

# Pennsylvania Municipal Retirement System

Monthly Performance Report  
as of June 30, 2021



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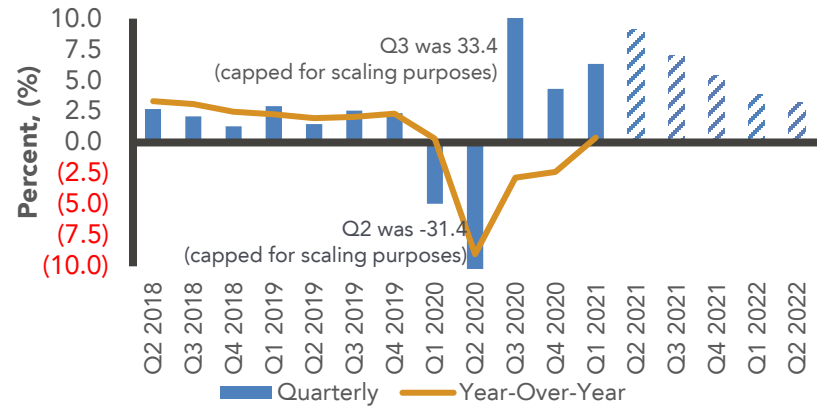
# I. Market Environment



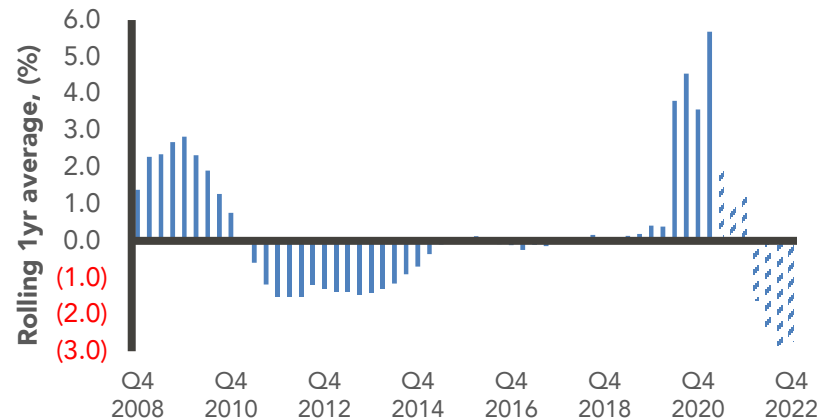
# U.S. Economy

- Economic activity likely accelerated in Q2, with economists forecasting real GDP growth of 9.1% amid policy support and continued strength in consumer spending. Economic growth, while strong, is expected to moderate over the next several quarters as fiscal spending is set to become contractionary, based on current policy measures.
- If fiscal policy does become a drag on economic growth, it will be imperative for the recovery in the private sector to continue.
- According to Morgan Stanley estimates, consumers are sitting on more than \$2 trillion in excess savings relative to the pre-pandemic trend, while business inventories reside at multi-decade lows. Both estimates argue that the private sector is positioned to take the baton from the public sector as the economy heads into 2022.

**U.S. Real GDP Growth**



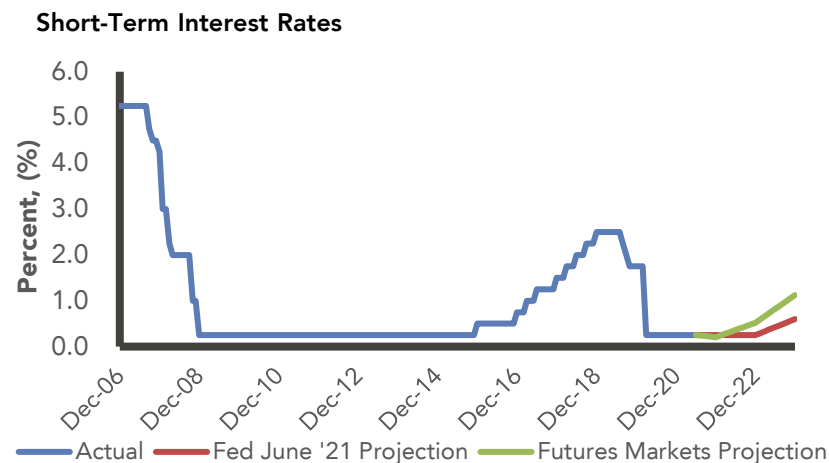
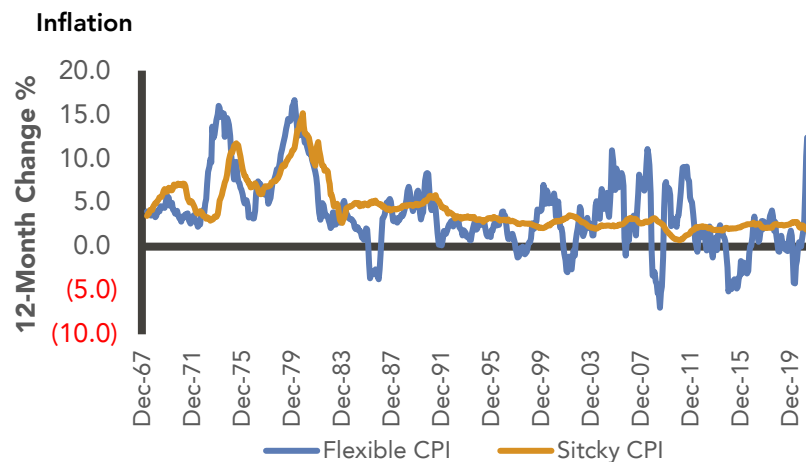
**Fiscal Contribution to GDP Growth**



Sources: Hutchins Center, Refinitiv and The Wall Street Journal. Striped bars reflect estimates.

# U.S. Economy

- Currently, 5-year breakeven inflation remains higher than 10-year breakeven inflation (as measured by the TIPS market), continuing to imply that inflation over the next 5 years will be higher than inflation in the latter half of the next decade.
- The actual data appear to bear this out. According to the Federal Reserve Bank of Atlanta, the institution's flexible-price consumer price index (CPI)—a weighted basket of items that change price relatively frequently—increased 12.4% over the past year, while their sticky CPI—a weighted basket of items that change price relatively slowly—increased just 2.7% over the same period.
- A strong economic backdrop and recent inflationary pressures have driven a shift in the Federal Reserve's outlook for short-term interest rates. As of June, the Federal Reserve anticipates raising rates at least once before the end of 2023. The futures market, on the other hand, continues to expect multiple rate hikes over the same period.

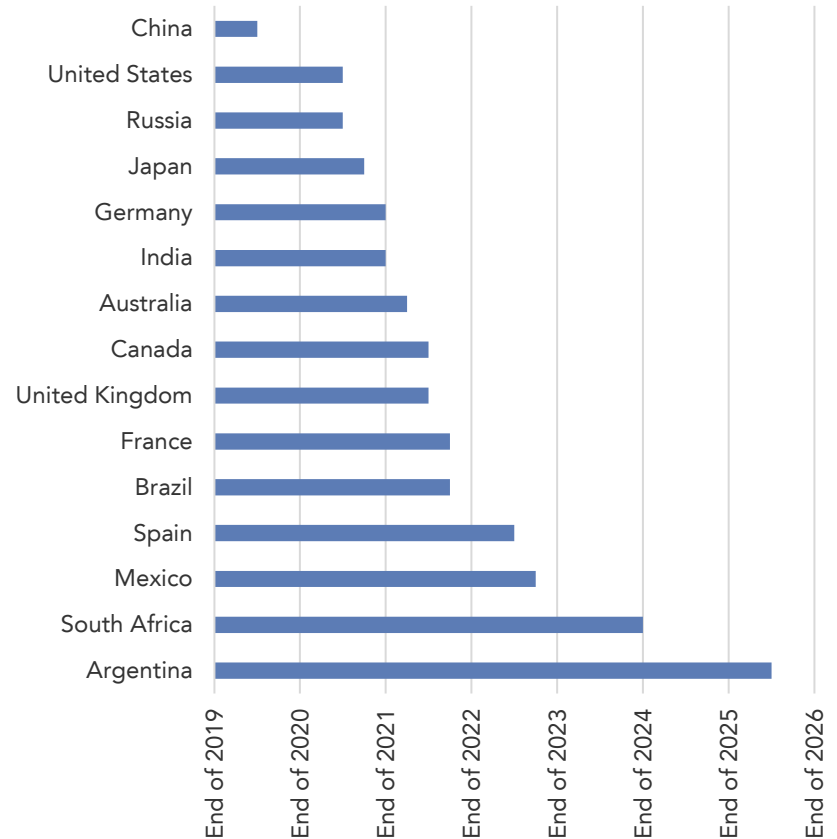


Sources: Federal Reserve Bank of Atlanta and Refinitiv.

# Global Economy

- Outside the U.S., economic recoveries continue to diverge across countries and regions, depending on the success of vaccine rollout and policy support.
- According to the OECD, many countries will not recover their respective pre-pandemic GDP levels until 2022 or even longer in some cases, most notably in several emerging market economies.
- Amid these divergences, policymakers continue to provide economic support through various fiscal and monetary measures. China, for instance, recently cut the reserve requirement for all its banks by 0.50%. The move has the potential to release around 1 trillion yuan (or about \$155 billion) in long-term liquidity to support the post-COVID recovery.

Time Until Projected GDP per Capita Reached Pre-Pandemic Levels

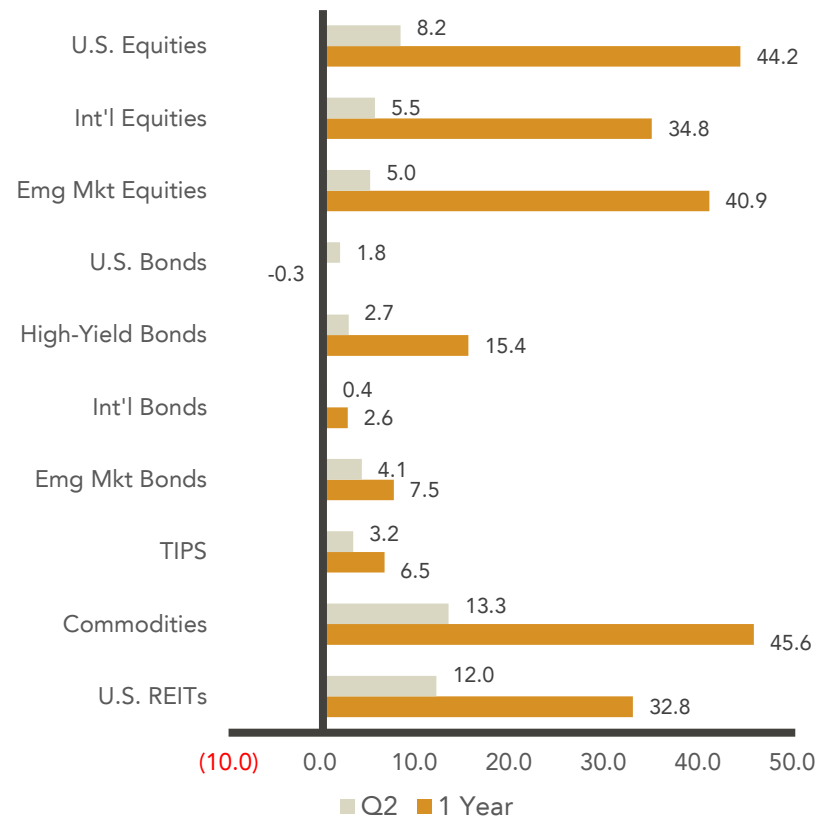


Sources: Organization for Economic Co-operation and Development Outlook No. 109 (Edition 2021/1); recovery to pre-pandemic level: sustained increase in forecasted real GDP per capita above its Q4 2019 level; for countries recovering after Q4 2022, calculations are based on average projected quarterly growth rates in 2022.

# Global Asset Class Performance

- Global equities** rallied in Q2, continuing their strong start in 2021. U.S. equities (+8.2%) topped their international developed (+5.5%) and emerging market equity (+5.0%) counterparts as the continued economic recovery and high expectations for the upcoming Q2 earnings season drove U.S. stocks to all-time highs.
- Fixed income** markets rebounded strongly in Q2 amid a decline in Treasury yields. Longer-dated securities were the best performers as the 10-year note and 30-year bond yields fell, 29 and 35 basis points, respectively. Sub-investment grade debt also did well amid the strong environment for equities. High yield (+2.7%) and bank loan (+1.4%) spreads continued to decline amid the economic rebound.
- Inflation-sensitive assets** also posted solid results for the quarter. TIPS (+3.2%) were firmly in the black, outperforming their nominal government bond counterparts. REITs (+12.0%) topped the broad equity markets for the second straight quarter amid continued stabilization in the commercial property markets, while commodities (+13.3%) rose strongly given increased demand and a slightly weaker U.S. dollar.

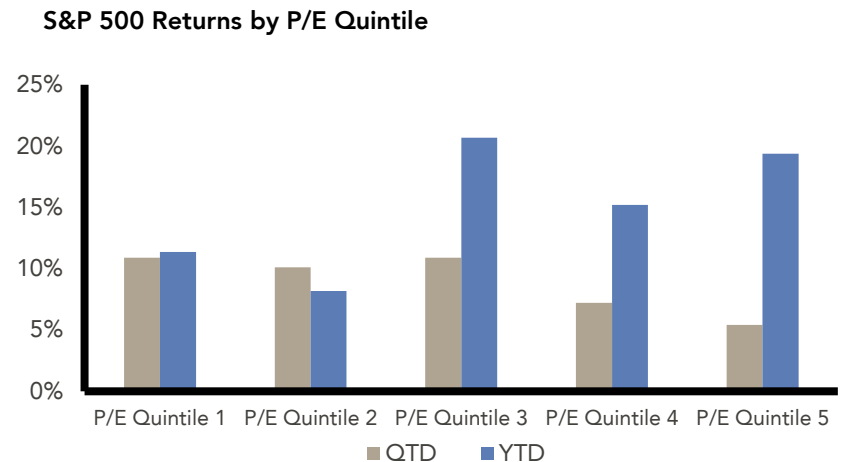
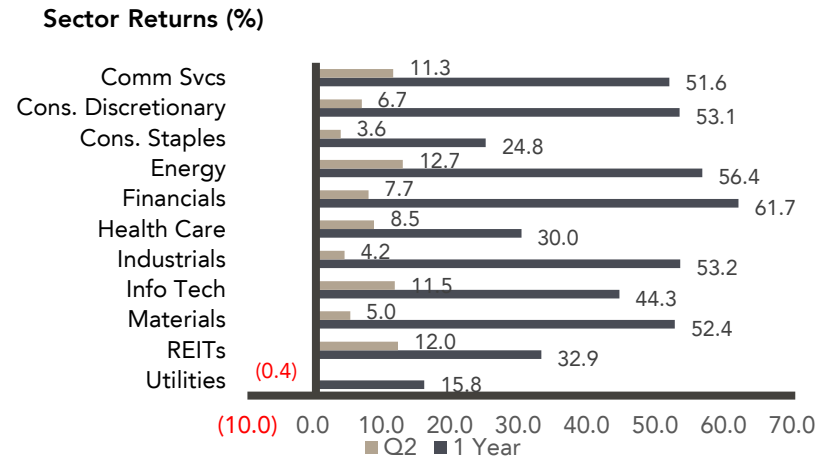
Asset Class Returns: Select Asset Class Performance (%)



Sources: Markov Processes International

# U.S. Equity Markets

- U.S equity markets continued their strength in Q2. All sectors finished the quarter in the black, except Utilities, with more cyclical areas generally outperforming their more defensive counterparts. Energy (+12.7%) and REITs (+12.0%) led the way again, while Utilities (-0.4%) and Consumer Staples (+3.6%) lagged.
- While more cyclical sectors outperformed, growth stocks and large caps were best from a style and capitalization perspective, halting two consecutive quarters of relative underperformance.
- The decline in interest rates proved to be a tailwind for the most expensive stocks relative to cheaper names in Q2, though value remains ahead of growth during the first half of 2021.



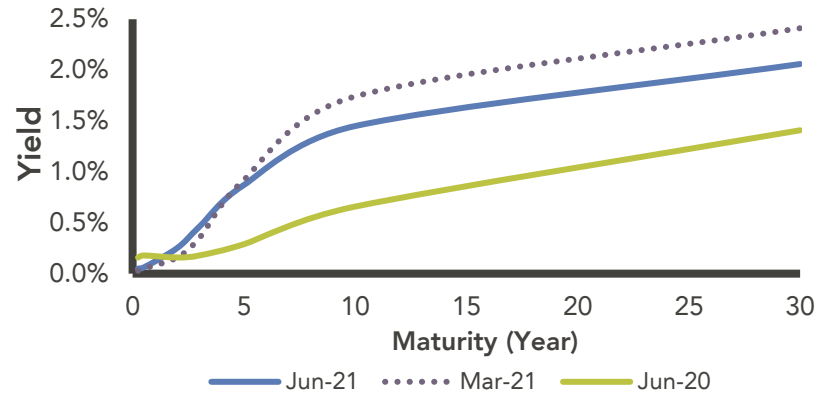
Sources: FactSet and Refinitiv. SPY ETF used as a proxy for the S&P 500.



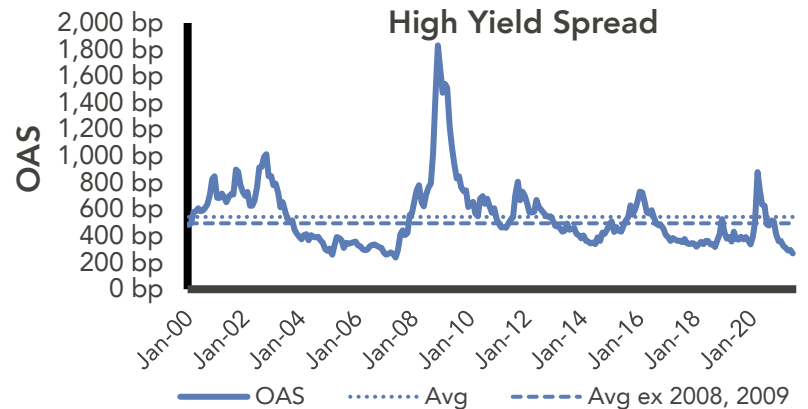
# U.S. Fixed Income

- Interest rates fell for intermediate- and long-term Treasuries in Q2. Most market participants attribute the drop to technical factors. More specifically, net Treasury issuance declined notably in Q2, leaving Federal Reserve purchases of Treasury debt higher than entire net issuance during the quarter.
- Sub-investment grade debt continued to do well amid the strong environment for equities. High yield (+2.7%) and bank loan (+1.4%) spreads declined further amid the economic rebound. High yield spreads, for example, ended the quarter at just 268 basis points—well below the long-term average of about 542 basis points.

Yield Curve



High Yield Spread



Sources: Bloomberg Barclays and Refinitiv.

# Global Index Returns

U.S. EQUITY	QTR	YTD	1 Year	3 Year	5 Year	10 Year
S&P 500 Index	8.5	15.3	40.8	18.7	17.6	14.8
Russell 3000 Index	8.2	15.1	44.2	18.7	17.9	14.7
Russell 3000 Growth Index	11.4	12.7	43.0	24.5	23.3	17.5
Russell 3000 Value Index	5.2	17.7	45.4	12.2	12.0	11.5
Russell TOP 200 Index	8.9	14.5	40.8	20.2	18.9	15.6
Russell TOP 200 Growth Index	12.1	13.6	42.3	25.8	24.6	18.9
Russell TOP 200 Value Index	5.0	15.8	39.0	12.6	11.9	11.5
Russell 1000 Index	8.5	15.0	43.1	19.2	18.0	14.9
Russell 1000 Growth Index	11.9	13.0	42.5	25.1	23.7	17.9
Russell 1000 Value Index	5.2	17.0	43.7	12.4	11.9	11.6
Russell Mid-Cap Index	7.5	16.2	49.8	16.4	15.6	13.2
Russell Mid-Cap Growth Index	11.1	10.4	43.8	22.4	20.5	15.1
Russell Mid-Cap Value Index	5.7	19.5	53.1	11.9	11.8	11.7
Russell 2000 Index	4.3	17.5	62.0	13.5	16.5	12.3
Russell 2000 Growth Index	3.9	9.0	51.4	15.9	18.8	13.5
Russell 2000 Value Index	4.6	26.7	73.3	10.3	13.6	10.8

U.S. EQUITY BY SECTOR	QTR	YTD	1 Year	3 Year	5 Year	10 Year
Communication Services	11.3	19.7	51.6	26.8	13.2	12.5
Consumer Discretionary	6.7	12.0	53.1	24.1	22.4	18.7
Consumer Staples	3.6	5.7	24.8	13.9	8.1	11.5
Energy	12.7	48.8	56.4	(6.7)	(1.2)	(0.9)
Financials	7.7	25.4	61.7	13.0	16.4	13.4
Health Care	8.5	11.2	30.0	17.7	15.4	16.2
Industrials	4.2	16.2	53.2	15.1	15.1	13.1
Information Technology	11.5	13.1	44.3	30.3	31.0	21.4
Materials	5.0	15.9	52.4	13.5	14.2	10.0
Real Estate	12.0	21.3	32.9	12.0	8.2	10.1
Utilities	(0.4)	2.6	15.8	9.6	7.3	10.6

Source: Markov Processes International.

# Global Index Returns

INT'L/GLOBAL EQUITY	QTR	YTD	1 Year	3 Year	5 Year	10 Year
MSCI EAFE (Net)	5.2	8.8	32.4	8.3	10.3	5.9
MSCI EAFE Growth (Net)	7.4	6.8	31.0	12.5	12.5	7.8
MSCI EAFE Value (Net)	3.0	10.7	33.5	3.8	7.8	3.9
MSCI EAFE Small Cap (Net)	4.3	9.0	41.0	8.4	12.0	8.4
MSCI AC World Index (Net)	7.4	12.3	39.3	14.6	14.6	9.9
MSCI AC World Index Growth (Net)	10.0	10.3	39.7	20.4	19.2	12.7
MSCI AC World Index Value (Net)	4.8	14.1	38.4	8.4	9.8	7.0
MSCI Europe ex UK (Net)	7.8	11.6	36.2	11.0	12.0	6.2
MSCI United Kingdom (Net)	6.0	12.5	31.3	1.9	5.7	3.7
MSCI Pacific ex Japan (Net)	4.8	9.6	34.2	8.2	10.4	5.5
MSCI Japan (Net)	(0.3)	1.3	24.8	7.2	10.2	7.2
MSCI Emerging Markets (Net)	5.0	7.4	40.9	11.3	13.0	4.3

Source: Markov Processes International.

# Global Index Returns

FIXED INCOME	QTR	YTD	1 Year	3 Year	5 Year	10 Year
Merrill Lynch 3-month T-Bill	0.0	0.0	0.1	1.3	1.2	0.6
Barclays Intermediate <u>Gov't./Credit</u>	1.0	(0.9)	0.2	4.7	2.6	2.8
Barclays Aggregate Bond	1.8	(1.6)	(0.3)	5.3	3.0	3.4
Barclays Short Government	0.0	0.0	0.2	2.1	1.5	1.0
Barclays Intermediate Government	0.6	(1.1)	(1.1)	3.9	1.9	2.1
Barclays Long Government	6.4	(7.8)	(10.4)	8.0	3.2	6.6
Barclays Investment Grade Corp.	3.5	(1.3)	3.3	7.8	4.9	5.2
Barclays High Yield Corp. Bond	2.7	3.6	15.4	7.4	7.5	6.7
JPMorgan Global ex US Bond	0.4	(6.0)	2.6	2.7	1.1	0.8
JPMorgan Emerging Market Bond	4.1	(0.7)	7.5	6.7	4.9	5.7

INFLATION SENSITIVE	QTR	YTD	1 Year	3 Year	5 Year	10 Year
Consumer Price Index	2.6	4.3	5.4	2.5	2.4	1.8
BC TIPS	3.2	1.7	6.5	6.5	4.2	3.4
Commodities	13.3	21.1	45.6	3.9	2.4	(4.4)
Gold	3.2	(7.0)	(3.9)	10.6	4.8	0.8
REITs	12.0	21.3	32.8	12.0	8.1	10.3
FTSE EPRA/NAREIT Global REITs	9.7	17.4	35.3	6.3	4.0	6.5
NCREIF ODCE*	3.7	5.7	7.1	4.6	5.6	8.6
NCREIF Farmland**	0.9	0.9	4.1	4.7	5.5	10.2
NCREIF Timberland**	0.8	0.8	1.5	1.7	2.5	4.5

\*Data are preliminary.

\*\*Data are as of March 31, 2021.

Source: Markov Processes International.

## II. Portfolio Review



## **Observations**

- Market Value as of June 30, 2021 was \$3.5M
- June '21 Return: Total Fund 1.0% (net) vs. Policy Index 1.1%; investment gain of \$35 million.
- 2Q '21 Return: Total Fund 5.1% (net) vs. Policy Index 5.1%; investment gain of \$168 million.
- Contributors 2Q '21 Performance:
  - Large Cap Growth
  - Developed International Equity
  - Opportunistic Real Estate
- Detractors 2Q '21 Performance
  - Overweight U.S. Small Cap Equities
  - Deeper Value U.S. Large Cap Equities
- Year-to-date Return: Total Fund 10.1% (net) vs. Policy Index 9.3%; investment gain of \$317 million.
- 1 Year Return: Total Fund 31.3% (net) vs. Policy Index 28.7%; investment gain of \$829 million.
- 5 Year Return: Total Fund 13.1% (net) vs. Policy Index 11.3%; investment gain of \$1.63 billion.
- Estimated Annual Plan Investment Management Expenses: 0.40%

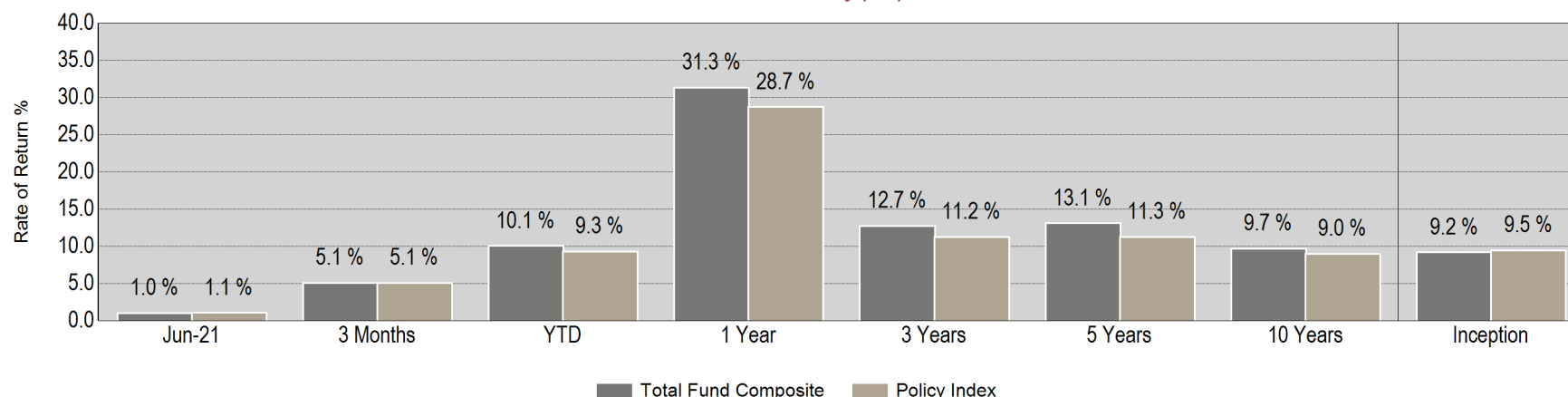
## **Recent Changes/Looking Ahead**

- New Asset Allocation and Passive Investment Manager mandates were approved at May Board Meeting
- Upcoming Investment Manager Searches
  - U.S. Equity: Small Cap Value and Large Cap Value
  - Fixed Income: Active Core Fixed Income and Opportunistic Credit

Summary of Cash Flows

	Last Month	Last Three Months	Year-To-Date	One Year	Three Years	Five Years	Ten Years
<b>Beginning Market Value</b>	<b>\$3,428,375,416</b>	<b>\$3,308,194,183</b>	<b>\$3,175,810,695</b>	<b>\$2,649,623,811</b>	<b>\$2,526,229,643</b>	<b>\$2,007,673,361</b>	<b>\$1,602,046,065</b>
Net Cash Flow	-\$7,863,430	-\$20,886,490	-\$37,855,975	-\$23,497,348	-\$119,109,001	-\$180,381,449	-\$331,628,429
Net Investment Change	\$34,849,232	\$168,053,526	\$317,406,498	\$829,234,755	\$1,048,240,576	\$1,628,069,307	\$2,184,943,582
<b>Ending Market Value</b>	<b>\$3,455,361,218</b>	<b>\$3,455,361,218</b>	<b>\$3,455,361,218</b>	<b>\$3,455,361,218</b>	<b>\$3,455,361,218</b>	<b>\$3,455,361,218</b>	<b>\$3,455,361,218</b>

Return Summary (Net)



Asset Allocation vs. Target

	Current	Policy	Difference*
U.S. Equity	41.8%	40.0%	\$62,389,631
Non-U.S. Equity	15.0%	15.0%	-\$1,436,559
Emerging Markets	9.6%	10.0%	-\$15,015,364
Real Assets	14.8%	20.0%	-\$180,330,535
U.S. Fixed Income	18.4%	15.0%	\$116,832,283
Cash Equivalent	0.5%	0.0%	\$17,560,544
<b>Total</b>	<b>100.0%</b>	<b>100.0%</b>	

\*Difference between Policy and Current Allocation

**RISK RETURN STATISTICS**

July 01, 2016 Through June 30, 2021

	Total Fund Composite	Policy Index
<b>RETURN SUMMARY STATISTICS</b>		
Number of Periods	20	20
Maximum Return	13.50	12.26
Minimum Return	-15.37	-14.88
Annualized Return	13.11	11.29
Total Return	85.13	70.73
Annualized Excess Return Over Risk Free	12.00	10.18
Annualized Excess Return	1.82	0.00

**RISK SUMMARY STATISTICS**

Beta	1.06	1.00
Upside Deviation	7.33	6.82
Downside Deviation	15.25	14.65

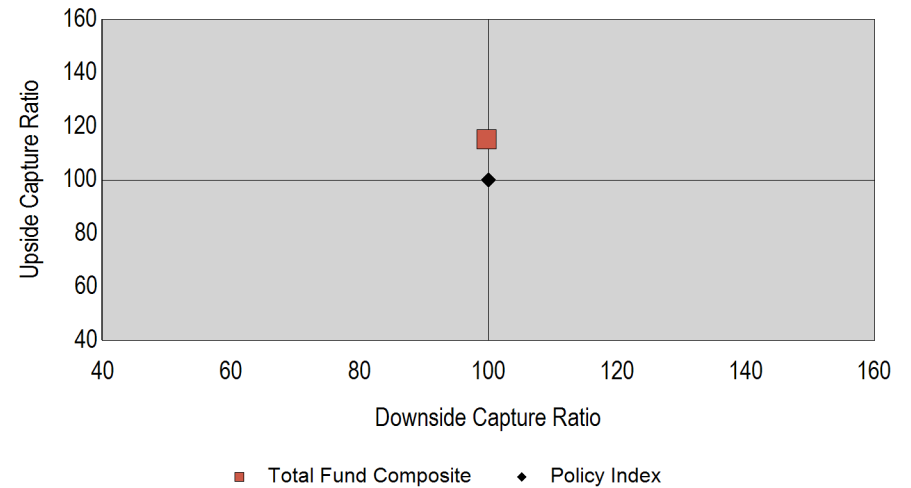
**RISK/RETURN SUMMARY STATISTICS**

Annualized Standard Deviation	13.03	12.23
Alpha	0.26	0.00
Sharpe Ratio	0.92	0.83
Excess Return Over Market / Risk	0.14	0.00
Tracking Error	1.08	0.00
Information Ratio	1.68	--

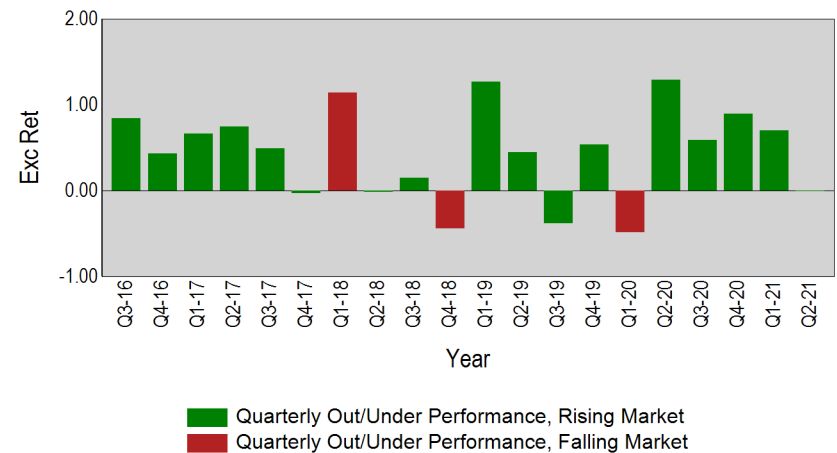
**CORRELATION STATISTICS**

R-Squared	1.00	1.00
Correlation	1.00	1.00

Upside Capture Ratio vs. Downside Capture Ratio  
5 Years Ending June 30, 2021



Quarterly Excess Performance  
Total Fund Composite vs. Policy Index





# Pennsylvania Municipal Retirement System

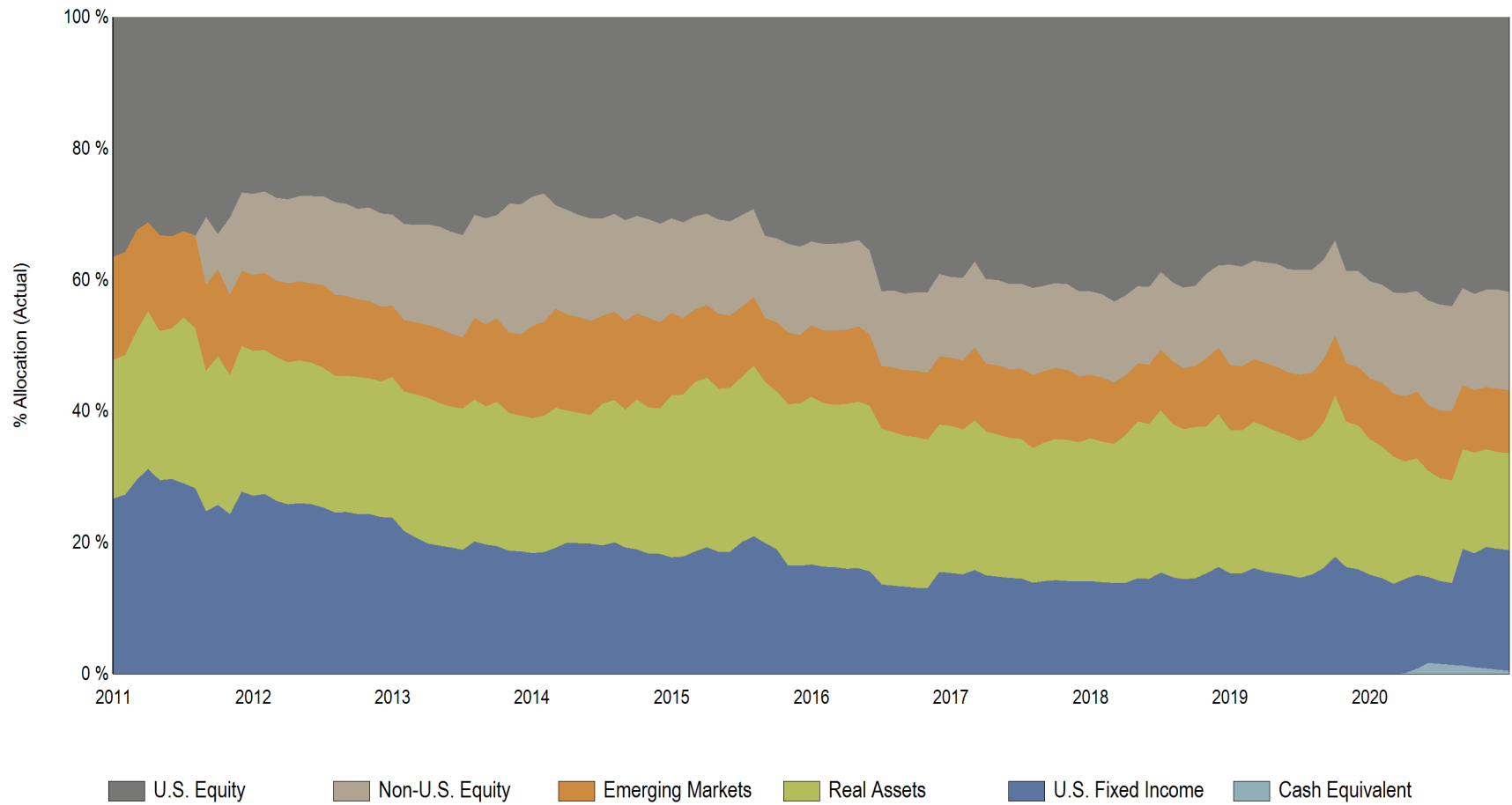
# Asset Allocation Summary

As of June 30, 2021

	Market Value	% of Portfolio	Policy %	Policy Difference	1 Mo Net Cash Flows
<b>Total Fund Composite</b>	<b>3,455,361,218</b>	<b>100.0</b>	<b>100.0</b>	<b>0.0</b>	<b>-8,288,608</b>
<b>Total Equity Composite</b>	<b>2,291,922,500</b>	<b>66.3</b>	<b>65.0</b>	<b>1.3</b>	<b>0</b>
<b>U.S. Equity Composite</b>	<b>1,444,534,118</b>	<b>41.8</b>	<b>40.0</b>	<b>1.8</b>	<b>0</b>
<b>Large Cap U.S. Equity Composite</b>	<b>915,146,207</b>	<b>26.5</b>	<b>25.0</b>	<b>1.5</b>	<b>0</b>
Eagle Asset Mgmt	227,119,805	6.6			0
LSV Large Cap Value	215,981,647	6.3			0
SSGA S&P 500	116,089,964	3.4			0
Polen Focus Growth	277,278,621	8.0			0
William & Blair Large Cap Growth	78,676,170	2.3			0
<b>Small Cap U.S. Equity Composite</b>	<b>529,387,911</b>	<b>15.3</b>	<b>15.0</b>	<b>0.3</b>	<b>0</b>
LSV Small Cap Value	100,437,933	2.9			0
Smith, Graham & Co Small Cap Value	102,681,641	3.0			0
SSGA Russell 2000	118,824,275	3.4			0
Copeland Small Cap Dividend Growth	60,835,665	1.8			0
AMI Small Cap Growth	54,143,314	1.6			0
Emerald Small Cap Growth	92,465,084	2.7			0
<b>Non-U.S Equity Composite</b>	<b>847,388,381</b>	<b>24.5</b>	<b>25.0</b>	<b>-0.5</b>	<b>0</b>
<b>Developed Non-U.S. Equity Composite</b>	<b>516,867,624</b>	<b>15.0</b>	<b>15.0</b>	<b>0.0</b>	<b>0</b>
SSGA MSCI World ex US	168,951,073	4.9			0
Hardman Johnston Int'l Equity	179,465,060	5.2			0
HGK Int'l Equity	168,109,615	4.9			0
<b>Emerging Markets Composite</b>	<b>330,520,758</b>	<b>9.6</b>	<b>10.0</b>	<b>-0.4</b>	<b>0</b>
SSGA MSCI Emerging Markets Index	330,520,758	9.6			0
<b>Real Assets Composite</b>	<b>510,741,709</b>	<b>14.8</b>	<b>20.0</b>	<b>-5.2</b>	<b>-2,125,177</b>
Forest Investment Associates	134,355,751	3.9			-1,700,000
PRISA LP	55,445,216	1.6			-130,256
PRISA II	112,243,471	3.2			-294,922
PennMuni-Nuveen U.S. Real Estate Fund	206,619,143	6.0			0
N. Front Street (Nuveen)	2,078,127	0.1			0
<b>Total Fixed Income Composite</b>	<b>635,136,465</b>	<b>18.4</b>	<b>15.0</b>	<b>3.4</b>	<b>0</b>
SSGA US Aggregate Bond Index	635,136,465	18.4			0
<b>Cash Composite</b>	<b>17,560,544</b>	<b>0.5</b>	<b>0.0</b>	<b>0.5</b>	<b>-6,163,430</b>
Cash Management	10,867,896	0.3			1,700,000
Pool 999	6,692,648	0.2			-7,863,430

\* Residual Value for Jarislowsky, Mercator, Globeflex and WHV (approx. \$342k) are included in Developed, Non-US Equity and Total Fund Composite values

Asset Allocation History  
10 Years Ending June 30, 2021



# Pennsylvania Municipal Retirement System

## Annualized Performance (Net)

As of June 30, 2021

	1 Mo	3 Mo	YTD	1 Yr	3 Yrs	5 Yrs	10 Yrs	Inception	Inception Date
<b>Total Fund Composite</b>	<b>1.0</b>	<b>5.1</b>	<b>10.1</b>	<b>31.3</b>	<b>12.7</b>	<b>13.1</b>	<b>9.7</b>	<b>9.2</b>	<b>Jan-86</b>
<i>Policy Index</i>	1.1	5.1	9.3	28.7	11.2	11.3	9.0	9.5	Jan-86
<b>Total Equity Composite</b>	<b>1.0</b>	<b>7.0</b>	<b>14.9</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>37.1</b>	<b>Oct-20</b>
<i>MSCI ACWI IMI Net USD</i>	1.2	7.2	12.7	--	--	--	--	30.4	Oct-20
<b>U.S. Equity Composite</b>	<b>1.6</b>	<b>7.6</b>	<b>19.1</b>	<b>52.9</b>	<b>18.9</b>	<b>19.5</b>	<b>14.1</b>	<b>10.2</b>	<b>Jan-06</b>
<i>Russell 3000</i>	2.5	8.2	15.1	44.2	18.7	17.9	14.7	10.6	Jan-06
<b>Large Cap U.S. Equity Composite</b>	<b>2.1</b>	<b>9.4</b>	<b>18.1</b>	<b>45.7</b>	<b>21.1</b>	<b>20.5</b>	<b>15.9</b>	<b>11.6</b>	<b>Jan-86</b>
<i>S&amp;P 500</i>	2.3	8.5	15.3	40.8	18.7	17.6	14.8	11.3	Jan-86
Eagle Asset Mgmt	-0.1	9.0	21.1	53.3	19.4	19.4	--	20.1	Feb-16
<i>Russell 1000 Value</i>	-1.1	5.2	17.0	43.7	12.4	11.9	--	13.3	Feb-16
LSV Large Cap Value	-1.3	4.6	21.4	50.1	11.4	13.1	12.0	9.0	Apr-04
<i>Russell 1000 Value</i>	-1.1	5.2	17.0	43.7	12.4	11.9	11.6	8.5	Apr-04
SSGA S&P 500	2.3	8.5	15.2	40.7	18.6	17.6	14.8	9.2	Feb-97
<i>S&amp;P 500</i>	2.3	8.5	15.3	40.8	18.7	17.6	14.8	9.2	Feb-97
Polen Focus Growth	6.0	13.1	15.0	39.3	27.3	25.2	18.8	19.3	Oct-10
<i>Russell 1000 Growth</i>	6.3	11.9	13.0	42.5	25.1	23.7	17.9	18.5	Oct-10
William & Blair Large Cap Growth	4.9	12.0	14.5	42.5	--	--	--	42.8	Jun-20
<i>Russell 1000 Growth</i>	6.3	11.9	13.0	42.5	--	--	--	44.2	Jun-20
<b>Small Cap U.S. Equity Composite</b>	<b>0.8</b>	<b>4.5</b>	<b>20.4</b>	<b>64.7</b>	<b>13.9</b>	<b>17.1</b>	<b>12.2</b>	<b>11.3</b>	<b>Jan-93</b>
<i>Russell 2000</i>	1.9	4.3	17.5	62.0	13.5	16.5	12.3	10.1	Jan-93
LSV Small Cap Value	-1.6	5.1	29.6	77.5	8.9	--	--	9.1	Dec-16
<i>Russell 2000 Value</i>	-0.6	4.6	26.7	73.3	10.3	--	--	10.6	Dec-16
Smith, Graham & Co Small Cap Value	0.4	3.3	25.2	79.5	14.5	--	--	12.0	Dec-16
<i>Russell 2000 Value</i>	-0.6	4.6	26.7	73.3	10.3	--	--	10.6	Dec-16
SSGA Russell 2000	1.9	4.3	17.6	62.1	13.5	16.5	12.4	9.3	Mar-97
<i>Russell 2000</i>	1.9	4.3	17.5	62.0	13.5	16.5	12.3	9.4	Mar-97
Copeland Small Cap Dividend Growth	0.1	4.1	19.1	49.5	13.5	--	--	14.1	Sep-17
<i>Russell 2000</i>	1.9	4.3	17.5	62.0	13.5	--	--	13.9	Sep-17
AMI Small Cap Growth	2.4	8.1	11.5	44.6	9.7	--	--	12.1	Sep-17
<i>Russell 2000 Growth</i>	4.7	3.9	9.0	51.4	15.9	--	--	18.0	Sep-17
Emerald Small Cap Growth	1.8	4.1	6.3	47.6	17.1	20.3	15.3	12.0	Oct-98
<i>Russell 2000 Growth</i>	4.7	3.9	9.0	51.4	15.9	18.8	13.5	9.4	Oct-98

\*Policy Index: 25% S&P 500, 15% Russell 2000, 15% MSCI EAFE, 10% MSCI Em Mrks, 20% NFI ODCE, 15% BBG Barc Agg

# Pennsylvania Municipal Retirement System

## Annualized Performance (Net)

As of June 30, 2021

	1 Mo	3 Mo	YTD	1 Yr	3 Yrs	5 Yrs	10 Yrs	Inception	Inception Date
<b>Non-U.S Equity Composite</b>	<b>0.0</b>	<b>5.9</b>	<b>8.2</b>	<b>39.3</b>	<b>11.8</b>	<b>13.9</b>	<b>--</b>	<b>9.8</b>	<b>May-12</b>
MSCI ACWI ex USA	-0.6	5.5	9.2	35.7	9.4	11.1	--	8.5	May-12
<b>Developed Non-U.S. Equity Composite</b>	<b>0.0</b>	<b>6.5</b>	<b>8.5</b>	<b>38.5</b>	<b>12.3</b>	<b>14.4</b>	<b>8.1</b>	<b>8.4</b>	<b>Jan-93</b>
MSCI EAFE	-1.1	5.2	8.8	32.3	8.3	10.3	5.9	6.4	Jan-93
SSGA MSCI World ex US	-1.1	5.8	10.2	34.0	9.0	10.7	--	7.4	Apr-12
MSCI World ex USA	-1.0	5.6	9.9	33.6	8.6	10.4	--	7.1	Apr-12
Hardman Johnston Int'l Equity	2.1	7.7	3.8	43.2	17.2	18.7	--	12.0	Apr-12
MSCI EAFE	-1.1	5.2	8.8	32.3	8.3	10.3	--	7.2	Apr-12
HGK Int'l Equity	-1.2	6.1	11.1	37.7	10.8	14.1	--	10.6	Feb-12
MSCI EAFE	-1.1	5.2	8.8	32.3	8.3	10.3	--	7.7	Feb-12
<b>Emerging Markets Composite</b>									
SSGA MSCI Emerging Markets Index	0.1	5.0	7.4	40.2	11.2	12.9	4.2	9.5	Nov-08
MSCI Emerging Markets	0.2	5.0	7.4	40.9	11.3	13.0	4.3	9.7	Nov-08
<b>Real Assets Composite</b>	<b>1.4</b>	<b>1.4</b>	<b>3.8</b>	<b>6.2</b>	<b>4.2</b>	<b>5.1</b>	<b>7.0</b>	<b>7.5</b>	<b>Apr-93</b>
NFI	1.2	3.7	5.7	7.1	4.6	5.6	8.6	--	Apr-93
Forest Investment Associates	0.0	-0.2	5.0	5.3	0.9	2.5	4.1	3.8	Mar-99
NCREIF Timberland Property Index	0.0	0.0	0.8	1.4	1.6	2.3	4.5	5.8	Mar-99
PRISA LP	3.7	3.7	5.6	7.2	5.5	6.1	9.0	6.3	Jan-86
NFI	1.2	3.7	5.7	7.1	4.6	5.6	8.6	--	Jan-86
PRISA II	4.8	4.8	6.7	8.4	5.4	6.5	10.2	3.9	Jul-07
NFI	1.2	3.7	5.7	7.1	4.6	5.6	8.6	4.6	Jul-07
PennMuni-Nuveen U.S. Real Estate Fund	0.0	0.0	1.0	5.8	6.3	6.9	8.7	6.0	Dec-08
NFI	1.2	3.7	5.7	7.1	4.6	5.6	8.6	5.6	Dec-08
N. Front Street (Nuveen)	0.0	0.0	0.8	-8.4	-3.7	--	--	-5.9	Sep-16
Consumer Price Index	0.9	2.6	4.3	5.4	2.5	--	--	2.5	Sep-16

\*Forest, PennMuni Nuveen RE & N. Front St. as of 3-31-21

Pennsylvania Municipal Retirement System

Annualized Performance (Net)

As of June 30, 2021

	1 Mo	3 Mo	YTD	1 Yr	3 Yrs	5 Yrs	10 Yrs	Inception	Inception Date
<b>Total Fixed Income Composite</b>									
SSGA US Aggregate Bond Index	0.7	1.8	-1.6	-0.3	5.4	3.0	3.4	5.1	Apr-97
<i>BBgBarc US Aggregate TR</i>	0.7	1.8	-1.6	-0.3	5.3	3.0	3.4	5.1	Apr-97
<b>Cash Composite</b>									
Cash Management									
Pool 999									

# Pennsylvania Municipal Retirement System

## Investment Grade & Opportunistic Fixed Income



Presented by

Lee H. Martin, Ph. D.  
Managing Director

William Torre Jr., CFA, CAIA  
Assistant Vice President

# Table of Contents

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- Plan Background
- Investment Grade Fixed Income
- Opportunistic Fixed Income
- Market Conditions



# Plan Background



# PMRS Fixed Income Allocation

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With the recent PMRB approval of a new target asset allocation, we believe it prudent to review the underlying fund line-up structure within fixed income.

- **Legacy Target Allocation:** All fixed income was passively managed with SSGA US Aggregate Bond Index
- **Approved Target Allocation:** With the large increase in Core Bond allocation (+9%) and adding a dedicated Opportunistic Credit allocation (+5%), we provided a deeper analysis on the fixed income asset class as well as the attributes of active and passive management.

Fixed Income Allocation	Legacy Target	Approved Target
Core Bonds	15.0%	24.0%
Opportunistic Credit	0.0%	5.0%
Cash	0.0%	1.0%

# Active & passive management

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	Active Management	Passive Management
<b>Objective</b>	Outperform benchmark on absolute or risk-adjusted basis	Match return of benchmark
<b>Return</b>	Based on Individual Securities	Equal to broad market
<b>Risk</b>	Greater or less than broad market	Equal to broad market
<b>Approach</b>	Bond-picking through a top-down and/or bottom-up approach	Rules-Based through replication or stratified sampling
<b>Decision Makers</b>	Portfolio Managers and Analysts	Index Provider
<b>Portfolio Construction</b>	Conviction-Weighted	Market-Cap Weighted
<b>Investment Grade Avg Cost</b>	10-20 bps (depending on plan size)	1-10 bps (depending on plan size)

# Q: Why not stay 100% passive in Fixed Income?

**A:**

- Fixed Income is an inefficient asset class given size of the broad market (\$46 trillion in US market alone)\*.
- Wide number of active managers and alpha opportunities exist in Fixed Income through prudent Manager Selection.
- Larger institutional investors can negotiate favorable fee concessions for active management.

As of March 31, 2021	1 Yr.	3 Yr.	5 Yr.	10 Yr.
SSGA US Agg	0.8%	4.7%	3.1%	3.4%
eVestment US Core Fixed Inc. Net Rank	90	78	77	75

\*Source: \$46 trillion based on data from the Securities Industry and Financial Markets Association (SIFMA)

# Fixed Income Structure

# Fixed Income Framework

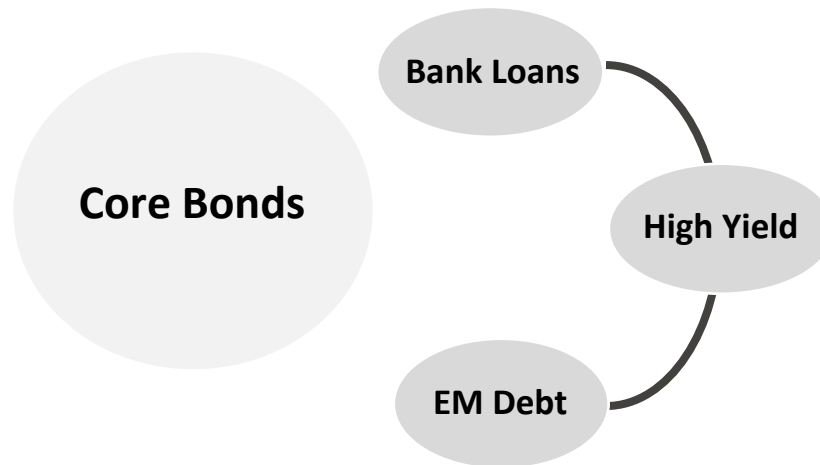
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## Objectives of the Asset Class:

- Stability & principal protection
- Consistent Income Generation
- Diversification of Portfolio

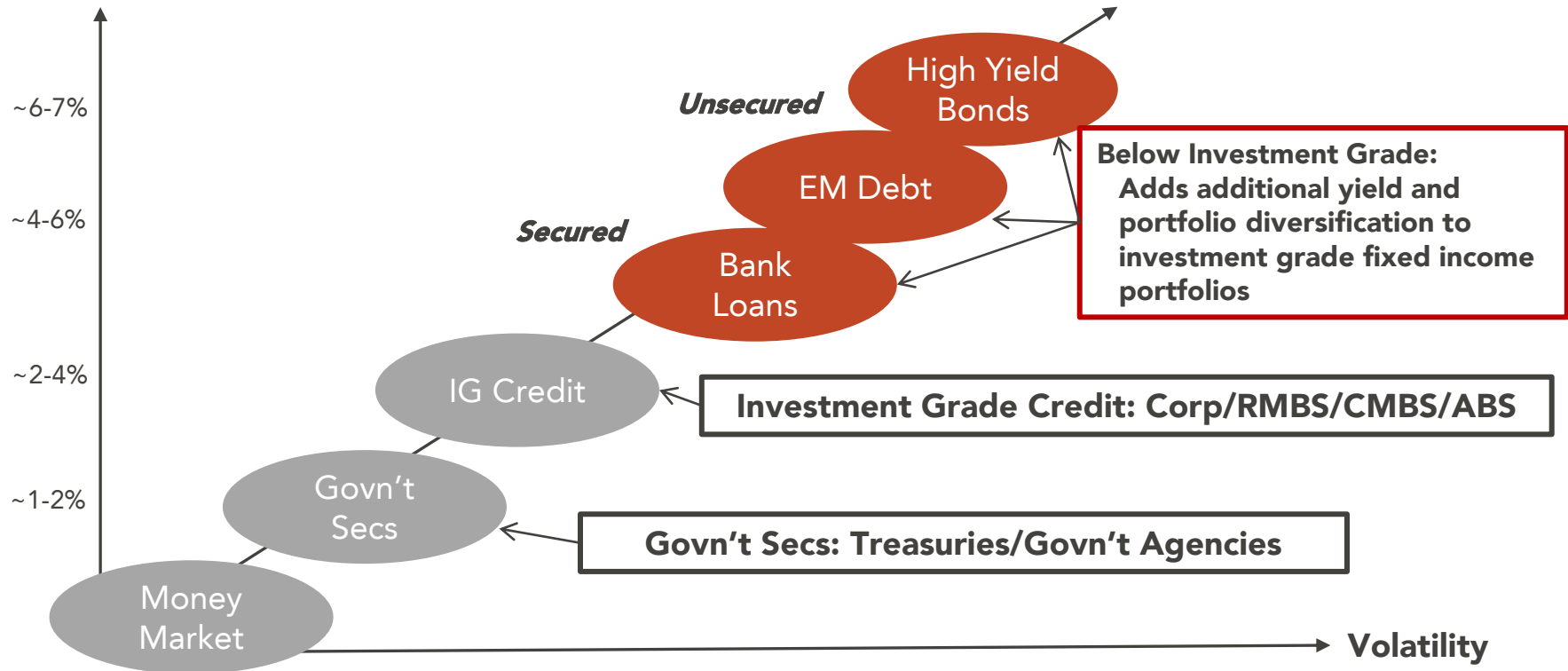
## Fixed Income Portfolio Structure

- Core fixed income provides principal protection
- Satellites provide additional income and diversification benefits
- Structure improves transparency and isolates risk
- Market environment drives portfolio tilts



# Fixed income return/risk spectrum

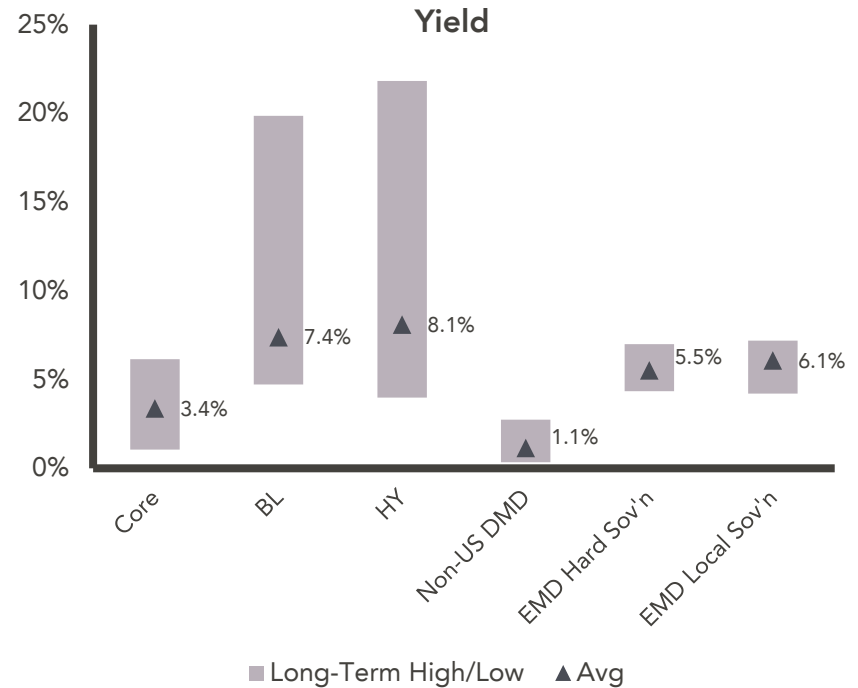
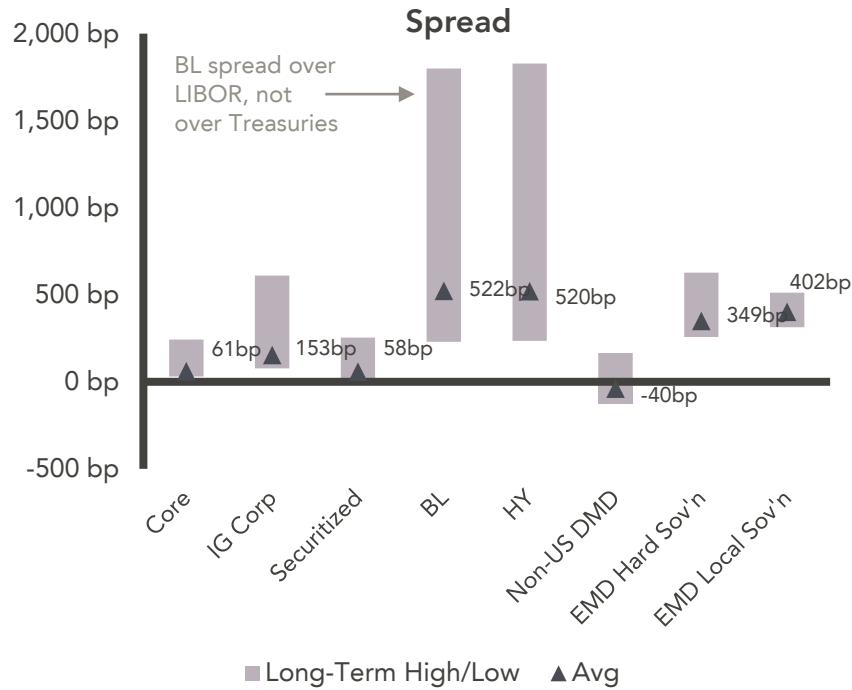
Expected Returns



Source: March 31, 2021 Marquette Associates Asset Allocation Assumptions

# Historical Spread Levels and Averages

- Spread:** Wide dispersion amongst historical high and low spreads for both Bank Loans and High Yield which provides opportunities for portfolio return enhancement as spreads drift toward higher end of the range.
- Yield:** Enhancement has been shown historically for below investment grade (Bank Loans, High Yield and Emerging Markets Debt)



Source: CS Leveraged Loan Index, BC HY Index, JPM EMBI GD Index, as of May 31, 2021

# Opportunistic Fixed Income



# Opportunistic Credit: Background

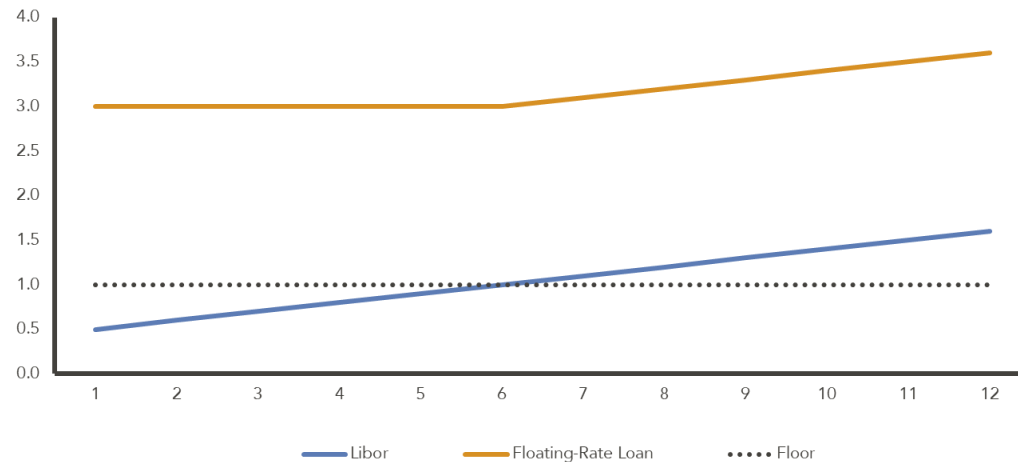
- Bank loans are loans at the top of a company's capital structure
- High yield bonds beneath bank loans and above equities in a company's capital structure

Capital Structure	Credit Rating	Historical Yield	Historical Default Rate	Historical Recovery Rate in Bankruptcy
Senior Secured Loans	BB to CCC	5-8%	2-4%	65%
High Yield Bonds	BB to CCC	6-9%	3-5%	45%
Preferred Securities	N/A	8-10% (stated dividend)	N/A	0%
Common Equity	N/A	N/A	N/A	0%

Source: Moody's, Credit Suisse

# Definition of bank loans

- The bank loan (also known as “leveraged loan” and “senior secured loan”) asset class is situated between core bonds and high yield bonds in the risk/return spectrum
- Bank loans have the unique characteristic of providing investors a floating interest rate, which benefits investors during rising interest rate environments
- Bank loans typically outperform core bonds in rising rate environments, and typically outperform high yield bonds in down markets
- LIBOR floors protect investors as rates fall



# Definition of high yield

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- High yield bonds are below investment grade bonds that offer a higher yield than investment grade bonds because of their higher risk of default.
- High yield bonds fall between investment grade bonds (core bonds) and public equities in their risk/return spectrum.
- High yield bonds tend to outperform core bonds and underperform equities in periods of economic advancement and underperform core bonds and outperform public equities during market corrections.
- Diversifying high yield portfolios by issuer, industries and regions can alleviate downside risks and enhance risk adjusted returns.

# Definition of Emerging Markets Debt

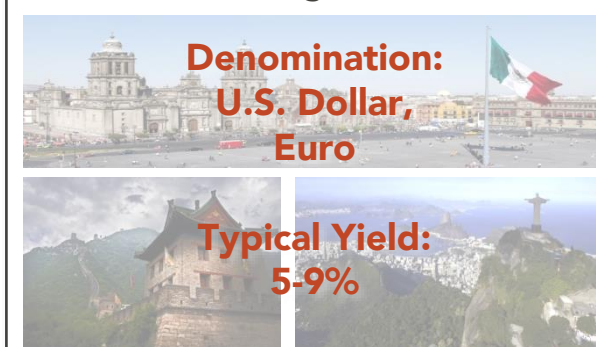
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- Emerging Markets Debt are bonds issued by countries or companies in the world's developing countries.
- Emerging Markets Debt historically have provided higher relative yields to their developed country counterparts, given higher risk.
  - Smaller Nations with higher concentrated economies
  - Less liquid/transparent markets
  - Political and regulatory challenges
- Emerging Markets Debt may provide inflation protection
  - Many countries have commodity focused economies
  - Higher economic growth in emerging economies vs. developed markets
- Large number of countries and regions within emerging markets universe, provides diversification benefits.

# Emerging markets debt building blocks

Emerging markets debt comprises three main building blocks

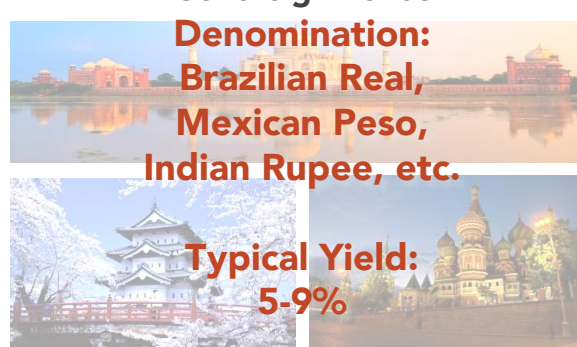
## Hard Currency Sovereign Bonds



**Denomination:**  
U.S. Dollar,  
Euro

**Typical Yield:**  
5-9%

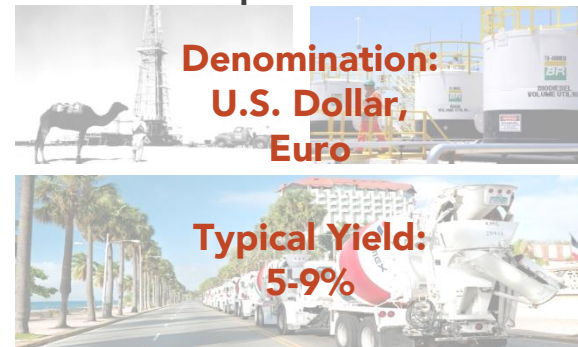
## Local Currency Sovereign Bonds



**Denomination:**  
Brazilian Real,  
Mexican Peso,  
Indian Rupee, etc.

**Typical Yield:**  
5-9%

## Hard Currency Corporate Bonds



**Denomination:**  
U.S. Dollar,  
Euro

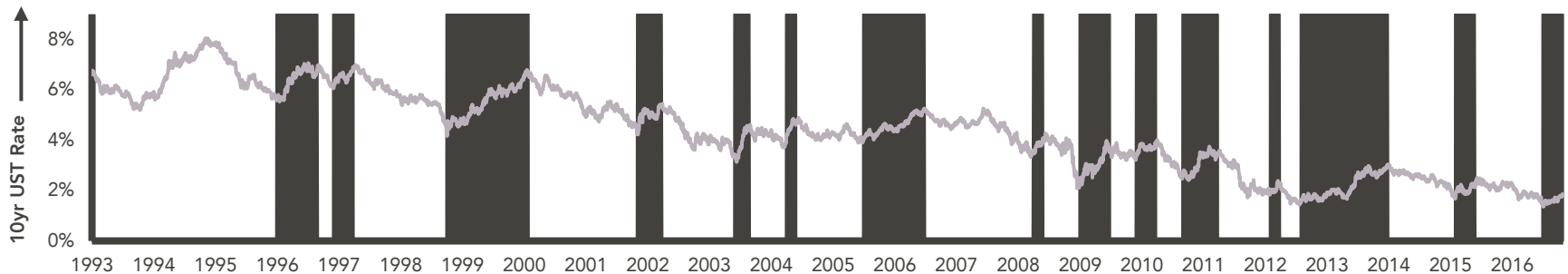
**Typical Yield:**  
5-9%

# Market Conditions

# Historical evidence

Bank loans, high yield and emerging markets debt have outperformed in rising rate environments

	Start Date	End Date	Total Return %					10yr UST Rate %			
			Bank Loans	HY	EM	MBS	IG	10yr UST	Start Rate	End Rate	Change
<b>Pre-Crisis</b>	Dec-95	Aug-96	5.6	4.8	22.2	0.7	-2.3	-5.5	5.6	6.9	1.4
	Nov-96	Mar-97	2.5	1.7	2.0	-0.4	-2.4	-4.2	6.1	6.9	0.9
	Sep-98	Jan-00	8.5	4.9	35.8	1.8	-1.7	-10.1	4.4	6.7	2.3
	Oct-01	Mar-02	3.1	4.5	6.3	-0.3	-1.8	-6.8	4.3	5.4	1.1
	May-03	Aug-03	1.8	2.7	-1.1	-1.0	-3.8	-7.2	3.4	4.5	1.1
	Mar-04	May-04	0.6	-2.2	-7.4	-2.0	-3.8	-5.5	3.8	4.7	0.8
<b>Post-Crisis</b>	Jun-05	Jun-06	6.8	4.7	5.2	0.4	-2.1	-5.8	4.0	5.1	1.2
	Mar-08	May-08	2.9	4.6	1.4	-0.6	-0.4	-4.4	3.4	4.1	0.6
	Dec-08	Jun-09	7.1	29.4	12.7	2.8	6.9	-8.7	2.3	3.5	1.3
	Nov-09	Mar-10	4.9	8.1	3.8	0.1	1.3	-3.9	3.2	3.8	0.6
	Aug-10	Mar-11	6.3	10.3	0.2	0.4	-0.3	-6.0	2.5	3.5	1.0
	Jan-12	Mar-12	1.5	2.2	2.5	0.2	0.0	-3.0	1.8	2.2	0.4
	Jul-12	Dec-13	9.6	13.8	-3.1	-1.4	-0.2	-8.7	1.5	3.0	1.5
	Jan-15	May-15	2.9	3.4	2.8	0.2	-1.8	-2.5	1.7	2.1	0.4
	Jun-16	Oct-16	3.8	6.2	2.2	0.3	0.4	-0.8	1.5	1.8	0.4



Source: Federal Reserve, Credit Suisse, Barclays, JP Morgan, PIMCO

# No near-term maturity wall

Bank loan and high yield issuers face low amounts of maturities in the next few years



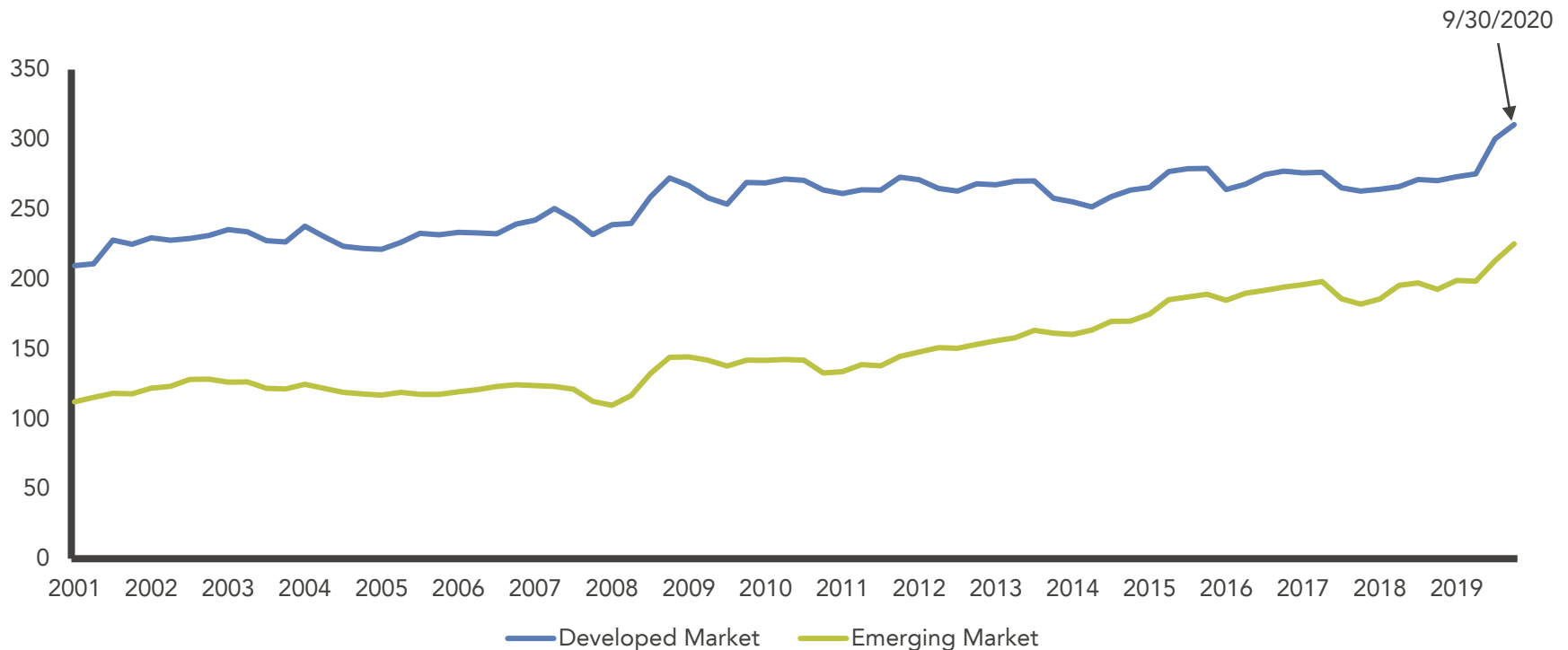
Source: BofA Merrill Lynch as of March 31, 2021



# EM fundamentals remain relatively strong

## EM leverage is still far lower than DM

▣ Leverage (Debt as % of GDP)

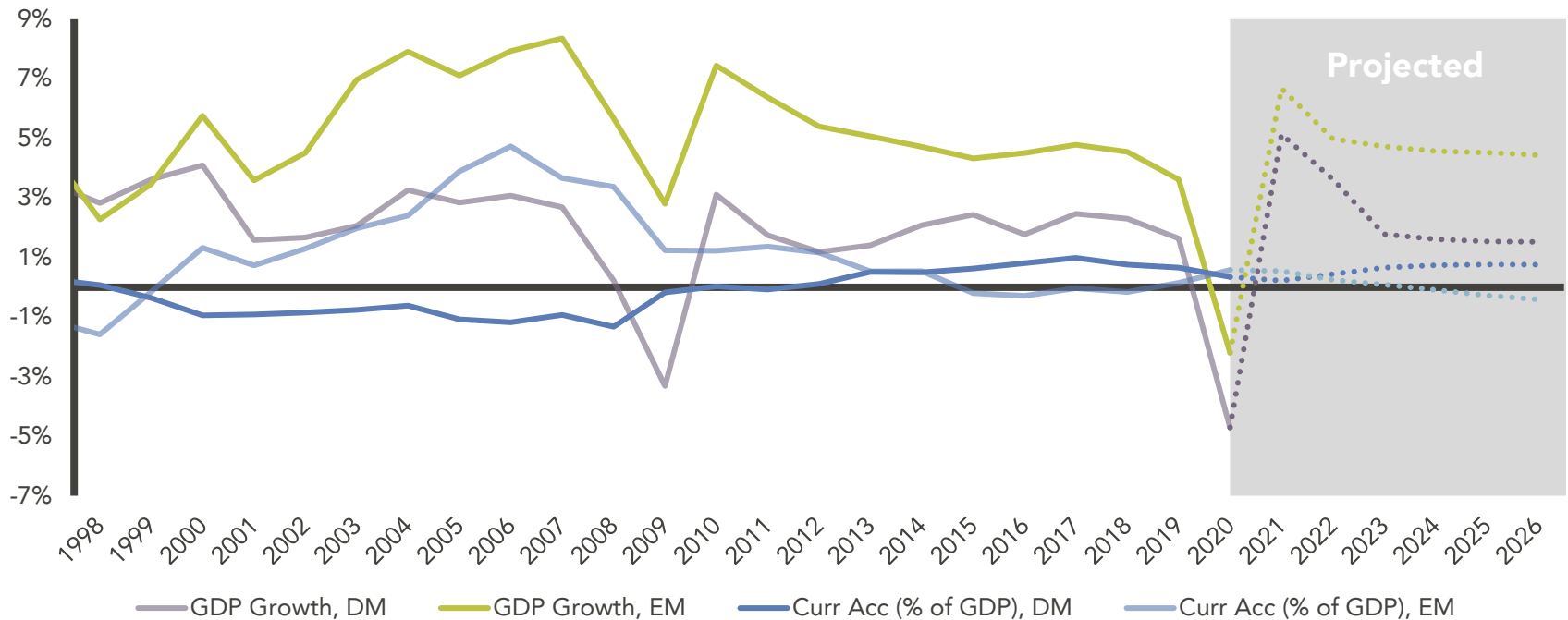


Source: Bank of International Settlements credit to non-financial sector, based on conversion of U.S. dollars at market exchange rates, latest as of March 31, 2021

# EM growth rate projected to climb

Emerging countries are still growing faster than developed countries

## Projected Growth of DM & EM Economies



Source: IMF as of April 2021 (updated twice a year, April and October)

# Disclosures

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The sources of information used in this report are believed to be reliable. Marquette Associates, Inc. has not independently verified all of the information and its accuracy cannot be guaranteed. Opinions, estimates, projections and comments on financial market trends constitute our judgment and are subject to change without notice. References to specific securities are for illustrative purposes only and do not constitute recommendations. Past performance does not guarantee future results.

## About Marquette Associates

Marquette Associates is an independent investment consulting firm that guides institutional investment programs with a focused client service approach and careful research. For over 30 years Marquette has served this mission in close collaboration with clients – enabling institutions to be more effective investment stewards. Marquette is a completely independent and 100% employee-owned consultancy founded with the sole purpose of advising institutions. For more information, please visit [www.marquetteassociates.com](http://www.marquetteassociates.com).

<u>Portfolio</u>	<u>Invoice End Date</u>	<u>Invoice Amount</u>	<u>Invoice Avg Base Rate (bps)</u>	<u>Revised Amount</u>	<u>Difference</u>
PMRSLV	12/31/2016	142,066	38.09	111,892	30,174
PMRSLV	3/31/2017	147,602	37.69	117,487	30,115
PMRSLV	6/30/2017	151,746	37.57	121,171	30,575
PMRSLV	9/30/2017	158,206	37.34	127,107	31,099
PMRSLV	12/31/2017	167,043	36.9	135,808	31,235
PMRSLV	3/31/2018	170,071	36.69	139,060	31,011
PMRSLV	6/30/2018	167,466	36.77	136,633	30,833
PMRSLV	9/30/2018	176,097	36.46	144,896	31,201
PMRSLV	12/31/2018	163,582	37.21	131,885	31,697
PMRSLV	3/31/2019	164,599	36.92	133,748	30,851
PMRSLV	6/30/2019	151,289	37.52	120,967	30,322
PMRSLV	9/30/2019	149,498	37.67	119,059	30,439
PMRSLV	12/31/2019	158,911	37.12	128,431	30,480
PMRSLV	3/31/2020	139,173	38.44	108,616	30,557
PMRSLV	6/30/2020	136,738	38.9	136,738	-
PMRSLV	9/30/2020	144,825	38.36	113,262	31,563
PMRSLV	12/31/2020	155,404	37.45	124,489	30,915
PMRSLV	3/31/2021	172,450	36.21	142,875	29,575
				<b>Total</b>	<b>\$522,642</b>

Note: No revised amount in (6/30/21) invoice as combined assets below \$200 million.

LSV propose to refund the overcharged amount and offer PMRS a quarter of investment management for no charge.