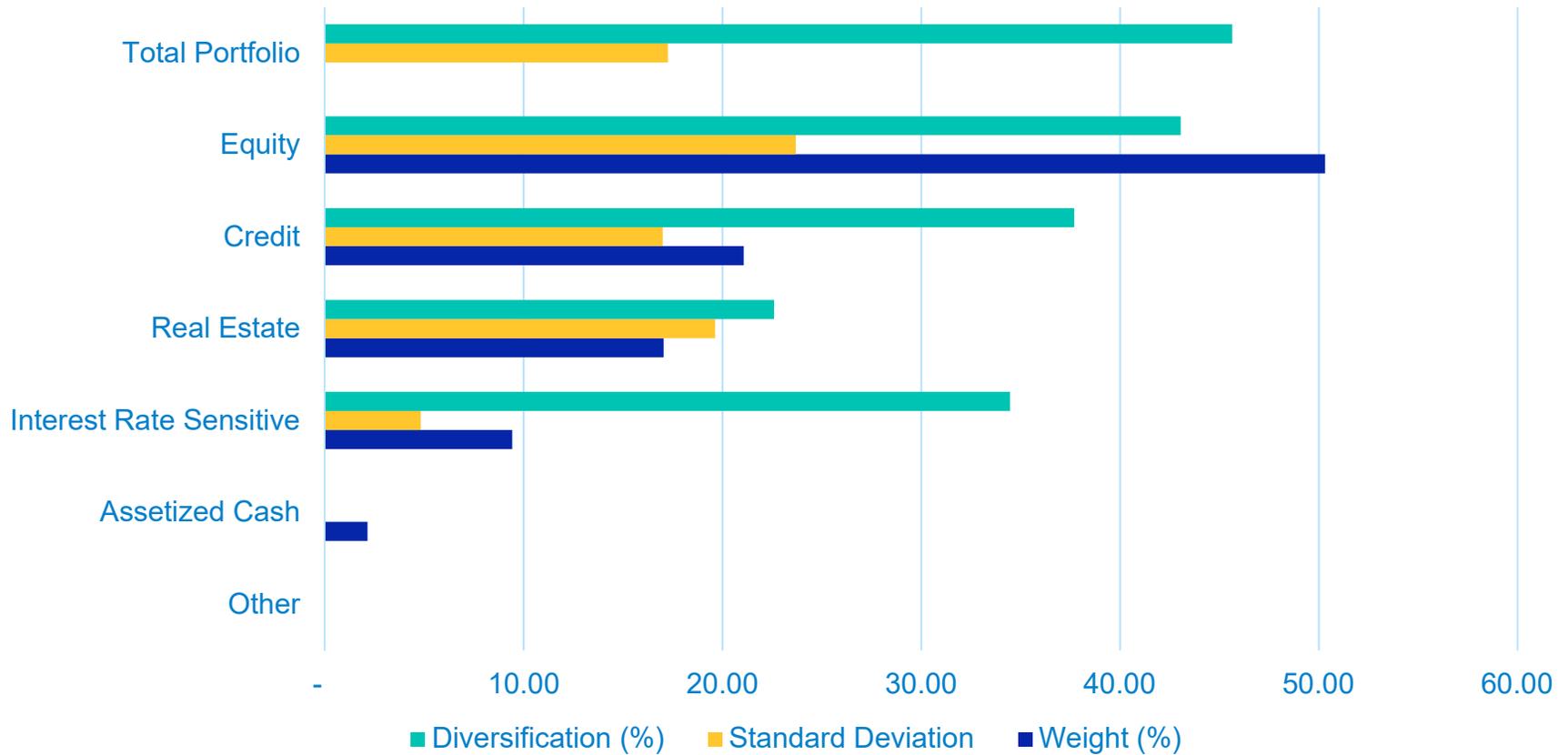
# ASRS ASSETS ARE DIVERSIFIED ACROSS REGIONS



**%Weight**

**%Contribution to  
Total Risk**

## ASRS ASSETS AND RISK SOURCES ARE DIVERSIFIED ACROSS DIFFERENT ASSET CLASSES



## VARIOUS EXPOSURE ANALYSIS VS. THE SAA

Asset Type	Weight of Total Plan (%)	Weight of SAA (%)	Active Weight (%)
Equity	50.32%	50.00%	0.32%
Credit	21.07%	20.00%	1.07%
Real Estate	17.04%	20.00%	-2.96%
Interest Rate Sensitive	9.42%	10.00%	-0.58%
Assetized Cash	2.15%	0.00%	2.15%
Other	0.00%	0.00%	0.00%
Total	100.00%	100.00%	0.00%

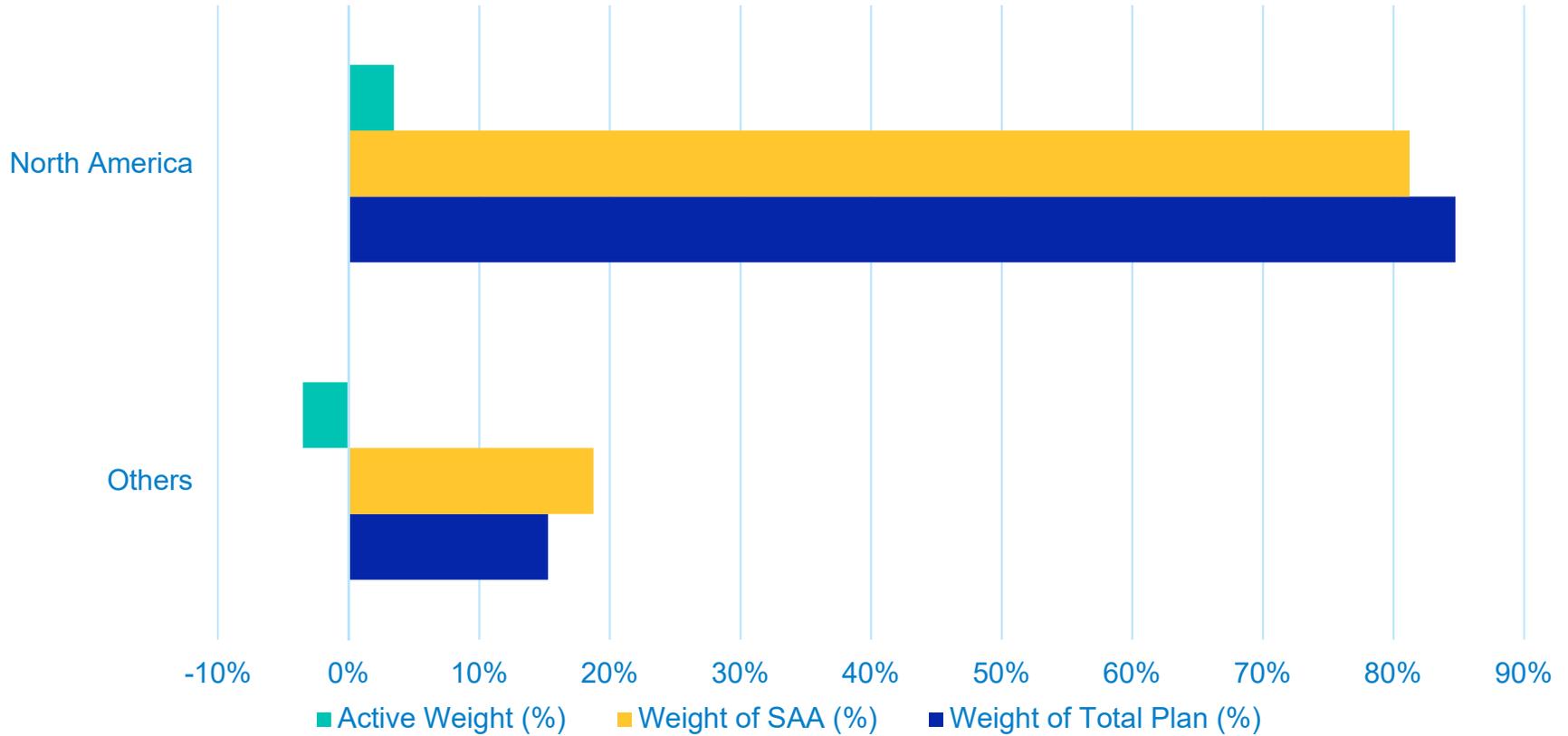
Country	Weight of Total Plan (%)	Weight of SAA (%)	Active Weight (%)
North America	84.73%	81.24%	3.49%
Europe DM	9.27%	10.32%	-1.05%
Asia DM	4.93%	5.34%	-0.41%
Asia EM	0.66%	2.16%	-1.50%
Latin America	0.16%	0.39%	-0.23%
Middle East	0.11%	0.22%	-0.11%
Europe EM	0.06%	0.17%	-0.11%
Africa	0.05%	0.13%	-0.08%
Others	0.03%	0.03%	0.00%
Total	100.00%	100.00%	0.00%

Top 15 Foreign Currency Exposures			
Currency	Weight of Total Plan (%)	Weight of SAA (%)	Active Weight (%)
EUR	4.31%	4.02%	0.29%
JPY	3.29%	3.39%	-0.10%
GBP	1.81%	1.87%	-0.06%
CAD	1.26%	0.00%	1.26%
CHF	1.20%	1.28%	-0.08%
AUD	0.87%	0.90%	-0.03%
HKD	0.63%	1.22%	-0.59%
SEK	0.45%	0.45%	0.00%
DKK	0.28%	0.30%	-0.02%
SGD	0.16%	0.16%	0.00%
TWD	0.13%	0.42%	-0.29%
KRW	0.12%	0.40%	-0.28%
NOK	0.09%	0.09%	0.00%
INR	0.08%	0.27%	-0.19%
ILS	0.06%	0.06%	0.00%

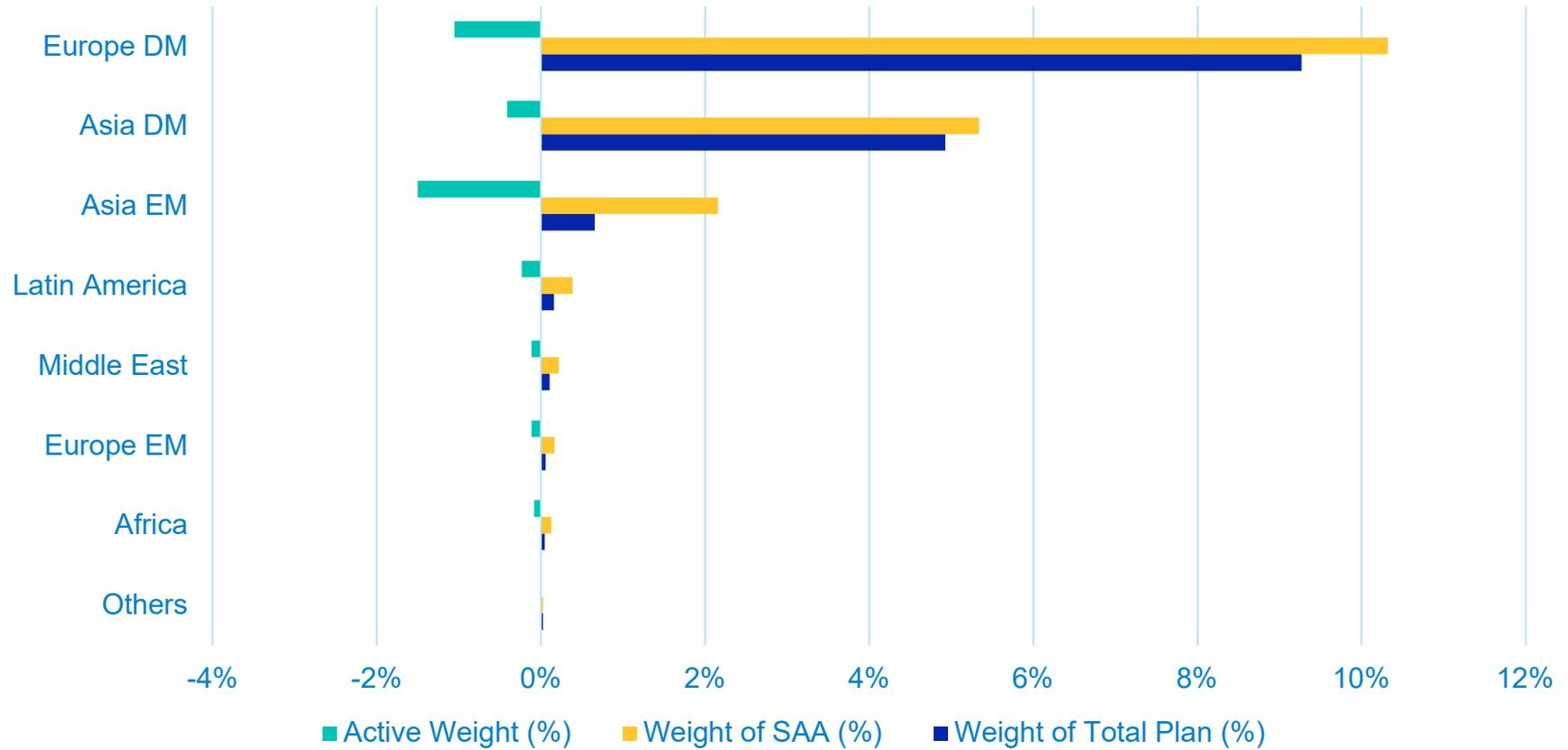
# EXPOSURE ANALYSIS: ASSET CLASS COMPARISON



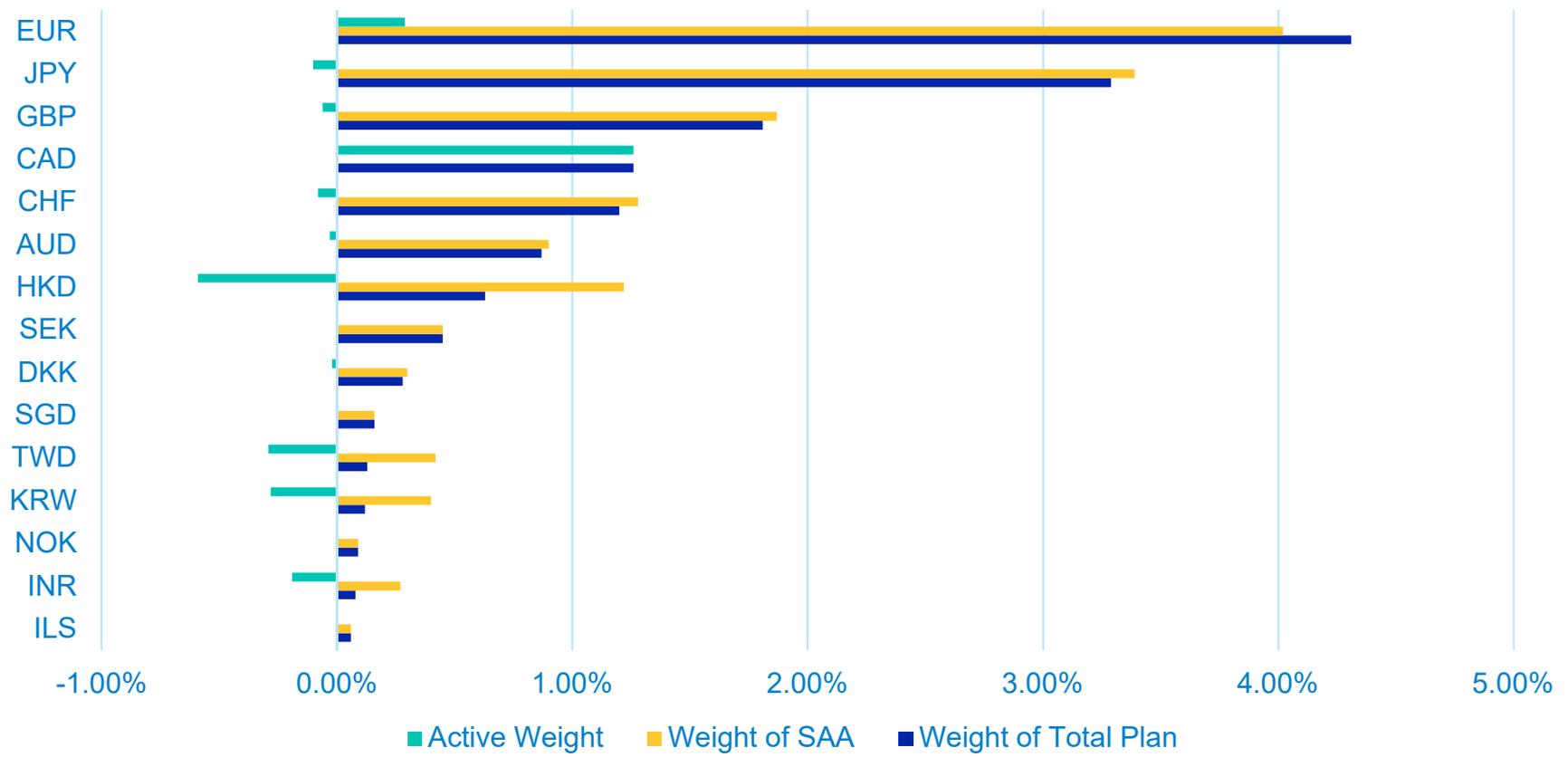
## EXPOSURE ANALYSIS: AMERICA VS. OTHERS



## EXPOSURE ANALYSIS: OTHER REGIONS



# Exposure Analysis: Foreign Currency



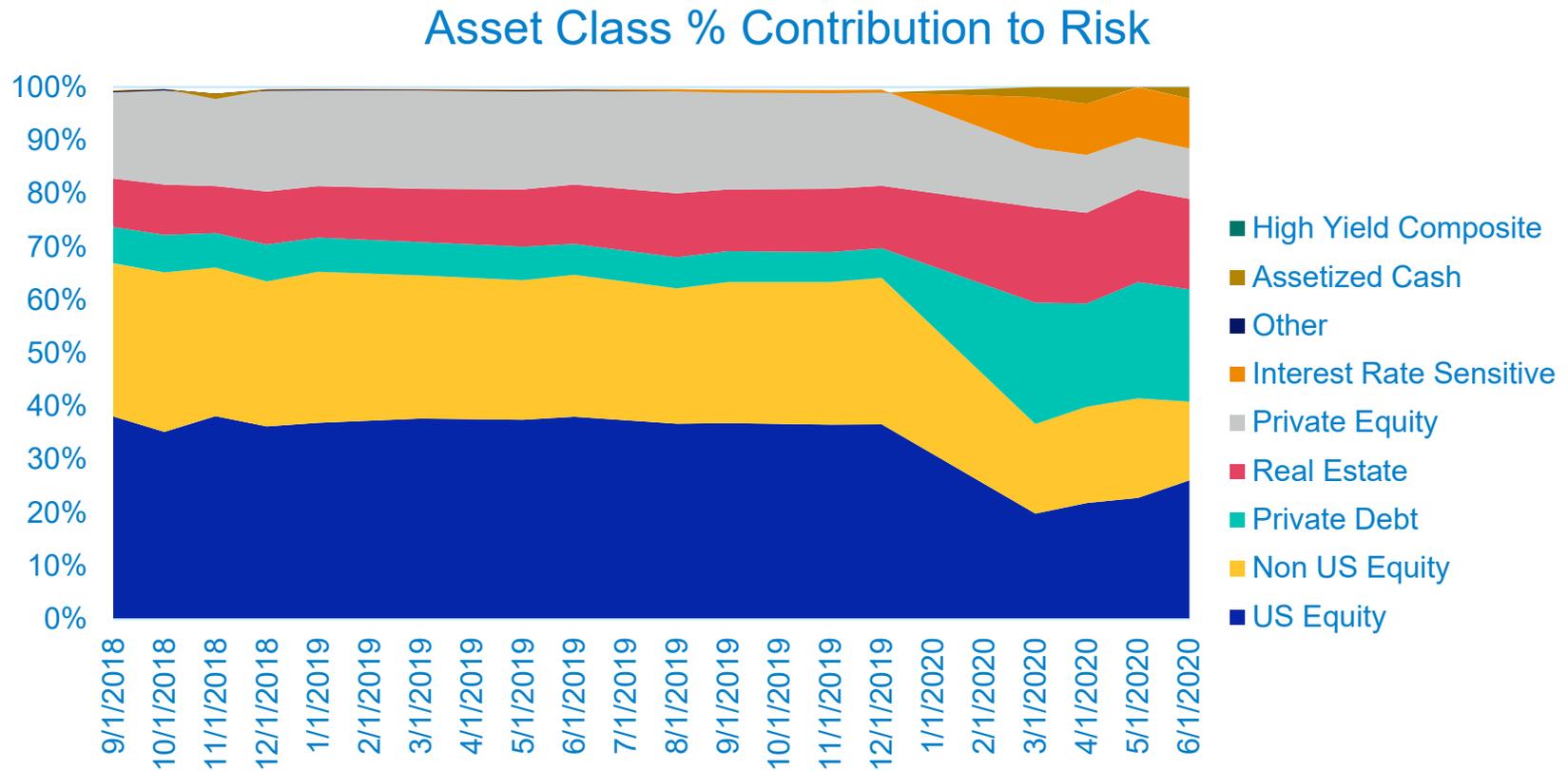
## **CORRELATION REPORT OF THE MAJOR ASSET CLASSES**

ASRS Assets are fairly diversified across different asset classes. While Fixed Income investments are a major source of portfolio diversification, private assets also add meaningful diversification benefits.

Portfolio	US Equity	Non US Equity	Private Equity node	Interest Rate Sensitive	Private Debt US Corporate	High Yield Composite	Emerging Market Debt	Real Estate	Assetized Cash	Other
US Equity	1									
Non US Equity	0.9	1								
Private Equity	0.78	0.72	1							
Interest Rate Sensitive	0.22	0.25	0.18	1						
Private Debt US Corporate	0.62	0.64	0.7	0.35	1					
High Yield	0.25	0.25	0.2	-0.03	0.14	1				
Emerging Market Debt	0.13	0.29	0.12	0.19	0.16	0.04	1			
Real Estate	0.69	0.64	0.55	0.32	0.56	0.15	0.14	1		
Assetized Cash	0	0	0	0	0	0	0	0	1	
Other	0	0	0	0	0	0	0	0	0	1

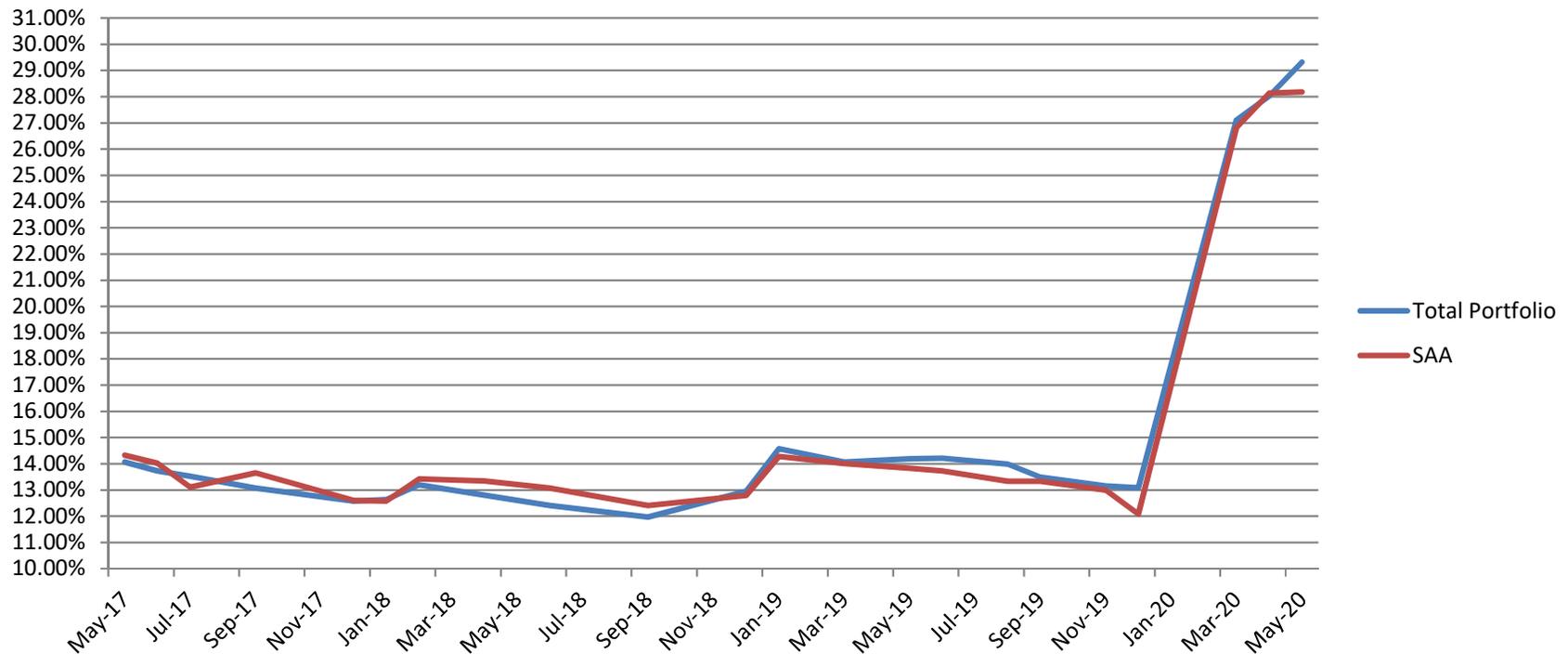
# HISTORICAL RISK CONTRIBUTION OF THE MAJOR ASSET CLASSES

Equities continue to account for more than 80% of the overall portfolio risk.

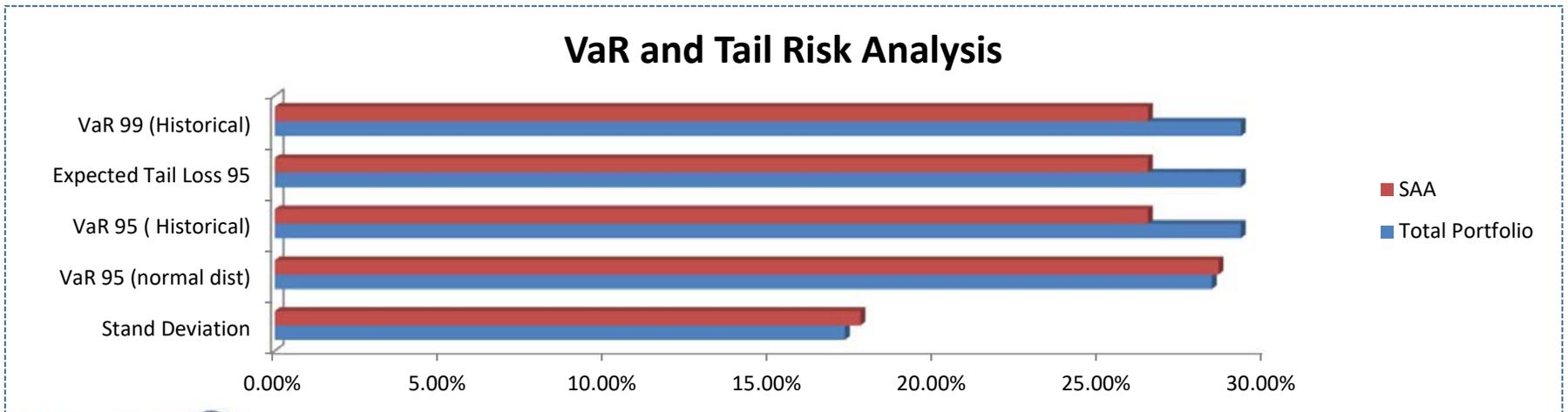
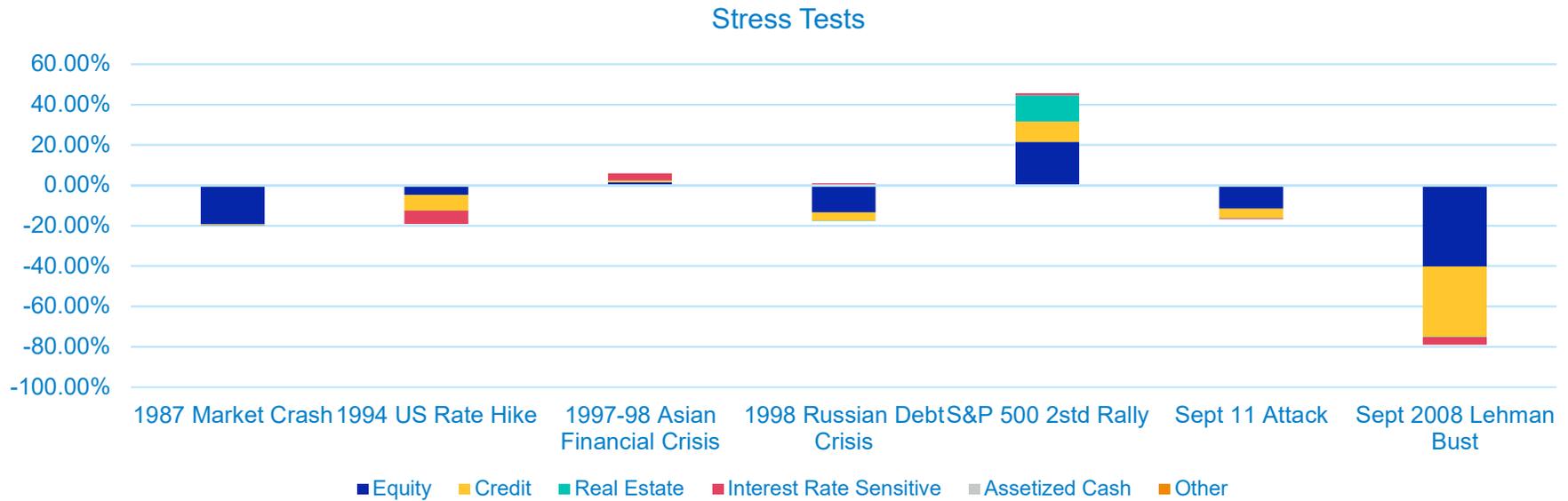


## ▀ Total Portfolio Value-At-Risk (VAR)

As of June 30th, 2020 Total VaR for ASRS Portfolio was 28.38%, indicating that there is a 5% chance that portfolio could lose ~\$11.74B in a given year. Note that a 5% event is expected to occur every 20 years



# Stress Test and Tail Risk Summary



## ▼ GLOSSARY

- Diversification: shows the diversifying effect of covariance on portfolio risk. For example, a diversification figure of 60% means that you are diversifying away 60% of portfolio risk. A higher number thus indicates greater diversification arising from covariance.
- Standard Deviation: distribution of asset's return, expressed in percent. We forecast volatility using normal distribution with two-third probability in Barra's multiple factor model (BIM). The total risk for an asset depends on the asset's exposures to the risk factors, the factor variance/covariance matrix, and the forecast selection risk of the asset.
- Parametric VaR Confidence Level: 95%
- Historical VaR & Expected Tail Loss Settings:
- Holding Period: 252 days (1 year)
- Decay Factor: 0.94
- Look Back Period: trailing 10 years
- Decay Factor: this parameter means that older observations are given less weight than more recent ones. Its magnitude determines how fast the weight on the observations used in the simulation decays over the historical period. BarraOne's decay factor default is 0.94.

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# Agenda Item #8

# Investment Compliance Reporting

Arizona State Retirement System

September 21, 2020

# Compliance Summary Overview

- The Investment Management Division regularly monitors and reviews compliance through several means:
  - Public Portfolios:
    - Pre-Trade Compliance
    - Post-Trade Compliance
  - Private Markets:
    - Independent consultant reviews on Commingled Private Equity and Real Estate Funds
    - Independent consultant reviews on Separate Accounts in Credit and Real Estate
  - Total Fund:
    - Statutory Compliance
    - Restricted Country tests
- No material instances of non-compliance were noted during the periods reported on in this report

## Pre-Trade Compliance Review

- For the internally managed portfolios, the Investment Management Division (IMD) utilizes Bloomberg's Trade Order Management System (OMS) for executing and processing trades
- The OMS platform runs pre-trade compliance rules to ensure trades will not violate established portfolio guidelines
- Compliance rules are based on the investment guidelines:
  - Approved Investment Strategy Papers
  - Applicable Arizona Revised Statutes

## Pre-Trade Summary Results

- Period reported on: May - August 2020
- Portfolios monitored: Internally managed fixed income and equity portfolios
- Exceptions: No exceptions occurred during the period under review

## Post-Trade Compliance Review

- State Street provides daily and monthly compliance monitoring at the individual portfolio level, for all the internal and external investment portfolios on a post-trade basis
- Daily monitoring allows for closer insight into the managers' activity
- The investment compliance rules are based on guidelines from:
  - Letters of Direction & Clarification (LODs) for the externally managed portfolios
  - Investment Strategy Papers for the internally managed portfolios
  - Applicable Arizona Revised Statutes

## Post-Trade Summary Results

- Period reported on: May - August 2020
- Portfolios monitored: All public markets portfolios
- Public Markets Investment Limits Exceptions:
  - Five public markets portfolios for the period May - June 2020 (equities, fixed income) were reviewed
  - Four public markets portfolios for the period July - August 2020 (equities, fixed income) were reviewed
  - State Street's review found a few findings resulting from index changes, corporate actions, and informational flags
- All findings were researched and resolved to both State Street and ASRS's satisfaction, for all periods

# Investment Compliance Review

- Reviews perform the following steps:
  - Review and note if financial statements are prepared on a fair value basis noting whether liabilities are marked to market
  - Review the calculation of ASRS Net Asset Value (i.e. the waterfall calculation) and comment to the manager and ASRS if any errors are noted
  - Review the management fee calculation, including review of the Net Operation Income (NOI) calculation to determine if it has been calculated correctly and if appropriate reserves have been deducted, then comment to the manager and ASRS if any errors are noted
  - Work with the manager and ASRS as necessary to address concerns and questions
  - Review audited financial statements at a high level for significant issues
  - Review valuation policies for consistency with ASRS policies, operating agreements and standards
  - Review expense policies for consistency with ASRS policies, operating agreements, and standards

## Compliance Summary Results

- The current consultant performed compliance reviews on 4 RE SMA funds for the 2018 review period
- There were no material discrepancies noted

# Investment Compliance Review

- Review managers' calculations of:
  - Asset management fees
  - Partnership expenses
  - Carried interest
- Review investment valuation policy
- Ensure calculation and policy agree to investment documentation, agreements, and manager policies
- If a deficiency is noted, the consultant will address with the sponsor and work to resolve deficiencies
- All results are communicated to ASRS
- A summary report will be presented to the ASRS to communicate findings on an annual basis

## Compliance Summary Results

- The current consultant is currently working on the compliance reviews for the 2018 review period

## Total Fund Compliance

- State Street Compliance Group provides compliance reporting and monitoring at the Total Fund level, known as the “Monthly Statute Tests Compliance” for:
  - Five mandated Arizona Revised Statutes on investment limits, under §A.R.S. 38-718.H-L
    - ① Max 80% Equity Test (§A.R.S. 38-718.H)
    - ② Max 40% Non-US Public Investments Test (§A.R.S. 38-718.I)
    - ③ Max 60% Internally Managed Assets Test (§A.R.S. 38-718.J)
    - ④ Max 5% Issuer Test (§A.R.S. 38-718.K)
    - ⑤ Max 10% Debt of Multinational Development Banks Test (§ A.R.S. 38-718.L)
  - Arizona Restricted Country Test
    - The test is setup to look at the Fund’s investment’s country of incorporation to identify companies that do business in or with countries currently designated by the United States Department of State as State Sponsors of Terrorism, pursuant to §A.R.S. 35-392, as added by Laws 2007, Chapter 201
- Per statute requirements, the results are measured using market value

## Compliance Summary Results

- Period reported on: May - August 2020
- Total Fund Monthly Statutory Investment Limits:
  - Total Fund investments passed the five mandated statutes on investment limits, as well as the Arizona Restricted Country Test for all periods.

# Agenda Item #9

## MEMORANDUM

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**TO:** The Arizona State Retirement System (ASRS) Investment Committee (IC)

**FROM:** Mr. Paul Matson, Director  
Mr. Karl Polen, Chief Investment Officer

**DATE:** September 14, 2020

**RE:** **Agenda Item #9:** Presentation, Discussion, and Appropriate Action Regarding the 2021 Investment Committee Meeting Calendar

### **Purpose**

To discuss a proposed Arizona State Retirement System (ASRS) Investment Committee (IC) meeting schedule for the 2021 calendar year.

### **Recommendation**

The IC adopt a meeting schedule for the 2021 calendar year.

### **Background**

The IC is set to meet four times each calendar year in the third month of each quarter in order to present the investment results for the prior quarter. To facilitate discussion we have proposed meetings on the third Monday of the third month of each quarter as follows:

- Monday, March 15, 2021 at 1:30 p.m.
- Monday, June 21, 2021 at 1:30 p.m.
- Monday, September 20, 2021 at 1:30 p.m.
- Monday, December 20, 2021 at 1:30 p.m.

Additional meetings may be scheduled as needed.

The Committee may choose alternate dates or times to accommodate member schedules and facilitate attendance.

Attachments: Proposed 2021 Meeting Schedule

# 2021 Calendar – ASRS INVESTMENT COMMITTEE

## JANUARY

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

## FEBRUARY

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28						

## MARCH

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

## APRIL

S	M	T	W	T	F	S
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## MAY

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## SEPTEMBER

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## OCTOBER

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## NOVEMBER

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## DECEMBER

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Holiday

IC Proposed Meeting Dates (4)

# Agenda Items #10-13

**No Materials**



# Arizona State Retirement System *Investment Beliefs*

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## **FRAME OF REFERENCE**

The following *Investment Beliefs* have been established to ensure the development of congruent and synergistic investment strategies, and to ensure the effective and efficient allocation of resources. These *Investment Beliefs* determine the general paradigm within which investment strategies are developed, investment ideas are reviewed, and investment decisions are implemented.

Modifications to these *Investment Beliefs* will occur if experiential, academic, conceptual, and/or practical perspectives suggest that a superior belief system exists.

## **INVESTMENT BELIEFS**

### **1. Asset Class Decisions are Key**

In general, decisions with respect to which asset classes and sub-asset classes to invest in, and the allocations to these asset classes and sub-asset classes, have a greater impact on total fund investment returns than decisions in which specific securities to invest.

### **2. Theories and Concepts Must be Sound**

Over longer periods of time, investment outcomes (e.g. rates of return, volatility) conform to logical theories and concepts. Significant deviations (e.g. internet bubble, pre-subprime erosion of risk premiums) from theoretically and conceptually sound investment constructs are usually not sustainable and are typically self-reverting.

### **3. House Capital Market Views Are Imperative**

The development and articulation of sound *House Views* (e.g. views on interest rates, corporate spreads, asset valuations) will ensure consistency among investment decisions, clarity of investment direction, baselines for debates, and conformity of understanding.

### **4. Investment Strategies Must be Forward Looking**

Investment strategies will be developed based on forward-looking insights, rather than simply on successful strategies of the past.

Asset class valuations and security valuations are significantly affected by endogenous outcomes (e.g. earnings, GDP growth rates, competitive barriers) that are probabilistic, and these outcomes are typically well analyzed by the investment industry.

Asset class valuations and security valuations are also significantly affected by random outcomes (e.g. natural disasters, certain supply & demand shocks) that are virtually unpredictable, and these outcomes are typically not analyzed directly by the investment industry.

Asset class valuations and security valuations are also significantly affected by exogenous outcomes (e.g. foreign policies, global cultural interactions) that can possibly be modeled, and these outcomes are typically not analyzed by the investment industry.

### **5. Public Markets are Generally Informationally Efficient**

#### **Asset Class Valuations**

Asset class valuations (e.g. stock market levels versus interest rate levels) are often in equilibrium with one another, but anomalous situations do occur which result in disequilibria between asset class valuations. These disequilibria offer valuable investment opportunities which we will pro-actively seek and capitalize on.

## Security Valuations

Security valuations (e.g. IBM versus Cisco) are often in equilibrium with one another, but private markets and anomalous public market situations do occur which result in disequilibria between security valuations. These disequilibria offer valuable investment opportunities which we will pro-actively seek and capitalize on.

The extent of informational efficiency varies across asset classes.

Private markets offer significant opportunities for asset mispricing and manager excellence which we will pro-actively seek and capitalize on.

## 6. Market Frictions are Highly Relevant

Market frictions (e.g. management fees, carried interest, revenue sharing, expenses, costs, transaction spreads, market impacts, taxes, commissions) can be significantly detrimental to investment performance and as a result transactions will be initiated only to the extent there is a strong level of conviction that they will result in increased investment returns or decreased risks net of all market frictions.

## 7. Internal Investment Professionals are the Foundation of a Successful Investment Program

In-house investment management capability engaged in direct portfolio management results in superior investment decision-making.

In-house investment management pro-actively monitors capital markets in order to determine mispricing opportunities & allocate capital and will successfully increase risk adjusted returns.

In-house investment professionals are more closely aligned with, and have a better understanding of, the purpose and risk & reward tolerance of the ASRS than external parties.

In-house investment professionals will impact direct investment negotiations, better align economic interests, and influence investment industry conditions (e.g. private deal structures, fee levels, introduction of innovative products & strategies).

## 8. External Investment Management is Beneficial

External investment organizations can often offer greater expertise, resources, and/or flexibility than internal personnel for various investment strategies.

## 9. Investment Consultants

Investment consultants will be effectively utilized in the following four general categories, and utilization of consultants will be focused on situations where there is a demonstrable need in at least one of the four areas:

- Independence: When oversight or controls should be enhanced
- Perspective: When internal perspectives are not broad enough
- Special Skills: When internal skills are not deep enough
- Resource Allocation: When internal resources are not broad enough

## 10. Trustee Expertise

Trustees often have expertise in various areas of investment management, and this expertise should be utilized while ensuring separation between Board oversight and staff management.