

STATE OF MICHIGAN INVESTMENT BOARD MEETING

June 23, 2022

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

JUNE 23, 2022

Agenda

- 9:30 a.m. Call to Order and Opening Remarks**
- Approval of the 3/24/22 SMIB Meeting Minutes**
- 9:35 a.m. Executive Summary & Performance for Periods Ending 3/31/22**
- 9:45 a.m. Current Asset Allocation Review**
- Markets Review and Outlook**
- 10:00 a.m. Review of Investment Reports**
- Private Equity – Update**
- **Fixed Income – Receive and File**
 - **International Equity – Receive and File**
 - **Domestic Equity – Receive and File**
 - **Absolute Return – Receive and File**
 - **Real Estate & Infrastructure – Receive and File**
 - **Real Return & Opportunistic – Receive and File**
 - **Defined Contribution – Receive and File**
- 10:15 a.m. Guest Speaker: Orlando Bravo, Thoma Bravo**
- 10:55 a.m. Public Comment**
- 11:00 a.m. Closing Remarks ~ Adjournment**

2022 Meeting Schedule

Thursday, September 22, 2022

Thursday, December 8, 2022

All meetings start at 9:30 a.m.

State of Michigan Retirement System

MINUTES

State of Michigan Investment Board Meeting

June 23, 2022



Robert L. Brackenbury
Deputy Chief Investment Officer
Bureau of Investments

STATE OF MICHIGAN INVESTMENT BOARD

March 24, 2022 Meeting Minutes

Board Members Present

Chairman – Treasurer Rachael Eubanks
Ms. Dina Richard
Mr. Reginald Sanders
Mr. Chris Harkins

Members of the Public and Bureau of Investments Staff Present

Jon Braeutigam	Patrick Moraniec	Royce Humm
Robert Brackenbury	Daniel Quigley	Alan Lambert
Greg Parker	Jack Behar	Molly Jason
Karl Borgquist	Janet Sudac	

Many others were present via AT&T phone line.

Opening Remarks:

Rachael Eubanks called the meeting to order at 9:31 am.

Approval of Minutes:

Approval of the December 9, 2021, SMIB Meeting Minutes – Motion to approve by Dina Richard. Seconded: Reginald Sanders. The vote was unanimous to approve.

Approval of the March 9, 2022, Special SMIB Meeting Minutes – Motion to approve by Chris Harkins. Seconded: Reginald Sanders. The vote was unanimous to approve.

Approval of Resolution:

Approval of Resolution of Appreciation for James Nicholson – Motion to approve by Dina Richard. Seconded: Chris Harkins. With great appreciation for his service to the SMIB Board for many years, the vote was unanimous to approve.

AGENDA

Executive Summary

Mr. Jon Braeutigam, Chief Investment Officer for the Bureau of Investments reviewed the executive summary performance section which shows one-year annualized returns of 22.2% beating the peer median return at 17.1%. Mr. Braeutigam prefers to focus on the 10-year, the long-term, which is 11.7% verse 10%. We have had a great 10 years. Past returns don't indicate future returns. Most industry consultants are in the 6-7% range. Could be higher, could be lower but that's where most industry consultants are at. It's been an interesting year for the stock markets.

Asset Allocation Review, Markets Review and Outlook

Mr. Gregory Parker, Director of Investments – Public Markets stated that today public markets will be discussed, these are the traditional stock and bond portfolios. Each division manager will review performance, strategy, and give an outlook for the various asset classes. Mr. Parker acknowledged his wonderful team of Dan, Jack and Patrick who represent the public markets. They also have teams that help support them and they have done a fantastic job, not just over the past two years, but really since day one. Mr. Parker thanked each of them.

As we look at today's environment, we had an environment pre-Covid, an emergency of Covid and now kind of a to-be-determined environment. To understand the point we are at today, we need to understand where we were. Greg used several graphs to explain this unprecedented event, the monetary policy graph, Fed funds rate graph and supply chain graph, for explanations of this time period. Greg explained a graph on business confidence suggesting that the supply disruptions are primarily supply issues and less so a demand issue.

In summary, he explained that internally two scenarios have been discussed which are lower rates, lower inflation, a more risk-on environment or persistently higher interest rates and persistently higher rates of inflation and a risk-off environment. Time will tell and we will be studying the material meticulously going forward.

Fixed Income Review

Dan Quigley, Senior Investment Manager of the Fixed Income Division (FID) reviewed positioning and structure of the Division, pointing out that this portfolio is rate sensitive. He explained the portfolio strategy which utilizes a Core-Plus strategy to achieve goals. The characteristics of the portfolio are: income, liquidity, principal preservation, and diversification from equity market risk. Greg mentioned regime change post-Covid and that things have become very difficult and changed now where more often than not, in order to beat the benchmark, one of these tenants needs to be given up. The idea has been to increase the income component.

Mr. Quigley reviewed the positioning of the portfolio, stating that 74% is in Core and 26% is in Plus and further explained the success of this strategy, stating that there is the ability to outperform a dynamic interest rate environment which is seen in the one-year annualized return of 2.1%.

Division highlights and successes include the reaction to the market, which was tactical positioning due to the excessive volatility, which resulted in reallocation of investments and moving cash to the FID. He stated the FID has never managed more cash than it has over the past couple of years. Managing this was a very difficult task and he thanked Betty Nicklesen for its success.

Dan discussed the FID outlook, explaining interest rates and credit spreads, what was seen over the past couple of years and what is expected going forward. The Board presented many questions which were discussed and answered.

International Equity Review

Mr. Patrick Moraniec, Senior Investment Manager of the International Equity Division (IED) reviewed the Division's goals, stating that the most important of them is the use of the processes that have been created to continuously improve investment decisions. He discussed the portfolio strategy, stating that capital is allocated with the intention of persistent exposure to the quality, value, and momentum factors. Staff does not think in terms of countries or sectors.

Patrick explained that regarding the Russia/Ukraine situation, the SMRS is divesting from Russia and has plans in place to never invest again in Russian assets. The Plan does not hold any large Russian securities. Patrick believes this conflict is not going away. He highly recommends the documentary on Netflix called Winter On Fire, which is an excellent documentary explaining the fall of the USSR. We hope for resolution of this conflict in the proper way. Patrick believes we are positioned for a more volatile environment as we still do not know what is ahead.

Patrick discussed performance, stating that returns are consistent which is what is desired in the long term. Highlights of the Division are that the QVM strategy beat the MSCI ACWI ex USA index by 2.4% in 2021. This marks the third consecutive year QVM has outperformed the benchmark. The QVM strategy has annualized returns of 14.1% since inception versus the benchmark's returns of 11.4%. The QVM outperformance has added approximately an incremental \$640 million to SMRS over the last three years.

He discussed the Division outlook stating that stocks are not cheap relative to themselves. They are however, a good alternative to bonds. Although the absolute yield, which is around 8% is good, it's terrible from a historical perspective. There were questions presented by the Board that were discussed and answered.

Domestic Equity Review

Mr. Jack Behar, Senior Investment Manager of the Domestic Equity Division (DED) presented a review of the Division. He stated the goal of the Division is to create a diversified portfolio with characteristics similar to the S&P 1500 benchmark index, but with return characteristics that are much better. This is done by creating a diversified portfolio of investments, most of which are underpriced at the time they are bought. This is a very challenging long-term goal.

It is also very important to obtain, maintain and develop internal staff. A good stock investment helps for a couple of years. The right staff can ensure long-term continuity. This is happening in the division now as there is one person that has been with us since 1974 and his returns are in the top percentile this period.

Mr. Behar discussed DED's strategy such as choosing managers the proper way, which is by cost. He believes that cost is the only reliable predictor of success. Talent and passion of both internal and external managers is also a factor. He discussed other factors in choosing external managers and named a few managers that are performing excellent for the division. Patience is necessary as well.

Mr. Behar discussed the Division's performance, showing a graph that revealed underperforming the S&P in this quarter, but if this was two quarters ago would show matching or exceeding the S&P 1500 over every time period shown. He also noted that returns are in the top fifth to top third in every time period and that this is reflective of how active management works. Questions were asked by the Board. There was a lot of discussion across the Board.

Public Comment:

There was no public comment.

Closing Remarks:

Chairman Eubanks noted the next Board meeting date of June 23. She is unable to attend, and Mr. Chris Harkins will act as Chairman.

Adjournment:

Motion to adjourn by Chris Harkins. Seconded by Reginald Sanders. The meeting concluded at 11:05 am.

Approved:

Chris Harkins, Acting Chairman

State of Michigan Retirement System

EXECUTIVE SUMMARY

State of Michigan Investment Board Meeting

June 23, 2022



Robert L. Brackenbury
Deputy Chief Investment Officer
Bureau of Investments

EXECUTIVE SUMMARY

March 31, 2022

Performance

Great peer comparison.

MPSERS Plan (3/31/22)	1-Year	3-Years	5-Years	7-Years	10-Years
Annualized Returns	14.3%	13.5%	12.0%	10.3%	10.7%
Policy Returns	11.7%	13.4%	11.4%	10.0%	10.6%
Peer Median Returns*	10.0%	11.8%	10.1%	8.7%	9.2%

*State Street Universe greater than \$10 billion.

- Over the past one, 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 is below average for the longer time horizons.
- Over a very long horizon, since 1979, the annualized rate of return on the plan assets has been approximately 9.6%.
- Compounding at higher than peer returns can add significant value. For example, based on the \$50.6 billion March 2012 market value, a ten-year annualized return of 10.7% compared to the 9.2% peer median return added approximately \$17.8 billion in excess value.
- Most asset classes earned returns comparable to or better than peer median returns over the longer-term in addition to meeting or exceeding the asset class specific benchmarks.

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, investment risks (primarily equity risk) must be assumed. The spread between the required rate of return, and the risk-free rate is approximately 600 bps. At the end of March 2022, the equity risk (beta) is approximately 0.38; lower than peer median at approximately 0.58.
- Liquidity is another fundamental risk assumed and it is managed through asset allocation. The plans have outstanding capital commitments to fund approximately \$17.5 billion in illiquid assets, primarily in private equity. In the March 2022 quarter, \$2.4 billion of new commitments were made.
- The combined systems paid out approximately \$1.48 billion net of contributions over the past twelve months ending in March 2022. Over the past year, the allocation to private equity was reduced by \$1.92 billion, long-term fixed income was reduced by \$112 million, short term fixed income by \$20.7 million, and domestic equity was reduced by \$19.1 million. Over the past year, the allocation to absolute return increased by \$2.22 billion, real estate by \$689 million and real return and opportunistic increased by \$35.4 million.

NEW COMMITMENTS

January 1, 2022 – March 31, 2022

(\$ Millions)

Asset class	Fund Name / (Managed By)	Commitment
Private Equity		
	Advent International GPE X, LP (Advent International Corporation)	\$ 350
	The Veritas Capital Fund VIII, LP (Veritas Capital Fund Management, LLC)	250
	TSG9, LP (TSG Consumer Partners, LP)	175
	Harvest Partners IX, LP (Harvest Partners, LP)	100
	Hg Saturn 3 A, LP (Hg Pooled Management Limited)	100
	Thoma Bravo Discover Fund IV, LP (Thoma Bravo, LLC)	100
	Thoma Bravo Explore II, LP (Thoma Bravo, LLC)	100
	Permira VIII, LP-2 (Permira Portfolio Management Limited)	83
	Lead Edge Capital VI, LP (Lead Edge Capital Partners VI, LLC)	75
	Lightspeed Opportunity Fund II, LP (Lightspeed General Partner Opportunity Fund II, LP)	25
	Lightspeed Venture Partners Select V, LP (Lightspeed General Partner Select V, LP)	25
	Menlo Special Opportunities Fund III, LP (Menlo Ventures Management, LP)	25
	Lightspeed XIV-B (Ignite), LP (Lightspeed General Partners XIV-B (Ignite), LP)	14
	Lightspeed Venture Partners XIV-A (Inception), LP (Lightspeed General Partners XIV-A (Inception), LP)	11
	Accel India VII, LP (Accel India VII Associates, LLC)	10
Real Estate and Infrastructure		
	TPG Real Estate Partners IV, LP (TPG Real Estate IV Management, LLC)	\$ 150
	Asana Partners Fund III, LP (Asana Partners)	100
	SFR CM, LP (Cerberus Capital Management)	100
Absolute Return		
	PIMCO Private Income Fund Onshore Feeder, LLC (Pacific Investment Management Co.)	\$ 100
Real Return and Opportunistic		
	Green Equity Investors IX, LP (Leonard Green & Partners)	\$ 275
	Jade Equity Investors II, LP (Leonard Green & Partners)	150
	Clearlake Opportunities Partners III, LP (Clearlake Capital Group)	100
TOTAL		\$2,418

State of Michigan Retirement System

PERFORMANCE

State of Michigan Investment Board Meeting

June 23, 2022



Robert L. Brackenbury
Deputy 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.

MPERS PENSION

Time-Weighted Rates of Return

Periods Ending March 31, 2022

	% of Portfolio 3/31/22	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	10.7	8	10.3	9	12.0	10	13.5	15	14.3	14	-2.0	50
Median - Greater than \$10 Billion ²		9.2		8.7		10.1		11.8		10.0		-2.0	
MPERS Total Plan Policy		10.6		10.0		11.4		13.4		11.7		0.2	
PRIVATE EQUITY AND VENTURE CAPITAL	24.2	17.7	8	18.4	9	21.9	13	26.4	11	44.9	17	3.2	46
Median ²		11.2		10.4		11.9		13.8		25.7		2.9	
Private Equity and VC Benchmark ³		20.0		18.3		22.0		29.8		32.5		11.8	
DOMESTIC EQUITIES	22.8	14.1	28	12.9	23	15.1	19	16.4	27	9.6	42	-6.5	91
Median ²		11.2		10.4		12.3		14.5		9.0		-4.8	
S&P 1500 Index		14.4		13.7		15.5		18.5		14.6		-4.6	
INTERNATIONAL EQUITIES	15.0	6.7	40	6.1	38	7.5	51	8.5	42	-2.8	76	-7.7	62
Median ²		6.5		6.0		7.5		8.2		0.0		-6.0	
MSCI ACWI ex USA Net Index ⁴		5.7		5.2		6.8		7.5		-1.5		-5.4	
REAL RETURN AND OPPORTUNISTIC	12.7	12.1		12.0		13.9		13.9		12.2		1.7	
50% (CPI + 4%) + 50% (actuarial rate) ⁵		7.3		7.5		7.5		7.6		9.6		2.8	
FIXED INCOME	9.4	3.5	25	3.4	27	3.4	24	2.9	34	-0.9	23	-4.3	20
Median ²		3.0		2.7		2.8		2.6		-3.3		-5.8	
Bloomberg US Agg Index		2.2		1.9		2.1		1.7		-4.2		-5.9	
REAL ESTATE & INFRASTRUCTURE	8.5	10.0	47	8.8	60	8.3	62	7.3	65	21.6	54	2.9	43
Median ²		9.9		9.2		9.0		9.2		22.6		2.0	
NCREIF Property Index ⁶		8.2		7.4		7.2		8.2		20.3		5.0	
NCREIF Open Fund Index Net		9.9		9.2		8.9		10.3		27.3		7.1	
ABSOLUTE RETURN	6.6	6.0		5.3		6.7		7.9		9.8		0.4	
1-Month T-Bill + 400 bps		4.6		4.8		5.0		4.7		4.0		4.0	
HFR Benchmark ⁷		3.8		3.4		4.4		5.8		4.4		0.4	
CASH EQUIVALENTS	0.9	1.0		1.2		1.4		1.0		0.2		0.1	
1 Month T-Bill		0.6		0.8		1.0		0.7		0.0		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 History from 10/1/2010 to 6/30/14 reflects MSCI ACWI ex USA (gross).

⁵ Current actuarial rate is 6%. History prior to 12/1/18 reflects 50% (CPI +5%) + 50% (actuarial rate).

⁶ NCREIF Property Index is NPI minus 130 bps.

⁷ FOF Conservative 1 month lagged.

Source: State Street Analytics; the NCREIF - NPI (Property Index) source is NCREIF.

Cumulative and Consecutive Total Fund Returns

MPSERS

Cumulative For Years Ending 3/31/22

	<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	14.3	20.8	13.5	11.6	12.0	11.9	10.3	10.2	10.8	10.7
Public Plan - Median (> \$10 billion)*	10.0	20.4	11.8	9.8	10.1	10.5	8.7	8.4	8.8	9.2
Rank	14	38	15	13	10	10	9	9	7	8
bp Difference - Median	438	37	165	178	192	142	167	179	195	159

Consecutive For Years Ending

	<u>03/22</u>	<u>03/21</u>	<u>03/20</u>	<u>03/19</u>	<u>03/18</u>	<u>03/17</u>	<u>03/16</u>	<u>03/15</u>	<u>03/14</u>	<u>03/13</u>
MPSERS	14.3	27.5	0.2	6.1	13.8	11.2	1.4	9.3	15.7	10.4
Public Plan - Median (> \$10 billion)*	10.0	29.0	-1.1	4.4	10.5	11.8	-0.2	7.0	11.9	11.0
Rank	14	64	22	6	8	62	12	14	11	63
bp Difference - Median	438	-149	124	171	324	-56	159	224	374	-56

MSERS

Cumulative For Years Ending 3/31/22

	<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	14.4	20.8	13.5	11.6	12.0	11.9	10.3	10.2	10.8	10.7
Public Plan - Median (> \$1 billion)*	8.6	20.3	11.6	9.4	9.8	10.2	8.4	8.3	8.8	9.1
Rank	9	41	11	9	6	7	6	6	5	6
bp Difference - Median	576	47	186	219	221	170	189	190	203	163

Consecutive For Years Ending

	<u>03/22</u>	<u>03/21</u>	<u>03/20</u>	<u>03/19</u>	<u>03/18</u>	<u>03/17</u>	<u>03/16</u>	<u>03/15</u>	<u>03/14</u>	<u>03/13</u>
MSERS	14.4	27.5	0.2	6.1	13.8	11.3	1.3	9.2	15.6	10.4
Public Plan - Median (> \$1 billion)*	8.6	30.4	-3.0	4.2	10.7	11.9	-0.4	7.2	12.0	10.5
Rank	9	71	17	4	9	65	8	10	11	53
bp Difference - Median	576	-290	315	193	312	-61	171	201	358	-13

*State Street Public Funds Universe

Cumulative and Consecutive Total Fund Returns

MSPRS

Cumulative For Years Ending 3/31/22

	1 Year	2 Year	3 Year	4 Year	5 Year	6 Year	7 Year	8 Year	9 Year	10 Year
MSPRS	14.3	20.7	13.5	11.6	12.0	11.9	10.3	10.2	10.8	10.7
Public Plan - Median (> \$1 billion)*	8.6	20.3	11.6	9.4	9.8	10.2	8.4	8.3	8.8	9.1
Rank	9	41	11	9	6	7	6	6	5	6
bp Difference - Median	572	42	183	217	219	168	187	188	200	160

Consecutive For Years Ending

	03/22	03/21	03/20	03/19	03/18	03/17	03/16	03/15	03/14	03/13
MSPRS	14.3	27.5	0.2	6.1	13.8	11.2	1.3	9.2	15.5	10.4
Public Plan - Median (> \$1 billion)*	8.6	30.4	-3.0	4.2	10.7	11.9	-0.4	7.2	12.0	10.5
Rank	9	71	17	4	9	65	8	11	16	54
bp Difference - Median	572	-294	315	192	312	-65	171	200	348	-17

MJRS

Cumulative For Years Ending 3/31/22

	1 Year	2 Year	3 Year	4 Year	5 Year	6 Year	7 Year	8 Year	9 Year	10 Year
MJRS	12.8	19.8	12.9	11.2	11.7	11.6	10.1	10.0	10.5	10.5
Public Plan - Median (> \$1 billion)*	8.6	20.3	11.6	9.4	9.8	10.2	8.4	8.3	8.8	9.1
Rank	14	59	19	11	7	8	7	7	7	8
bp Difference - Median	417	-47	128	177	186	142	165	167	175	135

Consecutive For Years Ending

	03/22	03/21	03/20	03/19	03/18	03/17	03/16	03/15	03/14	03/13
MJRS	12.8	27.3	0.2	6.1	13.8	11.3	1.3	9.1	14.9	10.2
Public Plan - Median (> \$1 billion)*	8.6	30.4	-3.0	4.2	10.7	11.9	-0.4	7.2	12.0	10.5
Rank	14	72	17	4	9	65	8	11	28	58
bp Difference - Median	417	-310	318	192	311	-58	170	186	285	-37

State of Michigan Retirement System

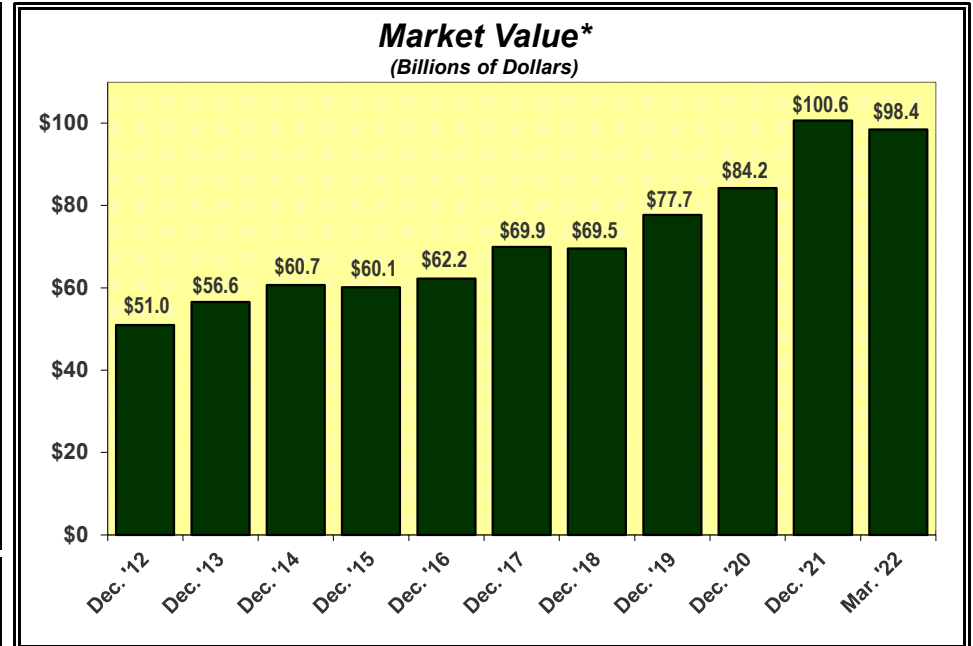
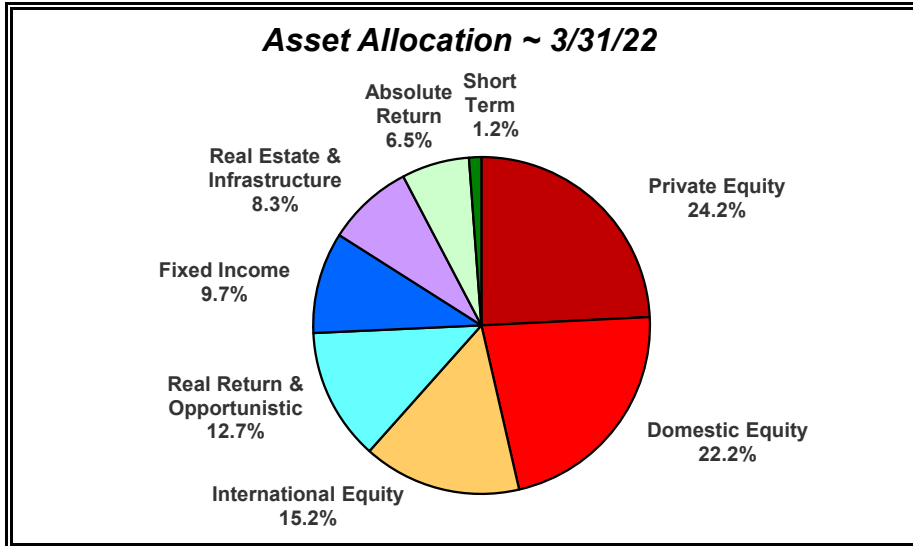
ASSET ALLOCATION REVIEW

State of Michigan Investment Board Meeting
June 23, 2022



Robert L. Brackenbury
Deputy Chief Investment Officer
Bureau of Investments

STATE OF MICHIGAN RETIREMENT SYSTEM PROFILE - MARCH 2022



Asset Allocation By Market Value (In Millions)

Investment Strategies	3/31/2022		3/31/2021	
	Mkt. Value	%	Mkt. Value	%
Private Equity	\$23,805	24.2%	\$18,038	20.6%
Domestic Equity	22,354	22.2%	20,408	23.3%
International Equity	14,699	15.2%	15,094	17.2%
Real Return & Opportunistic	12,468	12.7%	11,165	12.7%
Fixed Income	9,276	9.7%	9,520	10.9%
Real Estate & Infrastructure	8,313	8.3%	6,303	7.2%
Absolute Return	6,469	6.5%	3,837	4.4%
Short Term***	975	1.2%	3,316	3.7%
TOTAL	\$98,359	100.0%	\$87,681	100.0%

Market Value By Plan ~ 3/31/22 (in Millions)

Pension Plan	OPEB**		Combined	%
	Mkt. Value	Mkt. Value		
MPSERS	\$64,806	\$11,150	\$75,956	77.2%
MSERS - (closed)	14,622	5,225	19,847	20.2%
MSPRS	1,862	381	2,243	2.3%
MJRS - (closed)	301	12	313	0.3%
TOTAL	\$81,591	\$16,768	\$98,359	100.0%

MSERS includes the Military Pension Fund

Short Term Equivalent (in Billions)

Short Term Strategy***	\$1.0	
Short Term in Other Inv. Strategies	2.9	
TOTAL SHORT TERM	\$3.9	4.0% of Total Funds

16th Largest State Public Retirement System in the U.S.

Pensions & Investments survey - February 14, 2022 issue

*The combined net payout for the plans for FY 2021 was \$1.5 billion with \$24.4 billion paid out FY 2010 thru FY 2021 (Pension ACFRs). This represents the amount paid to beneficiaries in excess of employer and employee contributions.
**OPEB - Other Post Employment Benefits

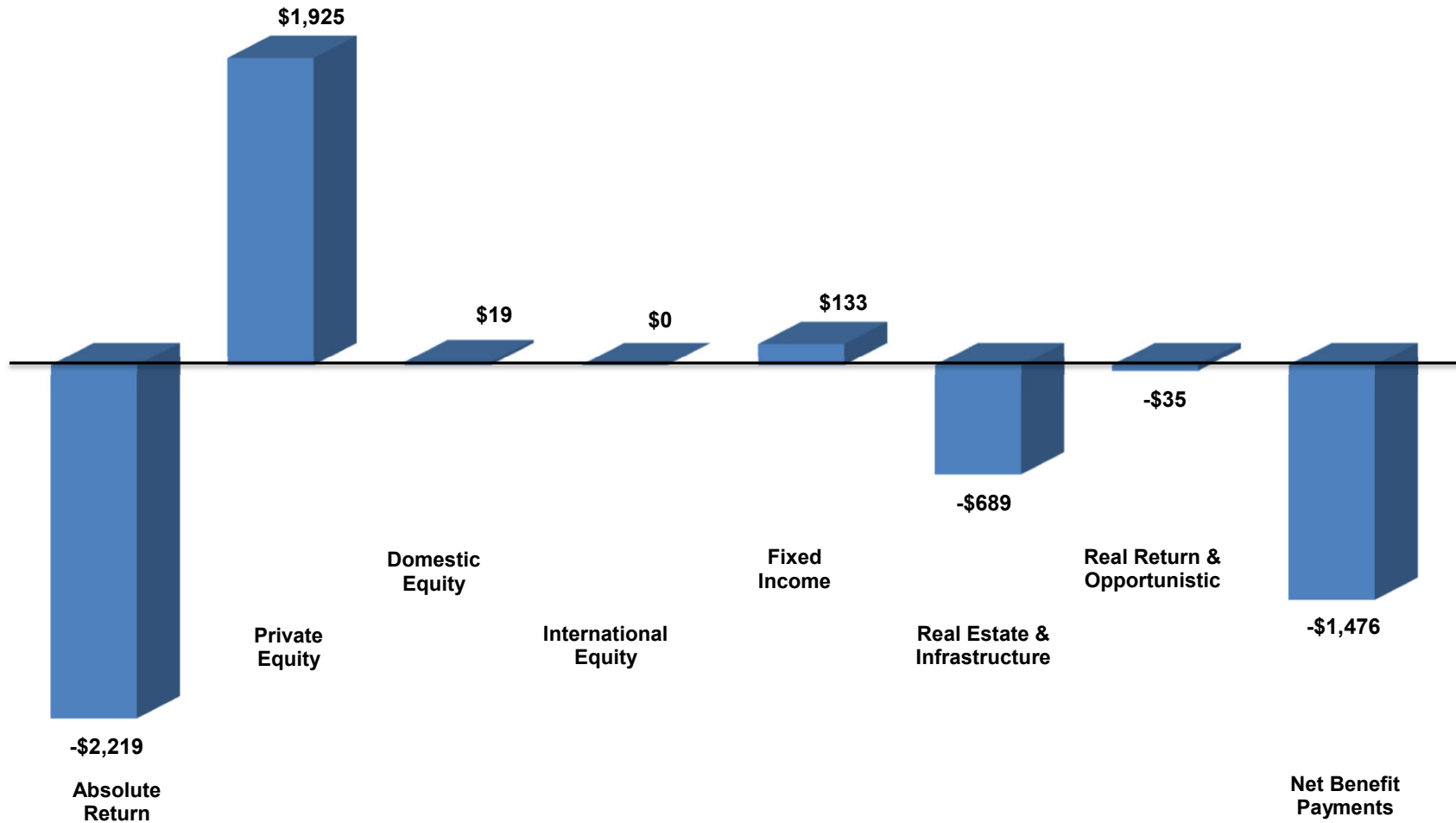
Sources and Uses of Cash

April 2021 ~ March 2022

4/01/21 Short-Term Cash Balance: \$ 3,317

3/31/22 Short-Term Cash Balance: 975

Net Short-Term Cash Decrease: \$ 2,342



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 3/31/22

	MPSERS		MSERS		MSPRS		MJRS		SMRS
<i>Asset Class</i>	<i>3/31/22</i>	<i>Target*</i>	<i>3/31/22</i>	<i>Target*</i>	<i>3/31/22</i>	<i>Target*</i>	<i>3/31/22</i>	<i>Target*</i>	<i>Ranges</i>
Private Equity	24.2%	16.0%	24.3%	16.0%	24.3%	16.0%	24.2%	16.0%	13% - 25%
Domestic Equity	22.8%	25.0%	22.8%	25.0%	22.8%	25.0%	22.8%	25.0%	17% - 32%
International Equity	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	12% - 22%
Real Return & Opportunistic	12.7%	12.5%	12.7%	12.5%	12.7%	12.5%	12.7%	12.5%	8% - 18%
Long Term Fixed Income	9.4%	10.5%	9.4%	10.5%	9.4%	10.5%	9.4%	10.5%	8% - 18%
Real Estate & Infrastructure	8.5%	10.0%	8.5%	10.0%	8.5%	10.0%	8.5%	10.0%	8% - 18%
Absolute Return	6.6%	9.0%	6.6%	9.0%	6.6%	9.0%	6.6%	9.0%	5% - 11%
Short Term Fixed Income	0.9%	2.0%	0.7%	2.0%	0.7%	2.0%	0.8%	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

June 23, 2022



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	12.0%	25.0%	20.0%
International Equity	9.5%	20.5%	5.7%
Real Ret/Opportunistic	9.1%	14.8%	7.3%
Domestic Equity	7.8%	17.5%	14.4%
Real Estate (Core)	9.5%	20.0%	9.9%
Absolute Return	5.5%	9.0%	3.8%
Long-Term Fixed Income	3.0%	4.0%	2.2%
Short-Term	2.3%	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.
- Fundamentally, 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.
- Additional complications for assessing the inflation picture is the war between Russia and Ukraine which started on February 24, 2022. Ukraine is a major exporter of wheat, and the price of wheat jumped 33% since the conflict began. Also, China's Covid-19 mitigation policies have had an impact on shipping. The number of bulk cargo ships waiting at anchor to enter Chinese ports has increased to 600-700 from 500 in early March, according to S&P Global Market Intelligence report, which is about 20%-40% more than two months ago.
- Over the past year, investment grade corporate spreads have widened by approximately 20 bps and are in-line with historical averages. High yield spreads have also widened over the past year; by approximately 15 bps. However, high yield spreads are about 100 bps tighter than normal. In contrast with the rates markets, economic concerns have not yet been priced into the credit markets.

U.S. Fixed Income

A mixed picture on economic future

- Interest rates across the curve rose over the past year, reflecting a reflation in the economy. However, the majority of the increase in rates occurred in the 1-5 year maturity range as the markets began to anticipate a near-term shift in Fed policy. A worrisome fact, at the end of March 2022 the curve was inverted from the 3-year through the 10-year maturity range. This suggests the market is concerned about a potential Fed policy error leading the economy into a recession in the next few years. Because of this, the U.S. Treasury rate curve is much flatter than average in terms of steepness.
- Interest rates at both the long and short end are earning less than the year-over-year increase in CPI. In fact, going back to the mid 1950's, the Fed Funds rate relative to the Year over Year change in CPI has never been lower. This fact is indicative of extremely accommodative Federal Reserve policies and critics of the Fed are growing louder.
- Over the past year, investment grade corporate spreads have widened by approximately 20 bps and are in-line with historical averages. High yield spreads have also widened over the past year; by approximately 15 bps. However, high yield spreads are about 100 bps tighter than normal. In contrast with the rates markets, economic concerns have not yet been priced into the credit markets.
- 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.
- At the end of March 2022, the 10-year U.S. Treasury rate was at 2.34%. A 10-year U.S. Treasury rate of 2.0 – 2.5% would be at the top end of the trading range for longer rates going back to the 1980's.

Domestic Equity

Another good quarter for risk assets.

- The broad U.S. stock market return for the one year ending March 2022 was 14.5%.
- Many domestic equity valuation metrics are above historical averages; however, many analysts expect that fundamentals will continue to improve 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, however they could still offer positive rates of return.
- Fundamentally, 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.

International Equity

Good relative valuations.

- International equities dramatically underperformed domestic equities for the year ending March 2022 by -15.6%. Over the past three, five, seven, and ten years, the international market index, MSCI ACWI ex USA, underperformed the S&P 1500 index by -10.5%, -8.3%, -8.0%, and -8.4% annualized, respectively.
- Within international equities, emerging market returns underperformed developed markets over the past one, three, five, seven, and ten years by -14.6%, -3.8%, -1.3%, -0.9% and -3.1% annualized, respectively.
- At the end of March 2022, based on both PE multiples and dividend yields, the MSCI ACWI World ex USA index was trading at nearly a 2.5 standard deviation discount to the S&P 500 index. Based on a price-to-earnings valuation multiple, excluding non-earning companies, developed international markets trade at approximately a 35% discount to U.S. counterparts while emerging markets are at a 45% discount.

Real Estate

Comparing public vs. private real estate.

- Over the one year ending March 2022, the NAREIT index increased by 23.6% including dividends which was -3.7% lower than their private market counterparts. 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 March 2022 were estimated to be around 2.7%, which is nearly 0.4% higher than the yield of the 10-year U.S. Treasury. This is approximately 0.8% below the historical metric.

Commodities

Inflation; supply and demand issues.

- As the economic recovery has gained momentum, and Fed policy remains ultra-accommodative, the attention has turned towards inflation. The March 2022 reading for non-seasonally adjusted year-over-year CPI was 8.5%. For comparison, the 20-year average for CPI is 2.3%.
- The commodities prices broadly, as measured by the CRB index, are up sharply at 25% over the 12-month period ending March 2022. The price for crude oil was up 79% year-over-year and ended March 2022 at \$90 per barrel.
- Additional complications for assessing the inflation picture is the war between Russia and Ukraine which started on February 24, 2022. Ukraine is a major exporter of wheat, and the price of wheat jumped 33% since the conflict began. Also, China's Covid-19 mitigation policies have had an impact on shipping. The number of bulk cargo ships waiting at anchor to enter Chinese ports has increased to 600-700 from 500 in early March, according to S&P Global Market Intelligence report, which is about 20%-40% more than two months ago.

Annual Total Returns of Key Asset Classes 2002 - 2021

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	
Best ↑	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	U.S. Equity	Best ↑
	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%	28.45%	
	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	Real Estate	
	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%	17.70%	
	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	Int'l Equity	
	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%	8.29%	
	Hedge Funds	Real Estate	Hedge Funds	Hedge Funds	Hedge Funds	Hedge Funds	Corp. Bonds	Hedge Funds	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	Gov't Bonds	Hedge Funds
	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%	7.56%	
	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	Real Estate	Hedge Funds	Hedge Funds	Inflation
	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%	7.12%	
	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	Hedge Funds	Real Estate	Cash	
	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%	0.05%	
	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	Inflation	Corp. Bonds	
	-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%	-1.04%	
	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	Gov't Bonds	
Worst ↓	-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%	-2.28%	Worst ↓

Annualized Returns 2002 - 2021

Return	Cash	Inflat.	Hedge	Gov't.	Corp.	Int'l.	R.E.	US Eq.	Return
Risk	1.28%	2.31%	3.41%	3.85%	5.52%	7.26%	8.69%	9.68%	Risk
	0.77%	1.44%	5.31%	4.63%	5.74%	19.20%	4.75%	16.61%	

- 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

PRIVATE EQUITY REVIEW

State of Michigan Investment Board Meeting
June 23, 2022



Peter A. Woodford
Senior Investment Manager
Private Equity Division

EXECUTIVE SUMMARY

Performance

MPSERS Plan (3/31/22)	1-Year	3-Years	5-Years	7-Years	10-Years
Annualized Returns	44.9%	26.4%	21.9%	18.4%	17.7%
PE Benchmark Returns	32.5%	29.8%	22.0%	18.3%	20.0%
Peer Median Returns	25.7%	13.8%	11.9%	10.4%	11.2%
Percentile Rank vs. Peers*	17	11	13	9	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. Over the last 10 years, the Private Equity Division outperformed the S&P by 3.1% (ten-year S&P 500 return 14.6%) and underperformed the benchmark by 2.3%.
- Commitments closed during the quarter include:
 - \$350 million to Advent International GPE X, LP, managed by Advent International Corporation.
 - \$250 million to The Veritas Capital Fund VIII, LP, managed by Veritas Capital Fund Management, LLC.
 - \$175 million to TSG9, LP, managed by TSG Consumer Partners, LP.
 - \$100 million to Harvest Partners IX, LP, managed by Harvest Partners, LP.
 - \$100 million to Hg Saturn 3 A, LP, managed by Hg Pooled Management Limited.
 - \$100 million to Thoma Bravo Discover Fund IV, LP, managed by Thoma Bravo, LLC.
 - \$100 million to Thoma Bravo Explore II, LP, managed by Thoma Bravo, LLC.
 - \$83.4 million to Permira VIII, LP-2, managed by Permira Portfolio Management Limited.
 - \$75 million to Lead Edge Capital VI, LP, managed by Lead Edge Capital Partners VI, LLC.
 - \$25 million to Lightspeed Opportunity Fund II, LP, managed by Lightspeed General Partner Opportunity Fund II, LP.
 - \$25 million to Lightspeed Venture Partners Select V, LP, managed by Lightspeed General Partner Select V, LP.
 - \$25 million to Menlo Special Opportunities Fund III, LP, managed by Menlo Ventures Management, LP.
 - \$13.8 million to Lightspeed Venture Partners XIV-B (Ignite), LP, managed by Lightspeed General Partner XIV-B (Ignite), LP.

- \$11.3 million to Lightspeed Venture Partners XIV-A (Inception), LP, managed by Lightspeed General Partner XIV-A (Inception), LP.
- \$10 million to Accel India VII, LP, managed by Accel India VII Associates, LLC.

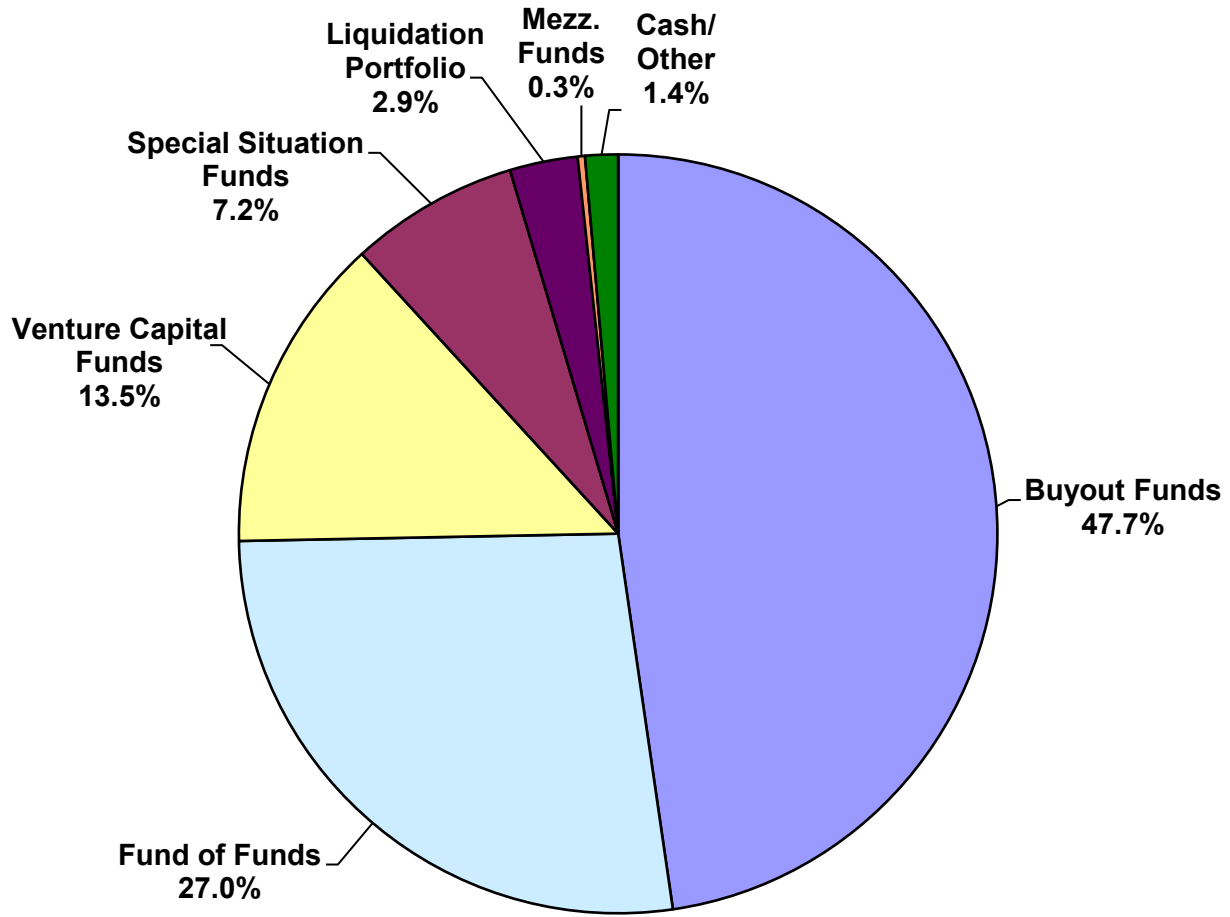
Strategy Update

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. Co-investments continue to play an important role in both averaging down costs and targeting specific investments with attractive risk/return characteristics.

SMRS

Private Equity

3/31/22



Market Value in Millions				
	<u>3/31/22</u>		<u>3/31/21</u>	
Buyout Funds	\$11,362	47.7%	\$8,703	48.3%
Fund of Funds	6,427	27.0%	4,137	22.9%
Venture Capital Funds	3,219	13.5%	2,067	11.5%
Special Situation Funds	1,710	7.2%	1,775	9.8%
Liquidation Portfolio	692	2.9%	673	3.7%
Mezzanine Funds	70	0.3%	373	2.1%
Cash/Other	325	1.4%	310	1.7%
Total	<u>\$23,805</u>	<u>100.0%</u>	<u>\$18,038</u>	<u>100.0%</u>

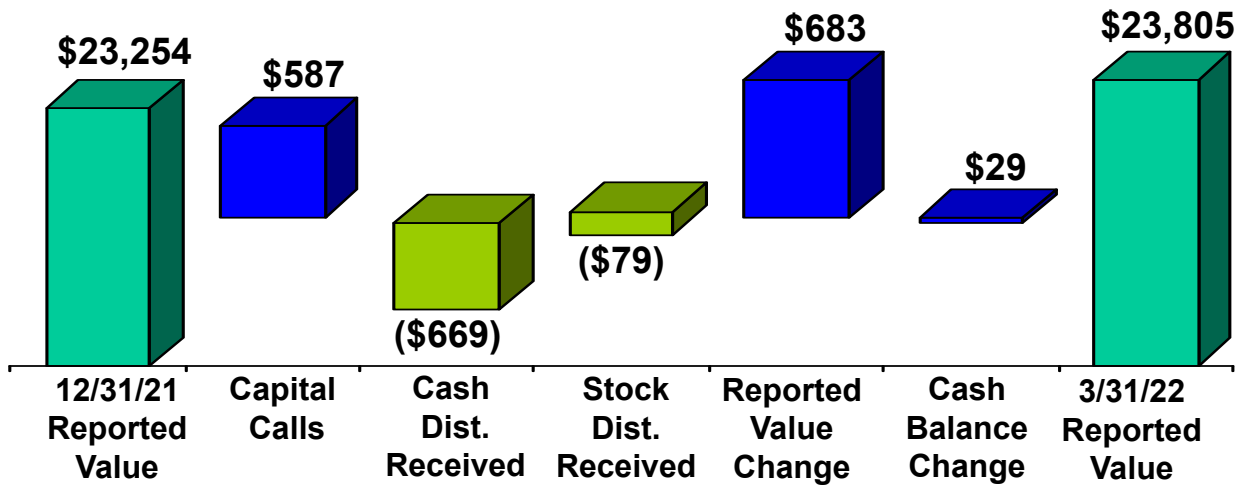
SMRS

Private Equity

3/31/22

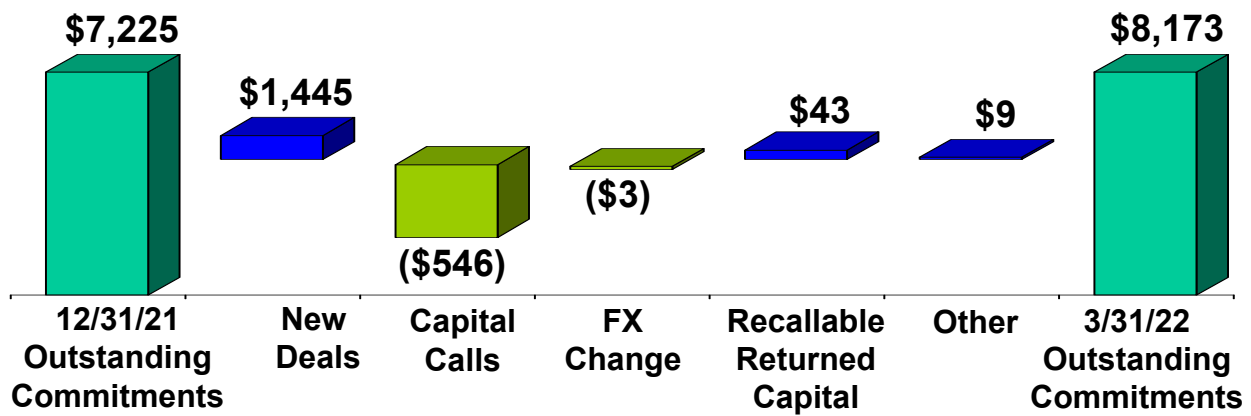
Invested Commitments

(\$ in Millions)



Outstanding Commitments

(\$ in Millions)

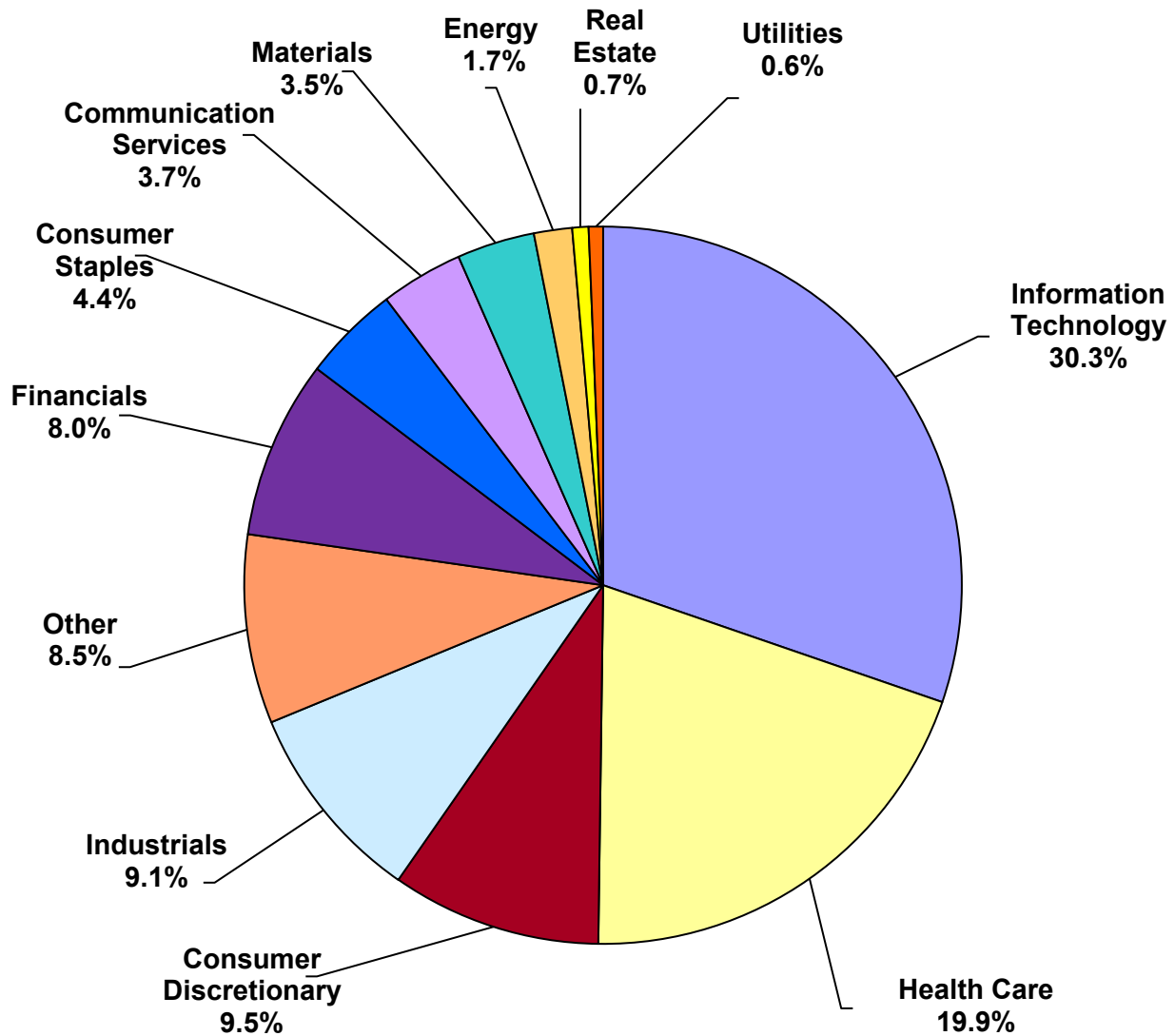


SMRS

Private Equity

3/31/22

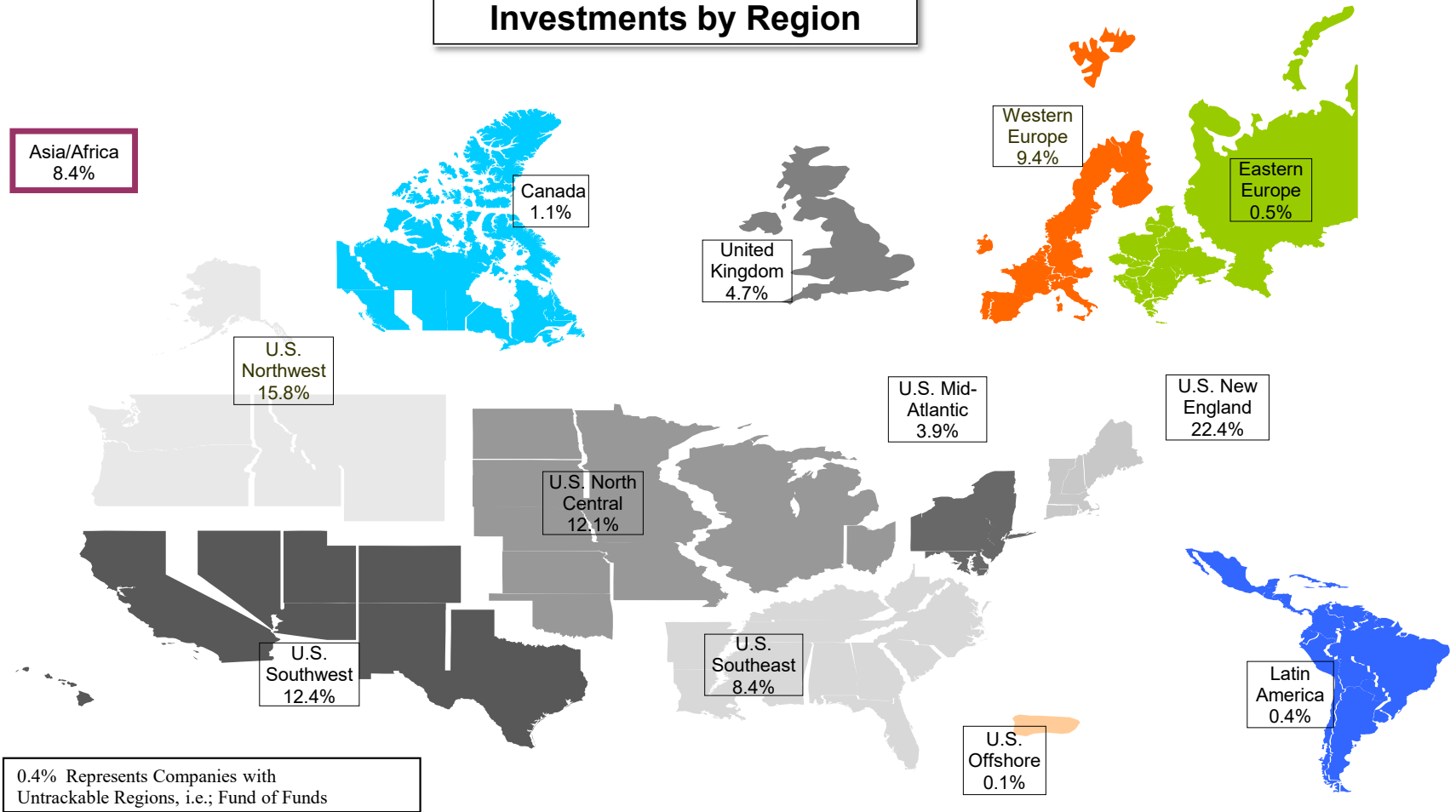
Investments by Industry



These numbers are based on the most recent available General Partner Data; primarily 12/31/21 and are subject to change.

SMRS Private Equity 3/31/22

Investments by Region



Geographic Report: North America 76%, Europe 15%, Asia 8.5%, Other .5%

SMRS

Private Equity

3/31/22

Portfolio by Vintage Year

(\$ in Millions)

Asset Vintage	Reported Value	Outstanding Commitment	Total Exposure
1986-2005	\$ 335	\$ 80	\$ 415
2006*	166	105	271
2007	83	88	171
2008	248	71	319
2009	30	1	31
2010	283	4	287
2011	614	91	705
2012	935	57	992
2013	216	47	263
2014	1,468	144	1,612
2015	7,736	585	8,321
2016	2,869	292	3,161
2017	2,025	335	2,360
2018	3,315	1,057	4,372
2019	1,951	779	2,730
2020	815	603	1,418
2021	379	2,403	2,782
2022	12	1,431	1,443
Income Accruals	0	0	0
Cash	318	0	318
Act. Small Cap - Stock Dist	7	0	7
Total	\$ 23,805	\$ 8,173	\$ 31,978

*Liquidation portfolio is 2006 vintage

FX Exposure

(\$ in Millions)

	Reported Value	Outstanding Commitment	Total Exposure	Total (USD)
Euro (\$1.113/ €)	€ 729	€ 303	€ 1,032	\$1,149

SMRS

Private Equity

03/31/2022

Top 10 Sponsors

(\$ in Millions)

Asset Type	Reported Value	Outstanding Commitment	Total
HarbourVest Partners	\$ 6,165	\$ 747	\$ 6,912
Advent International	872	494	1,366
Insight Partners	1,072	116	1,188
KKR	854	227	1,081
Thoma Bravo	663	379	1,042
The Carlyle Group	637	399	1,036
Leonard Green & Partners Warburg Pincus	749	204	953
Blackstone Private Equity	766	92	858
StepStone Group	564	205	769
	481	275	756
Top 10 Total Value	\$ 12,823	\$ 3,138	\$ 15,961

Cash Weighted Rates of Return*

(Net IRR)	Current Qtr.	1-Year	3-Year	5-Year	10-Year
Buyout	3.5%	43.0%	28.9%	24.3%	19.5%
Fund of Funds	4.7%	43.6%	22.9%	21.3%	18.3%
Mezzanine	4.8%	42.7%	12.1%	11.1%	11.5%
Special Situations	4.7%	46.6%	21.5%	17.2%	14.6%
Venture Capital	-2.5%	66.8%	42.0%	33.0%	23.6%

*These numbers are based on most recent available General Partner reported data; primarily 12/31/21 and are subject to change.

SMRS

Private Equity

3/31/22

Net Market Values by Ownership Entity

	Adjusted Reported Value	Unfunded Commitment
5AM Opportunities I, LP	\$ 25,860,792	\$ 1,575,000
5AM Opportunities II, LP	4,249,990	21,375,000
5AM Ventures VI, LP	23,563,715	4,000,000
5AM Ventures VII, LP	401,734	24,125,000
Accel Europe I, LP	1,710,060	1
Accel Europe II, LP	25,991,766	3,300,000
Accel Growth Fund II, LP	16,126,495	0
Accel Growth Fund III, LP	17,053,831	280,000
Accel Growth Fund IV, LP	45,144,755	0
Accel Growth Fund V, LP	50,703,662	1,028,554
Accel Growth Fund VI, LP	11,763,208	12,875,000
* Accel India VII, LP	800,000	9,200,000
Accel IX, LP	1,595,847	4,522,725
Accel Leaders Fund 3, LP	29,408,177	11,800,000
Accel Leaders Fund II, LP	15,364,052	0
Accel Leaders Fund, LP	18,191,986	0
Accel London V, LP	72,287,354	1,320,000
Accel London VI, LP	22,172,540	3,000,000
Accel London VII, LP	3,451,845	8,875,000
Accel VI-S	1,936,893	652,611
Accel VI, LP	755,025	0
Accel X, LP	7,322,035	0
Accel XI, LP	7,607,362	1,440,000
Accel XII, LP	25,145,480	980,000
Accel XIII, LP	24,450,054	1,250,000
Accel XIV, LP	13,675,338	2,050,000
Accel XV, LP	2,816,722	7,300,000
Accel-KKR Growth Capital Fund IV, LP	0	40,000,000
Acorn Bioventures 2, LP	0	100,000,000
Acorn Bioventures, LP	84,635,413	20,000,000
Advent Global Private Equity V, LP	3,264,356	8,700,000
Advent International GPE IX, LP	419,935,972	76,854,414
Advent International GPE VI-A, LP	23,053,277	0
Advent International GPE VII-B, LP	53,800,904	12,000,000
Advent International GPE VIII-B, LP	312,034,762	0
* Advent International GPE X, LP	0	350,000,000
Advent International LAPEF VII, LP	17,487,665	42,900,000

	<u>Adjusted Reported Value</u>	<u>Unfunded Commitment</u>
Advent Latin American Private Equity Fund VI, LP	42,881,673	2,975,000
Affinity Asia Pacific Fund III, LP	7,377,966	8,520,204
Affinity Asia Pacific Fund IV, LP	75,407,426	16,294,894
Affinity Asia Pacific Fund V, LP	70,105,852	122,627,320
Apax Digital II, LP	0	100,000,000
Apax Digital, LP	45,927,274	22,980,238
Apax Europe Fund VI, LP	23,042,982	2,353,030
Apax Europe VII, LP	1,753,869	1,657,159
Apax IX, LP	229,340,886	19,620,560
Apax US VII	2,559,887	417,509
Apax VIII - B, LP	40,188,170	5,661,905
Apax X USD, LP	86,807,321	77,725,821
Apollo Investment Fund IX, LP	66,719,347	45,487,484
Apollo Investment Fund VIII LP	55,080,551	12,965,644
Arboretum Ventures II, LP	1,040,725	0
Arboretum Ventures III, LP	6,754,361	0
Arboretum Ventures IV, LP	40,523,979	6,300,000
Arboretum Ventures V, LP	23,821,582	15,610,000
Ares Corporate Opportunities Fund II, LP	126,036	11,423,773
Ares Corporate Opportunities Fund III, LP	4,930,324	6,656,978
Ares Corporate Opportunities Fund IV, LP	49,196,820	13,701,239
ASF VIII B	98,102,620	87,281,985
AXA ASF Miller Co-Investment	296,621	6,656,684
Axiom Asia 6, LP	16,063,899	35,200,000
Axiom Asia Co-Investment Fund I, LP	60,517,259	8,441,698
Axiom Asia Co-Investment Fund II, LP	15,911,827	33,990,896
Axiom Asia IV, LP	68,459,621	9,950,886
Axiom Asia Private Capital Fund III, LP	59,002,013	5,250,002
Axiom Asia V, LP	48,088,703	17,250,000
BC European Capital IX, LP	78,013,646	6,266,074
BC European Capital VII, LP	753,242	0
BC European Capital VIII, LP	4,283,402	8,674,715
Berkshire Fund IX Coinvestment Fund, LP	53,030,530	6,435,897
Berkshire Fund IX, LP	181,941,974	13,170,440
Berkshire Fund VI, LP	22,206,680	7,600,677
Berkshire Fund VII, LP	6,693,732	2,805,875
Berkshire Fund VIII, LP	84,047,261	9,046,368
Berkshire Fund X, LP	13,677,956	140,421,793
Blackstone Capital Partners IV	2,593,679	4,580,765
Blackstone Capital Partners V	4,721,795	12,930,407
Blackstone Capital Partners V-S	833,680	712,476
Blackstone Capital Partners VI, LP	135,441,644	32,467,043
Blackstone Capital Partners VII, LP	331,743,805	20,557,815
Blackstone Capital Partners VIII, LP	88,582,301	134,131,589
Bridgepoint Europe IV	11,559,763	5,234,078
Carlyle Europe Partners III, LP	1,549,323	1,664,919

	Adjusted Reported Value	Unfunded Commitment
Carlyle Europe Partners IV, LP	82,841,935	10,438,513
Carlyle Europe Partners V, S.C.SP.	76,203,097	69,897,539
Carlyle Partners Growth, LP	3,425,762	46,574,238
Carlyle Partners V LP	24,819,321	53,227,845
Carlyle Partners VI, LP	165,540,442	8,046,731
Carlyle Partners VII, LP	275,986,271	15,352,791
Carlyle Partners VIII, LP	6,481,156	193,518,844
Charlesbank Equity Fund IX, LP	88,723,406	11,669,658
Charlesbank Equity Fund X, LP	22,738,919	77,103,876
Charlesbank Equity Overage Fund X, LP	15,966,179	34,324,745
Charlesbank Fund IX Overage Allocation Program	48,639,158	1,953,081
Clearlake Capital Partners VII, LP	0	200,000,000
Coller International Partners V, LP	3,661,142	2,000,000
Coller International Partners VI, LP	21,965,038	29,059,273
Coller International Partners VII, LP	107,873,858	44,654,951
CVC Capital Partners VII, LP	232,972,531	25,254,905
CVC Capital Partners VIII, LP	22,547,935	89,531,119
Dover Street IX, LP	76,740,654	16,000,000
Dover Street X, LP	91,882,355	72,000,000
FIMI Opportunity 6, LP	68,172,000	5,363,638
FirstMark Capital I, LP	107,791,523	196,596
FirstMark Capital IV, LP	93,098,430	4,025,000
FirstMark Capital OF I, LP	36,075,040	0
FirstMark Capital OF II, LP	101,572,483	0
FirstMark Capital OF III, LP	37,809,147	6,650,000
FirstMark Capital V, LP	24,969,491	15,925,000
Flagship Pioneering Fund VII, LP	27,941,271	177,000,000
Flagship Pioneering Special Opportunities Fund II, LP	83,316,437	33,000,000
Flagship Pioneering VI, LP	288,772,702	9,000,000
Flagship Ventures Fund 2004	44,486	0
Flagship Ventures Fund 2007, LP	3,615,082	0
Flagship Ventures Fund IV, LP	240,111,549	0
Flagship Ventures Fund V, LP	129,903,860	0
Flagship Ventures Opportunities Fund I, LP	52,655,886	1,500,000
FS Equity Partners VII, LP	92,023,952	7,654,690
FS Equity Partners VIII, LP	55,527,988	28,468,620
GCM Grosvenor Fund Investment Program I, LP	7,174,137	1,509,748
GCM Grosvenor Fund Investment Program II, LP	21,458,697	12,818,284
GCM Grosvenor Fund Investment Program III - 2004	39,051,678	4,404,554
GCM Grosvenor Fund Investment Program III - 2006	51,698,331	6,282,001
GCM Grosvenor Fund Investment Program V, LP	42,495,621	8,741,836
GCM Grosvenor Fund Investment Program VI, LP	22,836,043	1,440,586
GCM Grosvenor Fund Investment Program VIII, LP	114,124,277	8,699,344
GCM Grosvenor SeasPriFIP, LP (PIS06-10)	33,510,386	13,898,876
GCM Grosvenor SeasPriFIP, LP (PIS14)	216,174,894	7,652,193
GCM Grosvenor SeasPriFIP, LP (Seed)	9,930,177	16,498,464

	<u>Adjusted Reported Value</u>	<u>Unfunded Commitment</u>
Genstar Capital Partners IX, LP	94,154,519	7,570,814
Genstar Capital Partners VIII, LP	91,393,577	4,032,695
Genstar Capital Partners X, LP	13,138,413	87,716,366
Genstar IX Opportunities Fund I, LP	60,663,824	4,468,061
Genstar VIII Opportunities Fund I, LP	68,751,766	1,909,780
Genstar X Opportunities Fund I, LP	5,117,255	20,308,333
Golden Bell Azalea, LLC	47,769,698	0
Green Equity Investors V, LP	12,556,427	24,920,675
Green Equity Investors VI, LP	167,501,517	7,943,462
Green Equity Investors VII, LP	300,764,158	55,765,256
Green Equity Investors VIII, LP	206,150,675	56,841,234
Greenspring Master G, LP	446,488,649	270,000,000
Greenspring Micro II, LP	34,461,249	4,716,263
GSO Capital Opportunities Fund II, LP	4,057,164	7,812,824
GSO Capital Opportunities Fund III, LP	49,266,239	21,273,444
GSO COF III Co-Investment Fund, LP	16,068,567	22,229,800
GTCR Fund XIII, LP	11,067,470	40,820,000
GTCR Strategic Growth Fund, LP	0	50,000,000
HarbourVest Dover Street VIII, LP	12,954,090	5,400,000
HarbourVest Int'l III Partnership, LP	149,437	1,200,000
Harbourvest Partners Co-Investment Fund IV, LP	104,802,300	19,107,835
HarbourVest Partners Co-Investment Fund V, LP	234,789,350	45,000,000
Harbourvest Partners Co-Investment Fund VI, LP	0	200,000,000
HarbourVest V Partnership, LP	123,805	300,000
HarbourVest VI - Direct Fund, LP	712,180	750,000
HarbourVest VI Partnership, LP	370,148	2,000,000
* Harvest Partners IX, LP	0	100,000,000
Harvest Partners VII, LP	86,917,528	3,525,741
Harvest Partners VIII, LP	102,533,384	9,764,483
Hellman & Friedman Capital Partners X, LP	54,509,574	45,311,166
* Hg Saturn 3 A, LP	0	100,000,000
Insight Partners Fund X Follow-On Fund, LP	44,710,124	12,500,000
Insight Partners XI, LP	184,084,109	5,000,000
Insight Partners XII, LP	68,042,261	82,500,000
Insight Venture Partners GBCF, LP	141,790,163	4,970,616
Insight Venture Partners IX, LP	365,737,956	4,987,231
Insight Venture Partners X, LP	268,199,197	5,714,949
Jade Equity Investors, LP	61,572,566	59,098,282
Kelso Investment Associates IX, LP	66,788,603	8,990,985
Kelso Investment Associates VII, LP	160,661	0
Kelso Investment Associates VIII, LP	6,777,990	7,191,927
Kelso Investment Associates X, LP	115,883,837	35,715,089
Khosla Ventures III, LP	30,243,217	750,000
Khosla Ventures IV, LP	121,058,478	950,000
Khosla Ventures Opportunity I, LP	16,680,016	9,100,000
Khosla Ventures Seed D, LP	12,830,750	1,420,000

	<u>Adjusted Reported Value</u>	<u>Unfunded Commitment</u>
Khosla Ventures Seed E, LP	1,498,580	3,615,000
Khosla Ventures V, LP	128,000,506	1,750,000
Khosla Ventures VI, LP	92,577,803	5,100,000
Khosla Ventures VII, LP	21,314,264	28,600,000
KKR 2006 Fund, LP	38,547,603	6,102,869
KKR Americas Fund XII, LP	342,021,210	25,592,467
KKR Asian, LP	407,474	395,007
KKR Asian Fund II, LP	31,094,505	239,698
KKR Asian Fund III, LP	137,279,635	22,209,378
KKR China Growth Fund, LP	11,858,825	3,344,848
KKR European Fund II, LP	1,062,176	0
KKR European Fund III, LP	4,186,414	6,430,608
KKR European Fund IV, LP	85,407,043	291,546
KKR European Fund V (USD) SCSp	105,625,990	32,371,885
KKR Millennium Fund, LP	232,956	0
KKR North America Fund XI, LP	95,869,866	5,378,460
KKR North America Fund XIII SCSp	0	125,000,000
Lead Edge Capital IV, LP	34,063,690	4,231,624
Lead Edge Capital V, LP	26,030,371	8,786,545
* Lead Edge Capital VI, LP	0	75,000,000
* Lightspeed Opportunity Fund II, LP	2,750,000	22,250,000
Lightspeed Opportunity Fund, LP	36,641,863	750,000
Lightspeed Venture Partners Select IV, LP	25,844,378	4,750,000
* Lightspeed Venture Partners Select V, LP	2,750,000	22,250,000
Lightspeed Venture Partners VII, LP	9,137,618	0
Lightspeed Venture Partners XIII, LP	17,435,418	1,600,000
* Lightspeed Venture Partners XIV-A (Inception), LP	2,025,000	9,225,000
* Lightspeed Venture Partners XIV-B (Ignite), LP	2,200,000	11,550,000
Menlo Special Opportunities Fund II, LP	44,953,466	3,015,852
* Menlo Special Opportunities Fund III, LP	1,750,000	23,250,000
Menlo Ventures IX, LP	1,201,350	0
Menlo Ventures X, LP	2,786,425	0
Menlo Ventures XI, LP	25,081,755	0
Menlo Ventures XIV, LP	18,346,209	350,000
Menlo Ventures XV, LP	14,408,185	11,250,000
Meritech Capital Partners Franchise Fund, LP	4,179,507	10,987,500
Meritech Capital Partners IV, LP	5,880,367	300,000
Meritech Capital Partners V, LP	60,134,322	600,000
Meritech Capital Partners VI, LP	63,491,803	2,656,250
Meritech Capital Partners VII, LP	24,847,571	22,418,750
Michigan Growth Capital Partners II, LP	158,769,964	959,482
Michigan Growth Capital Partners III, LP	118,318,836	23,581,261
Michigan Growth Capital Partners IV, LP	6,688,355	18,311,645
Michigan Growth Capital Partners, LP	13,148,394	6,893,763
Michigan SEMF Barings	27,588,773	123,543,945
Michigan SEMF Grosvenor	24,100,813	126,281,960

	<u>Adjusted Reported Value</u>	<u>Unfunded Commitment</u>
New Leaf Biopharma Opportunities II, LP	136,937,460	8,000,000
New Leaf Growth Fund I, LP	34,070,716	0
New Leaf Ventures II, LP	5,012,428	0
New Leaf Ventures III, LP	45,738,966	0
New Leaf Ventures IV, LP	53,548,007	17,000,000
Nordic Capital VI, LP	138,387	1
Nordic Capital VIII, LP (Alpha)	40,728,572	6,686,016
Oak Investment Partners X, LP	107,747	0
Oak Investments Partners IX, LP	14,816	0
Ocqueoc Holdings, LLC	506,771	47,892,533
Odyssey Investment Partners Fund VI, LP	66,078,395	38,920,778
Parthenon Investors II, LP	590,295	3,175,229
Parthenon Investors III, LP	34,235,717	2,636,037
Parthenon Investors IV, LP	56,003,260	1,188,794
Permira Growth Opportunities I, LP1	47,771,109	23,244,666
Permira Growth Opportunities II SCSp	0	50,000,000
Permira VII L.P. 1	69,537,281	26,370,644
* Permira VIII, L.P. 2	0	83,448,744
PPC Fund II	72,804,064	11,376,270
Public Pension Capital, LLC	77,804,324	31,523,315
Renaissance Venture Capital Fund IV, LP	3,430,985	21,500,000
Rhone Partners V, LP	165,479,470	0
Riverside Capital Appreciation Fund VI, LP	28,699,669	3,673,878
Riverside Capital Appreciation Fund VII, LP	105,314,529	24,753,419
Riverside Micro Cap Fund I, LP	16,112,637	5,632,976
Riverside Micro-Cap Fund II, LP	6,937,728	2,735,834
Riverside Micro-Cap Fund III, LP	61,846,679	3,913,101
Riverside Micro-Cap Fund IV, LP	89,090,256	3,617,302
Riverside Micro-Cap Fund IV B, LP	21,520,765	713,421
Riverside Micro-Cap Fund V, LP	92,865,083	28,843,922
Riverside Micro-Cap Fund VI, LP	0	125,000,000
Science Ventures Fund II, LP	41,507,525	2,300,000
Science Ventures Fund III, LP	10,880,025	15,000,000
Shamrock Capital Content Fund I, P	23,579,185	32,703,753
Shamrock Growth Capital Fund IV, LP	53,110,107	2,426,116
Silver Lake Partners II	0	3,531,586
Silver Lake Partners III	8,335,339	11,910,583
Silver Lake Partners IV, LP	105,614,568	1,428,864
Silver Lake Partners V, LP	94,382,288	6,781,589
Silver Lake Partners VI, LP	50,868,788	32,514,946
Silver Lake SL SPV-2	66,151,467	0
SK Capital Partners V, LP	54,191,263	660,311
SKCP Catalyst Fund I-A, LP	27,072,007	16,952,699
SMRS - TOPE, LLC	4,969,231,273	222,835,071
SMRS-CAPP, LLC	241,485,759	0
SMRS-NCRP, LLC	432,199,340	161,958,521

	Adjusted Reported Value	Unfunded Commitment
Summit Partners Growth Equity Fund X, LP	84,769,288	32,999,413
Summit Partners Growth Equity Fund XI-A, LP	0	100,000,000
The Huron Fund III, LP	6,544,171	2,072,756
The Huron Fund IV, LP	16,615,596	382,593
The Huron Fund V, LP	16,461,510	14,695,157
* The Veritas Capital Fund VIII, LP	0	250,000,000
The Veritas Capital Vantage Fund, LP	6,291,992	52,645,209
Thoma Bravo Discover Fund II, LP	116,535,431	20,479,970
* Thoma Bravo Discover Fund IV, LP	0	100,000,000
* Thoma Bravo Explore II, LP	0	100,000,000
Thoma Bravo Fund XII, LP	246,732,190	26,441,887
Thoma Bravo Fund XIII, LP	181,219,857	25,027,953
Thoma Bravo Fund XV, LP	0	100,000,000
Thoma Bravo XIV, LP	118,325,642	7,356,134
TI Platform BOV, LP	14,716,224	5,209,307
TI Platform Fund II, LP	14,074,866	3,466,388
TI Platform Fund III, LP	0	25,000,000
TI Platform SMRS SMA, LP	83,119,557	37,501,190
TPG Healthcare Partners, LP	17,650,688	11,711,631
TPG IV, LP	115,766	211,725
TPG Partners VI, LP	17,066,773	7,467,821
TPG Partners VIII, LP	86,552,169	59,864,640
TPG Partners, VII, LP	79,078,418	6,486,774
TPG V, LP	960,834	5,841,509
Trilantic Capital Partners V (North America) Fund A, LP	26,621,004	2,229,369
Trilantic Capital Partners VI (North America), LP	74,362,729	13,524,832
TSG6, LP	59,620,728	19,996,180
TSG7-A, LP	223,745,846	25,630,649
TSG8, LP	74,264,957	73,379,837
* TSG9, LP	0	175,000,000
Veritas Capital Fund V, LP	184,915,321	8,898,273
Veritas Capital Fund VI, LP	204,333,768	29,090,757
Veritas Capital Fund VII, LP	106,696,391	17,106,490
Veritas V Co-Investors, LP	126,822,081	0
Vista Equity Endeavor Fund I, LP	51,913,404	10,250,563
Vista Equity Endeavor Fund II, LP	33,685,867	31,182,678
Vista Equity Partners Fund V, LP	65,728,690	10,673,598
Vista Equity Partners Fund VI, LP	119,258,160	11,206,603
Vista Equity Partners VII, LP	68,964,536	19,837,845
Vista Foundation Fund III, L.P	26,752,725	6,730,806
Vista Foundation Fund IV, LP	28,051,119	40,821,493
Warburg Pincus China-Southeast Asia II, LP	30,587,203	49,200,000
Warburg Pincus China, LP	60,740,299	1,296,782
Warburg Pincus Energy, LP	56,149,647	10,347,898
Warburg Pincus Equity Partners, LP	1,177,494	0
Warburg Pincus Financial Sector, LP	65,642,439	6,727,500

	Adjusted Reported Value	Unfunded Commitment
Warburg Pincus Global Growth, LP	167,058,775	22,200,000
Warburg Pincus Private Equity IX, LP	2,251,519	0
Warburg Pincus Private Equity X, LP	6,222,672	0
Warburg Pincus Private Equity XI, LP	97,015,386	0
Warburg Pincus Private Equity XII Secondary, LP	34,775,838	337,500
Warburg Pincus Private Equity XII, LP	243,980,970	2,362,500
Total Private Equity	\$23,479,369,565	\$ 8,172,980,467
Cash	301,070,628	0
Active Small Cap Cash	16,950,980	0
Active Small Cap	7,271,804	0
Income Accruals	(4)	0
Grand Total	\$23,804,662,973	\$ 8,172,980,467

* New Commitments made during quarter reported

State of Michigan Retirement System
FIXED INCOME REVIEW

State of Michigan Investment Board Meeting
June 23, 2022



Daniel J. Quigley
Senior Investment Manager
Fixed Income Division

EXECUTIVE SUMMARY

Performance

MPSERS Plan (3/31/22)	1-Year	3-Years	5-Years	7-Years	10-Years
Annualized Returns	-0.9%	2.9%	3.4%	3.4%	3.5%
Bloomberg Barclays US Agg	-4.2%	1.7%	2.1%	1.9%	2.2%
Peer Median Returns	-3.3%	2.6%	2.8%	2.7%	3.0%
Percentile Rank vs. Peers*	23	34	24	27	25

*State Street Universe greater than \$1 billion

- The fixed income portfolio outperformed its benchmark and peer group on a one-year basis. This outperformance was driven by a continued recovery in risk assets, particularly for structured fixed income and high yield bonds. The portfolio also maintains a shorter duration than the benchmark, which has helped recent performance as interest rates have increased over the past year.
- The negative performance of the U.S. Aggregate Bond Index on a one-year basis was driven by the increase in interest rates across the yield curve. U.S. Treasuries and RMBS had a negative performance, returning -4.0% and -5.0% respectively on a one-year basis. Investment Grade Corporate bonds also had a negative performance, returning -4.8% over the previous year.
- The Structured Fixed Income sleeve was the main contributor to the portfolio's outperformance. This was mainly due to the floating rate exposure in this portfolio as well as the strong fundamental performance of mortgage credit. The Structured Fixed Income Credit sleeve returned 2.1% on a year-over-year (YOY) basis, outperforming the index by over 600 bp.
- The portfolio's allocation to High Yield credit also helped performance. This portion of the portfolio had a YOY performance of 0.1%, outperforming the index by over 400 bp on a relative 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 4.4% versus a benchmark yield of 2.9%. 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 March 31, 2022, 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 65.8%. This includes a 32.1% 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 34.2% as of March 31, 2022.

Tactical Update

- The allocation to securitized credit, primarily in CMBS, ABS, non-agency RMBS, and CLO securities, was 24.5% 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. The one-year return on this portfolio was 2.1%.
- The allocation to high-yield strategies was 4.2% at the end of the quarter. This out-of-benchmark position has outperformed since it has been added to the portfolio. Recent outperformance has been driven by the shorter duration of this portfolio versus the benchmark as well as the higher coupon income in a rising rate environment. The one-year performance of this allocation was 0.1%, outperforming the core index by roughly 425 basis points (bp).
- 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.

Market Environment and Outlook

- The yield curve for U.S. Treasury securities flattened during the quarter. The spread between 2-year and 10-year U.S. Treasury Notes decreased by 78 bp for the quarter, ending March at 0 bp. This has been driven primarily by a 205 bp increase on the 2-year U.S. Treasury yield on a YOY basis as markets prepare for tightening monetary in the months ahead.
- Inflation expectations increased during the quarter with ten-year breakeven inflation ending the quarter at 2.83%, this is approximately 70 bp above the 5-year average for this metric.
- Credit markets were down during the quarter as investment grade (IG) and high yield (HY) spreads widened. IG spreads increased by 25 bp during the quarter, ending the period at 116 bp. HY spreads ended the quarter at 325 bp, 42 bp higher on a year-to-date (YTD) basis. IG spreads are higher than their 5-year moving average of 107 bp.
- Emerging Markets (EM) credit spreads ended the quarter at 320 bp after widening by 23 bp for the quarter. EM spreads have increased by 41 bp on a YOY basis.

Conclusion

- The portfolio currently has a slight underweight to interest rate duration versus the benchmark and 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 Holdings Portfolio Characteristics

Benchmark: Barclays Aggregate

3/31/22

<u>Characteristic</u>	<u>Portfolio</u>	<u>Benchmark</u>
Average Maturity (Yrs)	8.7	8.7
Duration (Yrs)	5.9	6.7
Spread Duration (Yrs)	6.4	6.7
Coupon (%)	3.2	2.4
Yield to Maturity (%)	4.3	2.9
Credit Rating	A	AA
VaR (%)	7.6	6.4
Tracking Error (%)	3.5	NA
Beta (vs S&P 500)	0.09	0.02

Commentary

Objectives

Income:

Highlights

The coupon of the portfolio is approximately 80 bps higher than the benchmark. Interest rate 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:

32.1% 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 Strategy

3/31/22

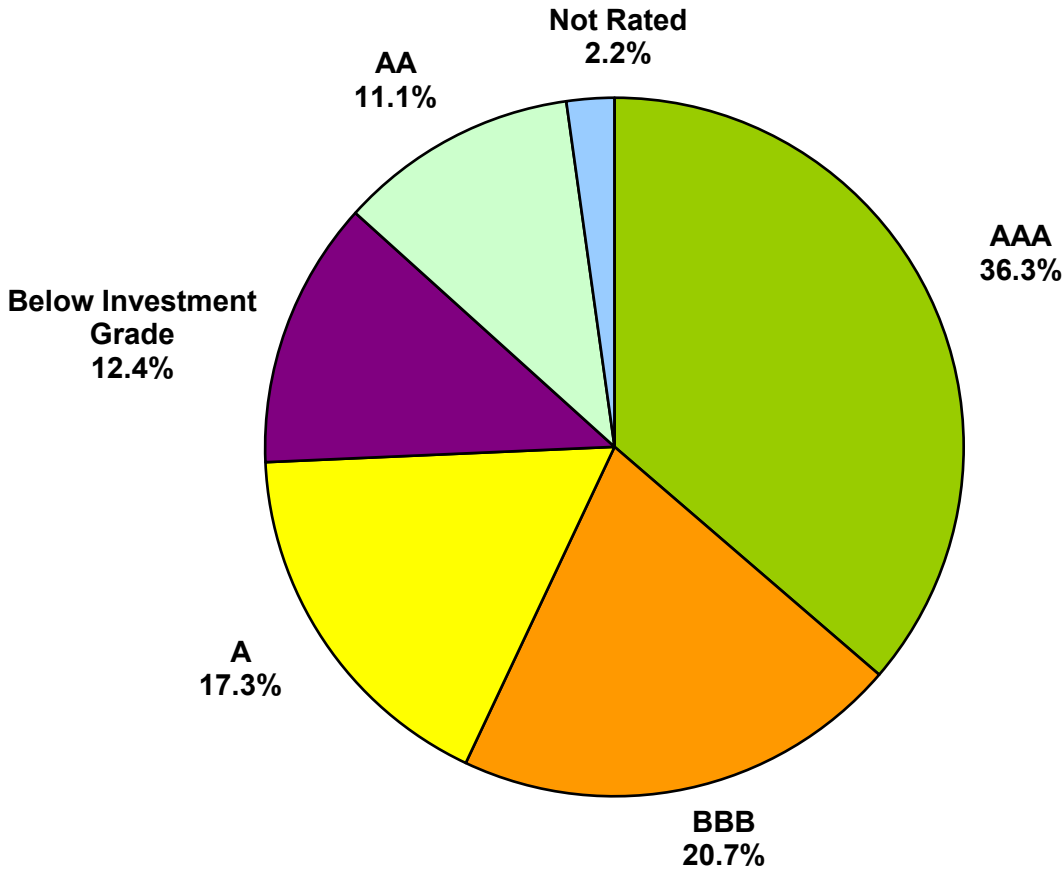
	Amount	Total	% of Total
Core (\$ in Millions)			
FID Internal	\$4,867		
PIMCO Mortgage Fund	565		
PGIM Investment Grade Credit	215		
Total Core		\$5,647	60.9%
Tactical			
Fidelity Tactical	\$512		
Guggenheim Core Plus	200		
Total Tactical		\$712	7.7%
Securitized Debt			
TICP CLO Debt	\$727		
Met West Securitized Ops	651		
Principal CMBS	447		
Fortress Credit ABI	372		
Napier Park ABS Income	52		
Napier Park Strategic Loan	26		
Putnam DMS	2		
Total Securitized Debt		\$2,277	24.5%
High Yield			
PGIM High Yield	\$348		
Crescent Direct Lending	37		
Total High Yield		\$385	4.2%
Global			
T. Rowe Global Multi-Sector	\$255		
Total Global		\$255	2.7%
TOTAL		<u>\$9,276</u>	<u>100.0%</u>

NOTE: Totals may not be exact due to rounding.

SMRS

Fixed Income By Rating

3/31/22



Market Value in Millions				
3/31/22				
	<u>Assets</u>	<u>Percent</u>	<u>Benchmark</u>	<u>Difference</u>
AAA	\$3,364	36.3%	70.9%	-34.6%
AA	1,025	11.1%	2.4%	8.7%
A	1,604	17.3%	10.9%	6.4%
BBB	1,923	20.7%	12.8%	7.9%
* Below Investment Grade	1,152	12.4%	0.3%	12.1%
Not Rated	208	2.2%	2.7%	-0.5%
Total Investments	<u>\$9,276</u>	<u>100.0%</u>	<u>100.0%</u>	

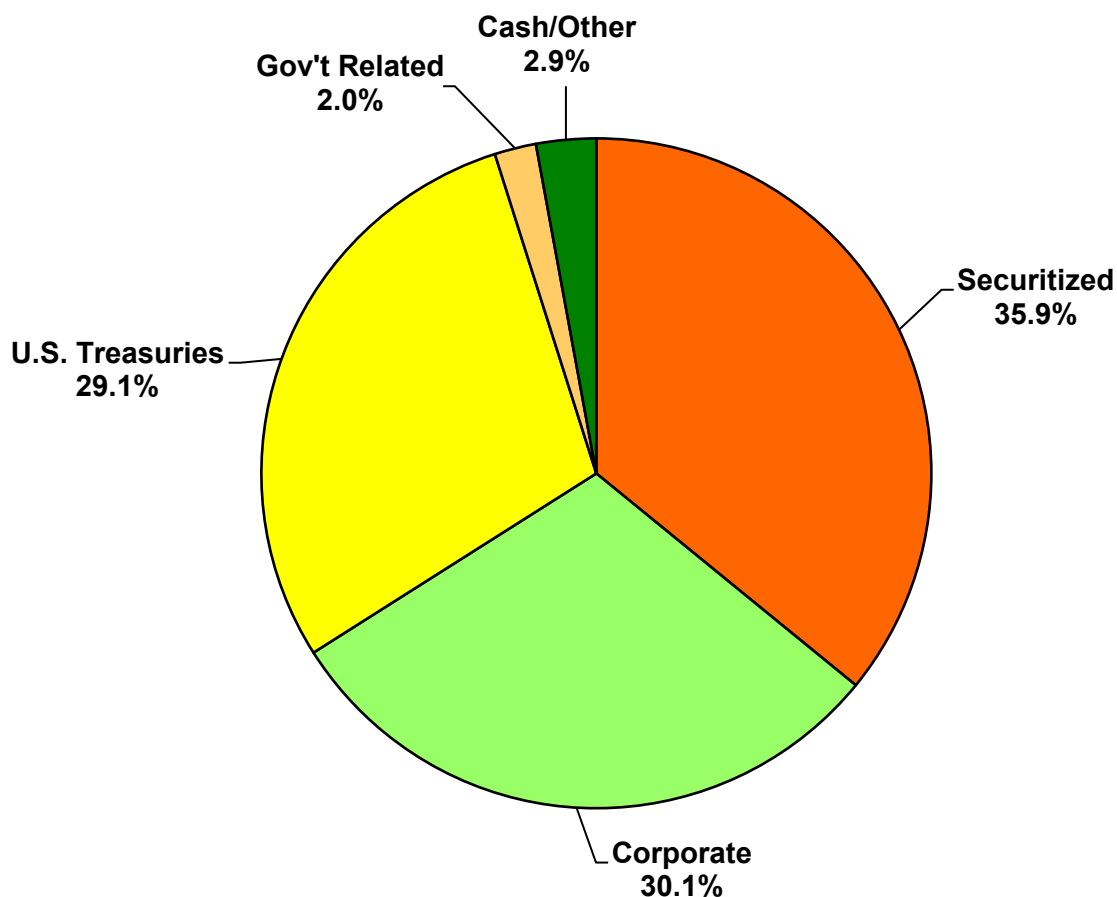
* Comprised of approximately 7.0% High Yield Credit and 5.4% High Yield RMBS/ABS

Benchmark: Barclays US Aggregate

SMRS

Fixed Income By Asset Type

3/31/22



Market Value in Millions				
3/31/22				
	<u>Assets</u>	<u>Percent</u>	<u>Benchmark</u>	<u>Difference</u>
Securitized	\$3,332	35.9%	29.9%	6.0%
Corporate	2,789	30.1%	24.9%	5.2%
U.S. Treasuries	2,702	29.1%	39.8%	-10.7%
Government Related	182	2.0%	5.4%	-3.4%
Cash/Other	271	2.9%	0.0%	2.9%
Total Investments	<u><u>\$9,276</u></u>	<u><u>100.0%</u></u>	<u><u>100.0%</u></u>	

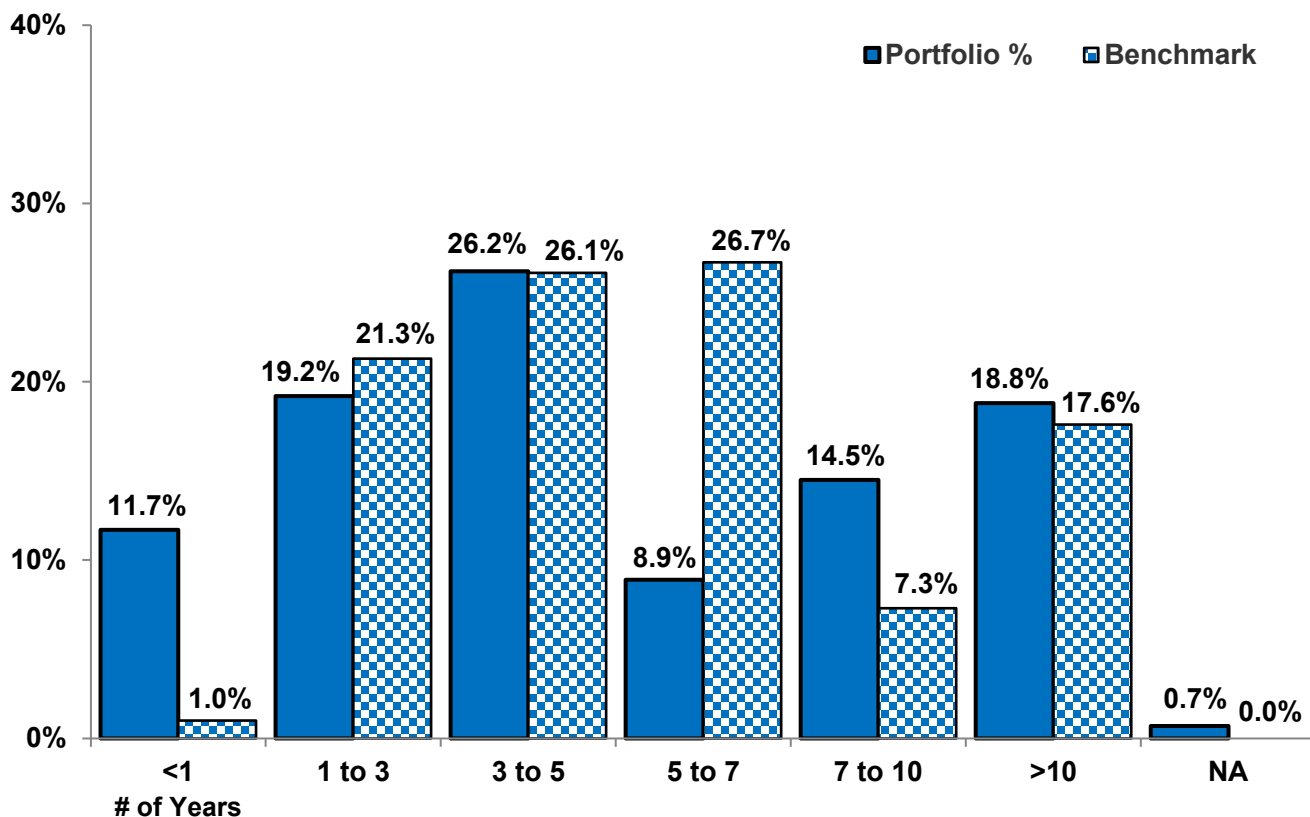
Benchmark: Barclays US Aggregate

SMRS

Duration Distribution

Fixed Income Composite Versus Benchmark

3/31/22



Source: Factset

Market Value in Millions					
Duration	Assets	Portfolio Weight	Benchmark Weight	Portfolio Duration*	Benchmark Duration*
<1	\$1,090	11.7%	1.0%	-0.1	1.0
1 to 3	1,777	19.2%	21.3%	2.1	2.0
3 to 5	2,431	26.2%	26.1%	4.1	4.0
5 to 7	822	8.9%	26.7%	6.0	5.9
7 to 10	1,343	14.5%	7.3%	8.4	8.2
>10	1,746	18.8%	17.6%	17.0	16.2
NA	67	0.7%	0.0%	2.3	0.2
Total	\$9,276	100.0%	100.0%	6.4	6.5

* Effective Duration

Benchmark: Barclays US Aggregate

Total Fixed Income Performance - Net of Fees (MPERS)

3/31/22

	<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	9,276,083,686.70	-1.13%	2.71%	3.23%	3.20%	3.37%
<i>Bloomberg/Barclays Aggregate Bond Index</i>	<i>N/A</i>	<i>-4.15%</i>	<i>1.69%</i>	<i>2.14%</i>	<i>1.87%</i>	<i>2.24%</i>
Internal Core Fixed Income	4,867,230,047.55	-2.08%	2.50%	2.99%	2.90%	3.03%
Externally Managed Fixed Income	\$4,408,853,639	0.08%	2.85%	3.48%	3.57%	3.82%
PIMCO Mortgage Fund	564,976,074	-4.23%	0.85%			
<i>Bloomberg/Barclays US MBS Agy Fixed Indx</i>	<i>N/A</i>	<i>-4.92%</i>	<i>0.56%</i>			
Investment Grade Credit	\$215,154,510	-4.02%	3.64%	3.70%	3.42%	4.02%
PGIM Investment Grade	215,154,510	-4.02%	3.64%	3.70%	3.42%	4.07%
<i>Bloomberg/Barclays Credit Index</i>	<i>N/A</i>	<i>-4.16%</i>	<i>2.81%</i>	<i>3.18%</i>	<i>2.82%</i>	<i>3.44%</i>
Tactical Fixed Income	\$511,872,834	-0.16%	4.41%	4.12%	3.89%	5.88%
Fidelity Tactical Bond Fund	511,872,834	-0.17%	4.51%	4.38%	4.22%	
<i>Bloomberg/Barclays Aggregate Bond Index</i>	<i>N/A</i>	<i>-4.15%</i>	<i>1.69%</i>	<i>2.14%</i>	<i>1.87%</i>	<i>2.24%</i>
High Yield Fixed Income	\$384,968,326	0.09%	5.46%	5.19%	5.28%	
PGIM High Yield	347,934,666	0.12%	6.00%	5.67%	5.69%	
Crescent Direct Lending	37,033,659	-0.58%	6.74%			
<i>Bloomberg/Barclays US HY BA/B 2% Cap</i>	<i>N/A</i>	<i>4.65%</i>	<i>9.07%</i>	<i>6.36%</i>	<i>6.07%</i>	
Structured Fixed Income	\$2,476,915,122	2.06%	2.41%	3.45%		
TICP CLO Debt	726,717,676	1.80%	5.74%	4.45%		
MetWest Securitized Opportunities	651,384,177	-0.57%	2.22%	3.47%	3.39%	
Principal CMBS	447,244,239	-0.41%	2.30%	3.58%	3.21%	5.82%
Fortress ABI	372,237,029	4.06%				
Guggenheim Core Plus	200,000,000	NA				
Napier Park ABS Income	51,840,533	19.71%	12.22%	11.12%		
Napier Park Strategic Loan LP	25,876,163	4.26%	3.30%	4.65%		
Putnam DMS	1,615,305	42.39%				
<i>Bloomberg/Barclays Aggregate Bond Index</i>	<i>N/A</i>	<i>-4.15%</i>	<i>1.69%</i>	<i>2.14%</i>	<i>1.87%</i>	<i>2.24%</i>
<i>Blended CMBS Benchmark</i>	<i>N/A</i>	<i>-4.40%</i>	<i>1.84%</i>	<i>2.47%</i>	<i>2.28%</i>	<i>3.49%</i>
Global Fixed Income	\$254,966,773	-3.59%	2.50%	2.84%		
T. Rowe Global Multi-Sector	254,966,773	-2.94%	2.94%	3.18%		
<i>Custom GMS Benchmark</i>	<i>N/A</i>	<i>-5.08%</i>	<i>1.41%</i>	<i>2.50%</i>		

State of Michigan Retirement System

INTERNATIONAL EQUITY REVIEW

State of Michigan Investment Board Meeting

June 23, 2022



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

EXECUTIVE SUMMARY

Performance

MPSERS Plan (03/31/22)	1-Year	3-Years	5-Years	7-Years	10-Years
Annualized Returns	-2.8%	8.5%	7.5%	6.1%	6.7%
MSCI ACWI ex USA Returns	-1.5%	7.5%	6.8%	5.2%	5.7%
Peer Median Returns	0.0%	8.2%	7.5%	6.0%	6.5%
Percentile Rank vs. Peers*	76	42	51	38	40

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

- The portfolio underperformed the benchmark by 1.3% over the last twelve months.
- The underperformance was driven by the momentum factor, information technology sector, financial sector, and energy 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 create consistent, transparent, low-cost, efficient returns.
- Current portfolio drivers of risk and return.
 - The tracking error of the portfolio is approximately 1.4%, which is below the division's risk budget of 3.0%.
 - The division's core strategy of exposure to the quality, value, and momentum factors (QVM), accounts for collectively 15.3% of the total tracking error, indicating that long-term, the portfolio is not materially exposed to any 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.
 - Allocated \$105.0 million to the Morgan Stanley International Opportunity Fund. The strategy identifies exceptional international growth companies that create and benefit from long-term structural changes in the economy and society.

- Invested \$125.0 million in the Brown Capital International Small Company Fund. The team invests in the vast and thinly researched universe of small and mid-sized publicly traded companies outside of the U.S. The strategy seeks exceptional growth companies over the long-term, as they transform their sustained revenue growth into increased earnings.

Market Environment and Outlook

Market Performance

- International stock markets were down -1.5% over the last twelve months. Fundamentals are still growing but have begun to deaccelerate on a year-over-year basis.
- Performance of the quality, value, and momentum factors (QVM) remains strategically important to the IED. Over the last twelve months, the value factor and quality factor outperformed the MSCI ACWI ex USA by 1.2%, and 3.1% respectively. The momentum factor continued to lag, underperforming the benchmark by -2.1%. IED's core strategy remains balanced and consistent, outperforming the division's benchmark for the third consecutive year. The QVM strategy outpaced the benchmark by 1.3% over the prior year ending in March 2022.
- Emerging markets have underperformed the MSCI ACWI ex USA by -9.9% over the last year. Developed markets outperformed the broader index by 4.5%.
- The U.S. dollar continues to strengthen and was up 7.0% over the last twelve months.
- Commodities continued to surge in 2022, up 48.5%, outperforming international stocks by nearly 50.0% over the last year ending March 2022. Oil, copper, and gold are up 69.5%, 18.9%, and 13.9% year-over-year.
- Global government interest rates (index weighted) remain subdued, at approximately 2.0%. Interest rates have risen in the last six months but remain at low absolute levels relative to history.

Outlook

- Global stocks, commodities, and real estate have risen at a pace that indicates significant global inflation across asset classes.
- Major central banks around the world plan to remove liquidity starting in 2022. The impact of this withdrawal will have consequences on the global financial system.
- The global economy is still expanding at an above-average pace; however, the rate will significantly contract in 2022. International stock markets' earnings per share grew at 41.2% year-over-year, down from the peak of 53.4%.
- Europe's top-line sales and earnings expanded year-over-year by 4.8% and 51.1%. Forward-looking sales and earnings per share are expected to be up over the next 12 months, 7.1% and 5.2% respectively.
- Japan's sales per share declined by -0.8% year-over-year. Earnings per share were above average, growing at 34.7% year-over-year. Forward-looking sales and earnings growth are forecasted at 1.7% and 8.5%.

- Over the last two years, central banks' "anything it takes" policies have created tremendous amounts of money in the global financial system. Forward-looking sales and earnings estimates appear to be moderating back towards a more normal level of growth.
- Energy costs have soared even before the war in Ukraine. At the end of December 2021, oil was up nearly 51% year-over-year, indicating the upward inflation pressures predate the war. The same dynamic has occurred across other major input commodities such as soybeans, wheat, and corn. If the price increases remain in consumers' and producers' expectations, central banks will find it increasingly difficult to lower inflation.
- Major central banks, apart from the Bank of Japan, will change monetary policies from accommodative to tightening in 2022 to rein in inflation. Currently, the market believes the narrative that inflation will moderate at some point in the back half of 2022.
- Persistently high inflation may force the banks to taper more quickly, leading markets to reassess how much support central banks will provide to indebted governments. Significantly higher interest rates may potentially lead to a further contraction in equity market multiples.
- If the major central banks stop tightening, their respective currencies will come under significant pressure, similar to what has occurred in Japan this year. Temporarily this may drive inflation even higher in 2023.
- Analysts' forward-looking, one-year estimate for earnings per share growth is 5.7% for the MSCI ACWI ex USA index.
- Go-forward returns for the MSCI ACWI ex USA index on an annualized basis are estimated at 8.4%. This rate is based on the current price and actual fundamentals over multiple periods to remove fundamental variability, and better estimate the earnings power of the index.
- A ten-year blended international government yield of 2.0% implies an international equity risk premium of 6.4%. The equity risk premium significantly contracted by 0.6% in the quarter due to nearly a 1.0% increase in long-term government interest rates.

Conclusion

International stock market fundamentals are slowing towards a more normal rate of growth. Global government bond yields have moved higher but remain near all-time lows. As stock markets lap their year-over-year fundamental comparisons, the question becomes what multiples investors are willing to pay if the growth projections moderate or even decline.

International stocks are expected to grow earnings per share by 5.7% in the next twelve months. The market trades at 13.2x price to earnings which is below its twenty-three year average of 16.8x but questions remain if earnings will be impacted by higher interest rates and inflation. The annualized go-forward return of 8.4% is still 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

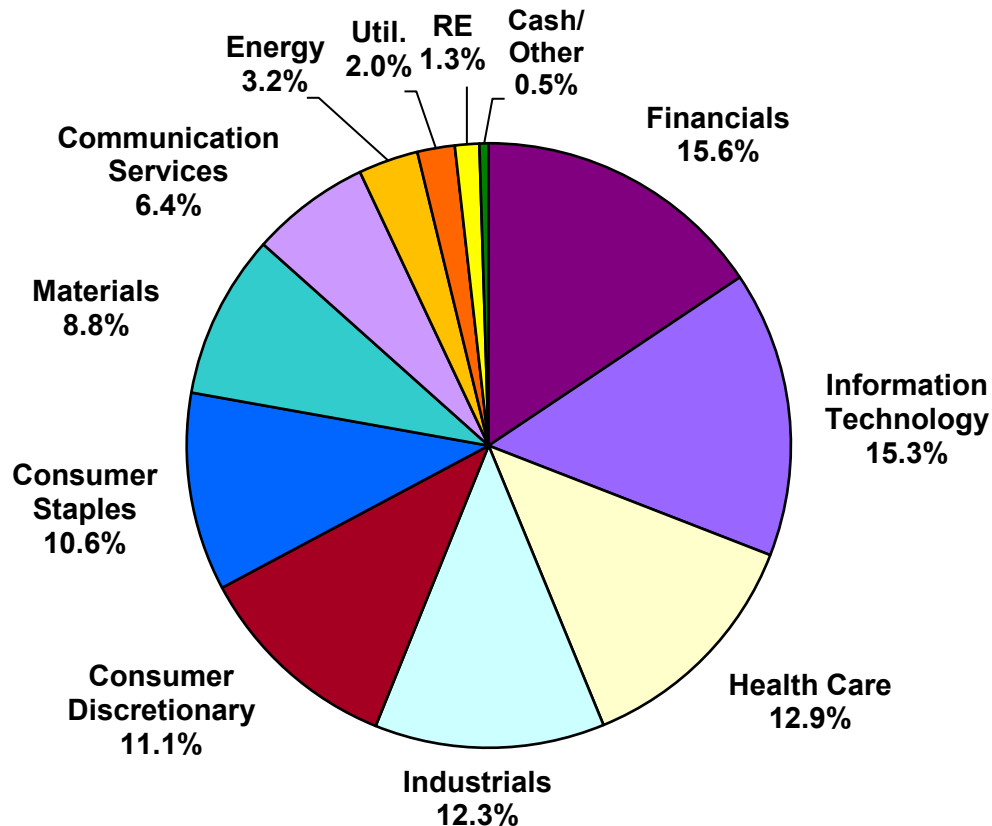
3/31/22

Markets	Amount	Total	% of Total
Active (\$ in Millions)			
BlackRock MSCI	\$2,539		
IED Quality Equity	899		
Wellington	798		
Martin Currie	505		
UBS	175		
WCM	167		
Brown	122		
Baillie Gifford	120		
Morgan Stanley	96		
Baron	69		
Total Active		\$5,490	37.3%
Stock Plus			
Internal	\$3,524		
PIMCO	2,291		
Total Stock Plus		\$5,815	39.6%
Indexed			
SSGA	\$1,766		
BlackRock	1,628		
Total Indexed		\$3,394	23.1%
TOTAL		<u>\$14,699</u>	<u>100.0%</u>

SMRS

International Equity By Sector

3/31/22



Market Value in Millions				
3/31/22				
	<u>Assets</u>	<u>Percent</u>	<u>Benchmark</u>	<u>Difference</u>
Financials	\$2,299	15.6%	20.6%	-5.0%
Information Technology	2,248	15.3%	11.6%	3.7%
Health Care	1,895	12.9%	9.5%	3.4%
Industrials	1,810	12.3%	12.0%	0.3%
Consumer Discretionary	1,635	11.1%	10.7%	0.4%
Consumer Staples	1,556	10.6%	8.8%	1.8%
Materials	1,290	8.8%	8.7%	0.1%
Communication Services	943	6.4%	6.3%	0.1%
Energy	466	3.2%	5.9%	-2.7%
Utilities	292	2.0%	3.4%	-1.4%
Real Estate	195	1.3%	2.5%	-1.2%
Total Investments	\$14,629	99.5%	100.0%	
Cash/Other	70	0.5%	0.0%	0.5%
Total	<u>\$14,699</u>	<u>100.0%</u>	<u>100.0%</u>	

Benchmark: MSCI ACWI ex USA

SMRS

International Equities

3/31/22

Date:	<u>3/31/22</u>	<u>12/31/21</u>	<u>9/30/21</u>	<u>6/30/21</u>
Assets (\$ in Millions):	\$14,699	\$15,899	\$15,538	\$16,043
Number of Securities:	2,467	2,506	2,639	2,624
Active Share:	34%	32%	33%	33%

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	12.1%	9.8%	10.1%	8.4%
Sustainable Growth Rate	8.0%	6.5%	7.0%	5.8%
Dividend Yield	2.7%	2.3%	2.2%	2.5%
Buyback Yield	0.7%	0.2%	0.0%	0.1%
Collateral Yield	0.8%	0.8%	--	--
Risk:				
Beta	0.99	--	1.00	--
Volatility	17.1%	--	16.9%	--
Tracking Error	1.4%	--	0.0%	--
Information Ratio	1.4	1.1	--	--
Fundamental:				
Average Capitalization (\$ in Billions)	89.4	--	93.6	--
Price/Earnings	12.4	17.0	16.2	17.8
Price/Book	1.7	1.9	1.9	1.9
ROE	13.7%	11.4%	11.7%	10.6%

TOP TEN HOLDINGS

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

	<u>Portfolio Weight</u>	<u>Market Capitalization*</u>	<u>FY1 P/E</u>	<u>Market Value**</u>
ASML Holding NV	2.0%	\$275.9	36.5	\$298.3
Taiwan Semiconductor Manufacturing Co., Ltd.	1.9%	540.3	19.6	276.4
Novo Nordisk A/S Class B	1.8%	198.6	33.1	266.3
Tencent Holdings, Ltd.	1.8%	459.3	21.5	265.1
Nestle S.A.	1.8%	367.7	26.0	262.5
Roche Holding Ltd. Dividend Right Cert.	1.5%	326.7	17.9	224.5
Samsung Electronics Co., Ltd.	1.3%	385.6	9.8	197.8
Toyota Motor Corp.	1.1%	298.7	11.3	168.9
CSL Limited	1.0%	97.0	40.2	143.7
BHP Group, Ltd.	<u>1.0%</u>	<u>196.7</u>	9.6	<u>143.2</u>
TOTAL	<u>15.3%</u>	<u>\$3,146.5</u>		<u>\$2,246.7</u>

International Equity Performance - Net of Fees
3/31/22

<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 Equity	\$14,698,537,400	-3.0%	8.2%	7.3%	5.9%	6.0%	1/1/04
MSCI ACWI ex USA		-1.5%	7.5%	6.8%	5.2%	6.1%	
Lipper International Multi-Cap Core		-0.6%	7.1%	6.2%	4.9%	5.5%	
Excess Return		-1.6%	0.7%	0.5%	0.7%	-0.1%	
Pct Rank vs. Lipper International Multi-Cap Core		83	23	15	17	21	

Total International Active Strategy	\$5,489,445,683	-6.5%	7.8%	6.6%	5.3%	5.2%	5/1/05
MSCI ACWI ex USA		-1.5%	7.5%	6.8%	5.2%	5.7%	
Lipper International Multi-Cap Core		-0.6%	7.1%	6.2%	4.9%	5.0%	
Excess Return		-5.1%	0.3%	-0.1%	0.1%	-0.5%	
Pct Rank vs. Lipper International Multi-Cap Core		95	38	44	35	43	
BlackRock MSCI Systematic Return	2,538,930,570	0.0%	10.4%	--	--	11.4%	12/1/18
MSCI ACWI ex USA		-1.5%	7.5%	--	--	8.4%	
Lipper International Multi-Cap Core		-0.6%	7.1%	--	--	7.8%	
Excess Return		1.5%	2.9%	--	--	3.0%	
Pct Rank vs. Lipper International Multi-Cap Core		49	1	--	--	1	
IED Quality Equity*	\$899,540,586	-1.9%	--	--	--	11.6%	2/1/20
MSCI ACWI ex USA		-1.5%	--	--	--	7.1%	
Lipper International Multi-Cap Core		-0.6%	--	--	--	6.5%	
Excess Return		-0.4%	--	--	--	4.5%	
Pct Rank vs. Lipper International Multi-Cap Core		68	--	--	--	1	
Martin Currie International Long-Term	\$504,754,470	-3.0%	13.6%	11.4%	--	12.3%	2/1/17
MSCI ACWI ex USA		-1.5%	7.5%	6.8%	--	7.4%	
Lipper International Multi-Cap Core		-0.6%	7.1%	6.2%	--	6.8%	
Excess Return		-1.5%	6.1%	4.6%	--	4.9%	
Pct Rank vs. Lipper International Multi-Cap Core		82	1	1	--	1	
Wellington IRE	331,021,754	0.8%	8.7%	7.7%	5.8%	5.1%	12/1/05
MSCI World ex USA		3.0%	8.6%	7.1%	5.4%	5.4%	
Lipper International Multi-Cap Core		-0.6%	7.1%	6.2%	4.9%	4.5%	
Excess Return		-2.3%	0.1%	0.6%	0.4%	-0.3%	
Pct Rank vs. Lipper International Multi-Cap Core		32	15	7	17	23	
Wellington Emerging Markets Local Equity	286,037,331	-20.4%	-0.2%	3.3%	3.2%	4.7%	12/1/11
MSCI Emerging Market Index		-11.4%	4.9%	6.0%	4.7%	3.9%	
Lipper Emerging Markets		-11.4%	4.3%	4.5%	3.3%	2.9%	
Excess Return		-9.0%	-5.1%	-2.6%	-1.5%	0.8%	
Pct Rank vs. Lipper Emerging Markets		85	91	86	76	37	
Wellington Select China Equity	180,569,159	-24.3%	--	--	--	17.2%	9/1/19
MSCI China On shore		-8.0%	--	--	--	13.9%	
Lipper Emerging Markets		-11.4%	--	--	--	6.6%	
Excess Return		-16.3%	--	--	--	3.3%	
Pct Rank vs. Lipper Emerging Markets		93	--	--	--	5	
UBS China A Opportunity Fund	174,743,193	-25.8%	--	--	--	5.4%	5/1/20
MSCI China On shore		-8.0%	--	--	--	13.9%	
Lipper Emerging Markets		-11.4%	--	--	--	14.4%	
Excess Return		-17.8%	--	--	--	-8.5%	
Pct Rank vs. Lipper Emerging Markets		95	--	--	--	92	
WCM Focused Growth International	167,564,675	--	--	--	--	-11.1%	10/1/21
MSCI ACWI ex USA		--	--	--	--	-3.7%	
Lipper International Large-Cap Core		--	--	--	--	-4.0%	
Excess Return		--	--	--	--	-7.3%	
Pct Rank vs. Lipper International Large-Cap Core		--	--	--	--	99	
Brown Capital Intl. Small Company Fund	121,658,504	--	--	--	--	-2.7%	3/1/22
MSCI ACWI Index		--	--	--	--	--	
Lipper International Large-Cap Core		--	--	--	--	--	
Excess Return		--	--	--	--	--	
Pct Rank vs. Lipper International Large-Cap Core		--	--	--	--	--	

<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>
Baillie Gifford Int'l Concentrated Growth	119,645,850	--	--	--	--	-29.6%	12/1/21
MSCI ACWI ex USA		--	--	--	--	--	
Lipper International Large-Cap Core		--	--	--	--	--	
<i>Excess Return</i>		--	--	--	--	--	
<i>Pct Rank vs. Lipper International Large-Cap Core</i>		--	--	--	--	--	
Morgan Stanley Intl Opportunity Fund	95,616,591	--	--	--	--	-8.9%	2/1/22
MSCI ACWI Index		--	--	--	--	--	
Lipper International Large-Cap Core		--	--	--	--	--	
<i>Excess Return</i>		--	--	--	--	--	
<i>Pct Rank vs. Lipper International Large-Cap Core</i>		--	--	--	--	--	
Baron Global Advantage	69,363,000	--	--	--	--	-22.9%	1/1/22
MSCI ACWI Index		--	--	--	--	--	
Lipper International Large-Cap Core		--	--	--	--	--	
<i>Excess Return</i>		--	--	--	--	--	
<i>Pct Rank vs. Lipper International Large-Cap Core</i>		--	--	--	--	--	

Total International Stock Plus Strategy**	\$5,815,177,040	-0.5%	8.9%	7.8%	6.3%	7.6%	1/1/09
MSCI ACWI ex USA		-1.5%	7.5%	6.8%	5.2%	7.5%	
Lipper International Multi-Cap Core		-0.6%	7.1%	6.2%	4.9%	7.2%	
<i>Excess Return</i>		1.0%	1.4%	1.0%	1.2%	0.1%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		52	10	6	7	26	
Internal Stock Plus	3,524,405,409	1.3%	8.4%	7.5%	5.4%	6.3%	9/1/11
MSCI ACWI ex USA		-1.5%	7.5%	6.8%	5.2%	5.5%	
Lipper International Multi-Cap Core		-0.6%	7.1%	6.2%	4.9%	6.0%	
<i>Excess Return</i>		2.8%	0.9%	0.7%	0.2%	0.8%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		26	20	11	31	37	
PIMCO StocksPLUS	2,290,780,104	-3.3%	9.6%	--	--	9.6%	4/1/19
MSCI ACWI ex USA		-1.5%	7.5%	--	--	7.5%	
Lipper International Multi-Cap Core		-0.6%	7.1%	--	--	7.1%	
<i>Excess Return</i>		-1.8%	2.1%	--	--	2.1%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		83	5	--	--	5	

Total International Index Strategy	\$3,393,914,677	-1.3%	7.8%	7.6%	6.3%	7.7%	7/1/09
MSCI ACWI ex USA		-1.5%	7.5%	6.8%	5.2%	6.7%	
Lipper International Multi-Cap Core		-0.6%	7.1%	6.2%	4.9%	6.9%	
<i>Excess Return</i>		0.2%	0.3%	0.9%	1.1%	1.0%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		62	34	8	7	14	
SSGA MSCI ACWI ex USA Index	1,766,202,598	-1.3%	7.8%	--	--	4.7%	11/1/17
MSCI ACWI ex USA		-1.5%	7.5%	--	--	4.5%	
Lipper International Multi-Cap Core		-0.6%	7.1%	--	--	3.9%	
<i>Excess Return</i>		0.2%	0.3%	--	--	0.3%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		63	63	--	--	21	
Blackrock ACWI ex USA Index	1,627,712,079	-1.3%	7.8%	--	--	4.2%	3/1/18
MSCI ACWI ex USA		-1.5%	7.5%	--	--	3.9%	
Lipper International Multi-Cap Core		-0.6%	7.1%	--	--	3.7%	
<i>Excess Return</i>		0.2%	0.3%	--	--	0.3%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		62	34	--	--	30	

* The amount includes the total for the International Transitio account.

State of Michigan Retirement System

DOMESTIC EQUITY REVIEW

State of Michigan Investment Board Meeting
June 23, 2022



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

EXECUTIVE SUMMARY

Performance

MPSERS Plan (3/31/22)	1-Year	3-Years	5-Years	7-Years	10-Years
Annualized Returns	9.6%	16.4%	15.1%	12.9%	14.1%
S&P 1500	14.6%	18.5%	15.5%	13.7%	14.4%
Peer Median Return	9.0%	14.5%	12.3%	10.4%	11.2%
Percentile Rank vs. Peers *	42	27	19	23	28

*State Street Universe greater than \$1 billion

- In the quarter ended March 31, 2022, the Domestic Equity Division both outperformed its peer group and underperformed the S&P 1500 over all time periods. During the past year, performance was 60 basis points (bps) ahead of peers and 500 basis points behind the S&P 1500, with incurred tracking error of 2.0%.
- Large Cap Growth stocks did well during this period, while small cap, momentum, quality, and value stocks, where DED was overweight in aggregate, all underperformed. While DED had exposure to the growth space, much of it was in smaller cap, momentum stocks, which moved in the opposite direction from their larger cap peers. Consequently, the growth side of the portfolio was unable to keep pace with growth stocks in the S&P 1500 benchmark index.
- The Disruptive Innovation space (typically smaller cap, growth and often linked to the momentum factor) continued to suffer disproportionate declines in value, negatively impacting the portfolio by approximately 150 bps. We believe this sector is now dramatically undervalued and has the best 3-5 year return profile of any in our portfolio.
- A handful of managers in the portfolio performed well in the year ended March of 2022:
 - DED's All Cap GARP fund transitioned from a value-based strategy to a higher beta enhanced index in August of 2021, and, largely as a result, outperformed the market by nearly 200 bps. The strategy was crafted and is managed by Greg Harrison, who has been with us since 1995. Greg has one of the strongest quantitative and derivative skillsets in the division.
 - DED's internally managed Large Cap Growth fund, run by Tom Smith, beat the S&P 500 by nearly 100 bps and significantly outperformed peers. Tom has been with us since 1987, is an assistant administrator and also doubles as our head trader. In addition to his stellar performance, he has been a leader by example within the division for many years and has helped to shape its supportive and collegial culture.
 - Michigan's Seizert Capital Partners was our best performing value manager, significantly outperforming value benchmarks in general and roughly matching the S&P 1500 on the year.

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 Domestic Equity Division continues to maintain a portfolio beta of 1.07 and is significantly undervalued when measured against ours and outside analysts' estimates of fair value, trading at nearly a 20% discount to the S&P 1500, despite higher levels of profitability and faster rates of reinvestment.
- The correction we have seen in both stocks and bonds so far in 2022 is both healthy, and supportive of the Fed's goal of reducing excess inflationary demand in the economy.
- This, coupled with continued low interest rates relative to stocks (and inflation), continues to make stocks appealing relative to other asset classes.
- DED sector over-weights include health care, communication services and financials. Underweights include consumer discretionary, consumer staples and technology.

Market Environment and Outlook

- At ~18X forward earnings equity markets trade at an earnings yield of roughly 5.5%, or 280 bps higher than 10-year treasury bonds at 2.7%, or ~37X earnings.
- Historically stocks have traded at an earnings yield approximately 125 bps higher than bonds, versus today's spread of nearly 300 bps, suggesting that market is currently pricing in further downside in bond yields and therefore may be attractive in the event those higher yields don't materialize.
- Given still depressed bond yields, the actions of the Federal Reserve to slow inflation, the current health of the economy, the strength of consumer balance sheets, and the continued availability of many attractively valued companies, stocks remain a reasonable alternative to bonds and bond-like asset classes.
- Inflation remains a concern but given the current disparity between equity and bond valuations, the Fed has room to raise rates further without significantly depressing stock valuations over the long-term.
- Longer-term we expect the market to return roughly 8.5%, driven by a dividend yield of 1.4% and dividend per share growth of 7.1% (inclusive of 2.8% growth driven by share buybacks from cash flow rich companies).

SMRS

Domestic Equity Strategies

3/31/22

Markets	Amount	Total	% of Total
Internal Indexed (\$ in Millions)			
Indexed Portfolios	\$10,960		
Total Indexed		\$10,960	49.0%
Internal Active			
Active Portfolios	\$7,467		
Total Internal Active		\$7,467	33.4%
External Active			
Los Angeles Capital	\$947		
Seizert Capital Partners	604		
Clarkston Capital Partners	529		
Martin Currie US LT Unconstrained	511		
ARK Investments	381		
Mellon Capital	292		
Patient Capital	177		
Attucks Asset Management	141		
Bivium Capital	133		
Managed Asset Portfolios	107		
Ancora	<u>105</u>		
Total External Active		\$3,927	17.6%

Total Domestic Equity

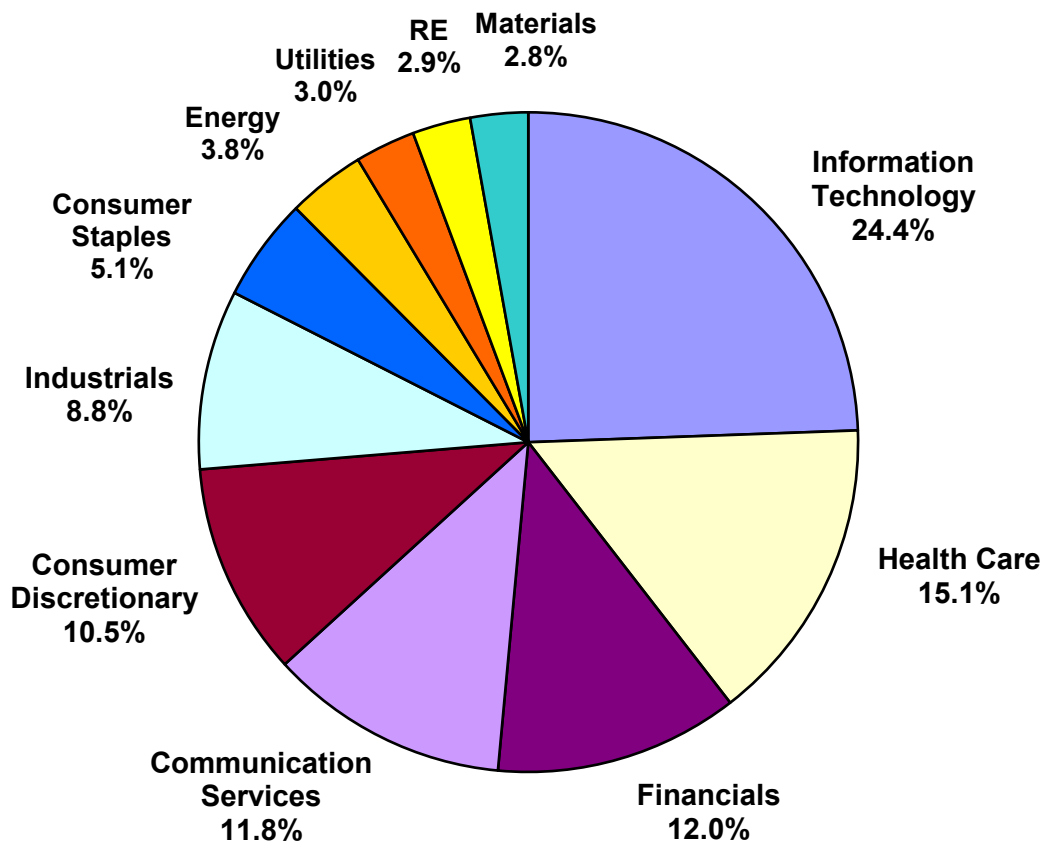
\$22,354

100.0%

SMRS

Domestic Equity By Sector

3/31/22



Market Value in Millions				
3/31/22				
	<u>Assets</u>	<u>Percent</u>	<u>Benchmark</u>	<u>Difference</u>
Information Technology	\$5,460	24.4%	26.9%	-2.5%
Health Care	3,372	15.1%	13.3%	1.8%
Financials	2,674	12.0%	11.4%	0.6%
Communication Services	2,627	11.8%	8.7%	3.1%
Consumer Discretionary	2,337	10.5%	12.1%	-1.7%
Industrials	1,966	8.8%	8.7%	0.1%
Consumer Staples	1,131	5.1%	5.9%	-0.8%
Energy	855	3.8%	3.9%	-0.1%
Utilities	662	3.0%	2.8%	0.2%
Real Estate	638	2.9%	3.3%	-0.5%
Materials	632	2.8%	3.0%	-0.2%
Total	<u>\$22,354</u>	<u>100.0%</u>	<u>100.0%</u>	

Benchmark: S&P 1500

SMRS

Domestic Equities Composite

3/31/22

Date:	<u>3/31/22</u>	<u>12/31/21</u>	<u>9/30/21</u>	<u>6/30/21</u>
Assets (\$ in Millions):	\$22,354	\$23,894	\$21,958	\$22,169
Number of Securities:	3,023	3,030	2,992	2,965
Active Share:	37%	30%	28%	32%

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.

	SMRS	S&P 1500
Characteristics:		
Market Cap. (\$ in Billions)	\$523.3	\$595.8
FY1 P/E	14.9	18.0
P/E upside to S&P 1500	20.5%	0.0
Return on Equity	39.9%	17.4%
Risk Metrics		
Beta	1.07	1.00
Tracking Error	2.4%	0.0%
Projected Returns		
Dividend Yield	1.8%	1.3%
Buyback Yield	3.9%	2.8%
Reinvestment Rate	<u>6.0%</u>	<u>4.4%</u>
Projected Investment Return	11.7%	8.5%

TOP TEN EXPOSURES – Domestic Equities vs S&P 1500 3/31/22

<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>
Apple, Inc.	5.0%	Apple, Inc.	6.5%
Microsoft Corporation	4.7%	Microsoft Corporation	5.6%
Meta Platforms, Inc., Class A	3.1%	Amazon.com, Inc.	3.4%
U.S. Dollar	2.8%	Tesla, Inc.	2.2%
Amazon.com, Inc.	2.7%	Alphabet Inc., Class A	2.0%
AT&T, Inc.	2.6%	Alphabet Inc., Class C	1.9%
Bristol-Myers Squibb Company	2.4%	NVIDIA Corporation	1.6%
Alphabet Inc., Class A	2.1%	Berkshire Hathaway Inc., Class B	1.6%
NVIDIA Corporation	1.7%	Meta Platforms, Inc., Class A	1.2%
Alphabet Inc., Class C	<u>1.3%</u>	UnitedHealth Group, Inc.	<u>1.2%</u>
TOTAL	<u>28.4%</u>	TOTAL	<u>27.2%</u>

Manager Performance - Net of Fees

3/31/22

<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	\$10,300,459,943	15.6%	18.8%	16.0%	14.1%	--	N/A
S&P 500		15.6%	18.9%	16.0%	14.0%	--	
Style & Risk Adjusted Benchmark		15.7%	18.9%	16.0%	14.0%	--	
Lipper Large-Cap Core		12.9%	17.6%	14.9%	12.7%	--	
<i>Excess Return</i>		-0.1%	-0.1%	0.0%	0.0%	--	
<i>Alpha</i>		-0.1%	0.0%	0.0%	0.1%	--	
<i>Pct. Rank vs. Lipper Large-Cap Core</i>		22	31	29	14	--	
SMRS All-Cap Garp	2,019,344,570	16.4%	14.4%	12.0%	10.6%	13.1%	4/30/11
S&P 1500 Super Composite		14.6%	18.5%	15.5%	13.7%	13.8%	
Style & Risk Adjusted Benchmark		15.2%	18.3%	15.7%	13.7%	13.8%	
Lipper Multi-Cap Core		9.1%	15.7%	13.2%	11.1%	11.7%	
<i>Excess Return</i>		1.9%	-4.1%	-3.5%	-3.1%	-0.7%	
<i>Alpha</i>		1.2%	-3.9%	-3.6%	-3.1%	-0.6%	
<i>Pct. Rank vs. Lipper Multi-Cap Core</i>		7	69	74	69	24	
SMRS Large-Cap Core	1,986,557,437	14.7%	16.5%	16.7%	12.8%	10.4%	8/31/07
S&P 500		15.6%	18.9%	16.0%	14.0%	10.3%	
Style & Risk Adjusted Benchmark		18.2%	16.5%	15.5%	13.7%	8.6%	
Lipper Large-Cap Core		12.9%	17.6%	14.9%	12.7%	9.6%	
<i>Excess Return</i>		-1.0%	-2.4%	0.7%	-1.2%	0.1%	
<i>Alpha</i>		-3.5%	0.0%	1.2%	-0.9%	1.8%	
<i>Pct Rank vs Lipper Large-Cap Core</i>		30	76	12	59	21	
SMRS Large-Cap Growth	977,561,332	15.3%	21.5%	20.6%	15.7%	12.0%	5/31/05
S&P 500 Growth		18.2%	22.5%	19.9%	16.8%	12.3%	
Style & Risk Adjusted Benchmark		16.7%	21.3%	19.4%	16.6%	12.3%	
Lipper Large-Cap Growth		7.5%	19.6%	18.4%	15.0%	11.6%	
<i>Excess Return</i>		-2.8%	-1.0%	0.6%	-1.1%	-0.3%	
<i>Alpha</i>		-1.3%	0.2%	1.2%	-0.9%	-0.3%	
<i>Pct Rank vs Lipper Large-Cap Growth</i>		7	28	17	38	35	
LA Capital All-Cap Growth	946,899,621	14.0%	17.2%	15.9%	14.3%	12.8%	5/31/05
S&P 1500 Growth		16.6%	21.7%	19.2%	16.2%	12.2%	
Style & Risk Adjusted Benchmark		15.1%	20.3%	17.8%	14.6%	9.8%	
Lipper Multi-Cap Growth		-0.7%	17.7%	17.1%	13.3%	11.0%	
<i>Excess Return</i>		-2.6%	-4.6%	-3.3%	-2.0%	0.6%	
<i>Alpha</i>		-1.0%	-3.1%	-1.9%	-0.3%	3.1%	
<i>Pct. Rank vs. Lipper Multi-Cap Growth</i>		5	52	58	37	15	
Value, Quality, Momentum Composite	884,306,935	7.8%	--	--	--	20.1%	10/1/20
S&P 1500		14.6%	--	--	--	24.4%	
Style & Risk Adjusted Benchmark		14.0%	--	--	--	25.0%	
Lipper Multi-Cap Core		9.1%	--	--	--	21.6%	
<i>Excess Return</i>		-6.8%	--	--	--	-4.2%	
<i>Alpha</i>		-6.2%	--	--	--	-4.8%	
<i>Pct. Rank vs. Lipper Multi-Cap Core</i>		70	--	--	--	67	
SMRS Mid-Cap Index	659,315,193	4.5%	14.0%	11.2%	10.5%	--	N/A
S&P 400		4.6%	14.1%	11.1%	10.2%	--	
Style & Risk Adjusted Benchmark		4.6%	14.1%	11.1%	10.1%	--	
Lipper Mid-Cap Core		7.6%	13.6%	10.8%	9.2%	--	
<i>Excess Return</i>		-0.1%	-0.1%	0.1%	0.3%	--	
<i>Alpha</i>		-0.1%	0.0%	0.2%	0.4%	--	
<i>Pct. Rank vs. Lipper Mid-Cap Core</i>		78	40	42	23	--	
Seizert Capital Partners	604,076,774	14.1%	18.7%	13.3%	12.0%	14.2%	11/30/09
S&P 1500 Value		12.1%	14.1%	11.0%	10.4%	12.6%	
Style & Risk Adjusted Benchmark		7.0%	13.7%	10.7%	10.2%	12.5%	
Lipper Multi-Cap Value		11.8%	13.4%	10.4%	9.3%	11.5%	
<i>Excess Return</i>		2.0%	4.6%	2.3%	1.6%	1.6%	
<i>Alpha</i>		7.1%	5.0%	2.6%	1.7%	1.7%	
<i>Pct. Rank vs. Lipper Multi-Cap Value</i>		26	4	8	6	4	

<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>
Large-Cap Consistent Growth	603,027,522	4.2%	13.7%	16.5%	13.1%	13.3%	3/1/15
S&P 500		15.6%	18.9%	16.0%	14.0%	13.6%	
Style & Risk Adjusted Benchmark		23.4%	24.5%	20.6%	17.1%	16.6%	
Lipper Large-Cap Core		12.9%	17.6%	14.9%	12.7%	12.3%	
<i>Excess Return</i>		-11.4%	-5.2%	0.5%	-0.9%	-0.3%	
<i>Alpha</i>		-19.2%	-10.8%	-4.1%	-4.0%	-3.3%	
<i>Pct. Rank vs. Lipper Large-Cap Core</i>		98	94	15	49	25	
Clarkston Capital Small/Mid-Cap	529,317,560	0.4%	15.3%	11.8%	11.2%	12.3%	1/1/14
S&P 400		3.5%	14.0%	11.0%	10.3%	10.4%	
Style & Risk Adjusted Benchmark		14.4%	13.1%	9.9%	9.3%	8.2%	
Lipper Mid-Cap Core		7.6%	13.6%	10.8%	9.2%	9.3%	
<i>Excess Return</i>		-3.1%	1.3%	0.8%	0.9%	1.9%	
<i>Alpha</i>		-14.0%	2.1%	1.9%	1.9%	4.1%	
<i>Pct. Rank vs. Lipper Mid-Cap Core</i>		95	16	30	13	2	
Martin Currie	511,294,692	-4.2%	--	--	--	6.4%	11/1/20
S&P 1500 Growth		16.6%	--	--	--	25.2%	
Style & Risk Adjusted Benchmark		22.7%	--	--	--	33.3%	
Lipper Multi-Cap Growth		-0.7%	--	--	--	12.5%	
<i>Excess Return</i>		-20.8%	--	--	--	-18.8%	
<i>Alpha</i>		-26.9%	--	--	--	-26.9%	
<i>Pct. Rank vs. Lipper Multi-Cap Growth</i>		67	--	--	--	79	
Ark Investments	380,761,580	-48.0%	5.8%	17.1%	--	19.3%	3/1/16
S&P 1500 Growth		16.6%	21.7%	19.2%	--	19.6%	
Style & Risk Adjusted Benchmark		22.6%	17.3%	15.7%	--	29.9%	
Lipper Multi-Cap Growth		-0.7%	17.7%	17.1%	--	17.7%	
<i>Excess Return</i>		-64.7%	-16.0%	-2.1%	--	-0.3%	
<i>Alpha</i>		-70.6%	-11.5%	1.4%	--	-10.6%	
<i>Pct. Rank vs. Lipper Multi-Cap Growth</i>		100	98	49	--	26	
Mellon US Equity Enhanced	292,058,854	2.8%	20.6%	--	--	22.4%	3/1/17
S&P 500		15.6%	18.9%	--	--	15.7%	
Style & Risk Adjusted Benchmark		-2.1%	18.9%	--	--	17.8%	
Lipper Large-Cap Core		12.9%	17.6%	--	--	14.7%	
<i>Excess Return</i>		-12.8%	1.7%	--	--	6.6%	
<i>Alpha</i>		5.0%	1.7%	--	--	4.5%	
<i>Pct. Rank vs. Lipper Large-Cap Core</i>		98	6	--	--	1	
Disruptive Innovation Momentum	191,270,411	-42.5%	--	--	--	-2.8%	9/1/20
MSCI Momentum Index		5.3%	--	--	--	6.6%	
Style & Risk Adjusted Benchmark		18.2%	--	--	--	35.3%	
Lipper Multi-Cap Growth		-0.7%	--	--	--	8.0%	
<i>Excess Return</i>		-47.8%	--	--	--	-9.4%	
<i>Alpha</i>		-60.7%	--	--	--	-38.1%	
<i>Pct. Rank vs. Lipper Multi-Cap Growth</i>		100	--	--	--	89	
Patient Capital	176,847,141	--	--	--	--	-11.6%	10/1/21
S&P 1500 Value		--	--	--	--	7.9%	
Style & Risk Adjusted Benchmark		--	--	--	--	1.6%	
Lipper Multi-Cap Value		--	--	--	--	7.0%	
<i>Excess Return</i>		--	--	--	--	-19.5%	
<i>Alpha</i>		--	--	--	--	-13.1%	
<i>Pct. Rank vs. Lipper Multi-Cap Value</i>		--	--	--	--	100	
Attucks Asset Management	141,485,077	13.1%	13.0%	11.0%	9.6%	7.8%	11/30/07
S&P 1500		14.6%	18.5%	15.5%	13.7%	10.0%	
Style & Risk Adjusted Benchmark		11.3%	13.3%	10.4%	9.9%	9.8%	
Lipper Multi-Cap Core		9.1%	15.7%	13.2%	11.1%	8.3%	
<i>Excess Return</i>		-1.4%	-5.4%	-4.5%	-4.1%	-2.2%	
<i>Alpha</i>		1.9%	-0.3%	0.6%	-0.3%	-2.0%	
<i>Pct. Rank vs. Lipper Multi-Cap Core</i>		21	81	84	81	66	

<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>
Bivium Capital Partners	132,773,329	12.5%	11.1%	9.3%	8.1%	7.0%	11/30/07
S&P 1500 Value		21.1%	14.1%	11.0%	10.4%	7.5%	
Style & Risk Adjusted Benchmark		14.4%	18.5%	15.7%	13.9%	10.2%	
Lipper Multi-Cap Value		11.8%	13.4%	10.4%	9.3%	7.0%	
<i>Excess Return</i>		0.4%	-3.0%	-1.8%	-2.2%	-0.4%	
<i>Alpha</i>		-1.9%	-7.3%	-6.4%	-5.7%	-3.1%	
<i>Pct. Rank vs. Lipper Multi-Cap Value</i>		47	83	75	81	53	
Managed Asset Portfolios	106,719,749	10.2%	13.7%	12.4%	--	13.9%	2/29/16
S&P 1500 Value		12.1%	14.1%	11.0%	--	13.4%	
Style & Risk Adjusted Benchmark		8.0%	11.0%	8.4%	--	13.1%	
Lipper Multi-Cap Value		11.8%	13.4%	10.4%	--	12.5%	
<i>Excess Return</i>		-2.0%	-0.4%	1.4%	--	0.5%	
<i>Alpha</i>		2.2%	2.7%	4.0%	--	0.8%	
<i>Pct. Rank vs. Lipper Multi-Cap Value</i>		73	44	16	--	22	
Ancora	104,976,323	-0.5%	11.8%	--	--	9.0%	10/1/17
S&P 1000		3.5%	14.0%	--	--	10.9%	
Style & Risk Adjusted Benchmark		10.1%	12.8%	--	--	9.7%	
Lipper Mid-Cap Core		7.6%	13.6%	--	--	10.7%	
<i>Excess Return</i>		-4.1%	-2.2%	--	--	-1.9%	
<i>Alpha</i>		-10.6%	-1.0%	--	--	-0.7%	
<i>Pct. Rank vs. Lipper Mid-Cap Core</i>		97	82	--	--	84	

State of Michigan Retirement System

ABSOLUTE RETURN REVIEW

State of Michigan Investment Board Meeting
June 23, 2022



Daniel J. Quigley
Senior Investment Manager
Absolute Return Strategy

EXECUTIVE SUMMARY

Performance

MPSERS Plan (3/31/22)	1-Year	3-Years	5-Years	7-Years	10-Years
Absolute Return	9.8%	7.9%	6.7%	5.3%	6.0%
HFRI FOF Conservative	4.4%	5.8%	4.4%	3.4%	3.8%

- The value of the Absolute Return portfolio is \$6.5 billion with a one-year return of 9.8%. Performance of the portfolio was positive for the first quarter, driven by manager selection and exposure to Credit, Diversifying and Multi-Strategy. Equities strategy detracted, driven by Equities-Fundamental exposure.
- The Private Credit allocation was the largest contributor to performance for the quarter. Residential mortgages maintained their strong performance during the quarter, despite a credit environment that was posing significant challenges. A key driver of positive performance included positions in Mortgage Servicing Rights (MSRs) and mortgage loan exposures, which continued to achieve stable returns with low beta and volatility to broader markets. Structured credit managers also posted positive returns.
- The Diversifying and Multi-Strategy hedge fund strategies also contributed to returns for the quarter. In Diversifying, the volatile market environment provided significant opportunities for macro rates and emerging markets credit managers. In addition, managers were able to generate returns from rising inflation by going long inflation in the US and in Europe. The Multi-Strategy allocation benefitted from non-directional exposures across asset classes, including equity activism, macro, and fixed income relative value. These strategies outperformed with broad based gains. Overall, Multi-Strategy managers served as effective diversifiers and reliable sources of alpha for the portfolio this quarter.
- The largest detractor to the portfolio was from Fundamental Equities. Losses were driven by beta to equity markets and managers with high growth stocks, which were particularly challenged. Quant managers within Equities, on the other hand, contributed positively.

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:
 - \$100 million in PIMCO Private Income Fund Onshore Feeder LLC, a fund managed by Pacific Investment Management Co. (PIMCO), that is focused on originating or acquiring public or private income-producing assets across residential, commercial, corporate, and specialty finance markets.
- 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 sector-focused fundamental equity exposures and niche credit ideas.

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

SMRS

Absolute Return

3/31/22

Net Market Value by Entity

	<u>Net Market Value</u>	<u>Unfunded Commitment</u>
* Tahquamenon Fund, LP	\$ 4,608,306,141	\$ 0
Acacia Coinvest, LP	232,416,126	75,000,000
Cerberus Manitou Residential Loan Fund, LP	231,818,703	8,580,645
AG Essential Housing, LP	142,595,878	58,000,000
JM IV, LP	107,693,031	612,741
PGIM Fixed Income Global Liquidity Relative Value Fund I, LP	105,302,059	0
** Pimco Private Income Fund Onshore Feeder LLC	100,000,000	0
SJC Direct Lending Revolver Fund III, LP	90,752,223	9,316,075
Crescent Mezzanine Partners VII, LP	79,972,688	141,466,234
Centerbridge Capital Partners III, LP	79,425,436	10,473,346
Irradiant CLO Partners Fund II, LP (fka Kayne CLO Partners FD II)	66,815,919	34,275,074
Kayne Anderson BDC, LLC (KABDC)	60,712,299	45,795,696
Oaktree Opportunities Fund Xb, LP	60,075,336	56,000,000
OCM Opportunities Fund IX, LP	56,014,593	0
SMRS-HVDL LLC	52,300,000	147,700,000
Castle Credit SMRS Holdings, LLC Series C	50,100,000	50,000,000
HPS Mezzanine Partners III, LP	40,222,158	4,345,231
HarbourVest Credit Opportunities Fund II, LP	33,270,971	42,750,000
HarbourVest Partners Mezzanine Income Fund	30,722,578	16,310,000
Peninsula Fund VI, LP	28,321,323	1,510,528
Farallon Special Situations Fund II, LP	21,743,260	78,105,392
Oaktree Opportunities Fund X, LP	21,683,361	0
Cerberus SMRS Partners, LP	15,946,771	23,304,657
OCM Opportunities Fund VIIIb, LP	13,067,933	0
EnTrust White Pine Partners, LP	13,059,716	0
Crescent Mezzanine Partners VI, LP	10,854,341	0
PIMCO Aviation Co-Invest Vehicle Onshore Feeder LP	10,000,000	90,000,000
MP Securitized Credit Fund, LP	4,430,020	0
TCW/Crescent Mezzanine Partners V, LP	672,273	24,790,932
Oaktree Opportunities Fund VIII, LP	373,414	0
OCM Opportunities Fund VII, LP	353,103	0
TCW/Crescent Mezzanine Partners VC Secondary	317,933	0
OCM Opportunities Fund VIIb, LP	25,462	2,500,000
Monument Park LLC	5	0
* Visium Balanced Fund, LP	2	0
OCM Principal Opportunities Fund IV, LP	1	10,004,754
Total Absolute Return Strategies	\$ 6,369,365,058	\$ 930,841,305
Short-Term Investments & Other	100,048,790	0
Grand Total	\$ 6,469,413,848	\$ 930,841,305

* Fund of Funds

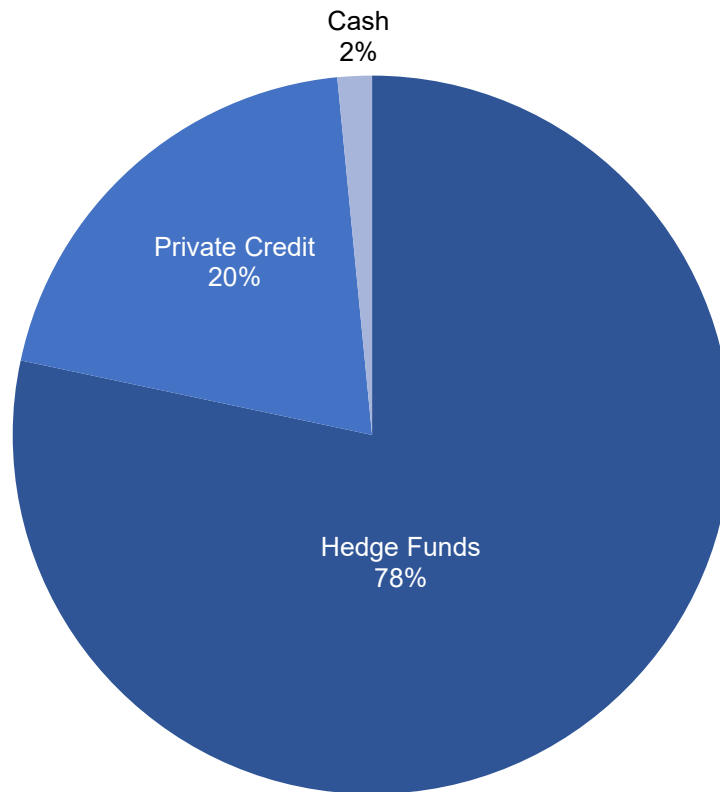
** New Commitment

SMRS

Absolute Return

3/31/22

Total Investments by Asset Type



Market Value in Millions	
	<u>3/31/22</u>
Hedge Funds	\$ 5,067
Private Credit	1,303
Cash	<u>100</u>
Total Investments	<u><u>\$ 6,469</u></u>

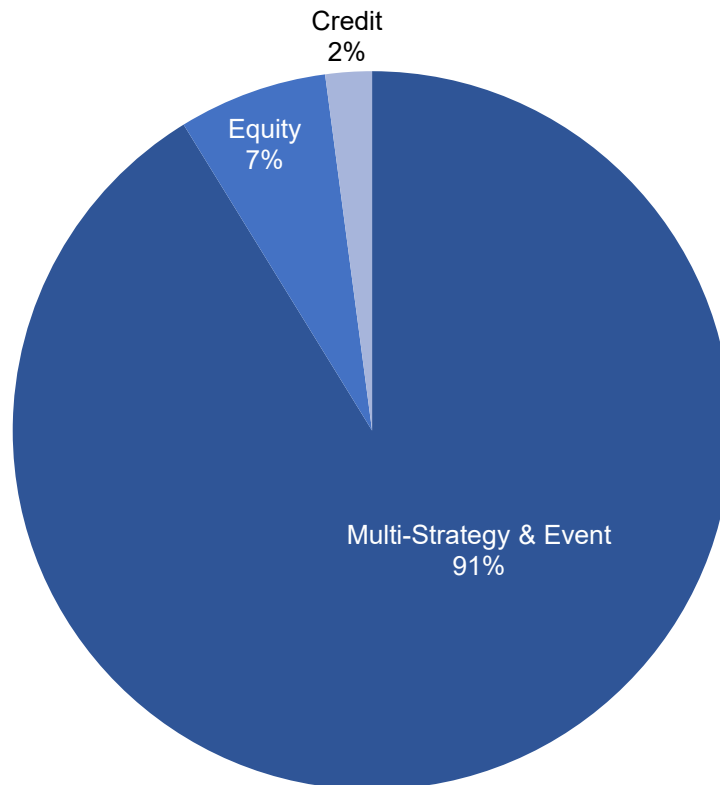
NOTE: Totals may not be exact due to rounding.

SMRS

Absolute Return

3/31/22

Hedge Fund Investments by Strategy



Market Value in Millions	
	3/31/22
Multi-Strategy & Event	\$ 4,621
Equity	340
Credit	105
Total Investments	\$ 5,067

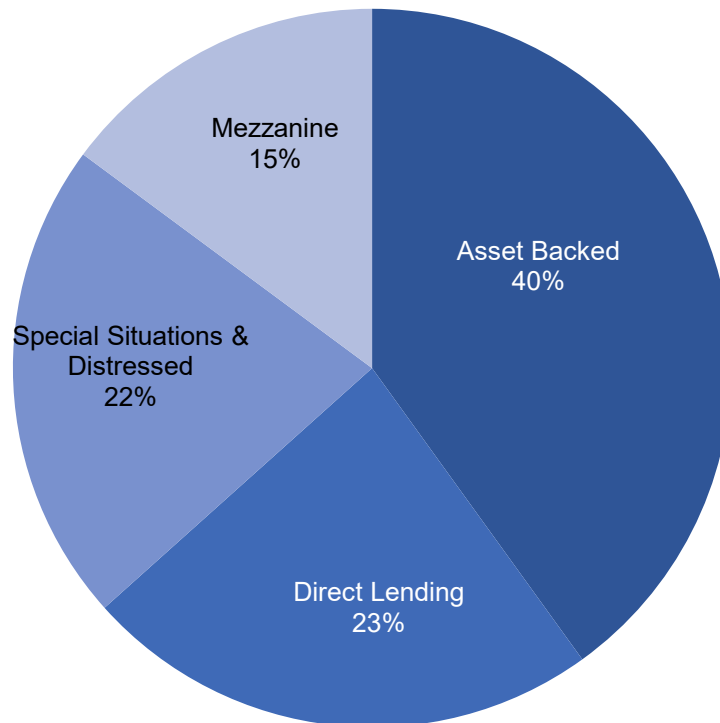
NOTE: Totals may not be exact due to rounding.

SMRS

Absolute Return

3/31/22

Private Credit Investments by Strategy



Market Value in Millions	
	3/31/22
Asset Backed	\$ 522
Direct Lending	304
Special Situations & Distressed	283
Mezzanine	194
Total Investments	\$ 1,303

NOTE: Totals may not be exact due to rounding.

State of Michigan Retirement System

REAL ESTATE AND INFRASTRUCTURE REVIEW

State of Michigan Investment Board Meeting
June 23, 2022



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

EXECUTIVE SUMMARY

Performance

MPSERS Plan (3/31/22)	1-Year	3-Years	5-Years	7-Years	10-Years
Annualized Returns	21.6%	7.3%	8.3%	8.8%	10.0%
NCREIF NPI	20.3%	8.2%	7.2%	7.4%	8.2%
Peer Median Returns	22.6%	9.2%	9.0%	9.2%	9.9%
Percentile Rank vs. Peers*	54	65	62	60	47

*State Street Universe greater than \$1 billion

- Outperformance relative to the one-year benchmark resulted primarily from the Real Estate and Infrastructure Division's (REID) strategy of being overweight in residential and maintaining a significant underweight to the office and retail sectors. Over the ten-year timeframe the REID is outperforming the benchmark by 180 basis points.

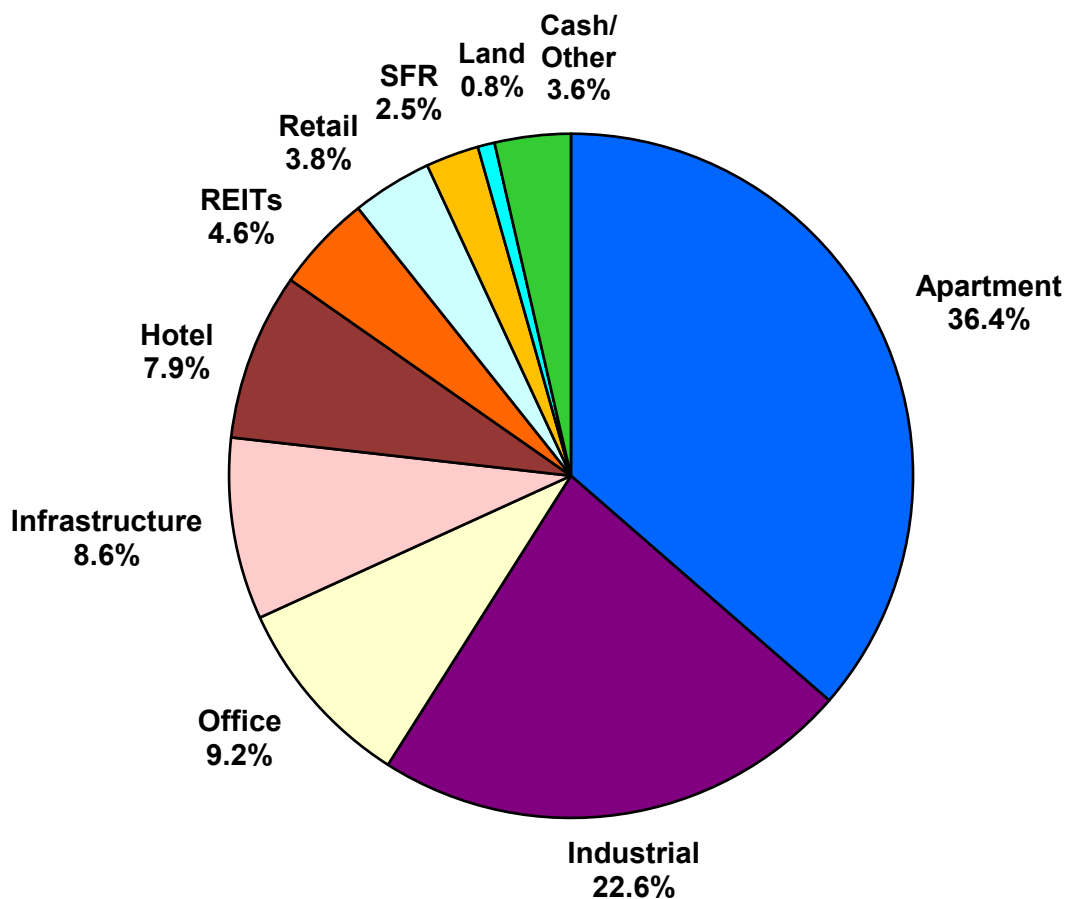
Strategy Update

- The COVID-19 global pandemic resulted in major negative impacts to the US and world economies, including certain segments of the commercial real estate and infrastructure markets in 2020 and to a lesser extent 2021. We expect there will be lingering effects for some time, with sporadically resurgent case numbers resulting in the continuation or return of mitigation measures to localized geographies. Impacts have been uneven across the real estate and infrastructure sectors, we continue to monitor, assess, and shift strategies, as necessary. Transaction volumes dropped to very low levels during the initial stages of the pandemic in both the infrastructure and real estate markets. Volumes have largely recovered, and in some sectors exceeded pre-pandemic levels.
- 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. 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 the potential for above market appreciation and total returns.
- We have been actively managing the portfolio with capital returned of approximately \$634 million, and funding for new or existing investments of approximately \$1.6 billion over the past 12 months.
- The REID has approximately \$3.3 billion in unfunded commitments. Three new commitments were made during the quarter.
 - \$150 million in TPG Real Estate Partners IV, LP, a closed-end, multi-sector real estate fund investing in North America and Western Europe. TPG will invest in platforms and individual properties, managed by TPG Real Estate IV Management, LLC.
 - \$100 million in Asana Partners Fund III, LP, a closed-end US real estate fund concentrating in the retail sector, managed by Asana Partners.
 - \$100 million in SFR CM, LP, a separately managed account, exclusively investing in the US single family rental market, managed by Cerberus Capital Management.

SMRS

Real Estate and Infrastructure

3/31/22



Market Value in Millions				
	<u>3/31/22</u>		<u>3/31/21</u>	
Apartment	\$3,020	36.4%	\$2,693	42.7%
Industrial	1,878	22.6%	1,093	17.4%
Office	767	9.2%	618	9.8%
Infrastructure	717	8.6%	727	11.5%
Hotel	659	7.9%	517	8.2%
REITs	378	4.6%	0	0.0%
Retail	319	3.8%	305	4.8%
Single Family Residential (SFR)	209	2.5%	128	2.0%
Land	67	0.8%	118	1.9%
	<u>\$8,014</u>	<u>96.4%</u>	<u>\$6,199</u>	<u>98.3%</u>
Cash/Other	<u>299</u>	<u>3.6%</u>	<u>104</u>	<u>1.7%</u>
Total Investments	<u><u>\$8,313</u></u>	<u><u>100.0%</u></u>	<u><u>\$6,303</u></u>	<u><u>100.0%</u></u>

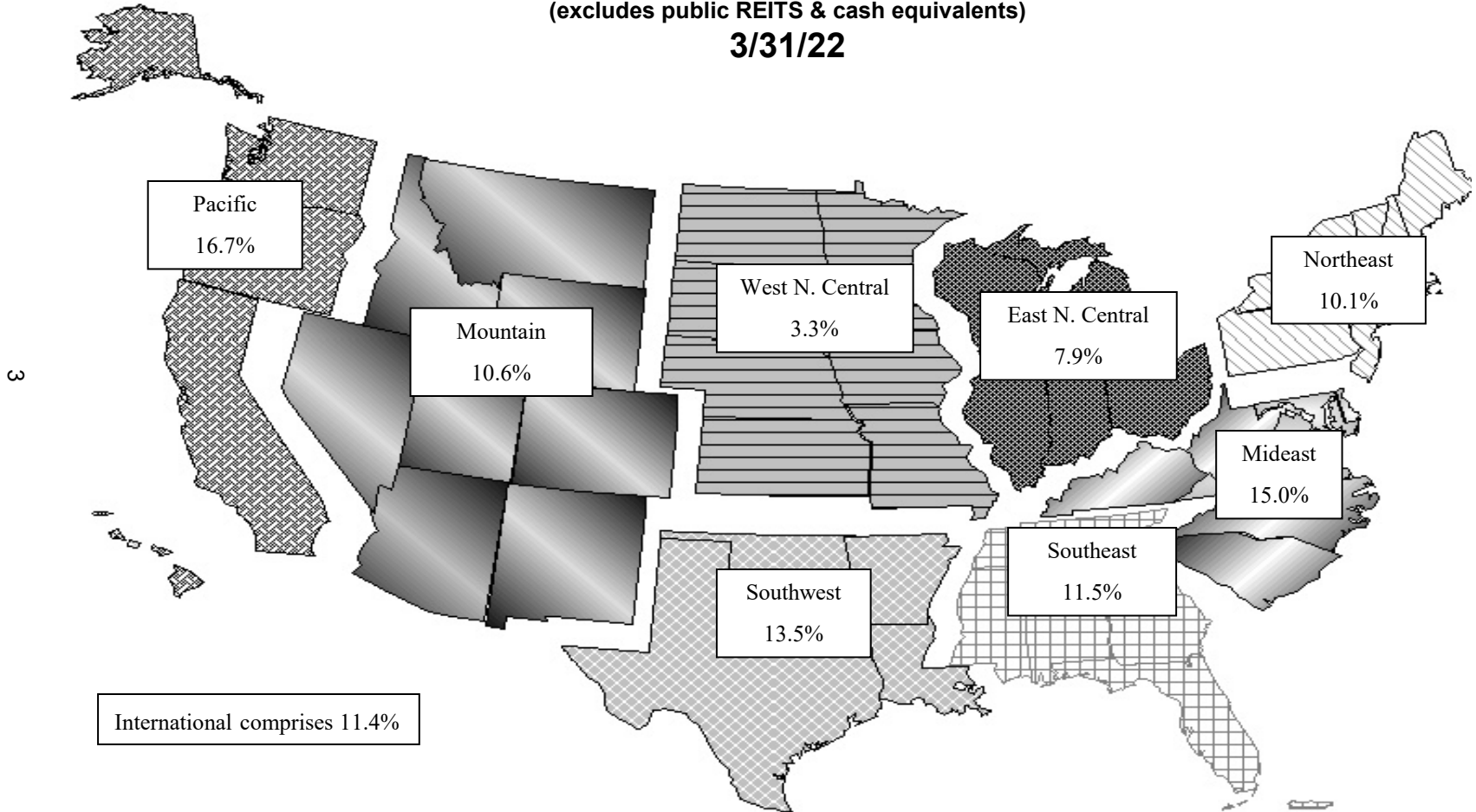
SMRS

Real Estate by Region

Based on Market Value

(excludes public REITS & cash equivalents)

3/31/22



Geographic regions defined by NCREIF, whose property index composition is: Pacific 34.6%, Mountain 6.8%, West N. Central 1.1%, Southwest 10.6%, East N. Central 6.6%, Southeast 10.5%, Northeast 18.9%, Midwest 10.9%

SMRS
Real Estate and Infrastructure
3/31/22

**Top Ten
Advisors or Entity**

<u>Advisor or Entity</u>	(\$ in millions)
	<u>Market Value</u>
MWT Holdings LLC	\$ 2,293
Principal Real Estate Investors	888
Clarion Partners	734
Blackstone Group	345
BentallGreenOak	283
Domain Capital Advisors Inc	278
Five Star Realty Partners LLC	249
L&B Realty Advisors	231
Lone Star Global	205
Rialto Capital Management LLC	179
	<u>\$ 5,685</u>

**Occupancy
by Property Type**

	Apartment	Office	Industrial	Retail	Hotel
SMRS Portfolio	94.1%	82.4%	98.5%	88.0%	58.8%
National Average	94.4%	83.4%	95.1%	95.3%	57.9%

**SMRS
REAL ESTATE
3/31/22**

Market Values by Ownership Entity

	<u>Market Value</u>	<u>Unfunded Commitment</u>
801 Grand Avenue Capital, LLC	\$ 22,195,843	\$ 0
AEW Senior Housing III	3,818,301	547,246
AEW Senior Housing Investors IV	22,968,031	25,185,969
Apollo Asia Real Estate Fund	62,723,014	22,769,961
Asana Partners Fund I	31,896,975	2,449,559
Asana Partners Fund II	31,057,428	24,030,405
* Asana Partners Fund III, LP	0	100,000,000
Avanath Affordable Housing II, LLC	69,210	0
Avanath II SMRS Co-Investment Fund, LLC	429,313	0
Avanath Affordable Housing III	52,003,285	1,988,608
Avanath Affordable Housing IV	23,580,342	10,199,301
BentallGreenOak US Cold Storage, LP	0	75,000,000
BGO Europe III Co Invest	19,409,486	9,498,361
BentallGreenOak Europe IV, LP	0	108,280,000
BlackRock MiREIT Fund	126,421,108	0
Blackstone R/E Partners V, LP	77,123	2,087,026
Blackstone R/E Partners VI, LP	2,079,022	3,680,930
Blackstone R/E Partners VIII, LP	69,460,496	10,882,270
Blackstone R/E Partners IX, LP	165,795,897	88,725,790
Capri Urban Investors, LLC	164,604	0
Carlyle Realty Partners IX, LP	0	100,000,000
Creative Media & Community Trust Corp	4,548,906	0
CIM Fund III, LP	33,908,449	0
CIM Fund VIII, LP	86,494,804	0
CIM VI (Urban REIT), LLC	23,097,320	0
Clarion Gables Multifamily Trust, LP	41,085,812	0
Columbus Circle Holdings, LLC	163,296,899	168,299,036
Crown Small Cap Real Estate	11,228,317	3,280,000
DM2501, LLC	14,448,254	26,227,042
Domain GVA-1, LLC	24,878,990	1,940,056
Domain Hotel Properties, LLC	205,905,046	0
Eastport Properties, LLC	50,404,720	0
Gateway Capital Real Estate Fund II, LP	662,816	1,276,875
GreenOak Europe III, LP	55,644,713	30,508,714
Heitman Credit	48,996,241	0
Heitman Global RE Fund II	47,873,171	52,126,829
Heitman MiREIT Fund	127,986,023	0
IDR Core Property Index Fund, LLC	104,953,267	25,000,000
IMRF II ColInvest Spiga, LP	24,820	2,615,000
India Property Fund II, LLC	12,352,580	3,411,411
Invesco Mortgage Recovery Feeder Fund	1,034,238	2,152,585
Invesco Mortgage Recovery Fund II, LP	24,514,107	21,394,854
Invesco Strategic Opportunities III, LP	27,770,381	82,461,385
IPF II Co-Invest, LP	12,096,856	2,168,655
ISO III SMRS Sidecar, LP	28,613,891	67,334,000
JBC Funds North LaSalle, LLC	12,462,794	0
JBC Opportunity Fund III, LP	495,673	0
KBS/SM Fund III, LP	263,271	0

	Market Value	Unfunded Commitment
KBS/SM Fund IV, LP	2,103,324	99,594,000
L-A Saturn Acquisition	70,692,513	250,799
L&B Spartan Holdings	56,319,106	148,533,780
Landmark Real Estate Partners V, LP	5,808,642	0
LaSalle Asia Opportunity Fund III, LP	1,218,590	0
Lion Industrial Trust	483,547,581	0
Lion Mexico Fund, LP	3,735,063	0
Lombard GVA0016 (former AGL Annuity)	249,355,492	100,000,000
Lone Star Fund X, LP	112,528,360	21,734,113
Lone Star Fund XI, LP	92,540,700	146,481,822
Lubert-Adler Real Estate Fund VII, LP	43,535,710	4,663,662
M1 Westgate ColInvest, LLC	49,499	0
M301W ColInvest, LLC	454,961	0
MERS Acquisitions Ltd.	174,913,204	0
MIP Holdco, LLC	115,675,708	6,836,984
MSREF V - International	2,234,756	0
MSRESS Fund III Institutional, LP	4,711,905	0
MWT Holdings, LLC	2,293,137,100	0
Northpark Land Associates	38,025,423	980,484
Orange Investors, LLC	353,782	0
Paladin Realty Brazil Investors III (USA), LP	2,704,370	0
Paladin Realty Latin America Investors IV-CI, LP	28,198,308	0
Paladin Realty TB COINV V, LP	9,031,715	0
Penmain Office, LLC	38,309,593	0
Principal MiREIT	123,599,516	0
Principal Separate Account	355,040,994	38,120,206
Proprium RE Spec. Situations Fund, LP	113,537,969	0
Rialto Credit Partnership, LP	7,756,951	0
Rialto Real Estate Fund, LP	18,053,060	0
Rialto Real Estate Fund II, LP	26,094,824	0
Rialto Real Estate Fund III-Debt, LP	40,449,524	0
Rialto Real Estate Fund III-Property, LP	35,640,093	0
Rialto Real Estate Fund IV-Debt, LP	51,415,444	47,765,586
* SFR CM, LP	10,891,089	89,108,911
SM Brell II, LP	13,879,144	0
SMP Data Center	511,498,803	646,886,917
Stockbridge RE Fund II-C, LP	649,049	0
Strategic II, LLC	208,726,923	140,653,568
TPG RE Finance Trust Inc. (TRTX)	56,974,298	0
TPG Real Estate Partners II	14,163,889	6,538,943
TPG Real Estate Partners III	36,430,619	18,344,940
* TPG Real Estate Partners IV, LP	0	150,000,000
TSP Fund III	340,596	74,493,714
TSP Spartan C-II, LLC	6,270,363	1,500,000
TSP Value & Income Fund II, LP	14,269,878	7,790,901
Trophy Property Development, LP	145,581	0
True North Real Estate Fund III, LLC	22,736,881	5,000,000
	<hr/>	<hr/>
	\$ 7,296,942,723	\$ 2,830,801,198
Short-Term Investments and Other	266,954,118	0
	<hr/>	<hr/>
Total Real Estate Investments	\$ 7,563,896,841	\$ 2,830,801,198

* New or additional commitment made during the quarter reported

**SMRS
INFRASTRUCTURE
3/31/22**

Market Values by Ownership Entity

	Market Value	Unfunded Commitment
Arclight Energy Partners VI, LP	\$ 33,519,871	\$ 7,004,763
Arclight Energy Partners VII, LP	26,742,480	22,383,174
ASF VI Infrastructure B, LP	10,380,517	5,992,354
ASF VII Infrastructure Fund B, LP	21,429,869	11,560,305
ASF Como Co-Investment, LP	1,612,392	1,583,035
Basalt Infrastructure Partners, LP	30,830,446	2,219,045
Blackstone Energy Partners, LP	11,489,412	4,728,291
Blackstone Energy Partners II, LP	74,263,947	15,540,808
Brookfield Infrastructure Fund II-B, LP	45,664,808	2,894,909
Customized Infrastructure Strategies, LP	10,559,909	4,413,657
Dalmore Capital Fund	67,336,093	0
GCM Grosvenor Infrastructure Investment Program, LP	66,313,557	100,501
GCM Grosvenor Customized Infrastructure Strategies II, LP	31,319,736	7,842,154
GCM Grosvenor Customized Infrastructure Strategies III, LP	13,695,391	86,304,609
Global E&P Infrastructure Fund II, LP	33,157,882	1,804,950
GSO Energy Select Opportunities Fund, LP	9,163,597	23,026,107
GSO Energy Select Opportunities Fund II, LP	13,259,810	37,987,272
JPMorgan AIRRO India SideCar Fund US, LLC	83,160,310	785,826
JPMorgan AIRRO Fund II	10,412,294	6,800,131
Irradiant Renewables Opportunities Partners	12,530,033	90,745,012
KKR Eagle CoInvest, LP	36,849,561	1,853,268
KKR Global Infrastructure Investors, LP	30,449	0
KKR Global Infrastructure Investors IV, LP	0	100,000,000
Ridgewood Water & Strategic Infrastructure Fund, LP	26,020,922	24,029,460
RPEP SMRS Infra II, LLC	13,537,639	0
StonePeak Infrastructure Fund, LP	33,987,186	8,679,028
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	\$ 717,268,111	\$ 468,278,660
Short-Term Investments and Other	31,950,252	0
	<hr/>	<hr/>
Total Infrastructure Investments	\$ 749,218,363	\$ 468,278,660
	<hr/>	<hr/>
TOTAL INVESTMENTS	\$ 8,313,115,205	\$ 3,299,079,858

State of Michigan Retirement System

REAL RETURN & OPPORTUNISTIC REVIEW

State of Michigan Investment Board Meeting
June 23, 2022



Travis L. Haney
Senior Investment Manager
Real Return & Opportunistic Division

EXECUTIVE SUMMARY

Performance

MPSERS Plan (03/31/22)	1-Year	3-Years	5-Years	7-Years	10-Years
Real & Opportunistic	12.2%	13.9%	13.9%	12.0%	12.1%
Custom Benchmark	9.6%	7.6%	7.5%	7.5%	7.3%

- The portfolio value is \$12.5 billion with a one-year return of 12.2%. As markets fluctuated in the first quarter of 2022, the valuation of our portfolio holdings held steady.
- 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 \$5.1 billion of unfunded commitments. The following are new commitments closed during the quarter.
 - \$275 million to Green Equity Investors IX, L.P., a comingled fund managed by Leonard Green & Partners focused on control opportunities in large-cap companies predominantly located in the United States.
 - \$150 million to Jade Equity Investors II, L.P., a comingled fund managed by Leonard Green & Partners focused on control opportunities in middle-market companies predominantly located in the United States.
 - \$100 million to Clearlake Opportunities Partners III, L.P., a comingled fund managed by Clearlake Capital Group focused on non-control structured equity and credit investments in small and medium-sized companies predominantly located in the United States.
- 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

3/31/22

Top Ten Advisors or Entities

(\$ in Millions)

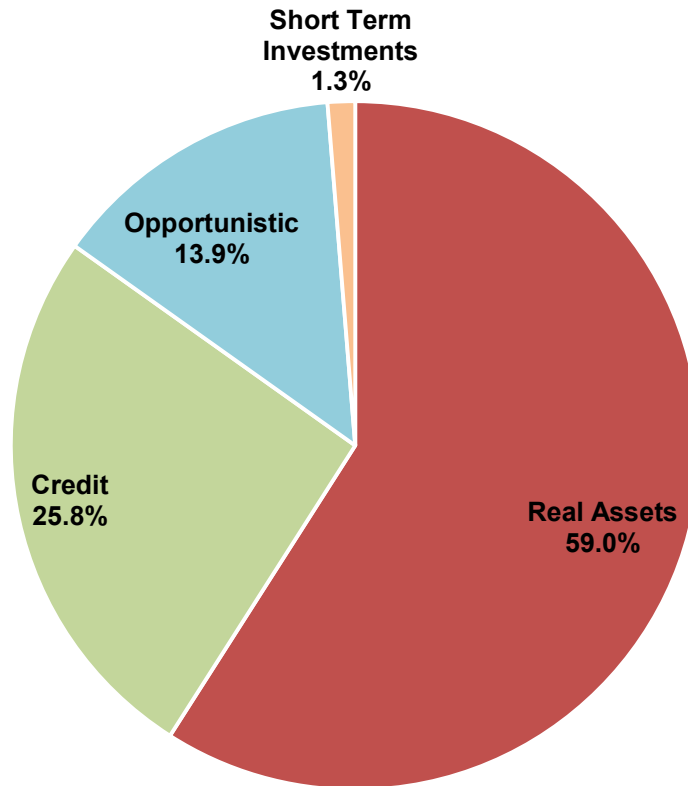
<u>Advisor or Entity</u>	<u>Market Value</u>
Great Mountain Partners, LLC	\$ 4,735
Apollo Global Management	975
Domain Capital Group LLC	767
Barings Alternative Investments	751
Sixth Street Partners	723
Blackstone Alternative Asset Management	480
Kayne Anderson Capital Advisors	440
HPS Partners	350
Ridgewood Energy	309
Czech Asset Management	285
Total Market Value	\$ 9,815

SMRS

Real Return and Opportunistic

3/31/22

Investments By Strategy



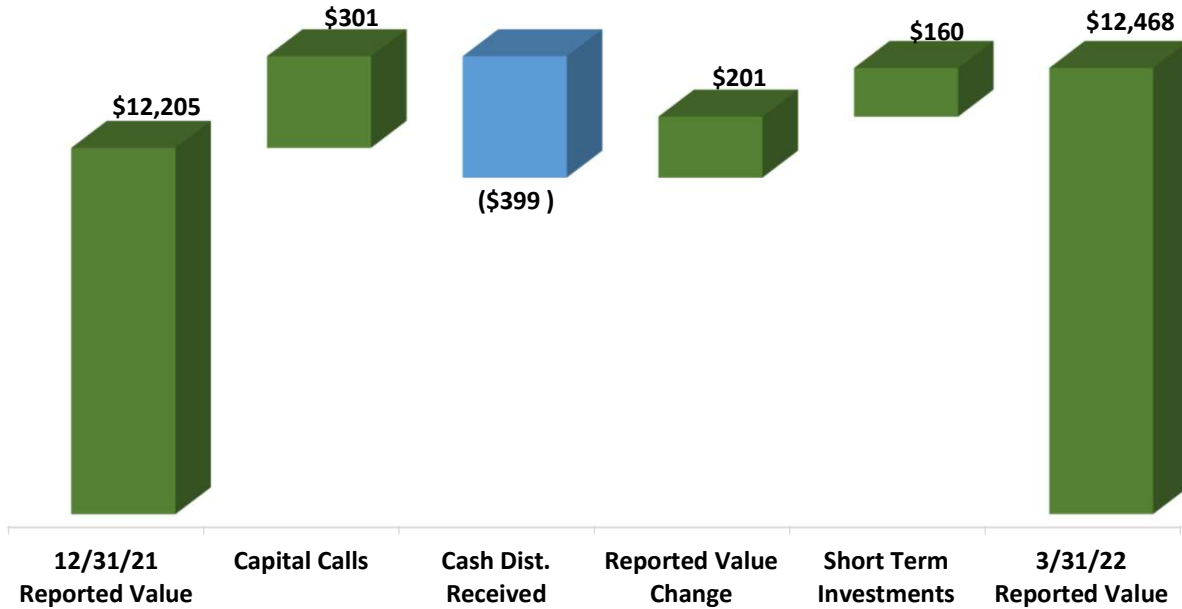
Market Value in Millions	
	<u>3/31/22</u>
Real Assets	\$7,362
Credit	\$3,215
Opportunistic	\$1,731
Short Term Investments	<u>\$160</u>
Total Investments	<u><u>\$12,468</u></u>

SMRS

Real Return and Opportunistic 3/31/22

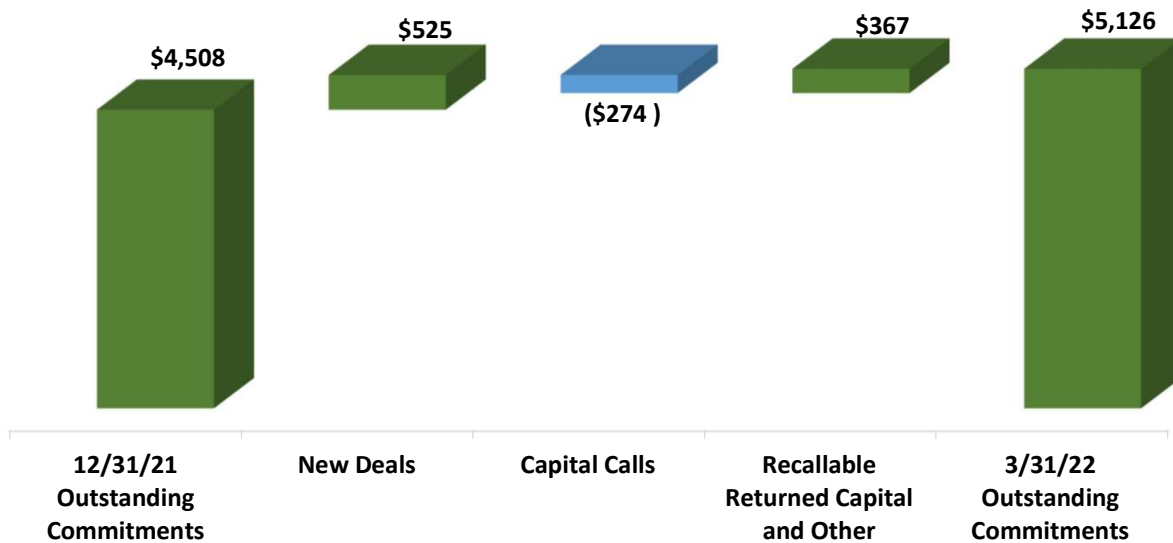
Invested Commitments

\$ In Millions



\$ In Millions

Outstanding Commitments



SMRS

Real Return and Opportunistic

3/31/22

Net Market Value by Entity

	<u>Net Market Value</u>	<u>Unfunded Commitment</u>
* Abernathy	\$ 266,605,321	\$ 16,197,117
* Abernathy II	7,475,610	3,025,363
Altus Midstream	11,376,750	0
American Industrial Partners VII, LP	52,725,627	22,634,336
Angelo Gordon Credit Solutions Fund	101,765,647	20,325,340
Angelo Gordon Credit Solutions Fund II, LP	10,000,000	90,000,000
Apollo European Principal Finance Fund II	6,827,828	8,811,143
Apollo HK TMS Investments Holdings, LP	194,092	0
Axton Holdings	3,608,465,790	0
Barings Asset Based Income Fund I	214,578,586	82,761,081
Barings Global Real Asset Fund I	88,919,960	14,248,321
Blackstone Capital Opportunities Fund IV, LP	22,445,900	127,962,516
Blackstone COF IV Co-Investment Fund, LP	4,957,558	32,542,442
Blackstone Strategic Capital Holdings (Side Car)	90,011,375	7,593,052
Blackstone Strategic Capital Holdings, LP	122,868,187	27,056,769
Blue Peninsula Fund, LP	152,962,628	22,003,054
Broadriver III	145,875,998	61,988,561
BSCH II	111,538,358	124,443,440
BSCH Parallel (MLG) I, LP	245,716,899	0
Carlyle Energy Mezzanine Opportunity Fund II	20,012,974	7,540,179
Carlyle IEP Co-Invest (Varo)	14,205,148	830,554
Carlyle International Energy Partners	52,880,175	12,858,920
Carlyle International Energy Partners II	59,365,663	100,601,225
Castle Credit SMRS Holdings, LLC	145,433,084	81,739,828
Centerbridge SCP III	15,410,787	3,025,715
Centerbridge SCP III, LP – Flex, LP	78,465,604	13,569,030
CircleUp Credit Fund I, LP	23,039,464	5,906,830
Clearlake Capital Partners VI, LP	82,183,120	14,908,841
Clearlake Opportunities Partners II, LP	29,020,545	55,947,804
** Clearlake Opportunities Partners III, LP	0	100,000,000
Content Holdings, LLC	296,878,623	36,247,610
Credit Opportunity Fund III	7,978,922	19,364,875
EnCap Energy Capital Fund X, LP	32,477,526	2,166,245
Energy Recap and Restructuring	9,615,680	7,085,025
ERR MI Holdings, LP	2,100,051	6,374,538
FCO MA MI, LP	144,962,932	31,243,671
Financial Credit Investment II	225,798,693	265,946,931

	Net Market Value	Unfunded Commitment
Financial Credit Investment III	205,127,035	193,330,979
Flywheel Energy Co-Invest	43,632,483	7,000,000
Fortress Transportation & Infrastructure	97,255,767	0
Global Maritime	109,649,053	3,414,854
Greatrock II, LLC	37,026,927	162,918,541
Greatrock, LLC	129,049,910	16,910,192
** Green Equity Investors IX, L.P.	0	275,000,000
GSO Credit Alpha Fund	23,818,101	37,910,064
HarbourVest Direct Lending Fund (L), LP	63,671,982	60,000,000
Hopen Life Science Fund II	3,489,190	365,000
HPS Mezzanine Partners 2019, LP	45,393,934	8,866,185
HPS Red Cedar Fund	301,913,934	135,343,845
** Jade Equity Investors II, L.P.	0	150,000,000
Kayne Anderson Energy Fund VII, LP	31,125,988	9,231,868
Kayne Anderson Private Energy Income Fund	144,517,786	26,718,507
Kayne Anderson Private Energy Income Fund II	50,708,140	110,825,283
Kayne Solutions Fund	120,496,422	126,133,660
KKR Energy Income & Growth Fund	21,051,982	1,953,202
KKR Lending Partners	4,079,657	8,917,164
KKR Lending Partners II	10,327,919	11,737,239
Lakewater	24,411,351	0
Lakewater II	31,285,389	4,990,020
Lakewater III	151,244,790	0
Lakewater IV	30,892,555	0
Lakewater V	43,494,761	19,853,087
Marathon CLO Equity Fund	14,267,914	0
Merit Energy Partners I, LP	29,164,817	0
MidCap Finco Holdings, LTD	308,942,670	0
Mortgage Servicing Rights	49,096,084	15,662,214
Napier Park Aircraft Leasing Vehicle I, LLC	47,857,537	17,207,852
Napier Park AL Rollover Fund I	39,181,561	20,299,143
Nash Co-Investment	17,081,383	94,259
New Fortress Energy HLDGS	922,443,041	0
NGP Natural Resources XII	103,599,222	50,174,071
Nyanza II, LLC	58,325,914	241,044,776
Orion Co-Investments III, LP	3,186	0
Orion Mine Finance	49,089,290	0
Orion Mine Finance 1A	40,901,773	0
Orion Mine Finance Co-Fund II, LP	6,067,517	35,000,000
Orion Mine Finance II	94,233,845	6,046,523
Orion Mine Finance III, LP	49,098,688	28,886,282
Redding Ridge Holdings, LP	107,038,058	15,155,765
* Ren Venture Fund II	37,236,065	0
* Ren Venture Fund III	26,671,852	6,500,000

	Net Market Value	Unfunded Commitment
Ridgewood Energy Oil & Gas II	67,741,743	6,370,264
Ridgewood Energy Oil & Gas III	181,261,050	71,994,719
Ridgewood Fund II Co-Invest (REOG)	18,990,824	2,987,383
Riverside Credit Solutions FD I, LP	30,424,506	11,293,723
RPEP Energy Opportunistic Institutional Partners	40,683,479	2,386,980
Sixth Street Agriculture Partners I, LP	45,990,426	58,300,358
Sixth Street Growth Partners I, LP	224,295,170	122,393,304
Sixth Street Growth Partners II (A), LP	0	200,000,000
Sixth Street Opportunities Partners IV, LP	88,533,551	24,930,379
Sixth Street Opportunities Partners V (A), LP	0	125,000,000
Sixth Street SSLE II (USD Feeder)	42,502,781	84,838,204
Sixth Street TAO Partners, LP	218,519,346	120,199,925
SJC Direct Lending Fund II	1	38,261,315
SJC Direct Lending Fund III	136,938,213	21,533,035
SJC Direct Lending Fund III Co-Invest G-III	40,503,060	0
SJC Onshore Direct Lending Fund IV – SMRS, LP	107,767,978	141,044,596
SM/TCP, LP	10,242,853	36,298,477
* Social Network Holdings	196,273,536	5,590,289
Specialty Loan Fund III	2,197,804	5,812,365
Sprott Private Resource Lending (US), LP	2,292,196	98,449,699
Sprott PRL(M), LP	1,005,507	24,006,633
Sprott PRL(M-Co-Invest), LP	22,761	25,000,000
Structured Credit Recovery Fund IV	112,724,756	147,742,521
Sycamore Partners III, LP	65,262,381	96,769,351
Terra Co-Investment	49,833,242	14,000,000
TICP CLO Partners II	37,255,832	1,480,904
TICP CLO Partners III	65,750,666	31,813,825
TPG Rise Climate I	0	250,000,000
Turnbridge Capital Partners I, LP	53,682,042	4,159,512
Turning Rock Fund I, LP	57,471,124	16,319,293
Turning Rock Fund II	16,156,768	58,763,011
Vida Insurance Credit Opportunity Fund II	71,413,289	39,419,993
Warwick (SMRS) Co-Invest, LP	35,822,353	2,089,081
Warwick Partners III	57,787,440	2,017,706
Total Real Return and Opportunistic	\$ 12,308,453,253	\$ 5,125,707,776
Short-Term Investments & Other	160,022,588	
Grand Total	\$ 12,468,475,841	\$ 5,125,707,776

* Fund of Funds

** New Commitment

State of Michigan Retirement System

DEFINED CONTRIBUTION REVIEW

State of Michigan Investment Board Meeting
June 23, 2022



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	3/31/22	3/31/21
State of Michigan 401(k)	\$8,529	\$8,100
State of Michigan 457	1,978	2,018
Pension Plus 401(k) & 457	1,882	1,525
EAA	11	12
Total	\$12,399	\$11,655

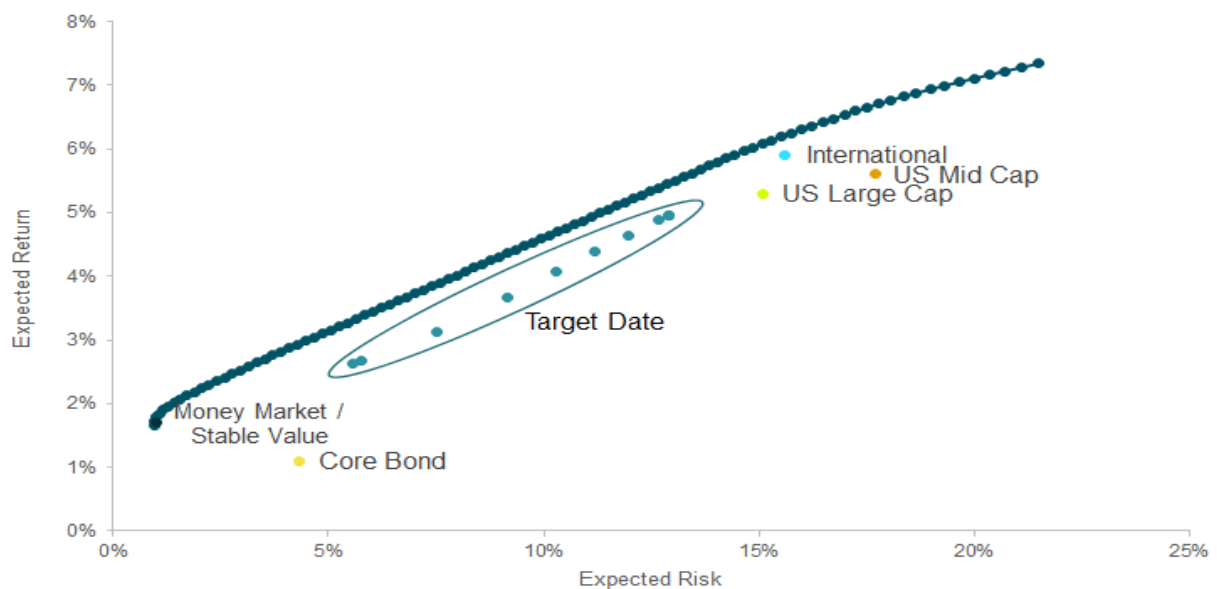
(\$ in millions)

*Loan Fund \$189M as of 3/31/22

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 as-of December 31, 2021

Plan Update

Voya Small Cap Growth Equity Fund: On November 23, 2021, Voya announced the acquisition of Tygh Capital Management (TCM). Internal due diligence was conducted on the new management team and the Michigan account was fully transitioned to the new portfolio team on April 1, 2022. The fund name remains the Voya Small Cap Growth Equity Fund. Equities markets collapsed in April, led by US growth stocks. Amid the continued volatility, the portfolio returned -11.41%, outperforming the index which was down -12.27%, by 86bps. Strong performance was driven by favorable stock selection, primarily within the health care and information technology sectors.

Market Environment and Outlook

With few exceptions, global financial assets sustained losses for the quarter.

Early in the quarter, the global economic recovery from COVID-19 was making progress. However, while business activity, employment and wages were increasing, so were prices. Supply shortages due to COVID-19 impacts pushed inflation to levels not seen since the early 1980s. Market volatility rose as investors anticipated an aggressive central bank response to control inflation. Then, in late February, Russia invaded Ukraine, sparking a humanitarian crisis and another pullback across virtually all asset classes. Nations responded to the invasion with sanctions that disrupted Russian oil and natural gas supplies, and the sanctions drove up fuel prices at the pump and worsened already high inflationary pressures.

As a first step in fighting those pressures, the Federal Reserve raised interest rates at its March policy meeting. Stock markets rallied somewhat, encouraged that the Fed was taking action. Since it was widely assumed that this was likely the first of many rate hikes, the U.S. Treasury yield curve briefly inverted, which some observers saw as a potential signal of recession.

The Russia-Ukraine conflict could lead to further tightening of financial conditions through elevated energy prices, marginally slowing economic growth. Should conditions tighten further, it could limit the Fed's desire to hike rates at the accelerated pace the market is currently projecting, which would be mildly positive for bonds and neutral for equities. Meanwhile, market fundamentals continue to advance — as of April 1, estimates of year-over-year S&P 500 earnings growth stood at about 6.4%.

The comparison of 2022 to 2021 earnings will be difficult but expectations continue to be positive each quarter. The key to sustained growth may be a transition from accommodative fiscal and monetary policies to a period of increased private sector investment.

In May, the Fed's raised rates half a percent. This marked the most aggressive Fed tightening of monetary policy at one meeting since 2000, following a four-decade high inflation print of 8.5%, year over year, in March. The Fed's ability to achieve a "soft landing" is in question as uncertainty over inflation, Covid challenges in China and the war in Ukraine continue. Unemployment remains low at 3.6%. The benchmark 10-year Treasury note moved up to 3.1% following the Fed's rate increase and a solid April jobs report.

Update on SECURE Act 2.0

On March 29, the House of Representatives passed the Securing a Strong Retirement Act of 2022. The retirement savings legislation, also known as SECURE Act 2.0, expands on the original SECURE Act, passed in 2019.

In addition to expanding coverage and increasing retirement savings, the SECURE Act 2.0 also allows hardship withdrawals in cases of domestic abuse and simplifies and clarifies retirement plan rules. Provisions included in SECURE Act 2.0 include:

- **Increases in RMD Age-** under current law, participants are generally required to begin taking distributions from their retirement plans at age 72, an increase ushered in by the SECURE Act. SECURE Act 2.0 increases the RMD age further to 73, starting on Jan. 1, 2022; to 74 starting on Jan.1, 2029; and to 75 starting on Jan. 1, 2032.

- **Expands Auto-Enrollment in Retirement Plans-** the bill requires 401(k) and 403(b) plans to automatically enroll participants when they become eligible; employees may opt out of coverage. The initial automatic enrollment amount is at least 3% but no more than 10%, then each year that amount is increased by 1% until it reaches 10%. All current 401(k) and 403(b) plans are grandfathered. There is an exception of small businesses with 10 or fewer employees, new businesses (i.e., have been in business for less than three years) church plans and governmental plans.
- **Higher Catch-Up Limits at age 62, 63, 64** - under current law, employees who have turned 50 are permitted to make catch-up contributions under a retirement plan. The limit on catch-up contributions for 2021 is \$6,500, except in the case of SIMPLE plans, for which the limit is \$3,000. The Act increase these limits to \$10,000 and \$5,000 (both indexed), respectively, for individuals who have attained ages 62, 63 and 64, but not age 65.
- **Student Loan Payments and Employer Matching** - the SECURE Act 2.0 permits an employer to make matching contributions under a 401(k) plan, 303(b) or SIMPLE IRA with respect to “qualified student loan payments.” The provision is intended to assist employees who may not be able to save for retirement because they are overwhelmed with student debt and missing out on available matching contributions.
- **Boosts Small Employer Pension Plan Startup Credit** - makes changes to the credit by increasing the startup credit from 50% to 100% for employers with up to 50 employees, and except in the case of defined benefit plans, an additional credit would be provided. The amount of the new credit generally would be a percentage of the amount contributed by the employer on behalf of employees, up to a per-employee cap of \$1,000.
- **Allows CITs in 403(b) Plans** - under current law, 403(b) plan investments are generally limited to annuity contracts and mutual funds. This limitation cuts off 403(b) plan participants, generally employees of charities and public educational organizations, from access to collective investment trusts (CITs), which are often used by 401(k) plans due to their lower fees. The bill permits 403(b) custodial accounts to invest in collective investment trusts
- **Opens the Door for ETFs in Variable Annuities** - SECURE 2.0 directs the Treasury Department to update regulations to facilitate the creation of a new type of ETF that is “insurance-dedicated.” Treasury regulations have prevented ETFs from being widely available through individual variable annuities. ETFs cannot satisfy the regulatory requirements to be “insurance-dedicated.”

SMRS

Defined Contribution Strategies

3/31/22

Markets	Amount		% of Total	Fee per \$1,000
QDIA (\$ in Millions)				
	<u>3/31/22</u>	<u>3/31/21</u>		
Total Target Date Fund	\$3,564	\$3,055	28.7%	\$0.55
Tier I Index Funds				
State Street S&P 500 Index Fund	\$1,863	\$1,636		\$0.13
State Street Bond Market Index Fund	1,088	1,052		0.20
State Street Global All Cap Equity ex-U.S. Index Fund	829	815		0.45
State Street S&P Mid Cap Index Fund	765	750		0.20
BlackRock Government Short-Term Investment CL F	226	221		0.56
BlackRock S&P Small Cap 600 Equity Index CL F	182	177		0.25
BlackRock Emerging Markets Index CL F	120	142		0.69
Total Tier I Index	\$5,071	\$4,793	40.9%	\$0.24
Tier II Active Funds				
Stable Value Fund	\$1,248	\$1,248		\$2.22
Dodge & Cox Stock Fund	707	633		4.15
Jennison Large Cap Growth Fund	531	562		2.83
American Funds EuroPacific Growth R6	293	343		4.60
T. Rowe Price Mid-Cap Value Fund	158	134		6.30
Artisan Mid Cap Fund	152	185		6.70
Voya Small Cap Growth Equity Fund	144	174		3.30
PIMCO Total Return I Fund	111	122		4.70
Virtus Ceredex Small-Cap Value Eq I	75	69		6.50
Prudential High Yield Fund	47	42		3.76
Total Tier II Active	\$3,466	\$3,513	28.0%	\$3.53
Tier III				
Total Self Directed Brokerage Account	\$298	\$293	2.4%	NA
Total Defined Contribution Assets	<u>\$12,399</u>	<u>\$11,655</u>	<u>100.0%</u>	\$1.24

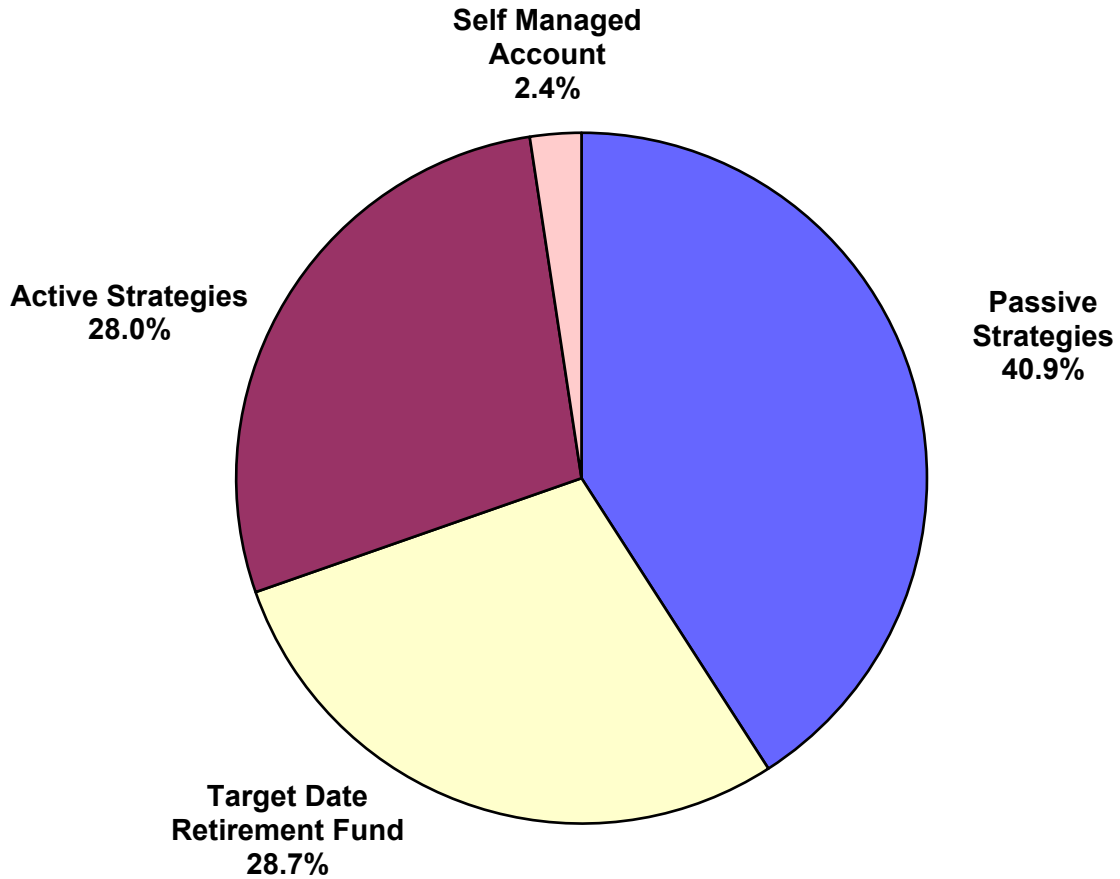
*Loan Fund \$189M as of 3/31/22

NOTE: Totals may not be exact due to rounding.

SMRS

Defined Contribution by Investment Strategy

3/31/22



Market Value in Millions				
	3/31/22		3/31/21	
Passive Strategies	\$5,071	40.9%	\$4,793	41.1%
Target Date Retirement Fund	3,564	28.7%	3,055	26.2%
Active Strategies	3,466	28.0%	3,513	30.1%
Self Managed Account	298	2.4%	293	2.5%
Total Investments	\$12,399	100.0%	\$11,655	100.0%

*Loan Fund \$189M as of 3/31/22

Note: Totals may not be exact due to rounding.

Defined Contribution Performance by Fund 3/31/22

<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	\$122,915,400	3.3	7.0	6.0	5.0
State Street Income Custom Index		3.3	7.0	6.0	5.0
Morningstar Target-Date Retirement		0.3	5.3	4.8	4.5
<i>Variance State Street Income Custom Index</i>		0.0	0.0	0.0	0.0
<i>Variance Morningstar Target-Date Retirement</i>		3.0	1.7	1.2	0.5
State Street Target Retirement 2020 Fund	144,816,096	4.1	8.5	7.5	7.1
State Street 2020 Custom Index		4.2	8.4	7.5	7.2
Morningstar Target-Date 2020		1.3	7.2	6.5	6.0
<i>Variance State Street 2020 Custom Index</i>		(0.1)	0.1	0.0	(0.1)
<i>Variance Morningstar Target-Date 2020</i>		2.8	1.3	1.0	1.1
State Street Target Retirement 2025 Fund	284,712,443	3.7	10.2	8.9	8.2
State Street 2025 Custom Index		3.8	10.1	8.8	8.3
Morningstar Target-Date 2025		1.8	8.1	7.3	7.0
<i>Variance State Street 2025 Custom Index</i>		(0.1)	0.1	0.1	(0.1)
<i>Variance Morningstar Target-Date 2025</i>		1.9	2.1	1.6	1.2
State Street Target Retirement 2030 Fund	356,979,407	3.1	11.0	9.6	8.8
State Street 2030 Custom Index		3.3	11.0	9.6	8.9
Morningstar Target-Date 2030		2.5	9.3	8.2	7.6
<i>Variance State Street 2030 Custom Index</i>		(0.2)	0.0	0.0	(0.1)
<i>Variance Morningstar Target-Date 2030</i>		0.6	1.7	1.4	1.2
State Street Target Retirement 2035 Fund	400,473,504	3.2	11.6	10.1	9.2
State Street 2035 Custom Index		3.4	11.6	10.1	9.3
Morningstar Target-Date 2035		3.3	10.5	9.2	8.5
<i>Variance State Street 2035 Custom Index</i>		(0.2)	0.0	0.0	(0.1)
<i>Variance Morningstar Target-Date 2035</i>		(0.1)	1.1	0.9	0.7
State Street Target Retirement 2040 Fund	406,522,745	3.5	12.2	10.5	9.6
State Street 2040 Custom Index		3.7	12.2	10.5	9.6
Morningstar Target-Date 2040		3.9	11.3	9.8	8.8
<i>Variance State Street 2040 Custom Index</i>		(0.2)	0.0	0.0	0.0
<i>Variance Morningstar Target-Date 2040</i>		(0.4)	0.9	0.7	0.8
State Street Target Retirement 2045 Fund	436,296,387	3.7	12.7	10.9	9.8
State Street 2045 Custom Index		3.9	12.7	10.9	9.9
Morningstar Target-Date 2045		4.3	12.0	10.3	9.4
<i>Variance State Street 2045 Custom Index</i>		(0.2)	0.0	0.0	(0.1)
<i>Variance Morningstar Target-Date 2045</i>		(0.6)	0.7	0.6	0.4
State Street Target Retirement 2050 Fund	563,262,933	3.7	13.0	11.1	9.9
State Street 2050 Custom Index		4.0	13.0	11.1	10.0
Morningstar Target-Date 2050		4.5	12.2	10.4	9.3
<i>Variance State Street 2050 Custom Index</i>		(0.3)	0.0	0.0	(0.1)
<i>Variance Morningstar Target-Date 2050</i>		(0.8)	0.8	0.7	0.6
State Street Target Retirement 2055 Fund	587,306,241	3.7	13.0	11.0	9.9
State Street 2055 Custom Index		4.0	13.0	11.1	10.0
Morningstar Target-Date 2055		4.5	12.4	10.6	9.7
<i>Variance State Street 2055 Custom Index</i>		(0.3)	0.0	(0.1)	(0.1)
<i>Variance Morningstar Target-Date 2055</i>		(0.8)	0.6	0.4	0.2

<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 2060 Fund	248,806,581	3.7	13.0	11.0	N/A
<i>State Street 2060 Custom Index</i>		4.0	13.0	11.1	N/A
<i>Morningstar Target-Date 2060</i>		4.6	12.4	10.7	N/A
<i>Variance State Street 2060 Custom Index</i>		(0.3)	0.0	(0.1)	N/A
<i>Variance Morningstar Target-Date 2060</i>		(0.9)	0.6	0.3	N/A
State Street Target Retirement 2065 Fund	12,405,854	3.7	N/A	N/A	N/A
<i>State Street 2065 Custom Index</i>		4.0	N/A	N/A	N/A
<i>Morningstar Target-Date 2065+</i>		4.6	N/A	N/A	N/A
<i>Variance State Street 2065 Custom Index</i>		(0.3)	N/A	N/A	N/A
<i>Variance Morningstar Target-Date 2065+</i>		(0.9)	N/A	N/A	N/A
TIER 1					
State Street S&P 500 Index Fund	\$ 1,862,627,522	15.6	18.9	16.0	14.6
<i>S&P 500 Index</i>		15.6	18.9	16.0	14.6
<i>Morningstar Large Blend</i>		11.4	16.0	13.5	12.3
<i>Variance S&P 500 Index</i>		0.0	0.0	0.0	0.0
<i>Variance Morningstar Large Blend</i>		4.2	2.9	2.5	2.3
State Street Bond Market Index Fund	1,087,682,167	(4.2)	1.7	2.1	2.2
<i>Bloomberg U.S. Aggregate Index</i>		(4.2)	1.7	2.1	2.2
<i>Morningstar Intermediate-Term Bond</i>		(4.5)	1.5	2.0	2.3
<i>Variance Bloomberg U.S. Aggregate Index</i>		0.0	0.0	0.0	0.0
<i>Variance Morningstar Intermediate-Term Bond</i>		0.3	0.2	0.1	(0.1)
State Street Global All Cap Equity ex-U.S. Index Fund	828,885,977	(1.7)	7.9	7.0	5.9
<i>MSCI ACWI ex USA IMI (Net)</i>		(1.3)	7.9	6.9	5.8
<i>Morningstar Foreign Large Blend</i>		(1.6)	7.0	6.1	5.5
<i>Variance MSCI ACWI ex USA IMI (Net)</i>		(0.4)	0.0	0.1	0.1
<i>Variance Morningstar Foreign Large Blend</i>		(0.1)	0.9	0.9	0.4
State Street S&P Mid Cap Index Fund	764,872,384	4.6	14.1	11.1	12.1
<i>S&P 400 Index</i>		4.6	14.1	11.1	12.2
<i>Morningstar Mid-Cap Blend</i>		5.8	13.3	10.3	10.7
<i>Variance S&P 400 Index</i>		0.0	0.0	0.0	(0.1)
<i>Variance Morningstar Mid-Cap Blend</i>		(1.2)	0.8	0.8	1.4
BlackRock Government Short-Term Investment CL F	225,551,370	0.0	0.7	1.1	N/A
<i>BofA Merrill Lynch US 3-Month Treasury Bill Index</i>		0.1	0.8	1.1	N/A
<i>Variance BofA Merrill Lynch US 3-Month Treasury Bill Index</i>		(0.1)	(0.1)	0.0	N/A
BlackRock S&P Small Cap 600 Equity Index CL F	182,129,479	1.3	13.6	N/A	N/A
<i>S&P SmallCap 600 Index</i>		1.2	13.6	N/A	N/A
<i>Morningstar Small Blend</i>		0.9	11.9	N/A	N/A
<i>Variance S&P SmallCap 600 Index</i>		0.1	0.0	N/A	N/A
<i>Variance Morningstar Small Blend</i>		0.4	1.7	N/A	N/A
BlackRock Emerging Markets Index CL F	119,606,094	(12.2)	4.5	5.7	N/A
<i>MSCI Emerging Market (Net)</i>		(11.4)	4.9	6.0	N/A
<i>Morningstar Diversified Emerging Mkts</i>		(11.3)	5.0	5.3	N/A
<i>Variance MSCI Emerging Market (Net)</i>		(0.8)	(0.4)	(0.3)	N/A
<i>Variance Morningstar Diversified Emerging Mkts</i>		(0.9)	(0.5)	0.4	N/A
TIER 2					
Stable Value Fund	\$ 1,248,007,596	1.8	2.2	2.3	2.2
<i>Bloomberg US Govt/Credit A+Interm Index</i>		(4.1)	1.3	1.6	1.6
<i>Hueler Universe</i>		1.7	2.1	2.1	2.0
<i>Variance Bloomberg US Govt/Credit A+Interm Index</i>		5.9	0.9	0.7	0.6
<i>Variance Hueler Universe</i>		0.1	0.1	0.2	0.2

<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	707,223,012	15.2	17.1	13.1	14.2
<i>Russell 1000 Value Index</i>		11.7	13.0	10.3	11.7
<i>Morningstar Large Value</i>		13.0	13.2	10.6	10.9
<i>Variance Russell 1000 Value Index</i>		3.5	4.1	2.8	2.5
<i>Variance Morningstar Large Value</i>		2.2	3.9	2.5	3.3
Jennison Large Cap Growth Fund	530,902,913	4.3	21.1	20.8	N/A
<i>Russell 1000 Growth Index</i>		15.0	23.6	20.9	N/A
<i>Morningstar Large Growth</i>		5.1	18.2	17.1	N/A
<i>Variance Russell 1000 Growth Index</i>		(10.7)	(2.5)	(0.1)	N/A
<i>Variance Morningstar Large Growth</i>		(0.8)	2.9	3.7	N/A
American Funds EuroPacific Growth R6	292,980,613	(9.4)	8.4	8.0	7.3
<i>MSCI EAFE Index - Net Div</i>		1.2	7.8	6.7	6.3
<i>Morningstar Foreign Large Blend</i>		(1.6)	7.0	6.1	5.5
<i>Variance MSCI EAFE Index - Net Div</i>		(10.6)	0.6	1.3	1.0
<i>Variance Morningstar Foreign Large Blend</i>		(7.8)	1.4	1.9	1.8
T. Rowe Price Mid-Cap Value Fund	158,428,674	13.8	15.6	10.7	12.5
<i>Russell Midcap Value Index</i>		11.5	13.7	10.0	12.0
<i>Morningstar Mid-Cap Value</i>		10.8	13.4	9.5	10.8
<i>Variance Russell Midcap Value Index</i>		2.3	1.9	0.7	0.5
<i>Variance Morningstar Mid-Cap Value</i>		3.0	2.2	1.2	1.7
Artisan Mid Cap Fund	152,067,821	(3.8)	19.0	17.4	13.5
<i>Russell Midcap Growth Index</i>		(0.9)	14.8	15.1	13.5
<i>Morningstar Mid-Cap Growth</i>		(4.6)	15.1	14.3	12.1
<i>Variance Russell Midcap Growth Index</i>		(2.9)	4.2	2.3	0.0
<i>Variance Morningstar Mid-Cap Growth</i>		0.8	3.9	3.1	1.4
Voya Small Cap Growth Equity Fund	143,729,147	(8.9)	8.5	7.2	9.9
<i>Russell 2000 Growth Index</i>		(14.3)	9.9	10.3	11.2
<i>Morningstar Small Growth</i>		(9.3)	13.2	13.0	11.7
<i>Variance Russell 2000 Growth Index</i>		5.4	(1.4)	(3.1)	(1.3)
<i>Variance Morningstar Small Growth</i>		0.4	(4.7)	(5.8)	(1.8)
PIMCO Total Return I Fund	110,997,541	(4.0)	2.2	2.5	2.7
<i>Bloomberg U.S. Aggregate Index</i>		(4.2)	1.7	2.1	2.2
<i>Morningstar Intermediate Core-Plus Bond</i>		(4.0)	2.1	2.4	2.7
<i>Variance Bloomberg U.S. Aggregate Index</i>		0.2	0.5	0.4	0.5
<i>Variance Morningstar Intermediate Core-Plus Bond</i>		0.0	0.1	0.1	0.0
Virtus Ceredex Small-Cap Value Eq I	74,848,267	4.2	8.6	6.6	9.5
<i>Russell 2000 Value Index</i>		3.3	12.7	8.6	10.5
<i>Morningstar Small Value</i>		6.1	13.1	8.4	9.8
<i>Variance Russell 2000 Value Index</i>		0.9	(4.1)	(2.0)	(1.0)
<i>Variance Morningstar Small Value</i>		(1.9)	(4.5)	(1.8)	(0.3)
Prudential High Yield Fund	46,756,773	(0.2)	5.5	5.5	N/A
<i>Bloomberg U.S. Corp. HY 1% Issuer Cap Index</i>		(0.7)	4.4	4.5	N/A
<i>Morningstar High Yield Bond</i>		(0.5)	3.7	3.7	N/A
<i>Variance Bloomberg U.S. Corp. HY 1% Issuer Cap Index</i>		0.5	1.1	1.0	N/A
<i>Variance Morningstar High Yield Bond</i>		0.3	1.8	1.8	N/A
TIER 3					
Self Directed	297,693,678				
TOTAL	\$12,399,488,618				

Loan Fund:

\$189,315,303

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.