

Board of Trustees



Handout Book

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Management Committee

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Performance Update

October 22, 2020

September Market Commentary



Equities under-performed for the first month since March

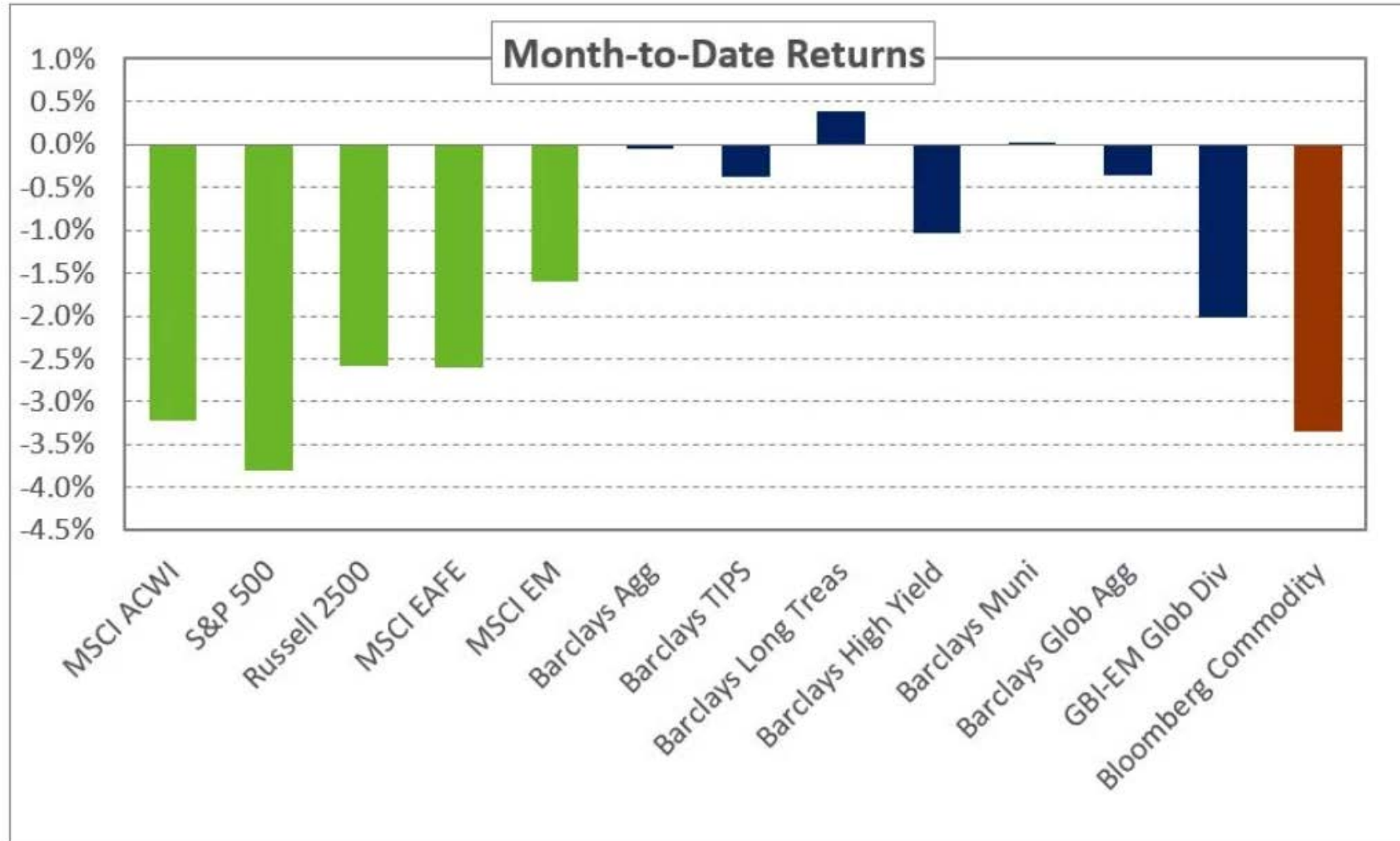
- However, 3Q returns were strong:
 - S&P 500 Index posted 8.9%, MSCI World Ex-USA posted 5.0%, and MSCI Emerging Markets posted 9.6%

Significant amount of economic uncertainty remains

- Potential of additional stimulus and results of the Presidential election will continue to effect markets

Heightened volatility across capital markets is expected to continue

September Market Performance



As of 9/30/2020 Source: S&P, Russell, MSCI, JPM, Bloomberg, Factset

World Stock Market Returns



2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	YTD	Q3 2020
MSCI EM 79.0%	MSCI Asia ex Japan 19.9%	US S&P 500 2.1%	MSCI Asia ex Japan 22.7%	Japan TOPIX 54.4%	US S&P 500 13.7%	Japan TOPIX 12.1%	UK FTSE All-Share 16.8%	MSCI Asia ex Japan 42.1%	US S&P 500 -4.4%	US S&P 500 31.5%	MSCI Asia ex-Japan 5.6%	MSCI Asia ex-Japan 10.8%
MSCI Asia ex Japan 72.5%	MSCI EM 19.2%	UK FTSE All-Share -3.5%	Japan TOPIX 20.9%	US S&P 500 32.4%	Japan TOPIX 10.3%	MSCI Europe ex UK 9.1%	US S&P 500 12.0%	MSCI EM 37.8%	UK FTSE All-Share -9.5%	MSCI Europe ex-UK 27.5%	US S&P 500 5.6%	MSCI EM 9.7%
UK FTSE All-Share 30.1%	US S&P 500 15.1%	MSCI Europe ex UK -12.1%	MSCI Europe ex UK 20.0%	MSCI Europe ex UK 24.2%	MSCI Europe ex UK 7.4%	US S&P 500 1.4%	MSCI EM 11.6%	Japan TOPIX 22.2%	MSCI Europe ex UK -10.6%	UK FTSE All-Share 19.2%	MSCI EM -0.9%	US S&P 500 8.9%
MSCI Europe ex UK 29.0%	UK FTSE All-Share 14.5%	Japan TOPIX -17.0%	MSCI EM 18.6%	UK FTSE All-Share 20.8%	MSCI Asia ex Japan 5.1%	UK FTSE All-Share 1.0%	MSCI Asia ex Japan 5.8%	US S&P 500 21.8%	MSCI Asia ex Japan -14.1%	MSCI EM 18.9%	Japan TOPIX -3.4%	Japan TOPIX 5.2%
US S&P 500 26.5%	MSCI Europe ex UK 5.1%	MSCI Asia ex Japan -17.1%	US S&P 500 16.0%	MSCI Asia ex Japan 3.3%	UK FTSE All-Share 1.2%	MSCI Asia ex Japan -8.9%	MSCI Europe ex UK 3.2%	MSCI Europe ex UK 14.5%	MSCI EM -14.2%	MSCI Asia ex-Japan 18.5%	MSCI Europe ex-UK -7.4%	MSCI Europe ex-UK 1.8%
Japan TOPIX 7.6%	Japan TOPIX 1.0%	MSCI EM -18.2%	UK FTSE All-Share 12.3%	MSCI EM -2.3%	MSCI EM -1.8%	MSCI EM -14.6%	Japan TOPIX 0.3%	UK FTSE All-Share 13.1%	Japan TOPIX -16.0%	Japan TOPIX 18.1%	UK FTSE All-Share -19.9%	UK FTSE All-Share -2.9%

Source: FTSE, MSCI, Refinitiv Datastream, Standard & Poor's, TOPIX, J.P. Morgan Asset Management. All indices are total return in local currency, except for MSCI Asia ex-Japan and MSCI EM, which are in US dollars. Past performance is not a reliable indicator of current and future results. Data as of 30 September 2020.

Fixed Income - Sector Returns



2013	2014	2015	2016	2017	2018	2019	YTD	Q3 2020
Euro HY 8.8%	Euro Gov. 13.1%	Euro Gov. 1.6%	US HY 17.5%	EM Debt 9.3%	Euro Gov. 1.0%	EM Debt 14.4%	US Treas. 8.9%	US HY 4.7%
US HY 7.4%	EM Debt 5.5%	EM Debt 1.2%	EM Debt 10.2%	Global IG 9.1%	US Treas. 0.9%	US HY 14.4%	Global IL 7.4%	Global IL 3.6%
Euro Gov. 2.2%	Euro HY 5.5%	US Treas. 0.8%	Euro HY 10.1%	Global IL 8.7%	US HY -2.3%	Global IG 11.5%	Global IG 5.8%	Global IG 3.1%
Global IG 0.3%	US Treas. 5.1%	Euro HY 0.5%	Global IG 4.3%	US HY 7.5%	Global IG -3.6%	Euro HY 10.7%	Euro Gov. 3.7%	Euro HY 2.5%
US Treas. -2.7%	Global IL 3.4%	Global IG -3.6%	Global IL 3.9%	Euro HY 6.1%	Euro HY -3.6%	Global IL 8.0%	EM Debt 0.4%	EM Debt 2.3%
Global IL -3.2%	Global IG 3.1%	US HY -4.6%	Euro Gov. 3.2%	US Treas. 2.3%	Global IL -4.1%	US Treas. 6.9%	US HY -0.4%	Euro Gov. 1.7%
EM Debt -6.6%	US HY 2.5%	Global IL -5.0%	US Treas. 1.0%	Euro Gov. 0.2%	EM Debt -4.6%	Euro Gov. 6.8%	Euro HY -2.7%	US Treas. 0.2%

Source: Bloomberg Barclays, BofA/Merrill Lynch, J.P. Morgan Economic Research, Refinitiv Datastream, J.P. Morgan Asset Management. Global IL: Barclays Global Inflation-Linked; Euro Gov.: Barclays Euro Aggregate Government; US Treas: Barclays US Aggregate Government - Treasury; Global IG: Barclays Global Aggregate - Corporates; US HY: BofA/Merrill Lynch US HY Constrained; Euro HY: BofA/Merrill Lynch Euro Non-Financial HY Constrained; EM Debt: J.P. Morgan EMBIG. All indices are total return in local currency, except for EM and global indices, which are in US dollars. Past performance is not a reliable indicator of current and future results. Data as of 30 September 2020.

Fixed Income – Government Bond Returns

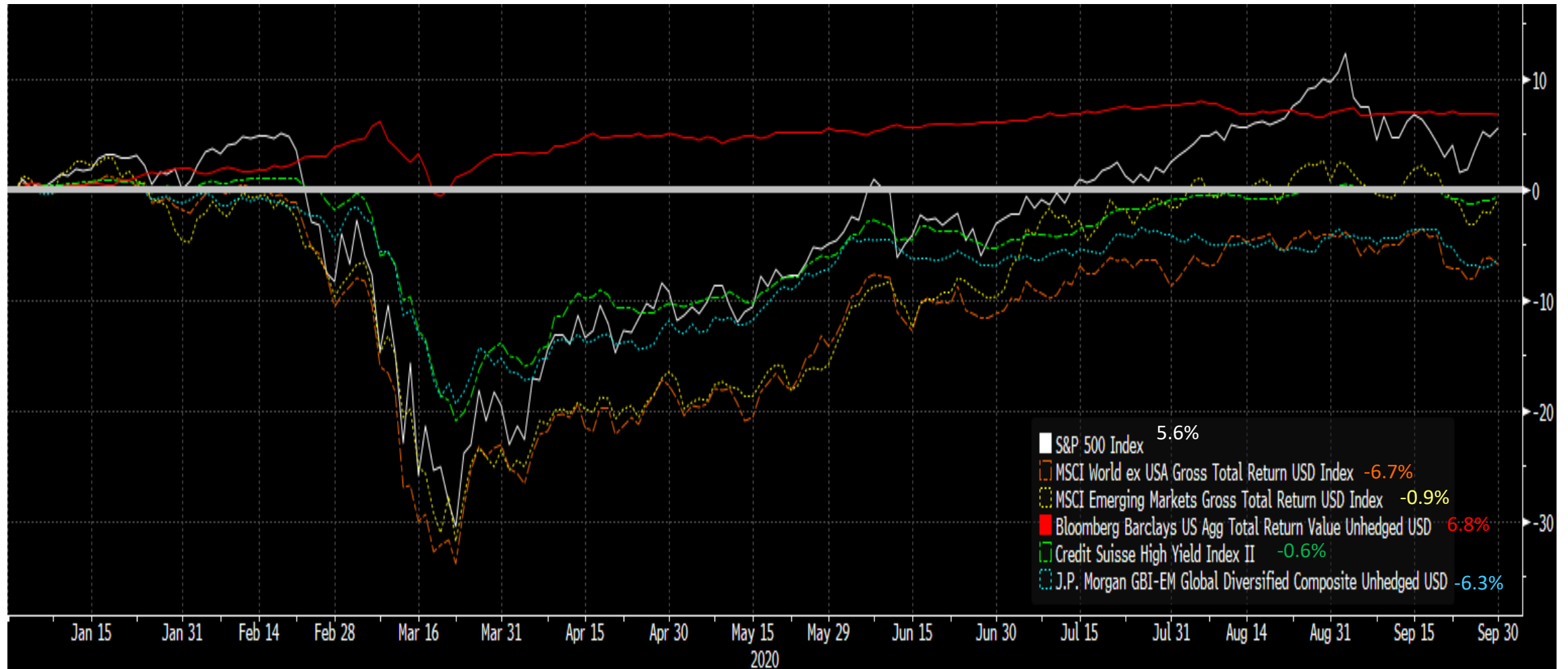


2013	2014	2015	2016	2017	2018	2019	YTD	Q3 2020
Spain 11.1%	Spain 15.9%	Italy 4.8%	UK 10.7%	Global 7.5%	Spain 2.5%	Italy 10.6%	US 8.9%	Italy 3.4%
Italy 7.2%	Italy 15.2%	Spain 1.7%	Spain 4.1%	US 2.3%	Germany 1.9%	Spain 8.3%	UK 8.2%	Global 2.9%
Japan 2.1%	UK 14.6%	Japan 1.2%	Germany 3.4%	UK 2.0%	Japan 1.0%	UK 7.1%	Global 6.0%	Spain 1.7%
Germany -1.7%	Germany 9.0%	US 0.8%	Japan 3.2%	Spain 1.1%	US 0.9%	US 6.9%	Italy 5.1%	Germany 0.5%
US -2.7%	US 5.1%	UK 0.5%	Global 1.7%	Italy 0.8%	UK 0.5%	Global 5.6%	Germany 2.6%	US 0.2%
UK -4.2%	Japan 4.5%	Germany 0.4%	US 1.0%	Japan 0.2%	Global -0.7%	Germany 3.1%	Spain 2.6%	Japan 0.1%
Global -4.3%	Global -1.0%	Global -3.7%	Italy 0.8%	Germany -1.0%	Italy -1.3%	Japan 1.7%	Japan -0.8%	UK -1.3%

Source: Bloomberg Barclays, Refinitiv Datatsream, J.P. Morgan Asset Management. All indices are Bloomberg Barclays benchmark government indices. All indices are total return in local currency, except for global, which is in US dollars. Past performance is not a reliable indicator of current and future results. Data as of 30 September 2020.

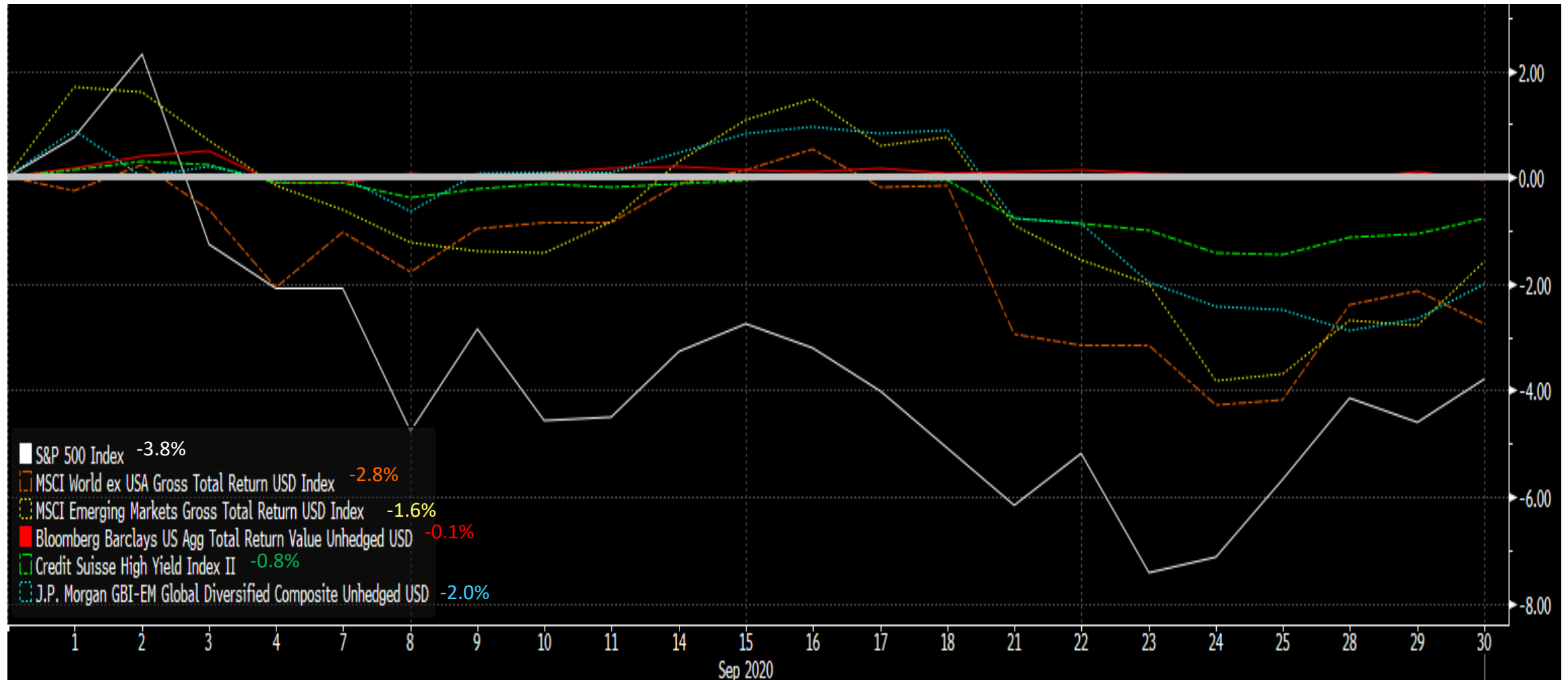
2020 - Major Indices Performance

Calendar Year to Date thru September 30, 2020



September Performance

Total Plan Return -1.3%



LASERS September Performance Summary



	Sept	YTD	FYTD	1yr	3yrs	5yrs	7yrs	10yrs
U.S. Large Cap Equity	-3.8	2.7	8.5	11.8	10.6	12.9	11.8	13.2
<i>S&P 500 Index</i>	<i>-3.8</i>	<i>5.6</i>	<i>8.9</i>	<i>15.1</i>	<i>12.3</i>	<i>14.1</i>	<i>12.7</i>	<i>13.7</i>
U.S. Mid Cap Equity	-3.2	-8.8	4.8	-2.3	2.9	8.1	7.7	10.5
<i>S&P 400 Index</i>	<i>-3.2</i>	<i>-8.6</i>	<i>4.8</i>	<i>-2.2</i>	<i>2.9</i>	<i>8.1</i>	<i>7.6</i>	<i>10.5</i>
U.S. Small Cap Equity	-4.1	-17.7	4.4	-11.6	-2.7	4.0	4.3	9.1
<i>S&P 600 Index</i>	<i>-4.7</i>	<i>-15.2</i>	<i>3.2</i>	<i>-8.3</i>	<i>-0.3</i>	<i>7.2</i>	<i>6.5</i>	<i>10.6</i>
LASERS U.S. Equity	-3.8	-4.6	6.9	3.2	5.7	9.7	9.1	11.7
Int'l Large Cap Equity	-2.8	-7.9	5.0	-0.4	0.6	5.4	3.2	4.7
<i>MSCI World Ex-USA</i>	<i>-2.8</i>	<i>-6.7</i>	<i>5.0</i>	<i>0.6</i>	<i>1.1</i>	<i>5.9</i>	<i>3.4</i>	<i>4.9</i>
Int'l Small Cap Equity	-1.1	-3.7	10.0	6.5	2.1	8.7	5.7	8.0
<i>MSCI World Ex-USA Small Cap</i>	<i>-1.1</i>	<i>-3.7</i>	<i>10.2</i>	<i>7.3</i>	<i>1.8</i>	<i>7.8</i>	<i>5.5</i>	<i>6.9</i>
Int'l Emerging Markets Equity	-1.4	-11.7	6.5	-2.1	-1.5	6.4	2.7	2.4
<i>MSCI Emerging Markets</i>	<i>-1.6</i>	<i>-0.9</i>	<i>9.7</i>	<i>10.9</i>	<i>2.8</i>	<i>9.4</i>	<i>4.1</i>	<i>2.9</i>
LASERS Non-U.S. Equity	-2.0	-8.7	6.5	0.1	0.1	6.2	3.3	4.2

LASERS September Performance Summary

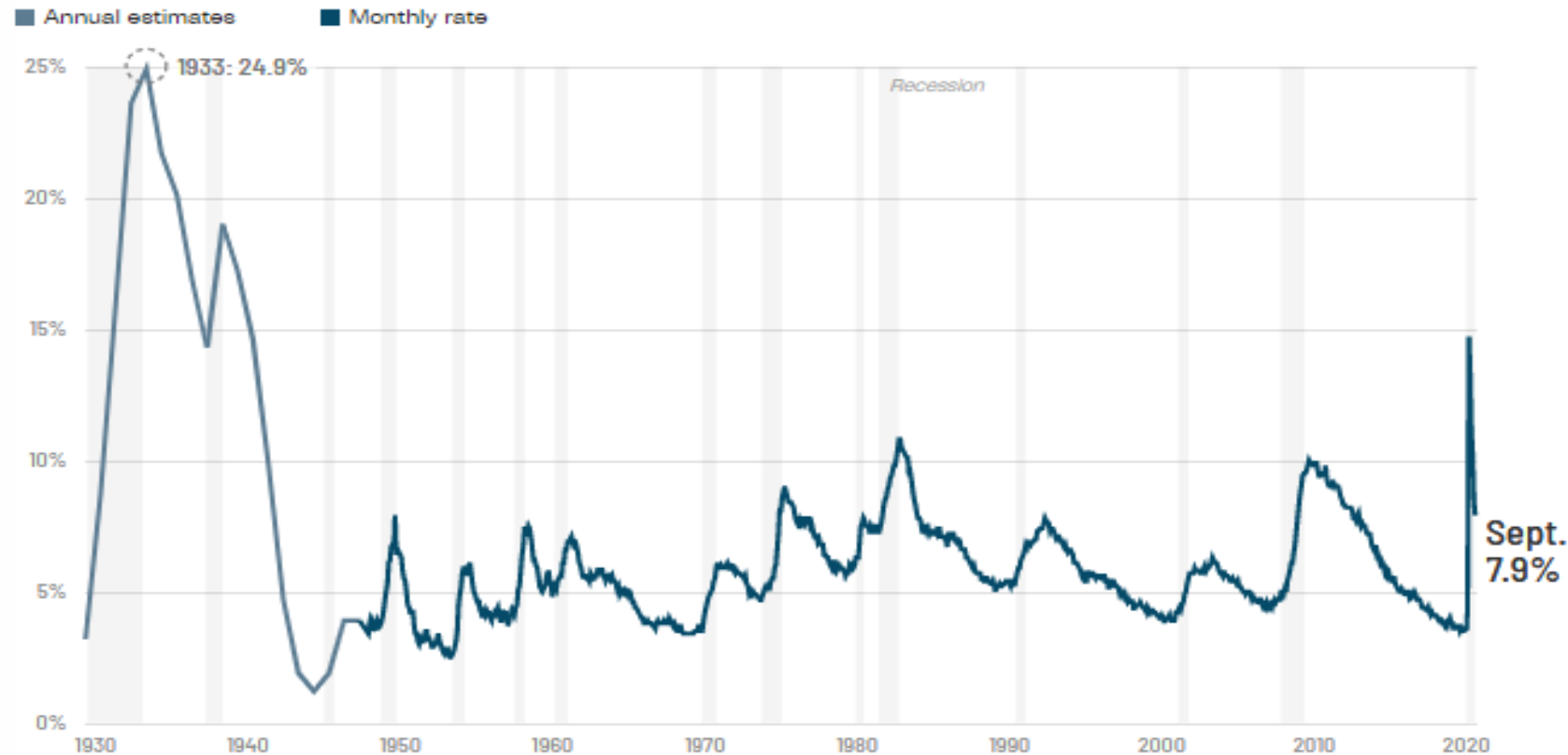


	Sept	YTD	FYTD	1yr	3yrs	5yrs	7yrs	10yrs
U.S. Investment Grade	-0.1	7.7	1.6	8.4	5.8	5.5	4.7	4.8
<i>BB BC Barclay's Aggregate</i>	<i>-0.1</i>	<i>6.8</i>	<i>0.6</i>	<i>7.0</i>	<i>5.2</i>	<i>4.2</i>	<i>4.0</i>	<i>3.6</i>
U.S. High Yield	-0.7	-1.3	5.4	1.3	3.3	6.4	5.3	7.1
<i>Credit Suisse High Yield</i>	<i>-0.8</i>	<i>-0.6</i>	<i>4.9</i>	<i>2.0</i>	<i>3.6</i>	<i>6.4</i>	<i>5.0</i>	<i>6.2</i>
LASERS U.S. Fixed Income	-0.4	3.0	3.3	4.7	4.6	5.8	5.2	6.3
Emerging Market Debt	-2.0	-3.6	0.9	1.1	-0.6	4.8	-0.6	n/a
<i>J.P. Morgan GBI-EM Global Diversified</i>	<i>-2.0</i>	<i>-6.3</i>	<i>0.6</i>	<i>-1.4</i>	<i>0.2</i>	<i>4.8</i>	<i>-.04</i>	<i>n/a</i>
Global Multi-Sector	1.0	0.9	4.2	2.9	4.8	n/a	n/a	n/a
<i>50/50 Barclay's Agg/CS HY</i>	<i>-0.6</i>	<i>2.7</i>	<i>3.8</i>	<i>4.3</i>	<i>3.9</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>
Alternatives	0.0	-1.6	3.9	0.2	6.1	6.4	6.3	7.1
LASERS Total Plan	-1.3	-4.4	4.9	1.0	3.5	7.0	5.9	7.2

Historical Unemployment

Unemployment rate since 1929

The unemployment rate declined in September, but at 7.9%, it's the highest unemployment rate heading into an election.

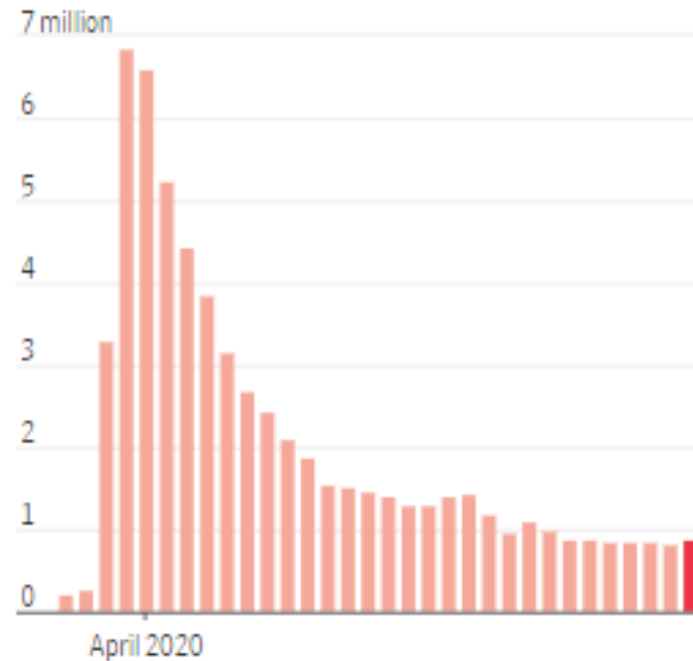


Note: The unemployment rates for 1929 to 1947 are only available as annual averages. From 1948 onward, it's monthly. The 1929 to 1947 data includes the US population ages 14 and up. From 1948 onward, it's 16 and up; An endpoint for the recession that began in February 2020 has not yet been determined.

Source: Bureau of Labor Statistics, NBER
Graphic: Annalyn Kurtz and Tal Yellin, CNN

Unemployment

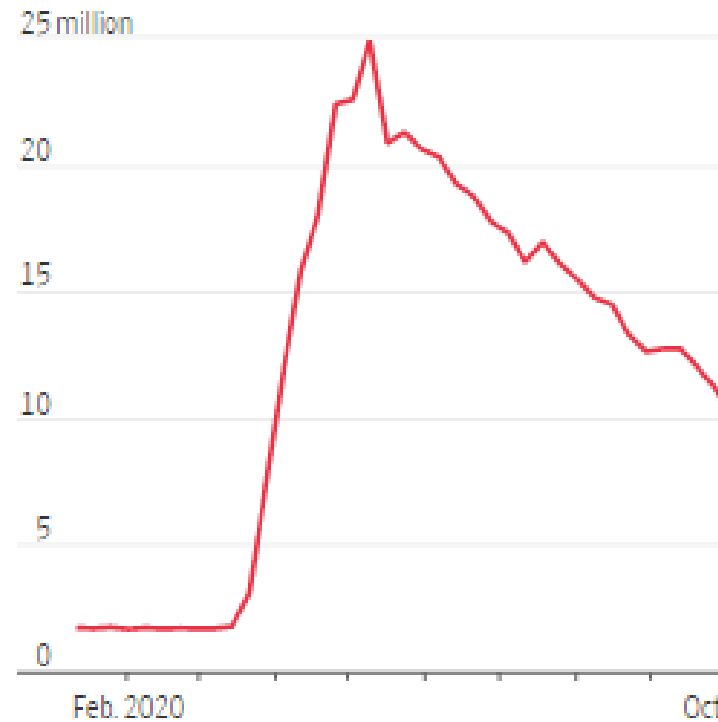
Initial unemployment claims, weekly



Note: Seasonally adjusted. The most recent national figure reflects the level California reported during the last week prior to a two-week pause in claims processing.

Source: Labor Department

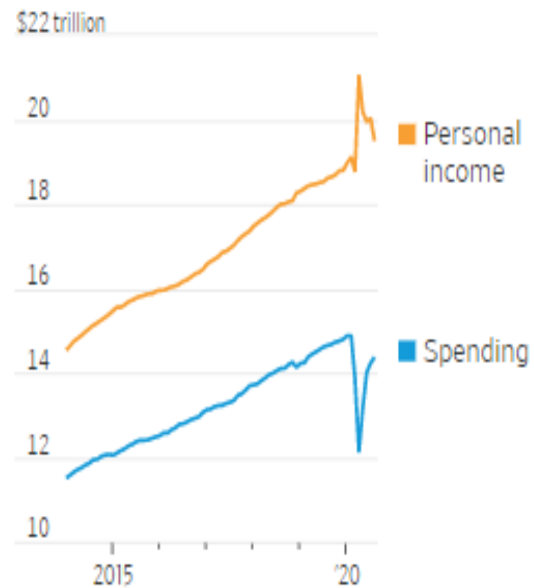
Continuing unemployment-benefits recipients



Note: Seasonally adjusted
Source: Labor Department

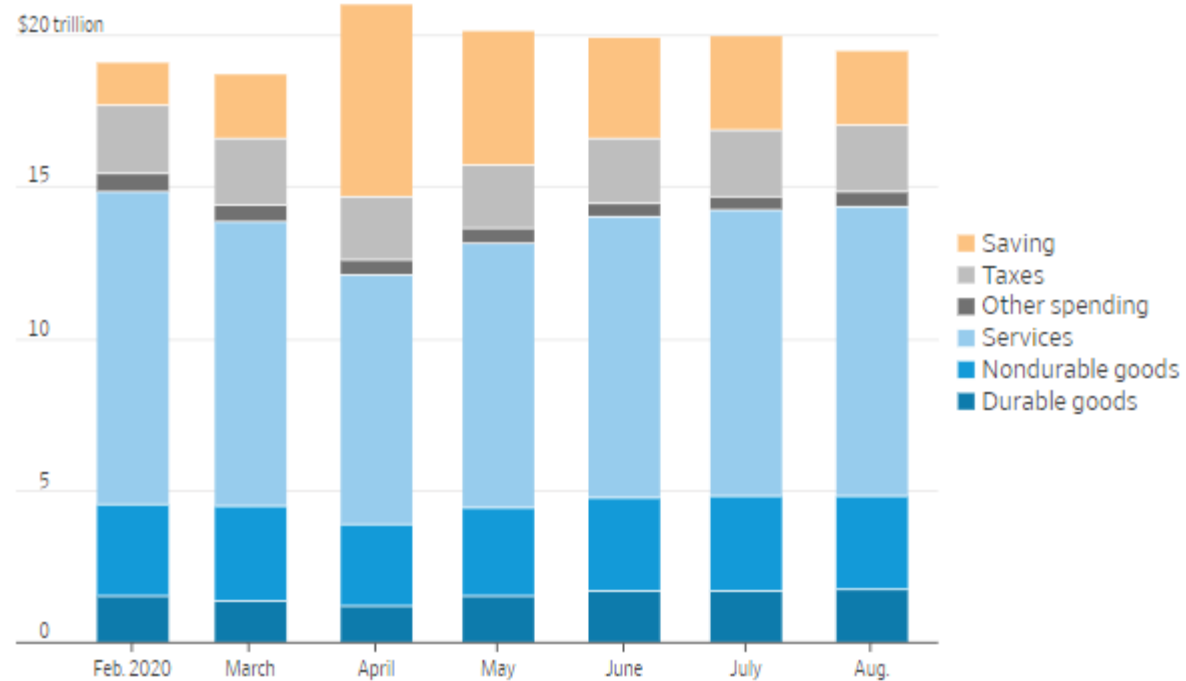
Consumer Spending

Personal income vs. spending, through August



Note: Seasonally adjusted at an annual rate
Source: Commerce Department

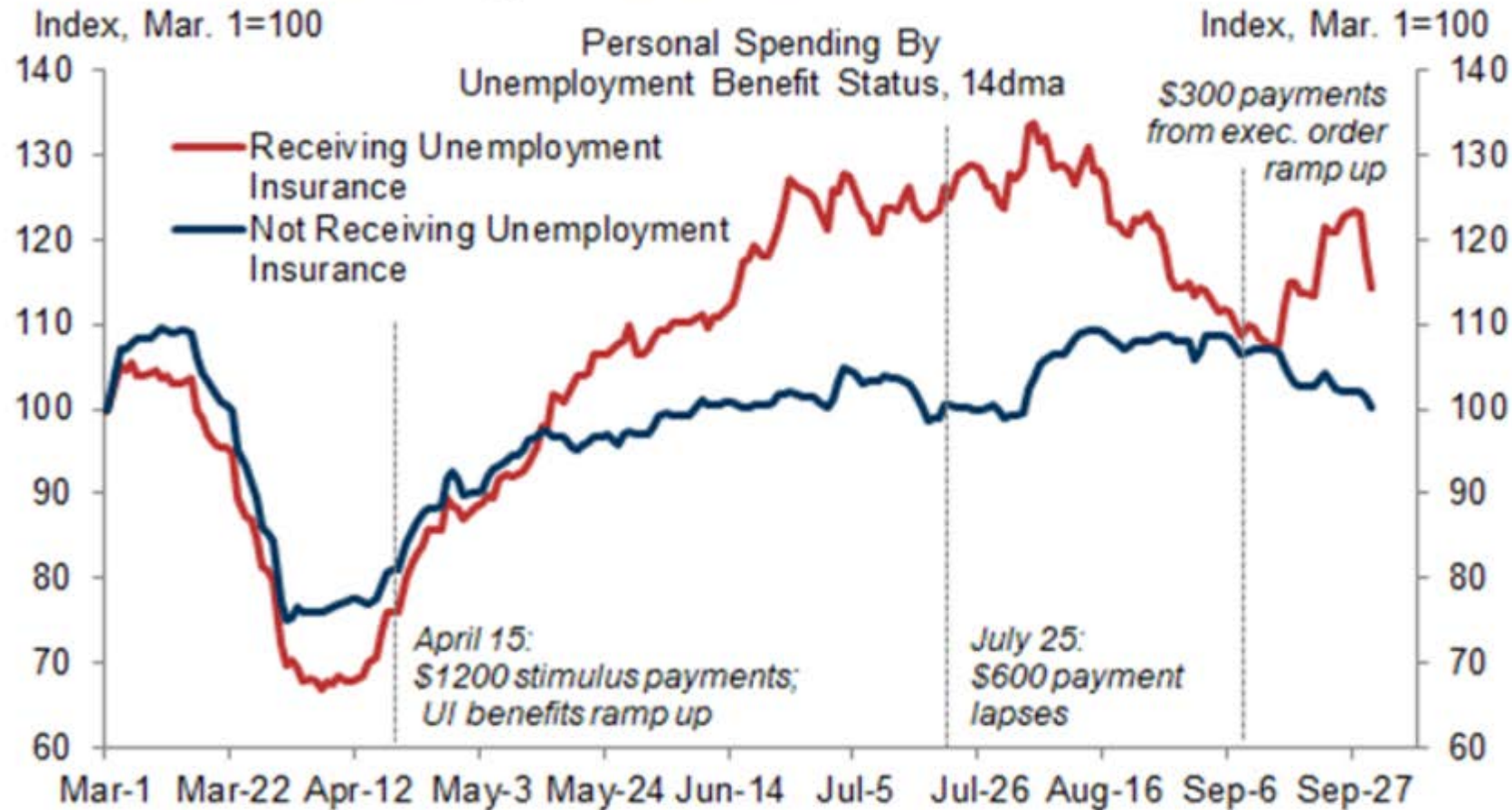
U.S. household income and spending during the coronavirus crisis



Note: Seasonally adjusted at an annual rate
Source: Commerce Department

Consumer Spending

Spending by Individuals Receiving Unemployment Benefits Remains Above Their Pre-Pandemic Spending Level Following the \$300 Supplemental Benefit



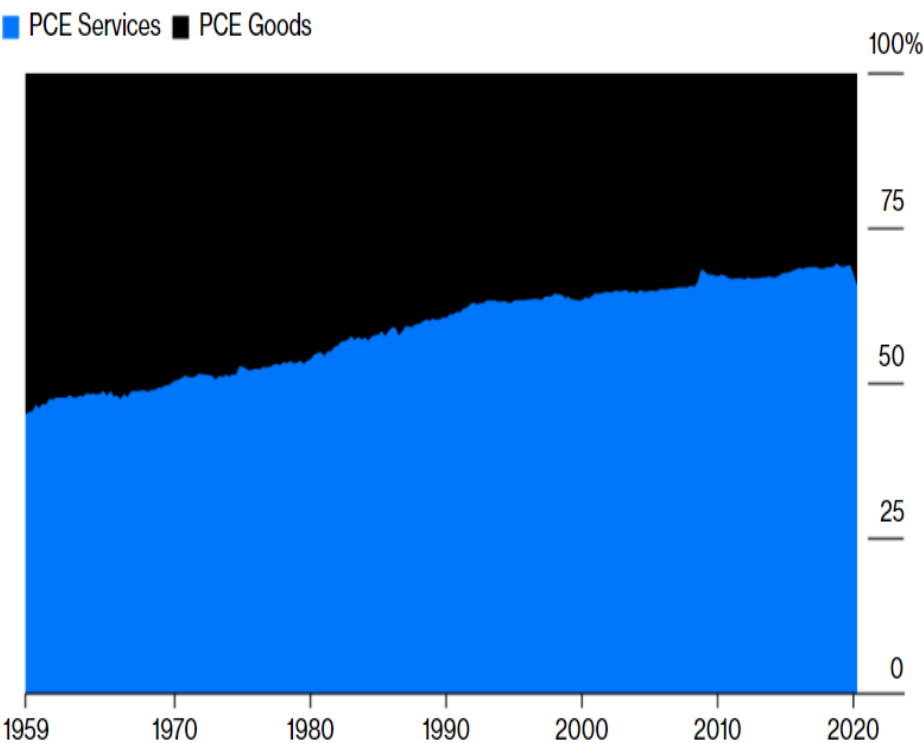
Source: Cardify.ai, Goldman Sachs Global Investment Research

Inflation – Services vs. Goods



America's Economy Is Skewed Toward Services

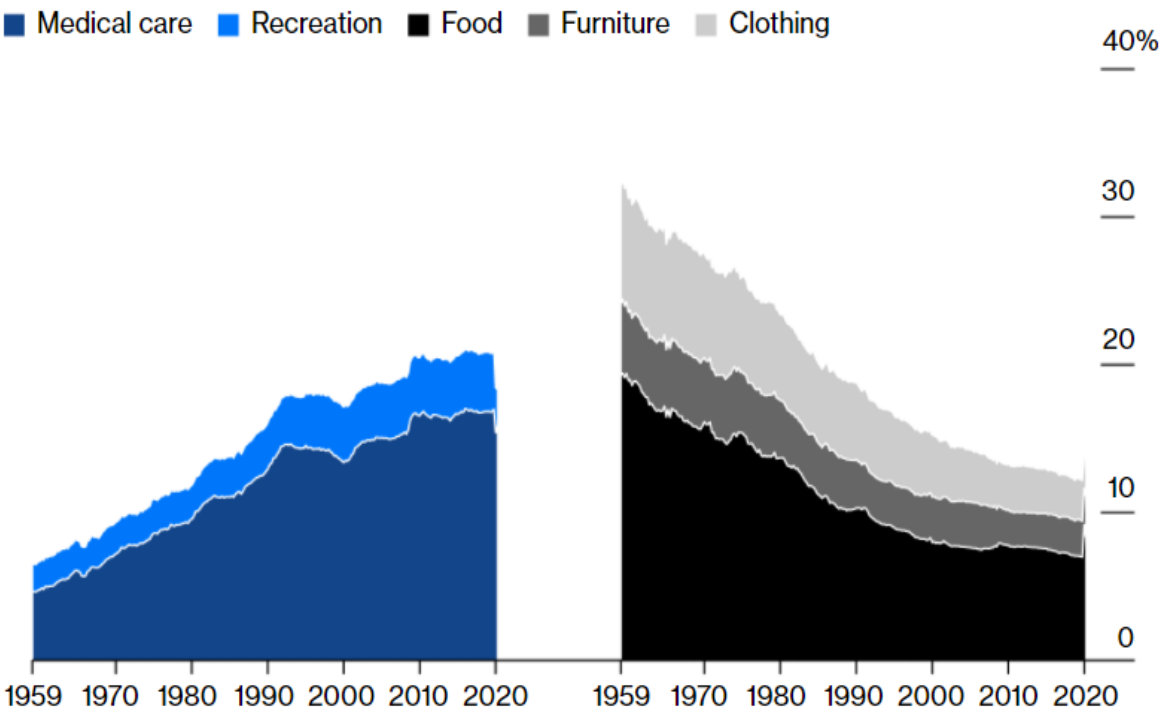
From 50-50 in the 1960s to two-thirds today



Source: Bureau of Economic Analysis

A Look Inside the Basket

As a percentage of PCE, Americans are spending more on services like health care and recreation and less on goods like food and clothing

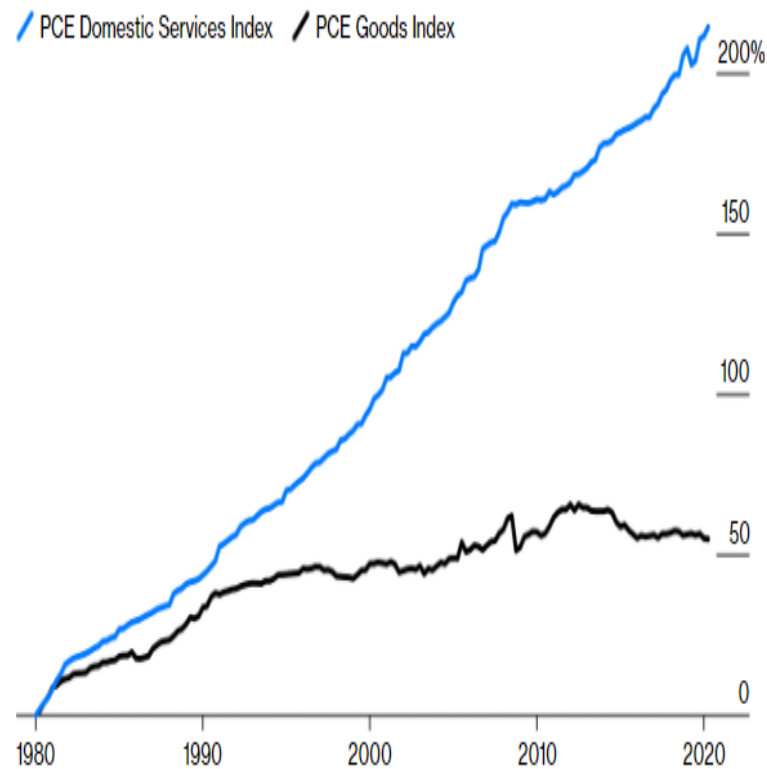


Source: Bureau of Economic Analysis

Inflation – Changes over Time

The Great Inflation Divide

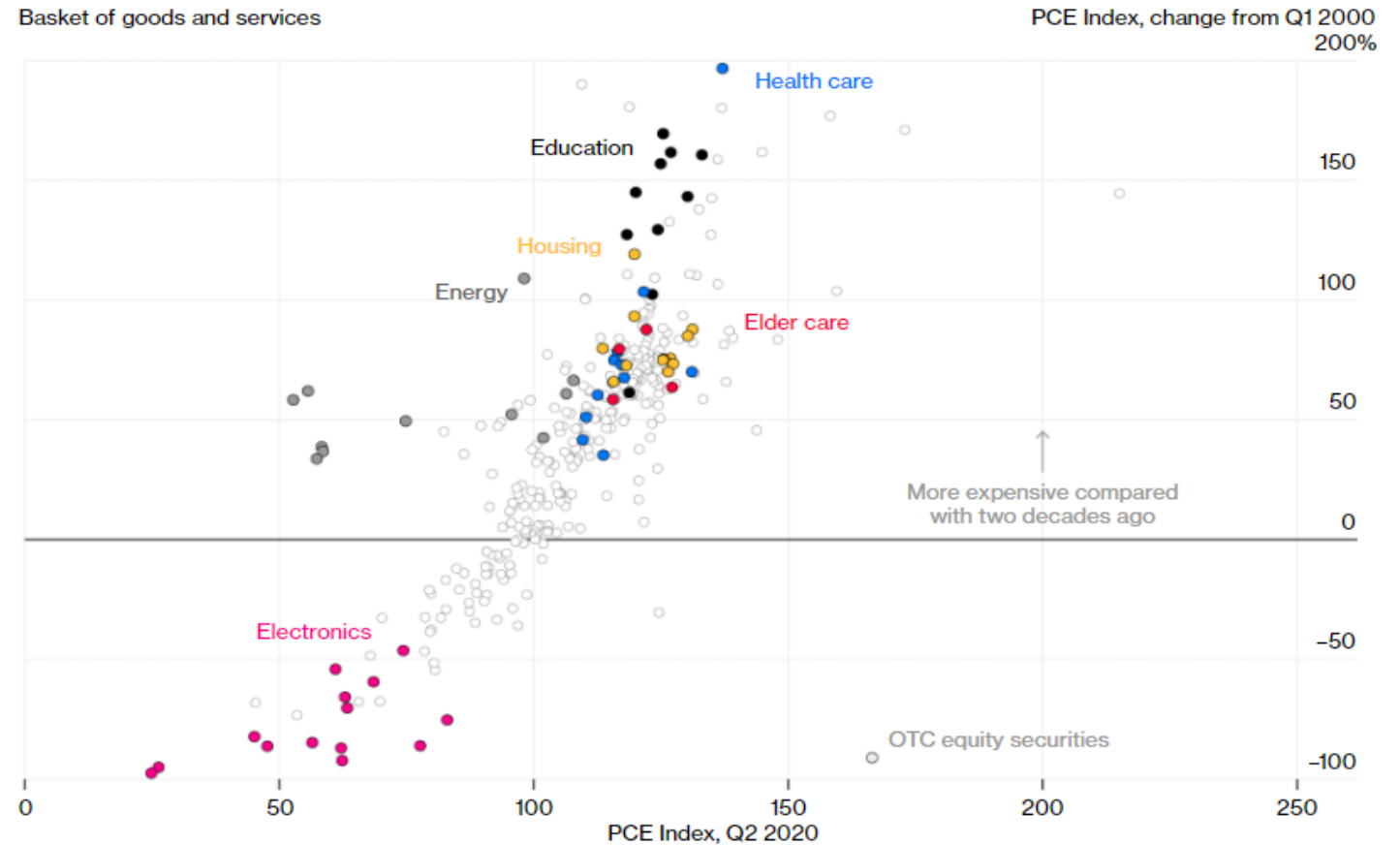
The cost of services has skyrocketed more than 200% since 1980, while the price of goods has barely budged from 1990



Source: Bureau of Economic Analysis

21st Century Inflation

Education is more expensive. Electronics are cheaper. Energy is its own animal.

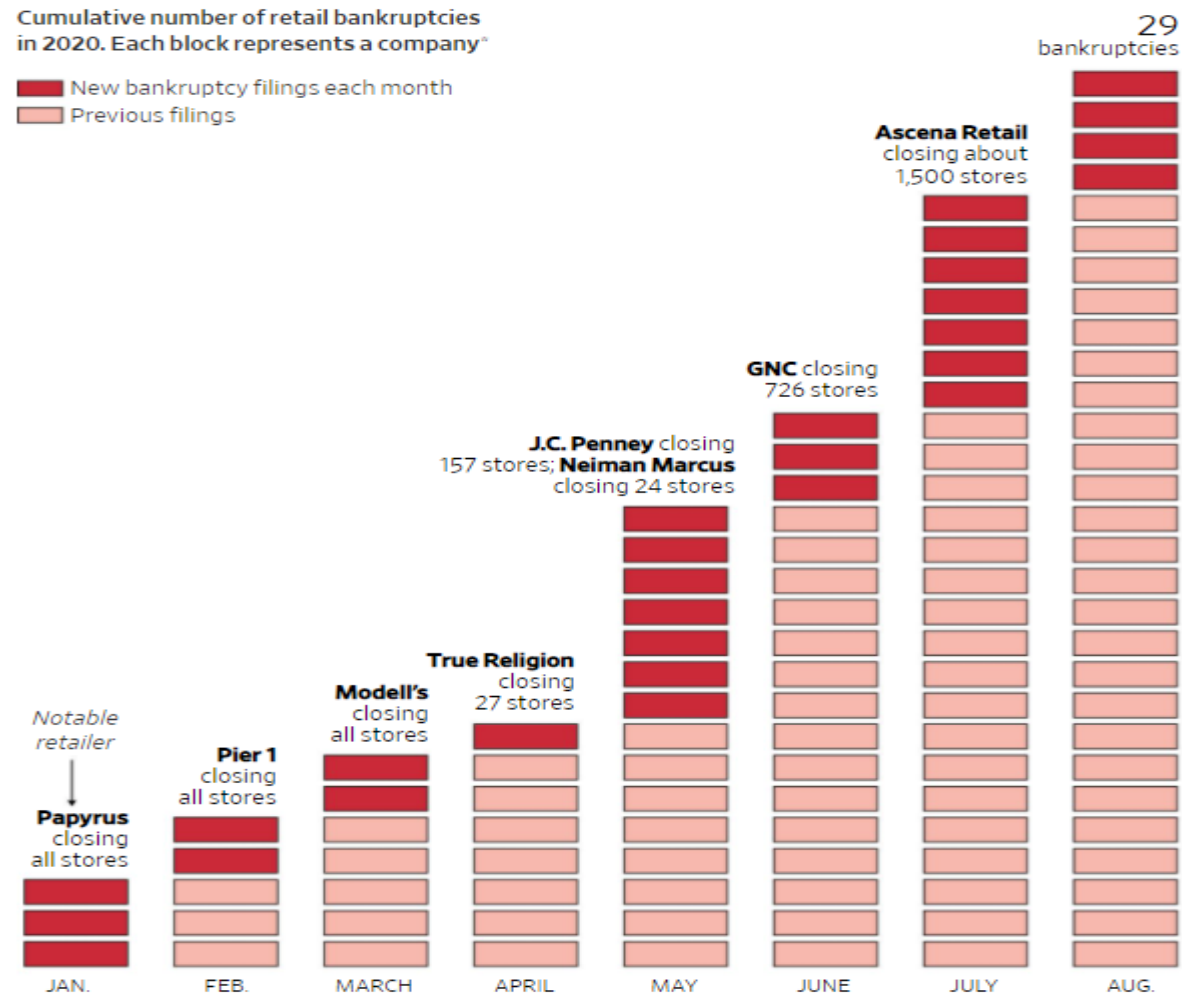


Source: Bureau of Economic Analysis

Retail Struggles

Cumulative number of retail bankruptcies in 2020. Each block represents a company*

■ New bankruptcy filings each month
■ Previous filings



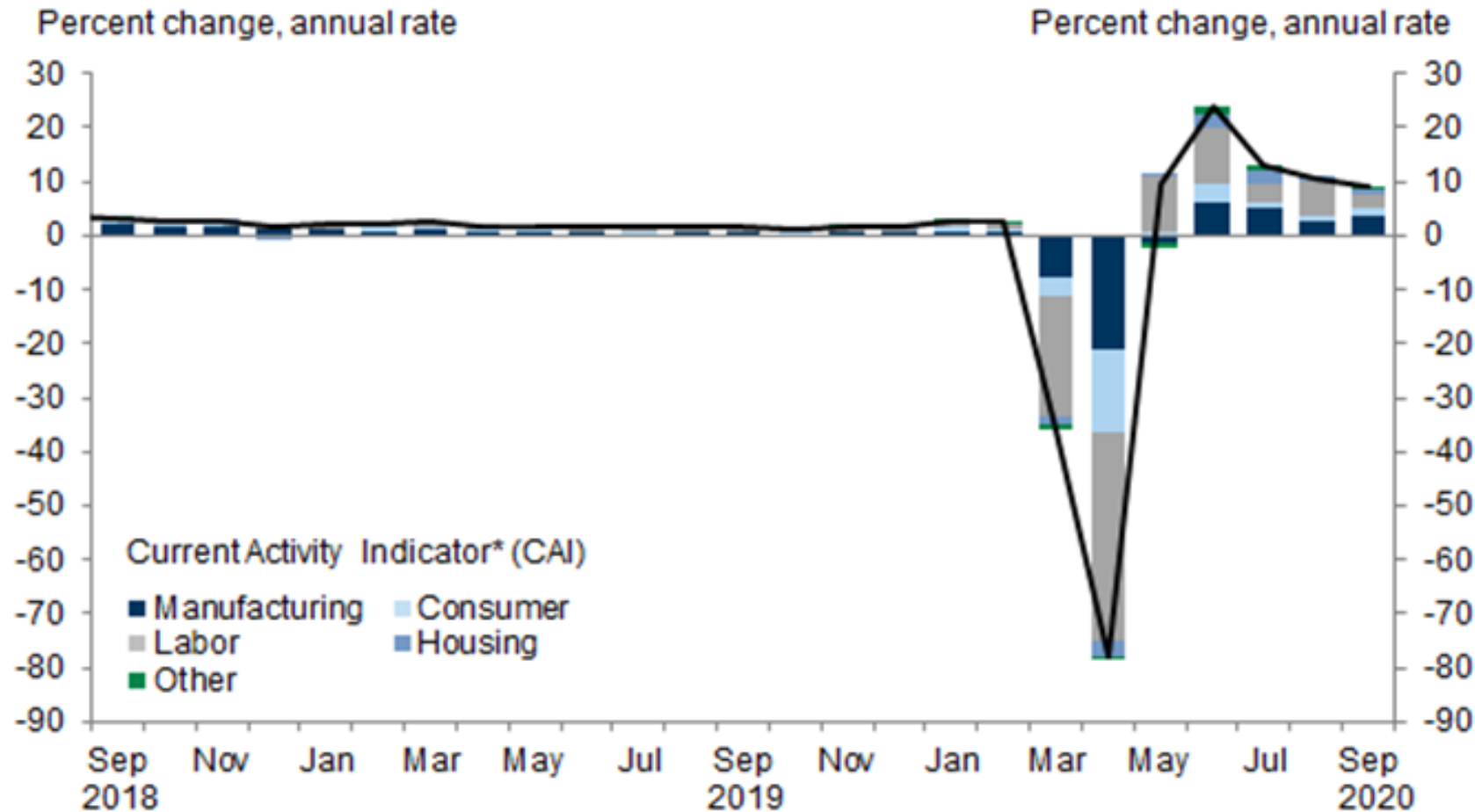
Announced store closings from retail bankruptcies, by type: 5,998

Apparel/Footwear 39%	Home Furnishings 24%	Dept. stores 15%	Other 22%
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*Bankruptcy filings through mid-August
Sources: BDO; staff reports

Activity Indicator

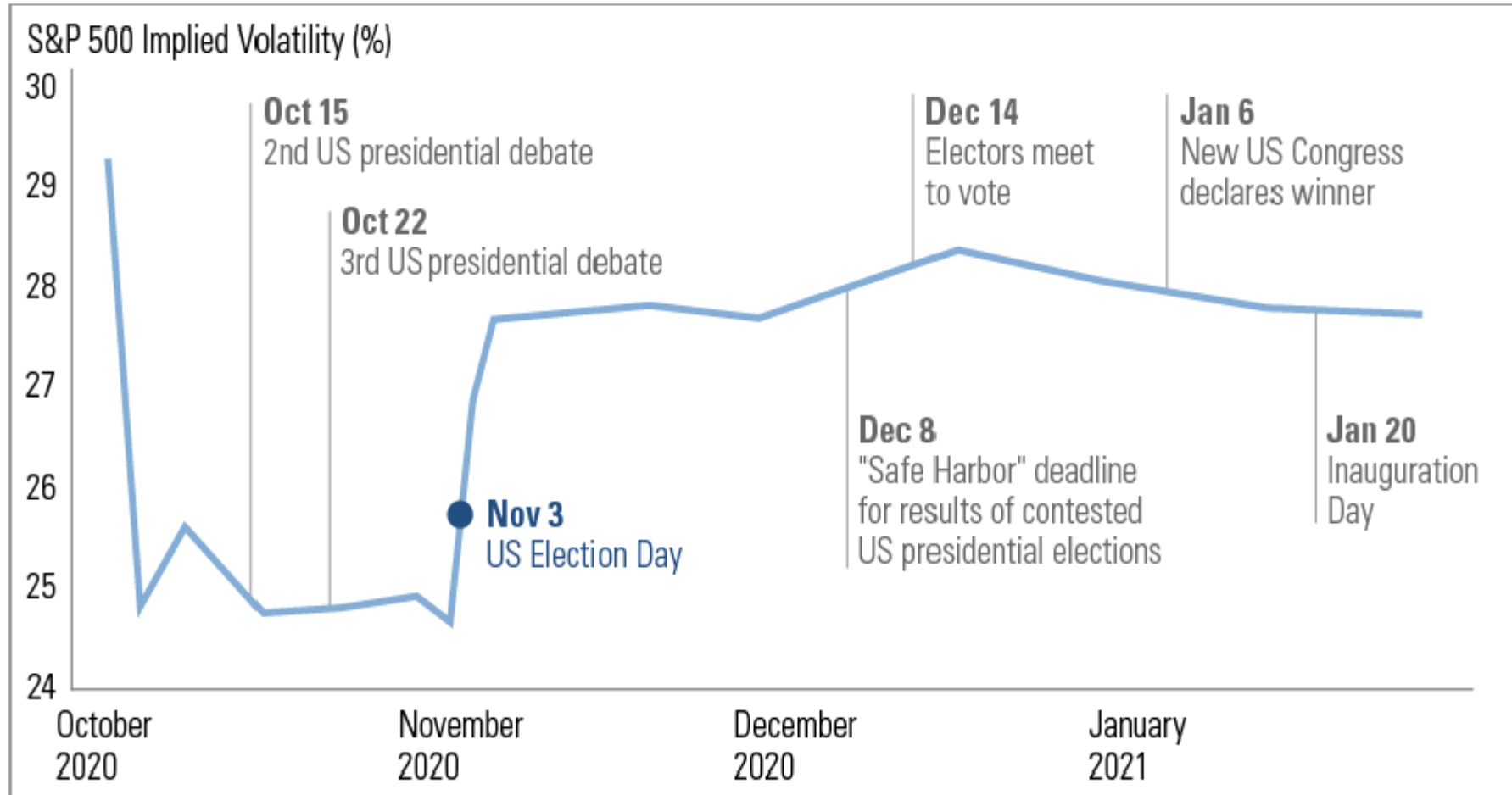
Currently 8.9% (vs. 10.7% in August)



*First principal component of 37 key weekly and monthly US economic indicators.

Source: Goldman Sachs Global Investment Research

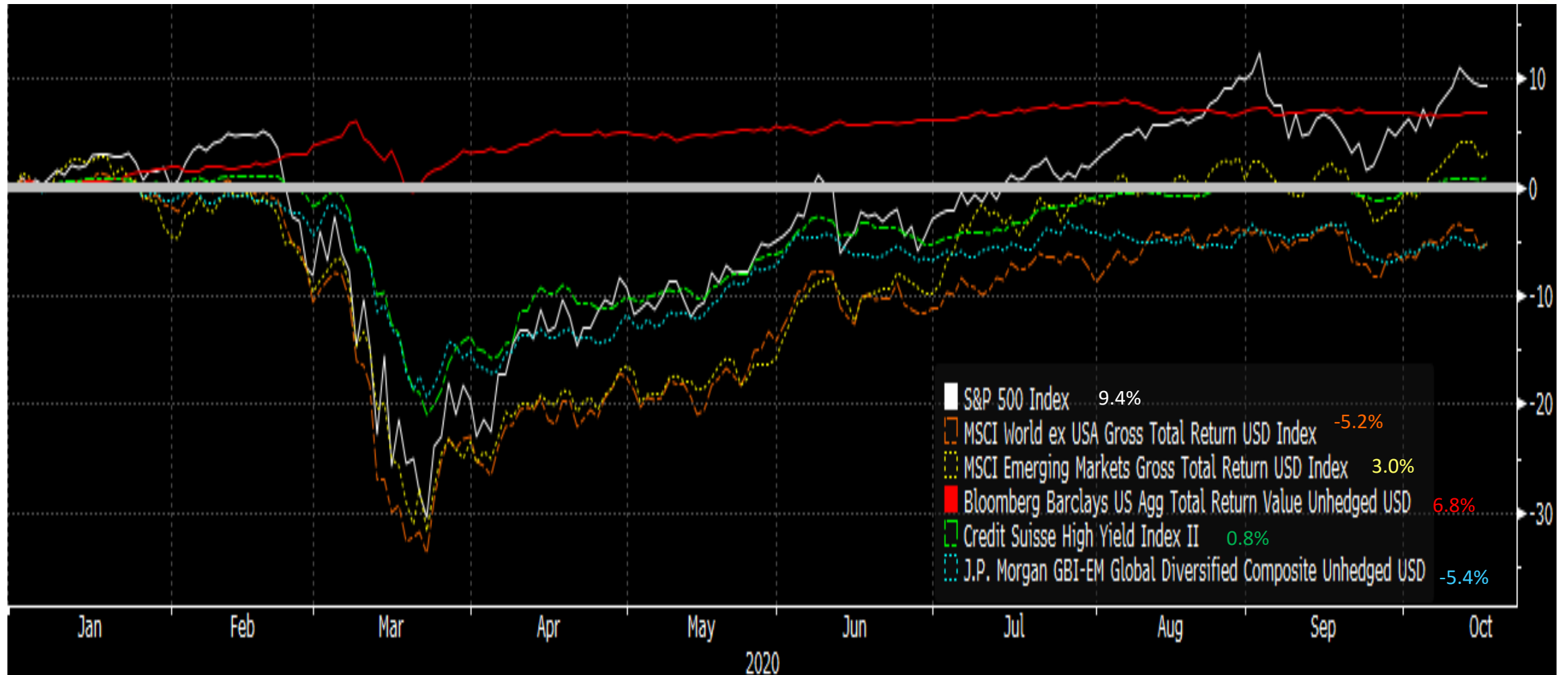
Continued Volatility



Source: Goldman Sachs Global Investment Research. As of September 28, 2020.

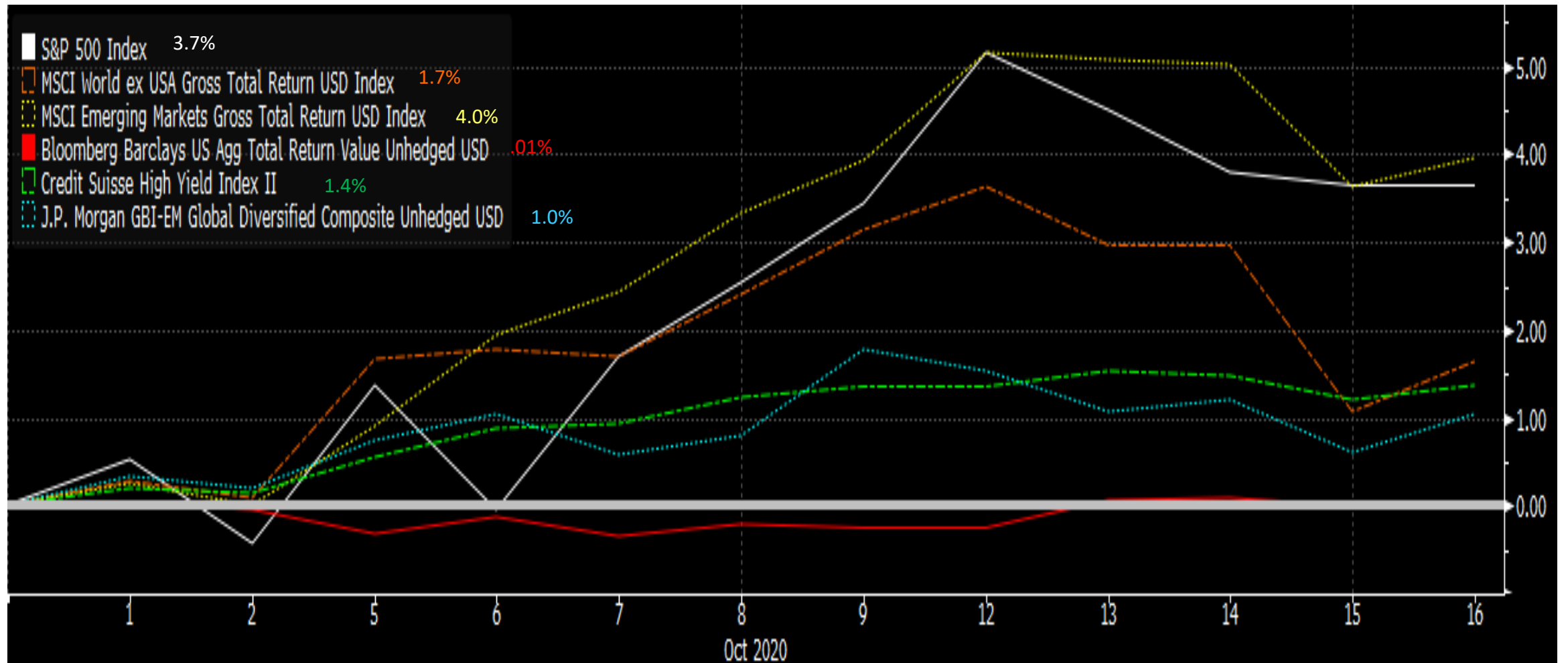
2020 - Major Indices Performance

Calendar Year to Date thru October 16, 2020



October MTD Indices Performance

Thru October 16, 2020



October MTD Performance Summary

As of October 16



	Oct MTD
U.S. Large Cap Equity	3.7
<i>S&P 500 Index</i>	<i>3.6</i>
U.S. Mid Cap Equity	7.4
<i>S&P 400 Index</i>	<i>7.3</i>
U.S. Small Cap Equity	8.3
<i>S&P 600 Index</i>	<i>8.1</i>
LASERS U.S. Equity	5.3
Int'l Large Cap Equity	1.7
<i>MSCI World Ex-USA</i>	<i>1.7</i>
Int'l Small Cap Equity	2.6
<i>MSCI World Ex-USA Small Cap</i>	<i>1.9</i>
Int'l Emerging Markets Equity	3.4
<i>MSCI Emerging Markets</i>	<i>4.0</i>
LASERS Non-U.S. Equity	2.6

	Oct MTD
U.S. Investment Grade	0.4
<i>BB BC Barclay's Aggregate</i>	<i>.01</i>
U.S. High Yield	3.5
<i>Credit Suisse High Yield</i>	<i>1.4</i>
LASERS U.S. Fixed Income	1.8
Emerging Market Debt	1.2
<i>J.P. Morgan GBI-EM Global Diversified</i>	<i>1.0</i>
Global Multi-Sector	0.5
<i>50/50 Barclay's Agg/CS HY</i>	<i>0.7</i>
Alternatives	0.0
LASERS Total Plan	2.5%

LASERS

SUMMARY OF MANAGER PERFORMANCE
 RATES OF RETURN
 TOTAL GROSS OF FEES
 (For Period Ending September 30, 2020)

	Contract Exp. Date	Approx. Mgt. Fees	Curr. Mkt. Value (\$M)	Month	3 mos	YTD	Fiscal YTD	1 Year	2 Years	3 Years	4 Years	5 Years	6 Years
U.S. EQUITY													
LARGE CAP INDEX FUNDS													
LASERS S&P 500 INDEX FUND		1.3 bps	\$ 1,428.0	-3.8	8.9	5.7	8.9	15.3	9.6	12.3	13.9	14.2	11.6
S&P 500 INDEX				-3.8	8.9	5.6	8.9	15.1	9.6	12.3	13.8	14.1	11.5
TOTAL DOMESTIC LARGE CAP		1.3 bps	\$ 1,428.0	-3.8	8.5	2.7	8.5	11.8	7.5	10.6	12.7	12.9	10.5
MID CAP INDEX FUNDS													
LASERS S&P 400 INDEX FUND		1.3 bps	\$ 422.7	-3.2	4.8	-8.8	4.8	-2.3	-2.4	2.9	6.3	8.1	7.0
S&P MIDCAP 400 INDEX				-3.2	4.8	-8.6	4.8	-2.2	-2.3	2.9	6.4	8.1	7.0
TOTAL DOMESTIC MID CAP INDEX		1.3 bps	\$ 422.7	-3.2	4.8	-8.8	4.8	-2.3	-2.4	2.9	6.3	8.1	7.0
SMALL CAP VALUE													
LSV	05/31/21	56.2 bps	\$ 163.9	-3.2	4.9	-22.3	4.9	-14.3	-13.0	-6.4	-0.6	2.9	3.3
S&P 600 VALUE INDEX				-5.3	2.1	-22.9	2.1	-16.9	-12.6	-4.4	1.3	5.0	4.0
S&P SMALLCAP 600 INDEX				-4.7	3.2	-15.2	3.2	-8.3	-8.8	-0.3	4.6	7.2	6.6
TOTAL SMALL VALUE		56.2 bps	\$ 163.9	-3.2	4.9	-22.3	4.9	-14.3	-13.0	-6.4	-0.6	2.7	2.5
SMALL CAP INDEX FUNDS													
LASERS S&P 600 INDEX FUND		1.3 bps	\$ 328.3	-4.5	3.8	-15.1	3.8	-8.1	-8.7	-0.2	4.7	7.2	6.7
S&P SMALLCAP 600 INDEX				-4.7	3.2	-15.2	3.2	-8.3	-8.8	-0.3	4.6	7.2	6.6
TOTAL DOMESTIC SMALL CAP		19.6 bps	\$ 492.3	-4.1	4.4	-17.7	4.4	-11.6	-11.2	-2.7	1.8	4.0	4.0
TOTAL U.S. EQUITY		5.1 bps	\$ 2,343.0	-3.8	6.9	-4.6	6.9	3.2	0.7	5.7	8.7	9.7	8.2

LASERS

SUMMARY OF MANAGER PERFORMANCE
RATES OF RETURN
TOTAL GROSS OF FEES
(For Period Ending September 30, 2020)

	Contract Exp. Date	Approx. Mgt. Fees	Curr. Mkt. Value (\$M)	Month	3 mos	YTD	Fiscal YTD	1 Year	2 Years	3 Years	4 Years	5 Years	6 Years
NON-U.S. EQUITY													
LARGE CAP VALUE													
MONDRIAN INVESTMENT PARTNERS	12/31/20	28.6 bps	\$ 207.2	-4.1	2.2	-15.9	2.2	-8.0	-3.4	-1.8	2.5	3.9	1.9
MSCI WORLD EX-USA VALUE INDEX				-4.8	1.5	-18.4	1.5	-12.2	-8.0	-5.3	1.2	2.0	-0.8
MSCI WORLD EX-USA INDEX				-2.8	5.0	-6.7	5.0	0.6	0.1	1.1	5.4	5.9	3.1
TOTAL INT'L LARGE VALUE		28.6 bps	\$ 207.2	-4.1	2.2	-15.9	2.2	-8.0	-3.4	-1.8	2.5	3.9	1.9
LARGE CAP CORE													
LASERS MSCI WORLD EX-USA INDEX FUND		1.3 bps	\$ 1,120.6	-2.6	5.6	-6.1	5.6	1.2	0.3	1.1	5.3	5.7	3.0
MSCI WORLD EX-USA INDEX				-2.8	5.0	-6.7	5.0	0.6	0.1	1.1	5.4	5.9	3.1
TOTAL INT'L LARGE CORE		1.3 bps	\$ 1,120.6	-2.6	5.6	-6.1	5.6	1.2	0.3	1.1	5.3	5.7	3.0
LARGE CAP TERROR-FREE													
LASERS TERROR-FREE INT'L FUND		1.3 bps	\$ 28.9	-2.9	4.3	-7.5	4.3	-0.5	0.3	1.0	5.7	5.9	3.2
MSCI WORLD EX-USA INDEX				-2.8	5.0	-6.7	5.0	0.6	0.1	1.1	5.4	5.9	3.1
TOTAL INT'L LARGE CAP		5.5 bps	\$ 1,356.7	-2.8	5.0	-7.9	5.0	-0.4	-0.4	0.6	4.8	5.4	2.8
INT'L SMALL CAP													
MONDRIAN INVESTMENT PARTNERS	02/14/21	70.6 bps	\$ 224.6	-2.3	9.0	-6.7	9.0	4.0	0.0	2.4	6.0	7.9	5.9
GOLDMAN SACHS	02/17/21	51.0 bps	\$ 351.6	-0.4	10.6	-1.7	10.6	8.1	0.8	2.0	7.0		
MSCI WORLD EX-USA SMALL CAP INDEX				-1.1	10.2	-3.7	10.2	7.3	0.8	1.8	6.3	7.8	5.8
TOTAL INT'L SMALL CAP		58.6 bps	\$ 576.2	-1.1	10.0	-3.7	10.0	6.5	0.4	2.1	6.5	8.7	6.5
EMERGING MARKETS													
CITY OF LONDON	08/31/24	93.0 bps	\$ 398.9	-1.1	9.6	-0.6	9.6	11.6	7.4	3.9	8.3	10.2	5.4
WESTWOOD GLOBAL EMERGING MKTS	OPEN	89.2 bps	\$ 272.8	0.6	9.9	-10.7	9.9	-1.5	-4.0	-1.1	4.6	6.8	2.3
LSV CUSTOM EMERGING MARKETS	08/22/23	50.0 bps	\$ 469.4	-2.7	2.1	-18.1	2.1	-9.5	-6.4	-4.8	1.4	4.0	-0.5
MSCI EMERGING MARKETS INDEX				-1.6	9.7	-0.9	9.7	10.9	4.4	2.8	7.5	9.4	4.0
TOTAL EMERGING MARKETS		74.4 bps	\$ 1,141.2	-1.4	6.5	-11.7	6.5	-2.1	-1.9	-1.5	4.0	6.4	1.7
TOTAL NON-U.S. EQUITY		41.0 bps	\$ 3,074.1	-2.0	6.5	-8.7	6.5	0.1	-0.8	0.1	4.8	6.2	2.8
TOTAL EQUITY		25.5 bps	\$ 5,417.1	-2.8	6.7	-7.1	6.7	1.3	-0.2	2.4	6.5	7.7	5.3

LASERS

SUMMARY OF MANAGER PERFORMANCE
RATES OF RETURN
TOTAL GROSS OF FEES
(For Period Ending September 30, 2020)

	Contract Exp. Date	Approx. Mgt. Fees	Curr. Mkt. Value (\$M)	Month	3 mos	YTD	Fiscal YTD	1 Year	2 Years	3 Years	4 Years	5 Years	6 Years
US FIXED INCOME													
INVESTMENT GRADE													
LOOMIS SAYLES & CO	12/31/24	17.6 bps	\$ 191.5	0.0	2.0	8.7	2.0	9.4	9.4	6.3	5.4	6.1	4.8
ORLEANS CAPITAL MGT	12/31/24	12.0 bps	\$ 137.8	-0.1	1.1	6.7	1.1	7.6	8.7	5.3	4.2	4.7	4.0
BB BC US AGGREGATE BOND INDEX				-0.1	0.6	6.8	0.6	7.0	8.6	5.2	3.9	4.2	4.0
TOTAL INVESTMENT GRADE		15.3 bps	\$ 329.3	-0.1	1.6	7.7	1.6	8.4	9.0	5.8	4.8	5.5	4.4
HIGH YIELD													
JPMORGAN	06/30/22	27.0 bps	\$ 140.5	-0.4	5.2	-1.0	5.2	1.2	3.4	3.3	4.7	5.9	4.5
NOMURA	06/30/22	45.0 bps	\$ 134.3	-1.0	5.7	-2.1	5.7	0.7	1.9	3.0	4.9	6.8	4.9
CREDIT SUISSE HY INDEX				-0.8	4.9	-0.6	4.9	2.0	3.9	3.6	5.0	6.4	4.6
TOTAL HIGH YIELD		35.8 bps	\$ 274.8	-0.7	5.4	-1.3	5.4	1.3	2.8	3.3	4.9	6.4	4.7
TOTAL U.S. FIXED INCOME													
		24.6 bps	\$ 604.1	-0.4	3.3	3.0	3.3	4.7	5.9	4.6	5.0	5.8	4.7
EMERGING MARKET DEBT (+)													
STONE HARBOR	10/02/22	52.5 bps	\$ 201.5	-2.4	0.9	-6.4	0.9	-1.5	4.1	-1.0	1.4	4.5	-0.5
GRAMERCY*	OPEN	85.0 bps	\$ 171.4	-1.5	0.9	1.4	0.9	5.6					
J.P. MORGAN GBI-EM GLOBAL DIVERSIFIED INDEX				-2.0	0.6	-6.3	0.6	-1.4	4.2	0.2	1.9	4.8	0.2
TOTAL EMERGING MARKET DEBT (+)		67.4 bps	\$ 372.9	-2.0	0.9	-3.6	0.9	1.1	4.7	-0.6	1.7	4.8	-0.3
GLOBAL MULTI-SECTOR (+)													
DOUBLELINE	05/05/21	60.0 bps	\$ 226.8	0.8	3.6	0.1	3.6	1.6	4.0	4.0	5.0		
GOLDENTREE	05/01/21	75.0 bps	\$ 260.9	0.1	4.5	1.7	4.5	5.1	4.9	5.6	6.9		
PIMCO*	OPEN	95.0 bps	\$ 291.0	1.4	4.8	9.9	4.8	12.1					
BLACKSTONE*	OPEN	78.1 bps	\$ 293.4	1.2	3.1	1.9	3.1	3.7					
ZAIS GROUP*	OPEN	62.5 bps	\$ 93.7	2.5	6.5	-21.2	6.5	-20.3					
50/50 BB BARCLAYS GLOBAL AGG/CS HY INDEX				-0.6	3.8	2.7	3.8	4.3	5.5	3.9	3.9		
TOTAL GLOBAL MULTI-SECTOR (+)		57.2 bps	\$ 1,165.6	1.0	4.2	0.9	4.2	2.9	4.4	4.8	5.9		
TOTAL FIXED INCOME (+)													
		49.8 bps	\$ 2,142.7	0.1	3.4	0.9	3.4	3.3	5.0	3.8	4.6	5.6	4.0

LASERS

SUMMARY OF MANAGER PERFORMANCE
RATES OF RETURN
TOTAL GROSS OF FEES
(For Period Ending September 30, 2020)

	Contract Exp. Date	Approx. Mgt. Fees	Curr. Mkt. Value (\$M)	Month	3 mos	YTD	Fiscal YTD	1 Year	2 Years	3 Years	4 Years	5 Years	6 Years
ALTERNATIVE ASSETS*													
PRIVATE MARKETS* (for breakout see pages 5-6)													
TOTAL PRIVATE MARKETS*		92.2 bps	\$ 2,029.5	0.7	4.0	3.1	4.0	4.4	7.6	11.5	12.5	10.6	10.5
ABSOLUTE RETURN STRATEGIES*													
BRIDGEWATER PURE ALPHA		200.0 bps	\$ 7.1	-1.9	0.0	-13.5	0.0	-11.3	-3.2	-0.7	1.5	0.0	0.5
PRISMA CAPITAL PARTNERS		65.0 bps	\$ 265.7	-0.3	1.0	-4.3	1.0	-1.7	-0.2	1.7	2.6	2.0	1.4
ENTRUST CAPITAL PARTNERS		111.9 bps	\$ 305.4	0.1	4.6	-7.7	4.6	-4.8	-6.3	-3.4	-1.8	0.7	-0.4
HFRI FUND OF FUNDS COMPOSITE INDEX				-0.3	4.1	2.4	4.1	5.5	3.8	3.9	4.4	3.6	2.9
ABSOLUTE RETURN STRATEGIES*~		90.9 bps	\$ 581.6	-0.1	2.8	-6.7	2.8	-4.2	-2.6	-0.3	1.0	0.8	0.4
~includes assets being liquidated: PAAMCO \$1.2m; Stark \$2.3m													
RISK PARITY*													
BRIDGEWATER CUSTOM		66.9 bps	\$ 309.7	-2.3	4.2	0.5	4.2	3.5	5.6				
AQR CAPITAL MANAGEMENT		110.0 bps	\$ 262.0	-1.7	4.8	-11.5	4.8	-10.7	-0.9	-0.6			
LASERS 8% NOMINAL BENCHMARK				0.6	1.9	5.9	1.9	8.0	8.0	8.0	8.0	8.0	8.0
TOTAL RISK PARITY*		86.6 bps	\$ 571.7	-2.0	4.5	-5.8	4.5	-3.9	2.2	2.1	3.0	4.5	2.7
TOTAL ALTERNATIVE ASSETS*		91.0 bps	\$ 3,182.9	0.0	3.9	-1.6	3.9	0.2	3.8	6.1	7.0	6.4	5.6
CASH EQUIVALENTS													
HOLDING ACCOUNT			\$ 341.4										
EB TEMPORARY INVESTMENT FUND		9.0 bps		0.01	0.05	0.57	0.05	1.07	1.79	1.81	1.61	1.38	1.19
90 DAY T-BILL INDEX				0.01	0.03	0.56	0.03	1.02	1.69	1.65	1.40	1.16	0.97
TOTAL PLAN													
FINANCIAL COMPOSITE		31.4 bps	\$ 7,901.2	-1.9	5.4	-5.7	5.4	1.2	0.5	2.6	6.0	7.3	5.0
FINANCIAL ALLOCATION INDEX				-2.3	6.1	-2.4	6.1	5.0	2.7	4.0	7.2	8.4	5.9
FINANCIAL POLICY INDEX				-2.4	6.2	-2.4	6.2	5.2	3.0	4.3	7.4	8.6	6.0
TOTAL PLAN		48.5 bps	\$ 11,084.1	-1.3	4.9	-4.4	4.9	1.0	1.5	3.5	6.3	7.0	5.2
TOTAL PLAN ALLOCATION INDEX				-1.5	5.4	-0.7	5.4	5.2	3.8	5.3	7.7	8.2	6.3
TOTAL PLAN POLICY INDEX				-1.6	5.5	-0.1	5.5	5.9	4.4	5.8	8.1	8.6	6.5
Cells highlighted in green represent performance above the benchmark. Cells highlighted in yellow represent manager performance below the benchmark. Cells highlighted in red represent asset class performance below the benchmark. Royal blue lines represent specific benchmarks. Light blue lines represent broad benchmarks. *Net of fee information is reported. (+) Composite is mixed, containing both gross-of-fee and net-of-fee portfolios.										LONG TERM RETURNS FOR TOTAL PLAN			
										7 Years	8 Years	9 Years	10 Years
										5.9	6.8	7.8	7.2

LASERS
SUMMARY OF MANAGER PERFORMANCE
RATES OF RETURN
TOTAL NET OF FEES
(For Period Ending September 30, 2020)

	Vintage Year	Contract Exp. Date	Commit. Amount	Approx. Mgt. Fees	Curr. Mkt. Value (\$M)	Month	3 mos	YTD	Fiscal YTD	1 Year	2 Years	3 Years	4 Years	5 Years	6 Years
PRIVATE MARKETS BREAKOUT															
ADAMS STREET 2005 NON-US	2005	12/31/20	\$ 15.0	9.3 bps	\$ 2.7	1.6	1.6	-4.9	1.6	-8.4	-6.5	-0.3	2.9	1.3	1.0
ADAMS STREET PARTNERSHIP 2002 US	2002	12/31/20	\$ 15.0	0.0 bps	\$ 1.1	9.6	9.6	2.6	9.6	0.6	-3.2	2.8	6.0	4.2	4.8
ADAMS STREET PARTNERSHIP 2005 US	2005	12/31/20	\$ 35.0	9.3 bps	\$ 6.0	12.4	12.4	3.6	12.4	3.1	8.5	9.9	10.8	7.9	8.7
ADAMS STREET 2007 US FUND	2007	12/31/20	\$ 27.5	22.5 bps	\$ 10.5	17.3	17.3	9.2	17.3	3.9	12.6	14.5	15.4	12.4	13.9
ADAMS STREET 2007 NON-US	2007	12/31/20	\$ 17.5	22.5 bps	\$ 6.9	14.9	14.9	5.8	14.9	2.5	5.0	8.9	10.2	8.7	8.8
ADAMS STREET 2007 DIRECT	2007	12/31/20	\$ 5.0	40.0 bps	\$ 2.4	41.4	41.4	26.5	41.4	24.7	25.3	29.2	23.0	18.7	25.0
ADAMS STREET 2009 US FUND	2009	12/31/20	\$ 25.0	42.0 bps	\$ 16.6	13.9	13.9	10.2	13.9	8.6	13.3	15.1	13.8	12.3	13.5
ADAMS STREET 2009 NON-US DEV	2009	12/31/20	\$ 15.0	42.0 bps	\$ 8.6	14.7	14.7	8.1	14.7	6.4	11.9	15.4	16.8	15.1	13.1
ADAMS STREET 2009 NON-US EMG	2009	12/31/20	\$ 5.0	42.0 bps	\$ 5.1	8.9	8.9	1.8	8.9	2.7	3.7	7.6	8.7	7.5	10.4
ADAMS STREET 2009 DIRECT	2009	12/31/20	\$ 5.0	80.0 bps	\$ 2.8	16.2	16.2	9.8	16.2	7.7	3.9	11.8	10.2	8.6	9.4
AEA INVESTORS FUND VI	2015	05/31/25	\$ 50.0	150.0 bps	\$ 56.3	0.0	0.0	9.9	0.0	10.0	10.7	9.9	6.7		
AEA INVESTORS FUND VII	2018	02/08/30	\$ 100.0	175.0 bps	\$ 15.0	0.0	-0.3	17.4	-0.3	9.4					
ALTAS PARTNERS HOLDING II	2019	06/30/29	\$ 100.0	100.0 bps	\$ 22.4	0.0	0.2	-8.8	0.2	-7.0					
BARING PE ASIA FUND VII	2018	08/08/28	\$ 100.0	175.0 bps	\$ 40.5	-1.4	-4.0	1.9	-4.0	3.3					
BCP ENERGY SERVICES FUND A	2015	09/23/25	\$ 50.0	200.0 bps	\$ 37.4	-0.7	-2.2	11.2	-2.2	3.2	4.6	15.8	17.6		
BCP FUND II A	2017	12/31/27	\$ 75.0	200.0 bps	\$ 14.0	0.0	62.9	n/a	62.9	-76.0					
BRINSON (ø)	'97-'03	termed out	\$ 202.8	0.0 bps	\$ 3.3	5.2	5.2	0.8	5.2	-1.4	-1.3	2.5	2.7	1.7	0.5
BROOKFIELD CAPITAL IV	2015	05/31/25	\$ 50.0	150.0 bps	\$ 37.4	-0.4	-0.4	-2.3	-0.4	3.4	17.0	56.4	46.7		
BROOKFIELD INFRASTRUCTURE IV-B	2020	02/07/32	\$ 100.0	140.0 bps	\$ 36.3	-0.1	5.8	N/A	5.8						
BROOKFIELD CAPITAL V	2019	10/24/29	\$ 100.0	150.0 bps	\$ 33.6	-1.6	-1.6	16.5	-1.6	7.9					
ADAMS STREET V	2003	08/08/21	\$ 15.0	0.0 bps	\$ 1.9	0.0	11.5	-27.9	11.5	-54.9	-29.1	-18.4	-16.5	-13.3	-10.1
APOLLO INV FUND VII	2008	12/17/20	\$ 60.0	0.0 bps	\$ 5.6	0.0	0.0	-18.4	0.0	-27.9	-24.5	-14.9	-10.8	-10.7	-8.3
APOLLO INV FUND VIII	2013	06/30/23	\$ 70.0	75.0 bps	\$ 49.7	-0.2	-0.2	-6.2	-0.2	-0.4	-0.2	5.7	8.6	10.2	11.1
APOLLO EUROPEAN FUND II	2011	12/31/20	\$ 100.0	150.0 bps	\$ 14.7	0.0	0.0	-10.3	0.0	-13.6	-10.8	-4.0	0.2	3.2	4.0
APOLLO INV FUND IX	2017	06/01/27	\$ 85.0	150.0 bps	\$ 19.5	0.0	0.0	11.8	0.0	8.5					
ARCLIGHT ENERGY FUND VI	2015	07/28/25	\$ 75.0	150.0 bps	\$ 49.8	0.0	6.0	-24.8	6.0	-26.6	-10.0	-0.6	2.1	2.7	
CCMP CAPITAL III	2013	12/31/23	\$ 60.0	100.0 bps	\$ 57.2	-0.1	11.0	7.6	11.0	11.0	7.0	7.6	9.0	11.3	11.4
CERBERUS VI	2016	08/31/26	\$ 125.0	150.0 bps	\$ 126.7	0.0	0.0	7.2	0.0	12.0	9.3	1.2	9.8		
COLLER INTERNATIONAL PTNRS VI	2012	06/15/22	\$ 100.0	72.9 bps	\$ 26.1	0.0	0.0	-15.9	0.0	-10.7	3.1	8.8	11.6	10.3	10.6
COLLER INTERNATIONAL PTNRS VII	2015	12/31/25	\$ 75.0	125.0 bps	\$ 59.2	0.0	0.0	-3.5	0.0	-1.7	4.0	11.3	30.8		
COLLER INTERNATIONAL PTNRS VIII	2018	01/31/30	\$ 100.0	150.0 bps	\$ 10.5	0.0	0.0	N/A	0.0						
DOUBLELINE MORTGAGE OPP FUND	2018	10/31/20	\$ 125.0	100.0 bps	\$ 118.5	0.0	0.0	-4.1	0.0	-2.0	1.8				
DRUG ROYALTY FUND III	2013	06/30/23	\$ 50.0	0.0 bps	\$ 4.7	0.0	0.0	9.6	0.0	9.6	18.1	31.8	26.3	23.7	21.2
EIG ENERGY FUND XIV	2007	11/07/20	\$ 50.0	0.0 bps	\$ 2.5	-1.3	-1.4	-43.9	-1.4	-48.1	-37.0	-22.3	-14.1	-28.7	-27.8
EIG ENERGY FUND XV	2010	06/06/21	\$ 40.0	125.0 bps	\$ 7.6	0.0	1.3	-26.3	1.3	-31.5	-17.6	-12.2	-5.8	-6.6	-6.3
EIG ENERGY FUND XVI	2013	05/13/23	\$ 70.0	125.0 bps	\$ 39.4	-2.3	0.4	-9.3	0.4	-6.9	-3.9	2.0	10.8	9.3	-4.4
ENERGY SPECTRUM FUND VI	2010	11/01/21	\$ 40.0	175.0 bps	\$ 8.6	0.0	0.0	-18.2	0.0	-16.3	24.4	24.6	31.1	21.9	19.8
GTCR FUND XI	2014	05/21/23	\$ 50.0	150.0 bps	\$ 36.8	-0.4	-0.4	19.8	-0.4	29.7	34.9	34.5	33.5	27.5	26.4
GTCR FUND XII	2017	09/14/27	\$ 60.0	150.0 bps	\$ 38.6	0.0	-0.8	21.0	-0.8	45.7	11.4				
LOUISIANA GROWTH FUND	2004	11/13/20	\$ 50.0	0.0 bps	\$ 0.1	0.0	0.0	-7.0	0.0	-7.0	3.5	12.9	-5.1	-6.6	-3.2
LOUISIANA GROWTH FUND II	2007	06/26/21	\$ 73.5	12.5 bps	\$ 0.3	0.0	0.0	1934.2	0.0	1934.2	359.5	243.3	170.9	121.7	93.7
GAMUT FUND I	2016	07/28/26	\$ 50.0	200.0 bps	\$ 26.7	0.0	12.3	1.4	12.3	-0.3	12.3	7.7			
GOLDMAN SACHS PEP IX	2007	12/31/20	\$ 100.0	8.0 bps	\$ 20.4	0.0	-9.2	-4.1	-9.2	-6.0	-0.5	7.2	9.6	8.8	9.3
GOLDENTREE DISTRESSED FUND III	2018	01/31/23	\$ 75.0	125.0 bps	\$ 61.0	0.0	0.0	6.9	0.0	5.2					

LASERS
SUMMARY OF MANAGER PERFORMANCE
RATES OF RETURN
TOTAL NET OF FEES
(For Period Ending September 30, 2020)

	Vintage Year	Contract Exp. Date	Commit. Amount	Approx. Mgt. Fees	Curr. Mkt. Value (\$M)	Month	3 mos	YTD	Fiscal YTD	1 Year	2 Years	3 Years	4 Years	5 Years	6 Years
JOHN HANCOCK*	multiple	OPEN	\$ 55.5	0.0 bps	\$ 0.4	0.0	-0.2	-0.5	-0.2	-0.7	22.8	-1.7	-2.6	-0.2	1.8
HIPEP PARTNERSHIP III	1997	12/31/20	\$ 60.0	0.0 bps	\$ 0.1	0.0	-0.6	-5.2	-0.6	-7.2	-6.9	-6.7	-3.5	-3.1	-3.8
HARBOURVEST VI - DIRECT	1999	termed out	\$ 25.0	0.0 bps	\$ 0.9	0.0	-12.3	-16.7	-12.3	-51.7	-18.9	-18.8	-17.8	-19.0	-13.8
HARBOURVEST VI - PTNR	1999	termed out	\$ 150.0	0.0 bps	\$ 0.7	0.0	8.8	-12.4	8.8	-15.2	-8.3	-5.7	-1.8	-1.6	-1.5
HIPEP DIRECT IV	2000	12/31/20	\$ 10.0	0.0 bps	\$ 0.2	0.0	32.0	-19.4	32.0	-24.8	-25.8	-10.9	3.1	1.7	-1.4
HUFF ALTERNATIVE FUND	2001	10/15/20	\$ 32.5	0.0 bps	\$ 4.6	0.0	-8.4	2.0	-8.4	0.6	0.4	0.1	4.7	3.1	3.4
INSIGHT VENTURE PARTNERS X	2017	07/14/27	\$ 50.0	175.0 bps	\$ 61.2	0.0	12.7	15.7	12.7	23.3	19.4				
INSIGHT VENTURE PARTNERS XI	2020	03/31/30	\$ 100.0	175.0 bps	\$ 25.2	0.0	19.1								
KKR ASIAN FUND III	2017	05/31/28	\$ 50.0	150.0 bps	\$ 34.6	0.0	0.0	5.3	0.0	11.9	38.0				
KPS SPECIAL SITUATIONS MID-CAP FUND	2019	10/04/29	\$ 20.0	125.0 bps	\$ 3.4	0.0	-1.7	-1.5	-1.7						
KPS SPECIAL SITUATIONS FUND V	2019	10/04/29	\$ 50.0	125.0 bps	\$ 8.4	-0.1									
MESIROW III	2005	04/06/21	\$ 23.0	36.0 bps	\$ 3.5	0.0	6.3	1.9	6.3	-2.6	-1.2	2.6	2.3	1.7	3.6
MESIROW IV	2006	11/21/20	\$ 60.0	33.5 bps	\$ 22.8	0.0	15.5	10.1	15.5	9.0	11.0	11.4	12.8	11.3	12.0
MESIROW V	2008	11/05/20	\$ 60.0	41.3 bps	\$ 44.2	0.0	13.8	9.1	13.8	10.9	14.7	16.1	17.7	16.0	16.7
NEWSTONE MEZZANINE II	2010	03/05/21	\$ 40.0	100.0 bps	\$ 4.7	0.0	0.1	11.0	0.1	10.2	13.2	14.3	12.5	11.3	14.4
OHA STRATEGIC CREDIT FUND II	2017	07/14/27	\$ 50.0	138.0 bps	\$ 25.6	2.8	4.2	-6.3	4.2	-7.5	-0.6				
OAKTREE EUROPEAN FUND III	2011	03/31/22	\$ 45.1	175.0 bps	\$ 29.0	-1.9	4.4	-2.4	4.4	2.4	2.0	3.8	8.0	7.7	8.2
PANTHEON EUROPE VI	2008	12/19/20	\$ 44.9	54.7 bps	\$ 14.1	11.0	18.1	13.4	18.1	19.2	15.6	16.4	18.7	16.4	15.1
PANTHEON VI	2004	07/12/21	\$ 50.0	34.9 bps	\$ 3.7	2.2	2.2	-27.6	2.2	-27.8	-12.9	-5.7	-2.2	-2.4	-1.2
PANTHEON VII	2006	04/28/21	\$ 50.0	49.2 bps	\$ 14.1	13.5	13.5	-0.4	13.5	-2.6	0.8	5.5	8.1	7.0	8.1
STEPSTONE FUND II	2006	05/12/21	\$ 50.0	37.5 bps	\$ 0.9	0.0	0.0	-1.9	0.0	-3.9	-10.7	2.1	6.5	4.1	8.1
STEPSTONE EUROPE FUND II	2010	12/15/22	\$ 25.9	50.0 bps	\$ 12.5	-8.0	-2.1	-8.1	-2.1	-4.0	-2.6	-0.4	4.8	2.6	4.5
PRIVATE ADVISORS IV	2011	12/15/26	\$ 35.0	54.7 bps	\$ 15.3	3.9	3.9	-4.9	3.9	1.0	9.8	15.6	17.5	15.0	14.8
PRIVATE ADVISORS V	2012	06/30/25	\$ 40.0	72.9 bps	\$ 29.5	7.1	7.1	8.4	7.1	8.6	17.8	18.6	18.1	17.6	16.1
PRIVATE ADVISORS VI	2014	06/30/26	\$ 40.0	90.0 bps	\$ 31.4	6.1	6.1	6.7	6.1	13.7	14.6	13.9	13.8	9.6	6.3
Q-BLK II	2005	12/04/20	\$ 50.0	33.5 bps	\$ 8.7	-10.9	-10.9	-5.5	-10.9	12.3	11.6	10.5	10.4	7.3	7.5
Q-BLK III	2007	12/29/20	\$ 60.0	0.0 bps	\$ 19.7	0.0	-9.7	0.7	-9.7	5.8	10.2	10.6	10.5	9.6	9.9
SIGULER GUFF DOF III	2008	12/31/20	\$ 200.0	12.0 bps	\$ 37.1	-0.4	-0.4	27.0	-0.4	37.5	17.7	16.4	15.3	12.0	11.3
SIGULER GUFF FUND IV	2011	09/03/23	\$ 40.0	29.0 bps	\$ 13.8	1.1	1.1	3.8	1.1	6.8	4.4	5.8	6.9	7.0	7.4
SIGULER GUFF PELICAN GEM	2016	10/10/28	\$ 100.0	75.0 bps	\$ 86.1	3.4	3.4	4.5	3.4	4.7	3.9	7.5			
SIGULER GUFF PELICAN EMG MKT OPP II	2020	05/04/32	\$ 50.0	75.0 bps	\$ 4.7	0.0									
STERLING PARTNERS	2011	09/30/23	\$ 35.0	200.0 bps	\$ 14.1	0.0	7.3	-12.4	7.3	-16.8	-20.5	-13.2	-14.1	-9.8	-7.4
VISTA EQUITY PARTNERS IV	2011	03/31/22	\$ 35.0	150.0 bps	\$ 22.1	0.0	-0.1	-3.4	-0.1	-11.0	-1.3	1.9	4.8	9.2	13.5
VISTA EQUITY PARTNERS V	2014	10/15/24	\$ 75.0	150.0 bps	\$ 81.0	0.0	0.0	5.6	0.0	2.3	17.7	28.7	25.3	22.8	19.3
VISTA EQUITY PARTNERS VI	2015	03/11/26	\$ 100.0	150.0 bps	\$ 134.9	0.0	22.8	23.4	22.8	23.2	30.0	24.8	18.7		
VISTA EQUITY PARTNERS VII	2018	02/28/28	\$ 125.0	150.0 bps	\$ 42.5	0.0	5.6	2.8	5.6	6.4					
WARBURG PINCUS	2018	02/28/29	\$ 100.0	140.0 bps	\$ 28.5	0.0	-0.2	1.7	-0.2	-1.0					
WILLIAMS CAPITAL	2004	termed out	\$ 30.0	0.0 bps	\$ 0.4	0.0	-1.3	-5.7	-1.3	-13.2	16.1	18.4	-1.6	-15.4	-12.5
TOTAL PRIVATE MARKETS*			\$ 5,008.2	92.2 bps	\$ 2,029.5	0.7	4.0	3.1	4.0	4.4	7.6	11.5	12.5	10.6	10.5
(*) Brinson consists of five limited partnerships Private Markets fees are based on commitment amounts rather than market value.															

LASERS FLASH REPORT

The return numbers are expressed as percentages and are listed in columns 5-14

The far left hand column lists the asset class headings, investment managers, benchmarks and composites

The contract expiration date is listed in the second column

The % return for the month

Year to Date (YTD) is the % return since Jan. 1

The 1-6 year columns represent the % return per year for each number of years

	Contract Exp. Date	Mgt. Fees	MKT VAL \$ (Million)	Month	3 mos	YTD	Fiscal YTD	1 Year	2 Years
U.S. EQUITY									
LARGE CAP GROWTH									
GOLDMAN SACHS	01/31/08	44.0 bps	\$ 130.4	-0.5	6.4	10.7	11.5	10.7	7.7
CHICAGO EQUITY PARTNERS	01/31/08	30.0 bps	\$ 136.8	-0.1	5.3	15.0	11.3	15.0	10.4
S&P 500 / CITIGROUP GROWTH				0.4	5.6	11.0	12.1	11.0	6.0
S&P 500				1.4	6.7	15.8	12.7	15.8	10.2
TOTAL LARGE GROWTH		36.8 bps	\$ 267.2	-0.2	5.9	12.9	11.5	12.9	9.0

The broader benchmarks are in light blue and style specific ones in royal blue

The management fees charged are listed third (bps stands for basis points)
"36.8 bps" equals .368%

The market value column tells us the size of each account in millions. For example, \$267.2 equals \$267,200,000

Fiscal YTD is the % return since July 1

Green = manager outperformed style benchmark

Yellow = manager underperformed style benchmark

Red = composite underperformed style benchmark

LASERS FLASH REPORT

WHAT IS IT?

- A snapshot look at the composition and investment returns of LASERS Trust Fund
- Summary of investment manager performance

WHAT INFORMATION DOES IT PROVIDE?

- Asset classes and the investment managers we use to invest the money
- Fees charged by the investment managers who invest our money
- Amount of money we have allocated to each manager
- Investment returns of each investment

HOW CAN I USE THE INFORMATION?

- To evaluate investment manager returns against a set benchmark ⁽¹⁾ return
- To evaluate the return of each asset or asset class
- Analyze LASERS investments gains/losses over time

HOW DO I READ THE REPORT?

Left Side (Asset Classes)

Broken down by each investment manager

Blue lines are benchmarks used to evaluate asset class

Top (contract data & returns):

Management fees in basis points ⁽²⁾

Market value

Returns -

Month	% return that month
3 months	% return from the past 3 months
YTD	Year to date return (since January 1)
Fiscal YTD	Fiscal year to date return (since July 1)
1 year, 2 years, etc.	% return for the specified time period

Colors **Green** – performance of asset was above benchmark (think *money*)

Yellow – manager performed below benchmark

Red – asset class as a whole performed below benchmark

Total Plan (last page of Flash Report)

Financial composite – portfolio excluding alternative investments asset class

Total plan – includes alternative investments

Policy index – return of portfolio based on allocation set forth in investment policy

Allocation index – return of portfolio based the actual allocation LASERS maintained
(Investment policy provides a model for allocation; however, small deviations from this model may occur to take advantage of certain market conditions.)

DEFINITIONS:

1. **Benchmark** – an index whose returns can be used to measure investment performance
2. **Basis Point (bps)** – 0.01%, 100 basis points equals 1%, investment managers charge fees as a percentage of the money invested, fees are usually defined in basis points



LOUISIANA STATE EMPLOYEES'
RETIREMENT SYSTEM

Investment Division

As of September 30, 2020

ASSET ALLOCATION

Asset Class	Target Weight	Actual Weight	Over/(Under) Weight
U.S. Equity	23%	21.1%	-1.9%
Non-U.S. Equity	32%	27.7%	-4.3%
U.S. Fixed Income	6%	5.5%	-0.5%
Emerging Market Debt	3%	3.4%	0.4%
Global Multi-Sector	7%	10.5%	3.5%
Private Markets	15%	18.3%	3.3%
Absoulte Return	7%	5.2%	-1.8%
Risk Parity	7%	5.2%	-1.8%
Cash	0%	3.1%	3.1%

*Target weights listed above were approved March 2018.

Asset Allocation Discussion

October 22, 2020

Market Returns Summary

As of December 31 Each Year

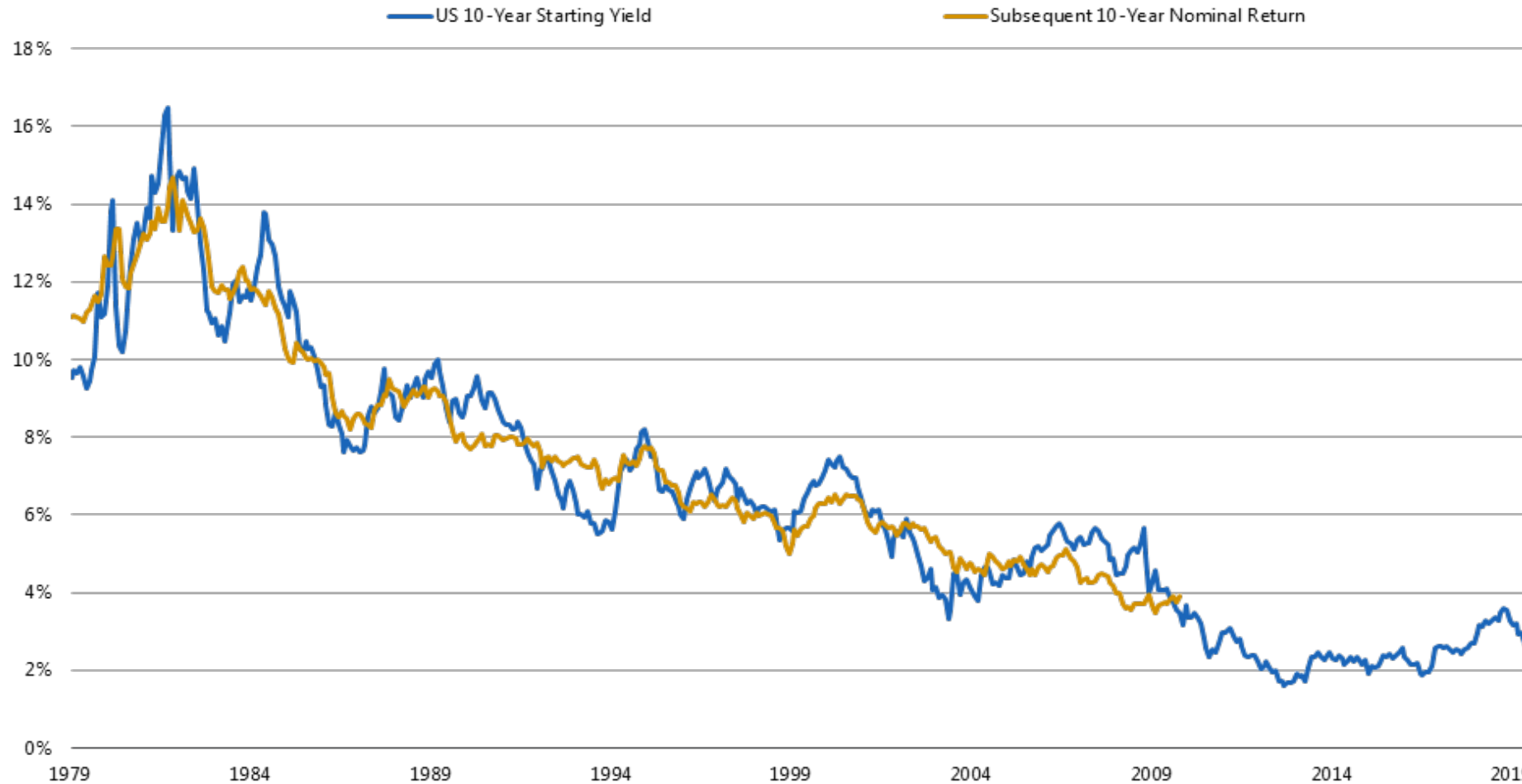


	20-Year (2000 – 2019)	10-Year (2010-2019)	10-Year (2000-2009)
LASERS Total Plan	6.37	8.62	4.16
<u>Index</u>			
S&P 500	6.05	13.50	-0.95
S&P 600	9.77	13.30	6.34
MSCI World Ex-USA	3.92	5.83	2.04
MSCI Emerging Markets	7.03	4.04	10.10
MSCI ACWI Ex-USA	4.36	5.51	3.21
Bloomberg Barclay's US Aggregate	5.03	3.74	6.33
Credit Suisse High Yield	7.21	7.36	7.05
FTSE World Government Bond	4.21	1.85	6.63
JP Morgan GBI-EM Global Diversified (incep '03)	n/a	2.71	n/a
Bloomberg Commodity	-0.66	-5.28	4.19
NCREIF Property	8.72	10.17	7.30
Hedge Fund Research HFRX Global Hedge Fund	2.75	1.11	4.42

U.S. Core Bonds

Starting Yield vs. Subsequent 10 Year Returns

LASERS



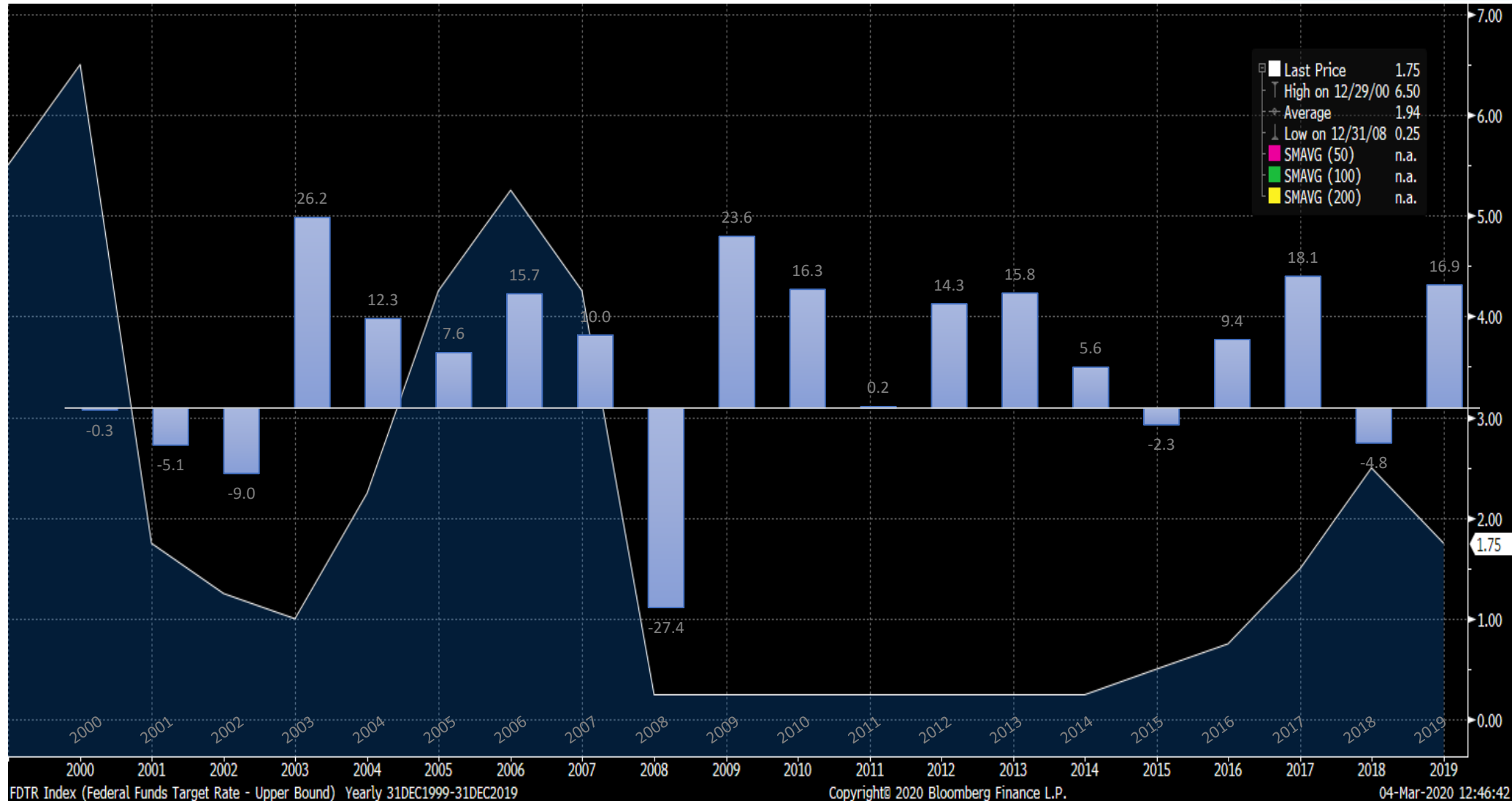
As of 30 August 2019. SOURCE: Bloomberg. 10-Year Yields based on Barclays US Agg Total Return Value Unhedged USD.
Past performance is not a guarantee or a reliable indicator of future results. It is not possible to invest directly in an unmanaged index.

PIMCO



Interest Rates & LASERS Returns

20 Years (2000 – 2019)



Key Drivers Going Forward



Factors:

- High debt levels, and low nominal growth
- Low levels of inflation (at least in the near term)
- Continued digital revolution
- More diversification of supply chains
- Downward pressure on margins
- Greater consolidation

Investment conclusions:

- Growth will remain scarce: growth companies will continue to prosper
- Income will remain scarce: sustainable dividend payers will prosper
- Debt levels will be higher: strong balance sheet companies will prosper

Source: Goldman Sachs



Asset Allocation Recommendation & Policy Ranges



Asset Class	Current Policy	Recommendation	Δ(+/-)	Minimum Exposure	Maximum Exposure
Large Cap Equity	13.0%	23.0%	+10%	18.0%	28.0%
Small/Mid Cap Equity	10.0%	8.0%	(2.0%)	3.0%	14.0%
International Equity (Large Cap)	15.0%	10.0%	(5.0%)	5.0%	15.0%
International Equity (Small Cap)	5.0%	5.0%	--	0.0%	10.0%
Emerging Markets Equity	12.0%	8.0%	(4.0%)	2.0%	14.0%
Total Equities	55.0%	54.0%	(1.0%)	44.0%	64.0%
Core Bonds	3.0%	3.0%	--	0.0%	10.0%
High Yield Bonds	3.0%	0.0%	(3.0%)	n/a	n/a
Global Multi-Sector	7.0%	14.0%	+7.0%	9.0%	19.0%
Emerging Market Debt	3.0%	4.0%	+1.0%	1.0%	9.0%
Total Fixed Income	16.0%	21.0%	+5.0%	12.0%	32.0%
Private Markets	15.0%	20.0%	+5.0%	15.0%	25.0%
Absolute Return	7.0%	4.0%	(3.0%)	0.0%	9.0%
Risk Parity	7.0%	0.0%	(7.0%)	n/a	n/a
Total Alternative Assets	29.0%	24.0%	(5.0%)	14.0%	34.0%
Total Cash	---	1.0%	+1.0%	0.0%	8.0%
Total Portfolio	100.0%	100.0%	--		
<i>Expected Return (10 year)</i>	7.37%	7.48%	0.12%		
<i>Expected Return (30 Year)</i>	7.76%	7.85%	0.09%		
<i>Standard Deviation</i>	16.04%	16.05%	0.01%		
<i>Sharpe Ratio (10 Year)</i>	0.42	0.43	+0.01		

Asset Allocation

Current Policy vs. Recommendations vs. Actual Weights



2020 NEPC RECOMMENDATIONS					
Asset Class	Current Policy	Recommendations	(+/-)	Actual Weights (thru 10/16)	Change
Large Cap Equity	13.0%	23.0%	10.0%	12.94%	10.06%
Small/Mid Cap Equity	10.0%	8.0%	-2.0%	8.65%	-0.65%
International Large Cap	15.0%	10.0%	-5.0%	12.31%	-2.31%
International Small Cap	5.0%	5.0%	0.0%	5.27%	-0.27%
Emerging Markets Equity	12.0%	8.0%	-4.0%	10.29%	-2.29%
Total Equity	55.0%	54.0%	-1.0%	49.46%	4.54%
Core Bonds	3.0%	3.0%	0.0%	2.94%	0.06%
High-Yield Bonds	3.0%	0.0%	-3.0%	2.53%	-2.53%
Global Multi-Sector	7.0%	14.0%	7.0%	10.42%	3.58%
Emerging Market Debt	3.0%	4.0%	1.0%	3.35%	0.65%
Total Fixed Income	16.0%	21.0%	5.0%	19.24%	1.76%
Private Markets	15.0%	20.0%	5.0%	17.99%	2.01%
Absolute Return	7.0%	4.0%	-3.0%	5.17%	-1.17%
Risk Parity	7.0%	0.0%	-7.0%	5.08%	-5.08%
Total Alternative	29.0%	24.0%	-5.0%	28.24%	-4.24%
Total Cash	0.0%	1.0%	1.0%	3.07%	-2.07%
Total Portfolio	100.0%	100.0%			

Implementation Plan



EQUITIES:

- Add NDX Index Fund and Increase the S&P 500 Index Fund
- Reduce allocation to International Large Cap (explore additional passively-managed options)
- Trim assets from Emerging Markets

FIXED INCOME:

- Transition High Yield allocation into GMS allocation
- Create distinct Opportunistic and Multi-Sector Credit buckets
- Use current cash balance as funding source for increased allocations

ALTERNATIVES:

- Current “Absolute Return” managers move into new Opportunistic allocation
- Use Risk Parity assets as a funding source for increased allocations

NEPC's Asset Allocation Material

2020 ASSET ALLOCATION STUDY

LOUISIANA STATE EMPLOYEES' RETIREMENT SYSTEM

August 2020

Rhett Humphreys, CFA, Partner

David Barnes, CFA, CAIA, Senior Consultant

Chris Hill, CFA, CAIA, Sr. Research Consultant



BOSTON | ATLANTA | CHARLOTTE | CHICAGO | DETROIT | LAS VEGAS | PORTLAND | SAN FRANCISCO

2020 ASSET ALLOCATION UPDATE

NEPC, LLC

INTRODUCTION

- **New assumptions and capital markets outlook reflect best thinking in very uncertain times**
- **Potential actions should be taken carefully**
- **Focus on fundamentals**
 - Liquidity management is a top priority
 - Confirm organizational risk tolerance and align asset allocation appropriately
 - Disciplined rebalancing is an opportunity to take advantage of volatility

ASSET CLASS ASSUMPTIONS OVERVIEW

This report details NEPC June 30, 2020 Capital Market Assumptions

Assumptions are published quarterly reflecting quarter-end market data

Forward-looking asset class returns are lower and reflect a range of potential outcomes due to the uncertainty of the pandemic and response

Embrace diversification and maintain appropriate levels of liquidity to navigate the wide paths of potential economic scenarios

We encourage investors to maintain a dedicated allocation to Treasuries to provide a consistent source of liquidity and offer downside protection

Consider higher strategic allocation targets for equity as the long-term return differential compared to fixed income is wide relative to history

The use of quarterly capital market assumptions should be aligned with clients' fiscal year or specific asset allocation planning cycle

We expect clients will use one set of assumptions for asset allocation projects and expect the 12/31 assumptions will be most used by clients

The availability of quarterly assumptions carry practical considerations

Quarterly assumptions should be used in conjunction with quarterly asset values but private markets are a complication where losses have yet to be reflected

Clients needing a calendar year assumption before January can use 9/30 assumptions

ASSUMPTION DEVELOPMENT

Capital market assumptions are published for over 65 asset classes

Assumptions include 10-year and 30-year return forecasts, volatility expectations, and correlations

NEPC publishes both 10- and 30-year return forecasts

10-year forecasts are appropriate for strategic asset allocation analysis and are influenced by global forecasts/pricing of growth, inflation, and yield, with credit spreads and valuations converging to NEPC-defined terminal values

30-year forecasts are appropriate for actuarial inputs and long-term planning

Based on data as of June 30, 2020

Assumptions are developed by the Asset Allocation Committee and approved by the Partners Research Committee (PRC)

Assumptions are developed with proprietary valuation models and rely on a core building block methodology

Asset Allocation Process

Finalize List of New Asset Classes

Discuss Outlook with NEPC Beta Groups

Calculate Asset Class Volatility and Correlation Assumptions annually

Set Model Terminal Values, Reflecting Long-Term Views on Key Inputs

Update Asset Models as of Quarter-End

Review Model Output and Produce Updated Return Assumptions

Present Draft Assumptions to the PRC

Assumptions published on the 15th calendar day following quarter-end

CORE GEOMETRIC RETURN ASSUMPTIONS

	Asset Class	10-Year Return	30-Year Return	Volatility
	Cash	0.6%	1.8%	1.00%
	US Inflation	1.7%	2.4%	-
Equity	Large Cap Equities	6.3%	6.7%	16.50%
	Small/Mid Cap Equities	6.8%	7.0%	20.00%
	International Equities (Unhedged)	6.7%	6.8%	20.50%
	International Small Cap Equities (Unhedged)	7.2%	7.3%	22.00%
	Emerging International Equities	9.1%	9.1%	28.00%
	<i>Private Equity⁽¹⁾</i>	<i>10.4%</i>	<i>10.5%</i>	<i>24.58%</i>
Fixed Income	<i>Core Bonds⁽¹⁾</i>	<i>1.3%</i>	<i>2.6%</i>	<i>6.10%</i>
	<i>Global Multi-Sector⁽¹⁾</i>	<i>5.9%</i>	<i>6.6%</i>	<i>9.87%</i>
	High Yield Bonds	4.3%	5.4%	12.50%
	Emerging Market Debt (Blended)	4.9%	5.1%	12.40%
Private Debt	Private Debt: Distressed	8.3%	8.1%	14.00%
	Private Debt: Credit Opportunities	7.1%	7.2%	14.00%
	Private Debt: Direct Lending	5.6%	7.0%	11.00%
Multi-Asset	<i>Absolute Return⁽¹⁾</i>	<i>4.7%</i>	<i>5.5%</i>	<i>7.74%</i>
	<i>Risk Parity⁽¹⁾</i>	<i>5.0%</i>	<i>6.0%</i>	<i>12.27%</i>

(1) Calculated as a blend of other asset classes – see appendix for additional details

KEY MARKET THEMES

NEPC, LLC

POTENTIAL OUTCOMES AND IMPLICATIONS

	Description	Market Implications
Base Case	Virus containment efforts aimed at slowing the spread of COVID-19 will result in a global recession, but the shape and trajectory of a recovery is unknown. Increased monetary and fiscal stimulus offset some of the economic disruption, but economic growth and labor markets are likely to take longer to normalize than historical recessions may suggest.	Market volatility remains at elevated levels for the next 6+ months. Low interest rates are here to stay but likely increased volatility around the path of inflation with large deflationary pressures paired with a potentially stimulative fiscal response. While uncertainty remains high, long-term opportunities may be available for investors willing to take on greater equity and credit risk. Market impact of Virus Trajectory looks to recede within 12 months.
Economic Depression	2 year period of extreme economic disruption characterized by unemployment levels greater than 20% and falling consumer spending levels. Waves of intense social distancing periods damage consumer confidence, limiting economic activity during times of less restrictive social distancing measures. Massive government fiscal relief measures look to plug holes in GDP but lack of economic dynamism reduces productivity and "creative destruction".	Combined fiscal and monetary policies are MMT-like and impact global currency regimes with outsized volatility with relative benefits to the yuan and dollar. Extreme deflationary pressures offer value for nominal government debt for local currency investors (e.g. US Treasuries). Overall represents the largest economic disruption of our lifetime across industries and countries. Patience is required as equity markets reprice and credit default cycle is elevated. Maintaining liquidity is a first order priority, but look to allocate surplus liquidity levels to distressed investments and large-cap equities following extreme market repricing.
V is for Victory...not Virus	Combination of targeted social distancing, summer lull, better testing, and human resilience lead to a quick path of economic recovery, even before vaccine availability. Unprecedented policy action is enough to fill the economic gap during shutdown and by late summer the world economy restarts as economic activity normalizes.	Strongly positive for all cyclical assets. Provides path for moderately higher inflation in medium- and long-term and fiscal policy is stimulative. The world turns back to worries of populism, political friction, and developed world demographics. The relative brevity of the shutdown limits moves to shift away from globalization.

POTENTIAL ACTIONS FOR INVESTORS

Maintain discipline with a rebalancing approach aimed at preserving long-term strategic targets to risk assets

Maintain one quarter of spending needs in cash

A focus on liquidity remains paramount

Consider increasing targets to risk assets from a strategic viewpoint

Ensure higher risk targets fit within organizational risk tolerance

Market recovery from bottom has been significant...better timing may become available

Long-term expected difference between safe and risky assets is attractive

Favor US and EM over EAFE among public market equity

Strong virus response and massive Fed/Fiscal intervention support quicker US recovery

Virus response and long-term expected return (over 10%) support EM equity

Within betas, look to rotate the risk profile and increase risk posture

Carve out fixed income allocations to Credit Opportunities and Distressed Investments

Consider a shift to lower quality credit like high yield and EMD

Shift hedged equity exposure to higher beta strategies

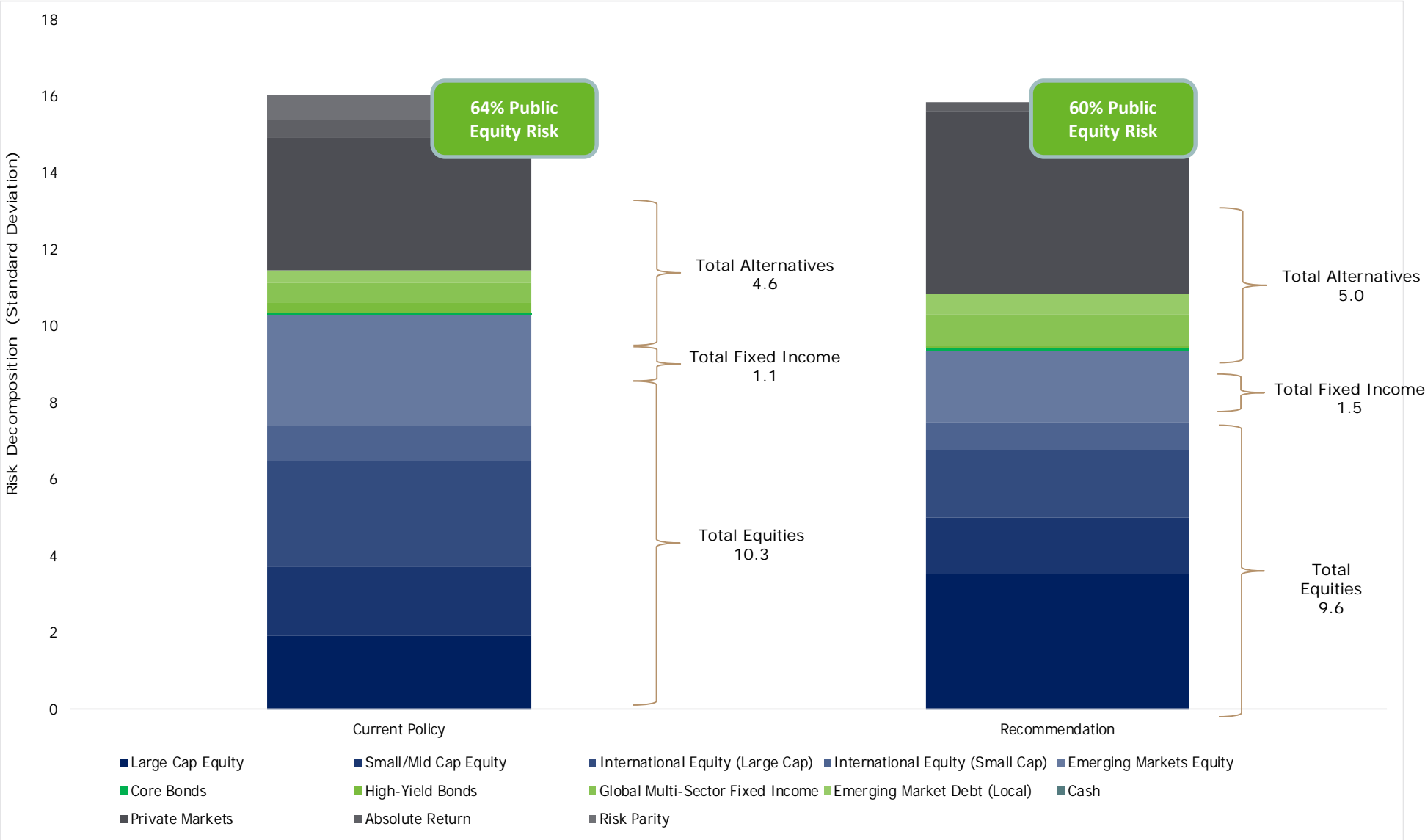
Investigate high conviction, capacity-constrained strategies for access

2020 NEPC RECOMMENDATIONS

Asset Class	Current Policy	Recommendation	Δ (+/-)
Large Cap Equity	13.0%	23.0%	+10.0%
Small/Mid Cap Equity	10.0%	8.0%	(2.0%)
International Equity (Large Cap)	15.0%	10.0%	(5.0%)
International Equity (Small Cap)	5.0%	5.0%	--
Emerging Markets Equity	12.0%	8.0%	(4.0%)
Total Equities	55.0%	54.0%	(1.0%)
Core Bonds ⁽¹⁾	3.0%	3.0%	--
High-Yield Bonds	3.0%	0.0%	(3.0%)
Global Multi-Sector ⁽¹⁾	7.0%	14.0%	+7.0%
Emerging Market Debt	3.0%	4.0%	+1.0%
Total Fixed Income	16.0%	21.0%	+5.0%
Private Markets	15.0%	20.0%	+5.0%
Absolute Return ⁽¹⁾	7.0%	4.0%	(3.0%)
Risk Parity ⁽¹⁾	7.0%	0.0%	(7.0%)
Total Alternative Assets	29.0%	24.0%	(5.0%)
Total Cash	---	1.00%	+1.0%
Total Portfolio	100.0%	100.0%	--
Expected Return (10 Year)	7.37%	7.48%	0.12%
Expected Return (30 Year)	7.76%	7.85%	0.09%
Standard Deviation	16.04%	16.05%	0.01%
Sharpe Ratio (10 Year)	0.42	0.43	+0.01

(1) Calculated as a blend of other asset classes – see appendix for additional details

RISK BUDGETING (%)



LASERS Private Market Portfolio

An Educational Presentation

Agenda



1. History of LASERS Private Markets Portfolio
2. LASERS Private Market Portfolio Fund Highlights (since 2010)
3. Historical Portfolio Returns
4. Trends in the Private Market Asset Class
5. Private Market Outlook

History of LASERS Private Market Portfolio

Plan Beginnings



- First investments in 1993 (Hancock Pathway)
- Successful venture capital investments in the mid-late 1990s
- More substantial commitments began in 1997 with investment in HarbourVest Fund of Funds
- Other fund of fund investments followed – Adams Street, Pantheon

Methods of Investing in Private Markets



Method of Investing	Advantages	Disadvantages
Direct	Control No fees	Very capital intensive Requires extensive management resources and experiences High concentration risk
Co-Investment	Control No or low fees	Capital intensive Requires extensive management resources and experience Concentration risk
Primary Investment	Professional management Optimal means to capture total return Mitigates disadvantages of direct and co-investing	Blind pool risk J-curve performance Illiquidity Ongoing capital commitment Fees

Methods of Investing in Private Markets



Method of Investing	Advantages	Disadvantages
Secondary Investment	Diversification Professional management Mitigation of blind pool risk and J-curve performance Reduced investment risk through negotiated pricing Potential access to selective funds	Typically lower return than primary investment Subject to volume and quality of assets available in secondary mkt Illiquidity Ongoing capital commitments Fees
Primary Fund-of-Funds Investment	Ease of implementation of private equity exposure Diversification Professional management Potential mitigation of investment risk Potential access to selective funds	Higher fees Typically lower return than primary investment Illiquidity Ongoing capital commitments

Methods of Investing in Private Markets



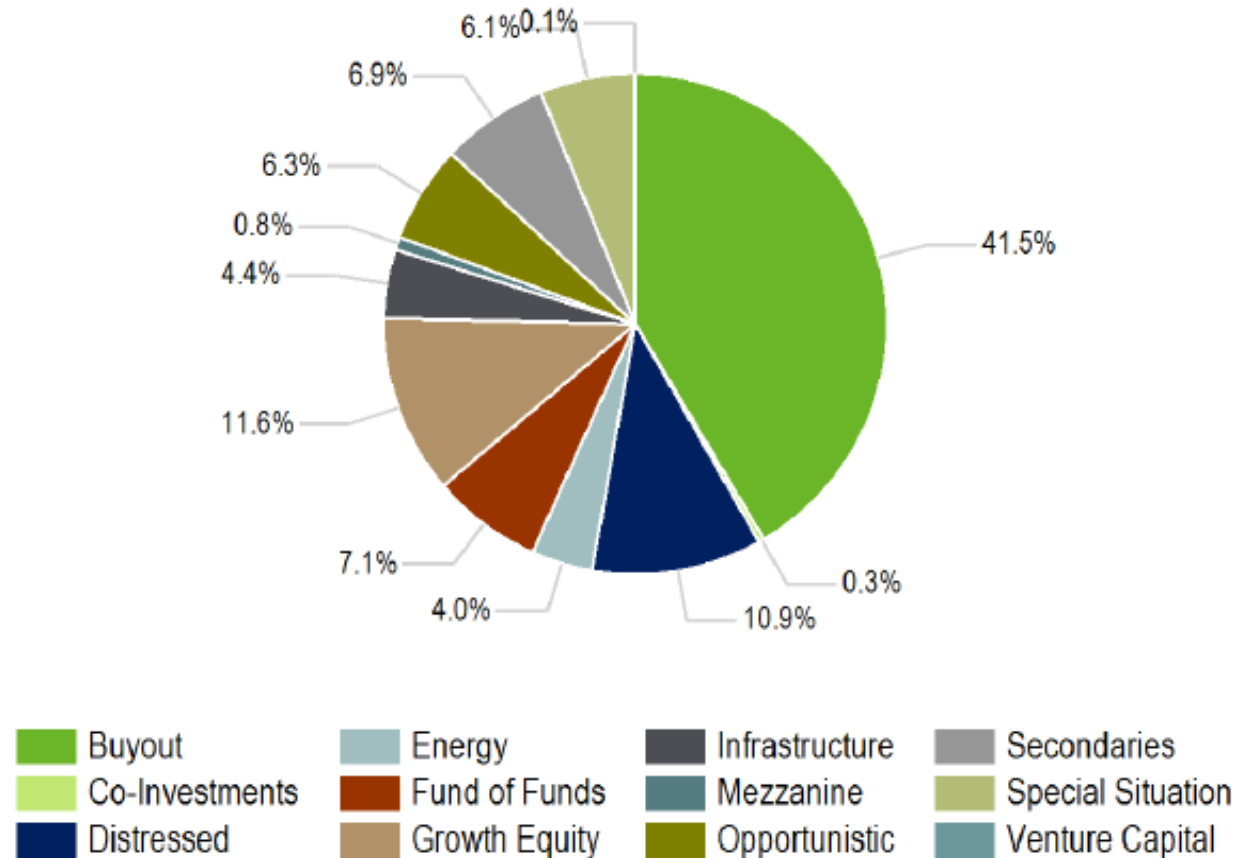
Method of Investing	Advantages	Disadvantages
Listed Private equity	Ease of access to private equity exposure Greatest potential for liquidity Statutory investor protections Transparency	Indirect and potentially imperfect exposure to asset class High fees Typically lower total return than primary investing Valuation lag/potential volatility

Strategy Analysis

As of March 31, 2020



Private Markets Fund Exposure by Strategy



Yearly Investment: 1990s



Year	Amount Invested	Number of Funds	Commitment Size Range
1993	\$10.7 million	4	\$1.8 – 3 million
1994	\$21.6 million	5	\$3 – 5.3 million
1995	\$14.9 million	4	\$2.9 – 4 million
1996	\$6.2 million	2	\$2 – 4 million
1997	\$95.4 million	4	\$2 – 18.4 million
1998	\$43.4 million	2	\$1.9 – 41 million
1999	\$243.2 million	4	\$25 – 150 million

*Rounded/ to be more representative, median or most common commitment is used when outlier skews the data

Yearly Investment: 2000s



Year	Amount Invested	Number of Funds	Commitment Size Range
2000	\$123.8 million	3	\$10 – 73 million
2001	\$47.6 million	2	\$15 – 35 million
2002	\$21.3 million	2	\$6.3 – 15 million
2003	\$17.2 million	2	\$2.2 – 5 million
2004	\$130 million	3	\$30 – 50 million
2005	\$123 million	4	\$15 – 50 million
2006	\$160 million	3	\$50 – 60 million
2007	\$361.7 million	8	\$5 – 100 million
2008	\$363.8 million	4	\$43.8 – 200 million
2009	\$90 million	5	\$5 – 40 million

Yearly Investment: 2010s



Year	Amount Invested	Number of Commitments	Commitment Size Range
2010	\$143.4 million	4	\$25 – 40 million
2011	\$288 million	6	\$35 – 100 million
2012	\$240 million	3	\$40 – 100 million
2013	\$234 million	4	\$34 – 70 million
2014	\$165 million	3	\$40 – 75 million
2015	\$300 million	5	\$50 – 75 million
2016	\$475 million	6	\$50 – 125 million
2017	\$270 million	4	\$50 – 85 million
2018	\$525 million	5	\$75 – 125 million
2019	\$665 million	8	\$20 – 100 million*

***KPS total commitment was \$50 million - \$20 million/\$30 million**

2020 Yearly Investment



Fund	Amount
DoubleLine Mortgage Opportunities Fund II	\$100 million
KKR Asian Fund IV	\$100 million
SigulerGuff Pelican Emerging Markets fund II	\$50 million
KPS Special Situations Fund	\$30 million

The last 10 years: Fund Highlights

AEA Investors



Fund Name	Year Invested	Commitment Amount (in millions)	Number of Underlying Companies
AEA Investors Fund VI	2015	\$50 million	10
AEA Investors Fund VII	2019	\$100 million	3 (12-15)

Strategy

Control investments in proven, well-positioned middle market companies in need of transformation and where significant operational change and geographic expansion can accelerate growth and profitability

Details	
Geography	North America/Europe
Headquarters	New York, NY
Classification	Buyout

Altas Partners



Fund Name	Year Invested	Commitment Amount (in millions)	Number of Underlying Companies
Altas Partners Holdings II	2019	\$100 million	2 (4-6)

Strategy

- (i) To be discerning and selective as an investor, with a focus on approximately one or two investments in new portfolio companies each year;
- (ii) To position the Firm in the North American private equity landscape as an attractive solution for owners and management teams seeking a value-added, stable partner with a more flexible investment horizon; and
- (iii) To focus on “hard to replicate” businesses headquartered in North America with strong cash flow and attractive return on invested capital characteristics and significant value creation potential through Altas’ active ownership.

Details	
Geography	North America
Headquarters	Toronto, ON
Classification	Buyout

Apollo Global Management



Fund Name	Year Invested	Commitment Amount (in millions)	Number of Underlying Companies
Apollo Investment Fund IX	2017	\$85 million	8 (25-35)

Strategy

Apollo takes a contrarian, value-oriented approach and primarily relies on three types of investments: distressed investments, corporate carve-outs and opportunistic buyouts, which we believe underpin our ability to find attractive value opportunities.

Details	
Geography	North America and Western Europe
Headquarters	New York, NY
Classification	Distressed/Buyout

Arclight Energy Partners



Fund Name	Year Invested	Commitment Amount (in millions)	Number of Underlying Companies
Arclight Energy Partners Fund VI	2015	\$75 million	18

Strategy

Energy infrastructure specialist focused primarily in North America – upstream, midstream, power, and energy services.

Details	
Geography	North America
Headquarters	Boston, MA
Classification	Buyout

Baring Private Equity Asia (BPEA)



Fund Name	Year Invested	Commitment Amount (in millions)	Number of Underlying Companies
Baring Asia Private Equity Fund VII	2019	\$100 million	9 (15-20)

Strategy

Focused on mid/large-cap buyouts and corporate partnering transactions across the Pan Asia region

Details

Geography	Pan Asia
Headquarters	Beijing, China
Classification	Buyout

Bernhard Capital Partners



Fund Name	Year Invested	Commitment Amount (in millions)	Number of Underlying Companies
BCP Energy Services Fund	2015	\$50 million	5
BCP Fund II	2017	\$75 million	3 (6-8)
BCP Infrastructure Fund	2019	\$75 million	1 (6-8)

Strategy

Energy Services/Fund II: Operationally-focused investing in middle market businesses that provide critical energy services (excluding E&P), industrial services, and infrastructure services in North America

Infrastructure: Value-add infrastructure opportunities, focus on operating/maintenance public/private partnerships with municipal utilities, specialized industrial and logistics infrastructure investment opportunities

Details	
Geography	United States
Headquarters	Baton Rouge, LA
Classification	Buyout

Brookfield Capital Partners



Fund Name	Year Invested	Commitment Amount (in millions)	Number of Underlying Companies
Brookfield Capital Partners IV	2015	\$50 million	9
Brookfield Capital Partners V	2018	\$100 million	8
Brookfield Infrastructure Fund IV	2019	\$75 million	12

Strategy

Value investments with a primary focus on real asset related businesses with preference for operationally and/or financially complex transactions where competition is limited. Operations-oriented approach helps enhance transaction execution and add value post-acquisition

Details

Details	
Geography	Global
Headquarters	Toronto, ON
Classification	Buyout/Infrastructure

Cerberus Capital Management



Fund Name	Year Invested	Commitment Amount (in millions)	Number of Underlying Companies
Cerberus Institutional Partners VI	2016	\$125 million	12/79 issuers

Strategy

Invest in a range of assets, mostly in two broad categories: private equity (e.g., operationally challenged companies, non-core/non-performing divisions or subsidiaries and businesses in liquidation) and distressed securities and assets (e.g., non-performing loans ("NPLs"), residential and commercial mortgage securities and assets, corporate debt and structured loans).

Details	
Geography	North America/Western Europe
Headquarters	New York, NY
Classification	Distressed

Coller Capital



Fund Name	Year Invested	Commitment Amount (in millions)	Number of Underlying Companies
Coller International Partners VII	2015	\$75 million	2500+
Coller International Partners VIII	2018	\$100 million	800+

Strategy

Global private equity secondaries: highly flexible and willing to invest where the market opportunity looks strongest at the time – not restricted to size, type, or geography

Details	
Geography	Global
Headquarters	London, UK
Classification	Secondaries

DoubleLine Capital



Fund Name	Year Invested	Commitment Amount (in millions)	Number of Underlying Companies
DoubleLine Mortgage Opportunities Fund	2018	\$125 million	68
DoubleLine Mortgage Opportunities Fund II	2020	\$100 million	0

Strategy

DoubleLine Mortgage Opportunities is a private real estate debt fund that seeks to generate attractive current income and total return by investing in a portfolio of residential and commercial mortgage-related assets.

Details

Details	
Geography	United States
Headquarters	Los Angeles, CA
Classification	Opportunistic (Mortgages)

Gamut Capital Management



Fund Name	Year Invested	Commitment Amount (in millions)	Number of Underlying Companies
Gamut Investment Fund I	2016	\$50 million	4 (6-8)

Strategy

Generalist middle market private equity firm that is focused on making long-term investments in well-positioned businesses. Highly flexible investment strategy encompassing leveraged buy-outs, corporate carve-outs, corporate partnerships (or minority equity/structured investments) and distressed-for-control investments.

Details	
Geography	Primarily North America, and Western Europe
Headquarters	New York, NY
Classification	Distressed/Buyout

GoldenTree Asset Management



Fund Name	Year Invested	Commitment Amount (in millions)	Number of Underlying Companies
GoldenTree Distressed Fund III	2018	\$75 million	36 (40-50)

Strategy

The objective of the strategy is to seek superior risk-adjusted returns by investing in distressed and stressed assets.

Details	
Geography	North America/Europe (some EM)
Headquarters	New York, NY
Classification	Distressed

Fund Name	Year Invested	Commitment Amount (in millions)	Number of Underlying Companies
GTCR Fund XII	2017	\$60 million	12 (13-15)
GTCR Fund XIII (requesting approval*)	2020	\$75 million*	

Strategy

GTCR targets middle market businesses with sufficient scale, infrastructure, customer base and strategic position to serve as attractive and leverageable platforms for growth. Focus on four areas of the economy where they believe growth and transformational investment opportunities can be found – Technology, Media & Telecommunications, Financial Services & Technology, Healthcare and Growth Business Services.

Details	
Geography	Primarily North America
Headquarters	Chicago, IL
Classification	Buyout and Growth Equity

Insight Partners



Fund Name	Year Invested	Commitment Amount (in millions)	Number of Underlying Companies
Insight Partners X	2017	\$50 million	78
Insight Partners XI	2019	\$85 million	28 (90)

Strategy

Software investing in high-growth companies – stage agnostic (early stage, late stage)

Details

Geography	Global (primarily N. America/Europe)
Headquarters	New York, NY
Classification	Growth Equity

Fund Name	Year Invested	Commitment Amount (in millions)	Number of Underlying Companies
KKR Asian Fund III	2016	\$50 million	26 (29)
KKR Asian Fund IV	2020	\$100 million	0 (30)

Strategy

Pan-Asian platform currently focusing on the following themes: 1. Consumption Upgrades; 2. Carve-outs, spin-offs & consolidation; 3. Technology; 4. Pivot to Control & Consolidation

Details

Details	
Geography	Asia-Pacific
Headquarters	New York, NY
Classification	Buyout

KPS Capital Partners



Fund Name	Year Invested	Commitment Amount (in millions)	Number of Underlying Companies
KPS Special Situations Mid-Cap Fund	2019	\$20 million	2 (10-15)
KPS Special Situations Fund V	2019	\$30 million	0 (10-15)

Strategy

(Flagship) Control equity investments in manufacturing and industrial companies; \$100 million to \$1 billion of capital investment per portfolio company
(Mid-Cap) Control equity investments in manufacturing and industrial companies; up to \$100 million of initial equity capital per portfolio company

Details

Geography	Global
Headquarters	New York, NY
Classification	Special Situations/Turnaround

Fund Name	Year Invested	Commitment Amount (in millions)	Number of Underlying Companies
OHA Strategic Credit Fund II	2016	\$50 million	73

Strategy

Seeks to maximize returns by investing primarily in debt, equity and other securities and/or obligations of North American and European companies experiencing financial or other distress or stress.

Details	
Geography	US and Europe
Headquarters	New York, NY
Classification	Distressed

Fund Name	Year Invested	Commitment Amount (in millions)	Number of Underlying Companies
Siguler Guff Pelican Global Emerging Markets Fund	2016	\$100 million (2 commitments)	258 (300)
Siguler Guff Pelican Global Emerging Markets Fund II	2020	\$50 million	0(60)

Strategy

Custom account of Emerging Market Fund Investments, Direct investments, and co-investments

Details

Details	
Geography	Emerging Markets
Headquarters	New York, NY
Classification	Growth Equity

Vista Equity Partners



Fund Name	Year Invested	Commitment Amount (in millions)	Number of Underlying Companies
Vista Equity Partners Fund VI	2016	\$100 million	19
Vista Equity Partners Fund VII	2018	\$125 million	7

Strategy

The Fund's investment strategy is to acquire companies that provide mission-critical enterprise software, data and technology-enabled solutions, have attractive recurring revenue attributes and offer opportunities for improvement in their operations, and then apply its operational expertise to enhance those companies' financial performance and value.

Details	
Geography	Primarily North America
Headquarters	Austin, TX
Classification	Buyout

Warbug Pincus



Fund Name	Year Invested	Commitment Amount (in millions)	Number of Underlying Companies
Warburg Pincus Global Growth	2019	\$100 million	29 (70-90)

Strategy

Global growth investing at scale across technology, financial services, healthcare, industrial & business services, real estate, energy and consumer sectors.

Details	
Geography	Global
Headquarters	New York, NY
Classification	Growth Equity

LASERS Historical Portfolio Returns

2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Global Fixed 12.3%	Emg Mkts 76.0%	US Sm Cap 28.9%	Risk Parity 18.3%	Opp Cr/Mrtg. 25.6%	US Sm Cap 40.4%	Private Mkts 14.2%	Private Mkts 8.6%	US Sm Cap 20.0%	Int'l Sm Cap 33.5%	Private Mkts 20.4%	US Lg Cap 26.2%
Inv. Grade 1.9%	High Yield 56.7%	Emg Mkts 26.3%	Private Mkts 9.7%	Int'l Sm Cap 25.5%	US Lg Cap 33.3%	US Lg Cap 13.8%	Int'l Sm Cap 3.9%	High Yield 17.5%	Emg Mkts 32.2%	GMS 1.5%	Int'l Sm Cap 24.9%
Private Mkts -4.4%	Int'l Sm Cap 52.0%	Int'l Sm Cap 24.4%	Inv Grade 7.8%	Emg Mkts 20.3%	Int'l Lg Cap 21.1%	Opp Cr/Mrtg. 9.1%	Opp Cr/Mrtg. 3.4%	Emg Mkts 14.7%	Int'l Lg Cap 23.7%	Ab Resturn 1.1%	Int'l Lg Cap 22.4%
Opp Cr/Mrtg. -5.8%	US Sm Cap 29.1%	Risk Parity 17.8%	Global Fixed 5.8%	High Yield 19.1%	Int'l Sm Cap 18.3%	Risk Parity 7.7%	US Lg Cap 0.8%	US Lg Cap 11.8%	US Lg Cap 21.5%	Inv Grade -0.6%	US Sm Cap 21.1%
Ab Return -14.2%	Int'l Lg Cap 29.0%	High Yield 17.7%	High Yield 3.5%	US Lg Cap 16.7%	Private Mkts 15.6%	Inv Grade 6.0%	Ab Return -1.0%	EMD 10.2%	Private Mkts 16.9%	High Yield -2.4%	Risk Parity 17.5%
High Yield -23.1%	US Lg Cap 26.9%	Opp Cr/Mrtg. 16.5%	Opp Cr/Mrtg. 2.8%	US Sm Cap 16.3%	High Yield 10.9%	US Sm Cap 5.9%	Inv Grade -1.8%	Risk Parity 10.1%	EMD 16.4%	US Lg Cap -5.7%	Emg Mkts 15.8%
US Sm Cap -34.7%	Opp Cr/Mrtg. 21.9%	US Lg Cap 15.4%	Ab Return 2.1%	Int'l Lg Cap 16.1%	Ab Return 9.0%	Ab Return 4.1%	Int'l Lg Cap -2.3%	Private Mkts 6.1%	US Sm Cap 12.0%	Risk Parity -8.4%	High Yield 13.5%
US Lg Cap -37.7%	Inv. Grade 17.5%	Private Mkts 13.3%	US Lg Cap 1.4%	Risk Parity 14.9%	Opp Cr/Mrtg. 8.5%	High Yield 3.6%	US Sm Cap -2.5%	Inv Grade 6.0%	Risk Parity 11.9%	EMD -9.4%	EMD 11.7%
Int'l Lg Cap -42.6%	Risk Parity 9.5%	Ab Return 10.5%	US Sm Cap 0.8%	Private Mkts 12.4%	Emg Mkts 0.9%	Emg Mkts 1.1%	High Yield -4.0%	Int'l Sm Cap 5.3%	GMS 9.5%	US Sm Cap -11.5%	GMS 10.7%
Int'l Sm Cap -48.8%	Ab Return 8.8%	Int'l Lg Cap 9.5%	Int'l Sm Cap -8.0%	Inv Grade 9.3%	Inv Grade -0.3%	Real Assets -2.0%	Risk Parity -6.7%	Int'l Lg Cap 3.5%	High Yield 8.3%	Emg Mkts -11.9%	Inv Grade 9.8%
Emg Mkts -55.2%	Global Fixed 7.9%	Inv Grade 9.5%	Int'l Lg Cap -10.7%	Ab Return 5.6%	Risk Parity -3.7%	Int'l Lg Cap -3.3%	Real Assets -10.7%	Ab Return 3.1%	Inv Grade 5.1%	Int'l Lg Cap -13.2%	Private Mkts 7.6%
	Private Mkts -8.4%	Global Fixed 8.6%	Emg Mkts -17.5%	Global Fixed 1.7%	Real Assets -4.3%	Int'l Sm Cap -4.1%	Emg Mkts -14.9%		Ab Return 2.6%	Int'l Sm Cap -16.4%	Ab Return 3.9%
				Real Assets 1.0%	EMD -11.4%	EMD -7.5%	EMD -14.9				

Historical Performance: Good & Bad

Since 2010



- Since inception private market performance: 12%
- Largest exposure: Buyouts
- Top Performer (style): Growth Equity
- Bottom performer (style): Energy (commodity exposure)

Year	Fund	Return
2010	EIG Energy VX	2.02%
2010	Energy Spectrum	6.37%
2013	EIG Energy XVI	4.71%
2015	Arclight Energy Partners VI	-0.29%

Using data from 2010 onward

Long Term Asset Class Performance

As of August 31, 2020



LASERS Assets	10 year return	15 year return
<i>Private Markets</i>	<i>12.01%</i>	<i>11.30%</i>
Total Equity	9.32%	6.42%
Fixed Income	5.31%	6.41%
Total Alternatives	7.28%	7.19%

Trends in the Private Market Asset Class

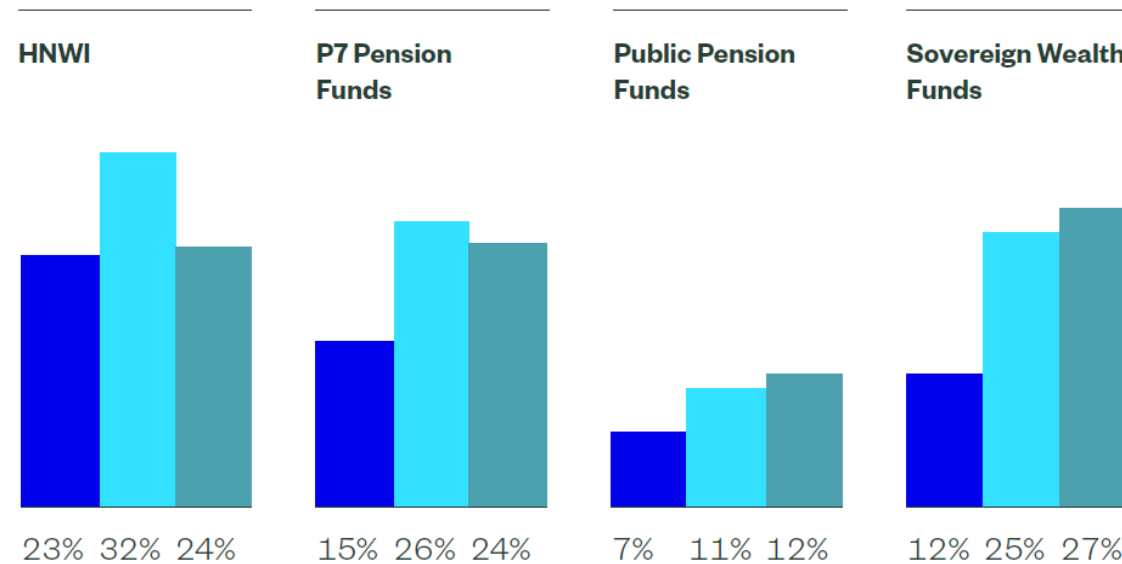
Private Markets have Increased in Significance



Public pensions have increased allocation to private equity since 2007

**Asset Owners' Allocation
to Alternatives⁴⁵**
% of Total Assets

■ 2007*
■ 2013
■ 2016



Source: HNWI — Capgemini, P7 Pension Funds — Willis Towers Watson, otherwise State Street Global Macro Policy Research, as at 31 December 2018.

Private Markets have Increased in Significance

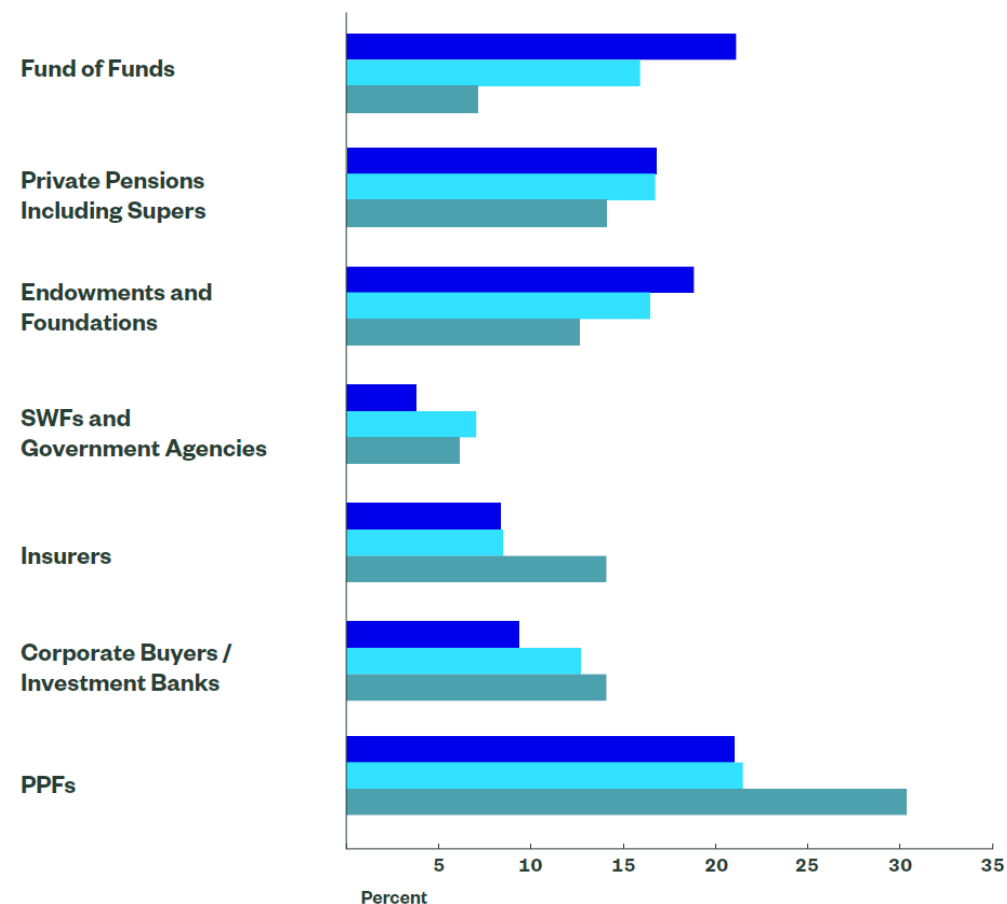


Public pension funds have increased participation in private equity asset class

Evolving Investor Universe

Share of Investor Group
in the Count of PE
Investments Made During
the Year

■ 2003
■ 2010
■ 2017

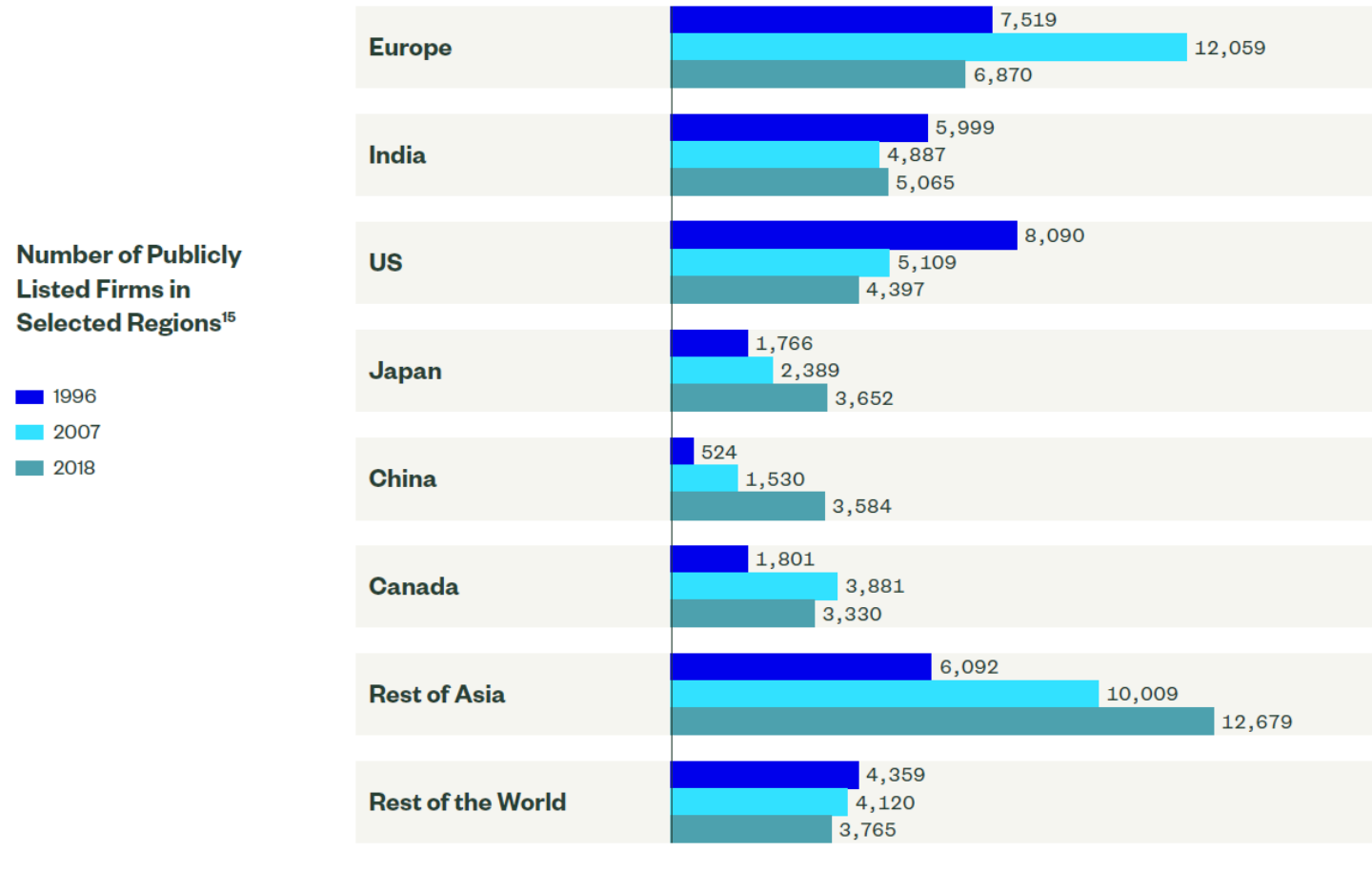


Source: Preqin, State Street Global Macro Policy Research, as at 31 December 2018.
PPFs — Public Pension Funds; SWFs — Sovereign Wealth Funds.

Private Markets have Increased in Significance



Publicly listed firms have declined worldwide

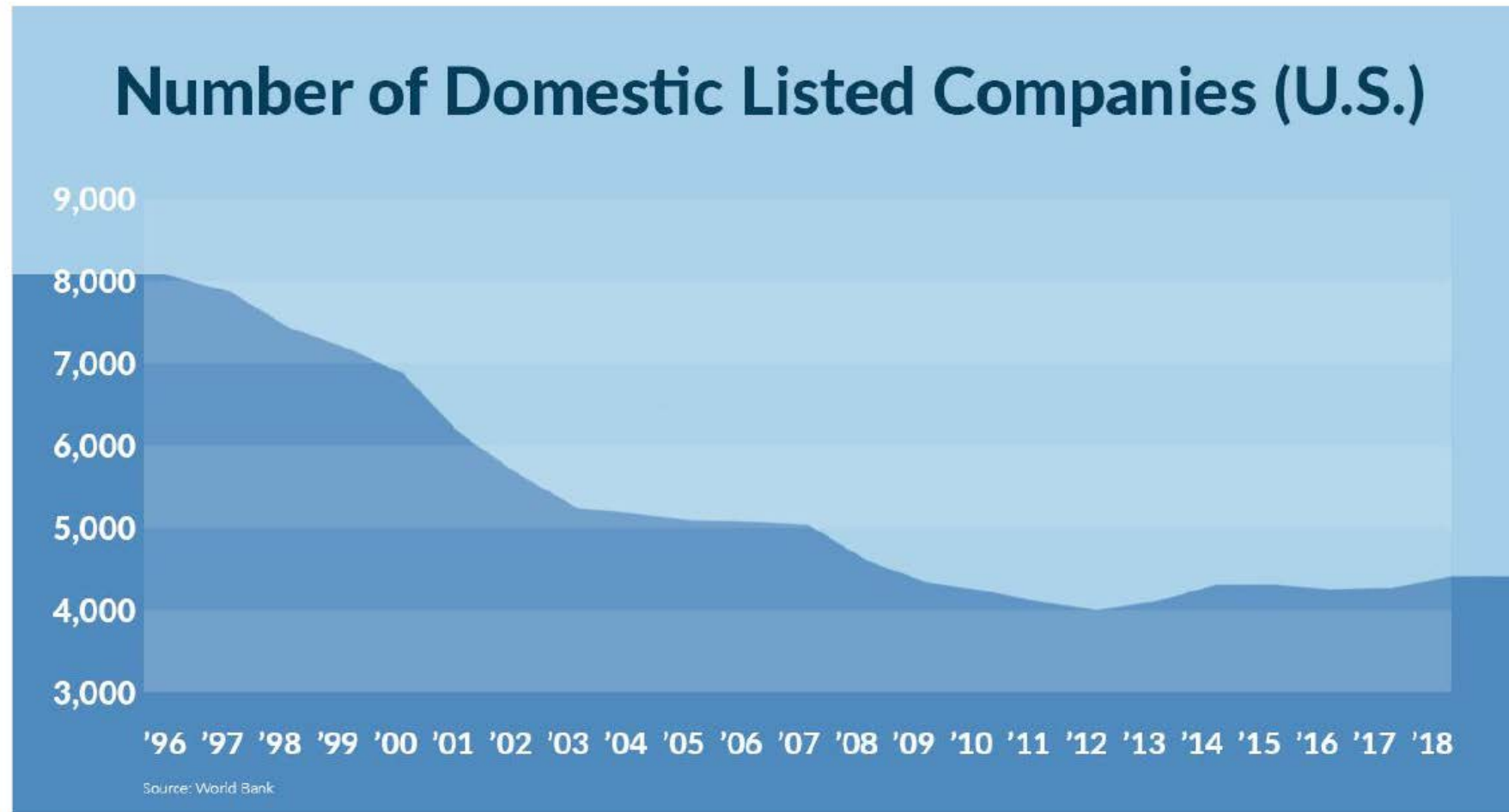


Source: World Bank World Development Indicators Database, as at 31 December 2018.

Private Markets have Increased in Significance



Domestic listings have fallen as businesses look for private capital

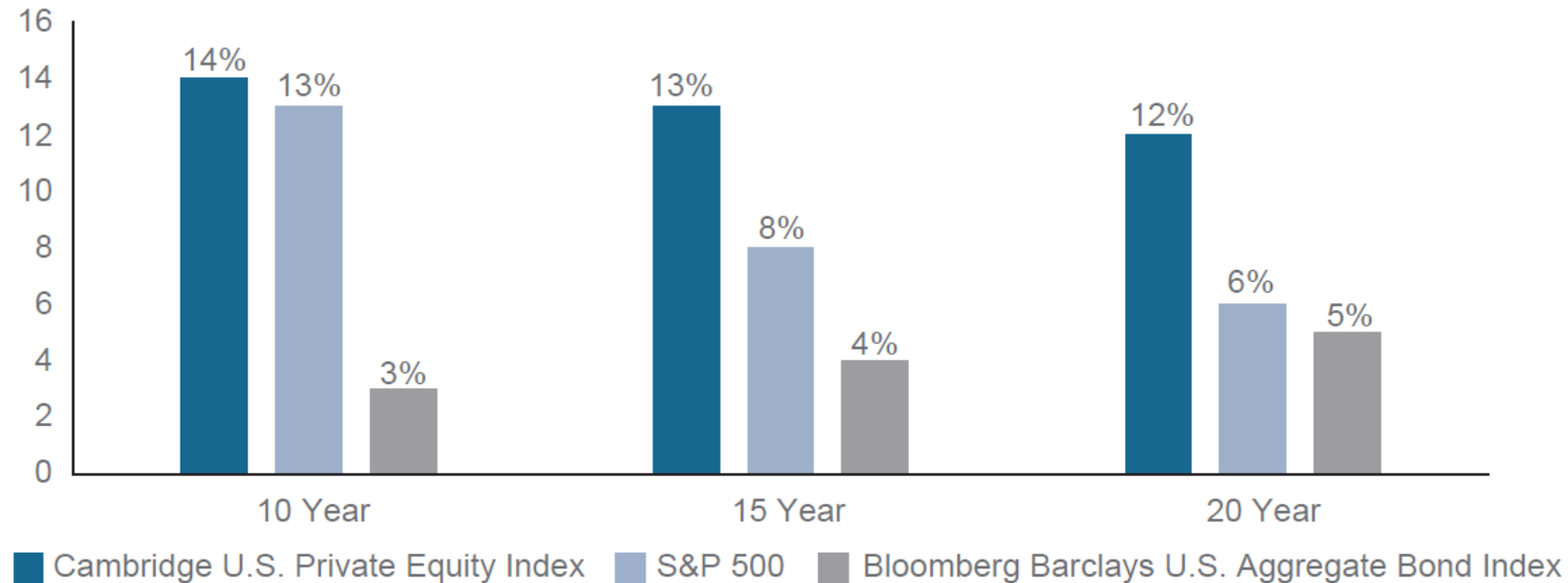


Private Markets have Increased in Significance



Private Equity outperforms meaningfully over time

Annualized Returns over 10-, 15-, and 20-Year Periods



Private Markets have Increased in Significance



Private markets have outperformed other asset classes

10-Year Annualized Return



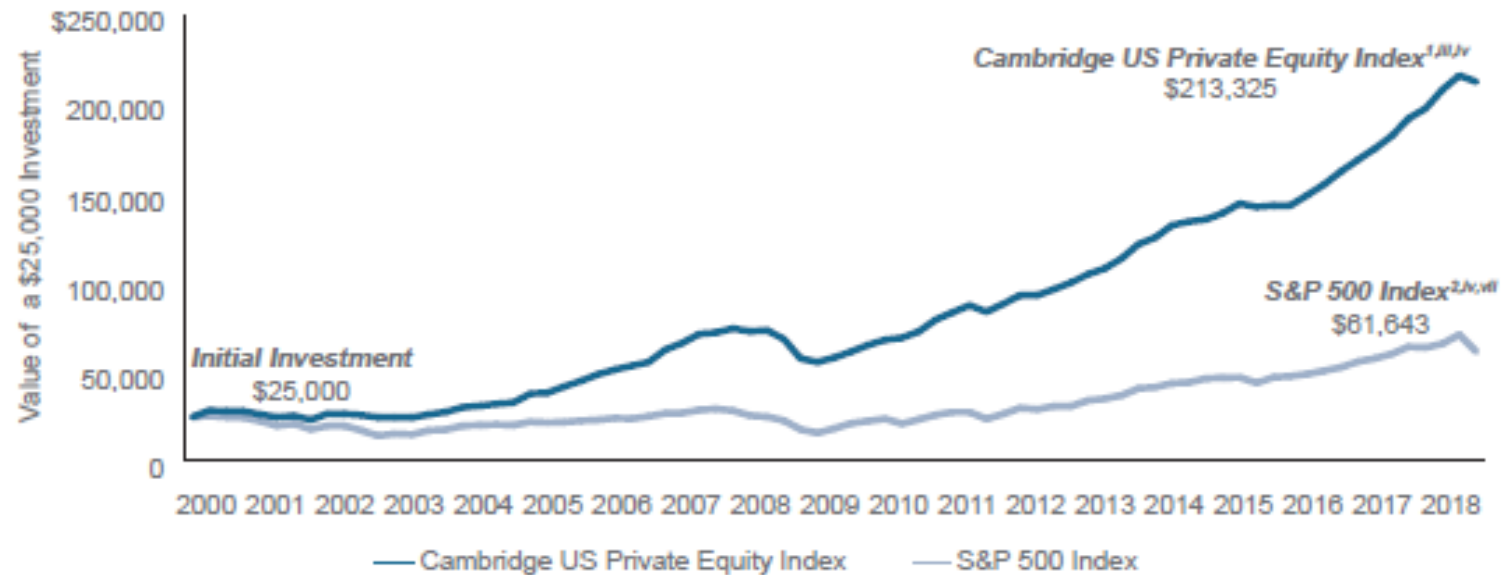
Source: American Investment Council (AIC)

Note: Based on study conducted by the AIC examining investments of 163 U.S. public pension funds; includes pension funds with returns as of June 30, 2017. There is no guarantee these trends will continue.

Private Markets have Increased in Significance



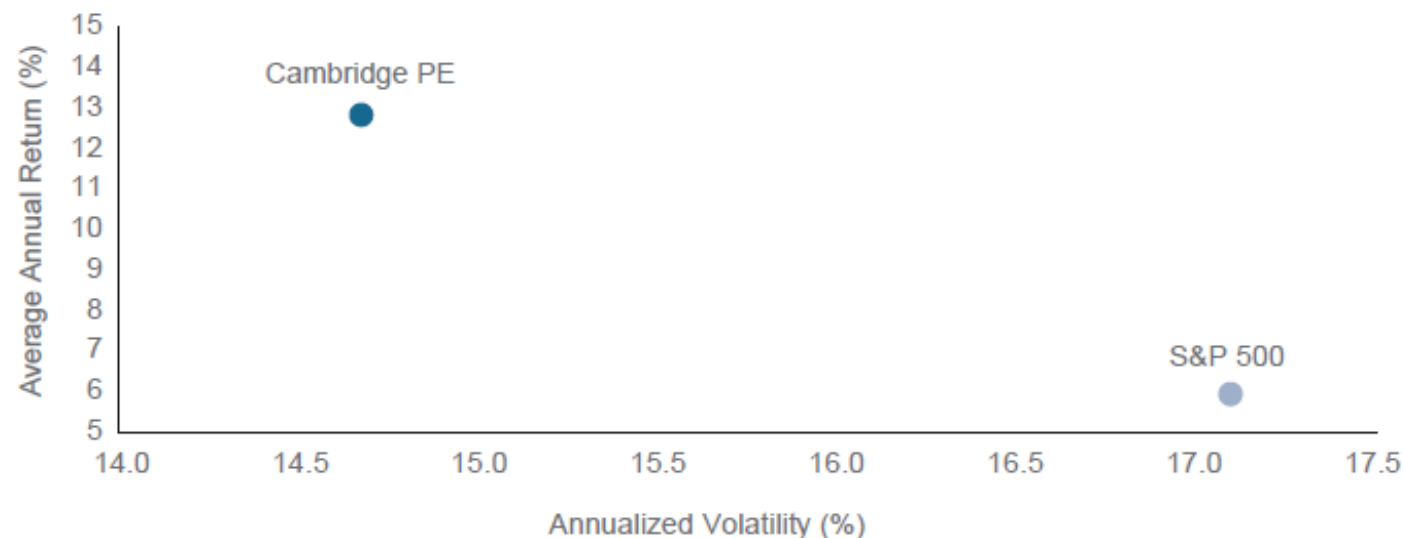
Private Equity Returns vs S&P 500, December 2000 – December 2018



Private Markets have Increased in Significance



Private equity has produced higher returns with less volatility than the S&P 500

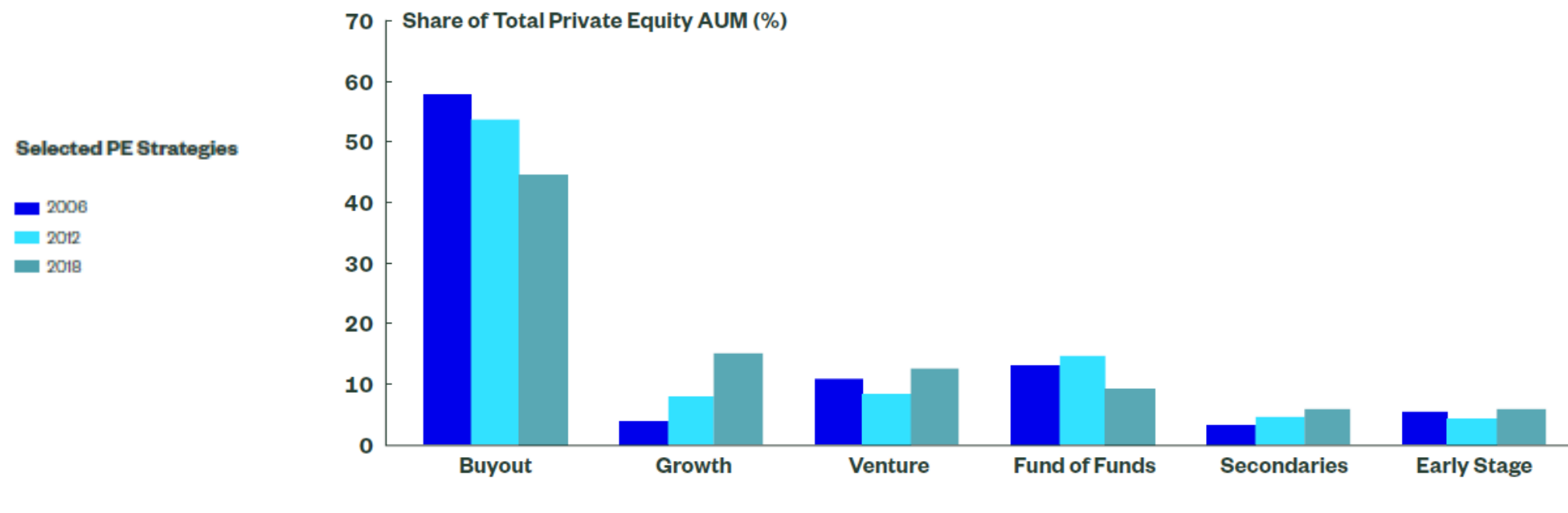


Source: Cambridge Associates, U.S. Private Equity Index (Data as of 12/31/18) and S&P 500 Total Return data from S&P Capital IQ.
Past performance is no guarantee of future results.

Private Markets have Increased in Significance



Buyouts have become less significant as growth has increased in significance

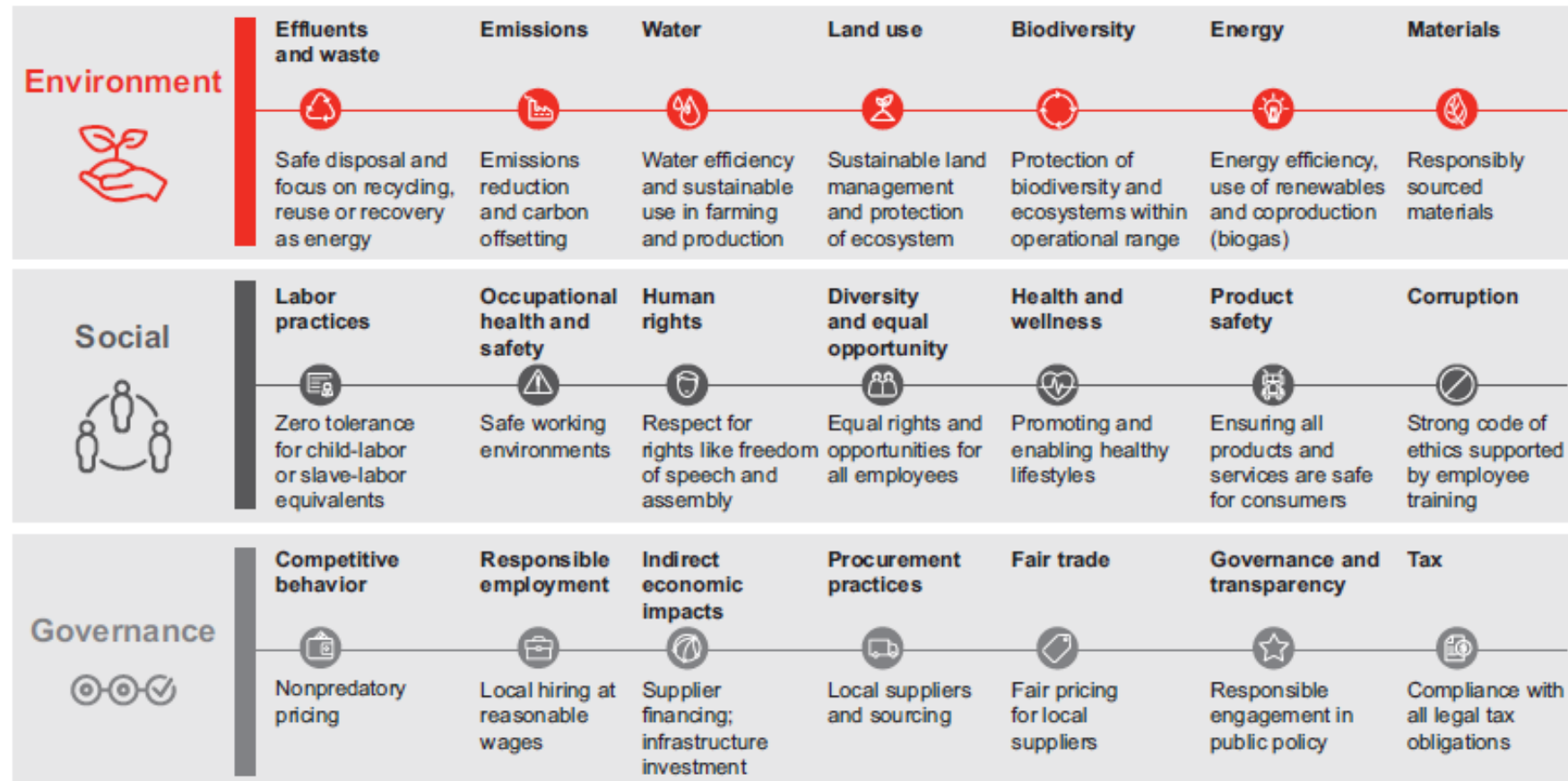


Source: Preqin.

Private Markets have Increased in Significance



ESG (Environmental/Social/Governance) factors – investors are sensitive to a wide range of issues



Institutional Limited Partners Association (ILPA)



What is ILPA?

The Institutional Limited Partners Association (ILPA) engages, empowers and connects limited partners (LPs) to maximize their performance on an individual, institutional and collective basis. LPs serve as trusted financial stewards who direct critical capital into private equity investments on behalf of their beneficiaries which include retirees, teachers, firefighters, police officers, universities, charities, and insurance policyholders. With **over 500 member institutions representing more than \$2 trillion USD of private equity assets under management (AUM), ILPA is the only global organization dedicated exclusively to advancing the interests of LPs and their beneficiaries through best-in-class education, research, advocacy and events.**

Institutional Limited Partners Association (ILPA)



Advocacy Objectives

1. **Educating policymakers and regulators** about the role of private equity in institutional investor portfolios and in the overall economy.
2. Serving as an **advocate for limited partners** and the important role our members play as trusted financial stewards for millions of beneficiaries worldwide.
3. Equipping ILPA members with **intelligence regarding legislation and regulation**, shifts in the political climate and policies and resulting risks and opportunities for their portfolios.

Institutional Limited Partners Association (ILPA)



ILPA Benefits

- Best practices
 - Transparency
 - Governance
 - Alignment of GP and LP interests
 - Allowed LPs to use these best practices to ensure contracts are more LP friendly
- Globally recognized reporting template for General Partners
- Allows a forum for LPs to share experiences
- Education platform for LPs

Private Market Outlook

Industry Outlook



Accelerating Businesses	Businesses with Issues
E-Commerce	Core/Office Real Estate in CBDs
Logistics	Retail (location based businesses)
Telemedicine	Hotel/Hospitality (location based businesses)
SaaS (Software as a Service)	Aerospace/Airlines
Online education/Tutoring	Cinema
Financial technology: payments, contactless payments	Physical banks
Online banking: “new generation” financial services	
Cybersecurity	

Source: KKR and Warbug Pincus

Industry Outlook



Global Themes

E-Commerce/Digitalization

Resiliency/Preparedness

Nesting

ESG/Infrastructure

Health & Wellness/Preventative Care

Savings/Tax Deferral

Potential reversals of: Globalization, Urbanization, and Sharing Economy

Source: KKR and Warbug Pincus

Moving Forward

Areas of Concentration



1. Distressed/Special Situations: to take advantage of market dislocations
2. Secondaries: to take advantage of forced sellers, gain exposures in areas we are underserved
3. Growth Equity: the end market is willing to pay for companies with growth prospects, multiple end market exit opportunities
4. Will focus less on the commodity exposure of energy, and more on infrastructure
5. Still work to globally diversify our private market portfolio – Asia, Emerging Markets, Latin America, Europe, etc.
6. Unique credit opportunities to bring further diversification and risk reduction to the portfolio

GTCR Fund XIII

Fund Commitment Recommendation



\$75 million commitment to GTCR Fund XIII

Prior Commitments:

- GTCR Fund XI (2014): \$50 million
- GTCR Fund XII (2017): \$60 million

See NEPC document for detailed information

FUND PROFILE: GTCR FUND XIII

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General Fund Information	
Fund Name	GTCR Fund XIII
General Partner	GTCR
Main Address	300 N LaSalle Dr. #5600 Chicago, IL 60654
Target Fund Size / Hard Cap	\$6.75B / None
Capital Raised	First and final close November 2020
Expected Final Close	November 2020
Fund Structure	Limited Partnership
Investment Period	Six years from the first capital call
Term of Entity	10 years from the first capital call
Minimum Investment	\$25 million
Fund Auditor	Ernst & Young LLP

Fund Strategy	
Fund Strategy	Buyout
Industry Focus	Technology, Media & Telecommunications; Financial Services & Technology; Healthcare; Growth Business Services
Geographic Focus	North America
Target Deal Size	Total equity checks of roughly between \$300 million and \$600 million
Target Number of Investments	16-20
Strategy Description	GTCR seeks to implement its trademarked "The Leaders Strategy™," which it defines as finding and partnering with exceptional management leaders in core domains to identify, acquire and build market-leading companies through transformational acquisitions and organic growth. GTCR combines research based investment theses and established, successful management teams to execute primarily control acquisitions of mature, cash flowing companies in their target industries.

GP Fees, Promote and Commitment	
Target Net IRR	20%
Target Net Return	2.0x
Management Fees	1.5% of commitments during the investment period; in the seventh year, 90% of the amount in effect in the prior year; decreases by 5% of the amount in effect for the prior year down to 75% in year 10. During the 11 th year and each year thereafter, 0.75% of the lower of invested capital or the fair value of such investments, but not to exceed the amount payable in the 10 th year
Preferred Return	No preferred return; GP distributions will only occur subject to a 125 minimum valuation test during the commitment period or a 100% minimum valuation test thereafter, or unless LPs have received distributions equal to aggregate capital contributions
Carried Interest	20%
GP Commitment	2% of total commitments

Firm Track Record

Fund Track Record (\$ in Millions)						
Fund Name	Fund Style	Vintage Year	Fund Size	Net TVPI Multiple	Net DPI Multiple	Net IRR
GTCR Fund VII	Buyout	2000	\$2,000	2.4x	2.4x	25.7%
GTCR Fund VIII	Buyout	2003	\$1,837	1.7x	1.7x	22.7%
GTCR Fund IX	Buyout	2006	\$2,750	1.8x	1.8x	13.9%
GTCR Fund X	Buyout	2011	\$3,233	2.1x	2.0x	21.3%
GTCR Fund XI	Buyout	2014	\$3,941	2.0x	0.9x	27.1%
GTCR Fund XII	Buyout	2017	\$5,408	1.2x	0.1x	21.4%



Note: Fund performance data as of 6/20/2020, as provided by GTCR.

ALTERNATIVE INVESTMENT DISCLOSURES

It is important that investors understand the following characteristics of non-traditional investment strategies including hedge funds and private equity:

- A. Performance can be volatile and investors could lose all or a substantial portion of their investment**
- B. Leverage and other speculative practices may increase the risk of loss**
- C. Past performance may be revised due to the revaluation of investments**
- D. These investments can be illiquid, and investors may be subject to lock-ups or lengthy redemption terms**
- E. A secondary market may not be available for all funds, and any sales that occur may take place at a discount to value**
- F. These funds are not subject to the same regulatory requirements as registered investment vehicles**
- G. Managers may not be required to provide periodic pricing or valuation information to investors**
- H. These funds may have complex tax structures and delays in distributing important tax information**
- I. These funds often charge high fees**
- J. Investment agreements often give the manager authority to trade in securities, markets or currencies that are not within the manager's realm of expertise or contemplated investment strategy**

To: Louisiana State Employees' Retirement System

From: Rhett Humphreys, CFA, Partner; David Barnes, CFA; and Melissa Mendenhall

Date: October 19, 2020

Subject: Proposed Follow-On Commitment to GTCR Fund XIII

Louisiana State Employees' Retirement System ("LASERS") staff and NEPC are recommending a follow-on commitment to GTCR Fund XIII ("GTCR XIII" or the "Fund"), which is being raised by GTCR, LLC ("GTCR", the "Manager", or the "Firm").

Executive Summary of the Opportunity

GTCR is seeking to raise \$6.75 billion for GTCR Fund XIII, a commingled, closed-end fund that will make between 16 and 20 control investments of approximately \$300 million to \$600 million in leveraged acquisitions of mature, cash flowing companies. GTCR has developed its investment approach, The Leaders Strategy™, over its 40-year history. The Leaders Strategy leverages three key attributes in seeking to drive investment results: partnerships with exceptional leaders; domain expertise; and execution of transformational opportunities. The Firm targets investments in its four core investment domains of Financial Services & Technology, Growth Business Services, Healthcare and Technology, Media and Telecommunications. The Firm is targeting a first and final close on the Fund in November 2020.

The commitment to GTCR XIII is a follow-on commitment to the commitments made by LASERS to the predecessor funds of the same strategy: \$60 million to GTCR XII in 2017 and \$50 million to GTCR XI in 2014. While GTCR XII is still actively investing and creating value, GTCR XI is a strong performer to date, generating a 24.7% net IRR with a net Multiple of Invested Capital of 1.6x and a Distributed to Paid in multiple of 0.6x as of June 30, 2020. GTCR's investment focus on mature, growing businesses across its range of industry verticals remains a complement to LASERS current private equity portfolio, which also includes sector-specific managers in software and technology and more value-oriented managers investing across a variety of sectors.

GTCR Firm Overview

Founded in 1980, GTCR is one of the oldest private equity firms in the United States. Since its founding, the Firm has raised over \$21 billion across its 12 previous funds and invested over \$18 billion into companies. The Firm has successfully undergone succession transitions from its founding partners, and the management company is owned entirely by its active investment professionals. The Firm is led by its 11 Managing Directors, who have an average tenure with the Firm of over 17 years. The investment team consists of 51 professionals that are organized into core teams around each of GTCR's four industry verticals and supported by specialist teams in capital markets and recruiting. The balance of the Firm's nearly 100 professionals consist of operations staff across legal and compliance, finance and accounting and information services. The entire Firm is based out of its one office in Chicago, IL.

GTCR Fund XIII

GTCR seeks to implement its trademarked "The Leaders Strategy™," which it defines as finding and partnering with exceptional management leaders in core domains to identify, acquire and build market-leading companies through transformational acquisitions and organic growth. GTCR combines research-based investment theses and established, successful management teams to execute primarily control acquisitions of mature, cash flowing companies in their target industries (Financial Services & Technology, Growth Business Services, Healthcare and Technology, Media



and Telecommunications). Attractive traits of these domains and investments include: strong, long term growth; recurring revenue and stable cash flow; attractive competitive profile; superior cash return on unleveraged net assets; substantial transformation opportunity through acquisition/consolidation; and opportunity for multiple expansion through IPOs or strategic sale exits.

After investment, the Fund will drive value through transformation of acquired companies, including accelerating growth by improving sales execution, improving efficiency by focusing on performance metrics and accountability and upgrading infrastructure and operations to position companies for public or strategic exits. The Fund will also seek to make add on acquisitions to build strategic significance by expanding geographic, customer or product reach. GTCR is often able to consummate these add on transactions at lower multiples than its platforms, enabling lower blended purchase prices and the ability to generate gains through both EBITDA growth and multiple expansion at exit.

GTCR XIII Advantages

Experienced firm and team – GTCR is one of the oldest private equity firms in the United States and enjoys strong brand recognition and a reputation as a high quality manager with which to work. The Firm is owned by its 11 Managing Directors, who average 17 years with GTCR and who are responsible for the continuing development and execution of its successful investment strategy.

Attractive and differentiated strategy – GTCR’s investment approach, which has been honed through decades of investing, allows the Firm to deploy capital into unique, complex transactions that other private equity investors may not have access to. Their ability to add significant value to these transactions through operational improvements, strategic positioning and scale, have enabled them to generate attractive investment returns through exits to large corporates, other PE firms, or in the public markets.

Strong track record – GTCR’s prior mature funds, particularly those invested by the current team, have generated attractive investment returns on an absolute and relative basis. They are able to benefit from lessons learned early in the Firm’s development, particularly as it relates to investment pacing and portfolio construction.

GTCR XIII Potential Issues

No preferred return – GTCR has historically not offered a preferred return to investors. In lieu of a preferred return and to mitigate clawback liability, the distribution waterfall has mechanisms in place that prevent the General Partner from receiving carried interest based on either a valuation or payout test.

Increase in fund size – GTCR’s success has enabled the Firm to generate significant support from institutional investors, who have enabled the Firm’s move up market. While the Fund’s target of \$6.75 billion is a somewhat modest increase of 25% over the prior fund, the last two funds have consistently increased by over \$1.5 billion per fund over their fund cycles. GTCR has maintained strong performance as fund sizes have increased, but the size of companies in which it must invest out of larger funds provide somewhat less exit optionality, as there are fewer larger private equity firms to which they can exit companies.



Conclusion

Based upon the due diligence process conducted both by staff and NEPC, NEPC and staff recommend an up to \$75 million follow-on commitment to GTCR XIII.



Disclaimers and Disclosures

- Past performance is no guarantee of future results.
- The opinions presented herein represent the good faith views of NEPC as of the date of this report and are subject to change at any time.
- This memo and the NEPC Tear Sheet for the Fund provide a summary of information and documentation received by NEPC from the manager through phone calls and meetings. The product has not been rated by NEPC's Alternative Assets Committee.
- Information used to prepare this report was obtained directly from the investment manager, and market index data was provided by other external sources. While NEPC has exercised reasonable professional care in preparing this report, we cannot guarantee the accuracy of all source information contained within.
- NEPC does not generally provide legal, regulatory or tax advice. Please consult your attorney or tax advisor for assistance as needed.
- This report may contain confidential or proprietary information and may not be copied or redistributed to any party not legally entitled to receive it.

LOUISIANA RETIREMENT SYSTEMS BUILDING FUND
2021-2022 Budget

	ACTUAL 2015-2016	ACTUAL 2016-2017	ACTUAL 2017-2018	ACTUAL 2018-2019	ACTUAL 2019-2020	BUDGET 2019-2020
REVENUES:						
RENTAL REVENUES						
Teachers' Retirement System of LA	\$830,369	\$830,369	\$830,369	\$830,369	\$830,369	\$830,500
LA State Employees' Retirement System	700,171	700,171	700,171	700,171	700,171	700,500
TOTAL - RENTAL REVENUES	\$1,530,540	\$1,530,540	\$1,530,540	\$1,530,540	\$1,530,540	\$1,531,000
OTHER REVENUES						
Miscellaneous Income					25,000	0
Interest Income	\$5,488	\$20,339	\$53,700	\$93,851	\$58,656	\$50,000
Room Rental/Other	4,160	460	50	60	50	500
TOTAL - OTHER REVENUES	\$9,648	\$20,799	\$53,750	\$93,911	\$83,706	\$50,500
TOTAL REVENUES	\$1,540,188	\$1,551,339	\$1,584,290	\$1,624,451	\$1,614,246	\$1,581,500
OPERATING EXPENSES:						
REPAIRS AND MAINTENANCE						
Electrical	\$1,639	\$2,894	\$0	\$4,067	\$18,681	\$19,000
Plumbing Expense	11,052	12,009	22,886	31,465	26,905	15,500
Heating and A/C	66,522	68,833	67,329	75,417	77,071	81,000
Building Exterior	2,120	9,598	39,495	15,781	772	20,000
Building Interior	46,038	38,456	62,432	50,595	55,358	65,000
Windows & Glass	10,200	\$0	0	0	17,151	15,000
Lighting & Fixtures	-	11,891	11,254	7,017	6,704	10,000

LOUISIANA RETIREMENT SYSTEMS BUILDING FUND
2021-2022 Budget

	ACTUAL 2015-2016	ACTUAL 2016-2017	ACTUAL 2017-2018	ACTUAL 2018-2019	ACTUAL 2019-2020	BUDGET 2019-2020
REPAIRS AND MAINTENANCE CONT.						
Roof	\$0	\$0	\$0	\$2,160	\$0	\$5,000
Carpet & Tile	4,260	4,281	0	85	6,539	7,000
Grounds	21,730	29,307	32,690	27,070	37,615	35,700
Janitorial Service	122,874	119,864	129,866	125,427	125,386	130,000
Janitorial Supplies	\$0	\$0	680	-	1,056	2,000
Exterminating	2,005	1,845	7,460	4,755	9,143	5,000
Elevator	8,279	9,281	6,681	11,604	12,392	10,750
Alarm Monitoring & Fire Safety & Security	16,429	24,337	24,121	28,627	28,182	35,000
Miscellaneous Expense	145	3,200	0	0	3,200	5,000
TOTAL - REPAIRS AND MAINTENANCE	\$313,293	\$335,796	\$404,893	\$384,068	\$426,155	\$460,950
UTILITIES						
Electricity	\$276,654	\$271,996	\$285,398	\$298,609	\$293,258	\$336,500
Water & Sewerage	11,814	10,730	10,065	10,728	11,647	13,000
Telephone	2,472	2,618	2,632	3,004	3,038	3,000
Waste Removal	\$5,730	\$6,453	\$6,202	\$6,764	\$12,032	7,000
TOTAL - UTILITIES	\$296,670	\$291,797	\$304,297	\$319,105	\$319,976	\$359,500
BUILDING SECURITY GUARDS						
Maintenance/Security Salary	\$172,479	\$165,120	\$157,918	\$167,160	\$159,180	\$191,000
TOTAL - BUILDING SECURITY GUARDS	\$172,479	\$165,120	\$157,918	\$167,160	\$159,180	\$191,000

LOUISIANA RETIREMENT SYSTEMS BUILDING FUND
2021-2022 Budget

	ACTUAL 2015-2016	ACTUAL 2016-2017	ACTUAL 2017-2018	ACTUAL 2018-2019	ACTUAL 2019-2020	BUDGET 2019-2020
BUILDING MANAGEMENT						
Management Contract	\$38,796	\$38,796	\$38,796	\$38,796	\$38,796	\$38,800
TOTAL - BUILDING MANAGEMENT	\$38,796	\$38,796	\$38,796	\$38,796	\$38,796	\$38,800
OTHER EXPENSES						
Insurance	\$34,950	\$40,871	\$38,895	\$46,334	\$51,353	\$60,000
Legal, Architect/Engineering & Professional	5,350	5,690	5,925	6,275	6,625	35,000
Advertising	0	0		0	0	500
Bank Charges	4,922	4,865	4,886	4,909	4,865	5,400
Dues & Licenses	6,064	6,432	6,204	6,145	6,166	6,878
Tenant Improvements	0	3,050	5,807	3,948	0	10,000
Office Supplies	66	114	97	182	199	500
PM/Planned Renovation Fund	\$2,802	\$0	72,385	98,508	638,196	166,880
Maintenance Reserve Account	35,771	10,944	713,353	-8,699	234,119	160,205
TOTAL OTHER EXPENSES	\$89,925	\$71,967	\$847,551	\$157,601	\$941,522	\$445,363
TOTAL OPERATING EXPENSES	\$911,163	\$903,477	\$1,753,456	\$1,066,730	\$1,885,629	\$1,495,613
NET INCOME FROM OPERATIONS	\$629,025	\$647,862	-\$169,166	\$557,721	-\$271,383	\$85,887

BUDGET 2020-2021	BUDGET REQUEST 2021-2022	OVER/(UNDER) CURRENT BUDGET		PAGE REF.
		AMOUNT	% CHANGE	
				J1
\$830,500	\$830,500	\$0	0.0%	
700,500	700,500	\$0	0.0%	
\$1,531,000	\$1,531,000	\$0	0.0%	
				J2
0	0			
\$50,000	\$5,000	-\$45,000	-90%	
100	100	\$0	0.0%	
\$50,100	\$5,100	-\$45,000	-89.8%	
\$1,581,100	\$1,536,100	-\$45,000	-2.8%	
				J3-J4
\$19,000	\$19,000	\$0	0.0%	
18,000	22,000	\$4,000	22.2%	
81,000	81,000	\$0	0.0%	
20,000	20,000	\$0	0.0%	
65,000	65,000	\$0	0.0%	
15,000	15,000	\$0	0.0%	
10,000	10,000	-	0.0%	

BUDGET 2020-2021	BUDGET REQUEST 2021-2022	OVER/(UNDER) CURRENT BUDGET		PAGE REF.
		AMOUNT	% CHANGE	
				J4--J5
\$5,000	\$5,000	\$0	0.0%	
7,000	7,000	\$0	0.0%	
35,700	35,700	\$0	0.0%	
133,492	132,772	(\$720)	-0.5%	
2,000	2,000	\$0	0.0%	
5,280	6,000	\$720	13.6%	
10,750	10,750	\$0	0.0%	
35,000	31,000	(\$4,000)	-11.4%	
5,000	5,000	\$0	0.0%	
\$467,222	\$467,222	\$0	0.0%	
				J6
\$336,500	\$336,500	\$0	0.0%	
13,000	13,000	\$0	0.0%	
3,000	3,000	\$0	0.0%	
9,642	12,300	\$2,658	27.6%	
\$362,142	\$364,800	\$2,658	0.7%	
				J6
\$191,000	\$165,000	-\$26,000	-13.6%	
\$191,000	\$165,000	-\$26,000	-13.6%	

BUDGET 2020-2021	BUDGET REQUEST 2021-2022	OVER/(UNDER) CURRENT BUDGET		PAGE REF.
		AMOUNT	% CHANGE	
				J6
\$38,800	\$38,800	\$0	0.0%	
\$38,800	\$38,800	\$0	0.0%	
				J7-J8
\$60,000	\$60,000	\$0	0.0%	
35,000	35,000	\$0	0.0%	
500	500	\$0	0.0%	
5,400	5,400	\$0	0.0%	
6,878	6,878	\$0	0.0%	
10,000	10,000	\$0	0.0%	
500	500	\$0	0.0%	
327,085	327,085	\$0	0.0%	
0	0	\$0	#DIV/0!	
\$445,363	\$445,363	\$0	0.0%	
\$1,504,527	\$1,481,185	-\$23,342	-1.6%	
\$76,573	\$54,915	-\$21,658	-28.3%	

2021-2022 Building Operating Budget

ACCOUNT BUDGET JUSTIFICATIONS AND COMMENTS

RENTAL INCOME FROM PARTNERS

AGENCY RENTAL

AGENCY

Teachers' Retirement System of Louisiana

Building Rental

PM/ Planned Renovation Account

Maintenance Reserve Account

TRSL Total Rental

LA State Employees' Retirement System

Building Rental

PM/Planned Renovation Account

Maintenance Reserve Account

LASERS Total Rental

Total Rental Income

Rate	2021 - 2022 BUDGETED AMOUNT	TOTAL USABLE SQUARE FT (USF)	% Sq Ft
\$14.423	\$652,915	45,269	
3.920	177,454	45,269	
0.000	0	45,269	
\$18.343	\$830,369	45,269	54.25%
\$14.423	\$550,540	38,171	
3.920	149,630	38,171	
0.000	0	38,171	
\$18.343	\$700,171	38,171	45.75%
\$18.343	\$1,530,540	83,440	100%

- Total Rental Rate = \$18.343
- Average Square Foot for this office park is \$22.00-\$24.00
- USF= Usable Square Feet - The actual office space and circulation used

2021-2022 Building Operating Budget

RENTAL INCOME FROM PARTNERS

AGENCY RENTAL CONT.

Teachers' Retirement System of Louisiana

- Lease rates will remain the same at \$18,343 per USF due to fulfillment of PM/ Planned Renovation fund obligations.
- TRSL Monthly Rent = \$69,197.44

Louisiana State Employees' Retirement System

- Lease rates will remain the same at \$18,343 per USF due to fulfillment of PM/Planned Renovation fund plan obligations.
- LASERS Monthly Rent = \$58,347.55

The Preventative Maintenance/Planned Renovation Fund is intended for use on expenditures that are consistent with maintaining an aging building, but not those considered routine for operations.

Interest Income

Interest earned on cash maintained in Sweep Account for operating expenses, PM/Planned Renovation plan expenses, and contingency fund.

Room Rental

The 4th floor conference room rental to an outside agency @ \$100 per half day.

2021-2022 Building Operating Budget

OPERATING EXPENSES

REPAIRS & MAINTENANCE

Electrical

Continued expansion of cabling, electrical, generator services, time clocks, data pulls and miscellaneous projects.

Plumbing Expense

Labor and supplies for miscellaneous repairs on aging equipment and average of 3 years prior actual expenses, less extraordinary items (2017-2018 = \$22,886; 2018-2019 = \$31,465; 2019-2020 = \$26,905)

Heating and HVAC

Johnson Controls contract (12 month agreement with MERV 13 filters executed in July 2020) invoiced quarterly at \$19,035 plus \$151.73 per month for Cox Communications data line for NAE communications plus any miscellaneous repairs.

Building Exterior

Miscellaneous repairs to building exterior.

Building Interior

Misc projects to include ceiling tile replacement, interior landscaping and other unspecified repairs. Ponds & Pools - \$360/month contract for maintenance. Plus \$600 per year for filters. On atrium pond, \$500 contingency for any repairs; Painting & Papering - \$25,000 for repairs to offices not covered under PM/ Planned Reno plan (\$10,000 per agency & \$5,000 unanticipated expenses); Drapes & Miniblinds - \$800 for replacement and cleaning of blinds; Locksmith - \$2,000 - Expense for materials and door hardware replacement as needed.

2021-2022 Building Operating Budget

OPERATING EXPENSES

REPAIRS & MAINTENANCE CONT.

Windows & Glass

Window maintenance and replacement as needed.

Lighting & Fixtures

\$700/mo for ballast/bulbs replacement with energy efficient products. Remainder of budget for other areas of energy efficiency as they arise.

Roof

Miscellaneous repairs as needed.

Carpet and Tile

Miscellaneous carpet repairs throughout building.

Grounds

Parking lot - \$3,500 for exterior bulb replacement; \$5,000 re-caulking cracks and parking permits. Monthly contract with Groundworks Lawnscape at \$1,872 per month.

Janitorial Service

Provider contract executed in 2017 at \$10,420 per month - anticipated increase of 5% to \$10,940 quarterly floor maintenance and miscellaneous items estimated to be \$550 per quarter.

Janitorial Supplies

Miscellaneous janitorial supplies and services not covered in janitorial services contract.

2021-2022 Building Operating Budget

OPERATING EXPENSES

REPAIRS & MAINTENANCE CONT.

Exterminating

Monthly pest service with Premier \$240/month plus Termite renewal. Exterior ant abatement at \$1,999 annually plus biannual treatment at a rate of \$450 per month for the months of May and October. Allowance for unplanned additional pest or rodent abatement at a cost of \$150 per occurrence.

Elevator

Quarterly elevator contract \$2,376 and miscellaneous repairs. Service contract currently being rebid between providers - cost expected to decrease for 2020-2021 fiscal.

Fire Safety/Security

Consolidated alarm, Fire Extinguisher and testing sprinkler contracts (\$2,500 per year). \$1,000 Halon inspection, \$2,500 repairs and contingency.

\$1,575.00 per month (Total \$18,900.00) for Skyhawk equip. lease payments, repair service contracts and security monitoring of systems (burglar, access, panic buttons & cameras) Additional \$10,100.00 for any miscellaneous security hardware as needed.

Miscellaneous Expense

Any miscellaneous expenses.

2021-2022 Building Operating Budget

OPERATING EXPENSES

UTILITIES EXPENSES

Electricity

Budget projection based on 2020-2021 budgeted amount.

Water & Sewerage

Based on 2020-2021 budgeted amount.

Telephone

Based on 2020-2021 budgeted amount.

Waste Removal

Pricing based on 2020-2021 contract costs. Waste removal contract with Republic Services at a rate of \$420/month. Recycling contract with Waste Management at a rate of \$603/month.

BUILDING SECURITY GUARDS

Maintenance/Security Salary

Maintenance: Full-time On-Site Maintenance Engineer. 40 hrs/week at \$20.50/hr = \$42,640.00; Maintenance Support Personnel as needed: 550 hours at \$18.00/hr = \$9,900.00 Total Cost: \$52,540. 16 hours per week at \$30.75 (\$20.50/hr x 1.5) overtime callout for Maintenance Engineer. Overtime required for renovations covered under the five year plan that have to be conducted outside of office hours. Additional support staff/overtime hours may be required depending on PM/Planned Reno improvement ventures.

Security Services: Contract based on one guard for 67.5 hours per week at \$16.20/hr (per Weiser invoices). Hours over 80 per week at \$24.30/hr. Current contract not to exceed \$72,000 per year but up for renegotiation prior to budget commencement.

MANAGEMENT CONTRACT

Management

According to contract at a fee equal to \$3,233.00 per month.

2021-2022 Building Operating Budget

OPERATING EXPENSES

OTHER EXPENSES

Insurance

Based on 2020-2021 budgeted amount.

Legal & Professional

\$29,500 - fees for legal services, consultants and/or assignments for building projects involving facilities planning, architecture, and space planning. Includes \$5,500 for External Audit.

Advertising

Miscellaneous advertising for vendor RFP's, bldg.

Bank Charges

Estimated potential fees based on increased banking costs.

Dues and Licenses

United Plaza Association dues. Based on association budget for 2020-2021.

Tenant Improvements

Tenant improvement costs not associated with or appearing in PM/Planned Renovation plan: for example carpet and painting of offices.

Office Supplies

Miscellaneous office supplies.

Preventative Maintenance/ Planned Renovation Fund

Ongoing repairs and upgrades to aging mechanical equipment servicing building.

2021-2022 Building Operating Budget

OPERATING EXPENSES

OTHER EXPENSES CONT.

Maintenance Reserve Fund

For unforeseen required maintenance of the building or replacement of building equipment that is not budgeted and cannot be covered by the normal operation budget.
Detailed reports of any funds charged to this fund will be provided to the board. As of August 2020, account balance sufficient so that no additional funding is required.

LOUISIANA RETIREMENT SYSTEMS BUILDING FUND
2021-2022 Budget

BUDGET CATEGORY	CURRENT BUDGET 2020-2021	REQUESTED BUDGET 2021-2022	OVER/(UNDER) CURRENT BUDGET		PAGE REFERENCE
			AMOUNT	% CHANGE	
NET INCOME FROM OPERATIONS (BEFORE CAPITAL OUTLAYS)					J1-J2 J3-J8
TOTAL REVENUES	\$1,581,100	\$1,536,100	(\$45,000)	-2.85%	
OPERATING EXPENSES					
Repairs & Maintenance	\$467,222	\$467,222	\$0	0.00%	
Utilities	362,142	364,800	2,658	0.73%	
Maintenance/Security Guard Contract	191,000	165,000	(26,000)	-13.61%	
Management Contract	38,800	38,800	0	0.00%	
Other Expenses	445,363	445,363	0	0.00%	
TOTAL OPERATING EXPENSES	\$1,504,527	\$1,481,185	(\$23,342)	-1.6%	
NET INCOME FROM OPERATIONS	\$76,573	\$54,915	-\$21,658	-28.3%	
OPERATING RESULTS AFTER CAPITAL OUTLAYS (CASH FLOW)					
TOTAL REVENUES	\$1,581,100	\$1,536,100	(\$45,000)	-2.8%	
TOTAL OPERATING EXPENSES	\$1,504,527	\$1,481,185	(\$23,342)	-1.6%	
TOTAL OPERATING EXPENSES AND CAPITAL IMPROVEMENTS	\$1,504,527	\$1,481,185	(\$23,342)	-1.6%	
CASH FLOW	\$76,573	\$54,915	-\$21,658	-28.3%	
APPROVAL FOR SUBMISSION OF 2021-2022 BUDGET REQUEST:					
Chairman, TRSL		Director, TRSL			
Date		Date			
Chairman, LASERS		Executive Director, LASERS			
Date		Date			

RECAP PAGE



LASERS CYBER SECURITY BRIEFING

*HOW LASERS IT STAFF FIGHTS DAILY TO PROTECT THE PRIVATE
DATA ENTRUSTED TO US BY OUR MEMBERS.*



LASERS Cyber-Security Briefing

CYBER CRIME IS GROWING!



- 2019 saw an increase in cyber security breaches of 112% over 2018 *
- 7.9 billion records stolen in 2019 *
- In 2020 Phishing attacks are up 600% and ransomware is up over 200%. **
- The Economic sector, Medical services, Retailers & Government experienced the most breaches *
- LASERS is a prime target since we have in our databases the PII (Personally Identifiable Information) for many thousands of current state employees and retirees.

***data from Risk Based Security 2019 Data Breach QuickView Report **Cyber Defense Magazine**

How much ransom proceeds have been paid?

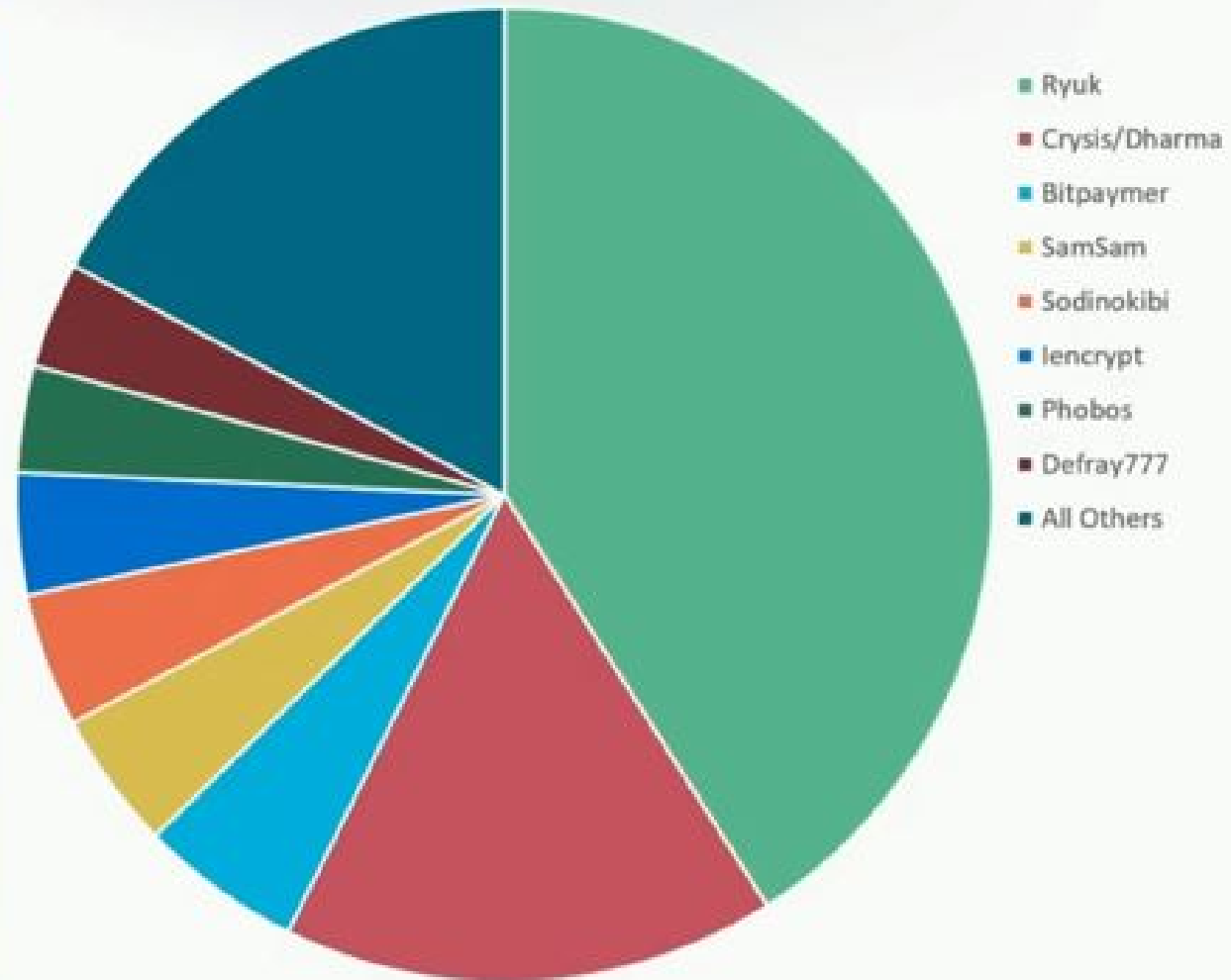
\$144.35 million

- **Date range 10/01/2013 to 11/07/2019**
- **Bitcoin only**
- **Does not quantify loss or total cost of incident**



Which variants raised the most money?

Variant	Approx. Dates of Activity	Amount (\$ millions)
Ryuk	02/09/2018 - 10/15/2019	61.26
Crysis/Dharma	11/14/2016 - 11/07/2019	24.48
Bitpaymer	10/21/2017 - 08/09/2019	8.04
SamSam	01/14/2016 - 11/20/2018	6.85
Sodinokibi	05/18/2019 - 10/05/2019	6.63
IEncrypt	12/20/2018 - 09/27/2019	6.05
Phobos	04/16/2018 - 11/07/2019	5.30
Defray777	12/05/2018 - 09/30/2019	5.25
Globelmposter	11/26/2014 - 11/07/2019	3.26
Mamba	08/09/2016 - 10/16/2019	3.10
Rapid	04/22/2017 - 11/05/2019	2.45
Aleta	06/04/2017 - 11/25/2017	.64
Mrdec	01/30/2019 - 10/30/2019	.40
GandCrab	06/08/2018 - 06/10/2019	.33
All Others	10/01/2013 - 11/07/2019	15.56
Total		144.35



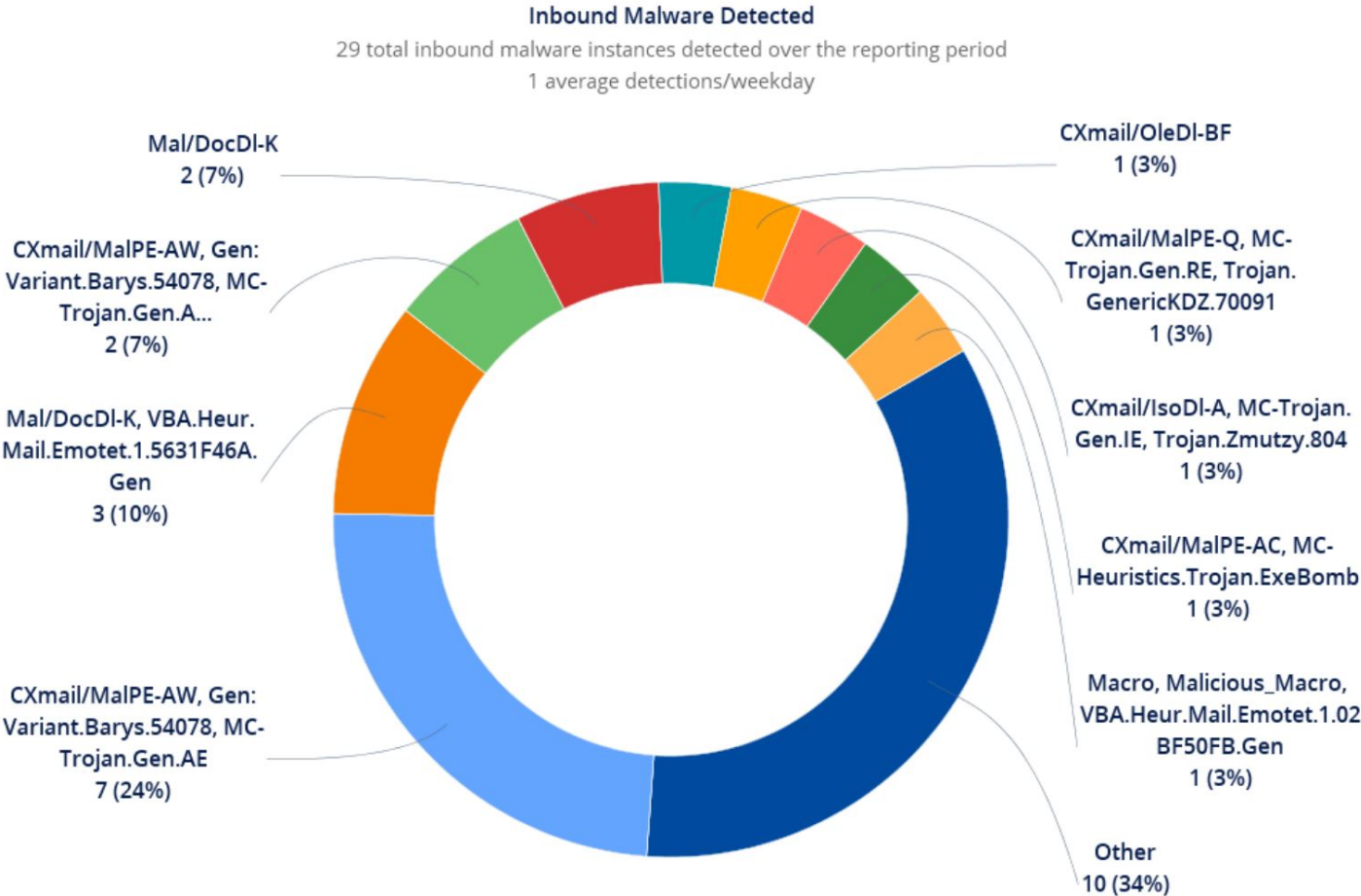


Top Inbound Malware

Secure Email Gateway

mimecast®

RS
Employees'
tem



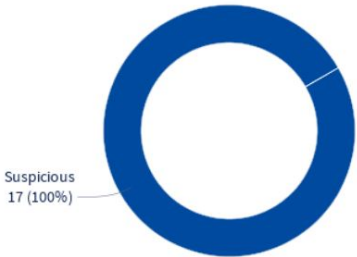
The distribution of malware detected in inbound mail. The count increments (+1) for each recipient. Details about the Malware Detections can be found in the [Threat Dashboard](#).



Impersonation Protect Detections

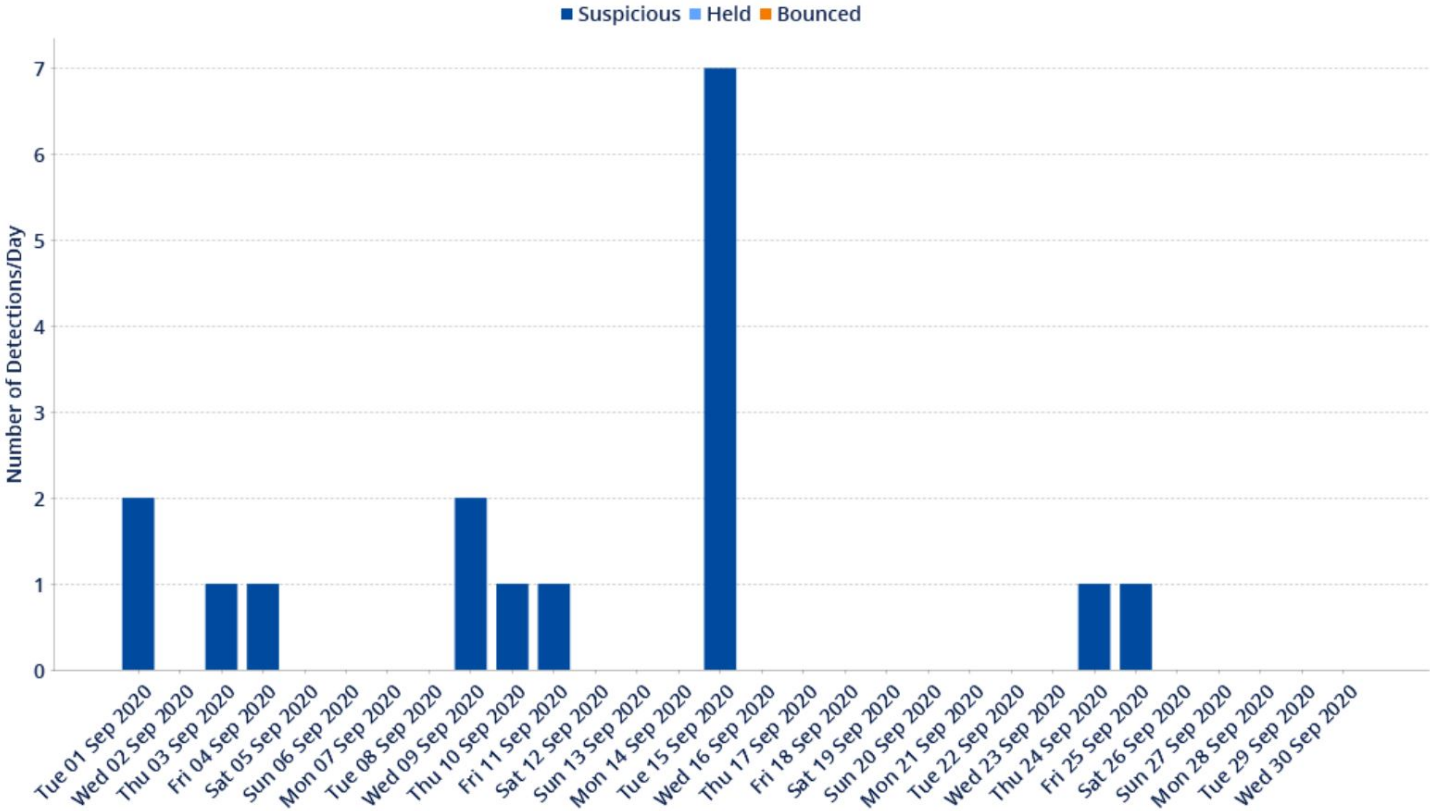
Impersonation Protect

Impersonation Detections by Outcome



Detections by Impersonation Protect per Day

17 total messages detected
1 average messages/weekday



The count of messages which trigger at least one Impersonation Detect policy. If these numbers are unexpectedly high or low then we recommend you review your [Policy Definitions](#). The benchmarking charts show how your business compares with other Mimecast customers. The calculation is based on the total number of impersonation detections per user across the same reporting period for comparable organizations, identified by industry, region and size.



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THE INTERNET IS A ROUGH NEIGHBORHOOD TO LIVE IN

LASERS





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RECENT BREACH EVENTS:

- City of New Orleans
- State of Louisiana
- Texas (over 20 Government agencies)
- City of Baltimore (again)
- City of Greenville, North Carolina
- Oklahoma Law Enforcement Retirement System
- Puerto Rico Pension Fund
- B.C. Pension Corporation



Top Ten

Threats & Remediation's



- Data Breach
- Human Error
- Bad Code
- Ransomware
- Malware
- Cloud
- Member Self-Service
- Rogue Employee (or Contractor)
- Physical Security
- Disaster Recovery/Business Continuity
- Next Generation Security Systems
- Policies and Controls
- Security Code Review
- Several layers of protection
- Several layers of protection
- Encryption and Certification Standards
- Multi-Factor Authentication
- End-Point Protections
- Multi-layer locks and video surveillance
- Advanced Recovery Plan

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HOW DO WE CHANGE OUR APPROACH OVER TIME

- Dedicated Security Staff
- Research each successful breach
- Stay connected to industry resources such as SANS & PRISM
- Continue to partner with the Audit Division
- Contract for external penetration testing regularly
- Stay informed and educated on the topic.



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Recent New Security Response Developments:

- Created the “LASERS SECURITY INCIDENT RESPONSE PLAN”
- Creative Breakthroughs Inc. (CBI): Retainer with pre-paid block of hours and SLA response commitment.



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Cyber Breach Insurance: Costs and Deliverables*

- \$57,390 annual premium
- \$2 million for notifications to individuals
- \$2.5 million for legal, forensic & public relations expenses
- \$5 million for business interruption loss, extortion loss, data recovery costs
- \$5 million for liability
- \$100,000 deductible

***Using TRSL as example**



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From Tony Gelderman's January presentation



To satisfy its fiduciary duty the Board should:

- ☐ Become reasonably informed about LASERS' cybersecurity posture, policies, and procedures.
- ☐ Ask questions to ensure that those policies and procedures are being properly and effectively implemented.
- ☐ Ask questions designed to identify potential improvements.
- ☐ Ensure that System executives engage directly with internal personnel and consultants responsible for cybersecurity and ask for presentations.



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From Tony Gelderman's January presentation



- Ensure that the System has enough properly qualified IT personnel to manage its IT systems, including implementing security patches and software updates.
- Ensure that the System's password policy requires complex, robust passwords and protects the secrecy of passwords.
- Ensure that the System conducts cybersecurity training for all employees regularly, addressing email policies, internet and social-media use, and other relevant issues.
- Ensure that the System uses an appropriate email-filtering system to reject illegitimate incoming emails.
- Ensure that the System's IT personnel monitor and promptly implement all significant patches and software updates.



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- Ensure that the System regularly (probably daily) backs up its data on site, off site, and in the Cloud using up-to-date, secure backup solutions.

- Prudently select and monitor third-party service providers with a process that includes investigating how personally identifiable information (PII) is protected

- Review the results of service providers' SOC 2 audits and other industry-recognized certifications.

(SOC 2: Service Organization Control Report on Controls Relevant to Security, Availability, Processing Integrity, Confidentiality or Privacy—an accountant's audit of the service provider's data security.)



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- Review and, if necessary, amend agreements with service providers to ensure that contracts mandate the protection of sensitive data and the allocation of liability.
- Consider buying cyber-liability insurance or include cyber provisions in existing liability policies. Policies should cover liability resulting in litigation, as well as the cost of and assistance and resources (such as credit monitoring or technical support) needed to minimize the impact of an actual breach.



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- Ensure that data, including data that is transferred to and from third party service providers or the Cloud, is appropriately encrypted.
- Consider retaining a cybersecurity consultant to test its IT systems' security, including possibly by “penetration testing”—a simulated cyberattack to test the IT systems' security.
- Regularly review and update the System's cybersecurity policies and procedures.



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Best Practices



1. Backup Systems Locally and in the Cloud
2. Segment Network Access
3. Use 'Least Privilege' Principles
4. Implement Early Threat Detection, Monitoring Systems
5. Update and patch everything right away.
6. Train Your Employees
7. Insist on Strong Password Security
8. Implement Mail Server Blocking
9. Manage Vulnerable Plug-Ins
10. Consider Buying a Cybersecurity Insurance Plan

QUESTIONS???