

STATE OF MICHIGAN INVESTMENT BOARD MEETING

March 25, 2021

State of Michigan Retirement System
Quarterly Investment Review



Rachael Eubanks, State Treasurer
Prepared by Bureau of Investments
Michigan Department of Treasury

STATE OF MICHIGAN INVESTMENT BOARD MEETING

MARCH 25, 2021

Agenda



- 9:30 a.m. Call to Order and Opening Remarks
- Approval of the 12/10/20 SMIB Meeting Minutes
- 9:35 a.m. Executive Summary & Performance for Periods Ending 12/31/20
- 9:50 a.m. Current Asset Allocation Review
- Markets Review and Outlook
- 10:00 a.m. Review of Investment Reports
- Domestic Equity
 - International Equity
 - Fixed Income
 - Absolute Return – Receive and File
 - Private Equity – Receive and File
 - Real Estate & Infrastructure – Receive and File
 - Real Return & Opportunistic – Receive and File
 - Defined Contribution – Receive and File
- Basket Clause – Receive and File
- 10:55 a.m. Public Comment
- 11:00 a.m. Closing Remarks ~ Adjournment



2021 Meeting Schedule

Thursday, June 10, 2021
Thursday, September 16, 2021
Thursday, December 9, 2021

All meetings start at 9:30 a.m.

www.michigan.gov/treasury

State of Michigan Retirement System

MINUTES

State of Michigan Investment Board Meeting

March 25, 2021



Jon M. Braeutigam
Chief Investment Officer
Bureau of Investments

STATE OF MICHIGAN INVESTMENT BOARD

December 10, 2020 Meeting Minutes

Board Members Present

Chairman – Treasurer Rachael Eubanks – via Microsoft Teams - East Lansing, MI
Ms. Dina Richard – via Microsoft Teams – Naples, FL
Mr. Reginald Sanders – via Microsoft Teams – Portage, MI
Mr. James Nicholson – via Microsoft Teams – Detroit, MI
Mr. Chris Kolb – via Microsoft Teams – Ann Arbor, MI

Members of the Public and Bureau of Investments Staff Present – via Microsoft Teams

Jon Braeutigam
Robert Brackenbury
Karl Borgquist
Greg Parker
Jim Elkins
Tim McEnery
Peter Woodford
Max Kotary
Molly Jason

Annette Russell
Janet Sudac
Lori Barrett
Patrick Moraniec
Daniel Quigley
Jennifer Yeung
Woodrow Tyler
Todd Warstler

Jack Behar
Pavel Stolarczyk
Semone James
Anthony Estell
Allison Wardlaw
Bradley Hartwell
Nicholas Whitman
Lan Chen

Many others were present via AT&T phone line.

Opening Remarks:

Rachael Eubanks called the meeting to order at 9:32 am.

Approval of Minutes:

Approval of the September 10, 2020 SMIB Meeting Minutes – Motion to approve by Chris Kolb.
Seconded: Dina Richard. The vote was unanimous to approve.

AGENDA

Executive Summary

Robert Brackenbury, Deputy Chief Investment Officer for the Bureau of Investments, reviewed the executive summary performance section discussing performance returns and markets. He explained that meetings are still being held virtually due to the pandemic and the status of future meetings is still unknown. He explained that over a very long time horizon, since 1979, the annualized rate of return on the plan assets has been approximately 9.3%.

Asset Allocation Review, Markets Review and Outlook

Mr. Gregory Parker, Director of Investments – Public Markets discussed a few observations within asset allocation including returns at the plan level being much less exposed to the month-to-month fluctuations of the stock market than they have been historically.

Mr. Parker explained that in 2020, the global COVID-19 pandemic was the dominant driver of the economy and of capital markets and reminded us that the markets are not the economy. There are still economic problems of high unemployment, the economic safety nets put in place are running out, and the future is anything but certain. The economy may not fully recover for many years.

Defined Contribution Presentation

Mr. Woodrow Tyler, Senior Investment Manager for the Defined Contribution, Trusts & Agencies Division presented a well-explained overview of the defined contribution plan. He discussed the importance of defined contribution (DC) plans and that new State of Michigan retirees rely on DC assets more than ever before.

He explained that research had made it clear that many participants don't know how to invest, are concerned about saving, and don't know how to draw on their savings in retirement. In the 2000's, behavioral economists began to look for ways to encourage greater DC plan participation and savings rates. Over time, groundbreaking research found that defaulting workers into better decisions about participation, contribution and investing would significantly improve expected outcomes. The 2006 Pension Protection Act encouraged automatic enrollment, automatic escalation of contributions and default investment options. Mr. Tyler explained the SOM adopted these features and they have proven to be beneficial.

Guest Speakers – Michigan's DC Plans

Mr. Anthony Estell and Ms. Allison Wardlaw of Office of Retirement Services

Mr. Anthony Estell explained the vision of the Michigan Office of Retirement Services, who they are, who they serve and their guiding principles, as well as the economic value of the plans and their impact. He explained the three types of retirement plans: Defined Benefit (DB) Plans, Defined Contribution (DC) Plans and Hybrid Plans. These plans impact 1 in 9 Michigan families.

Defined Benefit Plans are closed to new members except the Michigan National Guard. The average annual pension amount is modest at \$23,000. Every dollar paid to a Michigan retiree comes from three sources: investment earnings of 67 cents, employer contributions of 26 cents and member contributions of 7 cents.

In a Defined Contribution Plan, the employee makes voluntary contributions and the employer also makes contributions to the account. The net retirement benefit is the amount in the account at the time of retirement and risk is carried exclusively by the employee. Michigan's DC Plans have an ongoing partnership with Voya Financial to administer the State of Michigan 401(k) and 457 Plans.

The Hybrid plans offer a guaranteed DB benefit paired with a DC benefit. These plans were introduced in 2010 for public school employees and in 2012 for state police troopers in conjunction with closing the DB plans to help lower risk associated with the retirement plans. Risk is shared between the employer and employee.

Mr. Estell further explained the ORS responsibilities of the plan. He broke down the individual systems within the Plan: Michigan Public School Employees' Retirement System, Michigan State Employees' Retirement System, the State Police Retirement System, Judges Retirement System, Military Retirement Provisions and Michigan Legislators. Recent reforms within these platforms were touched on as well as benefit structure complexity.

Ms. Lan Chen, Treasury Investment Officer in the Defined Contribution, Trusts & Agencies Division broke down Michigan's DC Plan Investments, explaining that they maintain continuous dialogue with the ORS. She explained the plan overview of Tier I and Tier II Funds as well as the Tier III, Self-Directed Brokerage account options.

Guest Speakers – Defined Contribution

Ms. Mary Guy, Mr. Brenden Curran, and Mr. David Ireland of State Street Global Advisors. An extensive overview was given by David Ireland, Senior Managing Director and Global Head of Defined Contribution, whose global team is committed to every major aspect of DC Investing. Mr. Ireland stated that the State of Michigan is one of the largest and longest-standing clients of State Street, beginning in 1997. State Street has been around for 40 years and they take on a partnership type relationship with their clients. SOM began offering the index funds and the target retirement date funds back in 2008, being one of the early investors in this type of plan. He expressed gratitude for this relationship and explained who they are as a strategic partner.

Target date funds comprise 54.2% of total DC contributions today and they are expected to capture 85% of new flows into DC plans by 2022. These funds are diversified, they adjust investment allocation automatically, and they are professionally managed.

Mr. Brenden Curran discussed the key attributes of the State Street Target Date retirement funds and how stocks, bonds, and other asset classes are weighted as the employee gets closer to retirement. He explained the key benefits of diversification and professional management in this line of funds as well as efficient risk management.

Mr. Curran discussed the Peer Universe performance of the funds and how proud they are of outperforming 92% of products over the 15-year time period. This is just outside of top quartile and represents very strong risk-adjusted returns. He is very proud of the results they've delivered to our participants. Several questions were presented by the Board and were answered.

Review of Investment Reports and Basket Clause – Received and Filed

Closing Remarks

Chairman Eubanks discussed the open meetings act extension with Molly Jason. Chairman Eubanks thanked everyone for working so hard throughout this difficult year and wished everyone a happy and healthy holiday season.

Public Comment:

Mary Pollack of SERS expressed thankfulness for staff's hard work, for putting this topic on the agenda and for the thorough review.

Adjournment:

The meeting concluded at 11:16 am.

Approved:

Rachael Eubanks, Chairman

State of Michigan Retirement System

EXECUTIVE SUMMARY

State of Michigan Investment Board Meeting

March 25, 2021



Gregory J. Parker, CFA

Director of Investments – Public Markets

Director of Asset Allocation

Bureau of Investments

EXECUTIVE SUMMARY

December 31, 2020

Performance

Great peer comparison.

MPSERS Plan (12/31/20)	1-Year	3-Years	5-Years	7-Years	10-Years
Annualized Returns	11.2%	9.7%	10.5%	9.5%	9.8%
Policy Returns	11.6%	9.6%	11.0%	9.4%	9.9%
Peer Median Returns*	11.9%	8.3%	9.6%	8.0%	8.6%

*State Street Universe greater than \$10 billion.

- Over the past three, five, seven, and ten years, the returns are significantly higher than peer median returns. The peers are defined as the State Street Universe of public pension plans greater than \$10 billion. Notably, the standard deviation of the monthly returns was in the lowest quartile for the longer time horizons.
- Over a very long horizon, since 1979, the annualized rate of return on the plan assets has been approximately 9.5%.
- Compounding at higher than peer returns can add significant value. For example, based on the \$49.7 billion December 2010 market value, a ten-year annualized return of 9.8% compared to the 8.6% peer median return would add about \$13.2 billion in excess value.
- Most asset classes earned returns comparable to peer median returns or higher over the past ten years.

Asset Allocation

A low return environment.

- Given the low rates of return available in the capital markets for safe assets, and in order to earn the actuarial rate of return, additional risks (primarily equity risk) must be assumed. At the end of December 2020, the equity risk (beta) is approximately 0.38 which is the lowest measurement in three decades, and it is lower than peer median at approximately 0.6.
- Liquidity is another fundamental risk assumed and it is managed through asset allocation. The plans have outstanding capital commitments to fund approximately \$12.3 billion in illiquid assets, primarily in private equity. In the December 2020 quarter, \$804 million of new commitments were made.
- The combined systems paid out approximately \$1.9 billion net of contributions over the past twelve months ending in December 2020. Over the past year, private equity was a net purchaser of approximately \$881 million and real return & opportunistic of \$543 million. Over the past year, the allocation to domestic equity was reduced by \$1.28 billion, long-term fixed income by \$1.24 billion, absolute return by \$450 million, real estate by \$330 million, and international equity by \$250 million. The allocation to short-term cash increased by approximately \$183 million.

Investment Update

Highlighting the quarter.

(\$ Millions)

NEW COMMITMENTS

September 30, 2020 – December 31, 2020

Asset class	Fund Name / (Managed By)	Commitment
Private Equity		
	Axiom Asia Co-Investment Fund II, L.P. (Mission Capital GP Co-Investment GP II)	\$ 50.0
	GTCR Fund XIII, L.P. (GTCR Partners XIII A/B/C LP)	50.0
	Accel Leaders Fund 3, L/P. (Accel Leaders Fund Associates 3 L.L.C.)	40.0
Real Estate and Infrastructure Division		
	Kayne Renewable Opportunities Partners, LP (Kayne ROP Fund Manager, LP)	100.0
	Rialto Real Estate Fund IV-Debt, LP (Rialto Capital Management, LLC)	100.0
	BGO Europe III Co Invest (GreenOak Europe III GP, LP)	39.6
Real Return & Opportunistic Division		
	Sixth Street Specialty Lending Europe II (USD Feeder), L.P. (SSSLE II Management, LLC)	125.0
Fixed Income Division-Absolute Return		
	AG Essential Housing, L.P. (AG WIP Asset Management)	200.0
	Kayne CLO Partners II, L.P. (Kayne Anderson)	100.0
<hr/> TOTAL		\$804.6

State of Michigan Retirement System

PERFORMANCE

State of Michigan Investment Board Meeting

March 25, 2021



Jon M. Braeutigam
Chief Investment Officer
Bureau of Investments

Bureau of Investments

Mission Statement

The Bureau of Investments continually strives to provide quality investment management services, broad professional expertise, and independent advice to the State of Michigan Investment Board as fiduciary of the State of Michigan Retirement System, and independent of the Board, to the State Treasurer for various Michigan trust funds and the State's common cash, for which the State Treasurer is the fiduciary.

SMRS Goals

Maintain sufficient liquidity to pay benefits.

*Meet or exceed the actuarial assumption
over the long term.*

*Perform in the top half of the public plan
universe over the long term.*

Diversify assets to reduce risk.

*Exceed individual asset class benchmarks
over the long term.*

MPSERS PENSION

Time-Weighted Rates of Return Periods Ending December 31, 2020

	% of Portfolio 12/31/20	Ten Years ¹		Seven Years ¹		Five Years ¹		Three Years ¹		One Year		Current Quarter	
		Rate	Rank	Rate	Rank	Rate	Rank	Rate	Rank	Rate	Rank	Rate	Rank
TOTAL PLAN	100.0	9.8	11	9.5	7	10.5	22	9.7	15	11.2	63	10.6	20
Median - Greater than \$10 Billion ²		8.6		8.0		9.6		8.3		11.9		9.8	
MPSERS Total Plan Policy		9.9		9.4		11.0		9.6		11.6		7.9	
DOMESTIC EQUITIES	22.5	13.6	21	12.6	18	15.1	27	14.0	18	17.0	54	15.5	33
Median ²		11.3		10.1		13.0		11.1		17.6		14.5	
S&P 1500 Index		13.7		12.6		15.0		13.6		17.9		13.2	
PRIVATE EQUITY AND VENTURE CAPITAL	20.3	14.6	8	14.1	7	14.0	5	14.5	5	16.9	7	11.5	8
Median ²		10.2		8.8		9.0		7.3		5.2		7.8	
Private Equity and VC Benchmark ³		17.1		16.0		17.5		15.6		18.6		9.7	
INTERNATIONAL EQUITIES	17.3	6.4	32	6.4	35	9.9	40	6.2	42	13.1	38	17.5	42
Median ²		6.0		5.4		9.4		5.6		11.9		16.9	
International Blended Benchmark ⁴		5.1		4.9		8.9		4.9		10.7		17.0	
REAL RETURN AND OPPORTUNISTIC	12.8	11.1		13.2		12.4		14.7		16.8		13.6	
50% (CPI +500 bps) + 50% (6.8% actuarial rate)		7.2		7.0		7.1		6.7		6.2		1.4	
FIXED INCOME	11.5	4.6	56	4.9	39	5.4	59	5.3	61	5.2	83	2.4	19
Median ²		4.7		4.6		5.5		5.5		8.6		1.2	
Barclays Aggregate		3.8		4.1		4.4		5.3		7.5		0.7	
REAL ESTATE & INFRASTRUCTURE	7.5	9.2	56	8.4	55	6.0	66	3.8	72	-6.8	93	0.9	65
Median ²		9.2		8.4		6.5		5.1		0.9		1.6	
NCREIF - Property Blended Index ⁵		7.6		6.4		4.6		3.5		0.3		0.8	
NCREIF Open Fund Index Net		8.9		7.3		5.3		4.0		0.3		1.1	
ABSOLUTE RETURN	4.2	4.6		4.0		4.3		4.2		3.7		1.3	
HFRI FOF Cons 1 month lagged		2.8		2.8		2.9		3.2		4.8		3.1	
CASH EQUIVALENTS	4.0	1.0		1.2		1.6		1.9		1.1		0.1	
1 Month T-Bill		0.6		0.8		1.1		1.5		0.5		0.0	

¹ Annualized Returns and Percentile Rank.

² Comparison universe is the State Street Universe comprised of Public Funds greater than \$10 billion on the total plan level and greater than \$1 billion for asset classes.

³ SP500 + 300 bps with a 3 month lag.

⁴ International blended benchmark is S&P Developed BMI-EPAC 50/50 prior to 1/1/10. S&P Developed BMI-EPAC 75 USD / 25 Local, 1/1/10 to 9/30/10. MSCI ACWI ex USA Gross 10/1/10 to present.

⁵ NCREIF - Property Blended Index is NPI minus 130 bps.

Source: State Street Analytics; the NCREIF - NPI (Property Index) source is NCREIF; the S&P BMI-EPAC Index source is S&P.

Cumulative and Consecutive Total Fund Returns

MPSERS

Cumulative For Years Ending 12/31/20

	<u>1 Year</u>	<u>2 Year</u>	<u>3 Year</u>	<u>4 Year</u>	<u>5 Year</u>	<u>6 Year</u>	<u>7 Year</u>	<u>8 Year</u>	<u>9 Year</u>	<u>10 Year</u>
MPSERS	11.2	13.3	9.7	11.2	10.5	9.2	9.5	10.3	10.6	9.8
Public Plan - Median (> \$10 billion)*	11.9	13.7	8.3	9.9	9.6	8.1	8.0	9.0	9.2	8.6
Rank	63	69	15	15	22	17	7	12	11	11
bp Difference - Median	-61	-41	139	137	88	103	150	132	139	122

Consecutive For Years Ending

	<u>12/20</u>	<u>12/19</u>	<u>12/18</u>	<u>12/17</u>	<u>12/16</u>	<u>12/15</u>	<u>12/14</u>	<u>12/13</u>	<u>12/12</u>	<u>12/11</u>
MPSERS	11.2	15.4	2.7	16.2	7.4	2.8	11.3	16.4	12.6	3.3
Public Plan - Median (> \$10 billion)*	11.9	15.8	-2.0	15.8	7.8	0.4	7.2	16.1	13.3	1.8
Rank	63	60	5	42	66	4	5	41	66	19
bp Difference - Median	-61	-44	474	42	-39	240	413	29	-66	157

MSERS

Cumulative For Years Ending 12/31/2020

	<u>1 Year</u>	<u>2 Year</u>	<u>3 Year</u>	<u>4 Year</u>	<u>5 Year</u>	<u>6 Year</u>	<u>7 Year</u>	<u>8 Year</u>	<u>9 Year</u>	<u>10 Year</u>
MSERS	11.2	13.3	9.7	11.3	10.5	9.2	9.5	10.3	10.6	9.8
Public Plan - Median (> \$1 billion)*	12.0	14.2	8.3	9.9	9.6	8.2	8.0	8.9	9.3	8.5
Rank	65	72	17	16	19	20	10	14	15	15
bp Difference - Median	-77	-89	132	136	89	98	151	139	126	127

Consecutive For Years Ending

	<u>12/20</u>	<u>12/19</u>	<u>12/18</u>	<u>12/17</u>	<u>12/16</u>	<u>12/15</u>	<u>12/14</u>	<u>12/13</u>	<u>12/12</u>	<u>12/11</u>
MSERS	11.2	15.4	2.7	16.2	7.5	2.8	11.3	16.3	12.6	3.2
Public Plan - Median (> \$1 billion)*	12.0	17.3	-2.9	16.0	7.7	0.4	6.8	15.9	13.0	1.6
Rank	65	73	4	43	59	3	4	42	65	22
bp Difference - Median	-77	-189	561	22	-25	244	447	39	-40	161

*State Street Public Funds Universe

Cumulative and Consecutive Total Fund Returns

MSPRS

Cumulative For Years Ending 12/31/20

	<u>1 Year</u>	<u>2 Year</u>	<u>3 Year</u>	<u>4 Year</u>	<u>5 Year</u>	<u>6 Year</u>	<u>7 Year</u>	<u>8 Year</u>	<u>9 Year</u>	<u>10 Year</u>
MSPRS	11.3	13.3	9.6	11.2	10.5	9.2	9.5	10.3	10.5	9.8
Public Plan - Median (> \$1 billion)*	12.0	14.2	8.3	9.9	9.6	8.2	8.0	8.9	9.3	8.5
Rank	64	75	17	17	20	21	11	14	16	15
bp Difference - Median	-74	-90	130	135	88	97	149	136	123	126

Consecutive For Years Ending

	<u>12/20</u>	<u>12/19</u>	<u>12/18</u>	<u>12/17</u>	<u>12/16</u>	<u>12/15</u>	<u>12/14</u>	<u>12/13</u>	<u>12/12</u>	<u>12/11</u>
MSPRS	11.3	15.3	2.7	16.2	7.5	2.8	11.3	16.2	12.5	3.3
Public Plan - Median (> \$1 billion)*	12.0	17.3	-2.9	16.0	7.7	0.4	6.8	15.9	13.0	1.6
Rank	64	75	4	43	60	4	4	43	68	17
bp Difference - Median	-74	-194	560	22	-28	243	443	31	-47	176

MJRS

Cumulative For Years Ending 12/31/20

	<u>1 Year</u>	<u>2 Year</u>	<u>3 Year</u>	<u>4 Year</u>	<u>5 Year</u>	<u>6 Year</u>	<u>7 Year</u>	<u>8 Year</u>	<u>9 Year</u>	<u>10 Year</u>
MJRS	11.2	13.3	9.6	11.2	10.5	9.2	9.4	10.2	10.4	9.7
Public Plan - Median (> \$1 billion)*	12.0	14.2	8.3	9.9	9.6	8.2	8.0	8.9	9.3	8.5
Rank	65	75	17	17	20	21	13	17	22	19
bp Difference - Median	-79	-93	127	135	88	97	146	126	114	115

Consecutive For Years Ending

	<u>12/20</u>	<u>12/19</u>	<u>12/18</u>	<u>12/17</u>	<u>12/16</u>	<u>12/15</u>	<u>12/14</u>	<u>12/13</u>	<u>12/12</u>	<u>12/11</u>
MJRS	11.2	15.3	2.7	16.3	7.4	2.8	11.0	15.6	12.5	3.1
Public Plan - Median (> \$1 billion)*	12.0	17.3	-2.9	16.0	7.7	0.4	6.8	15.9	13.0	1.6
Rank	65	75	4	42	61	4	4	55	68	22
bp Difference - Median	-79	-195	557	31	-29	243	420	-26	-51	150

*State Street Public Funds Universe

State of Michigan Retirement System

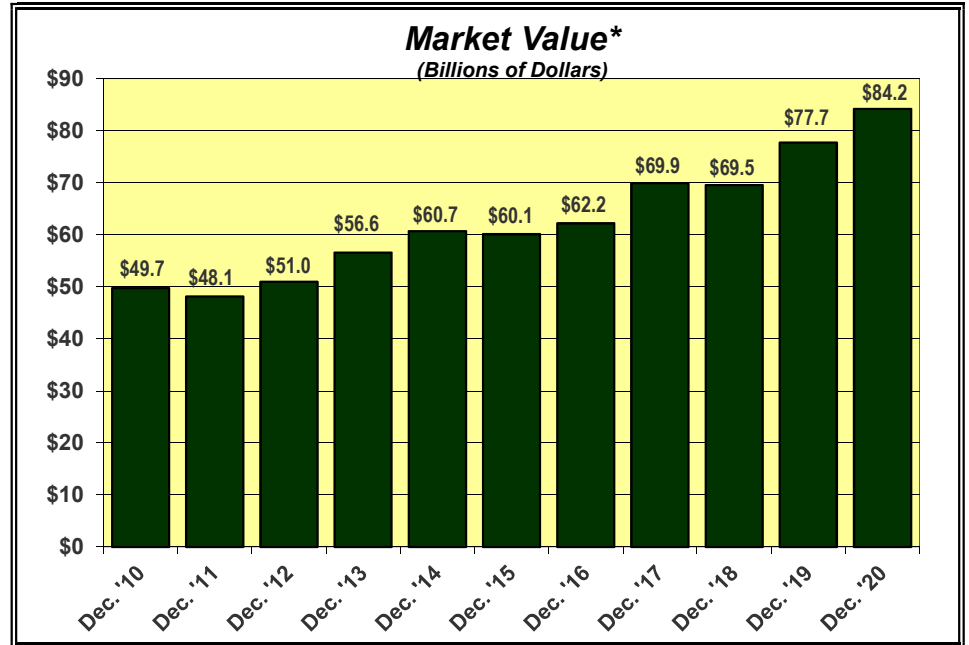
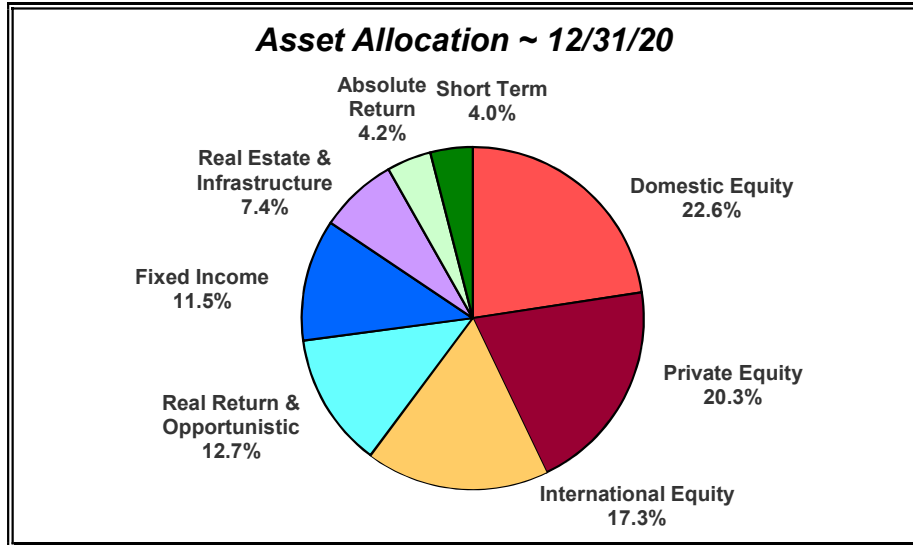
ASSET ALLOCATION REVIEW

State of Michigan Investment Board Meeting
March 25, 2021



Jon M. Braeutigam
Chief Investment Officer
Bureau of Investments

STATE OF MICHIGAN RETIREMENT SYSTEM PROFILE - DECEMBER 2020



Asset Allocation By Market Value (In Millions)

Investment Strategies	12/31/2020		12/31/2019	
	Value	%	Value	%
Domestic Equity	\$19,046	22.6%	\$17,645	22.7%
Private Equity	17,063	20.3%	13,801	17.8%
International Equity	14,527	17.3%	13,129	16.9%
Real Return & Opportunistic	10,714	12.7%	8,651	11.1%
Fixed Income	9,667	11.5%	10,305	13.3%
Real Estate & Infrastructure	6,269	7.4%	7,084	9.1%
Absolute Return	3,551	4.2%	3,908	5.0%
Short Term***	3,356	4.0%	3,175	4.1%
TOTAL	\$84,193	100.0%	\$77,698	100.0%

Market Value By Plan ~ 12/31/20 (in Millions)

Pension Plan	Mkt. Value		Combined Mkt. Value	%
	Pension Plan Mkt. Value	OPEB** Mkt. Value		
MPSERS	\$56,149	\$8,729	\$64,878	77.1%
MSERS - (closed)	13,125	3,955	17,080	20.3%
MSPRS	1,648	302	1,950	2.3%
MJRS - (closed)	275	10	285	0.3%
TOTAL	\$71,197	\$12,996	\$84,193	100.0%

MSERS includes the Military Pension Fund

Short Term Equivalent (in Billions)

Short Term Strategy***	\$3.4
Short Term in Other Inv. Strategies	1.3
TOTAL SHORT TERM	\$4.7 5.6% of Total Funds

18th Largest DB Public Pension Fund in the U.S.

Pensions & Investments survey - February 10, 2020 issue

*The combined net payout for the plans for FY 2019 was \$1.8 billion with \$21.3 billion paid out FY 2010 thru FY 2019 (Pension CAFRs). This represents the amount paid to beneficiaries in excess of employer and employee contributions.

**OPEB - Other Post Employment Benefits

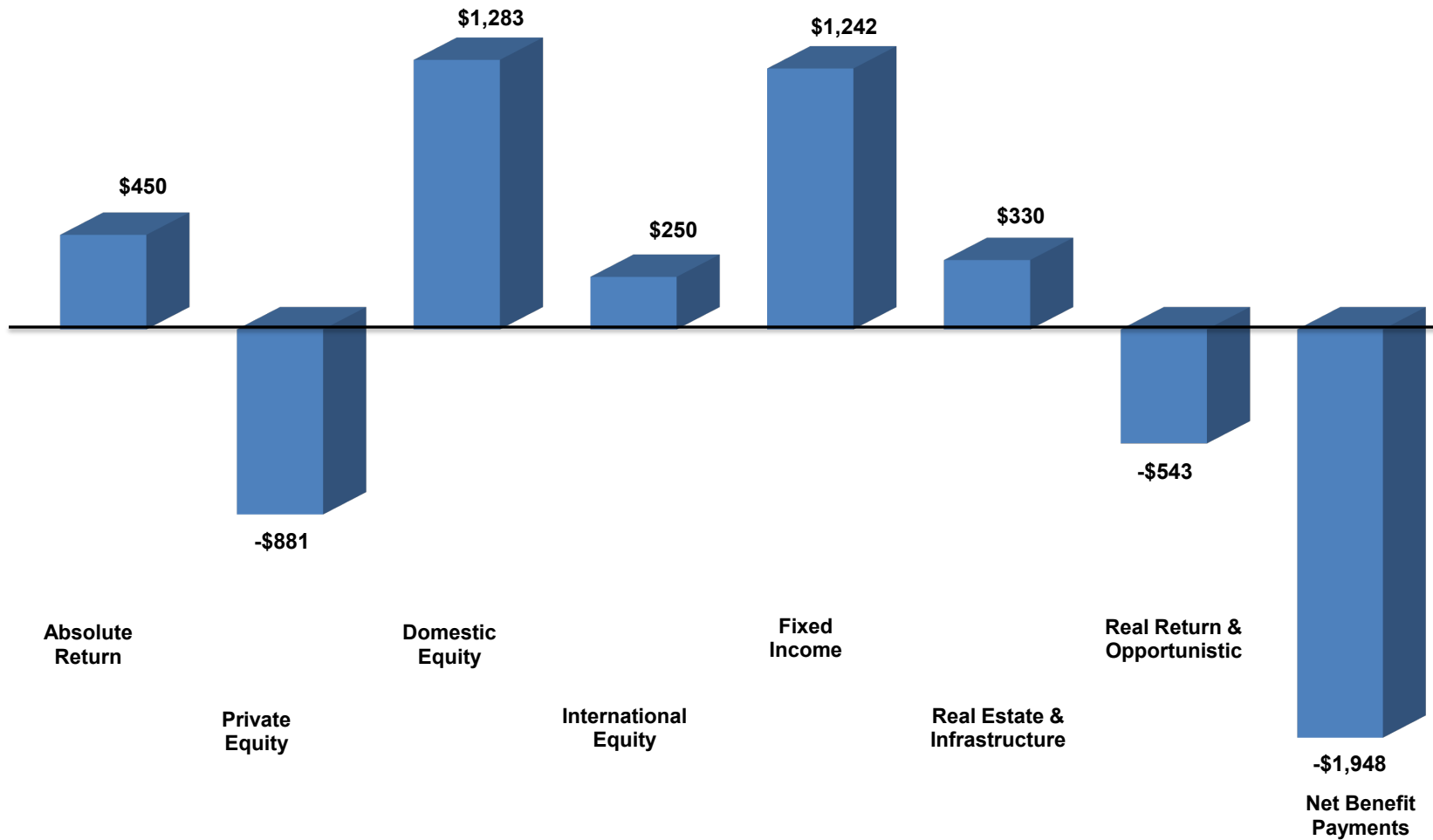
Sources and Uses of Cash

January 2020 ~ December 2020

1/01/20 Short-Term Cash Balance: \$ 3,176

12/31/20 Short-Term Cash Balance: 3,359

Net Short-Term Cash Increase: \$ 183



A negative number in an asset category indicates a use of cash, a positive number indicates a source of cash.

Dollars in millions

Asset Allocation Targets As of 12/31/20

Asset Class	MPSERS		MSERS		MSPRS		MJRS		SMRS
	12/31/20	Target*	12/31/20	Target*	12/31/20	Target*	12/31/20	Target*	
Domestic Equity	22.5%	25.0%	22.6%	25.0%	22.6%	25.0%	22.7%	25.0%	17% - 32%
Private Equity	20.3%	16.0%	20.4%	16.0%	20.4%	16.0%	20.5%	16.0%	13% - 25%
International Equity	17.3%	15.0%	17.4%	15.0%	17.4%	15.0%	17.4%	15.0%	12% - 22%
Real Return & Opportunistic	12.8%	12.5%	12.8%	12.5%	12.8%	12.5%	12.8%	12.5%	8% - 18%
Long Term Fixed Income	11.5%	10.5%	11.6%	10.5%	11.6%	10.5%	11.6%	10.5%	8% - 18%
Real Estate & Infrastructure	7.5%	10.0%	7.5%	10.0%	7.5%	10.0%	7.5%	10.0%	8% - 18%
Absolute Return	4.2%	9.0%	4.2%	9.0%	4.2%	9.0%	4.2%	9.0%	5% - 11%
Short Term Fixed Income	4.0%	2.0%	3.5%	2.0%	3.5%	2.0%	3.2%	2.0%	1% - 8%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	

*Complies with basket clause and international restrictions.

State of Michigan Retirement System

MARKETS REVIEW AND OUTLOOK

State of Michigan Investment Board Meeting

March 25, 2021



Gregory J. Parker, CFA

Director of Investments – Public Markets

Director of Asset Allocation

Bureau of Investments

CAPITAL MARKETS

Return and Risk Assumptions, Benchmark and Outlook

A starting point.

MPSERS Plan	Assumed Return* (Arithmetic)	Standard Deviation*	Trailing 10-Year (Benchmark**)
Private Equity	10.7%	25.0%	17.1%
International Equity	9.0%	21.6%	5.1%
Real Ret/Oppportunistic	7.6%	9.5%	7.2%
Domestic Equity	7.2%	18.2%	13.4%
Real Estate (Core)	7.5%	15.0%	7.6%
Absolute Return	4.6%	9.0%	2.8%
Long-Term Fixed Income	1.5%	4.0%	3.8%
Short-Term	1.1%	1.0%	0.6%

* Aon Investment Consultants 2021 Long-Term Return/Risk Assumptions

** Investment Policy Statement; Annualized Returns

*** Actual investments may differ due to changing conditions and the availability of new information

Overview

A market update.

- Capital market assumptions used for determining strategic asset allocations are being reduced across the board, and especially for safer, publicly traded fixed income securities. This is the general opinion for most consultants, investment banks, and other market participants. The reason for this phenomenon is the low interest rate environment caused by the policies of the Federal Reserve (Fed) and other central banks, as well as the run-up in prices for most risk assets over the past several years.
- Corporations in the U.S. as well as globally have access to capital through the debt market. The June 2020 quarter saw record issuances globally, including in the U.S., as both investment grade and high yield issuance was at a record high.
- During the fourth quarter of 2020, risk assets appreciated tremendously. The U.S. stock market increased by 13.4% and the international equity benchmark index increased 17%. Other examples of the “risk on” environment; smaller cap stocks outperformed larger cap stocks, value style outperformed growth style, and emerging markets outperformed developed markets.
- There were two main catalysts for the risk on fourth quarter environment. In November, Pfizer Inc. and Moderna Inc. both announced their vaccines had demonstrated great effectiveness against the COVID-19 virus, potentially marking a turning point against the pandemic. Also in November, the anxiety built up around the highly contested U.S. presidential election was resolved when the major news organizations declared Joseph Biden as the winner of the 2020 presidential election. Although the future is still uncertain, market participants collectively deemed the most severe risks to be now off the table.

- The U.S. dollar has fallen in value over the past year ending December 2020 by -6.7% as measured by the DXY index, and is at the low end of the past 5 year's trading range.

U.S. Fixed Income

Negative real yields.

- Interest rates are still very low. The Federal Reserve policy rate is near 0%. The U.S. 2-year Treasury rate ended 2020 at 0.12% while the 10-year Treasury rate finished at 0.92%. These rates are the lowest year-end levels recorded.
- Not only are nominal yields low, real yields are negative. At the end of 2020, the year-over-year CPI was at 1.4% and the Federal Reserve's stated inflation policy target is a rate of 2%.
- Since June 2020, the yield curve has steepened. The 10-year Treasury rate did the bulk of the work, rising to 0.92% at the end of December 2020 from 0.66% at the end of June 2020. By the end of 2020, although rates were low by historical standards, the shape of the yield curve was fairly normal.
- It would seem that rates have some upward pressure due to a healing economy and inflation rates higher than nominal rates. This potentially places some stronger headwinds on bond returns. However, as long as the Federal Reserve's policy rate remains at these levels, the shape of the yield curve could put a lid of sorts on the longer dated rates.

Domestic Equity

A good quarter for risk assets.

- The broad U.S. stock market return for the one year ending December 2020 was 17.9%. The market hit an all-time high in the month of September 2020.
- Many domestic equity valuation metrics are above historical averages, and analysts expect that fundamentals will continue to deteriorate over the next twelve months. Consequently, the returns over the next cycle may not be as strong as the historical average of 11 – 12% year-over-year total returns. Fundamentally, however, the market's returns on equity continue to be historically higher than average and some of the largest companies in the market today are less cyclical (economically sensitive) than past market leaders. These facts lend support to the argument that higher valuations are justified, and therefore the market could perhaps continue to deliver historical average rates of return in the future.
- The quarter ending December 2020 was very good for risk assets. The small cap Russell 2000 outperformed the larger cap S&P 500 by 19.2%, lifting the out performance for the year to 1.6%. However, over the past five and ten-year horizon, the small cap index underperformed the larger cap index by -2.0% and -2.7%, respectively. The value style also had a good quarter relative to the growth style, outperforming by 4.8%. However, over the past year, value still badly trailed growth by -35.4%.

International Equity

A good quarter for risk assets here too.

- International equities earned a higher return than domestic equities in the quarter ending December 2020, outperforming by 3.8%, however they underperformed domestic equities for the year by -7.3%. Over the past three, five, seven, and ten years, the international market index, MSCI ACWI ex USA, underperformed the S&P 1500 index by -8.8%, -6.1%, -7.8%, and -8.8% annualized, respectively.
- Within international equities, emerging market returns exceeded developed markets over the past quarter ending December 2020 by 3.9% and over the past one, three, five and seven years by 10.7%, 2.0%, 5.2% and 1.9% annualized, respectively. However, over the past ten years, emerging markets returns were -1.6% annualized less than developed markets.
- Based on a price-to-earnings valuation multiple, excluding non-earning companies, developed international markets trade at approximately a 16% discount to U.S. counterparts while emerging markets are at a 25% discount.

Real Estate

Comparing public vs. private real estate.

- Over the one year ending December 2020, the NAREIT index decreased by -5.1% including dividends, as the economic hit of the global pandemic began to take hold. Over the medium to longer-term, publicly traded REITs have earned 0.5% - 1.5% higher return than their private market counterparts but they are about three times more volatile.
- Dividend yields on REITs at the end of December 2020 were estimated to be around 3.4%, which is nearly 2.5% higher than the yield of the 10-year U.S. Treasury. Historically, REIT dividend yields have averaged only 1.3% higher than the 10-year U.S. Treasury and at these levels may be seen as relatively attractive.

Hedge Funds

Estimating the asset class return.

- Over the past five years, the Absolute Return portfolio's return has had a monthly beta of approximately 0.2 and annualized alpha of 2.1%.
- Based on an expected annualized equity market return of approximately 7.2%, should historical hedge fund betas and alphas continue, a 3.75% annualized net return seems like a reasonable assumed rate of return for hedge funds. This return is approximately 3-month U.S. Libor plus 350 basis points. However, it should also be noted that in the past after times of market dislocations, the realized alpha has been higher.

Commodities

Safe havens shine.

- The U.S. dollar has fallen in value over the past year ending December 2020 by -6.7% as measured by the DXY index and it is at the low end of the past 5 year's trading range.
- Safe-haven commodity assets such as gold have performed well over the past year. At the end of December 2020, the dollar price for an ounce of gold was at \$1,895. This is 24% higher than the year prior. Over the past decade, the precious metal has appreciated by more than 34%, this is in sharp contrast to the broad commodity market in general. Investors in gold believe that the significant increase in debt by the U.S. as well as other large economies provides a tail-wind for the supply constrained metal.

Annual Total Returns of Key Asset Classes 2001 - 2020

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020		
Best ↑	Corp. Bonds	Gov't Bonds	Int'l Equity	Int'l Equity	Real Estate	Int'l Equity	Int'l Equity	Gov't Bonds	Int'l Equity	U.S. Equity	Real Estate	Int'l Equity	U.S. Equity	U.S. Equity	Real Estate	U.S. Equity	Int'l Equity	Real Estate	U.S. Equity	U.S. Equity	Best ↑	
	10.40%	11.50%	40.82%	20.90%	20.06%	26.65%	16.65%	12.38%	41.44%	16.38%	14.26%	16.83%	32.80%	13.08%	13.32%	11.93%	27.19%	6.71%	30.90%	17.92%		
	Real Estate	Corp. Bonds	U.S. Equity	Real Estate	Int'l Equity	Real Estate	Real Estate	Cash	U.S. Equity	Real Estate	Gov't Bonds	U.S. Equity	Int'l Equity	Real Estate	U.S. Equity	Real Estate	U.S. Equity	Inflation	Int'l Equity	Int'l Equity		
	7.28%	10.52%	29.58%	14.48%	16.62%	16.59%	15.84%	2.05%	27.24%	13.11%	9.02%	16.17%	15.29%	11.81%	1.01%	7.97%	21.13%	1.91%	22.13%	10.65%		
	Gov't Bonds	Real Estate	Hedge Funds	U.S. Equity	U.S. Equity	U.S. Equity	Gov't Bonds	Inflation	Corp. Bonds	Int'l Equity	Corp. Bonds	Real Estate	Real Estate	Corp. Bonds	Gov't Bonds	Corp. Bonds	Real Estate	Cash	Corp. Bonds	Corp. Bonds		
	7.24%	6.74%	9.01%	11.78%	5.65%	15.34%	8.67%	0.10%	16.05%	11.15%	8.35%	10.54%	10.99%	7.53%	0.86%	5.63%	6.96%	1.88%	14.54%	9.89%		
	Cash	Hedge Funds	Real Estate	Hedge Funds	Hedge Funds	Hedge Funds	Hedge Funds	Corp. Bonds	Hedge Funds	Corp. Bonds	Corp. Bonds	Inflation	Corp. Bonds	Hedge Funds	Gov't Bonds	Inflation	Int'l Equity	Corp. Bonds	Gov't Bonds	Gov't Bonds		Gov't Bonds
	4.43%	3.57%	8.99%	5.83%	5.13%	9.21%	7.68%	-3.07%	9.65%	8.46%	2.96%	9.37%	7.70%	4.92%	0.66%	4.50%	6.42%	0.88%	6.83%	7.94%		
	Hedge Funds	Inflation	Corp. Bonds	Corp. Bonds	Inflation	Cash	U.S. Equity	Real Estate	Inflation	Gov't Bonds	U.S. Equity	Hedge Funds	Inflation	Hedge Funds	Hedge Funds	Inflation	Hedge Funds	Hedge Funds	Hedge Funds	Real Estate		Hedge Funds
	3.11%	2.39%	7.69%	5.25%	3.42%	4.81%	5.47%	-6.46%	2.72%	5.52%	1.75%	4.22%	1.49%	3.14%	0.37%	2.09%	3.88%	-1.05%	6.42%	4.75%		
Inflation	Cash	Gov't Bonds	Gov't Bonds	Cash	Corp. Bonds	Corp. Bonds	Hedge Funds	Cash	Hedge Funds	Cash	Gov't Bonds	Cash	Inflation	Cash	Hedge Funds	Gov't Bonds	Corp. Bonds	Corp. Bonds	Hedge Funds	Real Estate		
1.55%	1.79%	2.36%	3.48%	3.06%	4.27%	5.10%	-19.86%	0.19%	5.07%	0.10%	2.02%	0.07%	0.68%	0.01%	1.89%	2.30%	-2.51%	4.40%	1.60%			
U.S. Equity	Int'l Equity	Inflation	Inflation	Gov't Bonds	Gov't Bonds	Cash	U.S. Equity	Gov't Bonds	Inflation	Hedge Funds	Inflation	Corp. Bonds	Cash	Corp. Bonds	Gov't Bonds	Inflation	U.S. Equity	Inflation	U.S. Equity	Inflation		
-10.64%	-14.95%	1.88%	3.25%	2.65%	3.46%	5.03%	-36.72%	-2.19%	1.50%	-3.55%	1.70%	-2.01%	0.04%	-0.77%	1.05%	2.12%	-4.96%	2.29%	1.40%			
Int'l Equity	U.S. Equity	Cash	Cash	Corp. Bonds	Inflation	Inflation	Int'l Equity	Real Estate	Cash	Int'l Equity	Cash	Gov't Bonds	Int'l Equity	Int'l Equity	Cash	Cash	Int'l Equity	Cash	Cash	Cash		
Worst ↓	-19.74%	-21.30%	1.16%	1.33%	1.95%	2.55%	4.06%	-45.52%	-16.86%	0.13%	-13.71%	0.11%	-2.60%	-3.87%	-5.67%	0.27%	0.84%	-14.20%	2.28%	0.45%	Worst ↓	

Annualized Returns 2001 - 2020

Return	Cash	Infl.	Hedge	Gov't	Int'l	Corp.	US Eq.	R.E.	Return
Risk	0.83%	1.34%	5.28%	4.61%	19.88%	5.60%	17.32%	4.61%	Risk
	1.50%	2.04%	3.19%	4.34%	5.69%	6.10%	7.71%	8.19%	

- Hedge Funds are represented by the HFRI FOF Conservative Index
- Inflation is represented by the U.S. Consumer Price Index (SA)
- International Equity is represented by the MSCI - AC World EX-USA Index
- Cash is represented by 30-day T-Bills

- U.S. Equity is represented by the S&P 1500 Index
- Real Estate is represented by the NCREIF National Property Index
- Corporate Bonds are represented by the BBG Barclays - U.S. Corp. Inv. Gd. Index
- Government Bonds are represented by the BBG Barclays - U.S. Government Index

State of Michigan Retirement System

DOMESTIC EQUITY REVIEW

State of Michigan Investment Board Meeting
March 25, 2021



Jack A. Behar, CFA
Senior Investment Manager
Domestic Equity Division

EXECUTIVE SUMMARY

Performance

MPSERS Plan (12/31/20)	1-Year	3-Years	5-Years	7-Years	10-Years
Annualized Returns	17.0%	14.0%	15.1%	12.6%	13.6%
S&P 1500	17.9%	13.6%	15.0%	12.6%	13.7%
Peer Median Return	17.6%	11.1%	13.0%	10.1%	11.3%
Percentile Rank vs. Peers *	54	18	27	18	21

*State Street Universe greater than \$1 billion

- In the quarter ended December 31, 2020, Total Domestic Equity outperformed its peer group over three, five, seven and ten years while outperforming or matching the S&P 1500 over three, five and seven years. During the past year, performance was 90 basis points (bps) behind the benchmark net of fees, with incurred tracking error of 3.5%.
- Since the end of a difficult period in March driven by the black swan impact of COVID-19 on the capital markets, Total Domestic Equity has gone on to outperform the S&P 1500 by nearly 380 bps through the period ending December 31, 2020. Strong performance has continued into 2021.
- Performance on the year has been led by SMRS' exceptional lineup of growth managers, including Ark Investments (up 118.5%), SMRS Disruptive Innovation Momentum (up 67.5% since launch in September of 2020), SMRS Large Cap Growth (up 38.3%) and SMRS Large Cap Consistent Growth (up 23.1%).
- Towards the end of 2020, small-cap and value stocks quietly began to lead the market, even while large technology stocks that dominated market performance earlier in the year continued to appreciate. SMRS benefitted from that trend as well, with a healthy allocation to value oriented managers that have significant exposure to small and mid-cap stocks in their portfolios.
- Recent portfolio launches have been a success, with SMRS Disruptive Innovation Momentum, SMRS factor-based Value, Quality and Momentum index mix strategy and external manager Martin Currie all outperforming their respective benchmarks through December of 2020.

Asset Class Goal

To provide the SMRS with long-term domestic equity market returns or better, by investing in a diversified and attractively valued portfolio of companies at an index fund-like cost.

Strategy Update

- The division is well positioned for an economic recovery, further fiscal stimulus, low interest rates and the Fed's accommodative stance, with a relative overweight to both smaller cap, value stocks as well as to in-favor momentum stocks.
- We are very gradually rebalancing our portfolio away from less profitable stocks that have experienced significant price appreciation over the past year (and likely still have a very bright future) into solidly profitable companies that can weather any environment.
- We are also keeping an eye on interest rates and the potential for more significant inflation than has been experienced over the past decade, potentially driven by the end of the pandemic, pent up demand and more money in the system.
- If interest rates were to rise in a significant way, it could lead to a value stock outperformance cycle while putting a cap on or potentially lowering the market price/earnings ratio.
- DED sector overweights include financials, health care, communication services and utilities. Underweights include consumer discretionary and industrials.
- The division's portfolio trades at over a 10% PE ratio discount to the S&P 1500, despite higher levels of profitability and faster rates of reinvestment.
- Portfolio beta is slightly above one (1.04), implying that a rising market should provide a slight tailwind to performance while a falling market would generate a slight headwind.

Market Environment and Outlook

- At ~22x forward earnings, equity markets trade at a premium to both their long-term historical average of 15.7x and their twenty-five-year historical average of 21x.
- Meanwhile 10-year treasury bonds trade at roughly 110x earnings versus their long-term historical average of 21x.
- Factoring this in, alongside the enormous influx of money injected into the financial system from the Federal Reserve and the continued availability of many attractively valued companies, stocks remain a reasonable alternative to bonds and bond-like asset classes.
- As of December 31, the market was paying out 1.5% of its earnings in dividends and reducing shares outstanding by 1.2% through share buybacks, for a 2.7% total shareholder yield.
- The market was also reinvesting back into growth at a rate of 4.4%, thus generating a roughly 7.1% go-forward investment return (shareholder yield of 2.7% + growth rate of 4.4%), assuming market multiples remain constant.

SMRS

Domestic Equity Strategies

12/31/20

Markets	Amount	Total	% of Total
Internal Indexed (\$ in Millions)			
Indexed Portfolios	\$9,210		
Total Indexed		\$9,210	48.3%
Internal Active			
Active Portfolios	\$5,268		
Total Internal Active		\$5,268	27.7%
External Active			
Los Angeles Capital	\$1,369		
Mellon Capital	842		
ARK Investments	816		
Clarkston Capital Partners	472		
Seizert Capital Partners	462		
Martin Currie US LT Unconstrained	288		
Attucks Asset Management	115		
Bivium Capital	112		
Ancora	<u>92</u>		
Total External Active		\$4,568	24.0%

Total Domestic Equity

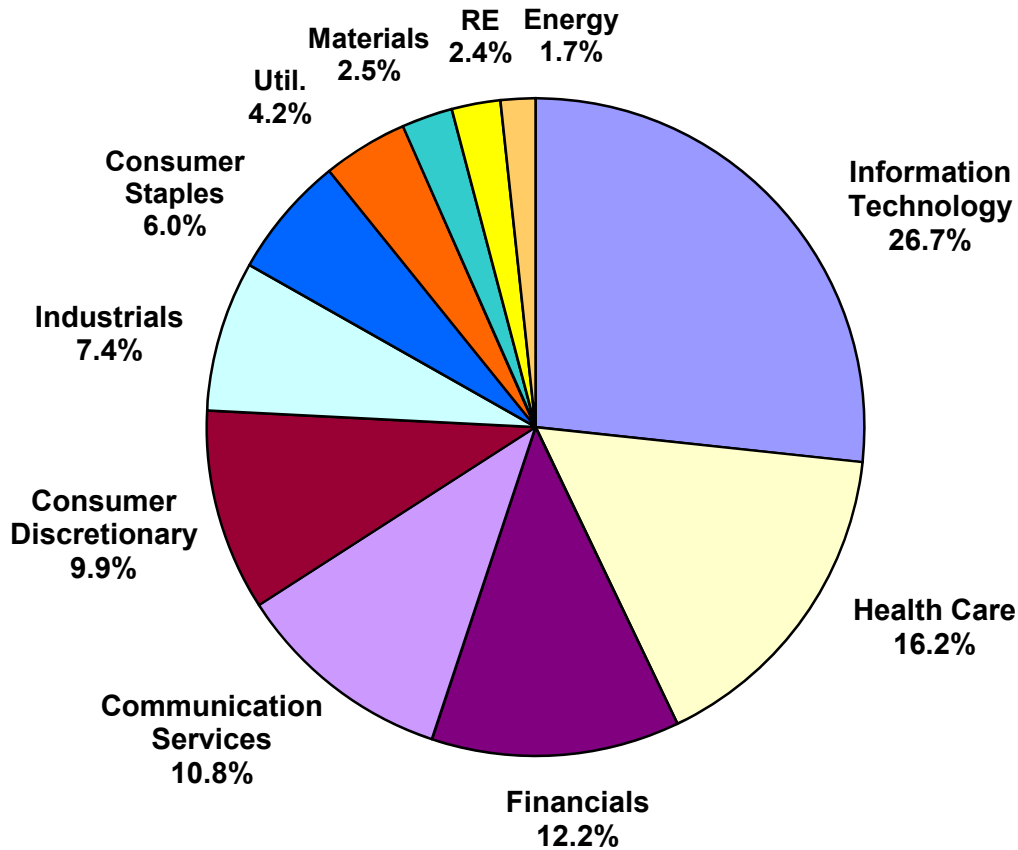
\$19,046

100.0%

SMRS

Domestic Equity By Sector

12/31/20



Market Value in Millions				
12/31/20				
	<u>Assets</u>	<u>Percent</u>	<u>Benchmark</u>	<u>Difference</u>
Information Technology	\$5,082	26.7%	26.7%	0.0%
Health Care	3,086	16.2%	13.3%	2.9%
Financials	2,318	12.2%	10.9%	1.3%
Communication Services	2,063	10.8%	10.0%	0.8%
Consumer Discretionary	1,887	9.9%	12.8%	-2.9%
Industrials	1,413	7.4%	9.2%	-1.8%
Consumer Staples	1,145	6.0%	6.3%	-0.3%
Utilities	794	4.2%	2.8%	1.4%
Materials	470	2.5%	2.9%	-0.4%
Real Estate	455	2.4%	2.9%	-0.5%
Energy	333	1.7%	2.2%	-0.5%
Total	<u>\$19,046</u>	<u>100.0%</u>	<u>100.0%</u>	

Benchmark: S&P 1500

SMRS

Domestic Equities Composite

12/31/20

Date:	<u>12/31/20</u>	<u>9/30/20</u>	<u>6/30/20</u>	<u>3/31/20</u>
Assets (\$ in Millions):	\$19,046	\$16,491	\$15,080	\$12,954
Number of Securities:	1,317	1,292	1,304	1,316
Active Share:	37%	35%	31%	35%

Description: The Domestic Equities Composite seeks to deliver excess returns through a blend of index investing and active management with value-added, but diverse strategies. While the goal is for most managers to outperform in the long run, the composite is designed such that they do so during differing parts of the business cycle.

Characteristics	<u>SMRS</u>	<u>S&P 1500</u>
Market Capitalization (\$ in Billions)	\$374.9	\$449.1
FY1 P/E	19.9	22.2
P/E Upside to S&P 1500	11.4%	0.0
Return on Equity	21.6%	17.0%
Risk Metrics		
Beta	1.04	1.00
Tracking Error	2.6%	0.0%
Projected Returns		
Dividend Yield	1.7%	1.5%
Buyback Yield	1.1%	1.2%
Reinvestment Rate	<u>7.0%</u>	<u>4.4%</u>
Projected Investment Return	<u>9.8%</u>	<u>7.1%</u>

TOP TEN EXPOSURES – Domestic Equities vs S&P 1500 12/31/20

<u>Domestic Equity Portfolio</u>		<u>S&P 1500</u>	
<u>Company Name</u>	<u>Portfolio Weight</u>	<u>Company Name</u>	<u>Market Weight</u>
SPDR S&P 500 ETF Trust	11.9%	Apple, Inc.	6.1%
Apple, Inc.	4.6%	Microsoft Corp.	4.9%
iShares 20+ Yr. Treas. Bond ETF	4.4%	Amazon.com, Inc.	4.0%
Microsoft Corp.	3.4%	Facebook, Inc. Class A	1.9%
Amazon.com, Inc.	2.6%	Alphabet, Inc., Class A	1.5%
NextEra Energy, Inc.	1.8%	Alphabet, Inc., Class C	1.5%
Facebook, Inc. Class A	1.5%	Berkshire Hathaway, Inc. B	1.3%
Alphabet, Inc., Class A	1.1%	Johnson & Johnson	1.2%
CVS Health Corporation	1.0%	JPMorgan Chase & Co.	1.1%
Visa, Inc. Class A	<u>0.9%</u>	Visa, Inc. Class A	<u>1.1%</u>
TOTAL	<u>33.2%</u>	TOTAL	<u>24.6%</u>

Manager Performance - Net of Fees

12/31/20

<u>Fund Name</u>	<u>Market Value</u>	<u>1-Year</u>	<u>3-Years</u>	<u>5-Years</u>	<u>7-Years</u>	<u>Inception</u>	<u>Inception Date</u>
SMRS S&P 500 Index	\$8,428,337,544	18.2%	14.1%	15.2%	13.0%	--	N/A
S&P 500		18.4%	14.2%	15.2%	12.9%	--	
Style & Risk Adjusted Benchmark		18.4%	14.1%	15.2%	12.9%	--	
Lipper Large-Cap Core		17.3%	12.9%	13.9%	11.6%	--	
<i>Excess Return</i>		-0.2%	-0.1%	0.0%	0.1%	--	
<i>Alpha</i>		-0.2%	-0.1%	0.1%	0.1%	--	
<i>Pct. Rank vs. Lipper Large-Cap Core</i>		51	37	27	18	--	
SMRS All-Cap Garp	1,596,637,470	4.2%	6.9%	10.0%	9.3%	12.2%	4/30/11
S&P 1500 Super Composite		17.9%	13.6%	15.0%	12.6%	13.3%	
Style & Risk Adjusted Benchmark		16.8%	13.8%	14.8%	12.5%	13.2%	
Lipper Multi-Cap Core		15.8%	11.1%	12.8%	10.5%	11.5%	
<i>Excess Return</i>		-13.7%	-6.8%	-5.0%	-3.3%	-1.1%	
<i>Alpha</i>		-12.6%	-6.9%	-4.8%	-3.2%	-1.0%	
<i>Pct. Rank vs. Lipper Multi-Cap Core</i>		94	89	87	80	37	
SMRS Large-Cap Core	1,439,939,911	3.3%	10.8%	12.7%	10.7%	8.7%	8/31/07
S&P 500		18.4%	14.2%	15.2%	12.9%	9.6%	
Style & Risk Adjusted Benchmark		14.3%	5.4%	11.4%	8.4%	7.4%	
Lipper Large-Cap Core		17.3%	12.9%	13.9%	11.6%	8.9%	
<i>Excess Return</i>		-15.1%	-3.4%	-2.5%	-2.3%	-0.9%	
<i>Alpha</i>		-11.1%	5.4%	1.4%	2.3%	1.4%	
<i>Pct Rank vs Lipper Large-Cap Core</i>		98	83	78	76	61	
SMRS Large-Cap Growth	854,157,092	38.3%	23.6%	18.5%	16.4%	12.1%	5/31/05
S&P 500 Growth		33.5%	20.5%	19.0%	16.4%	12.0%	
Style & Risk Adjusted Benchmark		29.7%	20.1%	18.9%	16.4%	12.0%	
Lipper Large-Cap Growth		36.1%	21.7%	19.0%	15.8%	11.8%	
<i>Excess Return</i>		4.8%	3.0%	-0.4%	0.0%	0.1%	
<i>Alpha</i>		8.6%	3.5%	-0.4%	0.0%	0.0%	
<i>Pct Rank vs Lipper Large-Cap Growth</i>		39	30	60	40	35	
Mellon US Equity Enhanced	842,002,079	22.9%	23.5%	--	--	28.1%	3/1/17
S&P 500		18.4%	14.2%	--	--	15.1%	
Style & Risk Adjusted Benchmark		15.2%	20.2%	--	--	21.0%	
<i>Lipper Large-Cap Core</i>		17.3%	12.9%	--	--	14.0%	
<i>Excess Return</i>		4.5%	9.3%	--	--	13.1%	
<i>Alpha</i>		7.7%	3.2%	--	--	7.2%	
<i>Pct. Rank vs. Lipper Large-Cap Core</i>		13	1	--	--	1	
Ark Investments	815,655,073	118.5%	40.2%	--	--	43.0%	3/1/16
S&P 1500 Growth		32.4%	19.7%	--	--	20.7%	
Style & Risk Adjusted Benchmark		21.4%	15.8%	--	--	32.6%	
Lipper Multi-Cap Growth		42.8%	21.8%	--	--	21.8%	
<i>Excess Return</i>		86.0%	20.5%	--	--	22.3%	
<i>Alpha</i>		97.1%	24.4%	--	--	10.4%	
<i>Pct. Rank vs. Lipper Multi-Cap Growth</i>		2	6	--	--	1	
LA Capital All-Cap Growth	808,421,772	21.5%	16.0%	16.1%	14.4%	12.8%	5/31/05
S&P 1500 Growth		32.4%	19.7%	18.5%	15.9%	11.9%	
Style & Risk Adjusted Benchmark		31.4%	18.3%	16.9%	14.3%	10.1%	
Lipper Multi-Cap Growth		42.8%	21.8%	18.9%	14.9%	11.8%	
<i>Excess Return</i>		-10.9%	-3.7%	-2.5%	-1.4%	0.8%	
<i>Alpha</i>		-9.9%	-2.3%	-0.8%	0.1%	2.7%	
<i>Pct. Rank vs. Lipper Multi-Cap Growth</i>		84	82	75	47	28	
SMRS Mid-Cap Index	781,420,783	15.7%	9.2%	13.2%	10.5%	--	N/A
S&P 400		13.7%	8.4%	12.3%	9.8%	--	
Style & Risk Adjusted Benchmark		13.6%	8.4%	12.3%	9.7%	--	
Lipper Mid-Cap Core		10.3%	7.6%	10.5%	7.9%	--	
<i>Excess Return</i>		2.1%	0.8%	0.8%	0.7%	--	
<i>Alpha</i>		2.2%	0.8%	0.9%	0.8%	--	
<i>Pct. Rank vs. Lipper Mid-Cap Core</i>		23	32	15	14	--	

Fund Name	Market Value	1-Year	3-Years	5-Years	7-Years	Inception	Inception Date
Large-Cap Consistent Growth	634,335,407	23.1%	19.9%	17.6%	--	15.9%	3/1/15
S&P 500		18.4%	14.2%	15.2%	--	12.7%	
Style & Risk Adjusted Benchmark		19.7%	19.5%	18.2%	--	15.5%	
Lipper Large-Cap Core		17.3%	12.9%	13.9%	--	11.4%	
<i>Excess Return</i>		4.7%	5.8%	2.4%	--	3.2%	
<i>Alpha</i>		3.4%	0.4%	-0.6%	--	0.3%	
<i>Pct. Rank vs. Lipper Large-Cap Core</i>		13	1	1	--	1	
LA Capital Deep Value	560,305,649	-7.5%	2.3%	7.4%	--	5.7%	4/1/15
S&P 1500 Value		1.6%	6.6%	10.5%	--	8.5%	
Style & Risk Adjusted Benchmark		11.7%	7.1%	11.4%	--	9.2%	
Lipper Multi-Cap Value		3.0%	4.9%	9.0%	--	6.8%	
<i>Excess Return</i>		-9.1%	-4.3%	-3.1%	--	-2.8%	
<i>Alpha</i>		-19.2%	-4.8%	-4.0%	--	-3.4%	
<i>Pct. Rank vs. Lipper Multi-Cap Value</i>		96	83	83	--	75	
Clarkston Capital Small/Mid-Cap	472,157,033	20.8%	12.4%	13.4%	12.8%	12.8%	1/1/14
S&P 400		13.0%	8.2%	12.4%	9.6%	9.6%	
Style & Risk Adjusted Benchmark		1.6%	6.4%	9.4%	7.3%	7.3%	
Lipper Mid-Cap Core		10.3%	7.6%	10.5%	7.9%	7.9%	
<i>Excess Return</i>		7.8%	4.1%	1.1%	3.2%	3.2%	
<i>Alpha</i>		19.2%	5.9%	4.0%	5.5%	5.5%	
<i>Pct. Rank vs. Lipper Mid-Cap Core</i>		7	3	8	1	1	
Seizert Capital Partners	462,308,505	9.8%	9.0%	12.2%	9.0%	13.2%	11/30/09
S&P 1500 Value		1.6%	6.6%	10.5%	8.6%	11.8%	
Style & Risk Adjusted Benchmark		1.6%	6.6%	10.5%	8.7%	11.9%	
Lipper Multi-Cap Value		3.0%	4.9%	9.0%	7.1%	10.4%	
<i>Excess Return</i>		8.2%	2.5%	1.7%	0.3%	1.4%	
<i>Alpha</i>		8.2%	2.5%	1.7%	0.3%	1.2%	
<i>Pct. Rank vs. Lipper Multi-Cap Value</i>		16	9	5	14	3	
Martin Currie	288,366,172	--	--	--	--	15.3%	11/1/20
S&P 1500 Growth		--	--	--	--	14.7%	
Style & Risk Adjusted Benchmark		--	--	--	--	N/A	
Lipper Multi-Cap Growth		--	--	--	--	17.2%	
<i>Excess Return</i>		--	--	--	--	0.6%	
<i>Alpha</i>		--	--	--	--	N/A	
<i>Pct. Rank vs. Lipper Multi-Cap Growth</i>		--	--	--	--	69	
Disruptive Innovation Momentum	282,971,854	--	--	--	--	67.5%	9/1/20
MSCI Momentum Index		--	--	--	--	5.3%	
Style & Risk Adjusted Benchmark		--	--	--	--	23.2%	
Lipper Multi-Cap Growth		--	--	--	--	11.5%	
<i>Excess Return</i>		--	--	--	--	62.2%	
<i>Alpha</i>		--	--	--	--	44.3%	
<i>Pct. Rank vs. Lipper Multi-Cap Growth</i>		--	--	--	--	1	
Attucks Asset Management	115,279,320	0.6%	6.3%	9.4%	7.5%	6.7%	11/30/07
S&P 1500		17.9%	13.6%	15.0%	12.6%	9.3%	
Style & Risk Adjusted Benchmark		1.4%	6.3%	10.1%	8.3%	9.3%	
Lipper Multi-Cap Core		15.8%	11.1%	12.8%	10.5%	7.9%	
<i>Excess Return</i>		-17.3%	-7.3%	-5.6%	-5.1%	-2.5%	
<i>Alpha</i>		-0.7%	0.0%	-0.7%	-0.8%	-2.5%	
<i>Pct. Rank vs. Lipper Multi-Cap Core</i>		98	90	91	93	81	
Bivium Capital Partners	112,349,088	0.7%	4.8%	9.2%	7.2%	6.4%	11/30/07
S&P 1500 Value		1.6%	6.6%	10.5%	8.6%	6.4%	
Style & Risk Adjusted Benchmark		17.7%	6.8%	10.7%	8.6%	9.5%	
Lipper Multi-Cap Value		3.0%	4.9%	9.0%	7.1%	5.8%	
<i>Excess Return</i>		-0.9%	-1.7%	-1.4%	-1.5%	0.0%	
<i>Alpha</i>		-17.0%	-2.0%	-1.5%	-1.4%	-3.1%	
<i>Pct. Rank vs. Lipper Multi-Cap Value</i>		64	53	44	52	39	

<u>Fund Name</u>	<u>Market Value</u>	<u>1-Year</u>	<u>3-Years</u>	<u>5-Years</u>	<u>7-Years</u>	<u>Inception</u>	<u>Inception Date</u>
SMRS Momentum Index	110,017,198	--	--	--	--	9.7%	10/1/20
MSCI Momentum Index		--	--	--	--	9.6%	
Style & Risk Adjusted Benchmark		--	--	--	--	13.2%	
Lipper Multi-Cap Growth		--	--	--	--	14.6%	
<i>Excess Return</i>		--	--	--	--	<i>0.1%</i>	
<i>Alpha</i>		--	--	--	--	<i>-3.5%</i>	
<i>Pct. Rank vs. Lipper Multi-Cap Growth</i>		--	--	--	--	<i>88</i>	
SMRS Quality Index	109,579,326	--	--	--	--	12.3%	10/1/20
MSCI Quality Index		--	--	--	--	12.4%	
Style & Risk Adjusted Benchmark		--	--	--	--	26.3%	
Lipper Multi-Cap Core		--	--	--	--	14.5%	
<i>Excess Return</i>		--	--	--	--	<i>-0.1%</i>	
<i>Alpha</i>		--	--	--	--	<i>-14.0%</i>	
<i>Pct. Rank vs. Lipper Multi-Cap Core</i>		--	--	--	--	<i>71</i>	
SMRS Value Index	109,177,876	--	--	--	--	18.4%	10/1/20
MSCI Value Index		--	--	--	--	18.5%	
Style & Risk Adjusted Benchmark		--	--	--	--	38.6%	
Lipper Multi-Cap Value		--	--	--	--	18.1%	
<i>Excess Return</i>		--	--	--	--	<i>-0.1%</i>	
<i>Alpha</i>		--	--	--	--	<i>-20.3%</i>	
<i>Pct. Rank vs. Lipper Multi-Cap Value</i>		--	--	--	--	<i>36</i>	
Ancora	92,006,606	12.0%	7.7%	--	--	8.2%	10/1/17
S&P 1000		13.0%	8.2%	--	--	9.4%	
Style & Risk Adjusted Benchmark		12.9%	8.1%	--	--	9.2%	
Lipper Mid-Cap Core		10.3%	7.6%	--	--	8.7%	
<i>Excess Return</i>		<i>-0.9%</i>	<i>-0.6%</i>	--	--	<i>-1.1%</i>	
<i>Alpha</i>		<i>-0.9%</i>	<i>-0.4%</i>	--	--	<i>-0.9%</i>	
<i>Pct. Rank vs. Lipper Mid-Cap Core</i>		<i>37</i>	<i>49</i>	--	--	<i>58</i>	

State of Michigan Retirement System

INTERNATIONAL EQUITY REVIEW

State of Michigan Investment Board Meeting

March 25, 2021



Patrick M. Moraniec, CFA
Senior Investment Manager
International Equity Division

EXECUTIVE SUMMARY

Performance

MPSERS Plan (12/31/20)	1-Year	3-Years	5-Years	7-Years	10-Years
Annualized Returns	13.1%	6.2%	9.9%	6.4%	6.4%
MSCI ACWI ex USA Returns	10.7%	4.9%	8.9%	4.9%	5.1%
Peer Median Returns	11.9%	5.6%	9.4%	5.4%	6.0%
Percentile Rank vs. Peers*	38	42	40	35	32

*Source: State Street Universe greater than \$1 billion

- The International Equity Division (IED) outperformed both peers and the division's benchmark over all listed periods.
- The portfolio outperformed the benchmark by 2.4% over the last twelve months.
- Outperformance was driven by the momentum factor, quality factor, emerging markets, energy sector, and financials sector.

Asset Class Goals

- Construct a non-U.S. equity-focused portfolio to generate, on a consistent basis, ten-year returns that exceed the MSCI ACWI ex USA by 1.0%.
- Perform in the top half of the public plan peer universe percentile rankings.
- Advance people, processes, and systems to continuously improve investment decisions.

Strategy

- The division allocates capital with the intention of persistent exposure to the quality factor, momentum factor, and value factor.
- Persistent factor exposures should create consistent, transparent, and efficient returns.
- Current portfolio drivers of risk and return.
 - Tracking error of the portfolio is approximately 2.1%, which is below the division's risk budget of 3.0%.
 - The momentum factor, the largest strategic contributor to tracking error, accounts for only 14.0% of the total tracking error indicating that long-term, the portfolio is not materially exposed to any one single risk.
- Quarterly changes to International Equity Division allocation.
 - Rebalanced \$0.9 billion of equity swaps to match the division's long-term equity factor strategy.

Market Environment and Outlook

Market Performance

- International stock markets declined nearly -33.0% in early 2020. Since late March, markets dramatically rebounded, finishing the year up 10.7%. Earnings per share declined -24.0% year-over-year and multiples expanded approximately 42.0% during the year. This marks the second consecutive year where market multiples expanded more than 25.0%.
- Performance of the quality, value, and momentum factors remains strategically important to the IED. The quality and momentum factors outperformed the MSCI ACWI ex USA, up year-to-date 12.8% and 18.9%, respectively. The value factor continued its relative underperformance, down -11.0%. For 2020, IED's core strategy outperformed the division's benchmark by 4.5%.
- Emerging markets outperformed the MSCI ACWI ex USA, up 7.7% year-to-date. Developed markets trailed the broader index, down -3.1%.
- The U.S. dollar was down year-to-date -6.7% and has fallen -12.5% since its March 2020 high. Part of the outperformance in emerging markets can be attributed to the weakening U.S. dollar.
- Commodities remain depressed, down -3.7% for the year. Oil was down -20.5% in 2020, copper was up 25.8%, and gold was up 24.4%.
- Global government interest rates (index weighted) remain subdued, at approximately 1.1%, up from 0.9% in early 2020.

Outlook

- IED's assessment of the global economy indicates a higher probability the world remains in a protracted recession, however, global stock markets have looked beyond poor economic fundamentals. Stock markets typically take several months or even years to reach previous market highs. Record levels of central bank liquidity have driven stock markets to new market highs despite an above average global recession which is different than prior economic cycles.
- More recently, several signs indicate the global economy is accelerating. The key question remains, can the global economy deliver on the stock market's lofty 2021 growth expectations.
- World trade volumes, a proxy for economic growth, grew for the first time in 12 months, at 1.5% year-over-year. The recent data indicates an improvement from May 2020 where the year-over-year volumes contracted -17.7%. For context, the twenty-year average year-over-year growth rate is 3.0%.
- Global manufacturing PMIs have returned to expansionary levels and now measure 53.5. A reading above 50.0 indicates expansion. In April 2020, global PMIs had collapsed to 39.6.

- Europe top line sales and earnings contracted year-over-year at -7.9% and -22.7%, a level not seen since the periphery debt crisis which began in late 2009. This marks a downward acceleration in trailing fundamentals for Europe. Forward looking sales and earnings per share have improved and are expected to be up over the next 12 months, 5.6% and 24.2% respectively.
- Japan has been slower in its recovery relative to other nations. Manufacturing PMIs contracted for the twenty-first consecutive month with a reading at or below 50.0. Sales per share year-over-year declined -7.3% and earnings per share growth further accelerated to the downside at -26.0%. Forward looking sales and earnings growth are forecasted at 2.9% and 26.8%.
- Central banks are fully committed to an “anything it takes” policy similarly to what Mario Draghi adopted near the end of his ECB term. The question will be if the vast amounts of liquidity can offset a major solvency crisis in the next two years especially if growth expectations don’t transpire.
- Analysts’ forward-looking earnings per share growth is estimated at 30.6% for the MSCI ACWI ex USA index. The sentiment has rapidly changed. As of May 2020, analysts were projecting negative -4.6% year-over-year earnings per share growth which was the first negative forward-looking estimate since the Great Financial Crisis. The current health and economic crisis make it difficult to accurately project earnings over the next two years.
- Go-forward returns for the MSCI ACWI ex USA index on an annualized basis are estimated at 7.7%. This rate is based on the current price and actual fundamentals over multiple periods to remove fundamental variability, better estimating the earnings power of the index.
- A ten-year blended international government yield of 1.1% implies an international equity risk premium of 6.6%. The equity risk premium decreased during the quarter due to significant increases in stock prices and only minor increases to the long-term earnings projections of the index.

Conclusion

International stock market fundamentals have stabilized. Global government bond yields remain near all-time lows as central banks remain committed to ultra-accommodative monetary policies not seen since the Great Financial Crisis. The policies in Japan, Europe, and now the U.S. are open-ended inflation targeting processes. Central banks’ policies will remain low indefinitely as the global recession will last longer than the COVID-19 pandemic. The liquidity crisis caused by COVID-19 may slowly turn into a solvency crisis, forcing monetary policy to remain accommodative if not requiring additional large non-standard policies.

Forward looking estimates for stock markets are lofty. International stocks are expected to grow earnings per share by 30.0% in the next twelve months. The markets seem to already have priced in this expected growth with 42.0% multiple expansion in 2020. If stock market fundamentals do not match high expectations, IED believes that market multiples may come under significant pressure in 2021.

International stock markets trade at approximately their twenty-three-year average of 17.0x price to earnings history, and a wide spread relative to global risk-free rates. To capture the spread to bonds, international stock investors will need a long investment horizon as the short-term environment may experience increased volatility.

SMRS

International Equity Strategies

12/31/20

Markets	Amount	Total	% of Total
Active (\$ in Millions)			
BlackRock MSCI	\$2,423		
Wellington	1,079		
IED Quality Equity	725		
Martin Currie	514		
Marathon-London	360		
Lazard	288		
UBS	249		
Total Active		\$5,641*	38.8%
Stock Plus			
Internal	\$3,305		
PIMCO	2,260		
Total Stock Plus		\$5,565	38.3%
Indexed			
SSGA	\$1,728		
BlackRock	1,592		
Total Indexed		\$3,320	22.9%

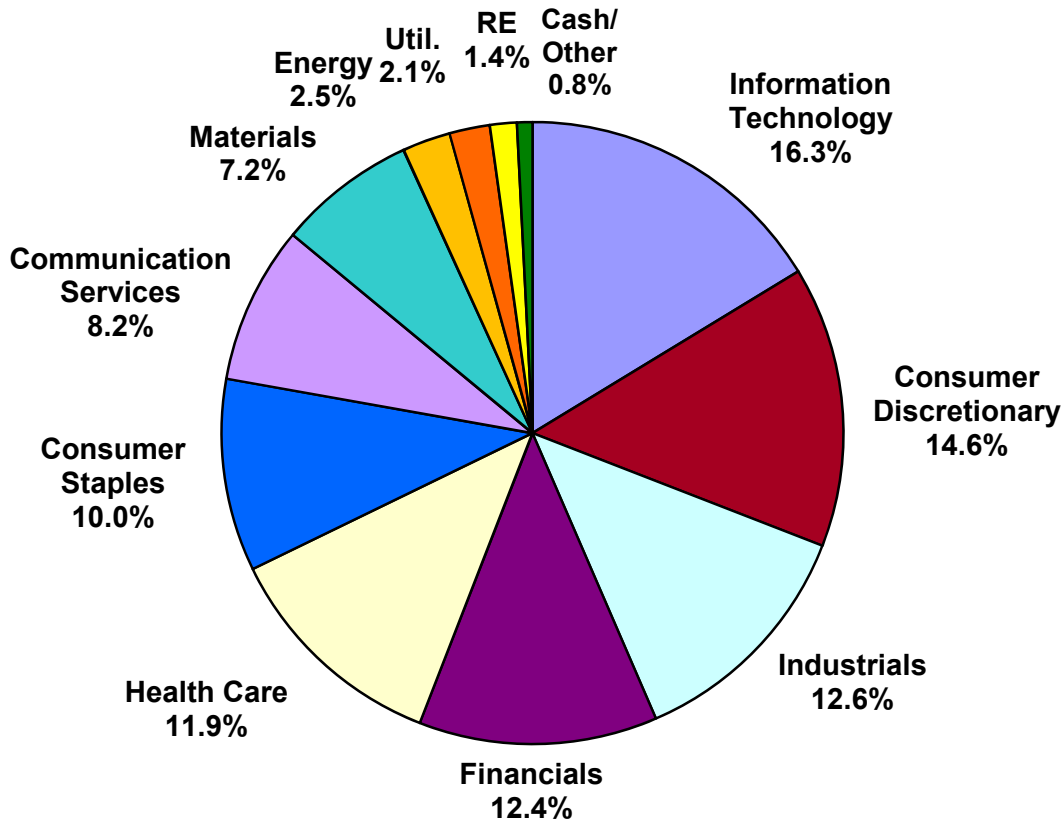
*Note: Total includes residual cash total of 2,242,650 from the closed fund of LA Capital World ex US.

TOTAL	<u>\$14,527</u>	<u>100.0%</u>
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SMRS

International Equity By Sector

12/31/20



Market Value in Millions				
12/31/20				
	<u>Assets</u>	<u>Percent</u>	<u>Benchmark</u>	<u>Difference</u>
Information Technology	\$2,371	16.3%	13.1%	3.2%
Consumer Discretionary	2,124	14.6%	14.4%	0.2%
Industrials	1,835	12.6%	11.4%	1.2%
Financials	1,795	12.4%	17.9%	-5.5%
Health Care	1,733	11.9%	9.4%	2.5%
Consumer Staples	1,452	10.0%	8.5%	1.5%
Communication Services	1,193	8.2%	7.4%	0.8%
Materials	1,037	7.2%	8.0%	-0.8%
Energy	367	2.5%	4.2%	-1.7%
Utilities	301	2.1%	3.2%	-1.1%
Real Estate	207	1.4%	2.5%	-1.1%
Total Investments	\$14,415	99.2%	100.0%	
Cash/Other	112	0.8%	0.0%	0.8%
Total	\$14,527	100.0%	100.0%	

Benchmark: MSCI ACWI ex USA

SMRS

International Equities

12/31/20

Date:	<u>12/31/20</u>	<u>9/30/20</u>	<u>6/30/20</u>	<u>3/31/20</u>
Assets (\$ in Millions):	\$14,527	\$12,315	\$11,458	\$9,835
Number of Securities:	2,616	2,655	2,677	2,715
Active Share:	34%	33%	33%	32%

Benchmark: MSCI ACWI ex USA

Description: The International Equities Composite represents all International Equity Division investments.

Portfolio Characteristics:	SMRS		MSCI ACWI ex USA	
	<u>LTM</u>	<u>Normalized</u>	<u>LTM</u>	<u>Normalized</u>
Return:				
Annualized Total Return	7.2%	8.8%	5.9%	7.7%
Sustainable Growth Rate	4.9%	6.4%	4.1%	5.7%
Dividend Yield	1.5%	1.8%	1.8%	2.0%
Buyback Yield	0.0%	0.0%	0.0%	0.0%
Collateral Yield	0.6%	0.6%	--	--
Risk:				
Beta	0.94	--	1.00	--
Volatility	20.1%	--	21.2%	--
Tracking Error	2.1%	--	0.0%	--
Information Ratio	0.6	0.5	--	--
Fundamental:				
Average Capitalization (\$ in Billions)	123.0	--	111.0	--
Price/Earnings	24.5	22.3	26.0	22.5
Price/Book	2.0	2.3	2.0	2.3
ROE	8.1%	10.5%	7.6%	10.4%

TOP TEN HOLDINGS

(\$ in Billions* - \$ in Millions**)

	<u>Portfolio Weight</u>	<u>Market Capitalization*</u>	<u>FY1 P/E</u>	<u>Market Value**</u>
Tencent Holdings Ltd.	3.2%	\$697.7	36.0	\$470.5
Taiwan Semiconductor Manufacturing Co., Ltd.	2.6%	489.1	26.8	378.8
Samsung Electronics Co., Ltd.	1.8%	500.9	19.9	258.9
ASML Holding NV	1.7%	204.1	51.4	249.5
Alibaba Group Holding	1.4%	649.3	22.9	204.5
Nestle S.A.	1.4%	340.2	24.7	197.9
Roche Holding	1.3%	302.1	16.1	190.4
Meituan Class B	0.8%	195.6	241.3	118.5
Novo Nordisk A/S Class B	0.8%	127.9	23.7	111.5
CSL Limited	<u>0.8%</u>	<u>99.4</u>	44.2	<u>110.0</u>
TOTAL	<u>15.8%</u>	<u>\$3,606.2</u>		<u>\$2,290.4</u>

International Equity Performance - Net of Fees
12/31/20

Fund Name	Market Value	1-Year	3-Years	5-Years	7-Years	Inception	Inception Date
Total International Equity	\$14,526,783,529	12.9%	5.9%	9.7%	6.2%	6.4%	1/1/04
MSCI ACWI ex USA		10.7%	4.9%	8.9%	4.9%	6.4%	
Lipper International Multi-Cap Core		7.6%	3.6%	7.3%	4.2%	5.8%	
<i>Excess Return</i>		2.2%	1.0%	0.8%	1.3%	0.0%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		9	3	3	2	16	

Total International Active Strategy	5,641,154,149*	17.8%	6.6%	9.4%	6.2%	5.9%	5/1/05
MSCI ACWI ex USA		10.7%	4.9%	8.9%	4.9%	5.9%	
Lipper International Multi-Cap Core		7.6%	3.6%	7.3%	4.2%	5.3%	
<i>Excess Return</i>		7.1%	1.8%	0.5%	1.2%	0.0%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		3	3	3	2	18	

BlackRock MSCI Systematic Return	2,423,494,998	14.7%	--	--	--	16.3%	12/1/18
MSCI ACWI ex USA		10.7%	--	--	--	12.7%	
Lipper International Multi-Cap Core		7.6%	--	--	--	10.6%	
<i>Excess Return</i>		4.0%	--	--	--	3.5%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		6	--	--	--	1	

IED Quality Equity	725,404,661	--	--	--	--	29.6%	2/1/20
MSCI ACWI ex USA		--	--	--	--	13.7%	
Lipper International Multi-Cap Core		--	--	--	--	10.4%	
<i>Excess Return</i>		--	--	--	--	15.9%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		--	--	--	--	1	

Martin Currie International Long-Term	514,268,100	28.4%	15.2%	--	--	17.1%	2/1/17
MSCI ACWI ex USA		10.7%	4.9%	--	--	9.3%	
Lipper International Multi-Cap Core		7.6%	7.6%	--	--	7.8%	
<i>Excess Return</i>		17.8%	10.3%	--	--	7.7%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		1	1	--	--	1	

Wellington IRE	496,225,431	10.6%	5.6%	8.3%	5.4%	5.3%	12/1/05
MSCI World ex USA		7.6%	4.2%	7.6%	4.3%	4.8%	
Lipper International Multi-Cap Core		7.6%	3.6%	7.3%	4.2%	4.7%	
<i>Excess Return</i>		3.0%	1.4%	0.7%	1.1%	0.5%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		21	8	25	9	18	

Marathon-London International Fund	360,156,315	9.3%	5.0%	7.7%	5.7%	8.7%	2/1/12
MSCI World ex USA		7.6%	4.2%	7.6%	4.3%	6.8%	
Lipper International Multi-Cap Core		7.6%	3.6%	7.3%	4.2%	6.7%	
<i>Excess Return</i>		1.7%	0.8%	0.0%	1.4%	1.9%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		31	21	46	5	2	

Wellington Emerging Markets Local Equity	355,825,419	16.6%	3.9%	11.5%	7.1%	8.0%	12/1/11
MSCI Emerging Market Index		18.3%	6.2%	12.8%	6.2%	6.2%	
Lipper Emerging Markets		17.1%	5.6%	11.6%	5.3%	5.7%	
<i>Excess Return</i>		-1.7%	-2.2%	-1.3%	0.9%	1.8%	
<i>Pct Rank vs. Lipper Emerging Markets</i>		51	65	55	29	19	

Lazard/Wilmington International Equity	287,775,000	8.8%	4.5%	6.2%	--	3.8%	6/1/14
MSCI World ex USA		7.6%	4.2%	7.6%	--	3.9%	
Lipper International Large-Cap Core		7.6%	3.6%	7.3%	--	4.0%	
<i>Excess Return</i>		1.2%	0.3%	-1.5%	--	-0.1%	
<i>Pct Rank vs. Lipper International Large-Cap Core</i>		35	40	80	--	67	

UBS China A Opportunity Fund	249,226,157	--	--	--	--	58.1%	5/1/20
MSCI China On shore		--	--	--	--	44.7%	
Lipper Emerging Markets		--	--	--	--	43.3%	
<i>Excess Return</i>		--	--	--	--	13.4%	
<i>Pct Rank vs. Lipper Emerging Markets</i>		--	--	--	--	9	

Wellington Select China Equity	226,535,417	80.4%	--	--	--	61.1%	9/1/19
MSCI China On shore		32.4%	--	--	--	35.5%	
Lipper Emerging Markets		17.1%	--	--	--	22.8%	
<i>Excess Return</i>		48.0%	--	--	--	25.6%	
<i>Pct Rank vs. Lipper Emerging Markets</i>		1	--	--	--	1	

<u>Fund Name</u>	<u>Market Value</u>	<u>1-Year</u>	<u>3-Years</u>	<u>5-Years</u>	<u>7-Years</u>	<u>Inception</u>	<u>Inception Date</u>
Total International Stock Plus Strategy	\$5,565,307,931	9.1%	5.8%	10.1%	6.4%	8.0%	1/1/09
MSCI ACWI ex USA		10.7%	4.9%	8.9%	4.9%	8.1%	
Lipper International Multi-Cap Core		7.6%	3.6%	7.3%	4.2%	7.6%	
<i>Excess Return</i>		-1.6%	0.9%	1.2%	1.5%	-0.1%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		33	3	1	2	25	
Internal Stock Plus	3,304,952,554	5.0%	5.3%	8.9%	5.9%	6.4%	9/1/11
MSCI ACWI ex USA		10.7%	4.9%	8.9%	4.9%	6.0%	
Lipper International Multi-Cap Core		7.6%	3.6%	7.3%	4.2%	6.2%	
<i>Excess Return</i>		-5.7%	0.5%	0.0%	1.0%	0.3%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		77	12	16	2	50	
PIMCO StocksPLUS	2,260,355,377	15.4%	--	--	--	16.1%	4/1/19
MSCI ACWI ex USA		10.7%	--	--	--	12.0%	
Lipper International Multi-Cap Core		7.6%	--	--	--	10.0%	
<i>Excess Return</i>		4.8%	--	--	--	4.1%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		5	--	--	--	5	

Total International Index Strategy	\$3,320,321,449	11.2%	6.0%	9.8%	6.1%	8.3%	7/1/09
MSCI ACWI ex USA		10.7%	4.9%	8.9%	4.9%	7.2%	
Lipper International Multi-Cap Core		7.6%	3.6%	7.3%	4.2%	7.1%	
<i>Excess Return</i>		0.5%	1.1%	0.9%	1.2%	1.0%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		15	3	3	2	7	
SSGA MSCI ACWI ex USA Index	1,728,344,141	11.5%	5.2%	--	--	5.9%	11/1/17
MSCI ACWI ex USA		11.1%	5.4%	--	--	6.1%	
Lipper International Multi-Cap Core		7.6%	3.6%	--	--	4.1%	
<i>Excess Return</i>		0.4%	-0.2%	--	--	-0.2%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		13	15	--	--	7	
Blackrock ACWI ex USA Index	1,591,977,308	10.9%	--	--	--	5.2%	3/1/18
MSCI ACWI ex USA		11.1%	--	--	--	5.5%	
Lipper International Multi-Cap Core		7.6%	--	--	--	3.9%	
<i>Excess Return</i>		-0.1%	--	--	--	-0.2%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		19	--	--	--	30	

* Note: Total includes residual cash total of \$2,242,650 from the closed fund of LA Capital World ex US.

State of Michigan Retirement System
FIXED INCOME REVIEW

State of Michigan Investment Board Meeting
March 25, 2021



Daniel J. Quigley
Senior Investment Manager
Fixed Income Division

EXECUTIVE SUMMARY

Performance

MPSERS Plan (12/31/20)	1-Year	3-Years	5-Years	7-Years	10-Years
Annualized Returns	5.2%	5.3%	5.4%	4.9%	4.6%
Bloomberg Barclays US Agg	7.5%	5.3%	4.4%	4.1%	3.8%
Peer Median Returns	8.6%	5.5%	5.5%	4.6%	4.7%
Percentile Rank vs. Peers*	83	61	59	39	56

*State Street Universe greater than \$1 billion

- The fixed income portfolio underperformed its benchmark and peer group on a one-year basis. This underperformance was driven by an overweight to structured credit securities and an underweight to U.S. Treasury securities and long duration investment grade corporate bonds.
- The performance of risk assets was strong during the quarter as markets started to recover from the first quarter selloff. This recovery was supported by record amounts of Monetary and Fiscal Policy support as the Federal Reserve and U.S. Treasury sought to support the economy and stabilize financial markets during the COVID-19 economic shutdown. Investment Grade corporates, high yield, and emerging market debt have all experienced returns greater than 10% since the end of the 1st quarter. The U.S. Aggregate Index was driven by this credit spread tightening as corporate bonds outperformed U.S. Treasuries and Residential Mortgage Backed Securities (RMBS) during the quarter.
- The year-over-year (YOY) widening of spreads for high yield credit and structured credit securities was the main driver of performance on a one-year basis. In addition to this, the portfolio had a shorter duration than the U.S. Aggregate benchmark. This hurt relative performance as interest rates declined substantially on a YOY basis.

Strategy Update

- The objective of the Fixed Income Division portfolio is to meet or exceed the returns of the Bloomberg U.S. Aggregate Bond Index while satisfying the overall characteristics of a core fixed income portfolio. These characteristics are: income, liquidity, principal preservation, and diversification from equity market risk. The portfolio has a higher yield than the benchmark while having a risk profile that is similar to the long-term volatility experienced in traditional core fixed income. The yield-to-maturity of the portfolio is currently 3.3% versus a benchmark yield of 1.2%. In addition to this, the portfolio exhibits risk characteristics that are in line with the historical volatility of traditional fixed income benchmarks and has an equity beta of 0.1.
- The Core-plus strategy implemented to achieve this goal includes:
 - Core: As of December 31, 2020, the portfolio's allocation to U.S. Treasuries, Investment Grade corporate bonds, government-guaranteed U.S. Agency Debentures, RMBS, and Commercial Mortgage Backed Securities (CMBS) was 57.7%. This includes a 21.2% allocation to U.S. Treasuries, TIPS, and cash.
 - Plus: The portfolio maintains a strategic out-of-benchmark allocation to high-yield corporate debt, securitized credit, and global fixed income strategies as market opportunities allow. This allocation increases the portfolio yield and total return potential but results in lower liquidity and higher volatility. The allocation to the Plus portfolio was 42.3% as of December 31, 2020.

Tactical Update

- The allocation to securitized credit, primarily in CMBS, ABS, non-agency RMBS, and CLO securities, was 30.3% of the portfolio at the end of the quarter. The combination of low interest rate duration and high coupon income (often floating rate) offers attractive characteristics for the overall fixed income portfolio in this low interest rate environment. This portion of the portfolio experienced large mark-to-market losses in the first half of the calendar year as securitized markets experienced a dramatic selloff and freeze in market liquidity. The one-year return on this portfolio was -1.4%.
- The allocation to high-yield strategies was 5.3% at the end of the quarter. This out-of-benchmark position underperformed during the first quarter but has recovered strongly for the remaining three quarters of the calendar year. The one-year performance of this allocation was 6.9%, underperforming the core index by roughly 60 basis points (bps).
- The portfolio has a meaningful allocation to floating rate securities, including AAA CLO investments and investment-grade floating rate corporate bonds. This allocation accounts for approximately 20% of portfolio assets. This allocation will underperform during risk-off markets when interest rates decline, however, it should exhibit strong risk-adjusted return characteristics on a go forward basis in this low interest rate environment.
- The allocation to U.S. TIPS ended the period at 2.3% of the fixed income portfolio. The TIPS allocation has outperformed nominal U.S. Treasuries by roughly 300 bps for the calendar year. We believe that this allocation offers an attractive hedge to the portfolio should inflation expectations increase in the future.

Market Environment and Outlook

- The yield curve for U.S. Treasury securities steepened during the fiscal year as short-term interest rates fell by a larger amount than long-term interest rates. Three-month U.S. Treasury Bills declined by 148 bps to 0.07% at the end of the quarter while ten-year U.S. Treasuries decreased by 98 bps to 0.92%.
- Inflation expectations increased during the quarter, with ten-year breakeven inflation expectations ending December at 1.99%, an increase of 26 bps for the quarter.
- Credit markets continued to recover during the quarter with high yield corporate bond spreads tightening by 157 bps to 360 bps at the end of the quarter. High yield spreads are near their levels from the beginning of the year after widening dramatically in the 1st quarter. Investment grade corporate bond spreads also tightened during the quarter, decreasing by 40 bps to 96 bps.
- Emerging Markets debt also strengthened during the quarter with spreads decreasing by 68 bps to 281 bps. Emerging markets spreads are 20 bps tighter for the year.
- The recovery of Commercial Mortgage Backed Securities (CMBS) was strong during the quarter after lagging corporate credit last quarter. This bumpy performance was driven by markets pricing in the increased likelihood of delinquencies and defaults for commercial real estate loans in the current economic environment. BBB CMBS spreads declined by 128 bps during the quarter to 473 bps. These spreads are 216 bps higher on a YTD basis.

Conclusion

- The portfolio currently has a neutral interest rate duration to the benchmark but remains overweight to corporate and structured debt securities. This positioning increases the income of the portfolio while also increasing the potential for price volatility. The portfolio will continue to look for attractive risk-adjusted opportunities within the fixed income opportunity set.

SMRS

Fixed Income by Strategy

12/31/20

	Amount	Total	% of Total
Core (\$ in Millions)			
FID Internal	\$4,590		
PIMCO Mortgage Fund	495		
PGIM Investment Grade Credit	234		
Total Core		\$5,319	55.0%
Tactical			
Fidelity Tactical	\$526		
Total Tactical		\$526	5.4%
Securitized Debt			
Met West Securitized Ops	\$509		
Napier Park ABS Income	582		
Principal CMBS	427		
TICP CLO Debt	800		
Fortress Credit ABI	345		
Putnam DMS	152		
Napier Park Strategic Loan	111		
Total Securitized Debt		\$2,925	30.3%
High Yield			
PGIM High Yield	\$235		
Columbia Management	215		
Crescent Direct Lending	63		
Total High Yield		\$513	5.3%
Global			
T. Rowe Global Multi-Sector	\$268		
PGIM Global Liquid Relative Value	115		
Total Global		\$383	4.0%

TOTAL

\$9,667

100.0%

NOTE: Totals may not be exact due to rounding.

SMRS

Fixed Income Holdings Portfolio Characteristics

Benchmark: Barclays Aggregate

12/31/20

<u>Characteristic</u>	<u>Portfolio</u>	<u>Benchmark</u>
Average Maturity (Yrs)	8.2	8.2
Duration (Yrs)	5.2	6.0
Spread Duration (Yrs)	6.9	6.3
Coupon (%)	3.4	2.8
Yield to Maturity (%)	3.3	1.2
Credit Rating	A	AA
VaR (%)	7.8	6.5
Tracking Error (%)	4.0	NA
Beta (vs S&P 500)	0.08	0.00

Commentary

Objectives

Income:

The coupon of the portfolio is approximately 60 bps higher than the benchmark. Price movement has been the main driver of U.S. bond market returns for the year, but Income is the primary driver of long-term performance.

Liquidity:

18.7% of the portfolio is invested in cash, U.S. Treasuries, and TIPS. These investments can be liquidated via same-day trading.

Principal Preservation:

The portfolio has a large allocation to U.S. Treasuries and carries an investment-grade credit rating.

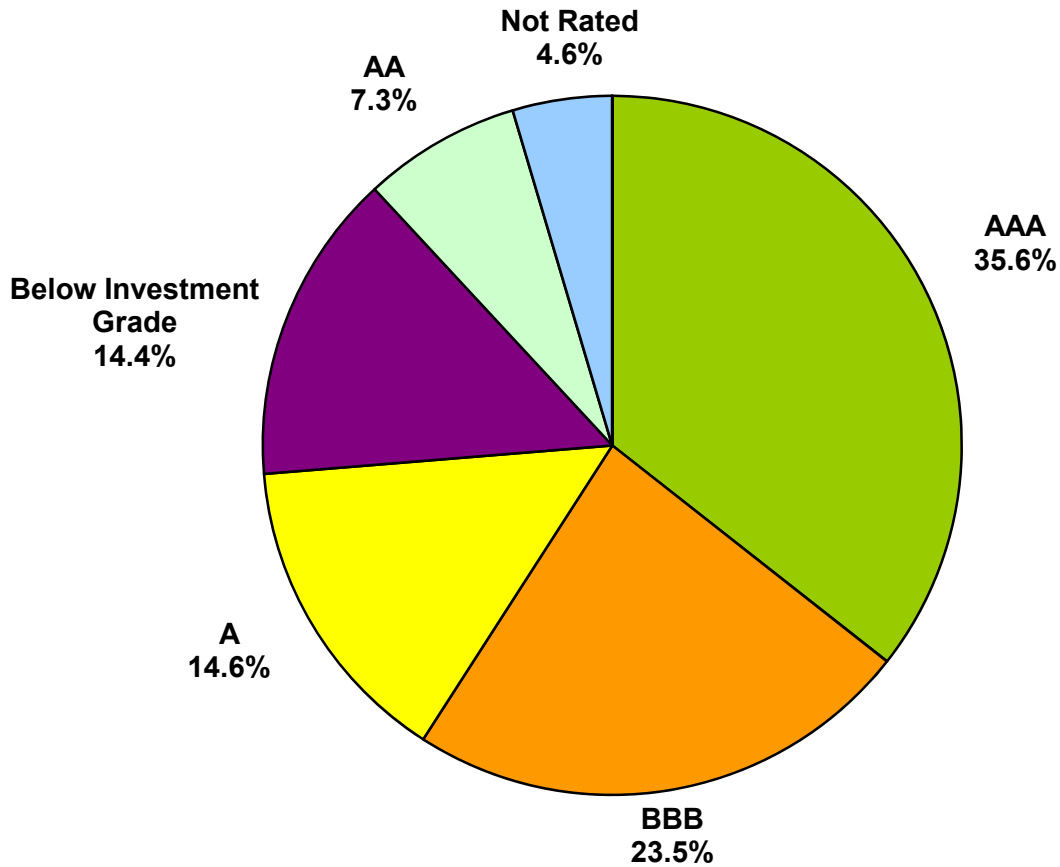
Diversification:

The equity beta of the portfolio is roughly 0.1 meaning that the portfolio returns have a low correlation with equity market movements.

SMRS

Fixed Income By Rating

12/31/20



Market Value in Millions				
12/31/20				
	<u>Assets</u>	<u>Percent</u>	<u>Benchmark</u>	<u>Difference</u>
AAA	\$3,440	35.6%	67.9%	-32.3%
AA	711	7.3%	3.4%	3.9%
A	1,408	14.6%	11.9%	2.7%
BBB	2,273	23.5%	13.9%	9.6%
* Below Investment Grade	1,388	14.4%	0.4%	14.0%
Not Rated	447	4.6%	2.5%	2.1%
Total Investments	<u>\$9,667</u>	<u>100.0%</u>	<u>100.0%</u>	

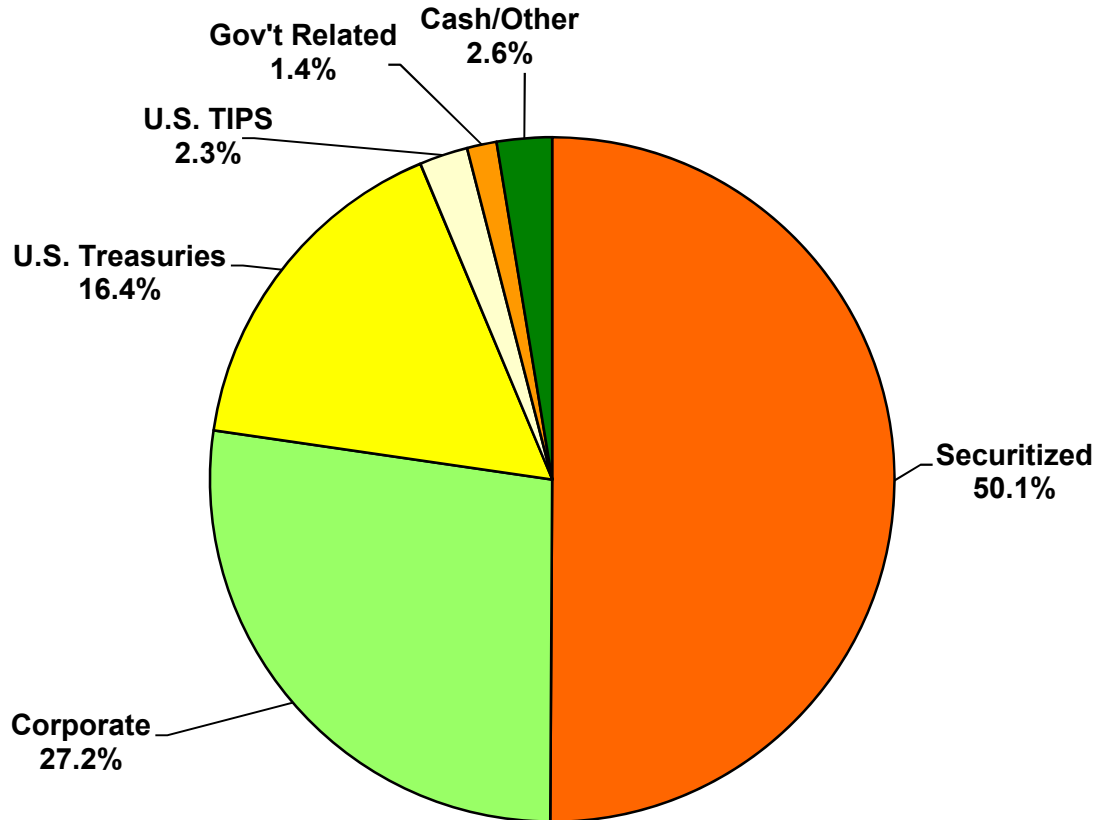
* Comprised of approximately 9.1% High Yield Credit and 5.3% High Yield RMBS/ABS

Benchmark: Barclays US Aggregate

SMRS

Fixed Income By Asset Type

12/31/20



Market Value in Millions				
12/31/20				
	<u>Assets</u>	<u>Percent</u>	<u>Benchmark</u>	<u>Difference</u>
Securitized	\$4,847	50.1%	29.5%	20.6%
Corporate	2,629	27.2%	27.4%	-0.2%
U.S. Treasuries	1,586	16.4%	36.8%	-20.4%
U.S. TIPS	221	2.3%	0.0%	2.3%
Government Related	132	1.4%	6.3%	-4.9%
Cash/Other	252	2.6%	0.0%	2.6%
Total Investments	<u>\$9,667</u>	<u>100.0%</u>	<u>100.0%</u>	

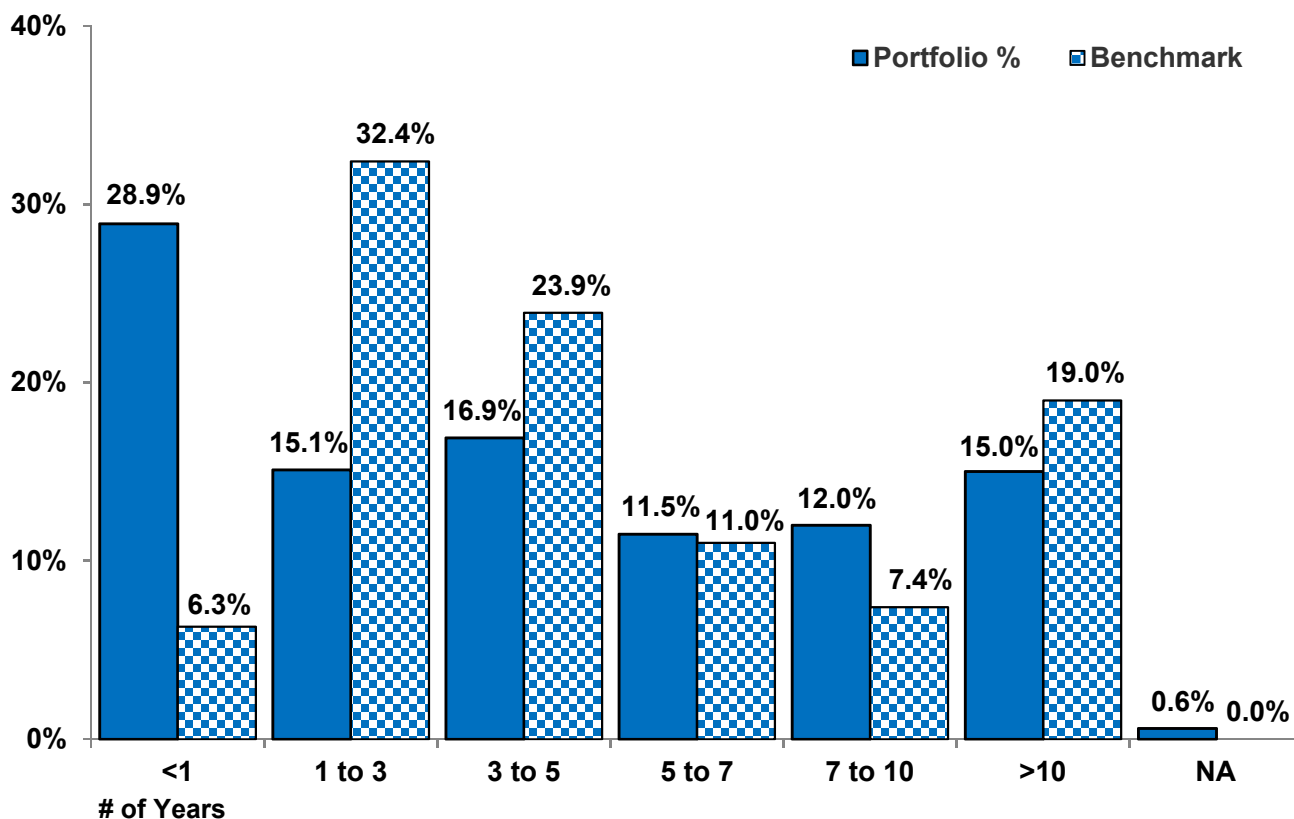
Benchmark: Barclays US Aggregate

SMRS

Duration Distribution

Fixed Income Composite Versus Benchmark

12/31/20



Source: Factset

Market Value in Millions					
Duration	Assets	Portfolio Weight	Benchmark Weight	Portfolio Duration*	Benchmark Duration*
<1	\$2,795	28.9%	6.3%	0.2	0.3
1 to 3	1,461	15.1%	32.4%	2.2	2.1
3 to 5	1,637	16.9%	23.9%	5.9	3.9
5 to 7	1,109	11.5%	11.0%	5.9	6.0
7 to 10	1,160	12.0%	7.4%	8.2	8.3
>10	1,450	15.0%	19.0%	19.0	17.3
NA	55	0.6%	0.0%	0.3	4.4
Total	\$9,667	100.0%	100.0%	5.5	6.2

* Effective Duration

Benchmark: Barclays US Aggregate

Total Fixed Income Performance - Net of Fees (MPERS)

12/31/20

	<u>Market Value</u>	<u>1-Year</u>	<u>3-Years</u>	<u>5-Years</u>	<u>7-Years</u>	<u>10-Years</u>
Total Fixed Income	\$9,666,560,160	5.00%	5.06%	5.20%	4.69%	4.46%
<i>Bloomberg/Barclays Aggregate Bond Index</i>	<i>N/A</i>	<i>7.51%</i>	<i>5.34%</i>	<i>4.44%</i>	<i>4.09%</i>	<i>3.84%</i>
Internal Core Fixed Income	4,590,065,103.77	7.56%	5.93%	5.31%	4.89%	4.43%
Externally Managed Fixed Income	\$5,076,495,056.63	2.42%	4.15%	5.28%	4.55%	4.67%
PIMCO Mortgage Fund	494,616,839	5.04%	4.20%			
<i>Bloomberg/Barclays US MBS Agy Fixed Indx</i>	<i>N/A</i>	<i>3.87%</i>	<i>3.71%</i>			
Investment Grade Credit	\$234,089,745	11.14%	7.43%	7.16%	6.09%	5.94%
PGIM Investment Grade	234,089,745	11.14%	7.43%	7.16%	6.09%	6.03%
<i>Bloomberg/Barclays Credit Index</i>	<i>N/A</i>	<i>9.35%</i>	<i>6.80%</i>	<i>6.44%</i>	<i>5.53%</i>	<i>5.40%</i>
Tactical Fixed Income	\$526,257,684	9.09%	6.64%	6.22%	5.37%	7.16%
Fidelity Tactical Bond Fund	526,257,684	9.10%	7.01%	7.43%		
<i>Bloomberg/Barclays Aggregate Bond Index</i>	<i>N/A</i>	<i>7.51%</i>	<i>5.34%</i>	<i>4.44%</i>	<i>4.09%</i>	<i>3.84%</i>
High Yield Fixed Income	\$513,095,025	6.86%	6.66%	7.83%	6.09%	
Columbia Management High Yield	215,392,252	6.27%	6.26%	7.41%	5.90%	
PGIM High Yield	234,934,683	8.03%	7.39%	8.51%	6.42%	
Crescent Direct Lending	62,768,090	7.95%				
<i>Bloomberg/Barclays US HY BA/B 2% Cap</i>	<i>N/A</i>	<i>7.67%</i>	<i>6.76%</i>	<i>8.22%</i>	<i>5.90%</i>	
Structured Fixed Income	\$2,925,036,533	-1.38%	2.80%			
Principal CMBS	426,971,428	-0.09%	4.05%	4.39%	4.65%	6.64%
MetWest Securitized Opportunities	508,747,946	4.93%	4.26%	4.82%	4.06%	
Napier Park ABS Income	581,812,737	3.63%	7.00%	8.83%		
Napier Park Strategic Loan LP	111,001,591	6.65%	6.89%			
TICP CLO Debt	799,718,352	10.71%	5.59%			
Fortress ABI	344,661,728	-2.56%				
Putnam DMS	152,122,752	-2.57%				
<i>Bloomberg/Barclays Aggregate Bond Index</i>	<i>N/A</i>	<i>7.51%</i>	<i>5.34%</i>	<i>4.44%</i>	<i>4.09%</i>	<i>3.84%</i>
<i>Blended CMBS Benchmark</i>	<i>N/A</i>	<i>7.61%</i>	<i>5.58%</i>	<i>5.07%</i>	<i>5.28%</i>	<i>5.70%</i>
Global Fixed Income	\$383,399,230	7.29%	5.41%			
T. Rowe Global Multi-Sector	268,479,215	6.96%	5.69%			
PGIM GLRV	114,920,014	8.07%	4.75%			
<i>Custom GMS Benchmark</i>	<i>N/A</i>	<i>5.37%</i>	<i>5.43%</i>			

State of Michigan Retirement System

ABSOLUTE RETURN REVIEW

State of Michigan Investment Board Meeting

March 25, 2021



Daniel J. Quigley
Senior Investment Manager
Absolute Return Strategy

EXECUTIVE SUMMARY

Performance

MPSERS Plan (12/31/20)	1-Year	3-Years	5-Years	7-Years	10-Years
Absolute Return	3.7%	4.2%	4.3%	4.0%	4.6%
HFRI FOF Conservative	4.8%	3.2%	2.9%	2.8%	2.8%

- The value of the Absolute Return portfolio is \$3.5 billion with a one-year return of 3.7%. Performance of the portfolio was positive for the fourth quarter across all strategies, benefiting from broader equity markets rallying and credit spreads tightening.
- Multi-Strategy and Event strategies were the largest contributors to performance for the quarter. Core Multi-Strategy managers with low volatility, high Sharpe ratios and low beta profiles drove performance across asset classes, including equity activism, distressed credit and fixed income relative value. The Special Situations sub-strategy performed well with key contributors including a beta-neutral capital markets strategy and a control equity investment in a technology company. Overall, Multi-Strategy managers served as effective diversifiers and reliable sources of alpha for the portfolio in 2020.
- Credit strategies also drove strong performance in the quarter, particularly across Fundamental, Distressed and Mortgage Credit sub-strategies. A small bank financials strategy contributed meaningfully to performance, supported by the market rally following positive COVID-19 vaccine news and progress on the next round of government stimulus, some of which is targeted at supporting small banks. Residential mortgage credit was stable for the quarter due to a strong housing market with increasing home prices and borrowers continuing to exit forbearance. Although structured credit is still recovering from March lows, we maintain high conviction in the underlying collateral of our manager's Asset Backed Securities.

Strategy Update

- The objective of the Absolute Return portfolio is to diversify the total plans' holdings, targeting returns above investment-grade fixed income with lower volatility than the equity portfolio. The portfolio utilizes a diverse mix of managers that invest both long and short to target specific exposures and seek to hedge out unwanted risk.
- Commitments closed during the quarter include:
 - \$200 million to AG Essential Housing, L.P. -a credit fund focused on financing the production-ready land inventory of large homebuilders.

- \$100 million to Kayne CLO Partners Fund II, L.P.- a credit fund that invests in majority stakes in Kayne-managed CLO equity/warehouse facilities and minority stakes in externally managed CLO equity and debt.
- In terms of allocation priorities, we will continue to increase exposure to high quality multi-strategy exposures, which act as a ballast to the portfolio. We will also build out equities allocations, specifically in quantitative strategies and sector-focused fundamental equity.

Overall, we will continue to focus on opportunities that seek to provide diversification, protect the downside, and deliver absolute return.

SMRS

Absolute Return

12/31/20

Net Market Values by Entity

		<u>Net Market Value</u>
* Tahquamenon Fund, LP	\$	3,122,719,226
Cerberus Manitou Residential Loan Fund, LP		135,258,333
JM IV, LP		86,356,685
SJC Direct Lending Revolver Fund III, LP		85,274,343
MP Securitized Credit Master Fund, LP		33,657,231
AG Essential Housing, L.P.		17,000,000
* EnTrust White Pine Partners, LP		12,384,054
Monument Park, LLC		7,855,640
Visium Balanced Fund, LP		299,801
Kayne CLO Partners Fund II LP		0
Total Absolute Return	\$	3,500,805,313
Short-Term Investments & Other		50,021,484
Grand Total	\$	3,550,826,797

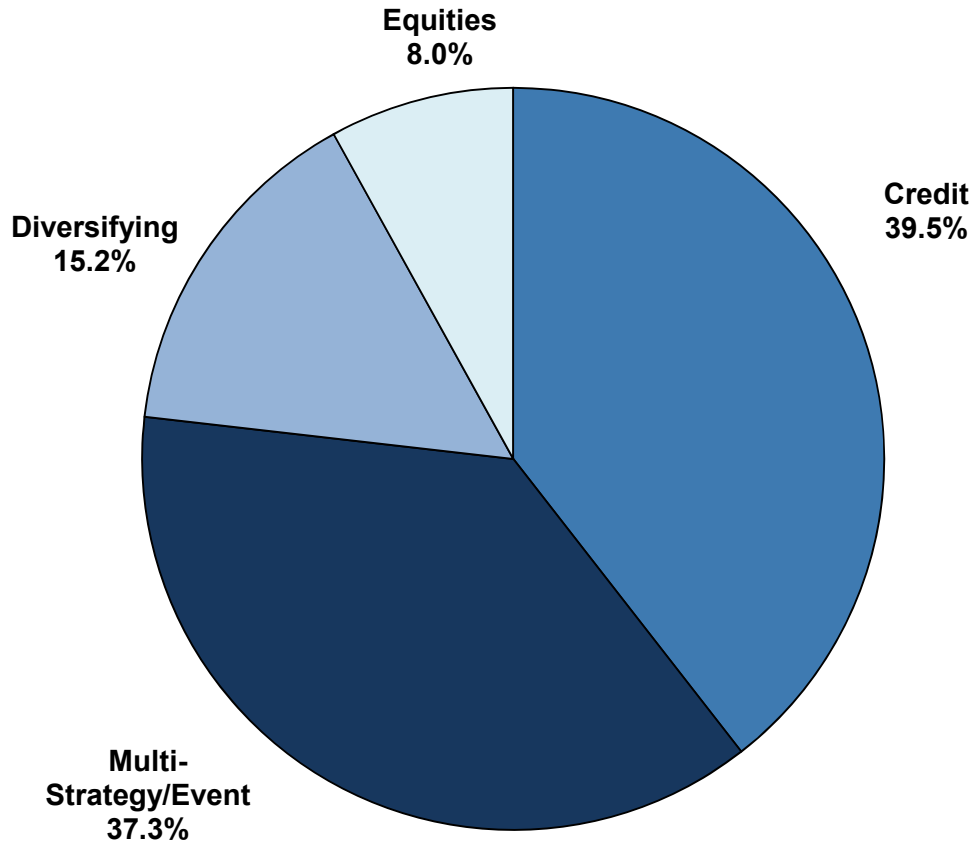
* Fund of Funds

SMRS

Absolute Return

12/31/20

Investments By Strategy



Strategy Breakdown			
Underlying Funds:	68	Median Position Size:	0.5%
Strategies:	4	Average Position Size:	1.4%
Relationships:	9	Largest Position Size:	8.3%

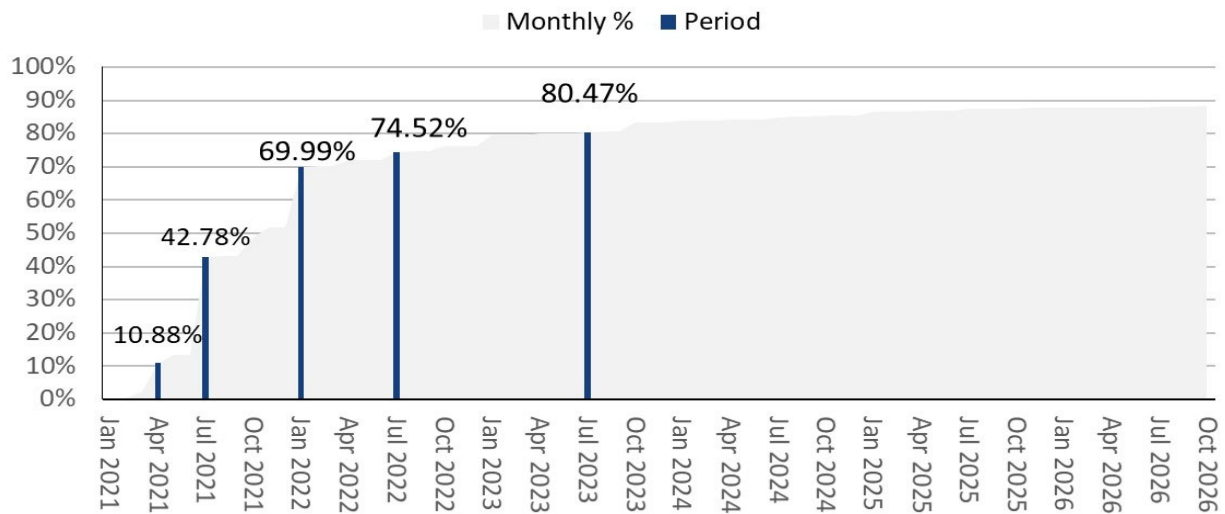
SMRS

Absolute Return

12/31/20

Liquidity Analysis

Redeemable	Marginal Allocation (% each period)	Aggregate Allocation (% since Analysis Date)
By 4/1/21	10.88%	10.88%
By 7/1/21	31.90%	42.78%
By 1/1/22	27.21%	69.99%
By 7/1/22	4.53%	74.52%
After 7/1/23	5.96%	80.47%
Illiquid	19.53%	100.00%
Total	100.00%	N/A



State of Michigan Retirement System

PRIVATE EQUITY REVIEW

State of Michigan Investment Board Meeting
March 25, 2021



Peter A. Woodford
Senior Investment Manager
Private Equity Division

EXECUTIVE SUMMARY

Performance

MPSERS Plan (12/31/20)	1-Year	3-Years	5-Years	7-Years	10-Years
Annualized Returns	16.9%	14.5%	14.0%	14.1%	14.6%
PE Benchmark Returns	18.6%	15.6%	17.5%	16.0%	17.1%
Peer Median Returns	5.2%	7.3%	9.0%	8.8%	10.2%
Percentile Rank vs. Peers*	7	5	5	7	8

*State Street Universe greater than \$1 billion

- Private Equity returns have been strong relative to peer median returns, ranking in the top 8% of peers over the past ten years. Outperformance to peers is attributable to strategy as well as fund and co-investment selectivity.
- It is not unusual for private equity returns to lag the public benchmark returns during periods of expansion and lead the public benchmark during periods of contraction. The past ten years, largely an expansionary period, has been no exception. Over this period, the Private Equity Division has outperformed the S&P (ten-year S&P 500 return 13.9%) by 70 bps while underperforming the PE benchmark by 2.5%.
- For the twelve months ending December 31, 2020, the Private Equity Division made contributions of approximately \$881 million, net of distributions. The COVID-19 pandemic slowed distributions for much of 2020 but a strong fourth quarter resulted in an overall distribution level that was on par with calendar years 2018 and 2019. Despite a decline in capital call activity during the middle of the year due to economic uncertainty, overall contributions reached a five-year high in 2020. This was driven by elevated call levels in April, when many General Partners paid down fund credit facilities, as well as a rebound of deal activity in Q4.
- Commitments closed during the quarter include:
 - \$50 million to GTCR Fund XIII, an upper-middle market buyout fund
 - \$50 million to Axiom Asia Co-Investment Fund II, a co-investment overage fund to Axiom Asia Fund VI
 - \$40 million to Accel Leaders Fund 3, a late-stage venture capital fund

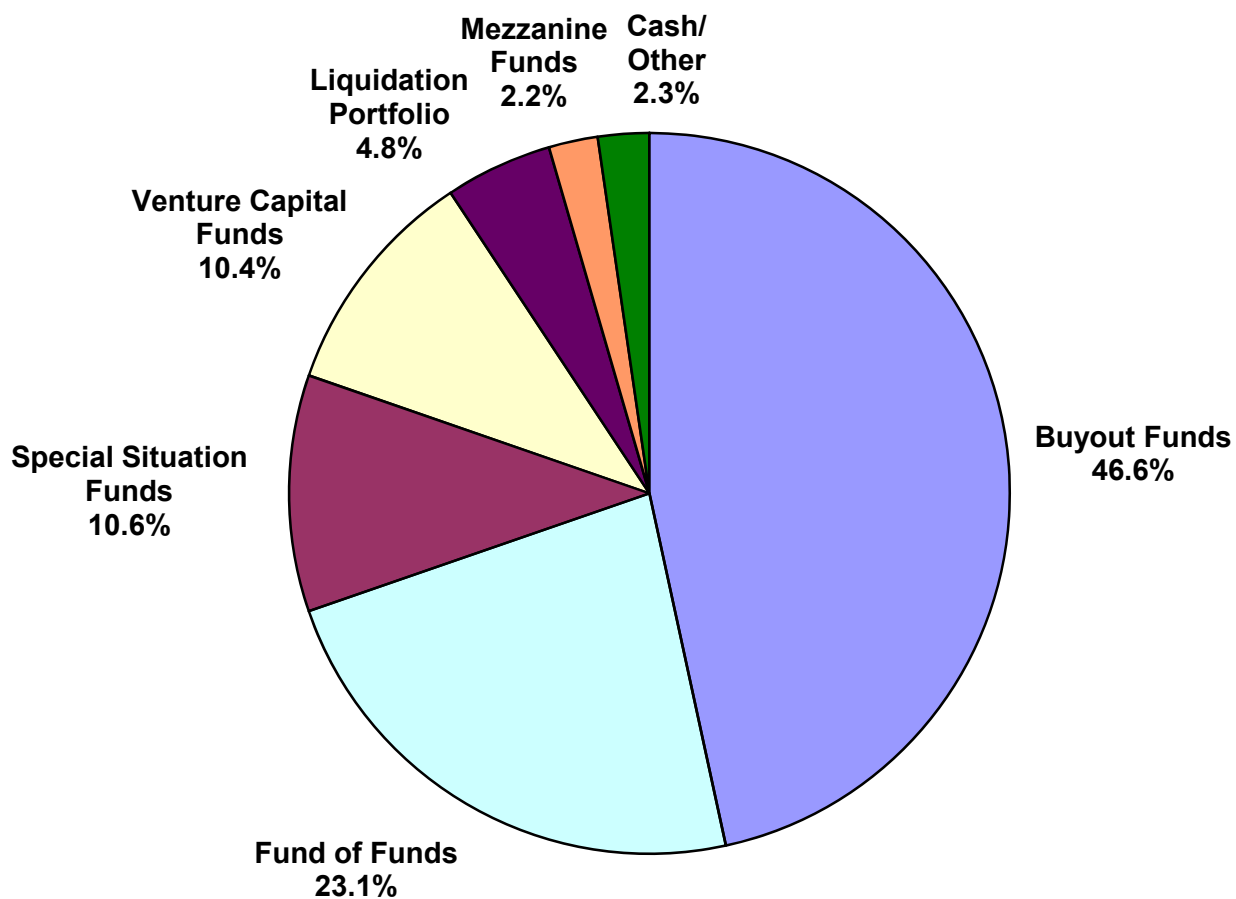
Strategy Update

The strategy for the next twelve months will focus on new sponsors raising capital and existing sponsors raising successor funds. This may be a combination of buyout, venture capital, secondary, and growth equity funds seeking new commitments. The Venture Capital Division will continue to pursue attractive opportunities across all strategies with a focus on early-stage and a bias towards healthcare versus the broader market. Co-investments will continue to play an important role in both averaging down costs and targeting specific investments with attractive risk/return characteristics.

SMRS

Private Equity

12/31/20



Market Value in Millions				
	12/31/20		12/31/19	
Buyout Funds	\$7,942	46.6%	\$6,391	46.3%
Fund of Funds	3,944	23.1%	2,610	18.9%
Special Situation Funds	1,808	10.6%	1,862	13.5%
Venture Capital Funds	1,771	10.4%	1,490	10.8%
Liquidation Portfolio	824	4.8%	938	6.8%
Mezzanine Funds	375	2.2%	297	2.2%
Cash/Other	399	2.3%	213	1.5%
Total	<u>\$17,063</u>	<u>100.0%</u>	<u>\$13,801</u>	<u>100.0%</u>

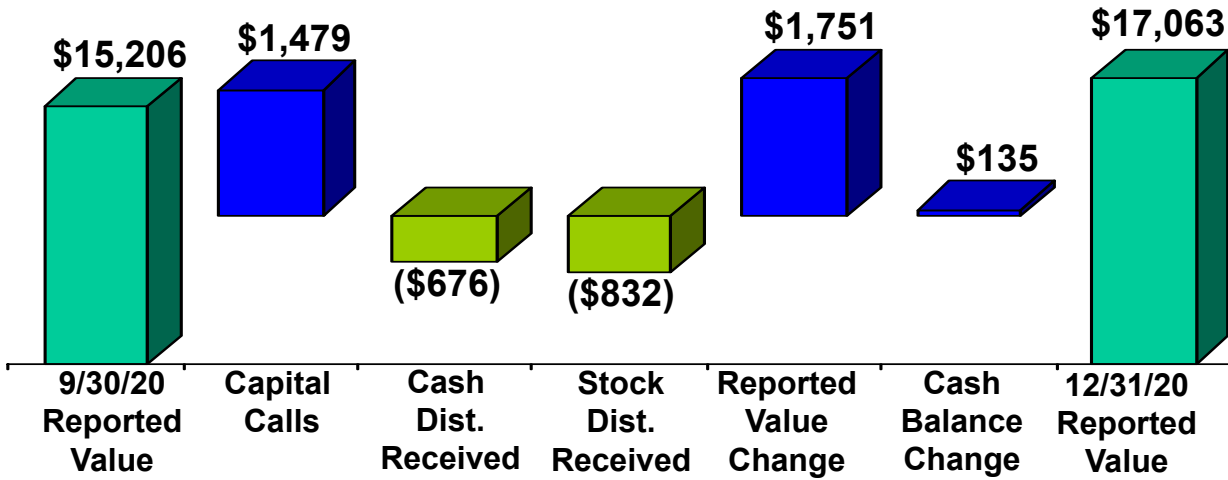
SMRS

Private Equity

12/31/20

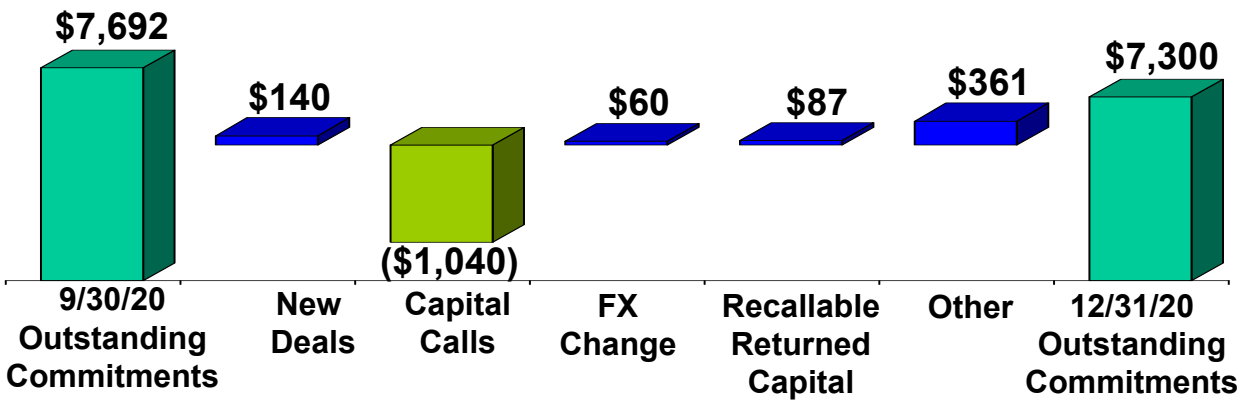
Invested Commitments

(\$ in Millions)



Outstanding Commitments

(\$ in Millions)

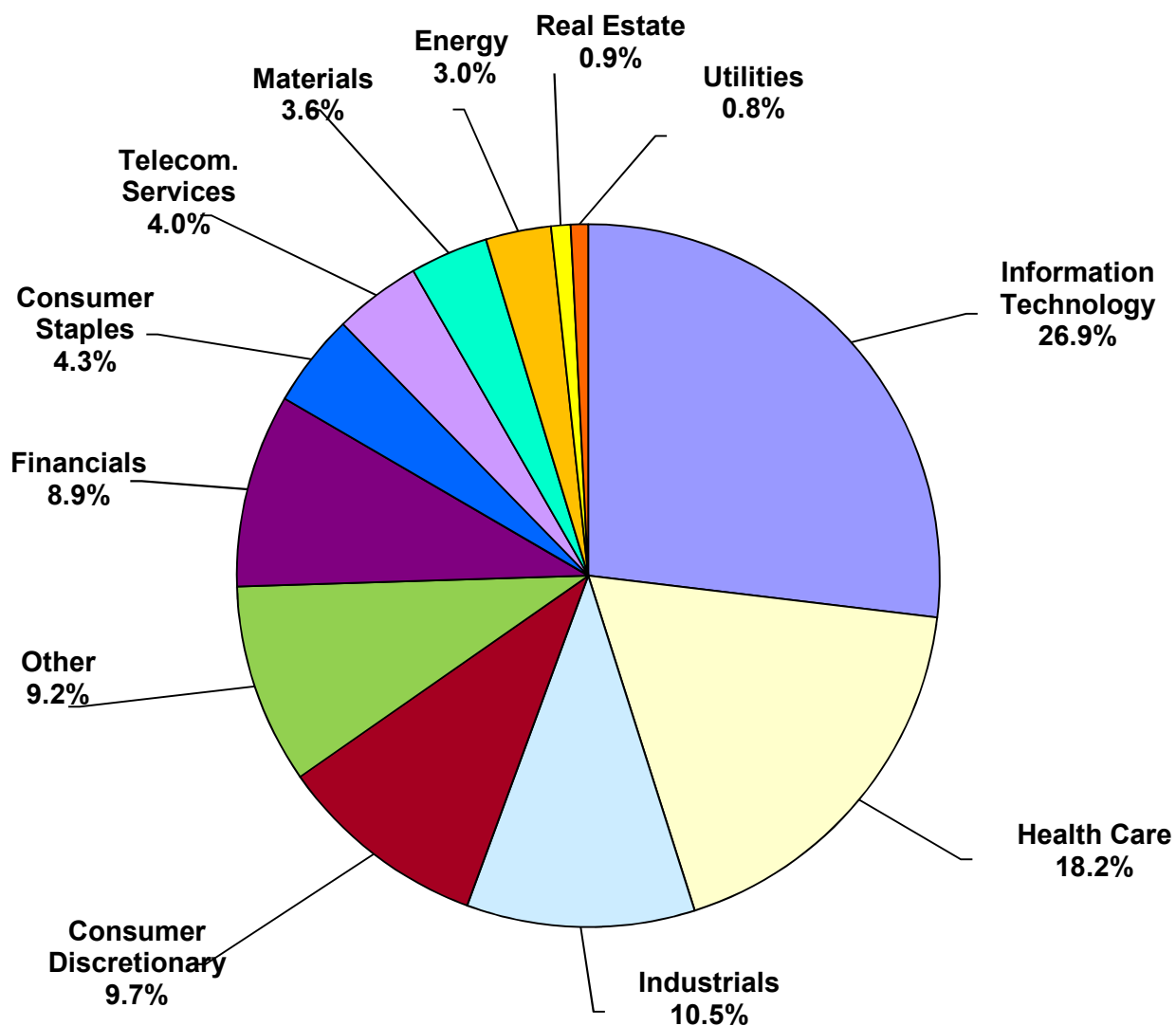


SMRS

Private Equity

12/31/20

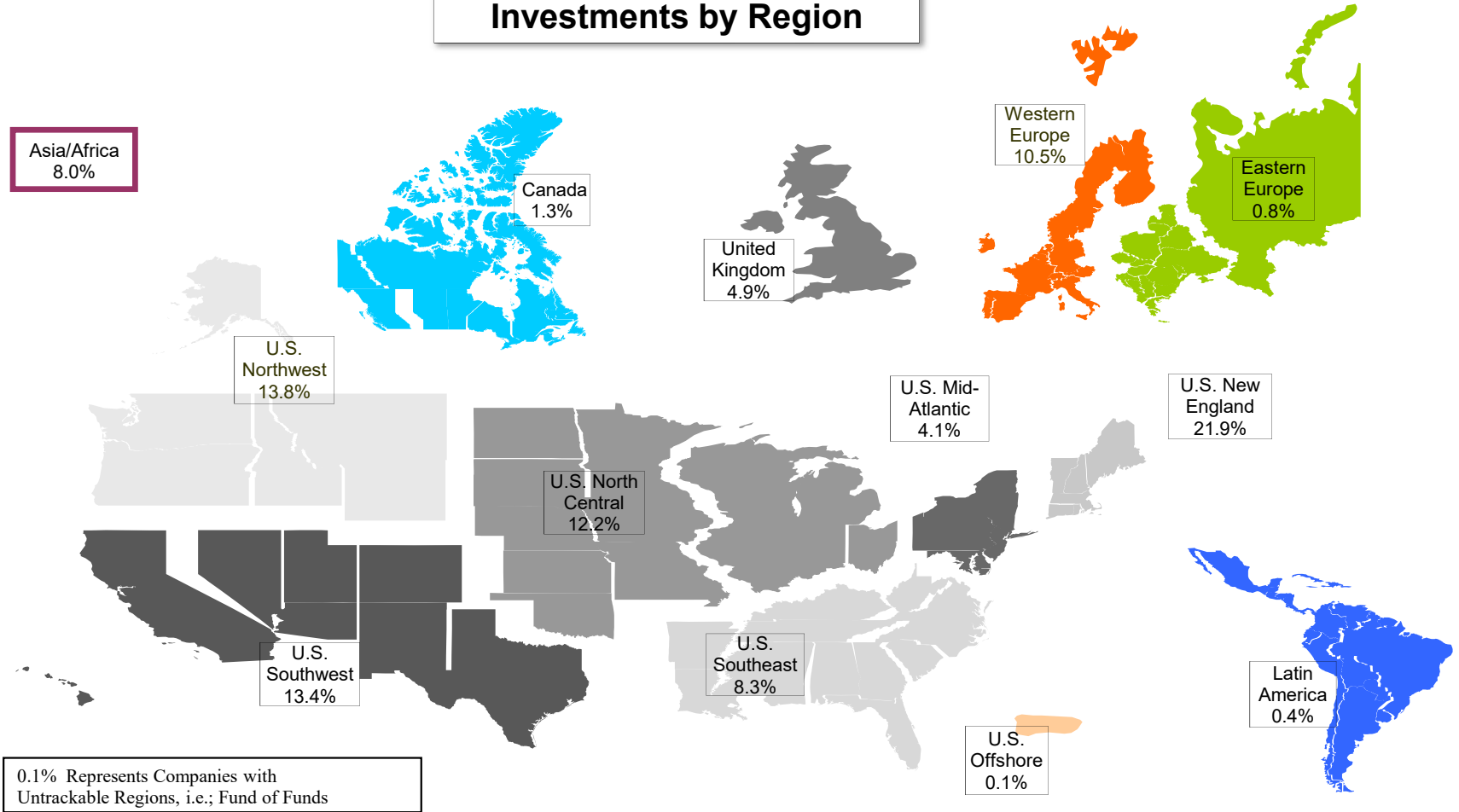
Investments by Industry



These numbers are based on the most recent available General Partner Data; primarily 9/30/20 and are subject to change.

SMRS Private Equity 12/31/20

Investments by Region



Geographic Report: North America 73%, Europe 16%, Asia 8%, Other 3%

SMRS

Private Equity

12/31/20

Portfolio by Vintage Year

(\$ in Millions)

Asset Vintage	Reported Value	Outstanding Commitment	Total Exposure
1986-2005	\$ 257	\$ 99	\$ 356
2006*	318	110	428
2007	143	108	251
2008	379	77	456
2009	15	1	16
2010	207	4	211
2011	601	96	697
2012	1,075	64	1,139
2013	282	80	362
2014	1,454	233	1,687
2015	5,945	483	6,428
2016	2,416	431	2,847
2017	1,152	717	1,869
2018	1,565	1,981	3,546
2019	649	1,791	2,440
2020	206	1,025	1,231
Income Accruals	1	0	1
Cash	360	0	360
Act. Small Cap - Stock Dist	38	0	38
Total	\$ 17,063	\$ 7,300	\$ 24,363

*Liquidation portfolio is 2006 vintage

FX Exposure

(\$ in Millions)

	Reported Value	Outstanding Commitment	Total Exposure	Total (USD)
Euro (\$1.22/ €)	€ 443	€ 350	€ 793	\$970

SMRS

Private Equity

12/31/20

Top 10 Sponsors

(\$ in Millions)

Asset Type	Reported Value	Outstanding Commitment	Total
HarbourVest Partners	\$ 4,349	\$ 554	\$ 4,903
Blackstone Capital Partners	587	322	909
Leonard Green & Partners	522	371	893
Advent International	627	255	882
KKR	656	210	866
Warburg Pincus Capital	608	182	790
The Carlyle Group	443	328	771
Greenspring Associates	144	493	637
Flagship Ventures	468	164	632
InSight Venture Partners	566	64	630
Top 10 Total Value	\$ 8,970	\$ 2,943	\$ 11,913

Cash Weighted Rates of Return*

(Net IRR)	Current Qtr.	1-Year	3-Year	5-Year	10-Year
Buyout	0.0%	12.2%	14.2%	15.4%	14.6%
Fund of Funds	0.0%	14.6%	13.3%	13.5%	12.3%
Mezzanine	0.0%	2.4%	8.6%	10.0%	10.2%
Special Situations	0.4%	5.1%	8.2%	9.9%	10.6%
Venture Capital	0.8%	22.9%	18.5%	15.1%	16.6%

*These numbers are based on most recent available General Partner reported data; primarily 9/30/2020 and are subject to change.

SMRS

Private Equity

12/31/20

Net Market Values by Ownership Entity

	<u>Adjusted Reported Value</u>	<u>Unfunded Commitment</u>
5AM Opportunities I, L.P.	\$ 16,378,597	\$ 14,325,000
5AM Ventures VI, L.P.	9,473,459	10,300,000
Accel Europe I, L.P.	1,411,743	1
Accel Europe II	24,769,141	3,300,000
Accel Growth Fund II, L.P.	12,780,535	0
Accel Growth Fund III, L.P.	11,148,538	280,000
Accel Growth Fund IV L.P.	25,538,156	990,000
Accel Growth Fund V L.P.	16,786,005	11,716,054
Accel IX, L.P.	1,695,668	4,522,725
** Accel Leaders Fund 3, L.P.	0	40,000,000
Accel Leaders Fund II L.P.	9,300,425	0
Accel Leaders Fund L.P.	14,744,462	0
Accel London V L.P.	23,698,940	1,320,000
Accel London VI, L.P.	4,956,133	7,500,000
Accel VI-S	1,976,403	652,611
Accel VI, L.P.	778,536	0
Accel X, L.P.	4,038,200	0
Accel XI, L.P.	4,491,047	1,440,000
Accel XII, L.P.	8,272,579	1,190,000
Accel XIII, L.P.	8,258,053	2,500,000
Accel XIV L.P.	4,855,979	4,950,000
Acorn Bioventures, L.P.	84,868,182	35,000,000
Advent Global Private Equity V	5,451,017	8,700,000
Advent International GPE IX, L.P.	110,483,362	158,125,761
Advent International GPE VI-A L.P.	24,490,916	0
Advent International GPE VII-B, L.P.	129,008,240	12,000,000
Advent International GPE VIII-B, L.P.	329,336,311	11,474,998
Advent International LAPEF VII	0	60,000,000
Advent Latin American Private Equity Fund VI, L.P.	28,077,810	5,180,000
Affinity Asia Pacific Fund III, L.P.	9,286,355	8,520,204
Affinity Asia Pacific Fund IV, L.P.	67,711,324	18,227,850
Affinity Asia Pacific Fund V L.P.	30,844,886	142,099,725
AIP VII, L.P.	3,714,048	71,026,423
Apax Digital, L.P.	37,185,022	24,986,586
Apax Europe Fund VI	17,543,264	2,587,561
Apax Europe VII, L.P.	417,258	1,822,332
Apax IX, L.P.	220,982,612	9,053,846
Apax US VII	1,664,474	417,509

	Adjusted Reported Value	Unfunded Commitment
Apax VIII - B, L.P.	52,968,554	5,890,984
Apax X USD L.P.	2,554,083	148,200,000
Apollo Investment Fund IX, L.P.	24,840,907	73,774,162
Apollo Investment Fund VIII L.P.	71,983,367	13,526,345
Arboretum Ventures II	971,560	0
Arboretum Ventures III, L.P.	6,326,311	0
Arboretum Ventures IV, L.P.	29,342,304	6,810,000
Arboretum Ventures V, L.P.	8,135,044	26,775,000
Ares Corporate Opportunities Fund II	172,835	11,423,773
Ares Corporate Opportunities Fund III, L.P.	5,529,481	6,852,952
Ares Corporate Opportunities Fund IV, L.P.	55,521,015	14,009,449
ASF VIII B	36,369,917	119,067,222
AXA ASF Miller Co-Investment	349,767	6,656,684
Axiom Asia 6, L.P.	0	50,000,000
Axiom Asia Co-Investment Fund I, L.P.	39,916,518	10,425,818
** Axiom Asia Co-Investment Fund II, L.P.	0	50,000,000
Axiom Asia IV, L.P.	59,851,852	9,950,886
Axiom Asia Private Capital Fund III, L.P.	64,590,966	5,729,639
Axiom Asia V, L.P.	28,186,271	24,450,000
BC European Capital IX	80,079,754	8,094,639
BC European Capital VII, L.P.	753,242	0
BC European Capital VIII, L.P.	2,330,148	9,539,341
Berkshire Fund IX Coinvestment Fund, L.P.	15,350,610	27,421,161
Berkshire Fund IX, L.P.	142,812,931	39,332,101
Berkshire Fund VI, L.P.	22,307,290	7,600,677
Berkshire Fund VII, L.P.	7,670,395	2,444,220
Berkshire Fund VIII, L.P.	95,205,088	7,115,318
Blackstone Capital Partners IV	3,855,812	4,580,765
Blackstone Capital Partners V	7,204,988	13,069,148
Blackstone Capital Partners V-S	1,120,681	712,476
Blackstone Capital Partners VI, L.P.	175,867,691	32,907,897
Blackstone Capital Partners VII, L.P.	300,856,831	20,134,627
Blackstone Capital Partners VIII L.P.	0	200,000,000
Bridgepoint Europe IV	11,553,955	5,260,399
Carlyle Europe Partners II	821,286	1,101,978
Carlyle Europe Partners III	7,873,927	2,316,137
Carlyle Europe Partners IV, L.P.	87,692,298	11,852,248
Carlyle Europe Partners V, S.C.SP.	28,082,039	115,462,082
Carlyle Partners V L.P.	28,426,781	53,227,845
Carlyle Partners VI, L.P.	180,786,015	9,479,788
Carlyle Partners VII, L.P.	109,043,047	134,631,507
Centerbridge Capital Partners III, L.P.	77,750,929	17,934,839
Cerberus SMRS Partners, L.P.	27,495,071	23,304,657
Charlesbank Equity Fund IX, L.P.	52,669,210	35,097,941
Charlesbank Fund IX Overage Allocation Program	35,015,182	9,475,061
CircleUp Credit Fund I, L.P.	17,820,341	28,721

	Adjusted Reported Value	Unfunded Commitment
Clearlake Capital Partners VI, L.P.	19,767,003	55,802,241
Clearlake Opportunities Partners II, L.P.	21,349,536	55,939,901
Coller International Partners V, L.P.	8,158,367	2,000,000
Coller International Partners VI, L.P.	27,126,597	29,723,267
Coller International Partners VII, L.P.	115,635,068	40,372,267
Crescent Mezzanine Partners VI, L.P.	20,241,557	5,681,254
Crescent Mezzanine Partners VII	85,164,992	61,005,337
CVC Capital Partners VII, L.P.	117,798,645	65,865,810
CVC Capital Partners VIII, L.P.	0	122,354,996
Dover Street IX, L.P.	71,814,018	20,000,000
Dover Street X, L.P.	37,053,163	116,250,000
EnCap Energy Capital Fund X, L.P.	28,793,453	5,961,000
FIMI Opportunity 6, L.P.	36,520,454	17,272,730
FirstMark Capital I, L.P.	21,802,093	196,596
FirstMark Capital IV, L.P.	37,885,067	6,650,000
FirstMark Capital OF I, L.P.	30,296,878	0
FirstMark Capital OF II, L.P.	58,737,340	0
FirstMark Capital OF III	9,600,498	25,725,000
FirstMark Capital P2, L.P.	0	0
FirstMark Capital V, L.P.	3,842,941	30,975,000
Flagship Pioneering Origination Fund VII	5,037,032	69,000,000
Flagship Pioneering Special Opportunities Fund II, L.P.	34,230,167	65,000,000
Flagship Pioneering VI	128,372,185	25,125,000
Flagship Ventures Fund 2004	19,836	0
Flagship Ventures Fund 2007, L.P.	7,554,982	0
Flagship Ventures Fund IV, L.P.	145,306,503	0
Flagship Ventures Fund V	101,699,424	0
Flagship Ventures Opportunities Fund I, L.P.	45,736,811	5,000,000
Fox Paine Capital Fund II, L.P.	20,876,783	15,382,699
FS Equity Partners VII, L.P.	106,740,274	11,509,522
FS Equity Partners VIII, L.P.	20,074,644	51,695,261
G-IV Acquisition Holdings, LLC	4,721,776	0
GCM Grosvenor Fund Investment Program I, L.P.	9,260,944	1,219,800
GCM Grosvenor Fund Investment Program II, L.P.	16,089,659	13,267,284
GCM Grosvenor Fund Investment Program III - 2004	32,465,638	4,412,859
GCM Grosvenor Fund Investment Program III - 2006	32,464,616	6,351,993
GCM Grosvenor Fund Investment Program V, L.P.	45,312,554	9,043,056
GCM Grosvenor Fund Investment Program VI, L.P.	26,984,455	2,212,878
GCM Grosvenor Fund Investment Program VIII, L.P.	86,068,364	16,161,087
GCM Grosvenor SeasPriFIP LP (PIS06-10)	34,762,133	13,809,167
GCM Grosvenor SeasPriFIP LP (PIS14)	211,782,142	10,432,796
GCM Grosvenor SeasPriFIP LP (Seed)	28,787,478	16,533,172
Genstar Capital Partners IX, L.P.	33,867,080	47,311,013
Genstar Capital Partners VIII, L.P.	71,190,937	4,990,051
Genstar IX Opportunities Fund I, L.P.	32,984,676	20,054,814
Genstar VIII Opportunities Fund I, L.P.	64,427,121	2,517,673

	Adjusted Reported Value	Unfunded Commitment
Golden Bell Azalea, LLC	13,971,352	0
Green Equity Investors V	120,140,005	25,966,435
Green Equity Investors VI, L.P.	135,289,847	10,453,635
Green Equity Investors VII, L.P.	223,407,752	25,776,933
Green Equity Investors VIII, L.P.	32,904,941	217,095,059
Greenspring Master G, L.P.	129,753,242	481,000,000
Greenspring Micro II, L.P.	14,696,580	12,216,263
GSO Capital Opportunities Fund II, L.P.	6,952,909	8,061,963
GSO Capital Opportunities Fund III, L.P.	62,784,159	20,122,404
GSO COF III Co-Investment Fund, L.P.	28,701,283	22,859,200
** GTCR Fund XIII, L.P.	0	50,000,000
HarbourVest Credit Opportunities Fund II, L.P.	18,856,514	56,250,000
HarbourVest Dover Street VIII, L.P.	21,310,887	6,075,000
HarbourVest Int'l III Partnership	151,260	1,200,000
Harbourvest Partners Co-Investment Fund IV L.P.	103,372,841	19,107,835
HarbourVest Partners Co-Investment Fund V L.P.	159,689,975	80,000,000
HarbourVest Partners Mezzanine Income Fund	68,169,362	16,310,000
HarbourVest V Partnership	127,310	300,000
HarbourVest VI - Direct Fund L.P.	1,996,983	750,000
HarbourVest VI Partnership	372,290	2,000,000
Harvest Partners VII, L.P.	88,176,920	3,801,792
Harvest Partners VIII	59,160,805	44,542,004
HPS Mezzanine Partners III, L.P.	41,779,656	5,909,466
Insight Partners XI, L.P.	53,886,329	51,800,000
Insight Venture Partners GBCF, L.P.	119,337,597	6,664,610
Insight Venture Partners IX, L.P.	237,821,093	3,110,681
Insight Venture Partners X, L.P.	155,381,769	2,200,000
Jade Equity Investors, L.P.	10,093,041	91,223,637
Kelso Investment Associates IX, L.P.	80,939,578	9,685,670
Kelso Investment Associates VII	157,744	0
Kelso Investment Associates VIII	26,713,835	7,416,504
Kelso Investment Associates X, L.P.	39,887,341	61,958,738
Khosla Ventures III, L.P.	13,818,555	750,000
Khosla Ventures IV, L.P.	71,823,557	950,000
Khosla Ventures Seed D, L.P.	6,840,398	3,000,000
Khosla Ventures V, L.P.	64,985,032	1,750,000
Khosla Ventures VI, L.P.	49,816,810	24,675,000
KKR 2006 Fund, L.P.	65,284,306	4,912,601
KKR Americas Fund XII, L.P.	167,501,427	80,932,273
KKR Asian	1,052,137	0
KKR Asian Fund II, L.P.	41,587,901	0
KKR Asian Fund III	79,229,557	34,853,752
KKR China Growth Fund	20,056,103	3,383,656
KKR European Fund II	1,069,831	0
KKR European Fund III	6,643,804	6,430,608
KKR European Fund IV L.P.	112,736,994	255,682

	Adjusted Reported Value	Unfunded Commitment
KKR European Fund V (USD) SCSp	55,953,185	73,392,885
KKR Millennium Fund	232,956	0
KKR North America Fund XI, L.P.	105,057,031	5,550,428
Lead Edge Capital IV, L.P.	27,339,154	4,049,876
Lead Edge Capital V, L.P.	1,500,000	28,500,000
Lightspeed Opportunity Fund, L.P.	11,519,351	14,125,000
Lightspeed Venture Partners Select IV, L.P.	5,024,874	19,500,000
Lightspeed Venture Partners VII, L.P.	10,912,035	0
Lightspeed Venture Partners XIII, L.P.	2,128,104	7,800,000
Menlo Special Opportunities Fund II, L.P.	15,372,174	16,332,259
Menlo Ventures IX, L.P.	952,261	0
Menlo Ventures X, L.P.	2,122,405	0
Menlo Ventures XI, L.P.	24,560,123	0
Menlo Ventures XIV, L.P.	8,171,802	700,000
Menlo Ventures XV, L.P.	2,500,000	22,500,000
Meritech Capital Partners IV, L.P.	7,052,039	300,000
Meritech Capital Partners V, L.P.	54,621,675	1,450,000
Meritech Capital Partners VI, L.P.	56,409,447	3,025,000
Meritech Capital Partners VII, L.P.	2,550,000	39,950,000
Michigan Growth Capital Partners II, L.P.	136,030,347	2,834,931
Michigan Growth Capital Partners III, L.P.	91,849,889	43,876,185
Michigan Growth Capital Partners, L.P.	70,375,251	8,631,142
New Leaf Biopharma Opportunities II, L.P.	106,250,307	8,000,000
New Leaf Growth Fund I, L.P.	64,141,932	0
New Leaf Ventures II, L.P.	6,239,417	0
New Leaf Ventures III, L.P.	42,387,051	0
New Leaf Ventures IV, L.P.	34,886,557	20,562,500
Nordic Capital VI, L.P.	62,325	1
Nordic Capital VII	335,288	3,421,841
Nordic Capital VIII, L.P. (Alpha)	36,525,990	2,302,387
Oak Investment Partners X, L.P.	405,444	0
Oak Investments Partners IX, L.P.	138,392	0
Oaktree Opportunities Fund X, L.P.	25,661,248	5,100,000
Oaktree Opportunities Fund Xb, L.P.	40,877,293	31,500,000
OCM Opportunities Fund IX, L.P.	47,614,307	0
OCM Opportunities Fund VII (B), L.P.	95,717	2,500,000
OCM Opportunities Fund VII, L.P.	362,938	0
OCM Opportunities Fund VIII B, L.P.	9,683,788	0
OCM Opportunities Fund VIII, L.P.	941,654	0
OCM Principal Opportunities Fund IV	546,746	4,998,467
Ocqueoc Holdings, LLC	177,435	48,399,304
Odyssey Investment Partners Fund VI, L.P.	13,709,957	84,813,551
Parthenon Investors II	450,527	3,186,779
Parthenon Investors III	29,886,776	2,656,037
Parthenon Investors IV, L.P.	46,558,960	1,813,379
Peninsula Fund VI, L.P.	34,472,351	3,530,301

	Adjusted Reported Value	Unfunded Commitment
Permira Growth Opportunities I, L.P.1	18,933,566	33,375,000
Permira VII L.P. 1	32,170,669	59,930,803
PPC Fund II	61,365,893	21,402,886
Public Pension Capital, LLC	38,908,415	47,625,970
Renaissance Venture Capital Fund IV, L.P.	867,396	24,000,000
Rhone Partners V, L.P.	117,813,728	16,029,675
Riverside Capital Appreciation Fund VI, L.P.	34,776,843	6,100,550
Riverside Capital Appreciation Fund VII, L.P.	65,705,456	45,741,043
Riverside Micro Cap Fund I, L.P.	13,797,381	5,632,976
Riverside Micro-Cap Fund II, L.P.	61,540,168	2,735,834
Riverside Micro-Cap Fund III, L.P.	116,176,233	4,347,998
Riverside Micro-Cap Fund IV	65,816,811	3,617,302
Riverside Micro-Cap Fund IV B, L.P.	8,325,381	7,255,266
Riverside Micro-Cap Fund V, L.P.	32,516,320	66,093,423
Science Ventures Fund II, L.P.	25,100,480	3,800,000
Science Ventures Fund III, L.P.	4,517,086	20,000,000
Shamrock Capital Content Fund I, L.P	34,728,398	17,971,282
Shamrock Growth Capital Fund IV, L.P.	32,711,216	14,910,392
Silver Lake Partners II	22,412	3,531,586
Silver Lake Partners III	11,030,487	11,777,723
Silver Lake Partners IV, L.P.	73,817,919	2,084,020
Silver Lake Partners V, L.P.	83,799,334	13,140,300
Silver Lake Partners VI, L.P.	0	75,000,000
Silver Lake SL SPV-2	45,673,873	0
SK Capital Partners V, L.P.	19,766,680	28,340,152
SKCP Catalyst Fund I-A, L.P.	7,306,297	25,573,440
SM/TCP L.P.	14,251,232	1,386,616
SMRS - TOPE LLC	3,228,370,744	6,160,571
SMRS-CAPP LLC	89,375,225	53,331,651
SMRS-NCRP LLC	548,531,521	175,958,521
Summit Partners Growth Equity Fund X, L.P.	49,541,130	53,979,998
Sycamore Partners III, L.P.	17,570,484	75,966,971
TCW/Crescent Mezzanine Partners V, LLC	6,011,297	12,395,466
TCW/Crescent Mezzanine Partners VC Secondary	1,889,964	0
The Huron Fund III, L.P.	5,999,289	2,072,756
The Huron Fund IV, L.P.	31,869,102	2,502,309
The Huron Fund V, L.P.	12,161,792	22,083,436
The Shansby Group 5 (TSG5)	0	4,261,291
Thoma Bravo Discover Fund II, L.P.	72,735,624	15,225,864
Thoma Bravo Fund XII, L.P.	203,997,583	29,327,414
Thoma Bravo Fund XIII, L.P.	112,220,157	59,984,391
Thoma Bravo XIV	0	125,000,000
TI Platform BOV, L.P.	6,110,297	8,709,309
TI Platform Fund II, L.P.	5,463,222	9,100,088
TI Platform SMRS SMA, L.P.	25,281,076	35,199,046
TPG Healthcare Partners, L.P.	5,344,400	18,228,555

	Adjusted Reported Value	Unfunded Commitment
TPG IV (Texas Pacific Group IV)	607,369	211,725
TPG Partners III, L.P.	8,873	2,087,002
TPG Partners VI, L.P.	43,761,861	8,329,720
TPG Partners VIII, L.P.	13,247,895	107,654,345
TPG Partners, VII, L.P.	125,725,253	14,220,523
TPG V (Texas Pacific Group V)	3,168,697	5,841,509
Trilantic Capital Partners V (North America) Fund A, LP	26,970,213	3,119,369
Trilantic Capital Partners VI (North America) L.P.	16,980,524	56,590,295
TSG6, L.P.	45,944,375	21,746,137
TSG7 A L.P.	131,420,922	29,023,127
TSG8, L.P.	21,025,421	119,113,056
Turnbridge Capital Partners I , L.P.	49,946,404	30,387,163
Veritas Capital Fund V, L.P.	165,481,083	8,918,273
Veritas Capital Fund VI, L.P.	193,120,892	1,743,928
Veritas Capital Fund VII, L.P.	18,556,297	80,250,823
Veritas V Co-Investors, L.P.	79,811,974	0
Vista Equity Endeavor Fund I, L.P.	42,527,990	7,576,019
Vista Equity Endeavor Fund II, L.P.	6,080,232	58,320,001
Vista Equity Partners Fund V, L.P.	54,860,924	11,426,692
Vista Equity Partners Fund VI, L.P.	100,775,041	17,471,861
Vista Equity Partners VII, L.P.	37,827,494	38,509,125
Vista Foundation Fund III, L.P.	28,339,608	7,875,864
Vista Foundation Fund IV, L.P.	275,110	73,710,165
Warburg Pincus China-Southeast Asia II, L.P.	11,973,122	61,950,000
Warburg Pincus China, L.P.	57,955,318	2,632,500
Warburg Pincus Energy MCIP, L.P.	0	10,396,887
Warburg Pincus Energy, L.P.	51,345,715	10,300,000
Warburg Pincus Equity Partners, L.P.	1,181,161	0
Warburg Pincus Financial Sector, L.P.	39,560,515	11,227,500
Warburg Pincus Global Growth, L.P.	67,256,114	82,200,000
Warburg Pincus International Partners	0	1,018
Warburg Pincus Private Equity IX	6,572,874	0
Warburg Pincus Private Equity VIII, L.P.	0	3,457
Warburg Pincus Private Equity X, L.P.	30,115,402	0
Warburg Pincus Private Equity XI, L.P.	110,495,504	0
Warburg Pincus Private Equity XII Secondary, L.P.	28,878,398	337,500
Warburg Pincus Private Equity XII, L.P.	202,365,638	2,362,500
* Total Private Equity	\$16,664,034,767	\$ 7,300,166,809
Cash	328,167,465	0
Active Small Cap Cash	31,394,144	
Active Small Cap	38,321,707	0
Income Accruals	1,347,487	0
Grand Total	\$17,063,265,570	\$ 7,300,166,809

* Total Private Equity amounts do not include Cash and Active Small Cap

** New Commitments made during quarter reported

State of Michigan Retirement System

REAL ESTATE AND INFRASTRUCTURE REVIEW

State of Michigan Investment Board Meeting
March 25, 2021



Todd A. Warstler
Senior Investment Manager
Real Estate and Infrastructure Division

EXECUTIVE SUMMARY

Performance

MPSERS Plan (12/31/20)	1-Year	3-Years	5-Years	7-Years	10-Years
Annualized Returns	-6.8%	3.8%	6.0%	8.4%	9.2%
NCREIF NPI	0.3%	3.5%	4.6%	6.4%	7.6%
Peer Median Returns	0.9%	5.1%	6.5%	8.4%	9.2%
Percentile Rank vs. Peers*	93	72	66	55	56

*State Street Universe greater than \$1 billion

- Underperformance relative to the one-year benchmark resulted from the Real Estate and Infrastructure Division's (REID) strategy of being overweight in hospitality and performance in the infrastructure portfolio particularly in the energy sector.

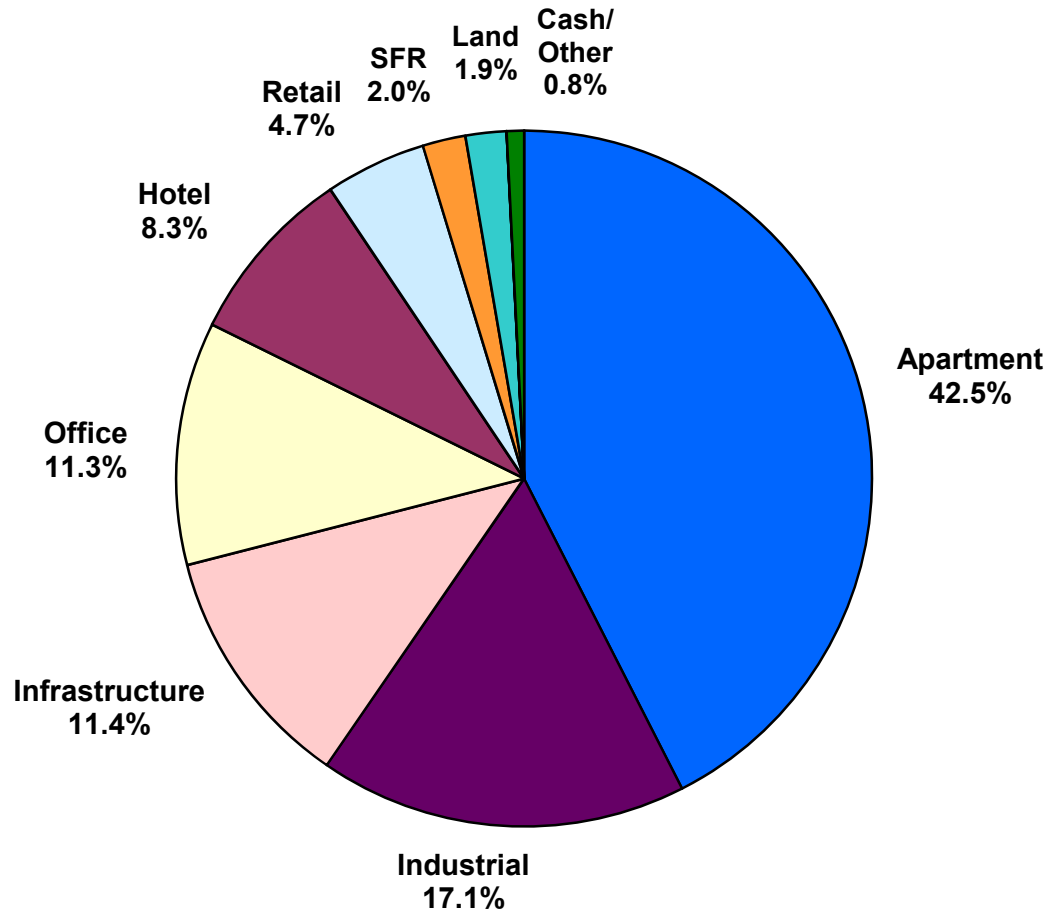
Strategy Update

- The COVID-19 global pandemic and Shelter-in-Place orders implemented to slow the spread of the virus resulted in major negative impacts to the US economy and commercial real estate and infrastructure markets. Large segments of the US economy remain shuttered to various degrees with economic reopening at various stages across the country. The impacts being felt in the commercial markets have been uneven across the real estate and infrastructure sectors. We continue to monitor, assess, and shift strategies, as necessary. US and foreign investors remain cautious and transaction volumes have dropped to very low levels for some sectors while rebounding nicely for others.
- We are focused on sourcing off-market opportunities through our extensive network and where available reducing risk in the portfolio through early income-generating investments including credit strategies that are higher in the capital stack with a shorter projected hold period. We have selectively acquired properties where we can add value through management and leasing and have continued to develop properties at attractive risk-adjusted returns. The team continues to assemble portfolios in both traditional and non-traditional real estate sectors that we believe will become institutional property types, providing above-market appreciation and total returns.
- We have been actively managing the portfolio with capital returned of just under \$620 million, and funding for new or existing investments of just over \$643 million over the past 12 months.
- The REID has approximately \$1.5 billion in unfunded commitments. Three new commitments were made during the quarter.
 - €32.5 million (\$39.6 million) in BGO Europe III Co Invest, a closed-end co-investment vehicle investing in an Italian logistics portfolio alongside our GreenOak Europe III, LP fund, managed by GreenOak Europe III GP, LP.
 - \$100 million in Rialto Real Estate Fund IV-Debt, LP, a closed-end commingled fund specializing in credit strategies including distressed debt, non-performing loans, subordinated debt, mezzanine, and commercial mortgage-backed securities, managed by Rialto Capital Management, LLC.
 - \$100 million in Kayne Renewable Opportunities Partners, LP, a closed-end commingled fund specializing in renewable infrastructure, primarily focused on solar and wind, managed by Kayne ROP Fund Manager, LP.

SMRS

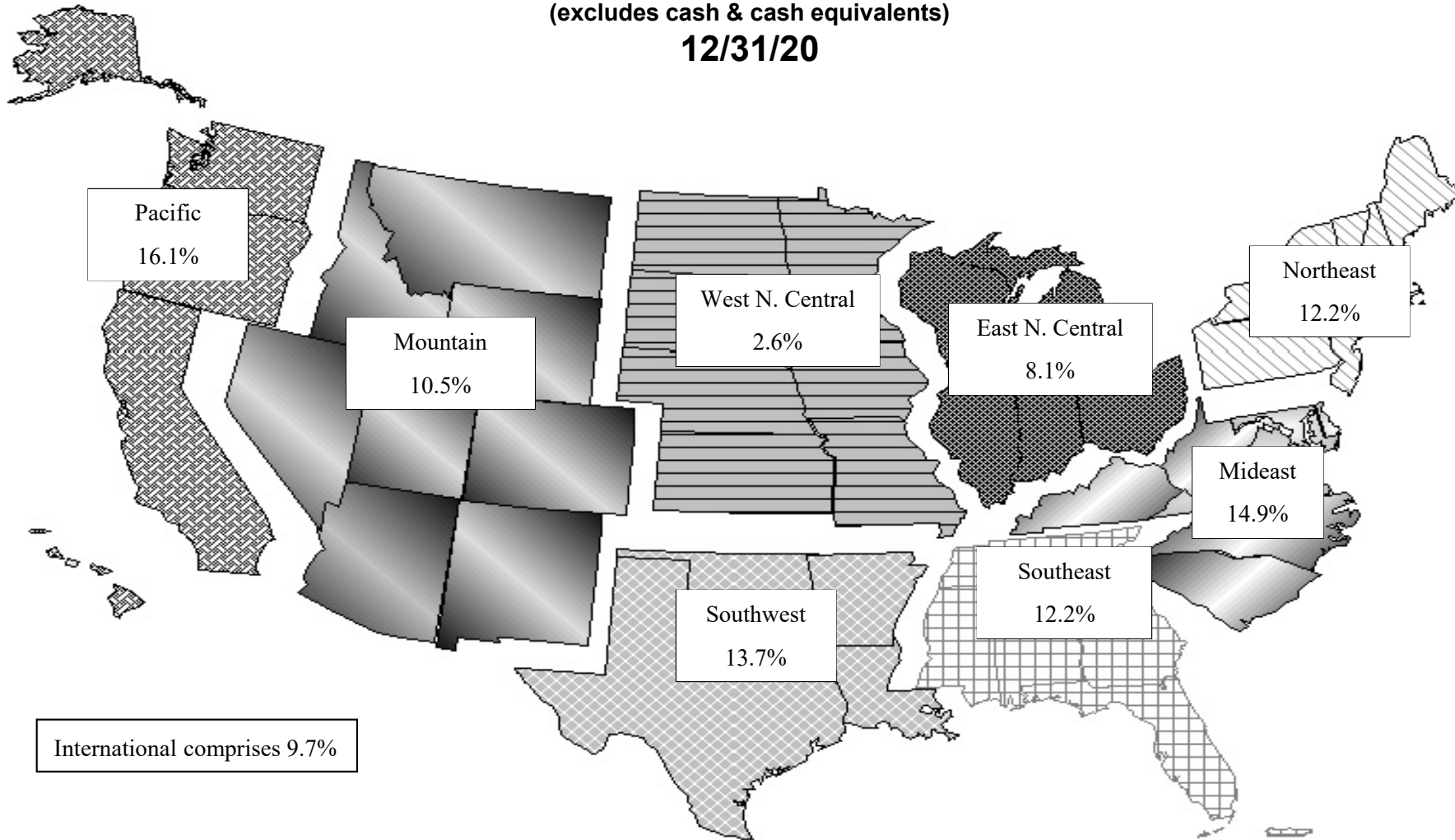
Real Estate and Infrastructure

12/31/20



Market Value in Millions				
	<u>12/31/20</u>		<u>12/31/19</u>	
Apartment	\$2,664	42.5%	\$3,003	42.4%
Industrial	1,070	17.1%	767	10.8%
Infrastructure	715	11.4%	830	11.7%
Office	709	11.3%	819	11.6%
Hotel	523	8.3%	910	12.9%
Retail	296	4.7%	329	4.6%
Single Family Residential (SFR)	128	2.0%	195	2.8%
Land	116	1.9%	86	1.2%
	<u>\$6,221</u>	<u>99.2%</u>	<u>\$6,939</u>	<u>98.0%</u>
Cash/Other	48	0.8%	145	2.0%
Total Investments	<u>\$6,269</u>	<u>100.0%</u>	<u>\$7,084</u>	<u>100.0%</u>

SMRS
Real Estate by Region
Based on Market Value
(excludes cash & cash equivalents)
12/31/20



3

Geographic regions defined by NCREIF, whose property index composition is: Pacific 33.7%, Mountain 6.6%, West N. Central 1.2%, Southwest 10.8%, East N. Central 6.9%, Southeast 9.9%, Northeast 19.5%, Midwest 11.4%

SMRS
Real Estate and Infrastructure
12/31/20

**Top Ten
Advisors or Entity**

<u>Advisor or Entity</u>	(\$ in millions)
	<u>Market Value</u>
MWT Holdings LLC	\$ 1,954
Principal Real Estate Investors	626
Clarion Partners	422
Domain Capital Advisors Inc	272
Five Star Realty Partners LLC	252
Rialto Capital Management LLC	226
Blackstone Group	220
Transwestern Investment Management	182
L&B Realty Advisors	171
CIM Investment Advisors LLC	166
	<hr/>
	\$ 4,491

**Occupancy
by Property Type**

	Apartment	Office	Industrial	Retail	Hotel
SMRS Portfolio	93.3%	87.0%	95.6%	88.1%	20.7%
National Average	93.6%	86.0%	92.4%	95.0%	48.0%

SMRS
Market Values by Ownership Entity
12/31/20
REAL ESTATE

	<u>Market Value</u>	<u>Unfunded Commitment</u>
801 Grand Avenue Capital, LLC	\$ 57,318,940	\$ 0
AEW Senior Housing III	3,878,658	715,013
AEW Senior Housing Investors IV	18,365,502	15,771,635
Apollo Asia Real Estate Fund	54,072,862	25,751,871
Asana Partners Fund I	26,418,999	3,499,559
Asana Partners Fund II	13,851,906	33,217,905
Avanath Affordable Housing II, LLC	33,279,203	0
Avanath II SMRS Co-Investment Fund LLC	13,115,581	0
Avanath Affordable Housing III	43,255,164	5,311,980
Avanath Affordable Housing IV	9,410,834	24,546,772
* BGO Europe III Co Invest	0	39,695,500
Blackstone R/E Partners V, LP	1,393,350	0
Blackstone R/E Partners VI, LP	3,223,720	3,680,930
Blackstone R/E Partners VIII, LP	55,682,344	13,216,634
Blackstone R/E Partners IX, LP	66,558,808	139,893,012
Capri Urban Investors, LLC	6,912,623	0
CIM Commercial Trust Corp	8,369,047	0
CIM Fund III, LP	31,910,972	0
CIM Fund VIII, L.P.	94,778,388	0
CIM VI (Urban REIT), LLC	30,258,839	0
Clarion Gables Multifamily Trust, LP	31,378,580	0
Columbus Circle Holdings, LLC	165,696,017	150,900,159
Crown Small Cap Real Estate	15,849,899	4,402,500
DM2501, LLC	0	0
Domain GVA-1, LLC	27,423,355	1,940,056
Domain Hotel Properties, LLC	127,057,172	0
Eastport Properties, LLC	0	0
Gateway Capital Real Estate Fund II, LP	2,851,801	0
Great Lakes Property Group Trust	8,454,692	746,897
GreenOak Europe III, LP	28,624,663	59,571,008
Heitman Credit	48,124,759	0
IDR Core Property Index Fund LLC	25,228,975	0
IMRF II CoInvest Spiga LP	56,636	0
India Property Fund II, LLC	15,489,136	1,552,610
Invesco Mortgage Recovery Feeder Fund	1,041,150	0
Invesco Mortgage Recovery Fund II, L.P.	23,617,257	34,249,727
Invesco Strategic Opportunities III, L.P.	23,831,924	82,461,385
IPF II Co-Invest LP	16,648,365	1,270,897
JBC Funds North LaSalle LLC	18,766,928	0
JBC Opportunity Fund III, LP	495,673	0
KBS/SM Fund III, LP	48,049,285	0
KBS/SM Fund IV	145,574	0
L-A Saturn Acquisition	32,499,713	0
Landmark Real Estate Partners V, LP	6,039,495	0

	<u>Market Value</u>	<u>Unfunded Commitment</u>
LaSalle Asia Opportunity Fund III, LP	1,226,418	0
Lion Industrial Trust	259,047,162	0
Lion Mexico Fund, LP	4,680,048	0
Lombard GVA0016 (former AGL Annuity)	252,204,888	0
Lone Star Fund X LP	160,663,504	29,311,293
Lone Star Fund XI LP	5,497,612	182,258,993
Lubert-Adler Real Estate Fund VII, LP	52,207,377	6,538,662
M301W ColInvest LLC	1,368,327	0
MERS Acquisitions Ltd.	171,022,778	0
MIP Holdco LLC	146,887,428	4,989,782
MSREF V - International	2,404,173	0
MSRESS Fund III Institutional LP	6,024,415	0
MWT Holdings, LLC	1,954,989,341	0
Northpark Land Associates	38,002,469	1,096,526
Orange Investors LLC	414,196	0
Paladin Realty Brazil Investors III (USA), LP	6,801,657	0
Paladin Realty Latin America Investors IV-CI, LP	24,995,992	0
Paladin Realty TB COINV V LP	9,616,741	0
Penmain Office LLC	41,290,274	0
Principal Separate Account	569,527,840	139,945,564
Proprium RE Spec. Situations Fund, LP	99,662,905	0
Rialto Absolute Partnership I	68,081,733	0
Rialto Credit Partshp LP	19,661,344	0
Rialto Real Estate Fund, LP	19,417,935	0
Rialto Real Estate Fund II, LP	23,720,658	0
Rialto Real Estate Fund III-Debt, LP	38,405,902	0
Rialto Real Estate Fund III-Property, LP	41,923,539	0
* Rialto Real Estate Fund IV-Debt, LP	15,000,000	85,000,000
Rialto Mezzanine Partners Fund	242,626	0
SM Brell II LP	18,597,450	0
Stockbridge RE Fund II-C, LP	5,439,217	0
Strategic II LLC	59,579,928	30,946,825
TPG RE Finance Trust Inc. (TRTX)	51,233,450	0
TPG Real Estate Partners II	22,124,094	9,964,803
TPG Real Estate Partners III	10,360,650	34,806,967
TSP Spartan C-II LLC	15,923,064	0
TSP Value & Income Fund II, LP	19,976,558	28,002,385
Trophy Property Development LP	214,639	0
True North High Yield Invest. Fund II, LLC	1,872,734	0
True North Real Estate Fund III, LLC	26,697,287	5,000,000
	<u>\$ 5,506,435,142</u>	<u>\$ 1,200,257,849</u>
Short-Term Investments and Other	35,564,958	0
Total Real Estate Investments	<u>\$ 5,542,000,100</u>	<u>\$ 1,200,257,850</u>

* New or additional commitment made during the quarter reported

SMRS
Market Values by Ownership Entity
12/31/20

INFRASTRUCTURE

	<u>Market Value</u>	<u>Unfunded Commitment</u>
Arclight Energy Partners VI, LP	\$ 32,563,608	\$ 7,004,763
Arclight Energy Partners VII, LP	3,640,124	45,215,863
ASF VI Infrastructure B LP	22,730,387	7,109,541
ASF VII Infrastructure Fund B L.P.	17,586,251	14,270,128
ASF Como Co-Investment LP	6,795,023	2,405,051
Basalt Infrastructure Partners, LP	42,104,635	2,219,045
Blackstone Energy Partners, LP	12,264,256	4,728,291
Blackstone Energy Partners II, LP	58,998,997	8,454,348
Brookfield Infrastructure Fund II-B, L.P.	53,921,109	4,414,002
Customized Infrastructure Strategies, LP	19,063,172	4,551,587
Dalmore Capital Fund	68,609,871	0
GCM Grosvenor Infrastructure Investment Program, L.P.	62,446,094	0
GCM Grosvenor Customized Infrastructure Strategies II, L.P.	36,094,451	11,355,972
Global E&P Infrastructure Fund II L.P.	46,621,787	3,722,004
GSO Energy Select Opportunities Fund LP	18,489,750	23,237,456
GSO Energy Select Opportunities Fund II, LP	3,643,722	46,574,092
JPMorgan AIRRO India SideCar Fund US, LLC	74,817,607	1,312,998
JPMorgan AIRRO Fund II	8,553,368	7,013,452
* Kayne Renewable Opportunities Partners, LP	12,774,457	87,010,800
KKR Eagle CoInvest L.P.	30,282,237	1,853,268
KKR Global Infrastructure Investors, LP	7,807,783	2,935,433
Ridgewood Water & Strategic Infrastructure Fund LP	12,147,901	38,564,918
RPEP SMRS Infra II, LLC	13,704,171	3,469,723
StonePeak Infrastructure Fund LP	49,405,869	9,900,211
	<u>\$ 715,066,630</u>	<u>\$ 337,322,946</u>
Short-Term Investments and Other	12,011,765	0
Total Infrastructure Investments	<u>\$ 727,078,395</u>	<u>\$ 337,322,946</u>
TOTAL INVESTMENTS	<u>\$ 6,269,078,495</u>	<u>\$ 1,537,580,796</u>

* New or additional commitment made during the quarter reported

State of Michigan Retirement System

REAL RETURN & OPPORTUNISTIC REVIEW

State of Michigan Investment Board Meeting
March 25, 2021



Jennifer Yeung
Senior Investment Manager
Real Return & Opportunistic Division

EXECUTIVE SUMMARY

Performance

MPSERS Plan (12/31/20)	1-Year	3-Years	5-Years	7-Years	10-Years
Real & Opportunistic	16.8%	14.7%	12.4%	13.2%	11.1%
Custom Benchmark	6.2%	6.7%	7.1%	7.0%	7.2%

- The portfolio value is \$10.7 billion with a one-year return of 16.8%. As global markets rebounded in the fourth quarter of 2020, the valuation of our portfolio holdings increased as well.
- Performance for the year was driven by i) income earned from entertainment royalties, investments in asset managers, credit investments and natural resource strategies and ii) capital appreciation of our natural resources and media and entertainment assets.

Strategy Update

- The objective of the Real Return & Opportunistic portfolio is to provide an inflation hedge and/or to gain exposure to attractive opportunities that may not fit in another plan portfolio.
- During the quarter, the Real Return & Opportunistic portfolio continued to benefit from exposure to assets with low equity beta and diversity of strategy, industry and geography.
- The Real Return & Opportunistic portfolio has approximately \$3.4 billion of unfunded commitments. The following are new commitments closed during the quarter.
 - \$125.0 million to Sixth Street Specialty Lending Europe II (USD Feeder), L.P., a comingled fund focused on originating European middle-market credit opportunities. The Fund will primarily target senior debt securities and is expected to generate a high single digit percentage cash yield.
- In addition to monitoring the impact of COVID-19 and pace of economic recovery, we remain focused on finding differentiated strategies that are additive to the current portfolio mix and continue to favor private credit opportunities and niche strategies with some scalability. Specifically, we like opportunities that have defensible, contractual cash flows and offer structural downside protection. We continue to be selective and favor experienced investment teams with a proven track record.

SMRS

Real Return and Opportunistic

12/31/20

Top Ten Advisors or Entities

(\$ in Millions)

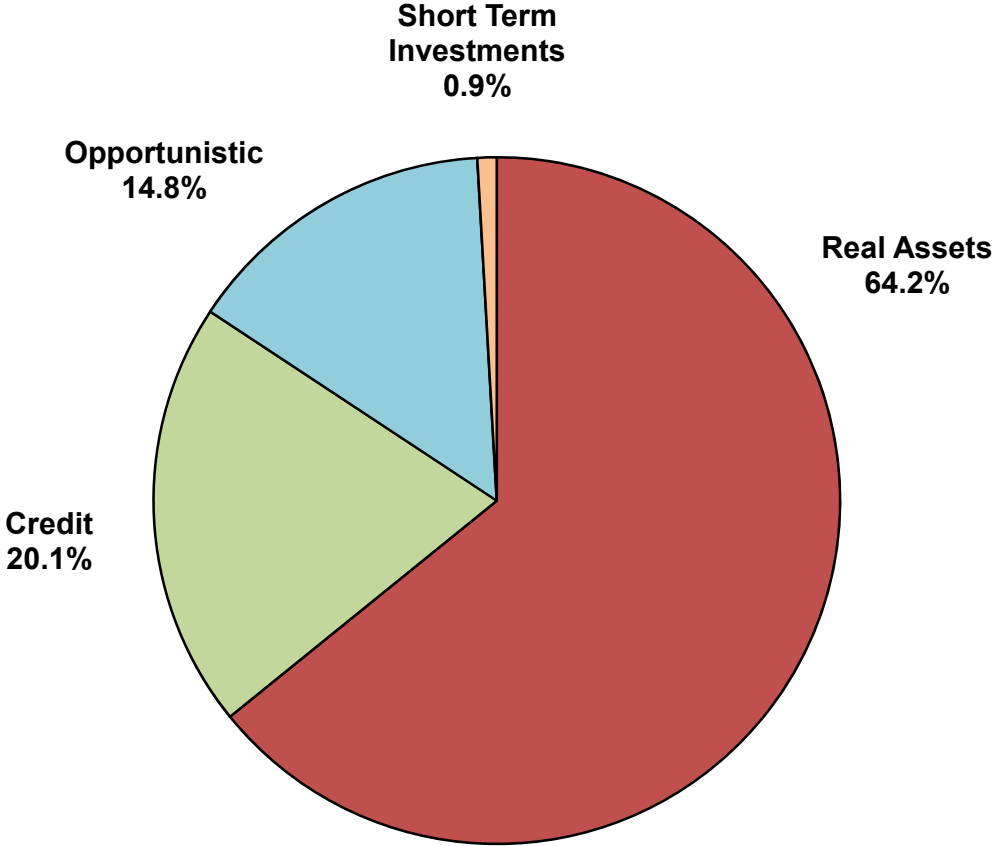
<u>Advisor or Entity</u>	<u>Market Value</u>
Great Mountain Partners LLC	\$ 4,309
Apollo Global Management	1,054
Barings Alternative Investments	850
Domain Capital Advisors	786
Sixth Street Partners	477
Blackstone Alternative Asset Management	340
Czech Asset Management	316
Kayne Anderson Capital Partners	300
Orion Resource Partners	257
HPS Investment Partners	235
Total Market Value	\$ 8,924

SMRS

Real Return and Opportunistic

12/31/20

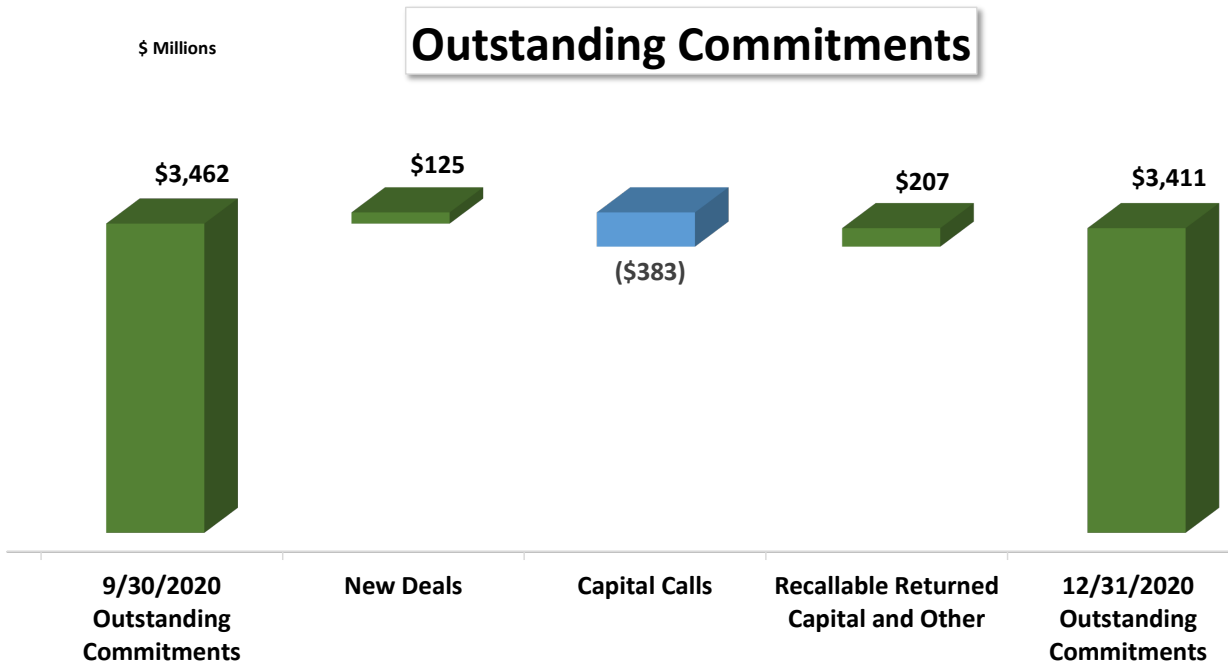
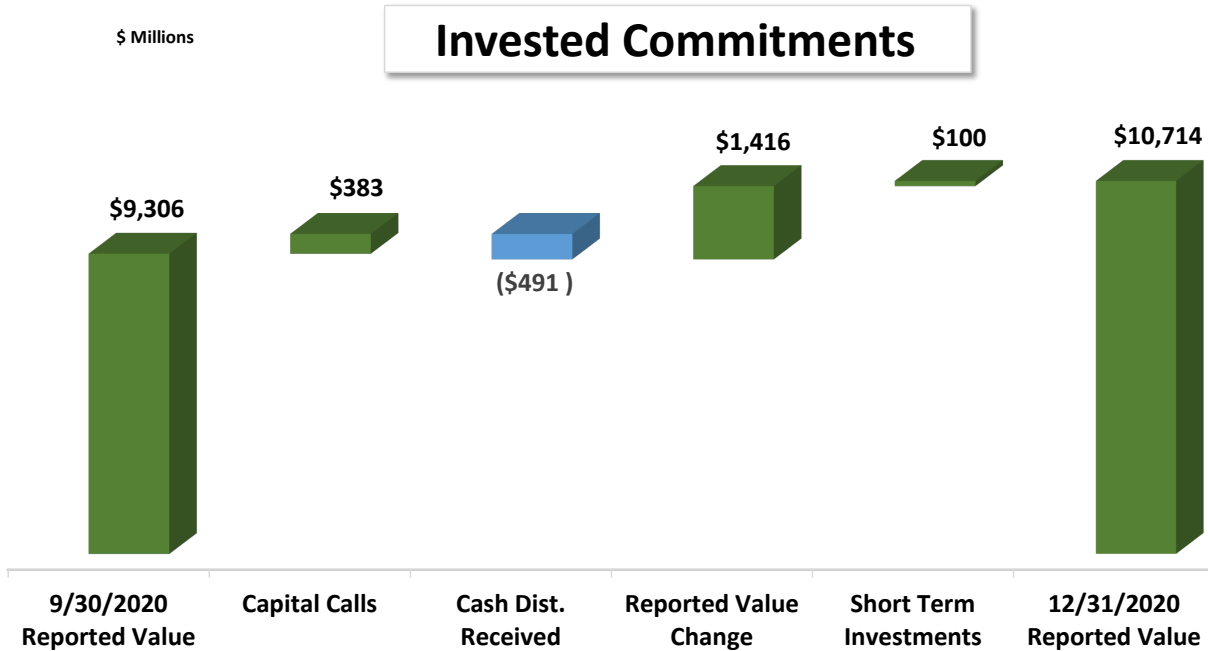
Investments By Strategy



Market Value in Millions	
	<u>12/31/20</u>
Real Assets	\$6,871
Credit	2,157
Opportunistic	1,586
Short Term Investments	<u>100</u>
Total Investments	<u>\$10,714</u>

SMRS

Real Return and Opportunistic 12/31/20



SMRS

Real Return and Opportunistic

12/31/20

Net Market Value by Entity

	Net Market Value	Unfunded Commitment
* Abernathy	\$ 272,948,351	\$ 9,247,812
* Abernathy II	4,229,473	5,320,450
Altus Midstream	8,305,500	0
Angelo Gordon Credit Solutions Fund	81,126,728	24,795,189
Apollo European Principal Finance Fund II	11,281,232	8,168,753
Apollo HK TMS Investments Holdings LP	212,737	0
Axton Holdings	2,683,801,736	0
Barings Asset Based Income Fund I	150,256,706	126,378,012
Barings Global Real Asset Fund I	57,240,146	28,806,102
Blackstone Strategic Capital Holdings, LP	73,723,962	51,093,568
Blue Peninsula Fund LP	150,877,815	38,423,398
Broadriver III	116,887,145	82,378,820
BSCH Parallel (MLG) I LP	162,368,200	0
BSCH II	36,147,676	217,500,000
Blackstone Strategic Capital Holdings (Side Car) L.P.	67,480,180	34,890,166
Carlyle Energy Mezzanine Opportunity Fund II	17,343,347	7,721,298
Carlyle IEP Co-Invest (Varo)	13,689,734	837,818
Carlyle International Energy Partners	47,898,450	15,117,996
Carlyle International Energy Partners II	22,172,105	121,438,847
Castle Credit SMRS Holdings LLC	133,693,400	76,419,243
Centerbridge SCP III	22,461,302	3,025,715
Centerbridge SCP III, LP – Flex, L.P.	20,900,812	56,269,030
Content Holdings, LLC	395,186,883	43,087,685
Credit Opportunity Fund III	16,066,783	19,711,623
Energy Recap and Restructuring	11,508,941	7,085,025
ERR MI Holdings LP	1,830,431	2,269,933
FCO MA MI LP	154,769,023	39,327,496
Financial Credit Investment II	250,347,201	183,297,353
Financial Credit Investment III	221,300,340	147,867,903
Flywheel Energy Co-Invest	42,643,933	7,000,000
Fortress Transportation & Infrastructure	88,606,614	0
Greatrock LLC	108,130,224	0
Global Maritime	59,218,590	3,414,854
GSO Credit Alpha Fund	36,097,225	37,910,063
HarbourVest Direct Lending Fund (L) L.P.	25,000,000	75,000,000
Hopen Life Science Fund II	3,704,775	485,000
HPS Red Cedar Fund	213,562,108	93,762,984
HPS Mezzanine Partners 2019, L.P.	18,310,501	32,756,254
Kayne Anderson Energy Fund VII, LP	22,506,689	9,609,541
Kayne Anderson Private Energy Income Fund	109,936,548	26,317,226
Kayne Anderson Private Energy Income Fund II	35,282,522	123,242,875
Kayne Solutions Fund	59,295,120	188,194,846
KKR Energy Income & Growth Fund	32,827,672	0
KKR Lending Partners	3,732,729	11,524,868
KKR Lending Partners II	16,536,069	11,737,239
Lakewater	105,244,663	1,556,450

	<u>Net Market Value</u>	<u>Unfunded Commitment</u>
Lakewater II	72,219,100	54,788
Lakewater III	244,555,985	59,616
Lakewater IV	33,448,398	1,049,139
Lakewater V	78,978,460	3,023,810
Marathon CLO Equity Fund	14,360,076	0
Merit Energy Partners I LP	34,426,363	0
MidCap Finco Holdings LTD	292,941,714	0
Mortgage Servicing Rights	59,970,967	0
Napier Park Aircraft Leasing Vehicle I, LLC	40,784,676	17,944,862
Napier Park AL Rollover Fund I	14,400,718	60,067,481
Nash Co-Investment	13,423,737	94,259
New Fortress Energy HLDGS	1,491,209,257	0
NGP Natural Resources XII	75,473,161	67,625,036
Orion Mine Finance	49,499,250	0
Orion Mine Finance 1A	35,839,055	0
Orion Mine Finance Co-Fund II LP	6,831,426	35,000,000
Orion Mine Finance II	111,466,888	9,867,126
Orion Mine Finance III LP	52,933,706	37,539,360
Redding Ridge Holdings, LP	78,565,256	10,842,105
* Ren Venture Fund II	31,437,474	1,000,000
* Ren Venture Fund III	13,468,865	15,000,000
Ridgewood Energy Oil & Gas II	46,712,458	17,104,339
Ridgewood Energy Oil & Gas III	72,400,406	110,057,713
Ridgewood Fund II Co-Invest (REOG)	11,502,387	4,516,974
Riverside Credit Solutions FD I LP	36,337,307	6,820,322
RPEP Energy Opportunistic Institutional Partners	26,777,117	6,952,840
** Sixth Street Specialty Lending Europe II (USD Feeder), L.P.	9,700,932	115,299,068
SJC Direct Lending Fund II	1,125,306	38,261,315
SJC Direct Lending Fund III	190,881,869	25,809,049
SJC Direct Lending Fund III Co-Invest G-III	19,013,309	0
SJC Onshore Direct Lending Fund IV – SMRS, L.P.	104,501,742	147,666,584
* Social Network Holdings	114,025,307	5,590,289
Specialty Loan Fund III	3,106,506	5,875,333
Sprott Private Resource Lending (US), LP	21,587,324	79,845,181
Sprott PRL(M) LP	1,193,703	26,218,145
Sprott PRL(M-Co-Invest) LP	7,858,950	17,687,500
Structured Credit Recovery Fund IV	182,975,393	0
Terra Co-Investment	29,953,881	14,000,000
TICP CLO Partners II	39,452,741	1,724,474
TICP CLO Partners III	31,036,991	68,498,179
TSSP Agriculture Partners	20,702,538	78,564,763
TSSP Adjacent Opportunities Partners	204,635,579	120,052,626
TSSP Capital Solutions	133,876,315	178,134,167
TSSP Opportunities Partners IV	37,470,047	70,308,052
Turning Rock Fund I, LP	49,539,977	26,167,976
Vida Insurance Credit Opportunity Fund II	100,705,732	9,433,075
Warwick (SMRS) Co-Invest, L.P.	30,313,027	2,089,081
Warwick Partners III	53,219,672	2,017,705
Total Real Return and Opportunistic	\$ 10,613,533,366	\$ 3,410,853,766
Short-Term Investments & Other	100,012,957	0
Grand Total	\$ 10,713,546,323	\$ 3,410,853,766

* Fund of Funds

** **New Commitment**

State of Michigan Retirement System

DEFINED CONTRIBUTION REVIEW

State of Michigan Investment Board Meeting
March 25, 2021



Woodrow S. Tyler
Senior Investment Manager
Defined Contribution, Trusts & Agencies Division

EXECUTIVE SUMMARY

Overview

Defined Contribution (DC) plans are participant led investments. The role of the Bureau of Investments is to offer a sufficient range of investment options which will allow participants enough choice to diversify their individual retirement accounts and construct portfolios that reasonably span the risk/return spectrum. To this end, the Plans may be comprised of at least one investment option from the categories below.

Investments Options

Tier I: Target Date Funds and Passively Managed Index Funds

- Target Date Funds (TDFs) are the default option for plan participants. Each TDF seeks to achieve its objective by investing in a set of underlying index funds representing various asset classes. Over time, the allocation to asset classes and funds change according to a predetermined "glide path" which will become more conservative as it approaches the target retirement date.
- Passively Managed Index Funds are comprised of low-cost index funds which seek to replicate the performance of a variety of cash, bond and stock indices with very little tracking error and at a low fee.

Tier II: Actively Managed Funds

- These are funds actively managed by investment managers in an attempt to outperform various cash, bond and stock indices over the long term (5+ years).

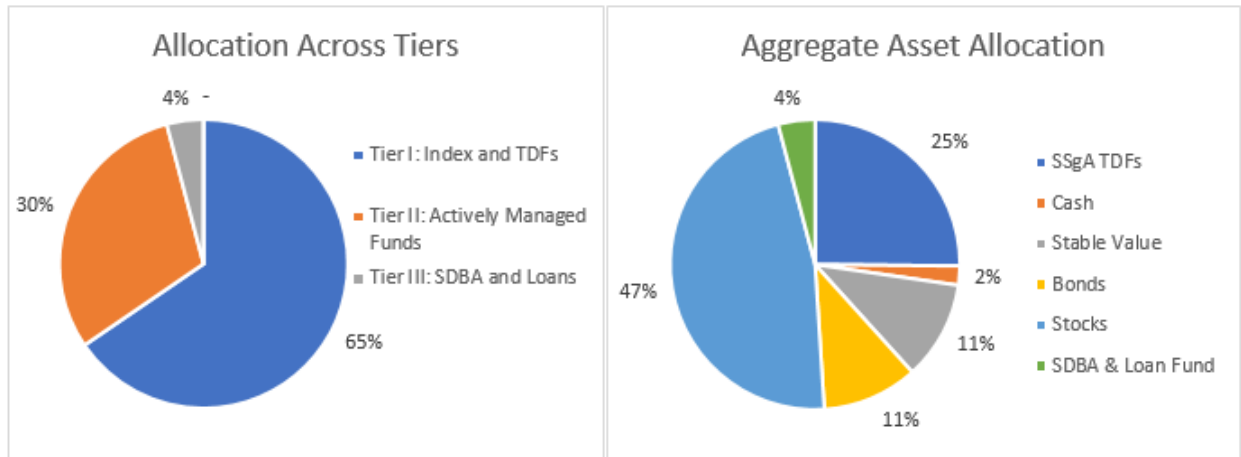
Tier III: Self Directed Brokerage Account – Non-Core Options

- TD Ameritrade provides access to a broad range of investment choices including individual stocks, bonds, CDs, over 100 commission-free ETFs, and more than 13,000 mutual funds—including more than 2,100 no-load, no-transaction-fee (NTF) mutual funds.

SOM Plans	12/31/19	12/31/20
State of Michigan 401(k)	\$6,768	\$7,782
State of Michigan 457	1,846	1,980
Pension Plus 401(k) & 457	961	1,430
EAA	11	12
Total	\$9,586	\$11,204

(\$ in millions)

Aggregate Allocations as of 12/31/2020

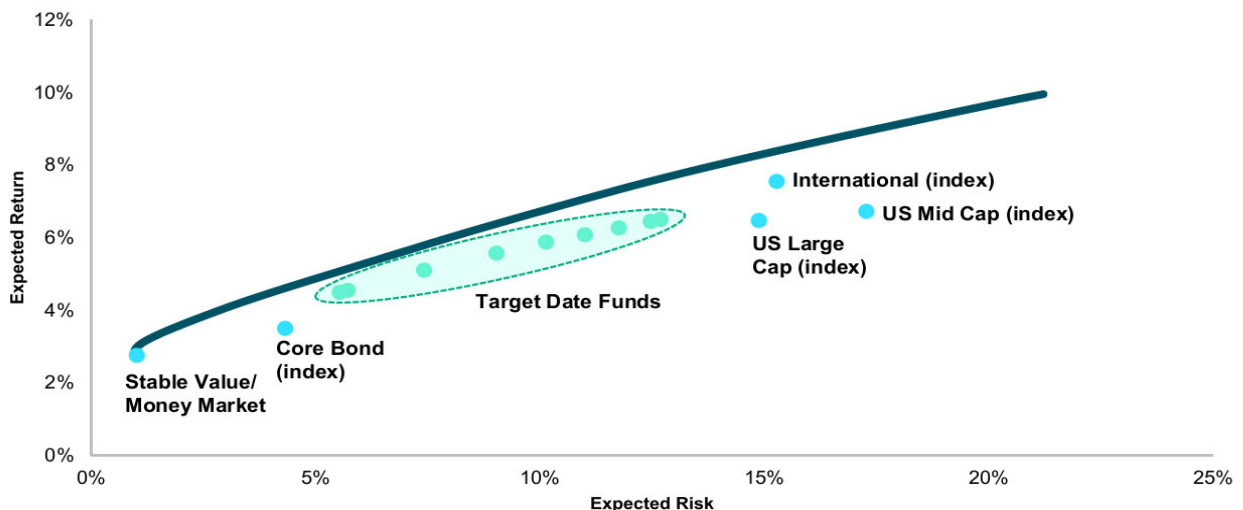


Investment Selection

- The selection of each investment option for the Plans is based on the prudence standards set by the Governing Documents and applicable law, with flexibility built-in to allow a search to take full advantage of strategic opportunities. The search will focus on finding opportunities which are tailored to the Plans' specific needs. The BOI, in consultation with the Office of Retirement Services (ORS), will establish search criteria that aligns with the purpose and objective an investment option is seeking to attain. Due diligence will be completed with the goal of selecting a plan that, in the totality of circumstances, offers fair and reasonable investment options for the Plan participants.
- With respect to Tier III investments, the universe of available options is extensive. Since the selection of investments is directed solely by the participants which elect the Tier III option, the State does not provide any criteria for selecting or monitoring these non-core investment options.

Michigan DC Plan Efficient Frontier

Target Date & Select Core Funds Plotted



Source: State Street analysis based on information provided by plan sponsor, as of April 2019.

Market Environment and Outlook

Despite historically weak and choppy economic data along with unsettling, pandemic-related news, risk assets pushed higher in the 4th quarter beginning in early November and extending into December. The move was driven by the approval of two Covid-19 vaccines along with a new round of fiscal stimulus which will be deployed in 2021. The stimulus is expected to provide a bridge to economic recovery which should pick up mid-summer 2021 as the outcome of the vaccines start to show their benefits.

Global stock markets finished the year on a strong note as they rallied on expectations for a synchronous, regional recovery. For the quarter, the NASDAQ composite rose 15.4%, the S&P 500 index gained 12.0% and the Dow Jones Industrial Average increased by 10.7%. By market capitalization, small and mid-cap stocks outperformed large caps, though all posted strong gains for the quarter. Non-U.S. markets, as measured by the MSCI EAFE index, gained 10.0% while the MSCI Emerging Markets index returned 19.7%.

Fixed income assets generally delivered positive returns for the quarter: the Bloomberg Barclays Global Aggregate Bond index gained 3.3% while the U.S. Aggregate Bond index gained 0.7%. The U.S. High Yield index gained 6.4% in the quarter while U.S. Treasury securities were weaker: the U.S. Treasury 1-5 Year index was up 0.01% and the Bloomberg U.S. Treasury 20+ Year index returned -3.0%.

DC Plan Evolution

Significant research and work continues within the industry to address the challenges of meeting the needs of participants, particularly in the area of providing a steady and reliable stream of retirement income. The challenges are magnified by the low return environment in fixed income combined with the increase in life expectancy of participants which tasks the ability of making sure participant savings last their lifetime.

SMRS

Defined Contribution Strategies

12/31/20

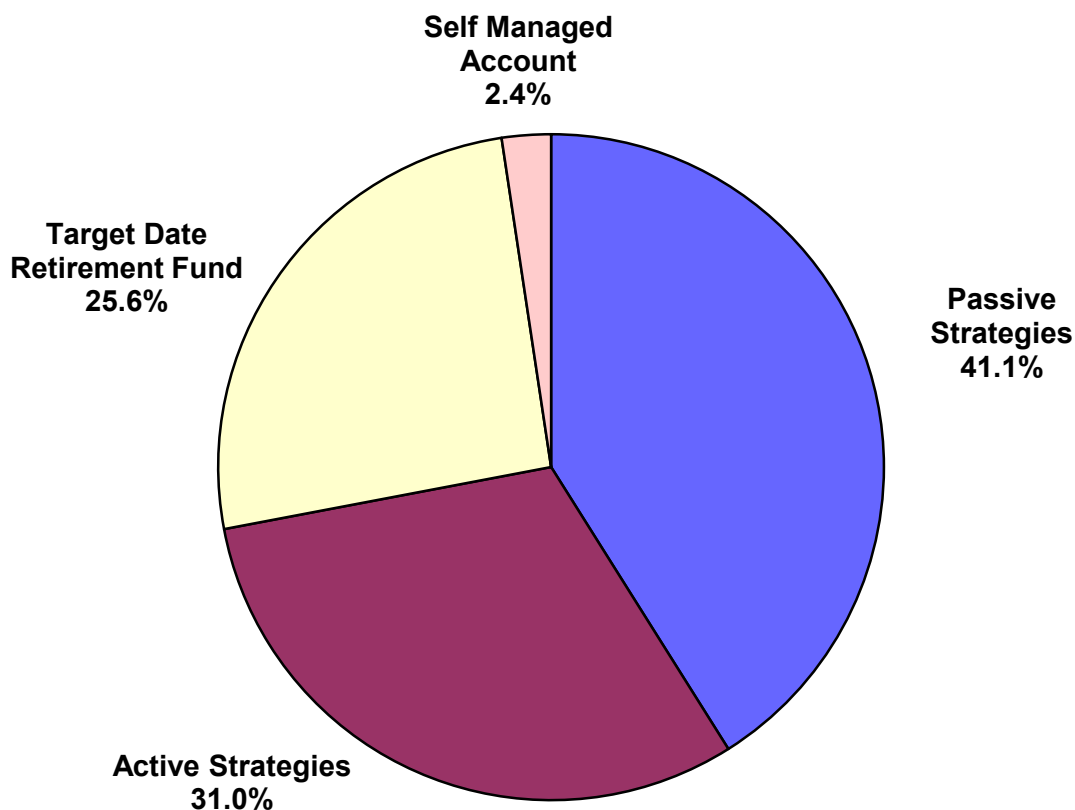
Markets	Amount		% of Total	Fee per \$1,000
QDIA (\$ in Millions)				
	<u>12/31/20</u>	<u>12/31/19</u>		
Total Target Date Fund	\$2,869	\$2,134	25.6%	\$0.70
Tier I Index Funds				
State Street S&P 500 Index Fund	\$1,559	\$1,335		\$0.13
State Street Bond Market Index Fund	\$1,049	866		0.20
State Street Global All Cap Equity ex-U.S. Index Fund	\$792	689		0.45
State Street S&P Mid Cap Index Fund	\$675	621		0.20
BlackRock Government Short-Term Investment CL F	\$243	234		0.56
BlackRock S&P Small Cap 600 Equity Index CL F	\$144	140		0.25
BlackRock Emerging Markets Index CL F	\$138	130		0.69
Total Tier I Index	\$4,600	\$4,014	41.1%	\$0.25
Tier II Active Funds				
Stable Value Fund	\$1,256	\$1,154		\$2.22
Jennison Large Cap Growth Fund	\$596	423		2.83
Dodge & Cox Stock Fund	\$556	596		4.15
American Funds EuroPacific Growth R6	\$353	327		4.60
Artisan Mid Cap Fund	\$194	126		6.77
Voya Small Cap Growth Equity Fund	\$168	150		4.30
PIMCO Total Return I Fund	\$133	117		7.00
T. Rowe Price Mid-Cap Value Fund	\$115	119		6.30
Virtus Ceredex Small-Cap Value Eq I	\$61	71		7.00
Prudential High Yield Fund	\$37	37		3.80
Oakmark Equity & Income I	\$0	117		4.30
Total Tier II Active	\$3,469	\$3,236	31.0%	\$3.65
Tier III				
Total Self Directed Brokerage Account	\$266	\$202	2.4%	NA
Total Defined Contribution Assets	<u>\$11,204</u>	<u>\$9,586</u>	<u>100.0%</u>	\$1.41

NOTE: Totals may not be exact due to rounding.

SMRS

Defined Contribution by Investment Strategy

12/31/20



Market Value in Millions				
	12/31/20		12/31/19	
Passive Strategies	\$4,600	41.1%	\$4,014	41.9%
Active Strategies	3,469	31.0%	3,236	33.8%
Target Date Retirement Fund	2,869	25.6%	2,134	22.3%
Self Managed Account	266	2.4%	202	2.1%
Total Investments	<u>\$11,204</u>	<u>100.0%</u>	<u>\$9,586</u>	<u>100.0%</u>

*Loan Fund \$204M as of 12/31/20
 Note: Totals may not be exact due to rounding.

Defined Contribution Performance by Fund 12/31/20

<u>Fund Name</u>	<u>Market Value</u>	<u>1-Year</u>	<u>3-Years</u>	<u>5-Years</u>	<u>10-Years</u>
State Street Target Retirement Income Fund	\$113,538,911	9.8%	6.5%	6.7%	5.5%
State Street Income Custom Index		9.6%	6.5%	6.7%	5.6%
Morningstar Target-Date Retirement		8.7%	5.9%	6.3%	5.1%
<i>Variance State Street Income Custom Index</i>		0.2%	0.0%	0.0%	-0.1%
<i>Variance Morningstar Target-Date Retirement</i>		1.1%	0.6%	0.4%	0.4%
State Street Target Retirement 2020 Fund	146,092,052	11.2%	7.5%	8.6%	7.9%
State Street 2020 Custom Index		11.1%	7.4%	8.5%	7.9%
Morningstar Target-Date 2020		10.8%	7.1%	7.9%	6.5%
<i>Variance State Street 2020 Custom Index</i>		0.1%	0.1%	0.1%	0.0%
<i>Variance Morningstar Target-Date 2020</i>		0.4%	0.4%	0.7%	1.4%
State Street Target Retirement 2025 Fund	256,370,439	15.1%	9.1%	10.3%	9.0%
State Street 2025 Custom Index		15.0%	9.1%	10.3%	9.0%
Morningstar Target-Date 2025		11.7%	7.7%	8.9%	7.3%
<i>Variance State Street 2025 Custom Index</i>		0.1%	0.0%	0.0%	0.0%
<i>Variance Morningstar Target-Date 2025</i>		3.4%	1.4%	1.4%	1.7%
State Street Target Retirement 2030 Fund	295,090,892	17.6%	10.1%	11.3%	9.6%
State Street 2030 Custom Index		17.5%	10.1%	11.3%	9.6%
Morningstar Target-Date 2030		12.9%	8.3%	9.7%	7.8%
<i>Variance State Street 2030 Custom Index</i>		0.1%	0.0%	0.0%	0.0%
<i>Variance Morningstar Target-Date 2030</i>		4.7%	1.8%	1.6%	1.8%
State Street Target Retirement 2035 Fund	331,411,212	18.5%	10.5%	11.9%	9.8%
State Street 2035 Custom Index		18.4%	10.5%	11.8%	9.9%
Morningstar Target-Date 2035		14.0%	9.0%	10.5%	8.5%
<i>Variance State Street 2035 Custom Index</i>		0.1%	0.0%	0.1%	-0.1%
<i>Variance Morningstar Target-Date 2035</i>		4.5%	1.5%	1.4%	1.3%
State Street Target Retirement 2040 Fund	331,456,167	19.0%	10.8%	12.3%	10.0%
State Street 2040 Custom Index		18.9%	10.7%	12.2%	10.1%
Morningstar Target-Date 2040		14.6%	9.2%	10.9%	8.6%
<i>Variance State Street 2040 Custom Index</i>		0.1%	0.1%	0.1%	-0.1%
<i>Variance Morningstar Target-Date 2040</i>		4.4%	1.6%	1.4%	1.4%
State Street Target Retirement 2045 Fund	346,814,415	19.5%	11.0%	12.6%	10.2%
State Street 2045 Custom Index		19.5%	10.9%	12.6%	10.2%
Morningstar Target-Date 2045		15.1%	9.5%	11.3%	9.1%
<i>Variance State Street 2045 Custom Index</i>		0.0%	0.1%	0.0%	0.0%
<i>Variance Morningstar Target-Date 2045</i>		4.4%	1.5%	1.3%	1.1%
State Street Target Retirement 2050 Fund	441,682,090	19.9%	11.1%	12.7%	10.2%
State Street 2050 Custom Index		19.9%	11.1%	12.7%	10.3%
Morningstar Target-Date 2050		15.3%	9.5%	11.4%	9.0%
<i>Variance State Street 2050 Custom Index</i>		0.0%	0.0%	0.0%	-0.1%
<i>Variance Morningstar Target-Date 2050</i>		4.6%	1.6%	1.3%	1.2%
State Street Target Retirement 2055 Fund	447,993,460	19.9%	11.1%	12.7%	N/A
State Street 2055 Custom Index		19.9%	11.1%	12.7%	N/A
Morningstar Target-Date 2055		15.5%	9.7%	11.5%	N/A
<i>Variance State Street 2055 Custom Index</i>		0.0%	0.0%	0.0%	N/A
<i>Variance Morningstar Target-Date 2055</i>		4.4%	1.4%	1.2%	N/A
State Street Target Retirement 2060 Fund	157,556,941	19.9%	11.1%	12.7%	N/A
State Street 2060 Custom Index		19.9%	11.1%	12.7%	N/A
Morningstar Target-Date 2060+		15.3%	9.7%	11.5%	N/A
<i>Variance State Street 2060 Custom Index</i>		0.0%	0.0%	0.0%	N/A
<i>Variance Morningstar Target-Date 2060+</i>		4.6%	1.4%	1.2%	N/A

<u>Fund Name</u>	<u>Market Value</u>	<u>1-Year</u>	<u>3-Years</u>	<u>5-Years</u>	<u>10-Years</u>
State Street Target Retirement 2065 Fund	\$1,429,567	19.9%	N/A	N/A	N/A
<i>State Street 2065 Custom Index</i>		19.9%	N/A	N/A	N/A
<i>Morningstar Target-Date 2060+</i>		15.3%	N/A	N/A	N/A
<i>Variance State Street 2065 Custom Index</i>		0.0%	N/A	N/A	N/A
<i>Variance Morningstar Target-Date 2060+</i>		4.6%	N/A	N/A	N/A
TIER 1					
State Street S&P 500 Index Fund	\$1,559,213,605	18.4%	14.2%	15.2%	13.8%
S&P 500 Index		18.4%	14.2%	15.2%	13.9%
Morningstar Large Blend		15.1%	11.6%	13.0%	11.6%
Variance S&P 500 Index		0.0%	0.0%	0.0%	-0.1%
Variance Morningstar Large Blend		3.3%	2.6%	2.2%	2.2%
State Street Bond Market Index Fund	1,048,987,602	7.6%	5.4%	4.4%	3.8%
Bloomberg Barclays U.S. Aggregate Index		7.5%	5.3%	4.4%	3.8%
Morningstar Intermediate-Term Bond		7.5%	5.0%	4.4%	3.8%
Variance Bloomberg Barclays U.S. Aggregate Index		0.1%	0.1%	0.0%	0.0%
Variance Morningstar Intermediate-Term Bond		0.1%	0.4%	0.0%	0.0%
State Street Global All Cap Equity ex-U.S. Index Fund	791,795,382	11.3%	5.0%	9.3%	N/A
MSCI ACWI ex USA IMI (Net)		11.1%	4.8%	9.0%	N/A
Morningstar Foreign Large Blend		8.9%	4.2%	7.4%	N/A
Variance MSCI ACWI ex USA IMI (Net)		0.2%	0.2%	0.3%	N/A
Variance Morningstar Foreign Large Blend		2.4%	0.8%	1.9%	N/A
State Street S&P Mid Cap Index Fund	675,061,925	13.6%	8.4%	12.3%	11.4%
S&P 400 Index		13.7%	8.4%	12.3%	11.5%
Morningstar Mid-Cap Blend		12.2%	7.8%	10.5%	9.7%
Variance S&P 400 Index		-0.1%	0.0%	0.0%	-0.1%
<i>Variance Morningstar Mid-Cap Blend</i>		1.4%	0.6%	1.8%	1.7%
BlackRock Government Short-Term Investment CL F	243,280,539	0.5%	1.5%	1.1%	N/A
BofA Merrill Lynch US 3-Month Treasury Bill Index		0.7%	1.6%	1.2%	N/A
Variance BofA Merrill Lynch US 3-Month Treasury Bill Index		-0.2%	-0.1%	-0.1%	N/A
BlackRock S&P Small Cap 600 Equity Index CL F	143,538,145	11.2%	7.8%	N/A	N/A
S&P SmallCap 600 Index		11.3%	7.7%	N/A	N/A
Morningstar Small Blend		10.7%	6.1%	N/A	N/A
Variance S&P SmallCap 600 Index		-0.1%	0.1%	N/A	N/A
Variance Morningstar Small Blend		0.5%	1.7%	N/A	N/A
BlackRock Emerging Markets Index CL F	138,150,666	18.3%	6.1%	12.9%	N/A
MSCI Emerging Market (Net)		18.3%	6.2%	12.8%	N/A
Morningstar Diversified Emerging Mkts		17.1%	5.4%	11.2%	N/A
Variance MSCI Emerging Market (Net)		0.0%	-0.1%	0.1%	N/A
<i>Variance Morningstar Diversified Emerging Mkts</i>		1.2%	0.7%	1.7%	N/A
TIER 2					
Stable Value Fund	\$1,256,256,357	2.2%	2.5%	2.4%	2.3%
Barclays Int Gov/Credit A or Higher Index		6.1%	4.4%	3.2%	2.8%
Hueler Universe		2.2%	2.3%	2.1%	2.1%
Variance Barclays Int Gov/Credit A or Higher Index		-3.9%	-1.9%	-0.8%	-0.5%
Variance Hueler Universe		0.0%	0.2%	0.3%	0.2%
Jennison Large Cap Growth Fund	596,294,397	53.7%	26.8%	23.1%	N/A
<i>Russell 1000 Growth Index</i>		38.5%	23.0%	21.0%	N/A
<i>Morningstar Large Growth</i>		34.8%	20.2%	18.0%	N/A
<i>Variance Russell 1000 Growth Index</i>		15.2%	3.8%	2.1%	N/A
<i>Variance Morningstar Large Growth</i>		18.9%	6.6%	5.1%	N/A

<u>Fund Name</u>	<u>Market Value</u>	<u>1-Year</u>	<u>3-Years</u>	<u>5-Years</u>	<u>10-Years</u>
Dodge & Cox Stock Fund	555,829,351	6.2%	7.2%	12.1%	11.9%
<i>Russell 1000 Value Index</i>		2.8%	6.1%	9.7%	10.5%
<i>Morningstar Large Value</i>		2.7%	5.5%	9.3%	9.4%
<i>Variance Russell 1000 Value Index</i>		3.4%	1.1%	2.4%	1.4%
<i>Variance Morningstar Large Value</i>		3.5%	1.7%	2.8%	2.5%
American Funds EuroPacific Growth R6	352,599,247	25.3%	10.7%	12.5%	8.1%
<i>MSCI EAFE Index - Net Div</i>		7.8%	4.3%	7.4%	5.5%
<i>Morningstar Foreign Large Blend</i>		8.9%	4.2%	7.4%	4.9%
<i>Variance MSCI EAFE Index - Net Div</i>		17.5%	6.4%	5.1%	2.6%
<i>Variance Morningstar Foreign Large Blend</i>		16.4%	6.5%	5.1%	3.2%
Artisan Mid Cap Fund	193,780,926	57.3%	28.3%	20.6%	16.1%
<i>Russell Midcap Growth Index</i>		35.6%	20.5%	18.7%	15.0%
<i>Morningstar Mid-Cap Growth</i>		37.3%	19.2%	17.4%	13.3%
<i>Variance Russell Midcap Growth Index</i>		21.7%	7.8%	1.9%	1.1%
<i>Variance Morningstar Mid-Cap Growth</i>		20.0%	9.1%	3.2%	2.8%
Voya Small Cap Growth Equity Fund	168,198,693	26.6%	10.5%	12.8%	12.1%
<i>Russell 2000 Growth Index</i>		34.6%	16.2%	16.4%	13.5%
<i>Morningstar Small Growth</i>		36.9%	18.0%	17.3%	13.1%
<i>Variance Russell 2000 Growth Index</i>		-8.0%	-5.7%	-3.6%	-1.4%
<i>Variance Morningstar Small Growth</i>		-10.3%	-7.5%	-4.5%	-1.0%
PIMCO Total Return I Fund	132,805,802	8.9%	5.5%	4.9%	4.2%
<i>Bloomberg Barclays U.S. Aggregate Index</i>		7.5%	5.3%	4.4%	3.8%
<i>Morningstar Intermediate Core-Plus Bond</i>		8.1%	5.4%	4.8%	4.2%
<i>Variance Bloomberg Barclays U.S. Aggregate Index</i>		1.4%	0.2%	0.5%	0.4%
<i>Variance Morningstar Intermediate Core-Plus Bond</i>		0.8%	0.1%	0.1%	0.0%
T. Rowe Price Mid-Cap Value Fund	115,381,254	9.9%	5.6%	10.4%	10.2%
<i>Russell Midcap Value Index</i>		5.0%	5.4%	9.7%	10.5%
<i>Morningstar Mid-Cap Value</i>		2.8%	3.8%	8.4%	8.9%
<i>Variance Russell Midcap Value Index</i>		4.9%	0.2%	0.7%	-0.3%
<i>Variance Morningstar Mid-Cap Value</i>		7.1%	1.8%	2.0%	1.3%
Virtus Ceredex Small-Cap Value Eq I	60,482,883	1.4%	1.8%	8.7%	8.4%
<i>Russell 2000 Value Index</i>		4.6%	3.7%	9.7%	8.7%
<i>Morningstar Small Value</i>		3.9%	2.1%	7.9%	7.8%
<i>Variance Russell 2000 Value Index</i>		-3.2%	-1.9%	-1.0%	-0.3%
<i>Variance Morningstar Small Value</i>		-2.5%	-0.3%	0.8%	0.6%
Prudential High Yield Fund	36,861,369	7.2%	7.3%	8.3%	N/A
<i>Bloomberg Barclays U.S. Corp. HY 1% Issuer Cap Index</i>		6.6%	6.0%	8.5%	N/A
<i>Morningstar High Yield Bond</i>		4.8%	4.6%	6.6%	N/A
<i>Variance Bloomberg Barclays U.S. Corp. HY 1% Issuer Cap Index</i>		0.6%	1.3%	-0.2%	N/A
<i>Variance Bloomberg Barclays U.S. Corp. HY 1% Issuer Cap Index</i>		2.4%	2.7%	1.7%	N/A
Self Directed	265,867,790				
TOTAL	\$11,203,822,077				

Loan Fund: \$203,863,971

State of Michigan Retirement System
BASKET CLAUSE REVIEW

State of Michigan Investment Board Meeting
March 25, 2021



Karen M. Stout, CPA, CGFM
Administrator
Trust Accounting Division

Basket Clause Investments

12/31/20

<u>Asset Class</u>	<u>Value</u>
Total Absolute Return	\$ 3,500,805,313
Total Real Return and Opportunistic	749,211,385
Total Fixed Income	<u>73,820,641</u>
Total Basket Clause Investments	<u><u>\$ 4,323,837,339</u></u>

The basket clause investments on December 31, 2020, were \$4.3 billion or 5.1% of the total portfolio value of \$84.2 billion.

The Public Employees Retirement System Investment Act, 1965, PA 314, MCL 38.1132 *et seq*, authorizes the State Treasurer to invest up to 30% of the system's assets in investments "not otherwise qualified under the act." MCL 38.1140d (1) commonly referred to as Section 20d (after the authorizing section of PA 314) or Basket Clause investments, gives the State Treasurer the flexibility to take advantage of market opportunities not specifically authorized in PA 314 while conserving protections against imprudent investment.

Disclaimer



This presentation was given solely for the purpose of explaining the structure, investment process, and returns for the State of Michigan Retirement System. It should not be interpreted in any way as financial advice.

