

Board of Trustees



Handout Book

Table of Contents

Investment Committee

FYE 2020 Performance Review.....	1-27
Asset Allocation Discussion.....	28-59

Management Committee

Actuarial Review & Discussion of Discount Rate Part II Presentation.....	60-70
--	-------

Fiscal Year-End 2020

Performance Review

July 23, 2020

Fiscal Year *Preliminary* Return

June 30, 2020



	2020 FYE Return
LASERS Total Plan	1.9%

Final June 30, 2020 returns will be available mid to late August, and will be distributed at the August Investment Committee meeting.

LASERS Total Plan Performance



During 2019 – 2020 Fiscal Year

Fiscal Year	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun*
Month Return	0.2	-2.0	1.7	1.9	1.0	2.7	-1.2	-4.7	-11.8	4.9	1.9	1.9
FYTD Return	0.2	-1.8	-0.1	1.7	2.8	5.6	4.3	-0.6	-12.3	-8.0	-6.3	-4.4

*LASERS TP Return shown for June '20 and FYE is preliminary..

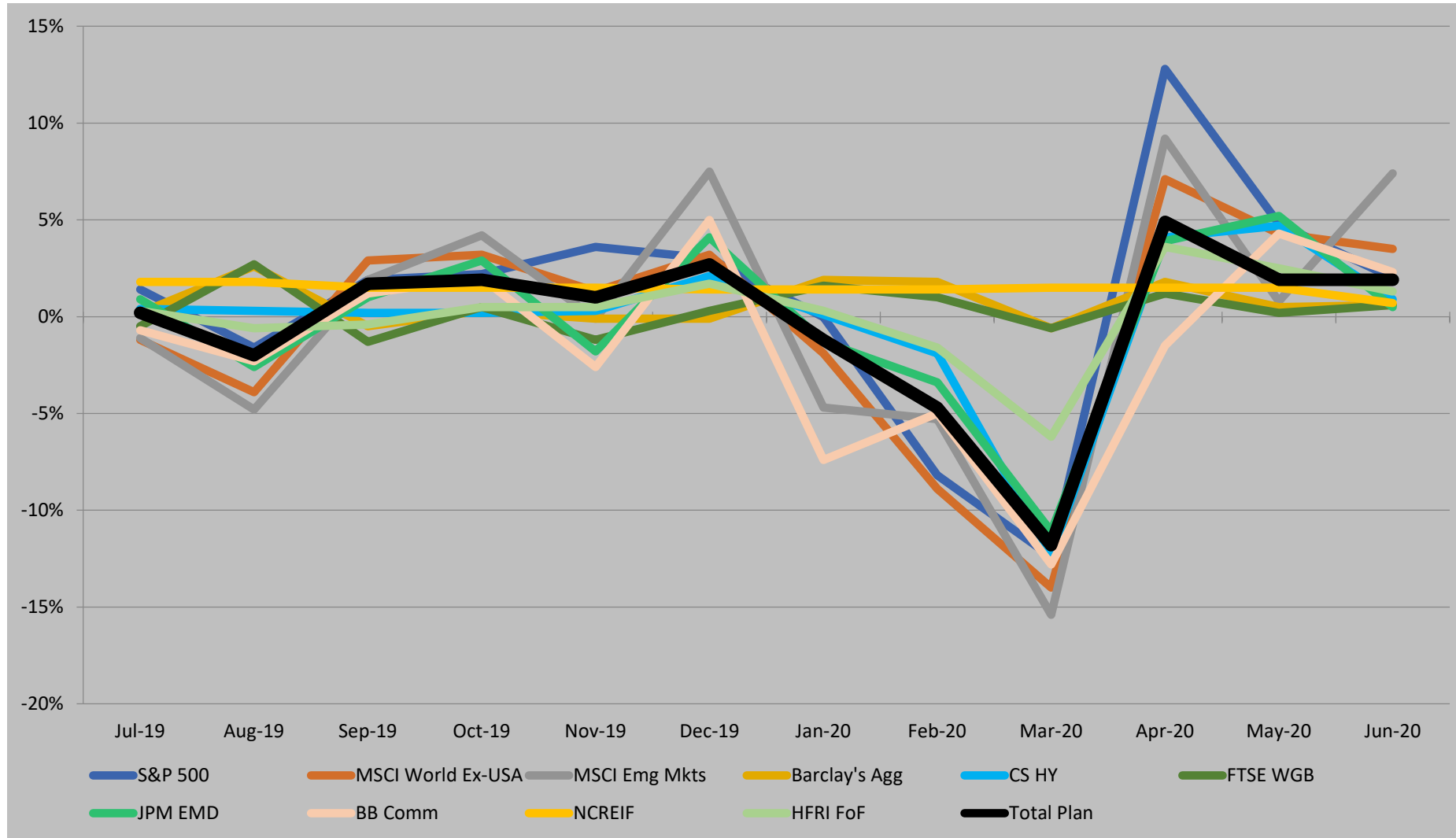
Major Indices Performance

Fiscal Year Returns



Major Indices Performance

Fiscal Year Returns



LASERS Total Plan Recap



At December 31, 2019 (the start of 2020):

FYTD Return was 5.6% / 2019 Calendar Year was 16.9%

2020 by Month:

Month	1-mth Return	FYTD Return	Market Summary
Jan 31, 2020	-1.2% Jan 1-17 1.2% Jan 17-31 -2.3%	4.5%	Month was positive early on, until, Jan 20, when China announced the virus was spreading between humans Bonds shine Growth > Value Large Cap > Small Cap Emerging Markets did worst
Feb 28, 2020	-4.7% Feb 1-19 1.9% Feb 19-28 -6.2%	-0.6%	Again, month was positive early on, until late Feb, when virus cases began to spread outside of China All equities down significantly Record U.S. declines at month-end (fastest & deepest) Again, Growth > Large Cap and Value > Small Cap
Mar 31, 2020	-11.8%	-12.3%	Month saw record volatility with deep swings both up and down Fastest, largest decline into a bear market ever Fastest, largest advances out (Mar 24 was best day in 87 years)



LASERS Total Plan Recap



2020 by Month (continued):

Month	1-mth Return	FYTD Return	Market Summary
Apr 30, 2020	4.9%	-8.0%	Record and near-record advances for the month – across the board When combined with March declines, some – like S&P 500 – emerged relatively unscathed Focus began to shift to the re-opening of economies
May 31 2020	1.9%	-6.3%	All asset classes posted positive returns Risk assets continued to rally on economic re-openings and vaccine progress
June 30, 2020*	1.9%	-4.4%	Reversal of 1Q seen in most asset classes Growth dominated Value under-performance continued

*LASERS Total Plan Return shown for June '20 and FYE is preliminary.



LASERS Total Plan Performance

Monthly, During 2009 – 2019 Fiscal Years

Fiscal Year	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	FYE
2009-2010	5.8	2.5	3.6	-0.7	2.9	2.0	-1.4	1.2	4.1	1.9	-5.1	-1.4	16.1
2010-2011	4.6	-1.4	6.3	2.7	-0.5	4.7	1.1	2.1	1.1	2.8	-0.7	-0.7	24.3
2011-2012	-0.2	-4.2	-5.3	6.1	-1.6	0.1	4.1	2.9	0.6	-0.1	-4.5	3.0	0.2
2012-2013	1.1	1.8	2.0	-.02	1.0	1.9	2.9	0.2	1.6	1.8	-.07	-2.1	12.6
2013-2014	3.1	-1.5	4.0	2.9	0.9	1.1	-2.2	3.3	1.2	0.7	1.6	2.2	18.8
2014-2015	-1.2	1.9	-2.6	0.9	0.8	-1.0	-0.6	3.3	-0.4	2.0	.06	-1.3	1.7
2015-2016	-0.5	-4.4	-2.2	4.6	-0.7	-1.9	-3.8	-0.2	5.3	1.4	-.08	0.5	-2.4
2016-2017	3.2	0.6	0.7	-0.7	0.6	1.7	2.0	1.8	1.2	1.3	1.5	0.8	15.8
2017-2018	1.9	0.3	1.7	1.4	1.4	1.5	3.6	-2.6	-0.4	0.5	0.3	-0.3	9.5
2018-2019	1.7	0.2	0.3	-5.3	1.1	-3.9	5.3	1.6	0.4	2.1	-3.3	4.5	4.4



LASERS Total Plan Performance

Monthly, During 1999 – 2009 Fiscal Years

Fiscal Year	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	FYE
1999-2000	-1.1	-1.1	-0.6	2.8	2.6	5.4	-2.9	3.2	3.7	-3.8	-1.3	4.5	11.5
2000-2001	-1.1	3.9	-2.9	-2.3	-4.2	3.8	2.2	-4.4	-4.6	4.5	0.9	-1.2	-6.1
2001-2002	-0.5	-2.0	-6.4	2.1	3.7	1.3	-0.6	-0.3	2.8	-0.9	-0.5	-4.1	-5.7
2002-2003	-5.7	0.9	-5.1	2.9	3.7	-2.0	-1.2	-.07	0.2	5.3	4.8	1.0	4.2
2003-2004	1.1	2.2	0.7	4.3	1.5	3.8	1.6	1.4	0.2	-2.3	0.3	1.9	18.1
2004-2005	-2.3	0.6	2.0	1.6	4.1	2.7	-1.3	2.2	-1.7	-1.7	2.4	1.4	10.2
2005-2006	2.9	0.2	1.1	-2.0	2.7	1.4	3.8	.01	1.7	1.8	-2.3	0.1	11.9
2006-2007	-.08	1.8	1.3	3.0	2.3	1.3	1.1	-.06	1.6	3.3	2.4	-0.2	19.2
2007-2008	-1.3	0.3	3.6	2.7	-3.3	-0.2	-4.9	.07	-0.5	3.2	1.7	-4.9	-3.8
2008-2009	-1.4	-0.6	-8.1	-13.0	-4.6	2.7	-4.6	-5.1	3.2	7.1	5.0	0.4	-19.1

Major Indices Performance

During Current Fiscal Year

	July '19	Aug '19	Sep '19	Oct '19	Nov '19	Dec '19	Jan '20	Feb '20	Mar '20	Apr '20	May '20	June '20*	FYE*
LASERS TP	0.2	-2.0	1.7	1.9	1.0	2.7	-1.2	-4.7	-11.8	4.9	1.9	1.9	-4.4
<u>Index</u>													
S&P 500	1.4	-1.6	1.9	2.2	3.6	3.0	0.0	-8.2	-12.4	12.8	4.8	2.0	7.5
MSCI Wrld Ex-USA	-1.2	-3.9	2.9	3.2	1.3	3.2	-1.9	-8.9	-14.0	7.1	4.3	3.5	-5.0
MSCI Emg	-1.1	-4.8	1.9	4.2	-0.1	5.7	-4.7	-5.3	-15.4	9.2	0.8	7.4	-3.0
BC Agg	0.2	2.6	-0.5	0.3	-0.1	-0.1	1.9	1.8	-0.6	1.8	0.5	0.6	8.7
CS HY	0.4	0.3	0.2	0.2	0.3	2.1	0.1	-1.9	-12.3	4.1	4.7	0.9	-1.8
FTSE Wrld GB	-0.5	2.7	-1.3	0.5	-1.2	0.3	1.6	1.0	-0.6	1.2	0.2	0.6	4.6
JPM EMD	0.9	-2.6	1.0	2.9	-1.8	4.1	-1.3	-3.4	-11.1	3.9	5.2	0.5	-2.8
BB Comm	-0.7	-2.3	1.2	2.0	-2.6	5.0	-7.4	-5.0	-12.8	-1.5	4.3	2.3	-17.4
NCREIF~	1.8	1.8	1.5	1.5	1.5	1.4	1.4	1.4	1.5	1.5	1.5	0.7	5.3
HFRI FoF	0.3	-0.6	-0.4	0.5	0.5	1.7	0.3	-1.6	-6.2	3.6	2.5	1.3	0.0

*LASERS TP Return shown for June '20 and FYE is preliminary.

~NCREIF returns are quarterly.

Equity Index Returns

Index	Year to Date June 30	Fiscal Year End Return
S&P 500	-3.1	7.5
S&P 500 Value	-15.5	-4.5
S&P 400	-12.8	-6.7
S&P 600	-17.9	-11.3
S&P 600 Value	-24.5	-17.4
MSCI Ex US	-11.2	-5.0
MSCI Ex US Value	-19.6	-14.6
MSCI EX US Small Cap	-12.7	-2.9
MSCI Emerging	-9.7	-3.0

LASERS Monthly Returns

During Current Fiscal Year



	July '19	Aug '19	Sept '19	Oct '19	Nov '19	Dec '19	Jan '20	Feb '20	Mar '20	Apr '20	May '20	June '20*	FYE*
Total Equity	-0.2	-3.5	2.8	2.9	1.8	4.0	-2.7	-8.3	-17.2	10.3	3.7	3.2	-6.0
Total Fixed Income	0.6	-0.1	0.3	0.5	0.1	1.7	0.7	-0.5	-10.2	2.5	3.8	1.9	0.6
Total Alts	0.5	-0.3	0.7	0.7	0.2	0.8	0.4	-0.7	-4.2	-1.3	-1.9	0.2	-4.8
Total Plan	0.2	-2.0	1.7	1.9	1.0	2.7	-1.2	-4.7	-11.8	4.9	1.9	1.9	-4.4
Total Plan FYTD	0.2	-1.8	-0.1	1.7	2.8	5.6	4.3	-0.6	-12.3	-8.0	-6.3	1.9	-4.4

*LASERS Total Plan Return shown for June '20 and FYE is preliminary.

LASERS Historical Returns

Preliminary - As of June 30, 2020



	1 Year	2 Years	3 Years	5 Years	7 Years	10 Years
Total Plan	-4.4	-0.1	3.0	4.3	5.9	7.6
Total Equity	-6.0	-1.9	2.0	4.0	6.2	8.7
Total Fixed Income	0.6	3.7	3.3	4.2	4.1	5.4
Total Alternatives	-4.8	1.2	4.6	4.7	5.8	6.8

Major Indices Historical Returns

As of June 30, 2020

	1 Year	2 Years	3 Years	5 Years	7 Years	10 Years
LASERS Total Plan <i>(preliminary)</i>	-4.4	-0.1	3.0	4.3	5.9	7.6
<u>Index</u>						
S&P 500	7.5	9.0	10.7	10.7	12.1	14.0
MSCI World Ex-USA	-5.0	-1.6	1.4	2.5	4.3	6.0
MSCI Emerging Mkts	-3.0	-0.7	2.3	3.2	3.4	3.6
Bloomberg Barclay's Aggregate	8.7	8.3	5.3	4.3	4.0	3.8
Credit Suisse HY	-1.8	2.6	2.6	4.3	4.6	6.3
FTSE World Govt Bond	4.6	5.0	4.0	3.7	2.2	2.4
JPM GBI-EM Global Diversified	-2.8	2.9	1.1	2.3	-0.2	1.6
HFRI FoF Composite	0.0	1.7	3.2	1.9	2.9	3.0
Bloomberg Commodity	-17.4	-12.2	-6.1	-7.7	-8.1	-5.8

LASERS 10-year Annualized Returns

Each Year Over Last Decade



As of June 30,	10-yr Return	10-yr % Ranking	Market Value (\$millions)
2011	6.7%	18	\$9,252.1
2012	7.4%	14	\$9,004.1
2013	8.2%	19	\$9,783.1
2014	8.2%	17	\$10,995.7
2015	7.4%	21	\$10,745.9
2016	5.9%	52	\$10,047.4
2017	5.6%	50	\$11,012.2
2018	7.0%	40	\$11,490.9
2019	9.8%	51	\$11,551.3
2020*	7.6%	n/a	\$10,592.7

*Data listed for 2020 is preliminary.

Major Indices Performance

Month-to-Date, as of July 20th



	July '19	Aug '19	Sep '19	Oct '19	Nov '19	Dec '19	Jan '20	Feb '20	Mar '20	Apr '20	May '20	June '20*	July MTD
LASERS TP	0.2	-2.0	1.7	1.9	1.0	2.7	-1.2	-4.7	-11.8	4.9	1.9	1.9	3.1
<u>Index</u>													
S&P 500	1.4	-1.6	1.9	2.2	3.6	3.0	0.0	-8.2	-12.4	12.8	4.8	2.0	4.9
MSCI Wrld Ex-USA	-1.2	-3.9	2.9	3.2	1.3	3.2	-1.9	-8.9	-14.0	7.1	4.3	3.5	4.7
MSCI Emg	-1.1	-4.8	1.9	4.2	-0.1	5.7	-4.7	-5.3	-15.4	9.2	0.8	7.4	7.5
BC Agg	0.2	2.6	-0.5	0.3	-0.1	-0.1	1.9	1.8	-0.6	1.8	0.5	0.6	0.9
CS HY	0.4	0.3	0.2	0.2	0.3	2.1	0.1	-1.9	-12.3	4.1	4.7	0.9	2.6
FTSE Wrld GB	-0.5	2.7	-1.3	0.5	-1.2	0.3	1.6	1.0	-0.6	1.2	0.2	0.6	1.3
JPM EMD	0.9	-2.6	1.0	2.9	-1.8	4.1	-1.3	-3.4	-11.1	3.9	5.2	0.5	1.9
BB Comm	-0.7	-2.3	1.2	2.0	-2.6	5.0	-7.4	-5.0	-12.8	-1.5	4.3	2.3	2.1
NCREIF~	1.8	1.8	1.5	1.5	1.5	1.4	1.4	1.4	1.5	1.5	1.5	0.7	0.7
HFRI FoF	0.3	-0.6	-0.4	0.5	0.5	1.7	0.3	-1.6	-6.2	3.6	2.5	1.3	1.0

*LASERS TP Return shown for June '20 and FYE is preliminary.

~NCREIF returns are quarterly.

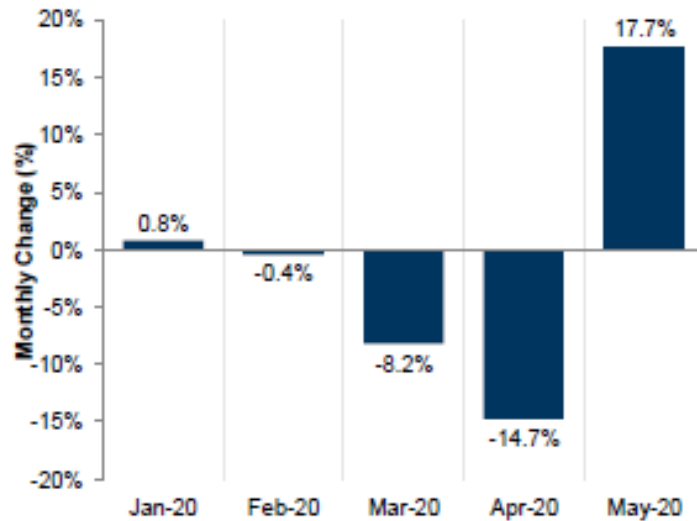
Economic Review

Economic Activity Data has Improved Considerably

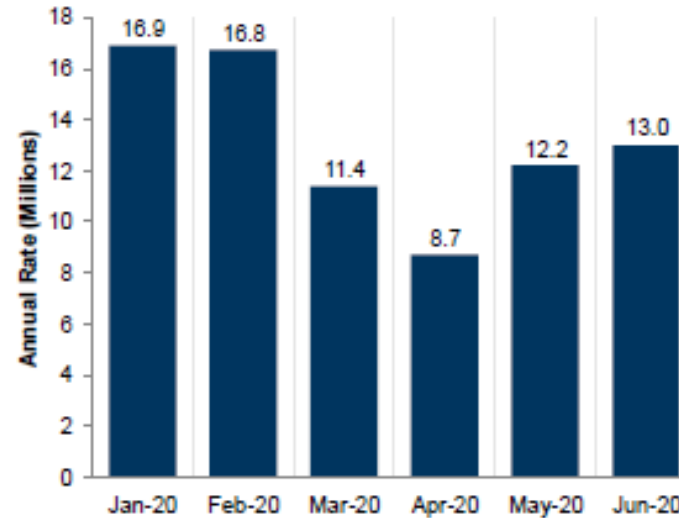
18

LASERS

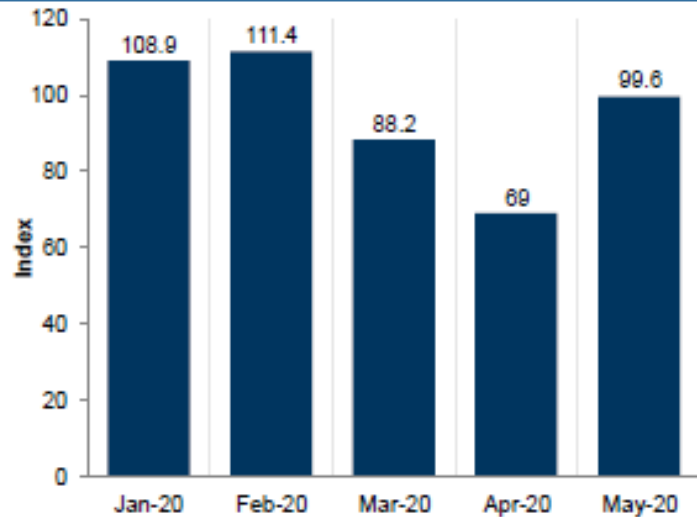
1. Total Retail and Food Service Sales



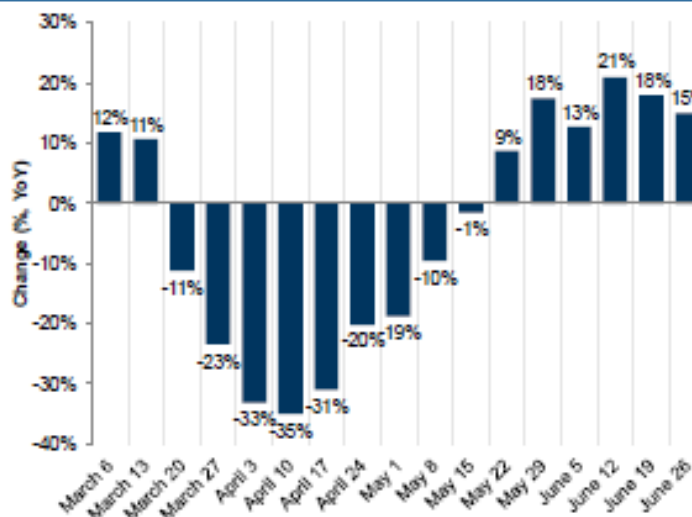
2. Light Vehicle Sales



3. Pending Home Sales



4. Mortgage Applications for Home Purchase



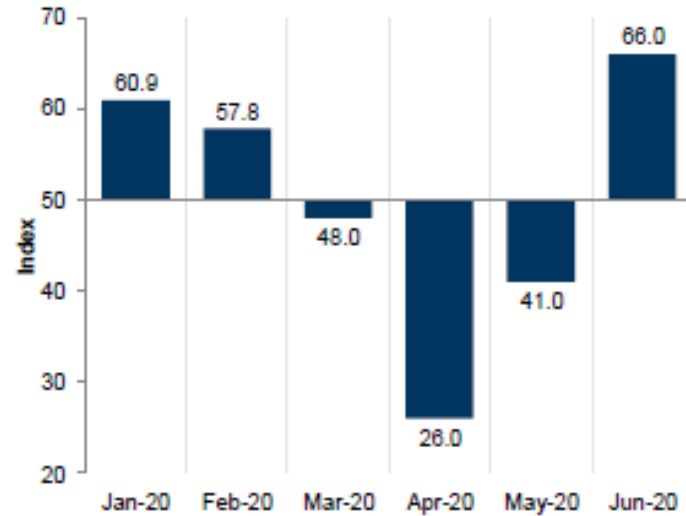
Source: Goldman Sachs
Investment Strategy Group, Haver

Economic Activity Data has Improved Considerably

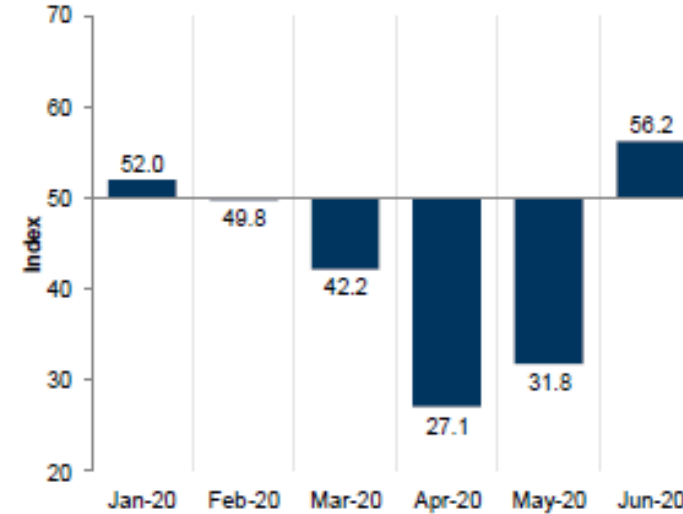
19

LASERS

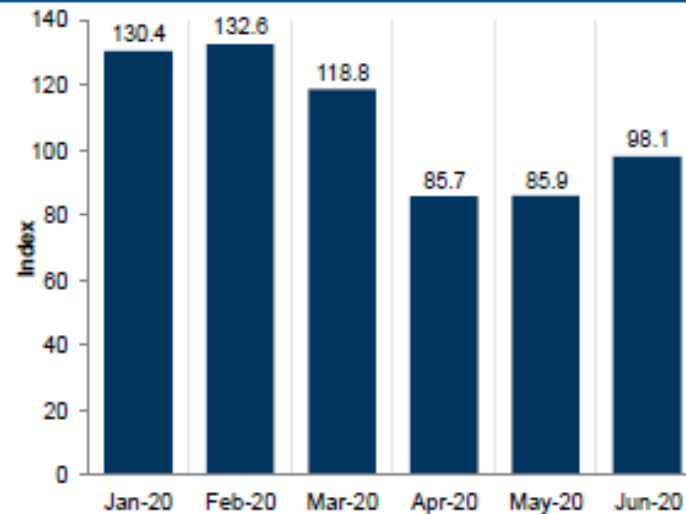
1. ISM Non-Manufacturing Business Activity Index



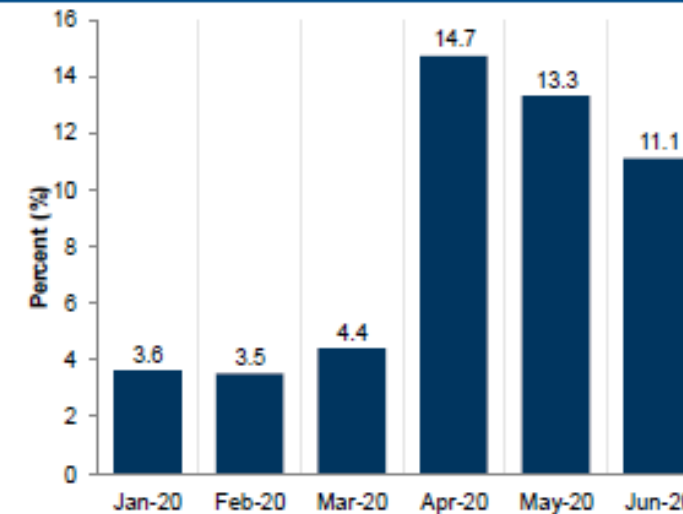
2. ISM Manufacturing Survey, New Orders Index



3. Conference Board Consumer Confidence



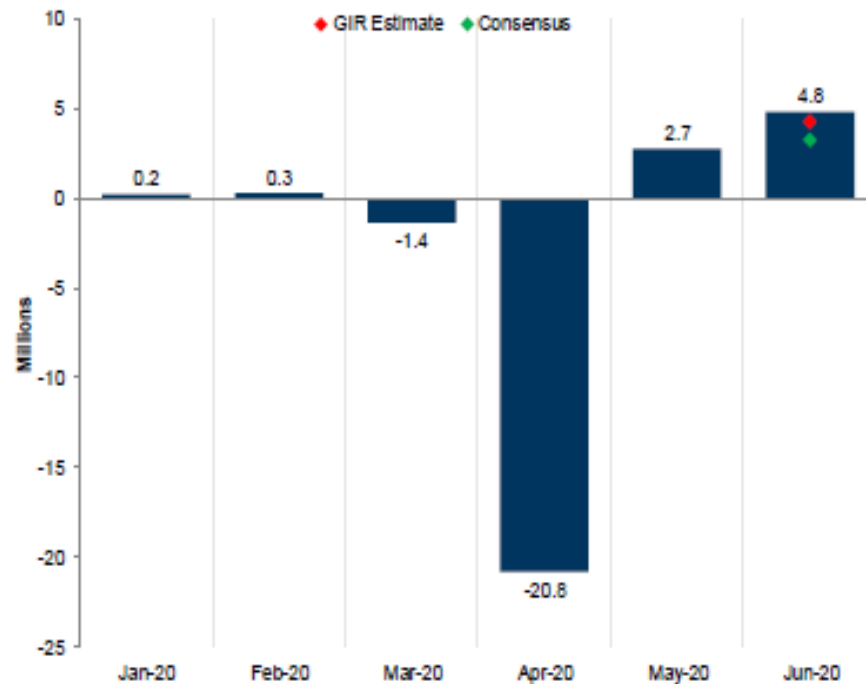
4. Unemployment Rate



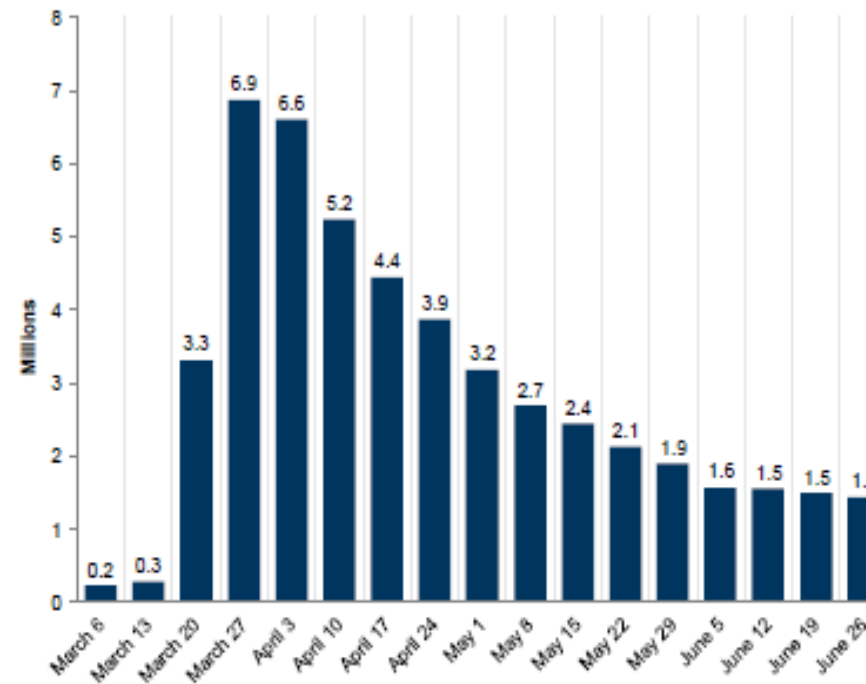
Source: Goldman Sachs
Investment Strategy Group, Haver

The Job Market Continues to Improve

1. Monthly Change in Payroll Employment (Millions)



2. Initial Claims for Unemployment Insurance, SA



- Nonfarm payrolls rose by 2.7 million in May and 4.8 million in June, reversing about a third of the decline in jobs in March and April.
- Meanwhile, initial claims for unemployment insurance continue to trend down.

Outlook for Further Fiscal & Monetary Easing

Fiscal Policy (GIR View)

- GIR expects that Congress will enact another \$1.5 trillion (7% of GDP) in fiscal measures.
- Most of this would come through the next fiscal bill that Congress enacts, likely in late July or early August.
- Additional measures might be slightly more front-loaded than previously assumed, with \$800bn implemented in 2020 (or 3.8% of GDP), versus prior expectations of \$550bn.

Monetary Policy

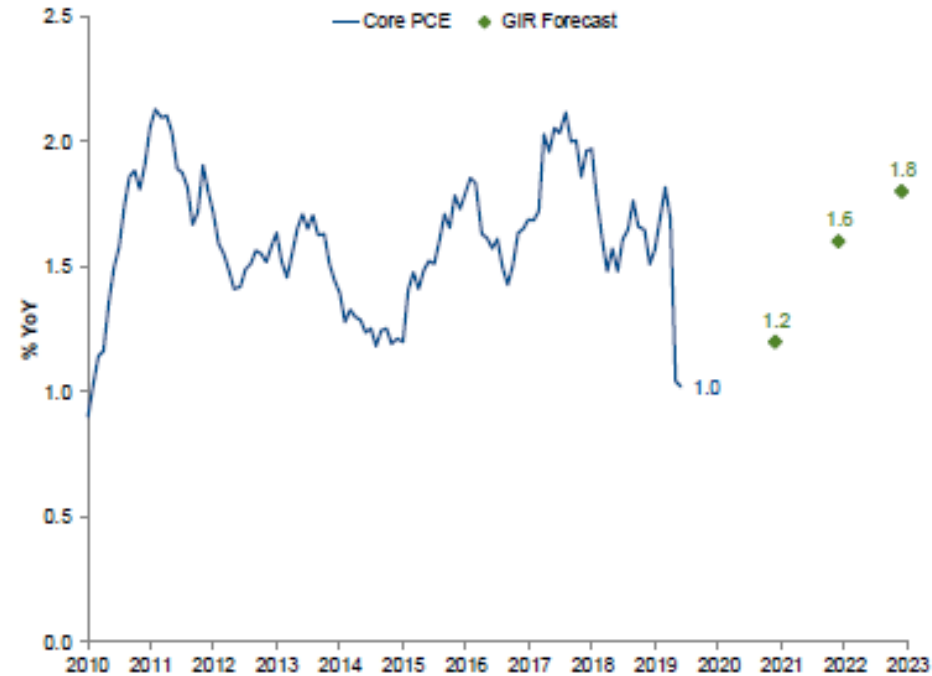
- Three areas of policy change under consideration by the FOMC:
 - Outcome-based forward guidance
 - Asset purchases
 - Yield caps or targets (YCT)

Inflation is Muted

1. Core CPI + GIR Forecasts Through 2023 (% YoY)

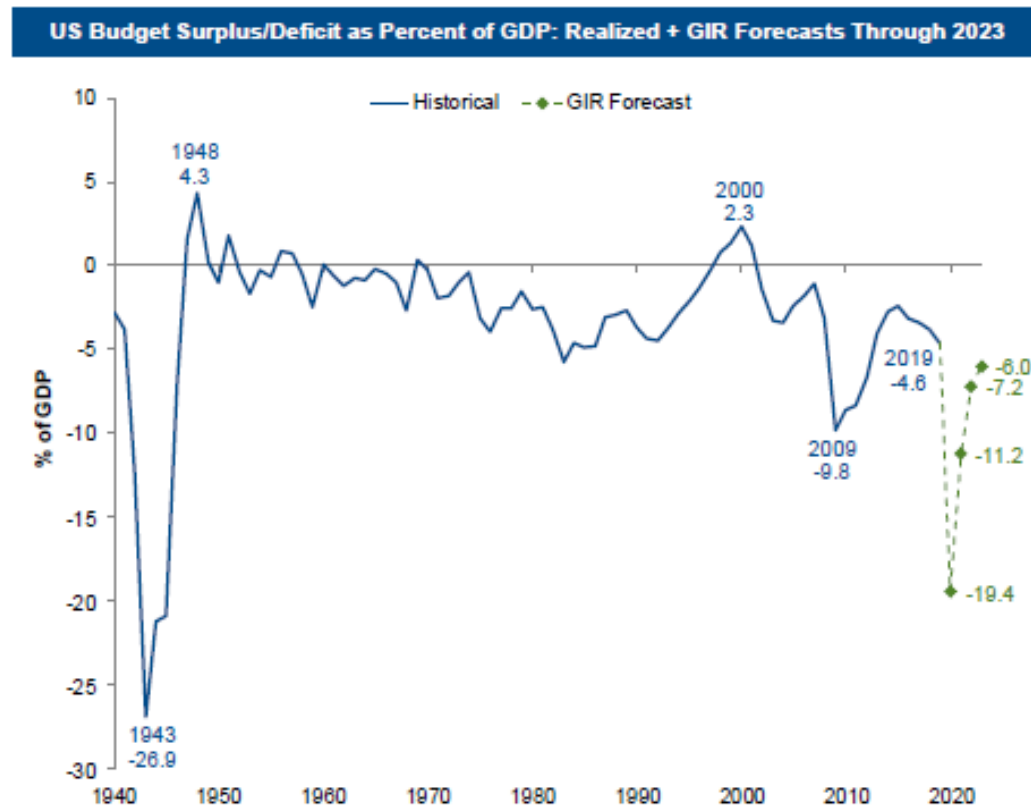


2. Core PCE + GIR Forecasts Through 2023 (% YoY)



- GIR expects core CPI and core PCE inflation to remain below pre-COVID rates through 2023.

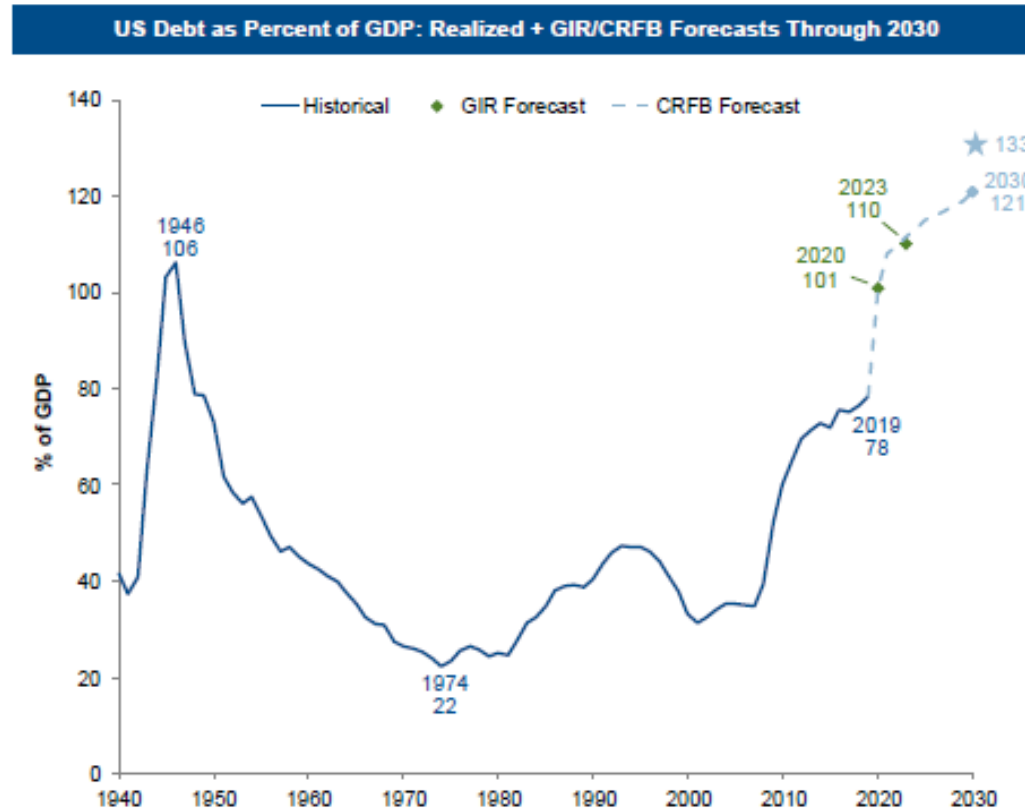
U.S. Deficit Set to Widen to Near-Record Levels



- GIR expects the US deficit to reach -19.4% of GDP in 2020.
- The only other years with a deficit of similar or greater magnitude were during WWII: 1943 (-26.9%), 1944 (-21.2%), and 1945 (-20.9%).

U.S. Debt Could Eclipse Levels Seen During WWII

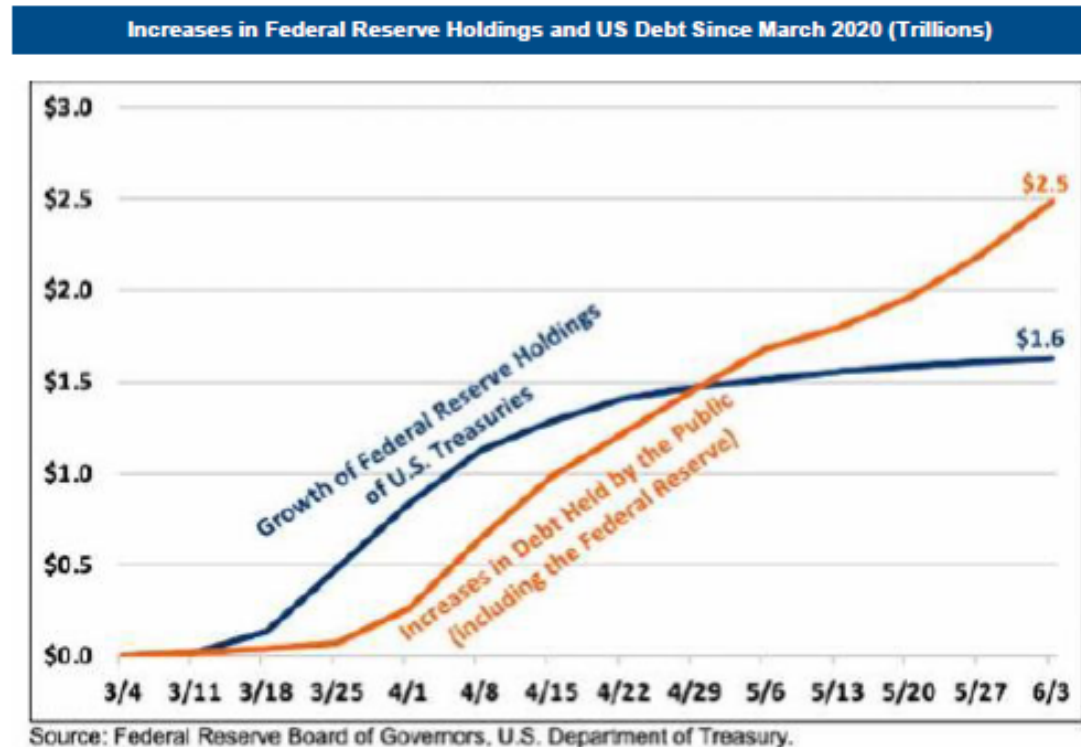
24



- Both GIR and CRFB expect US debt to reach 101% of GDP this year.
- GIR expects that Congress will enact another \$1.5 trillion in fiscal measures in 2020.
- CRFB projects that debt/GDP could reach 121% by 2030, or as high as 133% if policymakers enact an additional \$1 trillion of fiscal support, grow appropriations with the economy, and continue various expiring tax breaks.

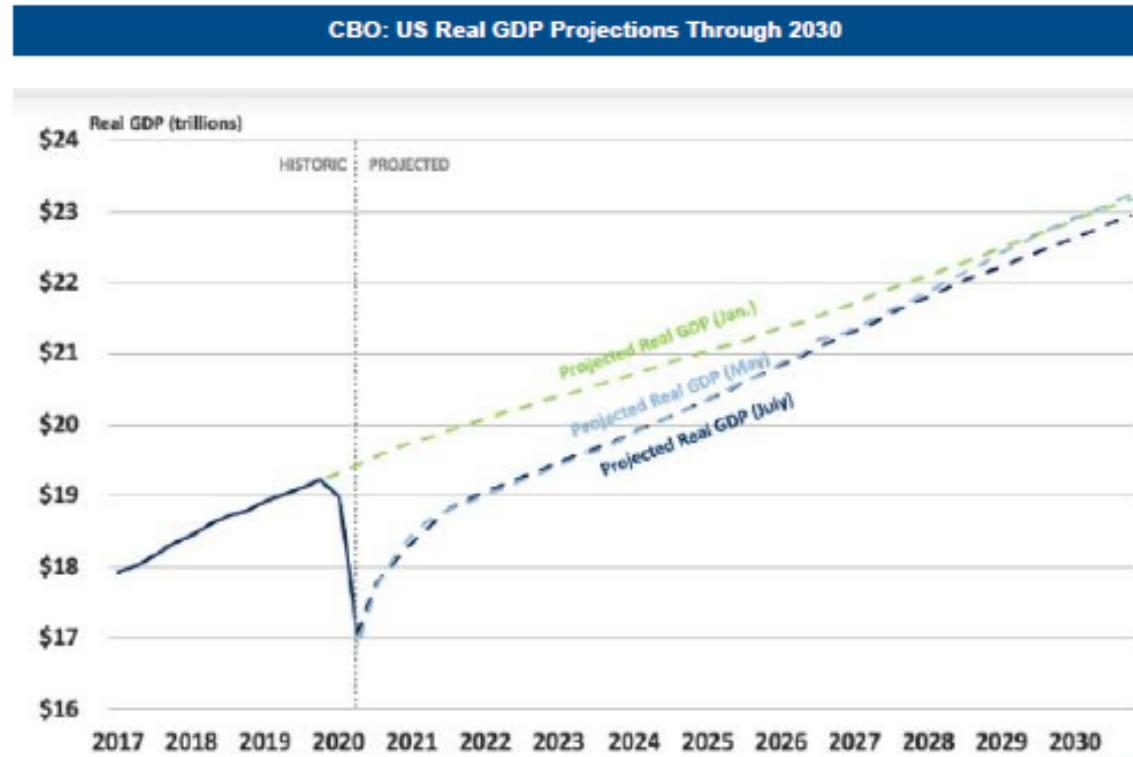
Source: Goldman Sachs Investment Strategy Group, CBO, GS Global Investment Research, CRFB.org

Increase in Federal Reserve Holdings



- CRFB (June 9, 2020): “Chairman of the Federal Reserve Jerome Powell recently noted, the Federal Reserve’s ‘balance sheet can’t go to infinity’ – meaning it cannot buy rising government debt forever. And importantly, the central bank has already significantly slowed its purchases from \$75 billion per day in March to just \$4 billion per day last week.”

CBO Expects the Economy Won't Recover Until 2028



- From 2020 through 2023, real GDP will be roughly \$7.5 trillion lower (in 2012 dollars) than projected in the pre-pandemic baseline.

Latest World Economic Outlook Growth Projections

27

LASERS

(real GDP, annual percent change)	PROJECTIONS		
	2019	2020	2021
World Output	2.9	-4.9	5.4
Advanced Economies	1.7	-8.0	4.8
United States	2.3	-8.0	4.5
Euro Area	1.3	-10.2	6.0
Germany	0.6	-7.8	5.4
France	1.5	-12.5	7.3
Italy	0.3	-12.8	6.3
Spain	2.0	-12.8	6.3
Japan	0.7	-5.8	2.4
United Kingdom	1.4	-10.2	6.3
Canada	1.7	-8.4	4.9
Other Advanced Economies	1.7	-4.8	4.2
Emerging Markets and Developing Economies	3.7	-3.0	5.9
Emerging and Developing Asia	5.5	-0.8	7.4
China	6.1	1.0	8.2
India	4.2	-4.5	6.0
ASEAN-5	4.9	-2.0	6.2
Emerging and Developing Europe	2.1	-5.8	4.3
Russia	1.3	-6.6	4.1
Latin America and the Caribbean	0.1	-9.4	3.7
Brazil	1.1	-9.1	3.6
Mexico	-0.3	-10.5	3.3
Middle East and Central Asia	1.0	-4.7	3.3
Saudi Arabia	0.3	-6.8	3.1
Sub-Saharan Africa	3.1	-3.2	3.4
Nigeria	2.2	-5.4	2.6
South Africa	0.2	-8.0	3.5
Low-Income Developing Countries	5.2	-1.0	5.2

Source: IMF, *World Economic Outlook Update*, June 2020

Note: For India, data and forecasts are presented on a fiscal year basis, with FY2020/2021 starting in April 2020. India's growth is -4.9 percent in 2020 based on the calendar year.

Asset Allocation Discussion

July 23, 2020

Market Returns – 20 Years (2000 – 2019)

As of December 31, 2019



Returns – 20 Years (2000 – 2019)

30

LASERS

1-Year Returns as of December 31 Each Year

*20-yr return is as of 12/31/2019

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	20-yr*
LASERS TP	-0.3	-5.1	-9.0	26.2	12.3	7.6	15.7	10.0	-27.4	23.6	16.3	0.2	14.3	15.8	5.6	-2.3	9.4	18.1	-4.8	16.9	6.4
<u>Index</u>																					
S&P 500	-9.1	-11.9	-22.1	28.7	10.9	4.9	15.8	5.6	-37.0	26.5	15.1	2.11	16.0	32.4	13.7	1.4	12.0	21.8	-4.4	31.5	6.1
S&P 600	11.8	6.5	-14.6	38.8	22.7	7.7	15.1	-0.3	-31.1	25.5	26.3	1.0	16.3	41.3	5.7	-2.0	26.5	13.2	-8.5	22.7	9.8
MSCI Wrld	-13.2	-21.2	-15.5	40.0	20.8	15.0	26.2	12.9	-43.2	34.4	9.4	-11.8	17.0	21.6	-3.9	-2.6	3.22	24.8	-13.6	23.2	3.9
MSCI Emg	-30.6	-2.4	-6.0	56.3	26.0	34.5	32.6	39.8	-53.2	79.0	19.2	-18.2	18.6	-2.3	-1.8	-14.6	11.6	37.8	-14.2	18.9	7.0
MSCI ACWI	-15.0	-19.3	-14.6	41.5	21.5	17.2	27.2	17.2	-45.2	42.3	11.7	-13.3	17.4	15.9	-3.3	5.2	5.1	27.8	-13.8	22.2	4.4
BC Agg	11.6	8.4	10.3	4.1	4.3	2.4	4.3	7.0	5.2	5.9	6.5	7.8	4.2	-2.0	6.0	0.6	2.6	3.5	.01	8.7	5.0
CS HY	-5.7	6.2	3.1	27.9	12.0	2.3	11.9	2.6	-26.2	54.2	14.4	5.5	14.7	7.5	1.9	-4.9	18.4	7.0	-2.4	14.0	7.2
FTSE Wrld GB	1.6	-1.0	19.5	14.9	10.3	-6.9	6.1	11.0	10.9	2.6	5.2	6.4	1.6	-4.0	-0.5	-3.6	1.6	7.5	-0.8	5.9	4.2
JPM EMD	n/a	n/a	n/a	16.9	23.0	6.3	15.2	18.1	-5.2	22.0	15.7	-1.8	16.8	-9.0	-5.7	-14.9	9.9	15.2	-6.2	13.5	n/a
BB Comm	24.2	-22.3	23.9	22.7	7.6	17.5	-2.7	11.1	-36.6	18.7	16.7	-13.4	-1.1	-9.6	-17.0	-24.7	11.4	0.7	-13.0	5.4	-0.7
NCREIF	11.7	7.1	6.6	8.7	13.8	18.7	15.7	15.0	-6.3	-18.0	12.6	13.6	10.2	10.6	11.3	12.7	7.7	6.8	6.6	6.3	8.7
HFRI FoF	14.3	8.7	4.7	13.4	2.7	2.7	9.3	4.2	-23.2	13.4	5.2	-8.9	3.5	6.7	-0.6	-3.6	2.5	6.0	-6.7	8.6	2.6

Market Returns - 10-Years (2010 – 2019)

As of December 31, 2019



Returns – 10 Years (2010 – 2019)

1-Year Returns as of December 31 Each Year

*10-yr return is as of 12/31/2019

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	10-yr*
LASERS TP	16.3	0.2	14.3	15.8	5.6	-2.3	9.4	18.1	-4.8	16.9	8.6
<u>Index</u>											
S&P 500	15.1	2.11	16.0	32.4	13.7	1.4	12.0	21.8	-4.4	31.5	13.5
S&P 600	26.3	1.0	16.3	41.3	5.7	-2.0	26.5	13.2	-8.5	22.7	13.3
MSCI Wrld	9.4	-11.8	17.0	21.6	-3.9	-2.6	3.22	24.8	-13.6	23.2	5.8
MSCI Emg	19.2	-18.2	18.6	-2.3	-1.8	-14.6	11.6	37.8	-14.2	18.9	4.0
MSCI ACWI	11.7	-13.3	17.4	15.9	-3.3	5.2	5.1	27.8	-13.8	22.2	5.1
BC Agg	6.5	7.8	4.2	-2.0	6.0	0.6	2.6	3.5	.01	8.7	3.7
CS HY	14.4	5.5	14.7	7.5	1.9	-4.9	18.4	7.0	-2.4	14.0	7.4
FTSE Wrld GB	5.2	6.4	1.6	-4.0	-0.5	-3.6	1.6	7.5	-0.8	5.9	1.9
JPM EMD	15.7	-1.8	16.8	-9.0	-5.7	-14.9	9.9	15.2	-6.2	13.5	2.7
BB Comm	16.7	-13.4	-1.1	-9.6	-17.0	-24.7	11.4	0.7	-13.0	5.4	-5.3
NCREIF~	12.6	13.6	10.2	10.6	11.3	12.7	7.7	6.8	6.6	6.3	10.2
HFRI FoF	5.2	-8.9	3.5	6.7	-0.6	-3.6	2.5	6.0	-6.7	8.6	1.1

Market Returns – 10 Years (2000 – 2009)

As of December 31, 2009



Returns – 10 Years (2000 – 2009)

1-Year Returns as of December 31 Each Year

*10-yr return is as of 12/31/2009

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	10-yr*
LASERS TP	-0.3	-5.1	-9.0	26.2	12.3	7.6	15.7	10.0	-27.4	23.6	4.2
<u>Index</u>											
S&P 500	-9.1	-11.9	-22.1	28.7	10.9	4.9	15.8	5.6	-37.0	26.5	-1.0
S&P 600	11.8	6.5	-14.6	38.8	22.7	7.7	15.1	-0.3	-31.1	25.5	6.3
MSCI Wrld	-13.2	-21.2	-15.5	40.0	20.8	15.0	26.2	12.9	-43.2	34.4	2.0
MSCI Emg	-30.6	-2.4	-6.0	56.3	26.0	34.5	32.6	39.8	-53.2	79.0	10.1
MSCI ACWI	-15.0	-19.3	-14.6	41.5	21.5	17.2	27.2	17.2	-45.2	42.3	3.2
BC Agg	11.6	8.4	10.3	4.1	4.3	2.4	4.3	7.0	5.2	5.9	6.3
CS HY	-5.7	6.2	3.1	27.9	12.0	2.3	11.9	2.6	-26.2	54.2	7.1
FTSE Wrld GB	1.6	-1.0	19.5	14.9	10.3	-6.9	6.1	11.0	10.9	2.6	6.6
JPM EMD	n/a	n/a	n/a	16.9	23.0	6.3	15.2	18.1	-5.2	22.0	n/a
BB Comm	24.2	-22.3	23.9	22.7	7.6	17.5	-2.7	11.1	-36.6	18.7	4.2
NCREIF~	11.7	7.1	6.6	8.7	13.8	18.7	15.7	15.0	-6.3	-18.0	7.3
HFRI FoF	14.3	8.7	4.7	13.4	2.7	2.7	9.3	4.2	-23.2	13.4	4.4

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

Total Plan Rankings

As of December 31 Each Year

TUCS* Percentile Rankings

Year	1-Year Return	1-Year % Ranking	Actual Rank	Year	10-Year Return	10-Year % Ranking	Actual Rank
2019	16.95	64	38 / 59	2019	8.62	57	32 / 56
2018	-4.80	87	62 / 71	2018	9.23	38	25 / 67
2017	18.11	8	6 / 69	2017	6.32	33	20 / 62
2016	9.34	14	11 / 80	2016	5.57	43	31 / 73
2015	-2.25	96	80 / 83	2015	6.16	31	23 / 74
2014	5.55	79	66 / 83	2014	7.19	26	18 / 71
2013	15.76	54	36 / 66	2013	7.86	19	10 / 50
2012	14.27	16	12 / 72	2012	8.79	17	11 / 67
2011	0.20	76	47 / 62	2011	6.34	19	10 / 55
2010	16.31	3	2 / 74	2010	5.77	17	12 / 69
2009	23.63	13	9 / 71	2009	4.15	34	22 / 64

*Trust Universe Comparison Services (TUCS) provides a universe comparison of market returns for the larger public pension plans in the United States. Percentile Rankings shown are based on the total returns of public funds with assets exceeding \$1 billion.

LASERS Asset Class Performance

1-Year Returns as of December 31 Each Year



37

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Private Mkts 17.0%	Real Estate 10.0%	Global Fixed 27.5%	Emg Mkts 57.3%	Real Estate 32.7%	Emg Mkts 33.8%	Emg Mkts 35.9%	Private Mkts 35.3%	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
Opp Cr/Mrtg. 10.9%	Inv. Grade 9.9%	Opp Cr/Mrtg. 9.0%	Int'l Sm Cap 51.4%	Int'l Sm Cap 31.1%	Int'l Sm Cap 32.2%	Real Estate 32.8%	Emg Mkts 33.2%	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
Inv. Grade 9.6%	Opp Cr/Mrtg. 9.8%	Inv. Grade 8.9%	US Sm Cap 44.0%	US Sm Cap 18.3%	Private Mkts 18.5%	Int'l Sm Cap 32.5%	Int'l Lg Cap 13.6%	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
Global Fixed 3.0%	High Yield 4.2%	Ab Return 0.5%	Int'l Lg Cap 38.7%	Int'l Lg Cap 18.3%	Int'l Lg Cap 12.9%	Int'l Lg Cap 26.7%	Ab Return 12.5%	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
High Yield -1.0%	Global Fixed 0.3%	High Yield 0.1%	Real Estate 31.6%	Emg Mkts 17.8%	Real Estate 11.5%	Private Mkts 18.3%	Global Fixed 11.5%	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
Real Estate -2.7%	US Equity* -6.1%	Emg Mkts -8.6%	US Lg Cap 28.4%	Global Fixed 14.3%	US Sm Cap 6.1%	US Lg Cap 16.2%	Opp Cr/Mrtg. 7.0%	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 Equity* -5.3%	Emg Mkts -8.0%	Real Estate -8.9%	High Yield 23.7%	US Lg Cap 10.7%	US Lg Cap 5.5%	US Sm Cap 14.6%	Inv. Grade 6.8%	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
Int'l Lg Cap -5.3%	Int'l Sm Cap -15.3%	Int'l Sm Cap -13.6%	Global Fixed 21.9%	High Yield 9.4%	Ab Return 5.5%	Ab Return 10.0%	US Lg Cap 5.7%	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 Sm Cap -10.4%	Int'l Lg Cap -21.6%	Int'l Lg Cap -17.8%	Inv. Grade 7.1%	Ab Return 6.1%	Opp Cr/Mrtg. 3.2%	High Yield 9.4%	High Yield 3.9%	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
Emg Mkts -34.0%	Private Mkts -32.0%	US Sm Cap -18.0%	Private Mkts 5.9%	Private Mkts 5.5%	Inv. Grade 2.5%	Global Fixed 7.7%	Int'l Sm Cap 2.9%	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
		Private Mkts -18.5%	Ab Return 4.9%	Inv. Grade 5.3%	High Yield 2.2%	Inv. Grade 5.1%	US Sm Cap -0.6%	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
		US Lg Cap -21.5%	Opp Cr/Mrtg. 3.4%	Opp Cr/Mrtg. 4.7%	Global Fixed -3.5%	Opp Cr/Mrtg. 4.8%			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				



LASERS Total Plan Performance

Monthly, During 2000-2009

Calendar Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	1-yr
2000	-2.9	3.2	3.7	-3.8	-1.3	4.5	-1.1	3.9	-2.9	-2.3	-4.2	3.8	-0.3
2001	2.2	-4.4	-4.6	4.5	0.9	-1.2	-0.5	-2.0	-6.4	2.1	3.7	1.3	-5.1
2002	-0.6	-0.3	2.8	-0.9	-0.5	-4.1	-5.7	0.9	-5.1	2.9	3.7	-2.0	-9.0
2003	-1.2	-0.7	0.2	5.3	4.8	1.0	1.1	2.2	0.7	4.3	1.5	3.8	26.2
2004	1.6	1.4	0.2	-2.3	0.3	1.9	-2.3	0.6	2.0	1.6	4.1	2.7	12.3
2005	-1.3	2.2	-1.7	-1.7	2.4	1.4	2.9	0.2	1.1	-2.0	2.7	1.4	7.6
2006	3.8	.01	1.7	1.8	-2.3	0.1	-0.8	1.8	1.3	3.0	2.3	1.3	15.7
2007	1.1	-0.6	1.6	3.3	2.4	-0.2	-1.3	0.3	3.6	2.7	-3.3	-0.2	10.0
2008	-4.9	.07	-0.5	3.2	1.7	-4.9	-1.4	-0.6	-8.1	-13.0	-4.6	2.7	-27.4
2009	-4.6	-5.1	3.2	7.1	5.0	0.4	5.8	2.5	3.6	-0.7	2.9	2.0	23.6



LASERS Total Plan Performance

Monthly, During 2010-2019

Calendar Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	1-yr
2010	-1.4	1.2	4.1	1.9	-5.1	-1.4	4.6	-1.4	6.3	2.7	-0.5	4.7	16.3
2011	1.1	2.1	1.1	2.8	-0.7	-0.7	-0.2	-4.2	-5.3	6.1	-1.6	0.1	0.2
2012	4.1	2.9	0.6	-0.1	-4.5	3.0	1.1	1.8	2.0	-0.2	1.0	1.9	14.3
2013	2.9	0.2	1.6	1.8	-0.7	-2.1	3.1	-1.5	4.0	2.9	0.9	1.1	15.8
2014	-2.2	3.3	1.2	0.7	1.6	2.2	-1.2	1.9	-2.6	0.9	0.8	-1.0	5.6
2015	-0.6	3.3	-0.4	2.0	.06	-1.3	-0.5	-4.4	-2.2	4.6	-0.7	-1.9	-2.3
2016	-3.8	-0.2	5.3	1.4	-0.8	0.5	3.2	0.6	0.7	-0.7	0.6	1.7	9.4
2017	2.0	1.8	1.2	1.3	1.5	0.8	1.9	0.3	1.7	1.4	1.4	1.5	18.1
2018	3.6	-2.6	-0.4	0.5	0.3	-0.3	1.7	0.2	0.3	-5.3	1.1	-3.9	-4.8
2019	5.3	1.6	0.4	2.1	-3.3	4.5	0.2	-2.0	1.7	1.9	1.0	2.7	16.9

Best & Worst Monthly Returns

Over the Last 20 years (2000 – 2019)

Top 10 Best

Month	Return
Apr 2009	7.05%
Sept 2010	6.31%
Oct 2011	6.08%
July 2009	5.84%
Dec 1999	5.39%
Mar 2016	5.34%
Apr 2003	5.34%
Jan 2019	5.27%
May 2009	5.04%
May 2003	4.77%

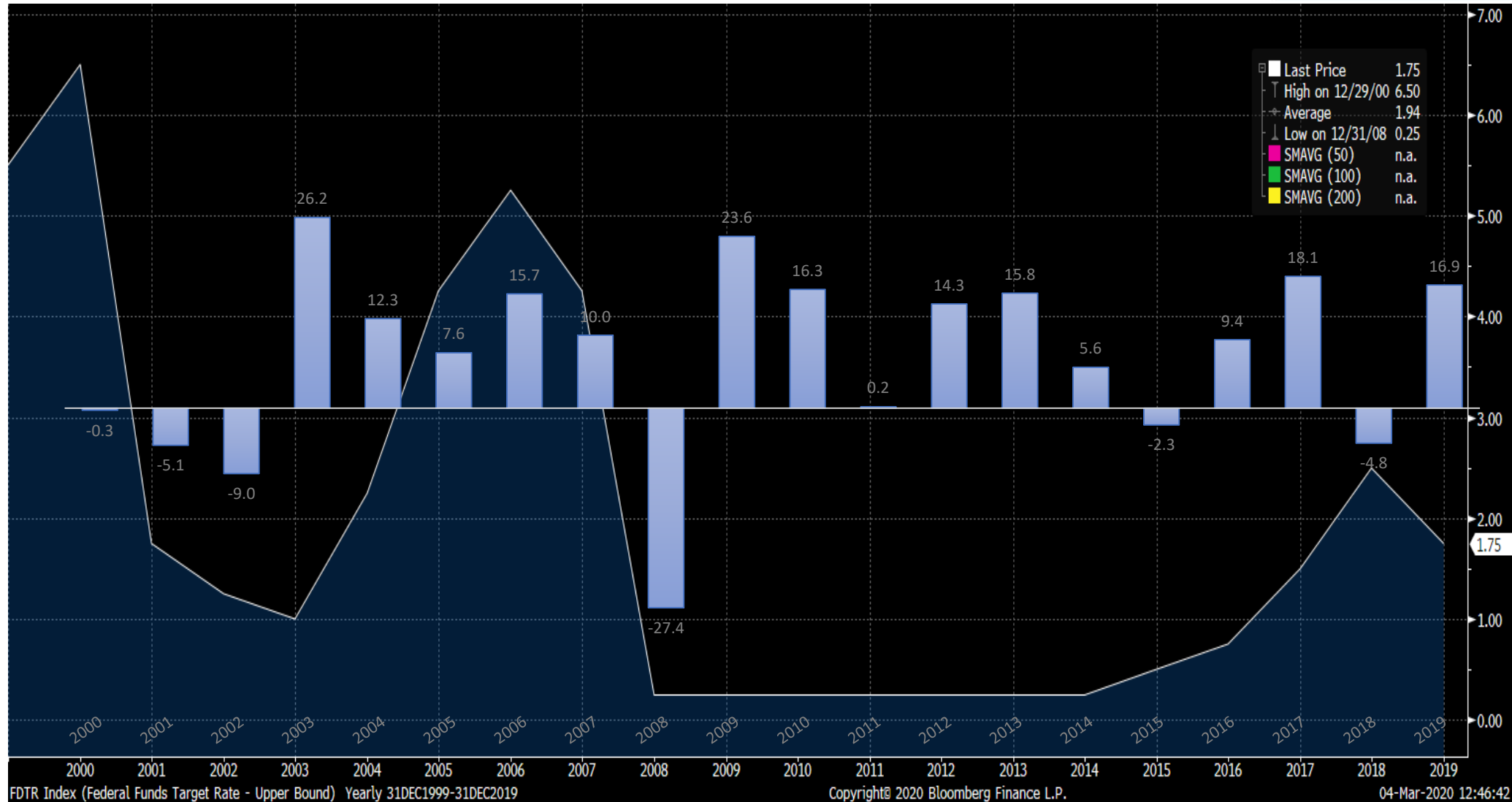
Top 10 Worst

Month	Return
Oct 2008	-13.02%
Sept 2008	-8.08%
Sept 2001	-6.2%
July 2002	-5.66%
Sept 2011	-5.34%
Oct 2018	-5.25%
May 2010	-5.11%
Feb 2009	-5.09%
Sept 2002	-5.07%
Jan 2008	-4.88%

Interest Rates & LASERS Returns

20 Years (2000 – 2019)

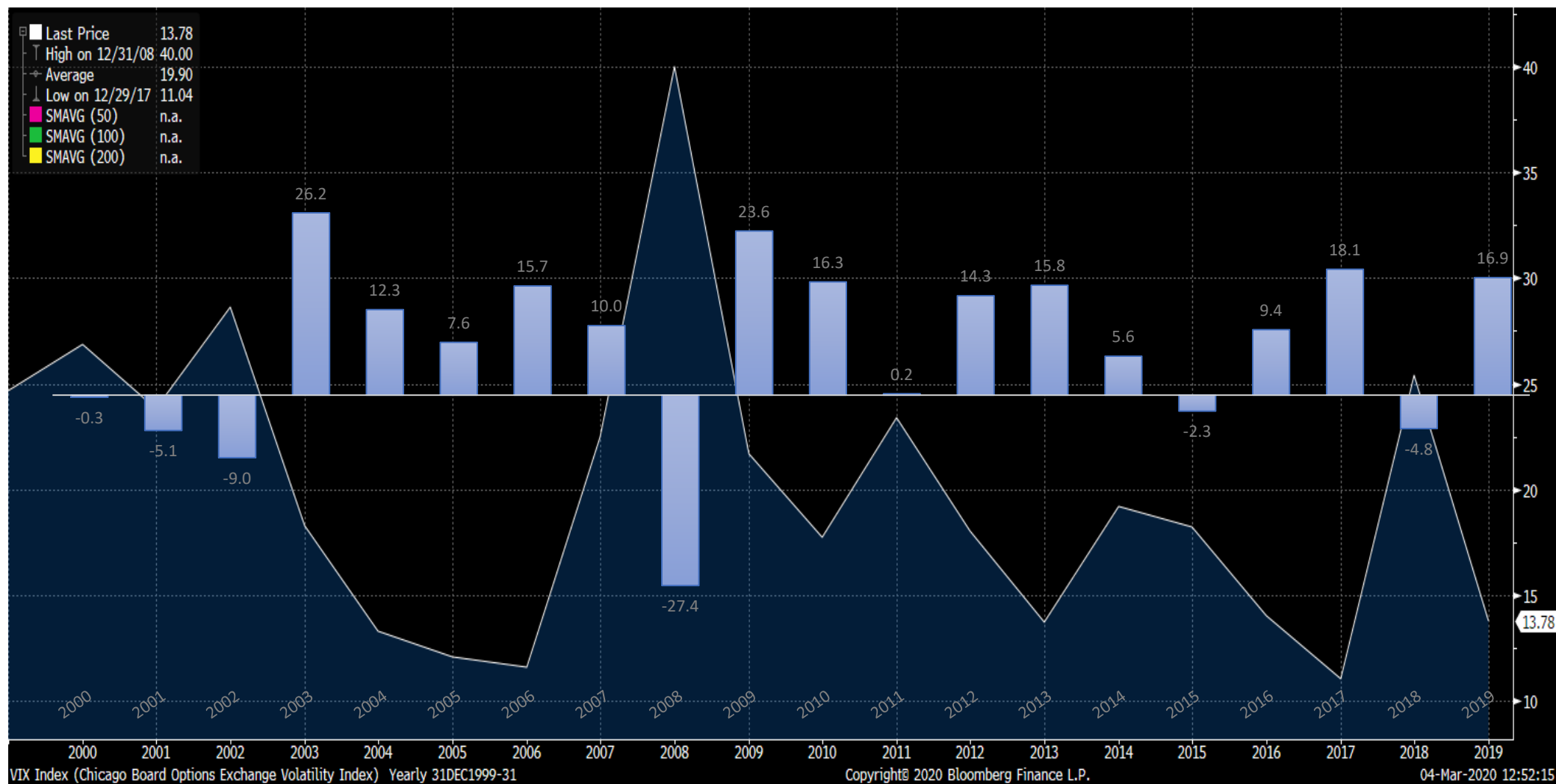
LASERS



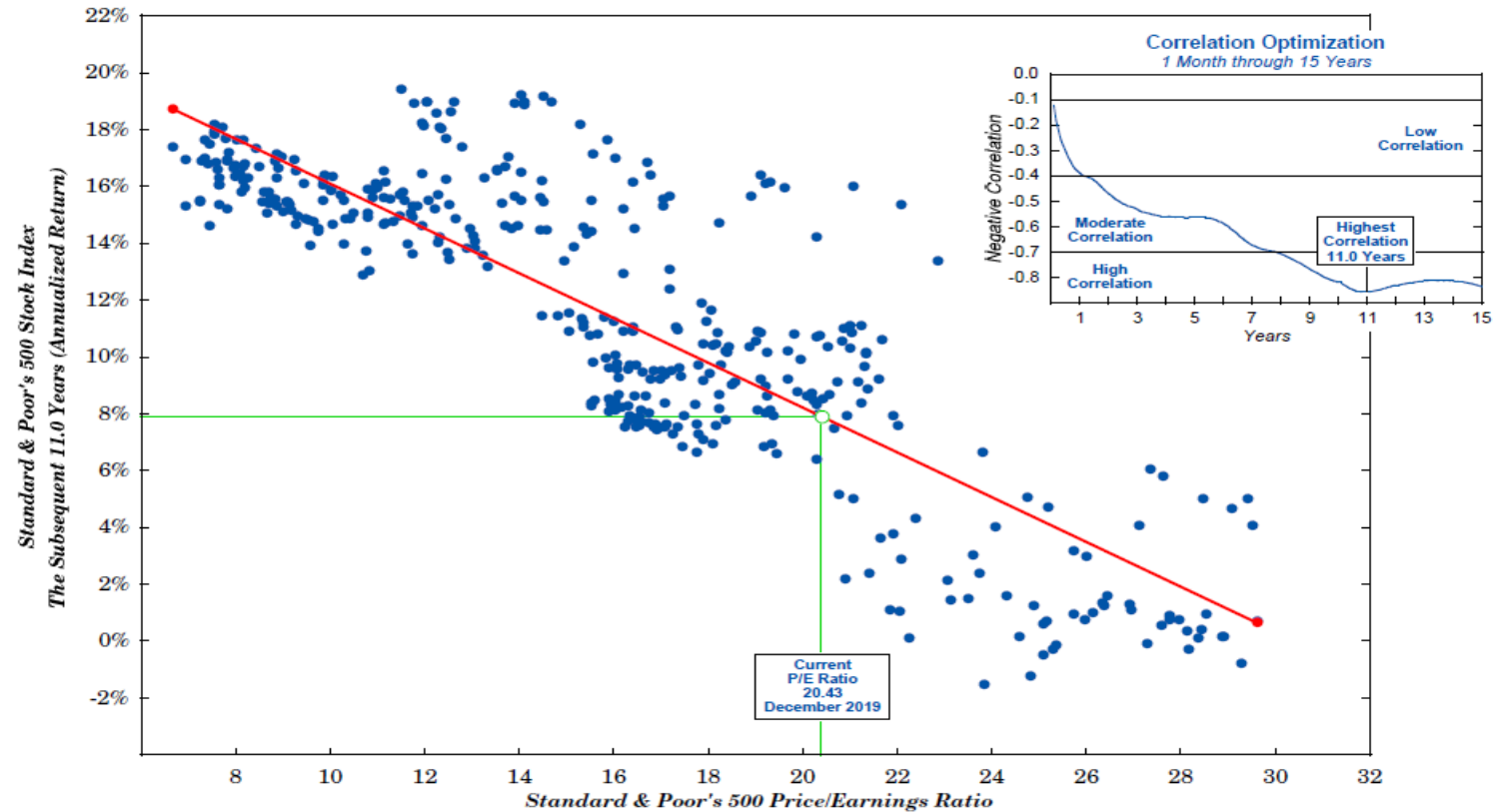
Volatility (VIX) & LASERS Returns

20 Years (2000 – 2019)

42
LASERS



Price/Earnings Ratios and Subsequent Stock Returns



Notes

Small Graph: All forward looking Stock Returns (1 Month through 15 Years) are tested to identify the holding period with the highest correlation (11.0 Years).

Main Graph: High Negative Correlation (-0.86); 408 Observations; X Axis: 1/75 - 12/08; Y Axis: 1/86 - 12/19; Trendline (Least-Squares Method)

Sources: Standard & Poor's Corporation • Copyright © 2020 Crandall, Pierce & Company

The information presented herein was compiled from sources believed to be reliable. It is intended for illustrative purposes only, and is furnished without responsibility for completeness or accuracy. Past performance does not guarantee future results. This illustration is subject to the terms & conditions at www.crandallpierce.com/usage.pdf. Under no circumstances may this illustration be copied, reproduced or redistributed in whole or in part including the data contained herein, without prior written permission.

NEPC's Asset Allocation Material

2020 ASSET ALLOCATION STUDY

LOUISIANA STATE EMPLOYEES' RETIREMENT SYSTEM

July 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

- **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

48

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



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

50

	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%
	Private Equity ⁽¹⁾	10.4%	10.5%	24.58%
Fixed Income	Core Bonds ⁽¹⁾	1.3%	2.6%	6.10%
	Global Multi-Sector ⁽¹⁾	5.9%	6.6%	9.87%
	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	Absolute Return ⁽¹⁾	4.7%	5.5%	7.74%
	Risk Parity ⁽¹⁾	5.0%	6.0%	12.27%

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



KEY MARKET THEMES

KEY MARKET THEMES OVERVIEW

52

Key Market Themes are factors that define global markets and can be expected to both evolve and remain relevant without a clear timeline of conclusion. At times, themes may be challenged or disrupted and generate market volatility. The conclusion of a theme likely alters both market dynamics and our market outlook. Our intent is for clients to be aware of these themes and understand their implications for asset allocation and portfolio implementation.

NEPC currently has four Key Market Themes:

**Virus
Trajectory**

**Permanent
Interventions**

**China
Transitions**

**Globalization
Backlash**

ASSESSING THE KEY MARKET THEMES

53

06/30/20 Assessment

	Virus Trajectory	Permanent Interventions	Globalization Backlash	China Transitions
Dominant	<u>Change in Status:</u> - Virus Trajectory is	<u>Change in Status:</u> - Globally, significant	<u>Change in Status:</u> - The influence of the	<u>Change in Status:</u> - Tensions between
Emerging	the dominant force driving market and economic outcomes. While the market is	monetary and fiscal stimulus has been aimed at lessening the economic impact	theme will likely increase in coming quarters as countries digest lasting	the US and China intensified following China's approval of the Hong Kong
Neutral	optimistic regarding a vaccine, economic reopening in some states have paused given recent upward trends in cases. We believe uncertainty remains high related to the path of the virus and the timing of a global economic recovery.	of COVID-19. The Federal Reserve created liquidity and lending facilities to support corporations along with state and local municipalities. Recent interventions have pushed credit spreads lower across IG and HY markets.	impacts from the pandemic. The world will likely be faced with an amplified wealth divide given economic and labor market disruptions. In addition, backlash may continue as countries reassess supply chains.	national security law that effectively ends the "one country, two systems" relationship. The question of Hong Kong and other geo-political tensions are likely to be at the forefront of political agendas in both the US and China.
Fading				
Dormant				

VIRUS AND ECONOMIC PATHS ARE ALIGNED

54

The COVID-19 pandemic has brought global economic activity to a halt

Economic data releases in the US and globally will be historically poor over the next quarter with levels of contraction in GDP not seen since the late 1940s

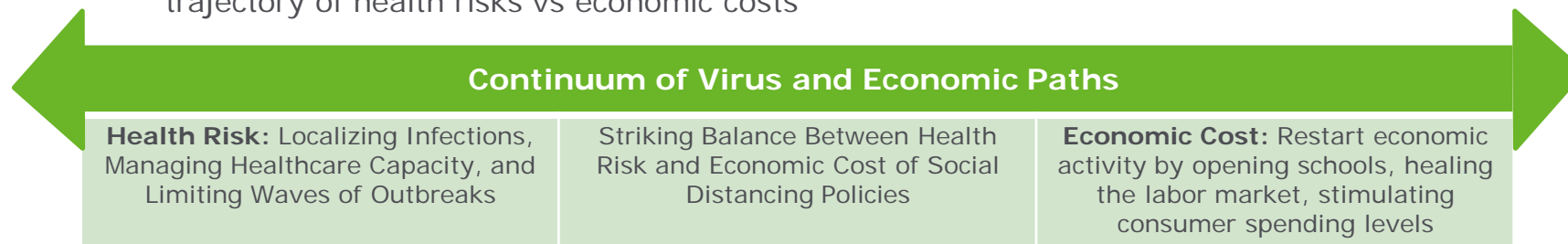
The intensity of social distancing policies has significantly disrupted consumer spending patterns and the labor market with US unemployment rate likely near 15%

Virus Trajectory looks to reflect the unknown path of a pandemic but also the timing and ability of economies to restart throughout the world

The duration and scope of social distancing policies is the key unknown as the market struggles to discount the potential scale of short and long-term economic costs

Investor focus likely to shift along a continuum of health risks and economic costs should we see COVID-19 infection rates escalate

Increased COVID-19 testing is needed to define an exposure baseline to inform potential trajectory of health risks vs economic costs



Represents an incredibly wide range of outcomes and a swift movement through the continuum could accelerate a “V-shaped recovery”

A lengthy economic shutdown or harmful second virus wave could inhibit transition along the continuum leading to self-reinforcing downward economic spiral

POTENTIAL OUTCOMES AND IMPLICATIONS

55

	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.

ELEVATED PERMANENT INTERVENTIONS

56

The developed world is undergoing a regime shift defined by central bank market interventions and permanent fiscal support by governments to support economic growth rates and address deflationary pressures

Recent actions by global central banks and governments aimed at lessening the economic impact of COVID-19 have increased the dominance of the theme

The unprecedented level of monetary and fiscal stimulus is supportive for risk assets, though likely encourages debt issuance - increasing the fragility of the system as a whole

Federal Reserve			~9% of US nominal GDP
Traditional Actions	Liquidity Actions/Facilities	Lending Actions/Facilities	
Interest Rate Cuts (150 bps)	Currency Swap Agreements	Cut Discount Window (0.25%) and Reserve Requirement (0.0%)	
Unlimited Quantitative Easing	Money Market Mutual Fund Liquidity Facility (MMLF)	Repo Operations	
	FIMA Repo Facility	Commercial Paper Funding Facility (CPFF)	
		Credit Facilities (PMCCF, SMCCF, PDCF)	
		Main Street Lending Facilities (MSNLF, MSELF)	
US Government Actions		Term Asset-Backed Securities Loan Facility (TALF), Municipal Liquidity Facility	~11.5% of US nominal GDP
Emergency Coronavirus Response Bill		Paycheck Protection Program Liquidity Facility (PPPLF)	
Families First Coronavirus Response Act			
CARES Act			

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

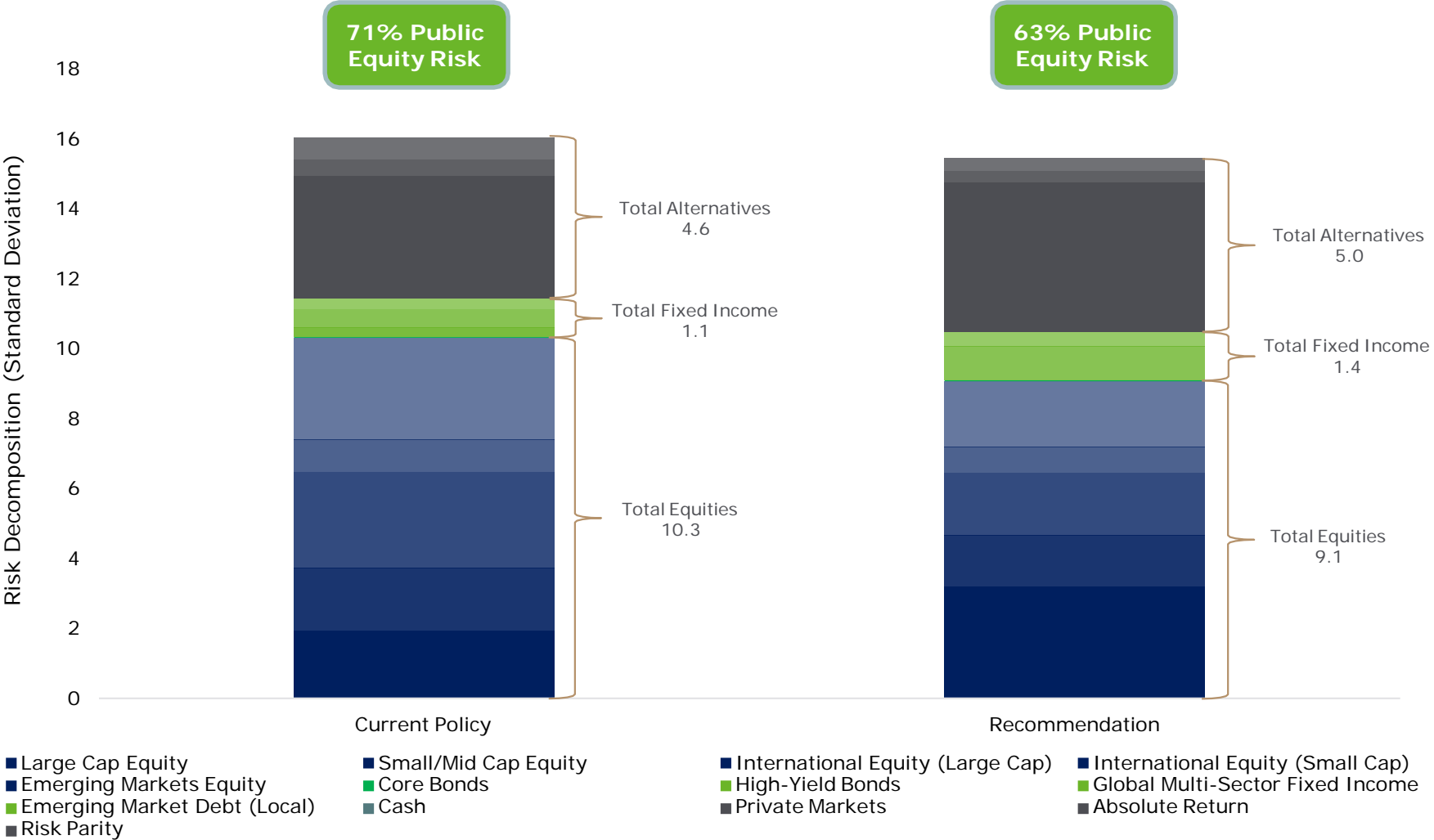
58

Asset Class	Current Policy	Recommendation	Δ (+/-)
Large Cap Equity	13.0%	21.0%	+8.0%
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%	4.0%	(1.0%)
Emerging Markets Equity	12.0%	8.0%	(4.0%)
Total Equities	55.0%	51.0%	(4.0%)
Core Bonds ⁽¹⁾	3.0%	3.0%	--
High-Yield Bonds	3.0%	---	(3.0%)
Global Multi-Sector ⁽¹⁾	7.0%	13.0%	+6.0%
Emerging Market Debt	3.0%	4.0%	+1.0%
Total Fixed Income	16.0%	20.0%	+4.0%
Private Markets	15.0%	18.0%	+3.0%
Absolute Return ⁽¹⁾	7.0%	4.0%	(3.0%)
Risk Parity ⁽¹⁾	7.0%	5.0%	(2.0%)
Total Alternative Assets	29.0%	27.0%	(2.0%)
Total Cash	---	2.0%	+2.0%
Total Portfolio	100.0%	100.0%	--
Expected Return (10 Year)	7.37%	7.29%	(0.08%)
Expected Return (30 Year)	7.76%	7.70%	(0.06%)
Standard Deviation	16.04%	15.44%	(0.60%)
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 (%)





Louisiana State Employees' Retirement System

Review and Discussion of Discount Rate Part II

*Shelley Johnson, ASA, MAAA
Consulting Actuary*

July 23, 2020



FOSTER & FOSTER
ACTUARIES AND CONSULTANTS

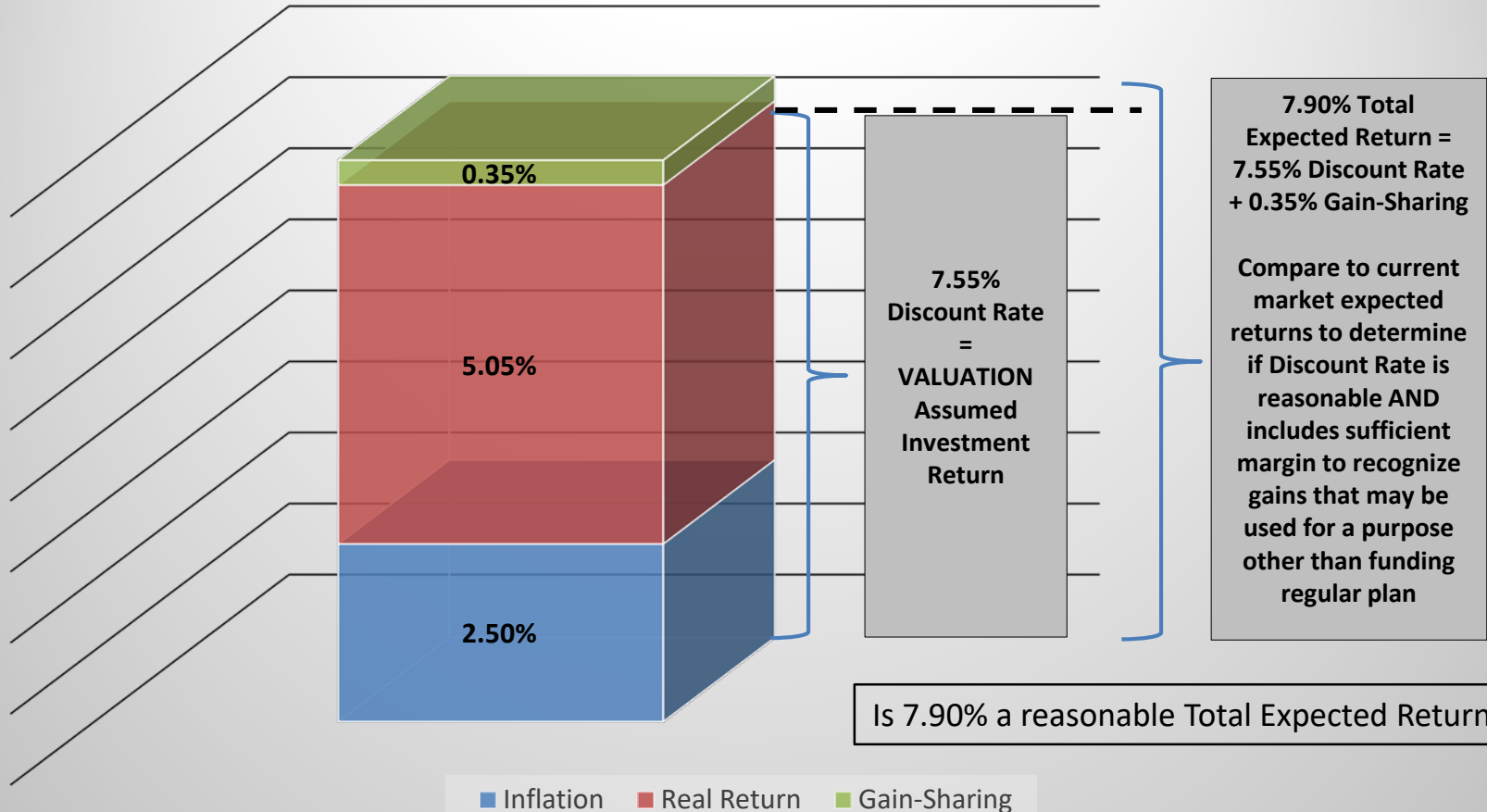
Recap from Part I (June Presentation)

61

- Board Plan: Reduce the discount rate from 7.75% to 7.50% in 0.05% annual increments.
- June 30, 2020 Actuarial Valuation: Current planned discount rate is 7.55% (7.50% for the projected FY 2021/2022 contribution rate).
- Is the 7.55% discount rate reasonable?
- Typical process of evaluating reasonableness of the discount rate:
 - 1) Set inflation assumption
 - 2) Determine the expected return using the set inflation assumption, current capital market assumptions, and plan's current or target asset allocation.
 - 3) Are there any other considerations, such as gain-sharing to consider?
- Consider System Investment Consultant capital market assumptions and those employed by other investment consultants, and any other considerations that may reasonably affect future experience.
- Estimated cost of gain-sharing is 35 basis points.

Current Assumptions

Discount Rate (7.55%) + Gain Sharing (0.35%) = 7.90%



Inflation

LASER's current inflation assumption: 2.50%

Other reported inflation assumptions:											
NEPC – June 2020	Reduced 30-year assumption to 2.40%										
SSA 2020 Trustee Report	Reduced from 2.60% to 2.40% (75 Year)										
Horizon Actuarial Services Survey of Capital Market Assumptions		<table> <tr> <td></td><td><u>2019</u></td><td><u>2020</u></td></tr> <tr> <td>10-Year:</td><td>2.30%</td><td>2.11%</td></tr> <tr> <td>20-Year:</td><td>2.29%</td><td>2.16%</td></tr> </table>		<u>2019</u>	<u>2020</u>	10-Year:	2.30%	2.11%	20-Year:	2.29%	2.16%
	<u>2019</u>	<u>2020</u>									
10-Year:	2.30%	2.11%									
20-Year:	2.29%	2.16%									
Evestment May 2019 (Avg. of 9 leading investment consultants)	<= 10-Year: 2.15% > 10-Year: 2.54%										

Other Louisiana Retirement Systems:	
State Systems (TRSL, LSERS, LSPRS):	2.50%
Statewide Systems:	2.40% - 2.50%

Evaluation of Reasonableness of 7.90% Expected Investment Return

64

Investment Consultant Expected Returns			
LASERS Portfolio Expected Returns	60 th Percentile	50 th Percentile	40 th Percentile
<u>NEPC LASERS Expected Return (30-Year)</u> <u>with various inflation assumptions:</u>			
2.30% Inflation	7.50%	8.24%	8.98%
2.40% Inflation (NEPC Assumption)	7.60%	8.35%	9.09%
2.50% Inflation	7.71%	8.45%	9.19%

* Actual Horizon Average Inflation: 2.29%

Evaluation of Reasonableness of 7.90% Expected Investment Return

65

Investment Consultant Expected Returns			
LASERS Portfolio Expected Returns	60 th Percentile	50 th Percentile	40 th Percentile
<u>Horizon 2019 Capital Market Survey (20-Year) LASERS Expected Return with various inflation assumptions:</u>			
2.30% Inflation (Horizon Avg. Assumption*)	7.56%	8.30%	9.05%
2.40% Inflation	7.66%	8.40%	9.15%
2.50% Inflation	7.77%	8.52%	9.26%
<u>Horizon 2020 Capital Market Survey (20-Year) LASERS Expected Return with various inflation assumptions:</u>			
2.16% Inflation (Horizon Avg. Assumption*)	7.03%	8.09%	9.14%
2.30% Inflation	7.18%	8.23%	9.29%
2.40% Inflation	7.28%	8.34%	9.40%
2.50% Inflation	7.39%	8.45%	9.50%

* Actual 2019 Horizon Average 20-Year Inflation: 2.29%

Evaluation of Reasonableness of Current 7.90% Expected Return

66

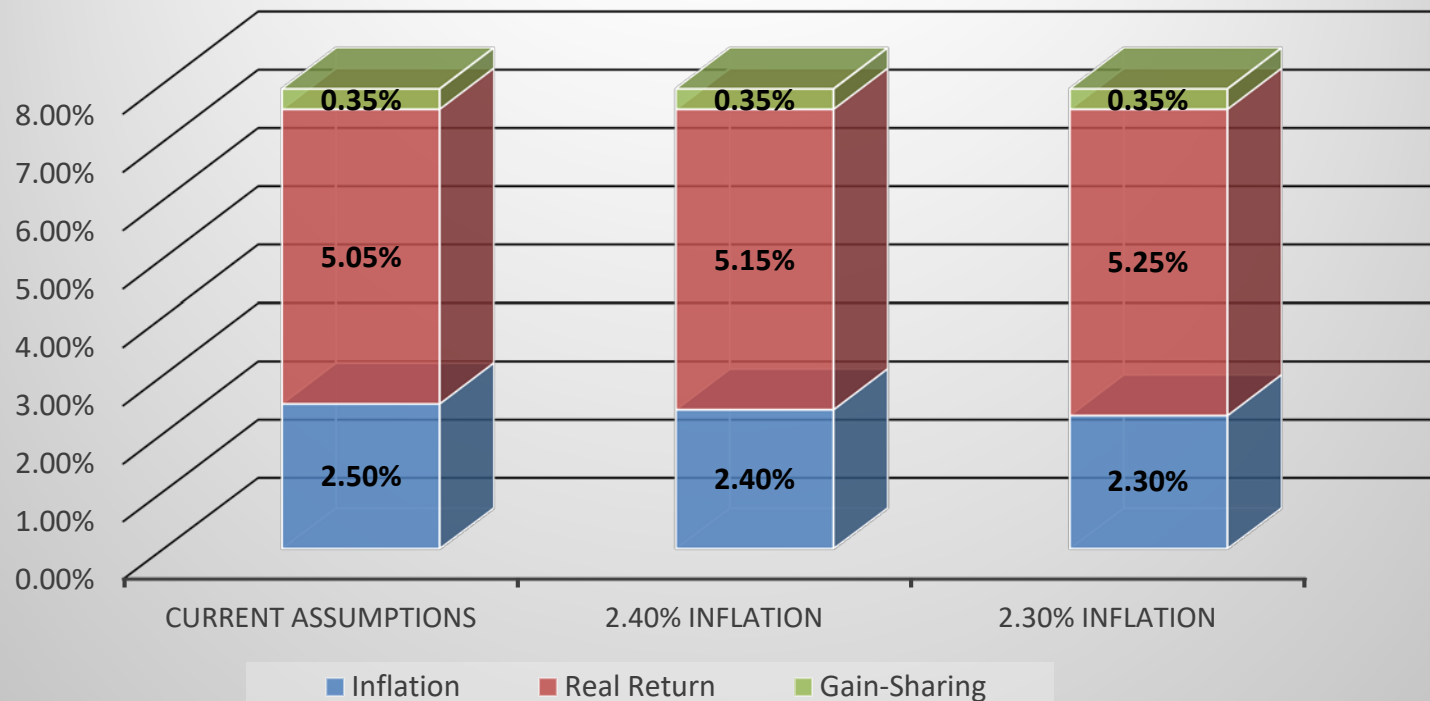
Current Assumptions vs. Current Market Expectations		
Current Assumptions (2.50% Inflation Assumption)	LASERS' FY 2020/21 Discount Rate	7.55%
	Updated Expected Gain-Sharing	0.35%
	Expected Return if include Gain-Sharing	7.90%
Current Market Expectations with 2.40% Inflation Assumption	NEPC 2020 Expected Returns (50 th Percentile, 30-Year)	8.35%
	HAS 2020 Survey of Capital Market Assumptions (LASERS) (50 th Percentile, 20-Year)	8.34%
Current Market Expectations with 2.30% Inflation Assumption	NEPC 2020 Expected Returns (50 th Percentile, 30-Year)	8.24%
	HAS 2020 Survey of Capital Market Assumptions (LASERS) (50 th Percentile, 20-Year)	8.23%

Inflation Assumption Change Impact on Discount Rate

67

- An inflation reduction with no discount rate reduction effectively results in an increase in the assumed “real” rate of return.

Revised Inflation Assumption with No Change to Discount Rate



Inflation Assumption Change Impact on Salary Increase Assumptions⁶⁸

- Salary increase assumptions include a component for expected inflation
- A reduction in the inflation assumption component of the salary assumption decreases normal cost, and unfunded accrued liability *

Estimated Contribution Rate Impact of Inflation Change, Potential Investment Loss, and Planned Discount Rate Change

Inflation Assumption	Impact on Salary Assumptions	Impact on Employer Contribution Rate *			
		Salary	-4.0% FY Market Return	7.50%DR Change	Total
2.50%	0.0%	0.00%	+1.50%	+0.35%	1.85%
2.40%	-0.1%	-0.17%	+1.50%	+0.35%	1.68%
2.30%	-0.2%	-0.35%	+1.50%	+0.35%	1.50%

* Does not include impact of other gains/losses. Discount rate reduction per Board's reduction plan. Expected real return increased to offset balance of inflation reduction less actual discount rate change (see slide 8).

Board Action Needed

- 1) Select Inflation Assumption for June 30, 2020 funding and GASB valuations.
- 2) If inflation assumption changes, adopt new salary assumptions.
- 3) Confirm or revise 7.55% discount rate for June 30, 2020 funding and GASB valuations, and 7.50% discount rate for projected FY 2021/2022 funding requirements.

Questions?