

STATE OF MICHIGAN INVESTMENT BOARD MEETING

September 22, 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
SEPTEMBER 22, 2022

Agenda



- 9:30 a.m. Call to Order and Opening Remarks**
- 9:35 a.m. Approval of the 6/23/22 SMIB Meeting Minutes**
- 9:40 a.m. Executive Summary & Performance for Periods Ending 6/30/22**
- 9:45 a.m. Current Asset Allocation Review
Markets Review and Outlook**
- 10:00 a.m. Asset Liability Analysis/Asset Allocation Discussion and Recommendation**
Guest Speakers:
 Phil Kivarkis, Partner – U.S. Director of Investment Policy Services, Aon
 John Sullivan, Jr., Associate Partner – Asset-Liability Management, Aon
- 10:45 a.m. Action Item:**
- **Resolution Authorizing Asset Allocation Strategy**
- Review of Investment Reports**
- **Fixed Income – Receive and File**
 - **International Equity – Receive and File**
 - **Domestic Equity – Receive and File**
 - **Absolute Return – Receive and File**
 - **Private Equity – Receive and File**
 - **Real Estate & Infrastructure – Receive and File**
 - **Real Return & Opportunistic – Receive and File**
 - **Defined Contribution – Receive and File**
- 10:55 a.m. Public Comment**
- 11:00 a.m. Closing Remarks ~ Adjournment**



2022 Meeting Schedule

Thursday, December 8, 2022

All meetings start at 9:30 a.m.

State of Michigan Retirement System

MINUTES

State of Michigan Investment Board Meeting

September 22, 2022



Jon M. Braeutigam
Chief Investment Officer
Bureau of Investments

STATE OF MICHIGAN INVESTMENT BOARD

June 23, 2022 Meeting Minutes

Board Members

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

Members of the Public and Bureau of Investments Staff Present

Robert Brackenbury	Greg Parker	Anthony Estell
Karl Borgquist	Max Kotary	Allison Wardlaw
Jim Elkins	Aaron Haftl	Travis Haney
Peter Woodford	Janet Sudac	Richard Holcomb

Many others were remotely present via Microsoft Teams.

Opening Remarks:

Mr. Harkins called the meeting to order at 9:30 am.

Approval of Minutes:

Approval of the March 24, 2022 SMIB Meeting Minutes – Motion to approve by Dina Richard.
Seconded: Reggie Sanders. The vote was unanimous to approve.

AGENDA

Executive Summary

Robert Brackenbury, Deputy Chief Investment Officer for the Bureau of Investments, reviewed the executive summary performance section, briefly discussing performance, returns and markets. He stated that the Plan has beat its benchmarks across all time periods, as well as significantly exceeding peer median returns. We raised approximately \$1 billion in cash a few months ago by selling some of our public equities when these markets were still elevated.

Maintaining discipline, sticking to our current asset allocation, and maintaining liquidity to pay benefits and capital calls are important goals of the Bureau and allow us to better manage through downturns in the economy. The US is now roughly five months into a bear market and the BOI needs to continue to move forward strategically. The combined pension plans held approximately \$50 billion in assets in 2012, whereas they have effectively doubled to \$100 billion in 2022. Our team's 10-year return outperformance above peer median returns leads to an impact of almost \$18 billion more added to the funds over this 10-year time horizon.

Asset Allocation Review, Markets Review and Outlook

Mr. Gregory Parker, Director of Investments – Public Markets discussed a few observations within asset allocation, stating that the BOI is undertaking a study to review the Plans' strategic asset allocation, return and risk assumptions. He presented a slide showing the building blocks used to create a diversified portfolio.

Today we can get investment grade corporate bonds at a rate of return close to 5% and high yield bonds at a rate of close to 8%. Leading up to 2022, there was an acronym in the markets, TINA – There Is No Alternative. Meaning you had to take risk in order to earn any type of return. Today we are talking more about her sister, TARA – There Are Reasonable Alternatives. So, our internal discussion is how are we going to earn these rates of return in the most risk efficient ways?

Mr. Parker discussed the S&P 500, stating that we are now back to January 2021 levels. He explained that the International markets have been a tough area to invest in over the past 12 years. Today the International market levels are where they were in the beginning of March 2020. They also match levels in 2013. There has been a lot of volatility that has not gone anywhere for a long time.

The one-year yield curve observation reveals it to be very steep in the front end of the curve. This reflects the market's interpretation of Fed policy in the next year or two. Past the three years mark there are some challenging signals given there is some inversion. Typically, we like to see a steadily increasing slope to the yield curve. What the market is signaling is that it is worried about a Fed policy mistake. It believes the Fed will carry out a mandate to tamp down inflation in the near term. The market in general is concerned that the Fed may go too far.

He further discussed credit spreads and the CRB Commodity index then answered questions presented by the Board.

Private Equity Review

Mr. Peter Woodford, Senior Manager of the Private Equity Division (PED), reviewed the Division's goals and strategies. He discussed division performance, stating that returns have been good over all periods, but he is especially proud of the 10-year track record of almost 17.7%. He stated that today, the PED manages a portfolio that is almost three times the size it was 15 years ago, with significantly higher returns.

Mr. Woodford highlighted that private equity returns have been superior to peer median returns over all measurement periods, which is attributable to strategy as well as fund and co-investment decisions. He stated 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 ten years, the PED outperformed the S&P 500 by 3.1% (10-year S&P 500 return of 14.6%) and underperformed its benchmark by 2.3%.

Mr. Woodford mentioned a few of the exceptional larger commitments in the Division. He described how the portfolio is constructed and how the portfolio is built by sector.

He explained there are several headwinds affecting private equity including inflation, higher interest rates and slower earnings growth. There's a disconnect between public equity valuations and private equity valuations due to several factors. These include the reporting lag effect, increased valuations of some private equity funds, and relatively smaller holdings of publicly held companies within the portfolio, meaning less volatility. It should be clear that a rise in interest rates affects all of us, private and public investors. With Fed tightening, interest coverage ratios for buyout deals will fall, suggesting either leverage or valuations need to come down for private equity.

Guest Speaker – Orlando Bravo of Thoma Bravo

Mr. Bravo spoke of the company's history and its two core competencies. Number one is that they know how to identify, transact, and buy the highest quality software companies in the world. It's all business-to-business software with no social media or consumer involvement. They realize a very high return on investments by doing so.

The number two core competency is that while they buy the highest quality technology companies, market share leaders, and recurring revenue streams, they also buy companies that are undermanaged from a profitability standpoint. He discussed the buyout strategy and target company characteristics.

Mr. Bravo stated that Thoma Bravo very quickly became a software focused private equity firm and did it not by having a huge plan, but by investing in one deal at a time and learning from each transaction as time went on. He said today the firm is the largest technology focused private equity firm, managing \$130 billion of their investor's assets.

According to Mr. Bravo, Thoma Bravo has followed this strategy over 300 times. Today the deals are much better but very similar. Same philosophy, same mission, same people, but with a different set of tactics for the evolutions that have happened in software. There are three factors he attributed their performance to. One is their people and culture, two is their strategy and operational approach and three is that software is a very good space to be in. He took each one of these factors and gave multiple examples.

He further discussed Thoma Bravo's relationship with SMRS and thanked SMRS for investing with them and continuing with their partnership.

Public Comment:

There was no public comment.

Adjournment:

Motion to adjourn by Reggie Sanders. Seconded: Dina Richard. The meeting concluded at 11:01 am.

Approved:

Rachael Eubanks, Chairman

State of Michigan Retirement System

EXECUTIVE SUMMARY

State of Michigan Investment Board Meeting

September 22, 2022



Jon M. Braeutigam
Chief Investment Officer
Bureau of Investments

EXECUTIVE SUMMARY

June 30, 2022

Performance

Great peer comparison.

MPSERS Plan (6/30/22)	1-Year	3-Years	5-Years	7-Years	10-Years
Annualized Returns	1.3%	10.6%	10.3%	9.4%	10.3%
Policy Returns	-0.5%	9.1%	9.1%	8.8%	9.7%
Peer Median Returns*	-2.9%	8.2%	7.9%	7.4%	8.4%

*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 9.5%.
- Compounding at higher than peer returns can add significant value. For example, based on the \$49.6 billion June 2012 market value, a ten-year annualized return of 10.3% compared to the 8.4% peer median return added approximately \$21.3 billion in excess value.

Asset Allocation

A low return environment.

- Given the investment 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 440 bps. At the end of June 2022, the equity risk (beta) is approximately 0.38; lower than peer median at approximately 0.55.
- Liquidity is another fundamental risk assumed and it is managed through asset allocation. The plans have outstanding capital commitments to fund approximately \$18.6 billion in illiquid assets, primarily in private equity. In the June 2022 quarter, \$2.3 billion of new commitments were made.
- The combined systems paid out approximately \$1.5 billion net of contributions over the past twelve months ending in June 2022. Over the past year, the allocation to private equity was reduced by \$2.1 billion, domestic equity was reduced by \$1.0 billion, short term fixed income by \$763 million, and real return and opportunistic decreased by \$474 million. Over the past year, the allocation to absolute return increased by \$2.2 billion, and real estate by \$942 million.

NEW COMMITMENTS

April 1, 2022 – June 30, 2022

(\$ Millions)

Asset class	Fund Name / (Managed By)	Commitment
Private Equity		
	Apax XI USD, LP (Apax XI GP Co., Limited)	\$ 150.0
	TPG Partners IX, LP (TPG GenPar IX, LP)	112.5
	Blackstone Growth II, LP (Blackstone Growth Associates II, LP)	100.0
	Accel Leaders 4, LP (Accel Leaders 4 Associates, LLC)	50.0
	Meritech Capital Partners VIII, LP (Meritech Capital Associates VIII, LLC)	48.0
	TPG Healthcare Partners II, LP (TPG Healthcare Partners GenPar II, LP)	37.5
	Arboretum Ventures VI, LP (Arboretum Investment Manager VI, LLC)	35.0
	FirstMark Capital OF IV, LP (FirstMark Capital VI GP, LLC)	35.0
	FirstMark Capital VI, LP (FirstMark Capital OF IV, LP)	35.0
	Meritech Capital Sidecar III, LP (Meritech Capital Associates VIII, LLC)	12.0
	Lightspeed India Fund IV, LLC (Ashwood Capital Management Limited)	7.5
Real Estate and Infrastructure		
	Blackstone Real Estate Partners X, LP (Blackstone Real Estate Advisors, LP)	\$ 200.0
	ASF VIII Infrastructure B, LP (ASF VIII Infrastructure, GP Limited)	100.0
	Ridgewood Water & Strategic Infrastructure II, LP (Ridgewood Infrastructure Fund II, GP)	75.0
	Warwick UK Real Estate Fund I (Warwick Investment Group)	50.0
Absolute Return		
	Sixth Street Lending Partners (Sixth Street Lending Partners Advisers, LLC)	\$ 500.0
	Apollo Accord+ (Apollo Accord+ Management, LP)	300.0
	Irradiant Solutions Fund II, LP (Irradiant Partners, LP)	250.0
	Owl Rock Technology Finance Corp II (Owl Rock Technology Advisers II, LLC)	225.0
TOTAL		\$2,322.5

State of Michigan Retirement System

PERFORMANCE

State of Michigan Investment Board Meeting

September 22, 2022



Jon M. Braeutigam
Chief Investment Officer
Bureau of Investments

Bureau of Investments

Mission Statement

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

SMRS Goals

Maintain sufficient liquidity to pay benefits.

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

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

Diversify assets to reduce risk.

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

MPSERS PENSION

Time-Weighted Rates of Return Periods Ending June 30, 2022

	% of Portfolio 6/30/22	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	10.3	8	9.4	9	10.3	9	10.6	11	1.3	18	-4.4	11
Median - Greater than \$10 Billion ²		8.4		7.4		7.9		8.2		-2.9		-6.6	
MPSERS Total Plan Policy		9.7		8.8		9.1		9.1		-0.5		-6.5	
PRIVATE EQUITY AND VENTURE CAPITAL	25.4	17.2	7	17.9	13	21.5	15	24.9	12	26.1	17	0.9	53
Median ²		11.4		10.1		11.4		13.0		18.2		1.3	
Private Equity and VC Benchmark ³		18.0		17.4		19.4		22.5		19.1		-3.9	
DOMESTIC EQUITIES	18.9	12.4	27	9.9	27	10.2	32	7.8	59	-16.6	84	-17.1	92
Median ²		9.6		8.1		8.2		8.0		-12.3		-14.3	
S&P 1500 Index		12.8		10.8		10.9		10.3		-11.0		-16.0	
REAL RETURN AND OPPORTUNISTIC	13.6	12.5		12.5		14.4		14.9		11.9		5.4	
50% (CPI + 4%) + 50% (actuarial rate) ⁴		7.5		7.6		7.7		8.0		9.7		2.8	
INTERNATIONAL EQUITIES	13.4	5.7	73	3.5	54	2.9	67	1.9	56	-22.0	78	-14.6	77
Median ²		5.8		3.6		3.2		2.0		-18.5		-13.8	
MSCI ACWI ex USA Net Index ⁵		4.9		2.9		2.5		1.4		-19.4		-13.7	
REAL ESTATE & INFRASTRUCTURE	9.9	10.9	45	10.0	46	10.0	56	10.2	63	29.8	28	10.6	20
Median ²		10.1		9.5		10.1		11.6		25.6		6.1	
NCREIF Property Index ⁶		8.3		7.5		7.5		8.8		19.9		2.9	
NCREIF Open Fund Index Net		10.2		9.4		9.6		11.7		28.3		4.5	
FIXED INCOME	9.4	2.9	18	2.8	15	2.0	12	0.2	20	-8.1	27	-5.0	47
Median ²		2.2		1.9		1.3		-0.4		-10.5		-5.2	
Bloomberg US Agg Index		1.5		1.4		0.9		-0.9		-10.3		-4.7	
ABSOLUTE RETURN	7.9	6.2		5.3		6.8		8.3		6.6		1.9	
1-Month T-Bill + 400 bps		4.6		4.8		5.0		4.5		4.2		4.1	
HFR Benchmark ⁷		3.9		3.2		4.2		5.3		1.6		-0.2	
CASH EQUIVALENTS	1.5	1.0		1.2		1.4		0.8		0.3		0.2	
1 Month T-Bill		0.6		0.8		1.0		0.5		0.2		0.1	

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

⁵ History from 10/1/2010 to 6/30/14 reflects MSCI ACWI ex USA (gross).

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 6/30/22

	1 Year	2 Year	3 Year	4 Year	5 Year	6 Year	7 Year	8 Year	9 Year	10 Year
MPSERS	1.3	16.2	10.6	9.9	10.3	10.8	9.4	9.0	10.1	10.3
Public Plan - Median (> \$10 billion)*	-2.9	11.0	8.2	7.8	7.9	8.7	7.4	6.9	7.8	8.4
Rank	18	9	11	11	9	9	9	8	8	8
bp Difference - Median	417	523	234	208	241	202	196	214	233	192

Consecutive For Years Ending

	06/22	06/21	06/20	06/19	06/18	06/17	06/16	06/15	06/14	06/13
MPSERS	1.3	33.4	0.1	8.0	12.0	12.9	1.5	6.2	19.1	12.2
Public Plan - Median (> \$10 billion)*	-2.9	27.5	2.7	6.6	9.0	13.1	1.3	3.5	16.9	12.6
Rank	18	7	88	17	5	57	47	5	7	59
bp Difference - Median	417	584	-267	137	303	-14	27	272	227	-44

MSERS

Cumulative For Years Ending 6/30/22

	1 Year	2 Year	3 Year	4 Year	5 Year	6 Year	7 Year	8 Year	9 Year	10 Year
MSERS	1.3	16.3	10.6	9.9	10.3	10.8	9.4	9.0	10.1	10.3
Public Plan - Median (> \$1 billion)*	-3.6	10.6	7.5	7.1	7.4	8.6	7.4	6.8	7.7	8.3
Rank	12	7	8	7	6	6	7	6	5	6
bp Difference - Median	491	566	312	281	292	213	202	221	237	202

Consecutive For Years Ending

	06/22	06/21	06/20	06/19	06/18	06/17	06/16	06/15	06/14	06/13
MSERS	1.3	33.4	0.1	7.9	12.0	13.0	1.5	6.2	19.1	12.2
Public Plan - Median (> \$1 billion)*	-3.6	27.0	2.5	6.4	8.6	13.0	1.2	3.6	16.8	12.5
Rank	12	4	86	14	4	51	47	3	5	55
bp Difference - Median	491	642	-239	155	344	0	33	259	229	-37

*State Street Public Funds Universe

Cumulative and Consecutive Total Fund Returns

MSPRS

Cumulative For Years Ending 6/30/22

	1 Year	2 Year	3 Year	4 Year	5 Year	6 Year	7 Year	8 Year	9 Year	10 Year
MSPRS	1.3	16.2	10.6	9.9	10.3	10.8	9.4	9.0	10.1	10.3
Public Plan - Median (> \$1 billion)*	-3.6	10.6	7.5	7.1	7.4	8.6	7.4	6.8	7.7	8.3
Rank	12	7	8	8	6	6	7	6	5	6
bp Difference - Median	486	561	309	279	290	212	201	219	234	199

Consecutive For Years Ending

	06/22	06/21	06/20	06/19	06/18	06/17	06/16	06/15	06/14	06/13
MSPRS	1.3	33.4	0.1	7.9	12.0	13.0	1.5	6.2	19.0	12.1
Public Plan - Median (> \$1 billion)*	-3.6	27.0	2.5	6.4	8.6	13.0	1.2	3.6	16.8	12.5
Rank	12	4	85	14	4	51	47	3	5	57
bp Difference - Median	486	637	-238	153	345	-1	32	257	221	-48

MJRS

Cumulative For Years Ending 6/30/22

	1 Year	2 Year	3 Year	4 Year	5 Year	6 Year	7 Year	8 Year	9 Year	10 Year
MJRS	0.6	15.4	10.0	9.5	10.0	10.5	9.2	8.8	9.8	10.0
Public Plan - Median (> \$1 billion)*	-3.6	10.6	7.5	7.1	7.4	8.6	7.4	6.8	7.7	8.3
Rank	15	9	10	9	7	6	7	7	6	7
bp Difference - Median	421	475	255	239	258	186	179	200	209	178

Consecutive For Years Ending

	06/22	06/21	06/20	06/19	06/18	06/17	06/16	06/15	06/14	06/13
MJRS	0.6	32.3	0.1	7.9	12.0	13.0	1.5	6.2	18.2	12.2
Public Plan - Median (> \$1 billion)*	-3.6	27.0	2.5	6.4	8.6	13.0	1.2	3.6	16.8	12.5
Rank	15	6	85	14	4	48	47	3	17	54
bp Difference - Median	421	525	-237	154	345	6	30	256	141	-32

*State Street Public Funds Universe

State of Michigan Retirement System

ASSET ALLOCATION REVIEW

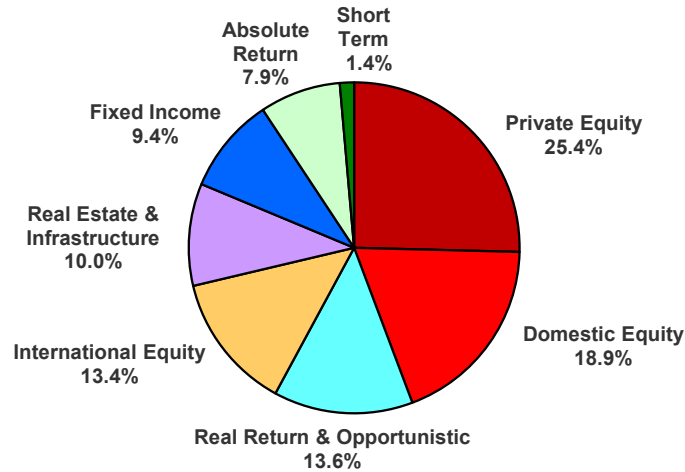
State of Michigan Investment Board Meeting
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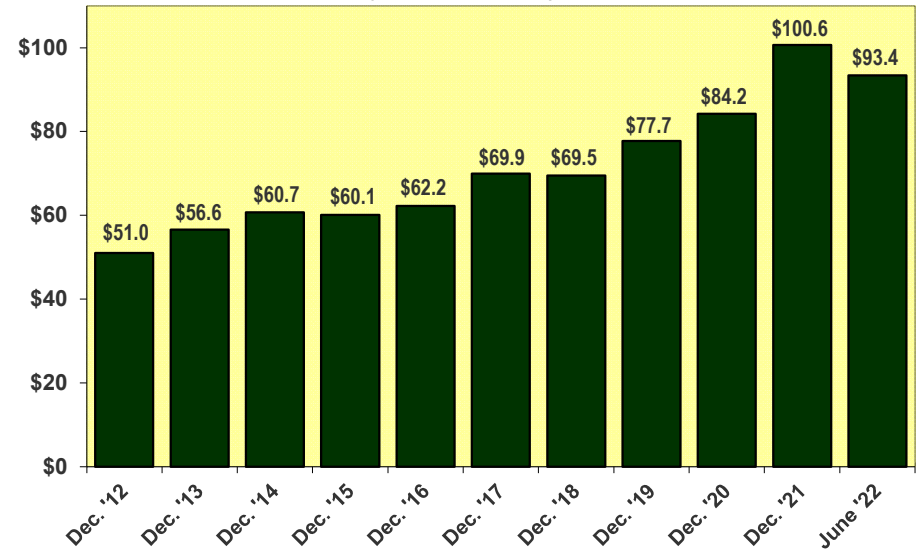
Gregory J. Parker, CFA
Director of Investments – Public Markets
Director of Asset Allocation
Bureau of Investments

STATE OF MICHIGAN RETIREMENT SYSTEM PROFILE - JUNE 2022

Asset Allocation ~ 6/30/22



Market Value*
(Billions of Dollars)



Asset Allocation By Market Value
(In Millions)

Investment Strategies	6/30/2022		6/30/2021	
Private Equity	\$23,759	25.4%	\$20,826	22.1%
Domestic Equity	17,652	18.9%	22,169	23.6%
Real Return & Opportunistic	12,723	13.6%	11,880	12.6%
International Equity	12,519	13.4%	16,043	17.1%
Real Estate & Infrastructure	9,281	10.0%	6,373	6.8%
Fixed Income	8,813	9.4%	9,616	10.2%
Absolute Return	7,380	7.9%	4,810	5.1%
Short Term***	1,291	1.4%	2,361	2.5%
TOTAL	\$93,418	100.0%	\$94,078	100.0%

Market Value By Plan ~ 6/30/22
(in Millions)

	Pension Plan Mkt. Value	OPEB** Mkt. Value	Combined Mkt. Value	%
MPSERS	\$61,504	\$10,762	\$72,266	77.3%
MSERS - (closed)	13,742	4,996	18,738	20.1%
MSPRS	1,756	365	2,121	2.3%
MJRS - (closed)	281	12	293	0.3%
TOTAL	\$77,283	\$16,135	\$93,418	100.0%

MSERS includes the Military Pension Fund

Short Term Equivalents (in Billions)

Short Term Strategy***	\$1.3	
Short Term in Other Inv. Strategies	1.7	
TOTAL SHORT TERM	\$3.0	3.3% 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

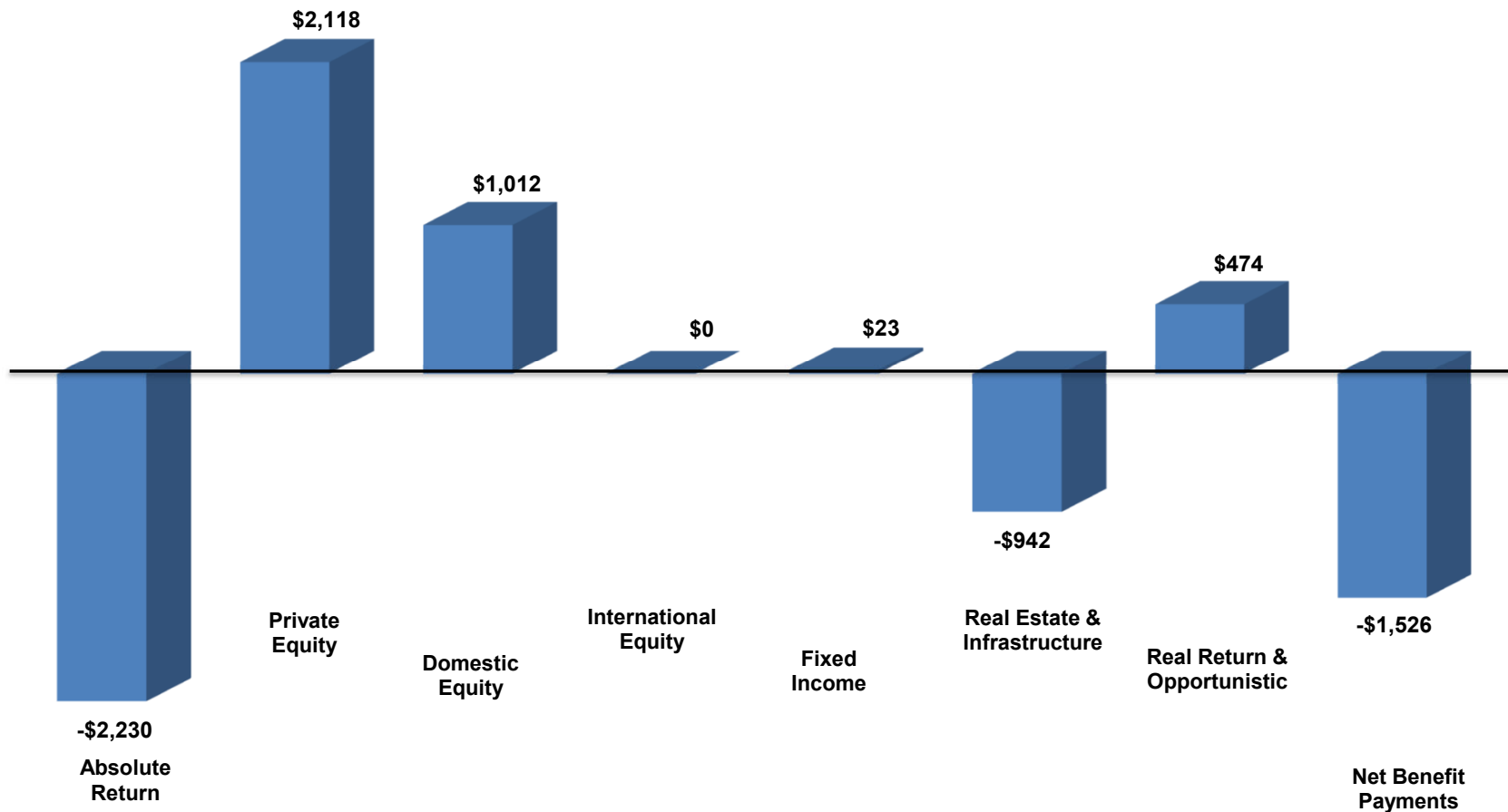
Sources and Uses of Cash

July 2021 ~ June 2022

7/01/21 Short-Term Cash Balance: \$ 2,362

6/30/22 Short-Term Cash Balance: 1,291

Net Short-Term Cash Decrease: \$ 1,071



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 6/30/22

	MPSERS		MSERS		MSPRS		MJRS		SMRS
Asset Class	6/30/22	Target*	6/30/22	Target*	6/30/22	Target*	6/30/22	Target*	Ranges
Private Equity	25.4%	16.0%	25.5%	16.0%	25.5%	16.0%	25.6%	16.0%	13% - 25%
Domestic Equity	18.9%	25.0%	19.0%	25.0%	18.9%	25.0%	19.0%	25.0%	17% - 32%
Real Return & Opportunistic	13.6%	12.5%	13.7%	12.5%	13.7%	12.5%	13.7%	12.5%	8% - 18%
International Equity	13.4%	15.0%	13.4%	15.0%	13.4%	15.0%	13.5%	15.0%	12% - 22%
Real Estate & Infrastructure	9.9%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	8% - 18%
Long Term Fixed Income	9.4%	10.5%	9.5%	10.5%	9.5%	10.5%	9.5%	10.5%	8% - 18%
Absolute Return	7.9%	9.0%	7.9%	9.0%	7.9%	9.0%	8.0%	9.0%	5% - 11%
Short Term Fixed Income	1.5%	2.0%	1.0%	2.0%	1.1%	2.0%	0.7%	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

September 22, 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	12.6%	25.0%	18.0%
International Equity	9.7%	20.5%	4.9%
Real Ret/Opportunistic	10.2%	14.8%	7.5%
Domestic Equity	8.7%	17.5%	12.8%
Real Estate	9.3%	20.0%	8.3%
Absolute Return	7.6%	9.0%	3.9%
Long-Term Fixed Income	4.0%	4.0%	1.5%
Short-Term	3.3%	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.

- The repricing happening within the fixed income market is remarkable. During the month of June 2022, the 10-year U.S. Treasury rate hit a high mark of 3.48%. This is the highest level since 2011. Coinciding with the high in long-term rates, the benchmark U.S. Aggregate index yield to maturity hit a high level of 4.14%. This is the highest yield since August 2009.
- During the June 2022 quarter, the U.S. Federal Reserve Board increased the policy interest rate twice by a combined 125 basis points. Market prices at the end of the quarter suggested the Fed would hike an additional 200 basis points over the next year and a half.
- 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.
- An additional complication 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 has jumped 33% since the conflict began. Also, China's Covid-19 mitigation policies have had an impact on shipping.
- Fed policy remains ultra-accommodative, and the attention has turned towards inflation. The June 2022 reading for non-seasonally adjusted year-over-year CPI was 9.1% which is the highest reading since 1981. For comparison, the 20-year average for CPI is 2.3%.

U.S. Fixed Income

Repricing within the fixed income markets

- The repricing happening within the fixed income market is remarkable. During the month of June 2022, the 10-year U.S. Treasury rate hit a high mark of 3.48%. This is the highest level since 2011. Coinciding with the high in long-term rates, the benchmark U.S. Aggregate index yield to maturity hit a high level of 4.14%. This is the highest yield since August 2009.
- During the June 2022 quarter, the U.S. Federal Reserve Board increased the policy interest rate twice by a combined 125 basis points. Market prices at the end of the quarter suggested the Fed would hike an additional 200 basis points over the next year and a half.
- 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 70 bps. High yield spreads have also widened over the past year; by approximately 300 bps. Both spreads are higher than long-term averages, reflecting investor's concerns that the U.S. economy could be soon headed into a recession.

Domestic Equity

Correction in domestic equity prices.

- The broad U.S. stock market return for the one year ending June 2022 was -11%. Most of the loss occurred in the first six months of 2022, and within the month of June the S&P 500 hit a correction level of more than -20%. A decline in the market more than 20% is sometimes referred to as a bear market.
- With the correction in prices, many valuation metrics are near historical averages; however, still on the higher end. The concern is that the risk of a potential recession may not be fully priced in.
- 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 June 2022 by -8.4%. Over the past three, five, seven, and ten years, the international market index, MSCI ACWI ex USA, underperformed the S&P 1500 index by -8.9%, -8.4%, -7.9%, and -8.0% annualized, respectively.
- Within international equities, emerging market returns underperformed developed markets over the past one, three, five, seven, and ten years by -8.5%, -1.1%, -0.5%, -0.2% and -2.3% annualized, respectively.

- 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 June 2022, the NAREIT index decreased by -5.9% including dividends which was -34% 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 June 2022 were estimated to be around 3.1%, 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.

- Fed policy remains ultra-accommodative, and the attention has turned towards inflation. The June 2022 reading for non-seasonally adjusted year-over-year CPI was 9.1% which is the highest reading since 1981. 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 36% over the 12-month period ending June 2022. The price for crude oil was up 42% year-over-year and ended June 2022 at \$106 per barrel.
- An additional complication 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 has jumped 33% since the conflict began. Also, China's Covid-19 mitigation policies have had an impact on shipping.

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 ↑ ↓ Worst	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 ↑ ↓ Worst
	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	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	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%	
4	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	
	-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%	

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

RESOLUTION

State of Michigan Investment Board Meeting

September 22, 2022



Jon M. Braeutigam
Chief Investment Officer
Bureau of Investments

STATE OF MICHIGAN INVESTMENT BOARD
RESOLUTION AUTHORIZING ASSET ALLOCATION STRATEGY

Resolution 2022-2

WHEREAS, the State of Michigan Investment Board (the “Board”) pursuant to Executive Order 2018-10 (the “Order”) and the Investment Policy Statement approved by the Board, is required to approve asset allocation targets and ranges with respect to the investment of the assets of the State of Michigan’s defined benefit retirement systems (the “DB Plans”);

WHEREAS, the Board previously approved an asset allocation at its meeting on June 11, 2020 in Resolution 2020-2 (the “Existing Allocation”);

WHEREAS, the Board has received an asset liability study presentation by consultant Aon, describing the process used to estimate expected returns and anticipated plan liabilities;

WHEREAS, the Board has reviewed an adjusted target asset allocation submitted to it by the Department of Treasury’s Bureau of Investments (the “BOI”) and attached hereto as Exhibit A (the “Asset Allocation Strategy”); and

WHEREAS, the Asset Allocation Strategy is intended to supersede and replace, in all respects, the Existing Allocation.

NOW, THEREFORE, BE IT RESOLVED, the Board adopts the Asset Allocation Strategy and the Proposed Asset Allocation Targets, Ranges and Benchmarks described therein, which fully replaces and supersedes the Existing Allocation.

Ayes:

Nays:

Recused:

East Lansing, Michigan

September 22, 2022

State of Michigan Investment Board

Asset Allocation Targets with Ranges^{1, 2}

As of 06/30/22

Asset Class	Weights			Current Asset Allocation Ranges	Proposed Asset Allocation Ranges
	Actual	Current Target	New Target		
Domestic Equity <i>S&P Composite 1500 Index</i>	18.9%	25.0%	25.0%	17% - 32%	17% - 32%
Private Equity <i>S&P 500 Index + 300 bps</i>	25.4%	16.0%	16.0%	13% - 25%	13% - 27%
International Equity <i>MSCI ACWI ex USA Index</i>	13.4%	15.0%	15.0%	12% - 22%	12% - 22%
Real Return & Opportunistic <i>Custom³</i>	13.6%	12.5%	10.0%	8% - 18%	8% - 18%
Long Term Fixed Income <i>Bloomberg U.S. Aggregate Bond Index</i>	9.4%	10.5%	13.0%	8% - 18%	8% - 18%
Real Estate & Infrastructure <i>Custom⁴</i>	10.0%	10.0%	10.0%	8% - 18%	8% - 18%
Absolute Return <i>HFRI Fund of Funds Conservative Index</i>	7.9%	9.0%	9.0%	5% - 11%	5% - 11%
Short Term Fixed Income <i>30-Day U.S. Treasury Bill</i>	1.4%	2.0%	2.0%	1% - 8%	1% - 8%
TOTAL	100.0%	100.0%	100.0%		

¹ Information in this table is based upon an asset liability study performed by Aon and presented at the State of Michigan Investment Board's September 22, 2022 quarterly meeting.

² Allocation and ranges are applicable to all component units of the State of Michigan Retirement System.

³ The custom benchmark is composed of 50% (CPI + 4%) and 50% (actuarial rate).

⁴ The custom benchmark consists of NCREIF Property Index less 130 basis points.

State of Michigan Retirement System

FIXED INCOME REVIEW

State of Michigan Investment Board Meeting
September 22, 2022



Daniel J. Quigley
Senior Investment Manager
Fixed Income Division

EXECUTIVE SUMMARY

Performance

MPSERS Plan (6/30/22)	1-Year	3-Years	5-Years	7-Years	10-Years
Annualized Returns	-8.1%	0.2%	2.0%	2.8%	2.9%
Bloomberg Barclays US Agg	-10.3%	-0.9%	0.9%	1.4%	1.5%
Peer Median Returns	-10.5%	-0.4%	1.3%	1.9%	2.2%
Percentile Rank vs. Peers*	27	20	12	15	18

*State Street Universe greater than \$1 billion

- The fixed income portfolio outperformed its benchmark and peer group across all time periods. Recent outperformance was driven by maintaining a shorter interest rate duration than the benchmark during a rising rate environment. The portfolio also benefitted from 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. Investment Grade Corporate bonds were the worst performing component of the index with a one-year return of -14.4%, driven by rate increases and credit spread widening. U.S. Treasuries and RMBS also had negative performance, returning -9.1% and -8.8% respectively on a one-year basis.
- 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 -4.1% on a year-over-year (YOY) basis, outperforming the index by over 600 basis points (bp).
- The portfolio's allocation to High Yield (HY) credit also helped performance. This portion of the portfolio had a YOY performance of -9.7%, outperforming the index by 60 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 5.3% versus a benchmark yield of 3.7%. 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 June 30, 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 70.1%. This includes a 28.9% allocation to U.S. Treasuries, TIPS, and cash.

- Plus: The portfolio maintains a strategic out-of-benchmark allocation to HY 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 29.9% as of June 30, 2022.

Tactical Update

- The allocation to securitized credit, primarily in CMBS, ABS, non-agency RMBS, and CLO securities, was 20.5% 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 HY strategies was 4.0% 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 -10.0%, outperforming the core index by roughly 25 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 16% 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 and experienced some inversion across the curve. The spread between 2-year and 10-year U.S. Treasury Notes decreased by 42 bp for the quarter, ending June at -42 bp. This has been driven primarily by a 205 bp increase on the 2-year U.S. Treasury yield on a YOY basis as the Federal Reserve has started an aggressive tightening cycle to fight high inflation pressures.
- Inflation expectations decreased during the quarter with ten-year breakeven inflation ending the quarter at 2.44%, dropping by 40bp during the quarter. This is approximately 30 bp above the 5-year average for this metric.
- Credit markets were down during the quarter as investment grade (IG) and HY spreads widened. IG spreads increased by 39 bp during the quarter, ending the period at 155 bp. HY spreads ended the quarter at 569 bp, 300 bp higher on a YOY basis. IG spreads are higher than their 5-year moving average of 113 bp.
- Emerging Markets (EM) credit spreads ended the quarter at 407 bp after widening by 87 bp for the quarter. EM spreads have increased by 138 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

6/30/22

Characteristic	Portfolio	Benchmark
Average Maturity (Yrs)	8.7	8.6
Duration (Yrs)	5.9	6.4
Spread Duration (Yrs)	6.5	6.4
Coupon (%)	3.1	2.5
Yield to Maturity (%)	5.3	3.7
Credit Rating	A	AA
VaR (%)	8.1	9.5
Tracking Error (%)	3.1	NA
Beta (vs S&P 500)	0.09	0.02

Commentary

Objectives

Income:

Liquidity:

Principal Preservation:

Diversification:

Highlights

The coupon of the portfolio is approximately 60 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.

28.9% of the portfolio is invested in cash, U.S. Treasuries, and TIPS. These investments can be liquidated via same-day trading.

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

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 Strategy

6/30/22

	Amount	Total	% of Total
Core (\$ in Millions)			
FID Internal	\$4,409		
PIMCO Mortgage Fund	540		
TCW Core Plus	403		
PGIM Investment Grade Credit	199		
Total Core		\$5,551	63.0%
Tactical			
Fidelity Tactical	\$475		
Guggenheim Core Plus	\$387		
Total Tactical		\$862	9.8%
Securitized Debt			
TICP CLO Debt	\$688		
Met West Securitized Ops	632		
Principal CMBS	424		
Napier Park ABS Income	43		
Napier Park Strategic Loan	24		
Total Securitized Debt		\$1,810	20.5%
High Yield			
PGIM High Yield	\$316		
Crescent Direct Lending	35		
Total High Yield		\$350	4.0%
Global			
T. Rowe Global Multi-Sector	\$239		
Total Global		\$239	2.7%

TOTAL

\$8,813

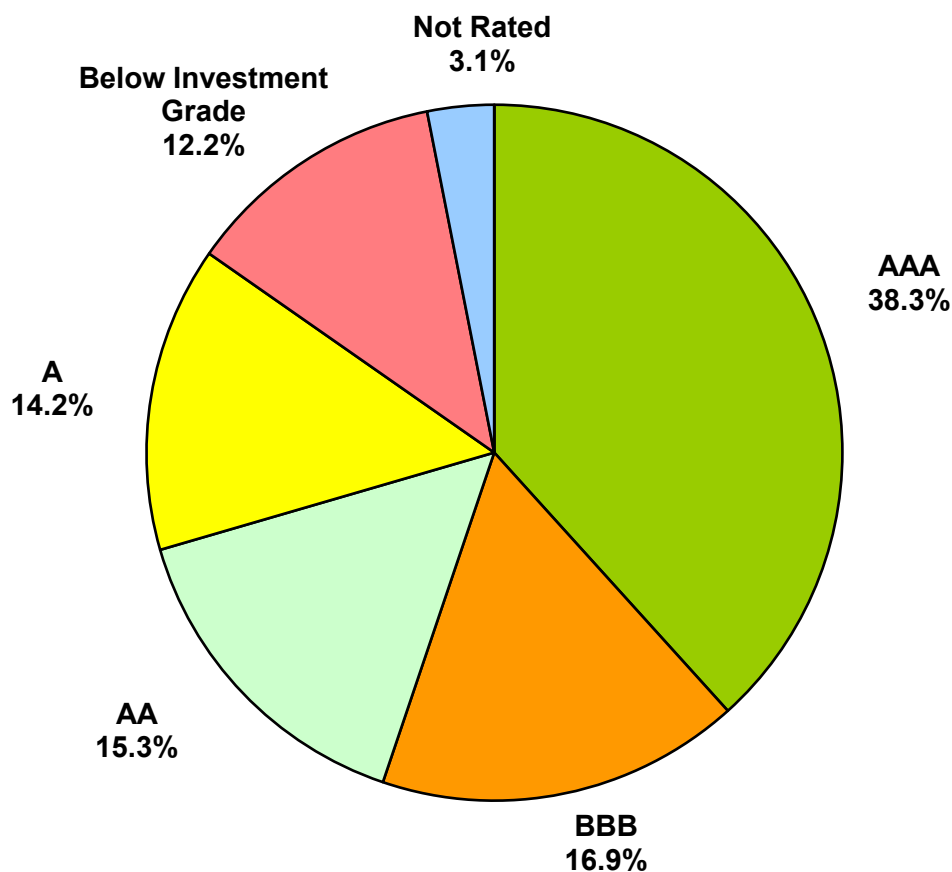
100.0%

NOTE: Totals may not be exact due to rounding.

SMRS

Fixed Income By Rating

6/30/22



Market Value in Millions				
6/30/22				
	Assets	Percent	Benchmark	Difference
AAA	\$3,376	38.3%	71.7%	-33.4%
AA	1,350	15.3%	2.3%	13.0%
A	1,248	14.2%	10.6%	3.6%
BBB	1,487	16.9%	12.3%	4.6%
* Below Investment Grade	1,076	12.2%	0.3%	11.9%
Not Rated	276	3.1%	2.8%	0.3%
Total Investments	\$8,813	100.0%	100.0%	

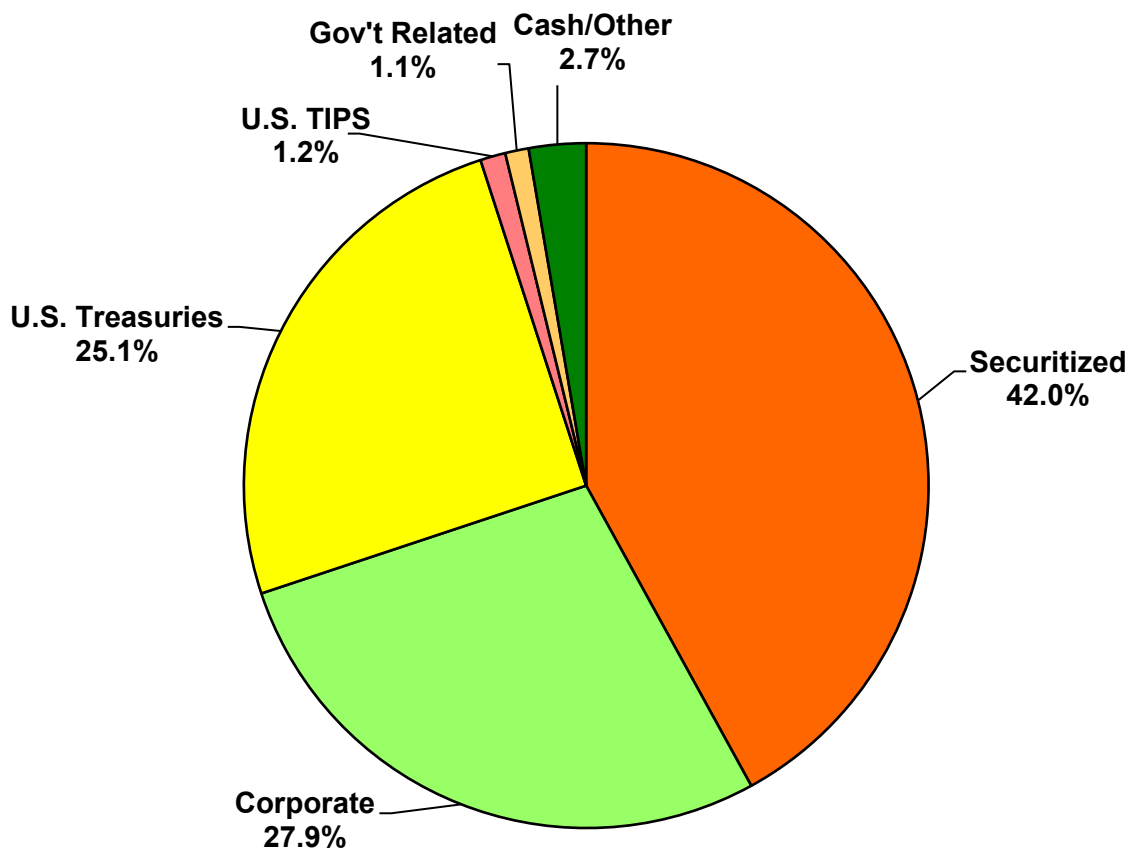
* Comprised of approximately 6.5% High Yield Credit and 5.7% High Yield RMBS/ABS

Benchmark: Barclays US Aggregate

SMRS

Fixed Income By Asset Type

6/30/22



Market Value in Millions				
6/30/22				
	Assets	Percent	Benchmark	Difference
Securitized	\$3,697	42.0%	30.2%	11.8%
Corporate	2,463	27.9%	24.0%	3.9%
U.S. Treasuries	2,212	25.1%	40.5%	-15.4%
U.S. TIPS	107	1.2%	0.0%	1.2%
Government Related	95	1.1%	5.3%	-4.2%
Cash/Other	239	2.7%	0.0%	2.7%
Total Investments	\$8,813	100.0%	100.0%	

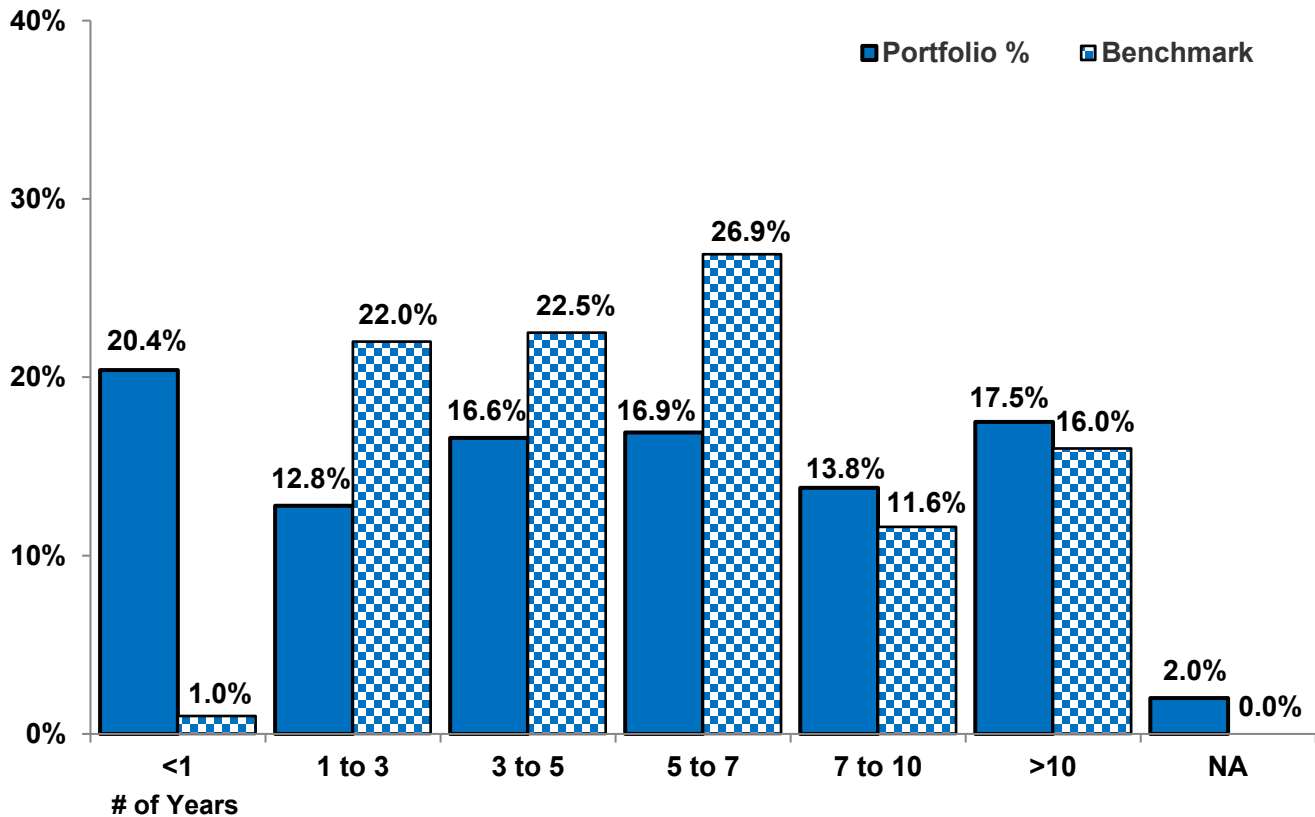
Benchmark: Barclays US Aggregate

SMRS

Duration Distribution

Fixed Income Composite Versus Benchmark

6/30/22



Source: Factset

Market Value in Millions					
Duration	Assets	Portfolio Weight	Benchmark Weight	Portfolio Duration*	Benchmark Duration*
<1	\$1,798	20.4%	1.0%	-0.1	1.0
1 to 3	1,127	12.8%	22.0%	2.2	2.0
3 to 5	1,458	16.6%	22.5%	4.1	4.1
5 to 7	1,488	16.9%	26.9%	6.2	6.1
7 to 10	1,220	13.8%	11.6%	8.0	7.8
>10	1,543	17.5%	16.0%	16.6	15.6
NA	179	2.0%	0.0%	NA	NA
Total	\$8,813	100.0%	100.0%	6.0	6.4

* Effective Duration

Benchmark: Barclays US Aggregate

Total Fixed Income Performance - Net of Fees (MPSEERS)

6/30/22

	<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	\$8,813,070,721	-8.25%	-0.05%	1.82%	2.58%	2.67%
<i>Bloomberg Aggregate Bond Index</i>	<i>N/A</i>	<i>-10.29%</i>	<i>-0.93%</i>	<i>0.88%</i>	<i>1.42%</i>	<i>1.54%</i>
Internal Core Fixed Income	\$4,409,251,139	-9.17%	-0.32%	1.68%	2.35%	2.38%
Externally Managed Fixed Income	\$4,403,819,582	-7.05%	0.19%	1.97%	2.85%	3.03%
External Core Fixed Income	1,329,221,242	-9.00%	-1.26%	0.53%	1.45%	1.78%
PIMCO Mortgage Fund	539,545,308	-9.00%	-1.26%			
Guggenheim Core Plus	386,590,123	NA				
TCW Core Plus	403,085,811	NA				
<i>Bloomberg US MBS Agy Fixed Indx</i>	<i>N/A</i>	<i>-9.03%</i>	<i>-1.44%</i>			
Investment Grade Credit	\$199,222,574	-14.31%	-0.43%	1.61%	2.68%	2.96%
PGIM Investment Grade	199,222,574	-14.31%	-0.43%	1.61%	2.68%	3.02%
<i>Bloomberg Credit Index</i>	<i>N/A</i>	<i>-13.64%</i>	<i>-1.00%</i>	<i>1.24%</i>	<i>2.21%</i>	<i>2.45%</i>
Tactical Fixed Income	\$475,264,860	-8.56%	1.21%	2.59%	3.00%	5.05%
Fidelity Tactical Bond Fund	475,264,860	-9.77%	0.85%	257.00%	3.24%	
<i>Bloomberg Aggregate Bond Index</i>	<i>N/A</i>	<i>-10.29%</i>	<i>-0.93%</i>	<i>0.88%</i>	<i>1.42%</i>	<i>1.54%</i>
High Yield Fixed Income	\$350,468,692	-10.04%	1.39%	2.90%	4.01%	
PGIM High Yield	315,743,467	-11.96%	1.50%	3.15%	4.22%	
Crescent Direct Lending	34,725,226	5.72%	6.34%			
<i>Bloomberg US HY BA/B 1% Cap</i>	<i>N/A</i>	<i>-12.40%</i>	<i>0.23%</i>	<i>2.19%</i>	<i>3.34%</i>	
Structured Fixed Income	\$1,810,268,049	-4.57%	0.21%	2.12%		
TICP CLO Debt	687,927,539	-4.73%	3.34%	3.21%		
MetWest Securitized Opportunities	632,068,000	-5.21%	0.77%	2.37%	2.86%	
Principal CMBS	423,612,770	-9.17%	-0.74%	2.03%	2.55%	5.06%
Napier Park ABS Income	42,658,372	13.96%	11.66%	10.50%	10.35%	
Napier Park Strategic Loan LP	24,001,356	9.25%	4.76%	5.42%		
<i>Bloomberg Aggregate Bond Index</i>	<i>N/A</i>	<i>-10.29%</i>	<i>-0.93%</i>	<i>0.88%</i>	<i>1.42%</i>	<i>1.54%</i>
<i>Blended CMBS Benchmark</i>	<i>N/A</i>	<i>-8.90%</i>	<i>-0.22%</i>	<i>1.60%</i>	<i>2.31%</i>	<i>2.87%</i>
Global Fixed Income	\$239,374,165	-9.95%	-0.57%	1.22%		
T. Rowe Global Multi-Sector	239,374,165	-9.95%	-0.29%	1.56%		
<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

September 22, 2022



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

EXECUTIVE SUMMARY

Performance

MPSERS Plan (06/30/22)	1-Year	3-Years	5-Years	7-Years	10-Years
Annualized Returns	-22.0%	1.9%	2.9%	3.5%	5.7%
MSCI ACWI ex USA Returns	-19.4%	1.4%	2.5%	2.9%	4.9%
Peer Median Returns	-18.5%	2.0%	3.2%	3.6%	5.8%
Percentile Rank vs. Peers*	78	56	67	54	73

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

- The portfolio underperformed the benchmark by 2.6% over the last twelve months.
- The underperformance was driven by the volatility factor, momentum factor, energy sector, and financial 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 1.5%, 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 13.6% 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 \$0.8 billion of equity swaps to match the division's long-term equity factor strategy.

Market Environment and Outlook

Market Performance

- International stock markets were down -18.4% 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 outperformed the MSCI ACWI ex USA by 4.2%. The momentum factor and quality factor continued to lag, underperforming the benchmark -3.9% and -4.7% respectively. IED's core strategy remains balanced and consistent, however, the strategy is currently underperforming the division's benchmark by -0.8% year-to-date.
- Emerging markets underperformed the MSCI ACWI ex USA by -5.9% over the last year. Developed markets outperformed the broader index by 2.7%.
- The U.S. dollar year-to-date has had an exceptionally strong year up 9.3% through June.
- Despite the recent decline in commodities, they remain up 18.0% through June of this year. Oil, a key driver, is up 40.6% year-to-date with copper, and gold declining -16.9% and -1.2%.
- Global government interest rates (index weighted) remain subdued, at approximately 2.6%. 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 25.0% year-over-year, down from the peak of 53.4%.
- Europe's top-line sales and earnings expanded year-over-year by 3.4% and 34.6%. Forward-looking sales and earnings per share are expected to be up over the next 12 months, 3.8% and 4.2% respectively.
- Japan's sales per share declined by -4.0% year-over-year. Earnings per share were above average, growing at 20.8% year-over-year. Forward-looking sales and earnings growth are forecasted at -1.9% and 2.5%.
- 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 especially as the central banks have tightened financial conditions.

- 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. Price increases have begun to moderate in both consumers' and producers' expectations but remain well above central banks' inflation targets.
- 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 the MSCI ACWI ex USA index earnings per share growth is 3.6% down from the 5.7% in March of 2022.
- Go-forward returns for the MSCI ACWI ex USA index on an annualized basis are estimated at 8.7%. 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 2.6% implies an international equity risk premium of 6.1%. The equity risk premium contracted by 0.3% 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 3.6% 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 8.7% is still a widespread 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

6/30/22

Markets	Amount	Total	% of Total
Active (\$ in Millions)			
BlackRock MSCI	\$2,168		
IED Quality Equity	872		
Martin Currie	405		
UBS	175		
Wellington	160		
WCM	137		
Brown	100		
Baillie Gifford	90		
Vontobel	88		
Morgan Stanley	71		
Baron	46		
Total Active***		\$4,646	37.1%
Stock Plus			
Internal	\$2,995		
PIMCO	1,944		
Total Stock Plus		\$4,939	39.5%
Indexed			
SSGA	\$1,527		
BlackRock	1,407		
Total Indexed		\$2,934	23.4%

TOTAL

\$12,519

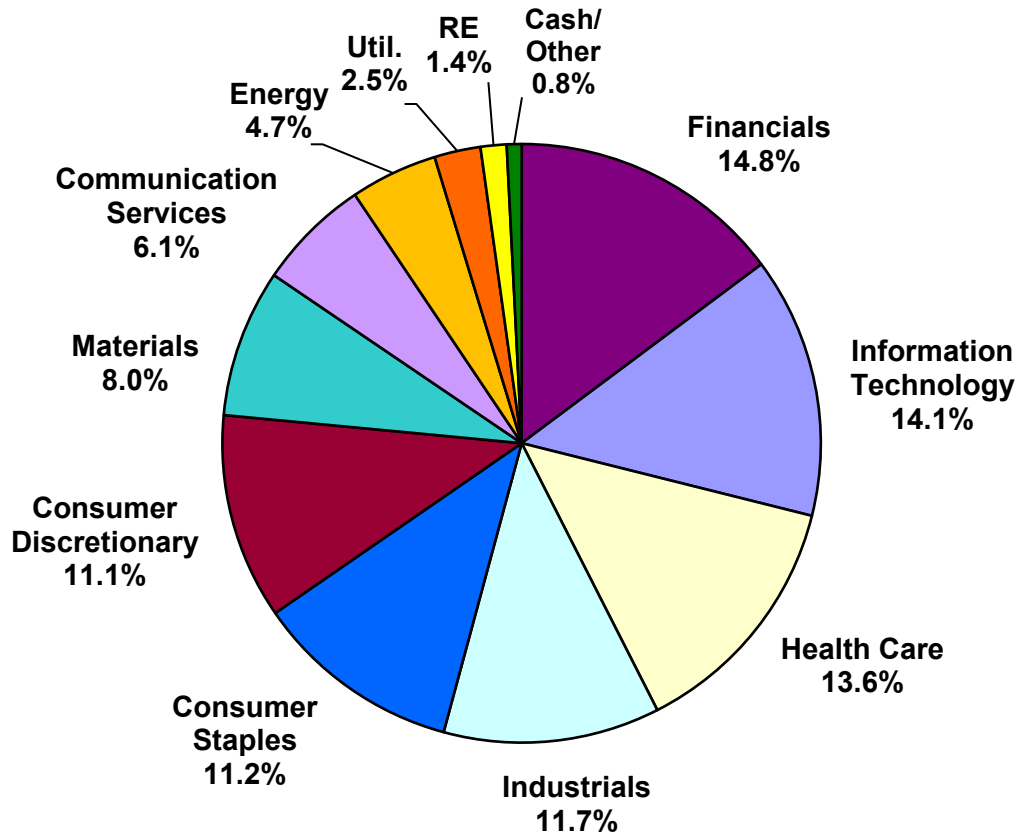
100.0%

***Adjusted for redeemed accounts held in cash accounts, \$333m

SMRS

International Equity By Sector

6/30/22



Market Value in Millions				
6/30/22				
	Assets	Percent	Benchmark	Difference
Financials	\$1,854	14.8%	20.1%	-5.3%
Information Technology	1,766	14.1%	11.5%	2.6%
Health Care	1,704	13.6%	9.5%	4.1%
Industrials	1,460	11.7%	12.4%	-0.7%
Consumer Staples	1,400	11.2%	9.1%	2.1%
Consumer Discretionary	1,387	11.1%	11.7%	-0.6%
Materials	1,007	8.0%	7.8%	0.2%
Communication Services	769	6.1%	6.2%	-0.1%
Energy	592	4.7%	5.9%	-1.2%
Utilities	307	2.5%	3.4%	-0.9%
Real Estate	178	1.4%	2.4%	-1.0%
Total Investments	\$12,424	99.2%	100.0%	
Cash/Other	95	0.8%	0.0%	0.8%
Total	\$12,519	100.0%	100.0%	

Benchmark: MSCI ACWI ex USA

SMRS

International Equities

6/30/22

Date:	<u>6/31/22</u>	<u>3/31/22</u>	<u>12/31/21</u>	<u>9/30/21</u>
Assets (\$ in Millions):	\$12,519	\$14,699	\$15,899	\$15,538
Number of Securities:	2,432	2,467	2,506	2,639
Active Share:	34%	34%	32%	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	12.3%	10.0%	10.2%	8.7%
Sustainable Growth Rate	7.4%	6.5%	6.5%	6.1%
Dividend Yield	3.0%	2.5%	2.7%	2.5%
Buyback Yield	1.2%	0.3%	0.9%	0.2%
Collateral Yield	0.7%	0.7%	--	--
Risk:				
Beta	1.01	--	1.00	--
Volatility	17.3%	--	17.2%	--
Tracking Error	1.5%	--	0.0%	--
Information Ratio	1.4	0.9	--	--
Fundamental:				
Average Capitalization (\$ in Billions)	91.7	--	78.2	--
Price/Earnings	11.5	15.7	13.2	17.0
Price/Book	1.6	1.8	1.7	1.9
ROE	14.2%	11.7%	12.7%	11.1%

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	2.1%	\$193.7	27.8	\$260.6
Nestle S.A.	2.0%	320.1	23.6	256.6
Taiwan Semiconductor Manufacturing Co., Ltd.	1.6%	415.1	14.2	205.7
Roche Holding Ltd. Dividend Right Cert	1.6%	274.8	15.4	196.5
Novo Nordisk A/S Class B	1.5%	192.8	33.0	193.0
Tencent Holdings Ltd.	1.5%	434.6	24.6	187.7
Samsung Electronics Co., Ltd.	1.2%	295.0	8.3	145.0
Novartis AG	1.1%	203.0	13.8	142.0
LVMH Moet Hennessy Louis Vuitton SE	1.1%	307.0	21.2	133.1
BHP Group, Ltd.	<u>1.0%</u>	<u>143.6</u>	6.5	<u>122.5</u>
TOTAL	<u>14.7%</u>	<u>\$2,779.8</u>		<u>\$1,842.7</u>

International Equity Performance - Net of Fees

6/30/22

<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	\$12,519,090,730	-22.0%	1.9%	2.9%	3.5%	5.4%	1/1/04
MSCI ACWI ex USA		-19.4%	1.4%	2.5%	2.9%	5.2%	
Lipper International Multi-Cap Core		-17.8%	1.5%	2.3%	2.9%	4.8%	
<i>Excess Return</i>		-2.6%	0.5%	0.4%	0.6%	0.2%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		94	43	27	33	34	

Total International Active Strategy***	\$4,333,718,803	-24.9%	1.4%	2.3%	3.0%	4.5%	5/1/05
MSCI ACWI ex USA		-19.4%	1.4%	2.5%	2.9%	4.8%	
Lipper International Multi-Cap Core		-17.8%	1.5%	2.3%	2.9%	4.3%	
<i>Excess Return</i>		-5.4%	0.1%	-0.2%	0.0%	-0.2%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		98	69	70	66	58	
BlackRock MSCI Systematic Return	2,167,968,921	-19.6%	3.9%	--	--	5.9%	12/1/18
MSCI ACWI ex USA		-19.4%	1.4%	--	--	3.4%	
Lipper International Multi-Cap Core		-17.8%	1.5%	--	--	3.4%	
<i>Excess Return</i>		-0.2%	2.6%	--	--	2.5%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		74	7	--	--	7	
IED Quality Equity*	\$872,221,759	-25.7%	--	--	--	1.4%	2/1/20
MSCI ACWI ex USA		-19.4%	--	--	--	0.0%	
Lipper International Multi-Cap Core		-17.8%	--	--	--	0.1%	
<i>Excess Return</i>		-6.3%	--	--	--	1.4%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		99	--	--	--	17	
Martin Currie International Long-Term	\$404,638,903	-30.0%	3.3%	5.2%	--	7.5%	2/1/17
MSCI ACWI ex USA		-19.4%	1.4%	2.5%	--	4.2%	
Lipper International Multi-Cap Core		-17.8%	1.5%	2.3%	--	4.0%	
<i>Excess Return</i>		-10.6%	1.9%	2.7%	--	3.4%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		100	100	100	--	1	
UBS China A Opportunity Fund	174,991,108	-26.2%	--	--	--	5.5%	5/1/20
MSCI China On shore		-25.4%	--	--	--	13.0%	
Lipper Emerging Markets		-26.0%	--	--	--	6.0%	
<i>Excess Return</i>		-0.8%	--	--	--	-7.6%	
<i>Pct Rank vs. Lipper Emerging Markets</i>		58	--	--	--	73	
Wellington Select China Equity	159,881,256	-33.7%	--	--	--	11.2%	9/1/19
MSCI China On shore		-25.4%	--	--	--	5.6%	
Lipper Emerging Markets		-26.0%	--	--	--	1.2%	
<i>Excess Return</i>		-8.3%	--	--	--	5.6%	
<i>Pct Rank vs. Lipper Emerging Markets</i>		88	--	--	--	3	
WCM Focused Growth International	137,066,792	--	--	--	--	-26.9%	10/1/21
MSCI ACWI ex USA		--	--	--	--	-16.9%	
Lipper International Large-Cap Core		--	--	--	--	-16.3%	
<i>Excess Return</i>		--	--	--	--	-9.9%	
<i>Pct Rank vs. Lipper International Large-Cap Core</i>		--	--	--	--	100	
Brown Capital Intl. Small Company Fund	99,700,908	--	--	--	--	-19.2%	3/1/22
MSCI ACWI Index		--	--	--	--	-13.6%	
Lipper International Large-Cap Core		--	--	--	--	-13.0%	
<i>Excess Return</i>		--	--	--	--	-5.6%	
<i>Pct Rank vs. Lipper International Large-Cap Core</i>		--	--	--	--	0	

<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	89,725,615	--	--	--	--	-44.0%	12/1/21
MSCI ACWI ex USA		--	--	--	--	-15.0%	
Lipper International Large-Cap Core		--	--	--	--	-14.7%	
<i>Excess Return</i>		--	--	--	--	-29.0%	
<i>Pct Rank vs. Lipper International Large-Cap Core</i>		--	--	--	--	0	
Vontobel International Quality Growth Fund	88,375,232	--	--	--	--	-9.7%	5/1/22
MSCI ACWI ex-USD Index		--	--	--	--	-7.9%	
Lipper International Large-Cap Core		--	--	--	--	-7.4%	
<i>Excess Return</i>		--	--	--	--	-1.7%	
<i>Pct Rank vs. Lipper International Large-Cap Core</i>		--	--	--	--	0	
Morgan Stanley Intl Opportunity Fund	70,896,861	--	--	--	--	36.7%	2/1/22
MSCI ACWI Index		--	--	--	--	-15.3%	
Lipper International Large-Cap Core		--	--	--	--	-15.4%	
<i>Excess Return</i>		--	--	--	--	52.0%	
<i>Pct Rank vs. Lipper International Large-Cap Core</i>		--	--	--	--	0	
Baron Global Advantage	46,422,000	--	--	--	--	-47.2%	1/1/22
MSCI ACWI Index		--	--	--	--	-18.4%	
Lipper International Large-Cap Core		--	--	--	--	-18.3%	
<i>Excess Return</i>		--	--	--	--	-28.8%	
<i>Pct Rank vs. Lipper International Large-Cap Core</i>		--	--	--	--	0	

***Adjusted for redeemed accounts held in cash accounts, \$333m

Total International Stock Plus Strategy**	\$4,938,914,922	-20.7%	2.4%	3.4%	4.0%	6.3%	1/1/09
MSCI ACWI ex USA		-19.4%	1.4%	2.5%	2.9%	6.1%	
Lipper International Multi-Cap Core		-17.8%	1.5%	2.3%	2.9%	6.2%	
<i>Excess Return</i>		-1.3%	1.0%	0.9%	1.1%	0.1%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		88	26	12	12	39	
Internal Stock Plus	2,995,180,370	-19.6%	1.9%	3.3%	3.2%	4.7%	9/1/11
MSCI ACWI ex USA		-19.4%	1.4%	2.5%	2.9%	3.9%	
Lipper International Multi-Cap Core		-17.8%	1.5%	2.3%	2.9%	4.7%	
<i>Excess Return</i>		-0.2%	0.5%	0.8%	0.3%	0.8%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		78	41	14	43	55	
PIMCO StocksPLUS	1,943,609,262	-22.5%	3.2%	--	--	3.8%	4/1/19
MSCI ACWI ex USA		-19.4%	1.4%	--	--	2.2%	
Lipper International Multi-Cap Core		-17.8%	1.5%	--	--	2.3%	
<i>Excess Return</i>		-3.0%	1.9%	--	--	1.7%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		95	13	--	--	15	

Total International Index Strategy	\$2,934,567,650	-19.1%	1.7%	3.3%	3.8%	6.4%	7/1/09
MSCI ACWI ex USA		-19.4%	1.4%	2.5%	2.9%	5.3%	
Lipper International Multi-Cap Core		-17.8%	1.5%	2.3%	2.9%	5.8%	
<i>Excess Return</i>		0.4%	0.3%	0.8%	0.9%	1.1%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		66	40	13	12	22	
SSGA MSCI ACWI ex USA Index	1,527,468,898	-19.2%	1.8%	--	--	1.3%	11/1/17
MSCI ACWI ex USA		-19.0%	1.8%	--	--	1.5%	
Lipper International Multi-Cap Core		-17.8%	1.5%	--	--	0.9%	
<i>Excess Return</i>		-0.1%	0.0%	--	--	-0.2%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		66	35	--	--	29	
Blackrock ACWI ex USA Index	1,407,098,752	-19.1%	1.6%	--	--	0.5%	3/1/18
MSCI ACWI ex USA		-19.0%	1.8%	--	--	0.7%	
Lipper International Multi-Cap Core		-17.8%	1.5%	--	--	0.4%	
<i>Excess Return</i>		0.0%	-0.2%	--	--	-0.2%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		66	43	--	--	46	

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

State of Michigan Retirement System

DOMESTIC EQUITY REVIEW

State of Michigan Investment Board Meeting
September 22, 2022



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

EXECUTIVE SUMMARY

Performance

MPSERS Plan (6/30/22)	1-Year	3-Years	5-Years	7-Years	10-Years
Annualized Returns	-16.6%	7.8%	10.2%	9.9%	12.4%
S&P 1500	-11.0%	10.3%	10.9%	10.8%	12.8%
Peer Median Return	-12.3%	8.0%	8.2%	8.1%	9.6%
Percentile Rank vs. Peers *	84	59	32	27	27

*State Street Universe greater than \$1 billion

- For the year ended June 30, 2022, the Domestic Equity Division underperformed its peer group and the S&P 1500 by 430 basis points (bps) and 560 bps respectively, with incurred tracking error of 1.9%. DED performed near the top quartile of peers over the past five, seven and ten years, while underperforming the S&P 1500.
- Energy, defensive and value stocks did well over the past year, while high beta, small-cap and momentum stocks, where DED was meaningfully overweight, all underperformed. The quality factor, which often moves together with growth stocks and where the division was slightly overweight, underperformed as well.
- The Disruptive Innovation space (typically smaller cap, and often linked to the momentum factor) continued to suffer disproportionate declines in value, negatively impacting the portfolio's one-year relative return by approximately 350 bps.
- We continue to believe our Disruptive Innovation portfolios are significantly underpriced, with excellent long term return potential. Our managers have excelled in this space for over 30 years and know how to successfully navigate cycles like these.
- Other high growth managers in the portfolio struggled over the past year as well but, like our Disruptive Innovation lineup, we believe they are talented, good at what they do, and that their portfolios will rebound and go on to outperform, as they have in the past.
- A handful of value managers in the portfolio performed well in the year ended June of 2022:
 - Attucks Asset Management, one of DED's emerging manager of managers, had a strong year, beating the S&P 1500 by over 400 bps, led by sub-managers Affinity Investment Advisors and Paradigm Asset Management.
 - Michigan's Seizert Capital Partners continued its run of solid performance, beating the S&P 1500 by over 350 bps on the year.
 - Managed Asset Portfolios, a new Michigan-based addition to our lineup that came up through our emerging manager program, beat the S&P 1500 by over 300 bps.

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's portfolio continues to maintain a beta of 1.06 and is significantly undervalued when measured against ours and outside analysts' estimates of fair value. It trades at nearly a 15% 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.
- Significant declines in year over year money supply measures also portend a more balanced inflationary environment over time.
- DED is overweight communication services and financials, highlighting the significant expected return opportunity that has presented itself in these sectors as the market has corrected in 2022. Portfolio underweights include consumer discretionary, consumer staples and real estate.

Market Environment and Outlook

- At ~16x forward earnings equity markets trade at an earnings yield (earnings/price) of roughly 6.25%, or ~325 bps higher than 10-year treasury bonds at ~3.0%, or ~33x earnings.
- Historically stocks have traded at an earnings yield approximately 125 bps higher than bonds, versus today's spread of over 300 bps, suggesting that the market is currently pricing in significant further downside in bond yields.
- Given such depressed bond yields relative to inflation and long-term normalized interest rate levels, the actions of the Federal Reserve to slow inflation and the significant correction in market valuations, stocks look attractive relative to bonds and bond-like asset classes in all but a 1970's style persistently highly inflationary environment.
- 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.
- Over time we expect the market to return roughly 9.6%, driven by a dividend yield of 1.6% and dividend per share growth of 8.0%
 - Dividend per share growth driven by nominal economic growth of 5% and further 3% growth driven by share buybacks from cash flow rich companies.

SMRS

Domestic Equity Strategies

6/30/22

Markets	Amount	Total	% of Total
Internal Indexed (\$ in Millions)			
Indexed Portfolios	\$9,734		
Total Indexed		\$9,734	55.2%
Internal Active			
Active Portfolios	\$5,001		
Total Internal Active		\$5,001	28.3%
External Active			
Los Angeles Capital	\$786		
Seizert Capital Partners	505		
Clarkston Capital Partners	450		
Martin Currie US LT Unconstrained	403		
ARK Investments	229		
Patient Capital	126		
Attucks Asset Management	123		
Bivium Capital	113		
Managed Asset Portfolios	93		
Ancora	89		
Total External Active		\$2,917	16.5%

Total Domestic Equity

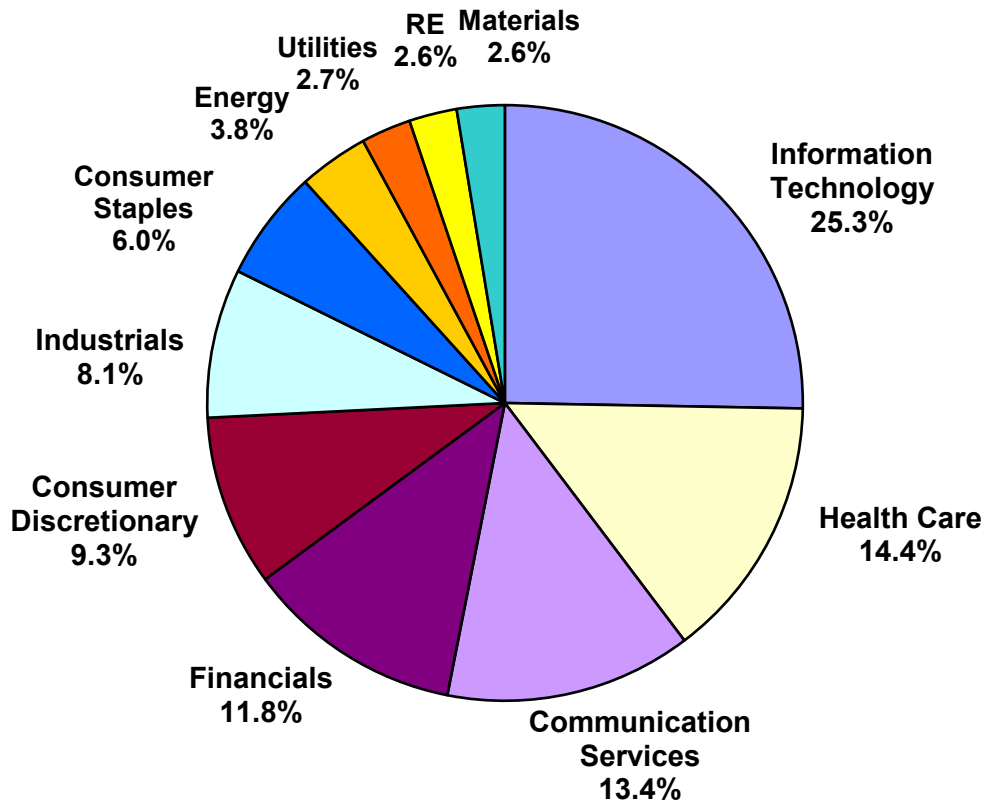
\$17,652

100.0%

SMRS

Domestic Equity By Sector

6/30/22



Market Value in Millions				
6/30/22				
	Assets	Percent	Benchmark	Difference
Information Technology	\$4,463	25.3%	25.7%	-0.4%
Health Care	2,545	14.4%	14.8%	-0.4%
Communication Services	2,362	13.4%	8.3%	5.1%
Financials	2,081	11.8%	11.3%	0.5%
Consumer Discretionary	1,650	9.3%	10.7%	-1.4%
Industrials	1,435	8.1%	8.6%	-0.5%
Consumer Staples	1,053	6.0%	6.8%	-0.8%
Energy	669	3.8%	4.4%	-0.6%
Utilities	480	2.7%	3.1%	-0.4%
Real Estate	461	2.6%	3.4%	-0.8%
Materials	453	2.6%	2.9%	-0.3%
Total	\$17,652	100.0%	100.0%	

Benchmark: S&P 1500

SMRS

Domestic Equities Composite

6/30/22

Date:	<u>6/30/22</u>	<u>3/31/22</u>	<u>12/31/21</u>	<u>9/30/21</u>
Assets (\$ in Millions):	\$17,652	\$22,354	\$23,894	\$21,958
Number of Securities:	1,856	3,023	3,030	2,992
Active Share:	28%	37%	30%	28%

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)	\$422.4	\$445.0
FY1 P/E	14.0	16.1
P/E upside to S&P 1500	15.3%	0.0
Return on Equity	22.8%	19.9%
Risk Metrics		
Beta	1.06	1.00
Tracking Error	3.0%	0.0%
Projected Returns		
Dividend Yield	1.9%	1.6%
Buyback Yield	3.5%	3.0%
Reinvestment Rate	<u>5.7%</u>	<u>5.0%</u>
Projected Investment Return	11.1%	9.6%

TOP TEN EXPOSURES – Domestic Equities vs S&P 1500

6/30/22

<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.	5.1%	Apple, Inc.	6.1%
Microsoft Corporation	5.0%	Microsoft Corporation	5.5%
Meta Platforms, Inc., Class A	3.2%	Amazon.com, Inc.	2.7%
Alphabet Inc., Class A	2.7%	Alphabet Inc., Class A	1.9%
AT&T, Inc.	2.5%	Alphabet Inc., Class C	1.7%
Amazon.com, Inc.	2.3%	Tesla, Inc.	1.6%
U.S. Dollar	2.3%	Berkshire Hathaway Inc., Class B	1.4%
Alphabet Inc., Class C	1.3%	UnitedHealth Group, Inc	1.4%
UnitedHealth Group, Inc.	1.3%	Johnson & Johnson	1.4%
NVIDIA Corporation	<u>1.3%</u>	NVIDIA Corporation	<u>1.1%</u>
TOTAL	<u>27.0%</u>	TOTAL	<u>24.8%</u>

Manager Performance - Net of Fees

6/30/22

<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	\$9,175,828,709	-10.7%	10.5%	11.3%	11.2%	--	N/A
S&P 500		-10.8%	10.6%	11.3%	11.1%	--	
Style & Risk Adjusted Benchmark		-10.6%	10.6%	11.3%	11.1%	--	
Lipper Large-Cap Core		-11.7%	9.7%	10.5%	10.1%	--	
Excess Return		-0.1%	-0.1%	0.0%	0.0%	--	
Alpha		-0.1%	0.0%	0.0%	0.1%	--	
Pct. Rank vs. Lipper Large-Cap Core		37	30	33	16	--	
SMRS Large-Cap Core	1,528,928,739	-10.4%	12.1%	13.5%	11.1%	9.4%	8/31/07
S&P 500		-10.6%	10.6%	11.3%	11.1%	8.8%	
Style & Risk Adjusted Benchmark		-6.6%	9.3%	7.9%	11.1%	7.5%	
Lipper Large-Cap Core		-11.7%	9.7%	10.5%	10.1%	8.3%	
Excess Return		0.2%	1.5%	2.2%	0.0%	0.5%	
Alpha		-3.9%	2.8%	5.7%	0.0%	1.9%	
Pct Rank vs Lipper Large-Cap Core		34	6	1	17	11	
SMRS All-Cap Garp	1,300,821,372	-15.3%	3.3%	5.6%	6.3%	10.1%	4/30/11
S&P 1500 Super Composite		-11.0%	10.3%	10.9%	10.8%	11.7%	
Style & Risk Adjusted Benchmark		-13.6%	10.8%	11.6%	11.3%	12.1%	
Lipper Multi-Cap Core		-13.4%	8.3%	8.9%	8.6%	9.7%	
Excess Return		-4.4%	-7.0%	-5.4%	-4.6%	-1.6%	
Alpha		-1.7%	-7.5%	-6.0%	-5.1%	-2.0%	
Pct. Rank vs. Lipper Multi-Cap Core		74	94	90	87	48	
LA Capital All-Cap Growth	786,444,558	-14.3%	8.0%	10.9%	11.3%	11.4%	5/31/05
S&P 1500 Growth		-16.7%	11.1%	12.9%	12.4%	10.5%	
Style & Risk Adjusted Benchmark		-14.9%	10.3%	11.8%	11.2%	8.6%	
Lipper Multi-Cap Growth		-29.9%	6.2%	10.0%	9.1%	9.1%	
Excess Return		2.4%	-3.1%	-2.0%	-1.2%	0.9%	
Alpha		0.6%	-2.2%	-1.0%	0.1%	2.9%	
Pct. Rank vs. Lipper Multi-Cap Growth		5	38	38	26	7	
Value, Quality, Momentum Composite	742,563,819	-15.4%	--	--	--	5.9%	10/1/20
S&P 1500		-11.0%	--	--	--	9.1%	
Style & Risk Adjusted Benchmark		-10.7%	--	--	--	9.3%	
Lipper Multi-Cap Core		-13.4%	--	--	--	7.7%	
Excess Return		-4.4%	--	--	--	-3.2%	
Alpha		-4.7%	--	--	--	-3.3%	
Pct. Rank vs. Lipper Multi-Cap Core		74	--	--	--	74	
SMRS Large-Cap Growth	717,202,735	-16.2%	11.9%	14.6%	12.1%	10.5%	5/31/05
S&P 500 Growth		-16.4%	11.6%	13.5%	12.9%	10.6%	
Style & Risk Adjusted Benchmark		-15.4%	10.7%	13.0%	12.6%	10.5%	
Lipper Large-Cap Growth		-23.6%	8.9%	11.7%	11.0%	9.8%	
Excess Return		0.2%	0.3%	1.1%	-0.8%	-0.1%	
Alpha		-0.8%	1.2%	1.6%	-0.5%	0.0%	
Pct Rank vs Lipper Large-Cap Growth		11	18	8	26	28	
SMRS Mid-Cap Index	558,308,143	-14.6%	6.8%	7.1%	8.1%	--	N/A
S&P 400		-14.6%	6.9%	7.0%	7.8%	--	
Style & Risk Adjusted Benchmark		-14.6%	6.8%	7.0%	7.7%	--	
Lipper Mid-Cap Core		-11.8%	6.9%	7.0%	7.0%	--	
Excess Return		0.0%	0.0%	0.1%	0.3%	--	
Alpha		-0.1%	0.0%	0.1%	0.4%	--	
Pct. Rank vs. Lipper Mid-Cap Core		71	48	47	23	--	
Seizert Capital Partners	505,289,048	-7.5%	11.6%	9.8%	9.7%	12.7%	11/30/09
S&P 1500 Value		-5.4%	8.2%	8.1%	8.5%	11.3%	
Style & Risk Adjusted Benchmark		-7.8%	8.1%	7.9%	8.4%	11.3%	
Lipper Multi-Cap Value		-6.6%	7.7%	7.3%	7.4%	10.2%	
Excess Return		-2.1%	3.4%	1.7%	1.3%	1.4%	
Alpha		0.3%	3.5%	1.9%	1.3%	1.4%	
Pct. Rank vs. Lipper Multi-Cap Value		68	7	10	8	3	

<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	461,274,245	-29.2%	1.4%	10.2%	9.2%	9.0%	3/1/15
S&P 500		-10.6%	10.6%	11.3%	11.1%	10.4%	
Style & Risk Adjusted Benchmark		-20.8%	12.7%	13.9%	13.2%	12.4%	
Lipper Large-Cap Core		-11.7%	9.7%	10.5%	10.1%	9.4%	
Excess Return		-18.6%	-9.2%	-1.1%	-1.9%	-1.4%	
Alpha		-8.3%	-11.4%	-3.7%	-4.0%	-3.3%	
Pct. Rank vs. Lipper Large-Cap Core		100	100	72	75	71	
Clarkston Capital Small/Mid-Cap	450,158,365	-9.3%	11.2%	9.9%	10.0%	10.9%	1/1/14
S&P 400		-15.3%	7.0%	7.1%	7.9%	8.0%	
Style & Risk Adjusted Benchmark		-4.7%	7.9%	7.2%	7.6%	6.3%	
Lipper Mid-Cap Core		-11.8%	6.9%	7.0%	7.0%	7.2%	
Excess Return		6.0%	4.2%	2.8%	2.1%	2.9%	
Alpha		-4.6%	3.4%	2.7%	2.4%	4.7%	
Pct. Rank vs. Lipper Mid-Cap Core		29	2	5	2	1	
Martin Currie	402,559,088	-33.5%	--	--	--	-8.7%	11/1/20
S&P 1500 Growth		-16.7%	--	--	--	5.5%	
Style & Risk Adjusted Benchmark		-19.4%	--	--	--	6.4%	
Lipper Multi-Cap Growth		-29.9%	--	--	--	-5.4%	
Excess Return		-16.8%	--	--	--	-14.2%	
Alpha		-14.0%	--	--	--	-15.1%	
Pct. Rank vs. Lipper Multi-Cap Growth		70	--	--	--	72	
Ark Investments	229,368,922	-71.3%	-12.3%	2.6%	--	9.4%	3/1/16
S&P 1500 Growth		-16.7%	11.1%	12.9%	--	14.6%	
Style & Risk Adjusted Benchmark		-19.4%	16.8%	20.1%	--	22.9%	
Lipper Multi-Cap Growth		-29.9%	6.2%	10.0%	--	12.2%	
Excess Return		-54.6%	-23.5%	-10.3%	--	-5.2%	
Alpha		-51.8%	-29.1%	-17.5%	--	-13.5%	
Pct. Rank vs. Lipper Multi-Cap Growth		100	99	96	--	88	
Patient Capital	125,582,174	--	--	--	--	-37.2%	10/1/21
S&P 1500 Value		--	--	--	--	-4.4%	
Style & Risk Adjusted Benchmark		--	--	--	--	7.5%	
Lipper Multi-Cap Value		--	--	--	--	-5.5%	
Excess Return		--	--	--	--	-32.8%	
Alpha		--	--	--	--	-29.8%	
Pct. Rank vs. Lipper Multi-Cap Value		--	--	--	--	100	
Attucks Asset Management	123,041,461	-6.9%	6.6%	7.6%	7.5%	6.6%	11/30/07
S&P 1500		-11.0%	10.3%	10.9%	10.8%	8.5%	
Style & Risk Adjusted Benchmark		-5.7%	8.0%	7.8%	8.2%	8.3%	
Lipper Multi-Cap Core		-13.4%	8.3%	8.9%	8.6%	6.9%	
Excess Return		4.2%	-3.6%	-3.3%	-3.4%	-1.8%	
Alpha		-1.2%	-1.4%	-0.2%	-0.7%	-1.7%	
Pct. Rank vs. Lipper Multi-Cap Core		11	77	78	78	61	
Disruptive Innovation Momentum	119,185,931	-68.0%	--	--	--	-24.6%	9/1/20
MSCI Momentum Index		-20.7%	--	--	--	-5.6%	
Style & Risk Adjusted Benchmark		-22.6%	--	--	--	13.6%	
Lipper Multi-Cap Growth		-29.9%	--	--	--	-7.3%	
Excess Return		-47.3%	--	--	--	-19.0%	
Alpha		-45.4%	--	--	--	-38.2%	
Pct. Rank vs. Lipper Multi-Cap Growth		100	--	--	--	93	

<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	113,285,766	-12.6%	4.0%	5.4%	5.4%	5.7%	11/30/07
S&P 1500 Value		-5.4%	8.2%	8.1%	8.5%	6.4%	
Style & Risk Adjusted Benchmark		-10.3%	10.0%	10.9%	10.9%	8.6%	
Lipper Multi-Cap Value		-6.6%	7.7%	7.3%	7.4%	6.0%	
<i>Excess Return</i>		-7.2%	-4.2%	-2.7%	-3.1%	-0.7%	
<i>Alpha</i>		-2.3%	-6.0%	-5.5%	-5.6%	-2.9%	
<i>Pct. Rank vs. Lipper Multi-Cap Value</i>		90	95	87	90	60	
Managed Asset Portfolios	93,401,480	-7.9%	6.7%	8.3%	--	11.0%	2/29/16
S&P 1500 Value		-5.4%	8.2%	8.1%	--	10.7%	
Style & Risk Adjusted Benchmark		-8.1%	6.9%	6.5%	--	10.2%	
Lipper Multi-Cap Value		-6.6%	7.7%	7.3%	--	9.9%	
<i>Excess Return</i>		-2.5%	-1.5%	0.3%	--	0.2%	
<i>Alpha</i>		0.1%	-0.2%	1.9%	--	0.8%	
<i>Pct. Rank vs. Lipper Multi-Cap Value</i>		70	69	27	--	22	
Ancora	88,634,628	-20.9%	5.5%	--	--	4.7%	10/1/17
S&P 1000		-15.3%	7.0%	--	--	6.6%	
Style & Risk Adjusted Benchmark		-8.3%	7.3%	--	--	6.3%	
Lipper Mid-Cap Core		-11.8%	6.9%	--	--	6.6%	
<i>Excess Return</i>		-5.6%	-1.5%	--	--	-1.8%	
<i>Alpha</i>		-12.6%	-1.8%	--	--	-1.5%	
<i>Pct. Rank vs. Lipper Mid-Cap Core</i>		98	78	--	--	88	
All-Cap Core	--	--	--	--	--	-8.3%	
S&P 1500		--	--	--	--	-8.1%	
Lipper Multi-Cap Core		--	--	--	--	-7.9%	
<i>Excess Return</i>		--	--	--	--	-0.2%	
<i>Alpha</i>		--	--	--	--	N/A	
<i>Pct. Rank vs. Lipper Multi-Cap Core</i>		--	--	--	--	N/A	

State of Michigan Retirement System

ABSOLUTE RETURN REVIEW

State of Michigan Investment Board Meeting
September 22, 2022



Daniel J. Quigley
Senior Investment Manager
Absolute Return Strategy

EXECUTIVE SUMMARY

Performance

MPSERS Plan (6/30/22)	1-Year	3-Years	5-Years	7-Years	10-Years
Absolute Return	6.6%	8.3%	6.8%	5.3%	6.2%
HFRI FOF Conservative	1.6%	5.3%	4.2%	3.2%	3.9%

- The value of the Absolute Return portfolio is \$7.4 billion with a one-year return of 6.6%. The portfolio performance was negative for the second quarter against a challenging market backdrop, as manager selection and exposure to equities detracted. Diversifying, Multi-Strategy/Event and Credit were flat, with mixed returns across managers.
- Equities were the largest detractor to the portfolio, driven by Equities-Fundamental, as many Long/Short managers generated losses due to negative long side alpha. TMT/Growth, biotech and Asia drove underperformance. Market-neutral and value-oriented managers performed better. Quant equity managers, on the other hand, contributed positively, benefitting from increased and sustained volatility and dispersion.
- In Diversifying, the heightened level of economic and political uncertainty created trading opportunities for macro rates and CTA managers. The Special Situations platform detracted, reflecting credit spread widening and some credit specific underperformance.
- In Multi-Strategy, the portfolio's core managers, in a combination of non-directional exposures across asset classes, contributed and served as effective diversifiers and sources of alpha for the portfolio this quarter. Event managers detracted.
- In Credit, mortgage and housing related credit drove performance. The portfolio's positioning into primarily floating rate and non-corporate exposure has allowed it to avoid the negative performance experienced in the high-yield bond market as this has been driven by interest rate increases and corporate credit spread widening.

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:
 - \$500 million dollar investment in Sixth Street Lending Partners, a seed investment in a Business Development Company (BDC) that focuses on middle market corporate credit opportunities, managed by Sixth Street Lending Partners Advisers, LLC. The BDC focuses on the direct origination of senior secured loans and underwriting corporate bonds, equity securities, and other instruments.

- \$300 million dollar investment in Apollo Accord+, a multi-asset opportunistic credit strategy centered around: levered performing credit, dislocated credit, large scale origination, structured credit, and other origination strategies, managed by Apollo Accord+ Management, LP.
- \$250 million dollar investment in Irradiant Solutions Fund II, LP, a drawdown investment partnership that focuses on private credit and has flexibility to invest in private equity and public securities, managed by Irradiant Partners, LP. This multi-asset credit strategy will invest primarily in highly structured, idiosyncratic, and complex credit opportunities.
- \$225 million dollar seed investment in Owl Rock Technology Finance Corp II (ORTF II), a private BDC that focuses on private credit opportunities within the Technology sector, managed by Owl Rock Technology Advisors II LLC.
- In terms of allocation priorities, we will continue to review opportunities in the private credit space along with reviewing the existing composition of our equity-oriented strategies in the hedge fund portfolio.

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

SMRS

Absolute Return

6/30/22

Net Market Value by Entity

	Net Market Value	Unfunded Commitment
* Tahquamenon Fund, LP	\$ 4,775,288,660	\$ 0
Acacia Coinvest, LP	319,422,645	2,000,000
Cerberus Manitou Residential Loan Fund, LP	223,220,959	8,580,645
** Apollo Accord+	133,443,272	166,556,728
Irradiant Solutions Fund, LP (fka Kayne)	120,561,549	124,821,415
AG Essential Housing, LP	116,618,065	58,000,000
Apollo SCRF IV, LP	114,258,860	147,742,521
Redding Ridge Holdings, LP	107,252,272	15,155,765
Jana Strategic Investment Fund IV, LP	101,955,263	298,601
Pimco Private Income Fund Onshore Feeder, LLC	99,321,709	0
SJC Direct Lending Revolver Fund III, LP	91,038,635	9,316,075
Irradiant CLO Partners Fund II, LP (fka Kayne CLO Partners FD II)	77,209,507	18,058,608
Crescent Mezzanine Partners VII, LP	76,308,547	68,637,820
Centerbridge Capital Partners III, LP	72,918,998	0
SMRS-HVDL, LLC	72,506,594	127,700,000
Kayne Anderson BDC, LLC (KABDC)	65,806,189	45,854,997
TICP CLO Partners III, LP	63,085,957	31,140,271
Oaktree Opportunities Fund Xb, LP	62,295,917	28,000,000
OCM Opportunities Fund IX, LP	56,311,557	0
Castle Credit SMRS Holdings, LLC Series C	53,382,846	50,000,000
Fortress MSR Opportunities Fund I A, LP	47,049,373	15,662,214
GSO Capital Opportunities Fund III, LP	45,670,380	29,893,563
HarbourVest Credit Opportunities Fund II, LP	44,105,241	32,250,000
HPS Mezzanine Partners III, LP	41,065,567	4,345,231
TICP CLO Partners II, LP	34,496,400	1,480,904
Farallon Special Situations Fund II, LP	33,089,922	67,302,868
HarbourVest Partners Mezzanine Income Fund	32,050,395	16,310,000
Peninsula Fund VI, LP	29,842,651	3,021,055
Blackstone Capital Opportunities Fund IV	22,978,766	128,123,669
Oaktree Opportunities Fund X, LP	20,578,758	5,100,000
GSO COF III Co-Investment Fund, LP	15,992,949	14,327,908
OCM Opportunities Fund VIIIb, LP	14,428,938	0
Cerberus SMRS Partners, LP	13,427,393	23,304,657
Marathon CLO Equity Fund, LP	12,328,075	0
Crescent Mezzanine Partners VI, LP	10,394,510	5,560,568

Pimco Aviation Co-Invest Vehicle Onshore Feeder LP	10,000,000	90,000,000
EnTrust White Pine Partners, LP	8,816,193	0
Blackstone Capital Opportunities Fund IV Co-Invest	5,393,554	32,212,312
PGIM Fixed Income Global Liquidity Relative Value Fund I, LP	3,045,828	0
MP Securitized Credit Fund, LP	2,764,106	0
GSO Capital Opportunities Fund II, LP	2,686,925	9,734,603
TCW/Crescent Mezzanine Partners V, LP	670,980	12,395,466
OCM Opportunities Fund VII, LP	398,442	0
Oaktree Opportunities Fund VIII, LP	369,225	0
TCW/Crescent Mezzanine Partners VC Secondary	316,841	0
OCM Opportunities Fund VIIb, LP	24,627	2,500,000
* Visium Balanced Fund, LP	17	0
Monument Park, LLC	5	0
OCM Principal Opportunities Fund IV, LP	1	10,004,754
** Irradiant Solutions Fund II, LP	0	250,000,000
** Owl Rock Technology Finance Corp II (ORTF II)	0	225,000,000
** Sixth Street Lending Partners	0	500,000,000
Total Absolute Return Strategies	\$ 7,254,194,061	\$ 2,380,393,218
Short-Term Investments & Other	125,330,175	0
Grand Total	\$ 7,379,524,236	\$ 2,380,393,218

* Fund of Funds

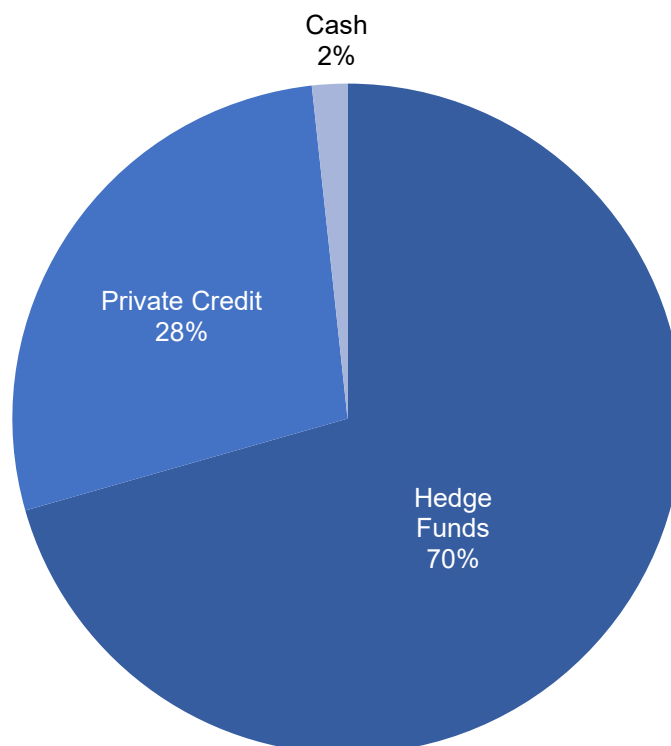
** New Commitment

SMRS

Absolute Return

6/30/22

Total Investments by Asset Type



Market Value in Millions	
	6/30/2022
Hedge Funds	\$ 5,209
Private Credit	2,046
Cash	125
Total Investments	\$ 7,380

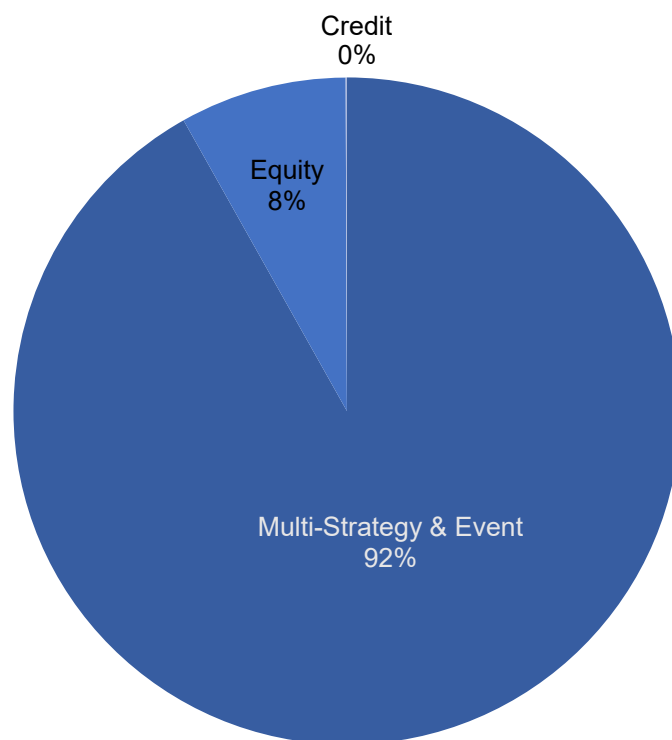
Note: Totals may not be exact due to rounding.

SMRS

Absolute Return

6/30/22

Hedge Fund Investments by Strategy



Market Value in Millions	
	6/30/2022
Multi-Strategy & Event	\$ 4,784
Equity	421
Credit	3
Total Investments	\$ 5,209

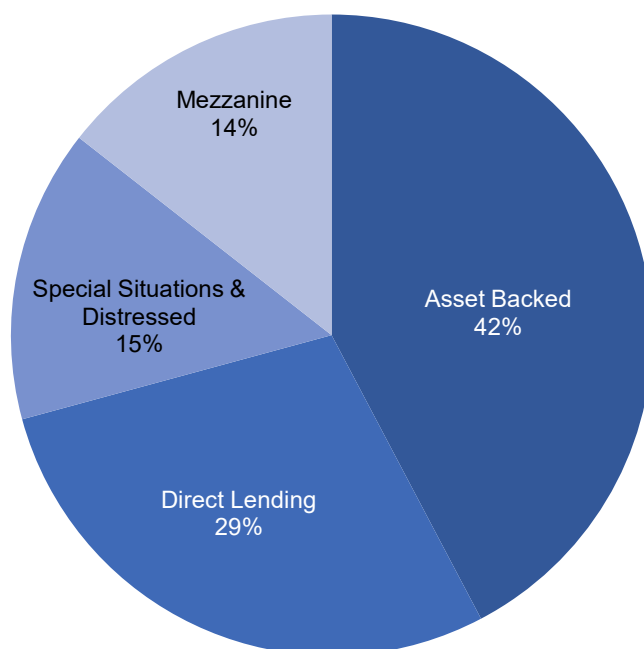
Note: Totals may not be exact due to rounding.

SMRS

Absolute Return

6/30/22

Private Credit Investments by Strategy



Market Value in Millions	
	6/30/2022
Asset Backed	\$ 865
Direct Lending	583
Special Situations & Distressed	302
Mezzanine	295
Total Investments	\$ 2,046

Note: Totals may not be exact due to rounding.

State of Michigan Retirement System

PRIVATE EQUITY REVIEW

State of Michigan Investment Board Meeting
September 22, 2022



Peter A. Woodford
Senior Investment Manager
Private Equity Division

EXECUTIVE SUMMARY

Performance

MPSERS Plan (6/30/22)	1-Year	3-Years	5-Years	7-Years	10-Years
Annualized Returns	26.1%	24.9%	21.5%	17.9%	17.2%
PE Benchmark Returns	19.1%	22.5%	19.4%	17.4%	18.0%
Peer Median Returns	18.2%	13.0%	11.4%	10.1%	11.4%
Percentile Rank vs. Peers*	17	12	15	13	7

*State Street Universe greater than \$1 billion

- Private equity returns have been strong relative to peer median returns, ranking in the top 7% 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 4.2% (ten-year S&P 500 return 13.0%) and underperformed the benchmark by 0.8%.
- Commitments closed during the quarter include:
 - \$150 million to Apax XI USD, LP, managed by Apax XI GP Co., Limited.
 - \$112.5 million to TPG Partners IX, LP, managed by TPG GenPar IX, LP.
 - \$100 million to Blackstone Growth II, LP, managed by Blackstone Growth Associates II, LP.
 - \$50 million to Accel Leaders 4, LP, managed by Accel Leaders 4 Associates, LLC.
 - \$48 million to Meritech Capital Partners VIII, LP, managed by Meritech Capital Associates VIII, LLC.
 - \$37.5 million to TPG Healthcare Partners II, LP, managed by TPG Healthcare Partners GenPar II, LP.
 - \$35 million to Arboretum Ventures VI, LP, managed by Arboretum Investment Manager VI, LLC.
 - \$35 million to FirstMark Capital OF IV, LP, managed by FirstMark Capital OF IV GP, LLC.
 - \$35 million to FirstMark Capital VI, LP, managed by FirstMark Capital VI GP, LLC.p
 - \$12 million to Meritech Capital Sidecar III, LP, managed by Meritech Capital Associates VIII, LLC.
 - \$7.5 million to Lightspeed India Partners IV, LLC, managed by Ashwood Capital Management, Limited.

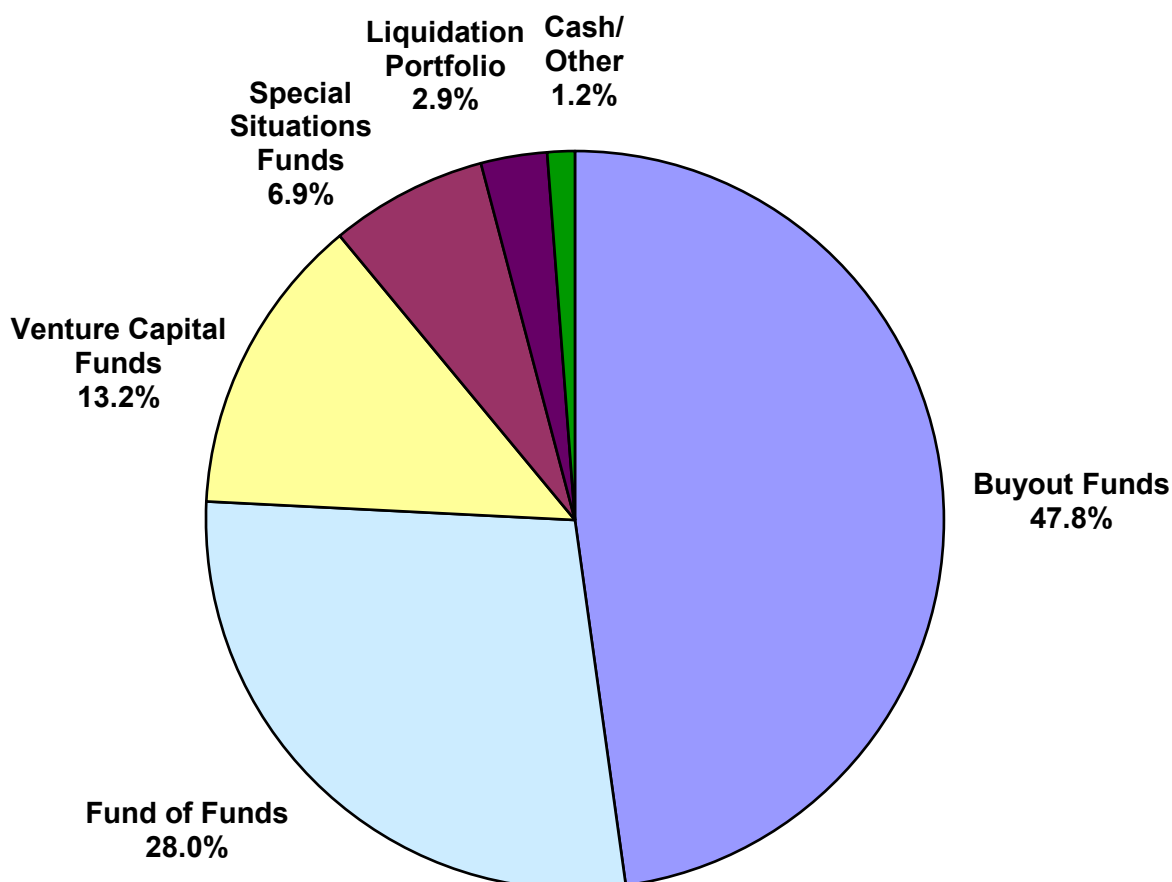
Strategy Update

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

6/30/22



Market Value in Millions

	6/30/22		6/30/21	
Buyout Funds	\$11,357	47.8%	\$9,699	46.6%
Fund of Funds	6,660	28.0%	5,005	24.0%
Venture Capital Funds	3,128	13.2%	2,703	13.0%
Special Situations Funds	1,640	6.9%	1,977	9.5%
Liquidation Portfolio	691	2.9%	732	3.5%
Cash/Other	283	1.2%	365	1.7%
Total	\$23,759	100.0%	\$20,826 *	100.0%

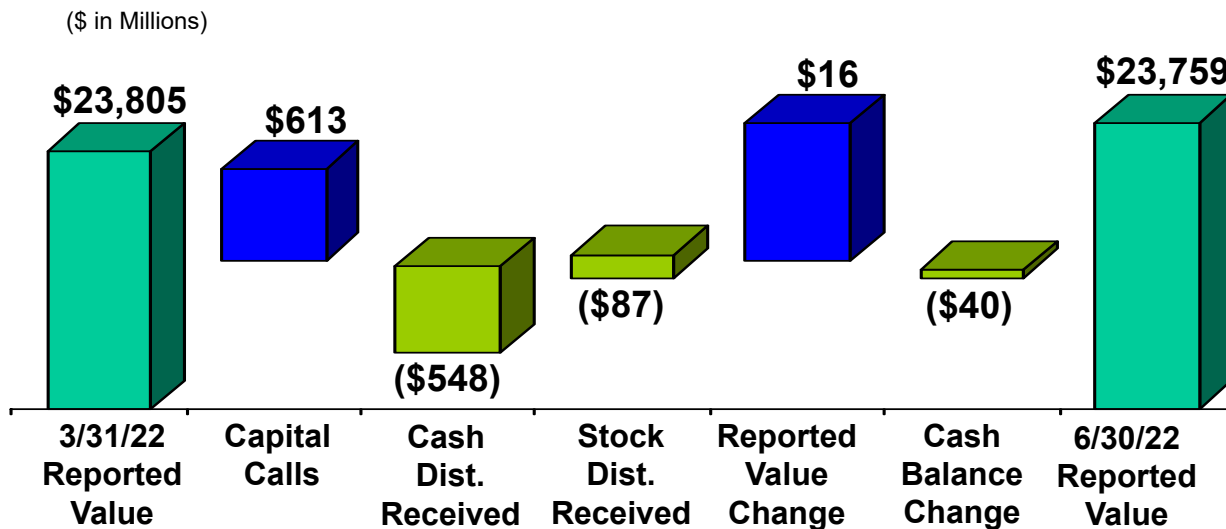
* 6/30/21 total includes \$345M in Mezzanine Funds

SMRS

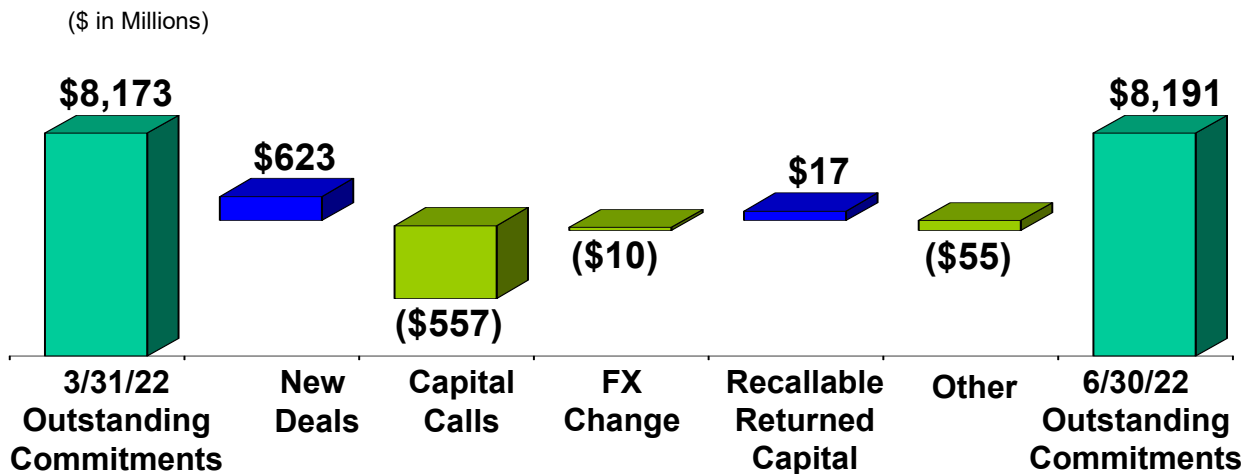
Private Equity

6/30/22

Invested Commitments



Outstanding Commitments

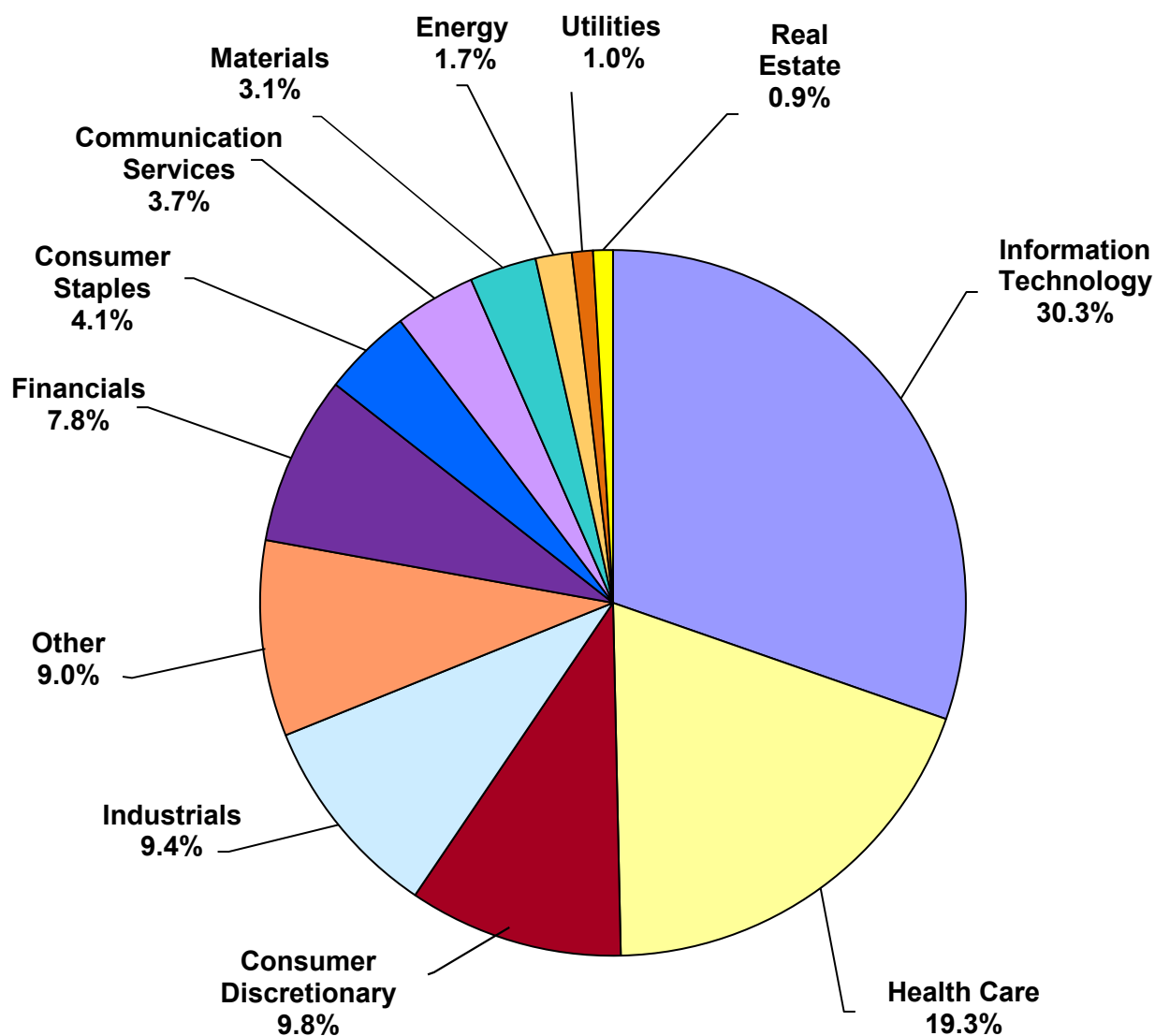


SMRS

Private Equity

6/30/22

Investments by Industry



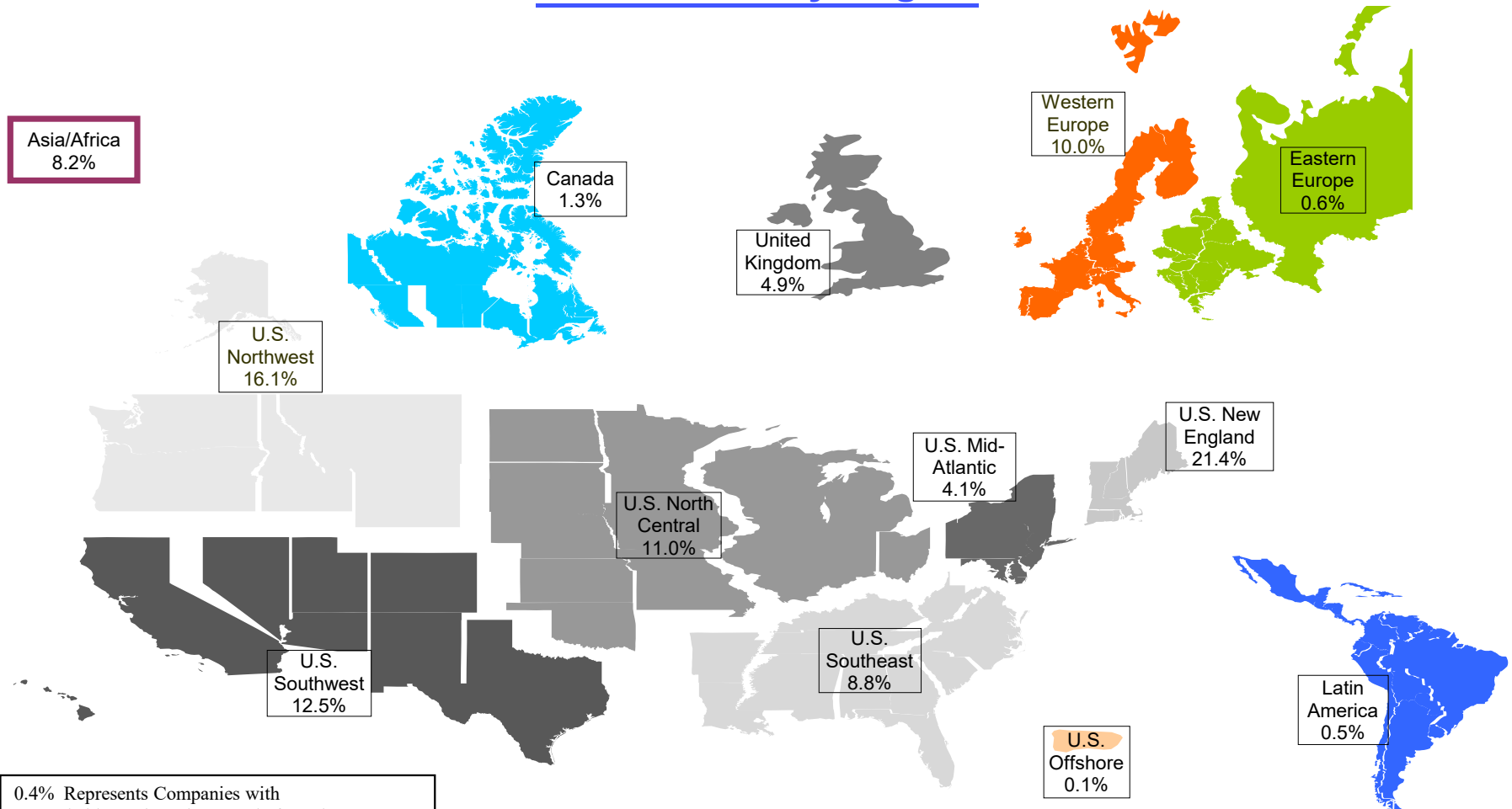
These numbers are based on the most recent available General Partner Data; primarily 3/31/22 and are subject to change.

SMRS

Private Equity

6/30/22

Investments by Region



Geographic Report: North America 75.8%, Europe 15.5%, Asia 8.2%, Other .5%
There is a 0.1% difference in totals due to rounding

SMRS

Private Equity

6/30/22

Portfolio by Vintage Year

(\$ in Millions)

Asset Vintage	Reported Value	Outstanding Commitment	Total Exposure
1986-2005	\$ 315	\$ 79	\$ 394
2006*	137	102	239
2007	95	88	183
2008	244	71	315
2009	23	1	24
2010	191	3	194
2011	554	81	635
2012	797	53	850
2013	206	47	253
2014	1,429	129	1,558
2015	7,723	540	8,263
2016	2,726	235	2,961
2017	2,064	286	2,350
2018	3,578	936	4,514
2019	1,968	718	2,686
2020	838	562	1,400
2021	568	2,220	2,788
2022	20	2,040	2,060
Income Accruals	(0)	0	(0)
Cash	278	0	278
Act. Small Cap - Stock Dist	5	0	5
Total	\$ 23,759	\$ 8,191	\$ 31,950

*Liquidation portfolio is 2006 vintage

FX Exposure

(\$ in Millions)

	Reported Value	Outstanding Commitment	Total Exposure	Total (USD)
Euro (\$1.113/ €)	€ 724	€ 299	€ 1,023	\$1,069

SMRS

Private Equity

6/30/22

Top 10 Sponsors

(\$ in Millions)

Asset Type	Reported Value	Outstanding Commitment	Total
HarbourVest Partners	\$ 6,290	\$ 726	\$ 7,016
Insight Partners	1,042	100	1,142
Kohlberg Kravis Roberts	795	206	1,001
Thoma Bravo	641	355	996
The Carlyle Group	608	388	996
Leonard Green & Partners	748	189	937
Advent International	768	140	908
StepStone Group	552	232	784
Warburg Pincus	701	78	779
Apax Partners	398	368	766
Top 10 Total Value	\$ 12,543	\$ 2,782	\$ 15,325

Cash Weighted Rates of Return*

(Net IRR)	Current Qtr.	1-Year	3-Year	5-Year	10-Year
Buyout	0.7%	27.0%	26.2%	23.7%	19.0%
Fund of Funds	2.3%	28.0%	22.5%	21.0%	18.1%
Special Situations	-1.1%	21.2%	22.0%	16.7%	13.9%
Venture Capital	-4.3%	20.0%	37.7%	31.1%	22.9%

*These numbers are based on most recent available General Partner reported data; primarily 3/31/2022 and are subject to change.

SMRS Private Equity 6/30/22

Net Market Values by Ownership Entity

	<u>Adjusted Reported Value</u>	<u>Unfunded Commitment</u>
5AM Opportunities I, LP	\$ 20,465,979	\$ 825,000
5AM Opportunities II, LP	6,873,055	18,500,000
5AM Ventures VI, LP	23,081,704	3,550,000
5AM Ventures VII, LP	1,633,801	22,750,000
Accel Europe I, LP	1,451,585	1
Accel Europe II	25,083,593	3,300,000
Accel Growth Fund II, LP	13,730,843	0
Accel Growth Fund III, LP	17,853,027	280,000
Accel Growth Fund IV, LP	40,860,663	0
Accel Growth Fund V, LP	51,116,442	1,028,554
Accel Growth Fund VI, LP	11,625,605	12,875,000
Accel India VII, LP	1,500,000	8,500,000
Accel IX, LP	1,618,323	4,522,725
* Accel Leaders 4, LP	0	50,000,000
Accel Leaders Fund 3, LP	32,183,196	8,800,000
Accel Leaders Fund II, LP	14,920,781	0
Accel Leaders Fund, LP	16,418,801	0
Accel London V, LP	60,706,757	1,320,000
Accel London VI, LP	18,734,196	3,000,000
Accel London VII, LP	3,878,794	8,250,000
Accel VI-S	1,831,652	652,611
Accel VI, LP	641,034	0
Accel X, LP	6,934,437	0
Accel XI, LP	8,696,921	1,440,000
Accel XII, LP	26,255,997	980,000
Accel XIII, LP	26,273,443	1,250,000
Accel XIV, LP	16,332,895	1,150,000
Accel XV, LP	3,872,286	6,300,000
Accel-KKR Growth Capital Fund IV, LP	2,242,313	37,757,687
Acorn Bioventures 2, LP	5,000,000	95,000,000
Acorn Bioventures, LP	66,027,688	15,000,000
Advent Global Private Equity V	3,264,356	8,700,000
Advent International GPE IX, LP	336,523,244	76,854,414
Advent International GPE VI-A, LP	22,155,185	0
Advent International GPE VII-B, LP	47,845,877	10,000,000

	Adjusted Reported Value	Unfunded Commitment
Advent International GPE VIII-B, LP	292,073,676	0
Advent International GPE X, LP	0	350,000,000
Advent International LAPEF VII	20,385,732	42,000,000
Advent Latin American Private Equity Fund VI, LP	45,465,977	2,450,000
Affinity Asia Pacific Fund III, LP	14,270,765	8,520,204
Affinity Asia Pacific Fund IV, LP	70,006,591	16,294,894
Affinity Asia Pacific Fund V, LP	73,970,260	112,256,189
Apax Digital II, LP	0	100,000,000
Apax Digital, LP	58,061,489	10,160,046
Apax Europe Fund VI	9,819,094	2,210,916
Apax Europe VII, LP	5,105,047	1,557,073
Apax IX, LP	200,097,132	17,529,295
Apax US VII	2,854,892	417,509
Apax VIII - B, LP	34,736,581	5,661,905
Apax X USD, LP	87,049,469	80,582,833
* Apax XI USD, LP	0	150,000,000
Apollo Investment Fund IX, LP	78,037,722	40,615,434
Apollo Investment Fund VIII, LP	52,768,318	12,807,892
Arboretum Ventures II	1,039,622	0
Arboretum Ventures III, LP	6,292,132	0
Arboretum Ventures IV, LP	31,752,813	6,300,000
Arboretum Ventures V, LP	23,164,699	14,035,000
* Arboretum Ventures VI, LP	0	35,000,000
Ares Corporate Opportunities Fund II	124,974	11,423,773
Ares Corporate Opportunities Fund III, LP	2,662,504	6,656,978
Ares Corporate Opportunities Fund IV, LP	47,902,926	13,701,239
ASF VIII B	100,905,430	84,152,532
AXA ASF Miller Co-Investment	281,617	6,656,684
Axiom Asia 6, LP	15,474,322	35,200,000
Axiom Asia Co-Investment Fund I, LP	60,517,259	8,441,698
Axiom Asia Co-Investment Fund II, LP	16,241,319	33,990,896
Axiom Asia IV, LP	67,250,608	9,200,886
Axiom Asia Private Capital Fund III, LP	56,567,537	5,250,002
Axiom Asia V, LP	48,875,409	15,000,000
BC European Capital IX	58,996,757	5,887,627
BC European Capital VII, LP	753,241	0
BC European Capital VIII, LP	354,657	8,150,794
Berkshire Fund IX Coinvestment Fund, LP	55,891,622	6,435,897
Berkshire Fund IX, LP	233,839,458	7,928,751
Berkshire Fund VI, LP	22,347,213	7,600,677
Berkshire Fund VII, LP	6,818,535	2,805,875
Berkshire Fund VIII, LP	105,684,628	8,301,931
Berkshire Fund X, LP	22,586,003	132,832,447
Blackstone Capital Partners IV	2,569,962	4,580,765
Blackstone Capital Partners V	1,654,035	12,930,407
Blackstone Capital Partners V-S	124,295	712,476

	Adjusted Reported Value	Unfunded Commitment
Blackstone Capital Partners VI, LP	132,025,238	32,435,071
Blackstone Capital Partners VII, LP	328,329,760	20,557,815
Blackstone Capital Partners VIII LP	98,221,581	127,391,171
* Blackstone Growth II, LP	0	100,000,000
Bridgepoint Europe IV	11,464,373	4,917,959
Carlyle Europe Partners III	1,518,362	1,564,364
Carlyle Europe Partners IV, LP	76,154,308	9,808,066
Carlyle Europe Partners V, SCSP	83,067,218	60,227,719
Carlyle Partners Growth, LP	3,425,469	46,574,238
Carlyle Partners V LP	27,592,469	53,227,845
Carlyle Partners VI, LP	130,556,064	7,858,711
Carlyle Partners VII, LP	280,253,069	15,352,791
Carlyle Partners VIII, LP	5,594,895	193,518,844
Charlesbank Equity Fund IX, LP	97,816,059	4,025,179
Charlesbank Equity Fund X, LP	23,591,774	77,103,876
Charlesbank Equity Overage Fund X, LP	16,822,331	34,324,745
Charlesbank Fund IX Overage Allocation Program	47,997,042	1,953,081
Clearlake Capital Partners VII, LP	62,559,420	137,435,712
Coller International Partners V, LP	4,283,669	2,000,000
Coller International Partners VI, LP	20,779,983	29,059,273
Coller International Partners VII, LP	97,850,040	44,654,951
CVC Capital Partners VII, LP	225,758,437	24,340,874
CVC Capital Partners VIII, LP	23,088,090	84,123,770
Dover Street IX, LP	77,769,448	15,000,000
Dover Street X, LP	100,683,950	69,375,000
FIMI Opportunity 6, LP	65,415,000	5,363,638
FirstMark Capital I, LP	117,497,860	196,596
FirstMark Capital IV, LP	118,546,606	2,800,000
FirstMark Capital OF I, LP	31,869,041	0
FirstMark Capital OF II, LP	111,166,308	0
FirstMark Capital OF III	43,066,937	3,150,000
* FirstMark Capital OF IV, LP	0	35,000,000
FirstMark Capital V, LP	29,365,099	14,000,000
* FirstMark Capital VI, LP	0	35,000,000
Flagship Pioneering Fund VII, LP	31,204,241	173,000,000
Flagship Pioneering Special Opportunities Fund II, LP	87,467,052	27,000,000
Flagship Pioneering VI	302,026,316	5,250,000
Flagship Ventures Fund 2004	44,319	0
Flagship Ventures Fund 2007, LP	3,640,158	0
Flagship Ventures Fund IV, LP	149,342,324	0
Flagship Ventures Fund V	101,491,807	0
Flagship Ventures Opportunities Fund I, LP	49,312,063	0
FS Equity Partners VII, LP	96,240,777	7,654,690
FS Equity Partners VIII, LP	69,858,672	28,468,620
GCM Grosvenor Fund Investment Program I, LP	6,940,830	1,509,748
GCM Grosvenor Fund Investment Program II, LP	20,831,462	12,818,284

	Adjusted Reported Value	Unfunded Commitment
GCM Grosvenor Fund Investment Program III - 2004	36,511,360	4,349,427
GCM Grosvenor Fund Investment Program III - 2006	45,183,523	6,245,226
GCM Grosvenor Fund Investment Program V, LP	42,739,704	8,602,810
GCM Grosvenor Fund Investment Program VI, LP	23,572,332	1,286,827
GCM Grosvenor Fund Investment Program VIII, LP	114,515,682	6,183,875
GCM Grosvenor SeasPriFIP, LP (PIS06-10)	23,022,009	11,378,106
GCM Grosvenor SeasPriFIP, LP (PIS14)	288,576,668	4,260,582
GCM Grosvenor SeasPriFIP, LP (Seed)	9,706,114	16,486,829
Genstar Capital Partners IX, LP	98,862,687	7,310,857
Genstar Capital Partners VIII, LP	86,629,860	2,364,485
Genstar Capital Partners X, LP	21,910,662	79,493,824
Genstar IX Opportunities Fund I, LP	62,612,641	4,369,583
Genstar VIII Opportunities Fund I, LP	73,251,177	1,806,605
Genstar X Opportunities Fund I, LP	7,382,928	18,130,217
Golden Bell Azalea, LLC	51,290,797	0
Green Equity Investors V	10,804,002	24,920,675
Green Equity Investors VI, LP	155,285,194	7,943,462
Green Equity Investors VII, LP	296,516,968	55,765,256
Green Equity Investors VIII, LP	207,282,049	56,841,234
Greenspring Master G, LP	509,416,212	228,000,000
Greenspring Micro II, LP	43,036,806	3,466,263
GTCR Fund XIII, LP	15,742,557	37,570,000
GTCR Strategic Growth Fund, LP	0	50,000,000
HarbourVest Dover Street VIII, LP	11,572,654	5,400,000
HarbourVest Int'l III Partnership	149,845	1,200,000
Harbourvest Partners Co-Investment Fund IV, LP	95,547,750	19,107,835
HarbourVest Partners Co-Investment Fund V, LP	249,394,129	45,000,000
Harbourvest Partners Co-Investment Fund VI, LP	10,706,917	190,000,000
HarbourVest V Partnership	119,297	300,000
HarbourVest VI - Direct Fund, LP	701,092	750,000
HarbourVest VI Partnership	277,900	2,000,000
Harvest Partners IX, LP	0	100,000,000
Harvest Partners VII, LP	103,382,462	3,525,741
Harvest Partners VIII	108,275,482	9,764,483
Hellman & Friedman Capital Partners X, LP	55,691,051	45,311,166
Hg Saturn 3 A, LP	0	100,000,000
Insight Partners Fund X Follow-On Fund, LP	42,719,143	12,500,000
Insight Partners XI, LP	186,711,748	2,700,000
Insight Partners XII, LP	77,703,934	72,000,000
Insight Venture Partners GBCF, LP	142,286,445	4,120,616
Insight Venture Partners IX, LP	333,197,041	4,987,231
Insight Venture Partners X, LP	259,502,727	3,364,949
Jade Equity Investors, LP	77,965,422	43,654,646
Kelso Investment Associates IX, LP	67,514,711	8,862,814
Kelso Investment Associates VII	156,625	0
Kelso Investment Associates VIII	6,777,990	7,191,927

	Adjusted Reported Value	Unfunded Commitment
Kelso Investment Associates X, LP	121,777,571	30,479,058
Khosla Ventures III, LP	22,565,051	675,000
Khosla Ventures IV, LP	104,607,295	950,000
Khosla Ventures Opportunity I, LP	19,155,241	7,850,000
Khosla Ventures Seed D, LP	21,696,205	940,000
Khosla Ventures Seed E, LP	2,386,230	3,225,000
Khosla Ventures V, LP	118,460,948	1,750,000
Khosla Ventures VI, LP	115,087,139	3,750,000
Khosla Ventures VII, LP	27,462,806	24,600,000
KKR 2006 Fund, LP	30,045,071	6,102,869
KKR Americas Fund XII, LP	300,758,970	25,367,719
KKR Asian	395,771	395,007
KKR Asian Fund II, LP	30,782,111	239,698
KKR Asian Fund III	129,554,662	22,218,732
KKR China Growth Fund	12,981,626	3,306,040
KKR European Fund II	1,065,161	0
KKR European Fund III	3,797,562	6,430,608
KKR European Fund IV, LP	85,036,030	291,546
KKR European Fund V (USD) SCSp	113,953,193	32,802,655
KKR Millennium Fund	232,956	0
KKR North America Fund XI, LP	65,672,020	5,145,266
KKR North America Fund XIII SCSp	20,904,341	104,095,659
Lead Edge Capital IV, LP	32,796,305	4,231,624
Lead Edge Capital V, LP	25,820,334	8,786,545
Lead Edge Capital VI, LP	3,750,000	71,250,000
* Lightspeed India Fund IV, LLC	0	7,500,000
Lightspeed Opportunity Fund II, LP	2,743,257	22,250,000
Lightspeed Opportunity Fund, LP	38,092,842	750,000
Lightspeed Venture Partners Select IV, LP	28,343,743	4,000,000
Lightspeed Venture Partners Select V, LP	4,119,452	20,750,000
Lightspeed Venture Partners VII, LP	7,403,003	0
Lightspeed Venture Partners XIII, LP	17,894,040	1,600,000
Lightspeed Venture Partners XIV-A, LP	1,961,273	9,225,000
Lightspeed Venture Partners XIV-B, LP	2,124,884	11,550,000
Menlo Special Opportunities Fund II, LP	50,367,336	3,015,852
Menlo Special Opportunities Fund III, LP	4,209,333	20,750,000
Menlo Ventures IX, LP	1,200,414	0
Menlo Ventures X, LP	2,785,256	0
Menlo Ventures XI, LP	22,648,088	0
Menlo Ventures XIV, LP	18,811,851	0
Menlo Ventures XV, LP	17,925,841	8,750,000
Meritech Capital Partners Franchise Fund, LP	4,177,144	10,987,500
Meritech Capital Partners IV, LP	5,460,794	0
Meritech Capital Partners V, LP	29,596,183	600,000
Meritech Capital Partners VI, LP	56,673,850	2,656,250
Meritech Capital Partners VII, LP	25,295,309	21,781,250

	Adjusted Reported Value	Unfunded Commitment
* Meritech Capital Partners VIII, LP	0	48,000,000
* Meritech Capital Sidecar III, LP	0	12,000,000
Michigan Growth Capital Partners II, LP	115,232,395	630,633
Michigan Growth Capital Partners III, LP	111,594,060	23,135,218
Michigan Growth Capital Partners IV, LP	19,859,418	4,660,128
Michigan Growth Capital Partners, LP	17,321,208	6,717,531
Michigan SEMF Barings	29,725,216	121,869,755
Michigan SEMF Grosvenor	29,137,821	122,548,863
New Leaf Biopharma Opportunities II, LP	125,888,797	8,000,000
New Leaf Growth Fund I, LP	33,563,751	0
New Leaf Ventures II, LP	5,101,862	0
New Leaf Ventures III, LP	38,177,424	0
New Leaf Ventures IV, LP	60,219,439	17,000,000
Nordic Capital VI, LP	137,589	1
Nordic Capital VIII, LP (Alpha)	31,675,209	6,229,296
Oak Investment Partners X, LP	106,319	0
Oak Investments Partners IX, LP	13,673	0
Ocqueoc Holdings, LLC	613,515	47,785,788
Odyssey Investment Partners Fund VI, LP	69,991,180	38,920,778
Parthenon Investors II	737,745	3,175,229
Parthenon Investors III	30,284,229	2,636,037
Parthenon Investors IV, LP	58,439,351	1,188,794
Permira Growth Opportunities I, LP 1	47,329,364	15,494,666
Permira Growth Opportunities II SCSp	0	50,000,000
Permira VII LP 1	65,602,317	24,777,954
Permira VIII, LP 2	0	78,408,748
PPC Fund II	75,791,600	11,046,539
Public Pension Capital, LLC	88,704,195	31,240,044
Renaissance Venture Capital Fund IV, LP	4,594,625	20,500,000
Rhone Partners V, LP	163,441,723	0
Riverside Capital Appreciation Fund VI, LP	28,931,585	3,312,932
Riverside Capital Appreciation Fund VII, LP	118,515,634	24,753,419
Riverside Micro Cap Fund I, LP	16,231,508	5,632,976
Riverside Micro-Cap Fund II, LP	2,359,532	2,035,107
Riverside Micro-Cap Fund III, LP	68,341,636	3,913,101
Riverside Micro-Cap Fund IV	91,216,759	3,617,302
Riverside Micro-Cap Fund IV B, LP	26,473,859	713,421
Riverside Micro-Cap Fund V, LP	108,110,235	23,317,049
Riverside Micro-Cap Fund VI, LP	0	125,000,000
Science Ventures Fund II, LP	41,918,877	1,500,000
Science Ventures Fund III, LP	10,692,104	15,000,000
Shamrock Growth Capital Fund IV, LP	51,415,516	1,778,263
Silver Lake Partners II	0	3,531,586
Silver Lake Partners III	7,447,940	11,910,583
Silver Lake Partners IV, LP	93,972,475	1,440,657
Silver Lake Partners V, LP	89,516,149	6,656,052

	Adjusted Reported Value	Unfunded Commitment
Silver Lake Partners VI, LP	49,262,227	32,514,946
Silver Lake SL SPV-2	61,902,781	0
SK Capital Partners V, LP	55,948,297	648,951
SKCP Catalyst Fund I-A, LP	30,210,640	14,406,741
SMRS - TOPE LLC	5,073,577,535	222,835,071
SMRS-CAPP LLC	299,833,051	0
SMRS-NCRP LLC	369,817,163	154,958,521
Summit Partners Growth Equity Fund X, LP	94,298,816	23,358,399
Summit Partners Growth Equity Fund XI-A, LP	0	100,000,000
The Huron Fund III, LP	6,432,755	2,072,756
The Huron Fund IV, LP	17,106,691	382,593
The Huron Fund V, LP	23,603,028	9,488,654
The Veritas Capital Fund VIII, LP	0	250,000,000
The Veritas Capital Vantage Fund, LP	12,418,889	46,096,031
Thoma Bravo Discover Fund II, LP	104,934,571	21,229,860
Thoma Bravo Discover Fund IV, LP	0	100,000,000
Thoma Bravo Explore II, LP	0	100,000,000
Thoma Bravo Fund XII, LP	219,721,718	26,441,887
Thoma Bravo Fund XIII, LP	181,102,619	16,889,638
Thoma Bravo Fund XV, LP	16,599,284	83,400,716
Thoma Bravo XIV	118,983,224	7,356,134
TI Platform BOV, LP	15,299,500	4,626,031
TI Platform Fund II, LP	14,615,258	2,925,996
TI Platform Fund III	0	25,000,000
TI Platform SMRS SMA, L.P.	84,119,457	36,501,290
* TPG Healthcare Partners II, LP	0	37,500,000
TPG Healthcare Partners, LP	14,495,098	11,238,789
TPG IV (Texas Pacific Group IV)	115,575	211,725
* TPG Partners IX, LP	0	112,500,000
TPG Partners VI, LP	15,913,033	7,467,821
TPG Partners VIII, LP	91,747,205	55,960,648
TPG Partners, VII, LP	103,180,408	5,733,680
TPG V (Texas Pacific Group V)	888,691	5,841,509
Trilantic Capital Partners V (North America) Fund A, LP	25,422,242	2,178,132
Trilantic Capital Partners VI (North America), LP	73,180,619	13,524,832
TSG6, L.P.	42,589,533	19,996,180
TSG7 A, LP	224,991,111	25,061,641
TSG8, LP	92,664,220	55,617,168
TSG9 LP	0	175,000,000
Veritas Capital Fund V, LP	184,455,400	8,898,273
Veritas Capital Fund VI, LP	203,848,474	29,090,757
Veritas Capital Fund VII, LP	129,764,290	1,119,842
Veritas V Co-Investors, LP	121,883,943	0
Vista Equity Endeavor Fund I, LP	56,097,230	11,819,603
Vista Equity Endeavor Fund II, LP	38,691,381	31,182,678
Vista Equity Partners Fund V, LP	70,244,394	10,673,598

	Adjusted Reported Value	Unfunded Commitment
Vista Equity Partners Fund VI, LP	115,187,665	10,817,795
Vista Equity Partners VII, LP	79,669,263	19,837,845
Vista Foundation Fund III, LP	27,188,512	6,730,806
Vista Foundation Fund IV, LP	42,147,058	27,759,313
Warburg Pincus China-Southeast Asia II, LP	27,457,355	49,200,000
Warburg Pincus China, LP	58,174,778	1,304,961
Warburg Pincus Equity Partners, LP	1,176,830	0
Warburg Pincus Financial Sector, LP	65,451,115	6,727,500
Warburg Pincus Global Growth, LP	176,026,472	18,075,000
Warburg Pincus Private Equity IX	327,224	0
Warburg Pincus Private Equity X, LP	6,523,225	0
Warburg Pincus Private Equity XI, LP	94,471,244	0
Warburg Pincus Private Equity XII Secondary, LP	33,869,136	337,500
Warburg Pincus Private Equity XII, LP	237,086,807	2,362,500
Total Private Equity	\$ 23,475,470,368	\$ 8,191,419,338
Cash	251,838,541	0
Active Small Cap Cash	26,426,256	0
Active Small Cap	4,825,667	0
Income Accruals	(3)	0
Grand Total	\$ 23,758,560,827	\$ 8,191,419,338

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

* New Commitments made during quarter reported

State of Michigan Retirement System

REAL ESTATE AND INFRASTRUCTURE REVIEW

State of Michigan Investment Board Meeting
September 22, 2022



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

EXECUTIVE SUMMARY

Performance

MPSERS Plan (6/30/22)	1-Year	3-Years	5-Years	7-Years	10-Years
Annualized Returns	29.8%	10.2%	10.0%	10.0%	10.9%
NCREIF NPI	19.9%	8.8%	7.5%	7.5%	8.3%
Peer Median Returns	25.6%	11.6%	10.1%	9.5%	10.1%
Percentile Rank vs. Peers*	28	63	56	46	45

*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, underweight to office & retail and recovery in the hospitality sector. Over the ten-year timeframe the REID is outperforming the benchmark by 260 basis points.

Strategy Update

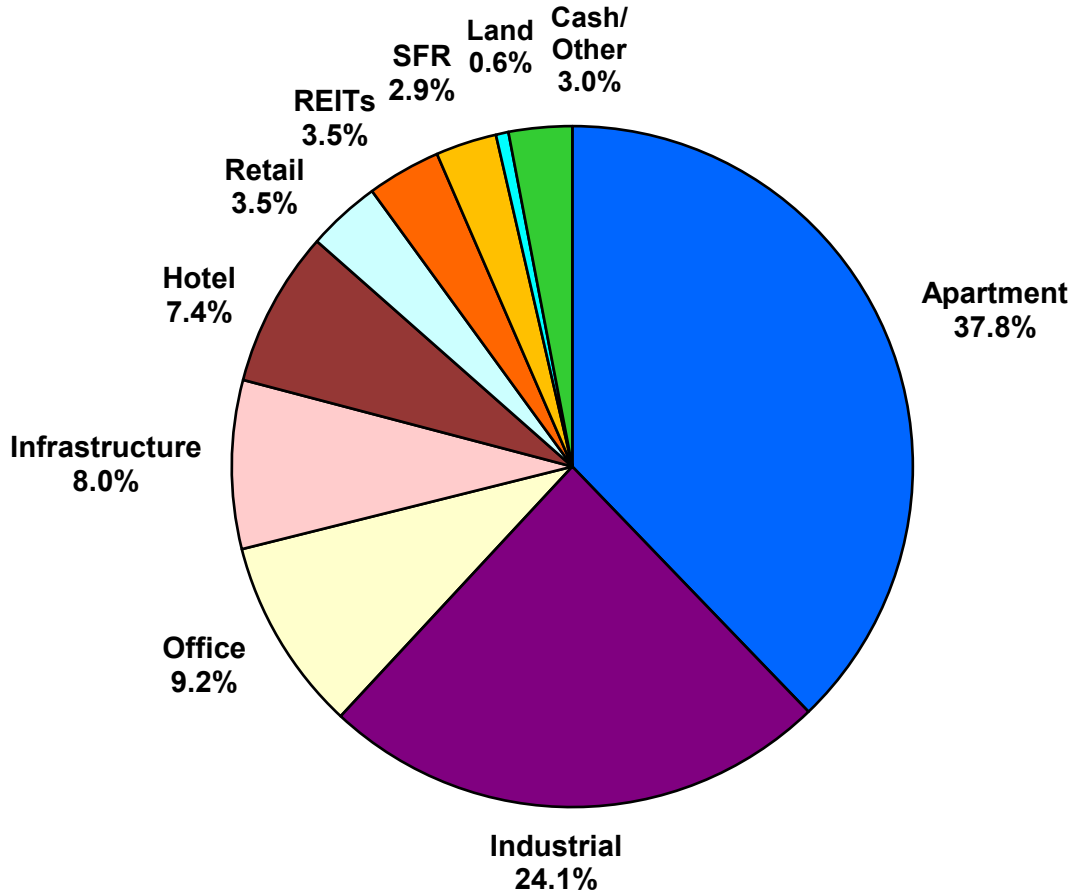
- The COVID-19 global pandemic resulted in major negative impacts to the US and world economies, including certain segments of the commercial real estate and infrastructure markets in 2020 and to a lesser extent 2021; we expect there will be lingering effects for some time. While the US and world economies are now largely reopened, sporadically resurgent case numbers as new variants spread have resulted in the return of mitigation measures in some locations. Impacts to the commercial markets 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 \$658 million, and funding for new or existing investments of approximately \$1.8 billion over the past 12 months.
- The REID has approximately \$3.4 billion in unfunded commitments. Four new commitments were made during the quarter.
 - \$200 million in Blackstone Real Estate Partners X, LP, a closed-end, global diversified real estate fund, managed by Blackstone Real Estate Advisors, LP.

- \$100 million in ASF VIII Infrastructure Fund B, LP, a closed-end global, diversified infrastructure fund concentrating in secondaries and co-investments, managed by ASF VIII Infrastructure, GP Limited.
- \$75 million in Ridgewood Water & Strategic Infrastructure II, LP, a closed-end, domestic, diversified infrastructure fund, managed by Ridgewood Infrastructure Fund II, GP.
- \$50 million in Warwick UK Real Estate Fund I, an open-end fund focused on the United Kingdom (London) residential rental market, managed by Warwick Investment Group.

SMRS

Real Estate and Infrastructure

6/30/22



Market Value in Millions

	6/30/22		6/30/21	
Apartment	\$3,504	37.8%	\$2,693	42.3%
Industrial	2,241	24.1%	1,226	19.2%
Office	858	9.2%	592	9.3%
Infrastructure	744	8.0%	713	11.2%
Hotel	686	7.4%	516	8.1%
Retail	328	3.5%	302	4.7%
REITs	320	3.5%	0	0.0%
Single Family Residential (SFR)	268	2.9%	126	2.0%
Land	58	0.6%	121	1.9%
	<u>\$9,007</u>	<u>97.0%</u>	<u>\$6,289</u>	<u>98.7%</u>
Cash/Other	274	3.0%	84	1.3%
Total Investments	<u>\$9,281</u>	<u>100.0%</u>	<u>\$6,373</u>	<u>100.0%</u>

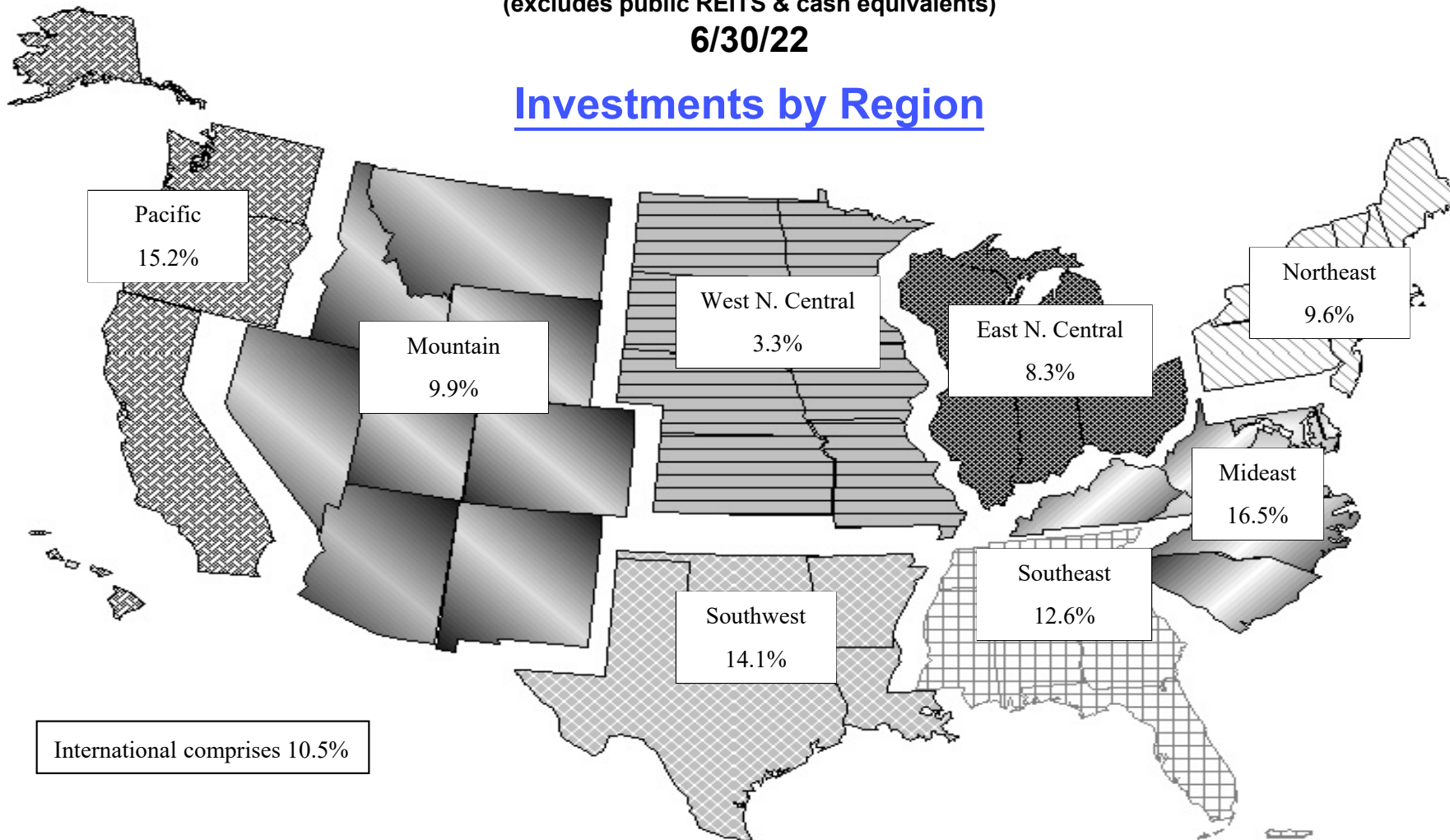
SMRS

Real Estate by Region Based on Market Value

(excludes public REITS & cash equivalents)

6/30/22

Investments by Region



Geographic regions defined by NCREIF, whose property index composition is: Pacific 34.6%, Mountain 7.0%, West N. Central 1.1%, Southwest 10.6%, East N. Central 6.4%, Southeast 11.0%, Northeast 18.7%, Midwest 10.6%

SMRS

Real Estate and Infrastructure

6/30/22

Top Ten Advisors or Entity

(\$ in millions)

<u>Advisor or Entity</u>	<u>Market Value</u>
MWT Holdings LLC	\$ 2,792
Principal Real Estate Investors	888
Clarion Partners	810
Blackstone Group	362
BentallGreenOak	314
Domain Capital Advisors Inc	290
Five Star Realty Partners LLC	254
Transwestern Investment Management	244
Lone Star Global	208
L&B Realty Advisors	186
	<u>\$ 6,348</u>

Occupancy by Property Type

	Apartment	Office	Industrial	Retail	Hotel
SMRS Portfolio	94.3%	75.3%	97.8%	88.0%	51.6%
National Average	94.2%	83.2%	95.4%	95.5%	56.2%

SMRS REAL ESTATE 6/30/22

Market Values by Ownership Entity

	<u>Market Value</u>	<u>Unfunded Commitment</u>
801 Grand Avenue Capital, LLC	\$ 22,031,225	\$ 0
AEW Senior Housing III	3,849,726	503,557
AEW Senior Housing Investors IV	26,677,105	20,428,156
Apollo Asia Real Estate Fund	66,150,818	22,769,961
Asana Partners Fund I, LP	32,558,545	2,449,559
Asana Partners Fund II, LP	34,140,949	24,030,405
Asana Partners Fund III, LP	4,000,000	96,000,000
Avanath Affordable Housing III	60,213,309	2,575,458
Avanath Affordable Housing IV	34,266,716	1,260,440
BentallGreenOak US Cold Storage, LP	402,556	73,722,045
BGO Europe III Co Invest	20,951,280	8,421,373
BentallGreenOak Europe IV, LP	0	104,810,000
BlackRock MiREIT Fund	105,864,814	0
Blackstone Real Estate Partners V, LP	61,066	2,087,026
Blackstone Real Estate Partners VI, LP	2,085,907	3,680,930
Blackstone Real Estate Partners VIII, LP	63,599,478	10,882,270
Blackstone Real Estate Partners IX, LP	186,013,582	88,725,790
* Blackstone Real Estate Partners X, LP	0	200,000,000
Capri Urban Investors, LLC	164,604	0
Carlyle Realty Partners IX, LP	0	100,000,000
Creative Media & Community Trust Corp	4,172,769	0
CIM Fund III, LP	32,850,148	0
CIM Fund VIII, LP	84,923,870	0
CIM VI (Urban REIT), LLC	20,065,740	0
Clarion Gables Multifamily Trust, LP	45,914,634	0
Columbus Circle Holdings, LLC	170,161,347	168,299,036
Crown Small Cap Real Estate	11,219,034	3,280,000
DM2501, LLC	19,191,890	26,210,152
Domain GVA-1, LLC	17,528,026	1,940,056
Domain Hotel Properties, LLC	223,489,260	0
Eastport Properties, LLC	59,508,466	0
Gateway Capital Real Estate Fund II, LP	662,840	1,276,875
GreenOak Europe III, LP	55,610,945	28,304,142
Heitman Credit	48,937,491	0
Heitman Global RE Fund II	48,267,069	52,126,829
Heitman MiREIT Fund	109,059,596	0

	Market Value	Unfunded Commitment
IDR Core Property Index Fund, LLC	131,890,358	0
India Property Fund II, LLC	12,777,147	5,448,995
IMRF II ColInvest Spiga, LP	0	2,615,000
Invesco Mortgage Recovery Feeder Fund	1,006,730	2,152,585
Invesco Mortgage Recovery Fund II, LP	24,214,280	21,394,854
Invesco Strategic Opportunities III, LP	30,498,406	82,461,385
IPF II Co-Invest, LP	12,706,869	2,168,655
ISO III SMRS Sidecar, LP	25,986,071	67,334,000
JBC Funds North LaSalle, LLC	12,790,946	0
KBS/SM Fund III, LP	247,875	0
KBS/SM Fund IV, LP	101,552,382	5,426,000
L-A Saturn Acquisition	77,838,507	250,799
L&B Spartan Holdings	64,704,051	142,823,271
Landmark Real Estate Partners V, LP	6,892,309	0
LaSalle Asia Opportunity Fund III, LP	1,219,184	0
Lion Industrial Trust	537,382,671	0
Lion Mexico Fund, LP	3,672,233	0
Lombard GVA0016	254,278,617	99,033,796
Lone Star Fund X, LP	93,090,428	21,734,113
Lone Star Fund XI, LP	115,530,723	146,481,822
Lubert-Adler Real Estate Fund VII, LP	47,862,394	4,663,662
M1 Westgate ColInvest, LLC	216,893	0
M301W ColInvest, LLC	411,455	0
MERS Acquisitions Ltd.	121,587,034	0
MIP Holdco, LLC	203,754,355	11,015,570
MSREF V - International	2,227,092	0
MSRESS Fund III Institutional, LP	3,099,337	0
MWT Holdings, LLC	2,792,939,253	0
Northpark Land Associates	39,690,682	950,490
Orange Investors, LLC	308,041	0
Paladin Realty Brazil Investors III (USA), LP	2,128,591	0
Paladin Realty LA Investors IV-CI, LP	31,351,476	0
Paladin Realty TB COINV V, LP	10,332,469	0
Penmain Office, LLC	43,805,449	0
Principal MiREIT	105,231,896	0
Principal Separate Account	394,856,042	34,314,206
Proprium RE Spec. Situations Fund, LP	116,076,694	0
Rialto Credit Partnership, LP	7,971,684	0
Rialto Real Estate Fund II, LP	28,461,738	0
Rialto Real Estate Fund III-Debt, LP	43,023,540	0
Rialto Real Estate Fund III-Property, LP	35,170,382	0
Rialto Real Estate Fund IV-Debt, LP	50,096,749	47,765,586
SFR CM, LP	42,755,193	57,425,743
SMP Data Center	620,553,842	625,769,917
Stockbridge RE Fund II-C, LP	766,707	0

	Market Value	Unfunded Commitment
Strategic II, LLC	237,671,506	101,616,272
TPG RE Finance Trust Inc.	43,466,420	0
TPG Real Estate Partners II	11,093,543	6,538,943
TPG Real Estate Partners III	39,059,415	18,344,940
TPG Real Estate Partners IV, LP	0	150,000,000
TSP Fund III	8,729,135	65,787,074
TSP Spartan C-II, LLC	12,221,898	1,500,000
TSP Value & Income Fund II, LP	19,838,861	7,790,901
Trophy Property Development, LP	135,035	0
True North Real Estate Fund III, LLC	23,340,586	5,000,000
* Warwick UK Real Estate Fund I	0	50,000,000
	<hr/>	<hr/>
	\$ 8,263,111,196	\$ 2,831,592,639
Short-Term Investments and Other	251,722,428	0
	<hr/>	<hr/>
Total Real Estate Investments	\$ 8,514,833,625	\$ 2,831,592,639
	<hr/> <hr/>	<hr/> <hr/>

* New or additional commitment made during the quarter reported

SMRS INFRASTRUCTURE 6/30/22

Market Values by Ownership Entity

	Market Value	Unfunded Commitment
Arclight Energy Partners VI, LP	\$ 28,938,858	\$ 7,004,763
Arclight Energy Partners VII, LP	30,753,690	22,383,174
ASF VI Infrastructure B, LP	10,034,235	5,211,032
ASF VII Infrastructure Fund B, LP	21,848,477	11,052,266
* ASF VIII Infrastructure Fund B, LP	3,584,224	96,415,776
ASF Como Co-Investment, LP	1,567,670	1,583,035
Basalt Infrastructure Partners, LP	15,634,891	2,219,045
Blackstone Energy Partners, LP	11,576,450	4,728,291
Blackstone Energy Partners II, LP	81,379,211	15,540,808
Brookfield Infrastructure Fund II-B, LP	43,016,641	2,847,442
Customized Infrastructure Strategies, LP	10,434,157	4,521,318
Dalmore Capital Fund	53,507,066	0
GCM Grosvenor Infrastructure Investment Program, LP	73,089,182	74,863
GCM Grosvenor Customized Infrastructure Strategies II, LP	32,999,448	7,473,916
GCM Grosvenor Customized Infrastructure Strategies III, LP	28,748,999	71,936,676
Global E&P Infrastructure Fund II, LP	29,646,278	1,804,950
GSO Energy Select Opportunities Fund, LP	5,439,347	23,026,107
GSO Energy Select Opportunities Fund II, LP	12,760,735	38,795,806
JPMorgan AIRRO India SideCar Fund US, LLC	81,074,680	573,799
JPMorgan AIRRO Fund II	10,640,889	6,800,131
Irradiant Renewables Opportunities Partners	18,480,270	86,858,328
KKR Eagle CoInvest, LP	42,743,992	1,853,268
KKR Global Infrastructure Investors, LP	30,449	2,943,773
KKR Global Infrastructure Investors IV, LP	17,156,639	82,875,183
Ridgewood Water & Strategic Infrastructure Fund, LP	31,584,947	19,289,151
* Ridgewood Water & Strategic Infrastructure Fund II, LP	0	75,000,000
RPEP SMRS Infra II, LLC	13,705,010	0
StonePeak Infrastructure Fund, LP	33,941,496	8,679,028
	<hr/>	<hr/>
Short-Term Investments and Other	\$ 744,317,931	\$ 601,491,929
	22,260,244	0
Total Infrastructure Investments	<hr/> \$ 766,578,175 <hr/>	<hr/> \$ 601,491,929 <hr/>
TOTAL INVESTMENTS	<hr/> \$ 9,281,411,800 <hr/>	<hr/> \$ 3,433,084,568 <hr/>

* New or additional commitment made during the quarter reported

State of Michigan Retirement System

REAL RETURN & OPPORTUNISTIC REVIEW

State of Michigan Investment Board Meeting
September 22, 2022



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

EXECUTIVE SUMMARY

Performance

MPSERS Plan (6/30/22)	1-Year	3-Years	5-Years	7-Years	10-Years
Real & Opportunistic	11.9%	14.9%	14.4%	12.5%	12.5%
Custom Benchmark	9.7%	8.0%	7.7%	7.6%	7.5%

- The portfolio value is \$12.7 billion with a one-year return of 11.9%. As markets declined in the second quarter of 2022, the valuation of our portfolio holdings increased.
- 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 \$4.6 billion of unfunded commitments. No new commitments were closed during the quarter.
- 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

6/30/22

Top Ten Advisors or Entities

(\$ in Millions)

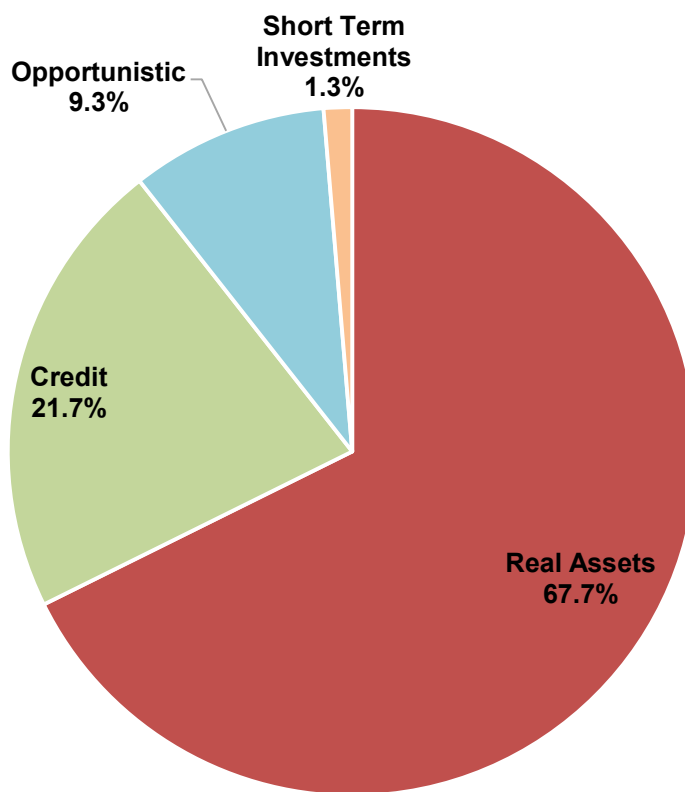
<u>Advisor or Entity</u>	<u>Market Value</u>
Great Mountain Partners, LLC	\$ 7,527
Domain Capital Group, LLC	882
Apollo Global Management	766
Sixth Street Partners	674
Blackstone Group	403
HPS Partners	336
Czech Asset Management	305
Blackstone Alternative Asset Management	239
Broadriver Asset Management	149
BlackRock	148
Total Market Value	\$ 11,429

SMRS

Real Return and Opportunistic

6/30/22

Investments By Strategy



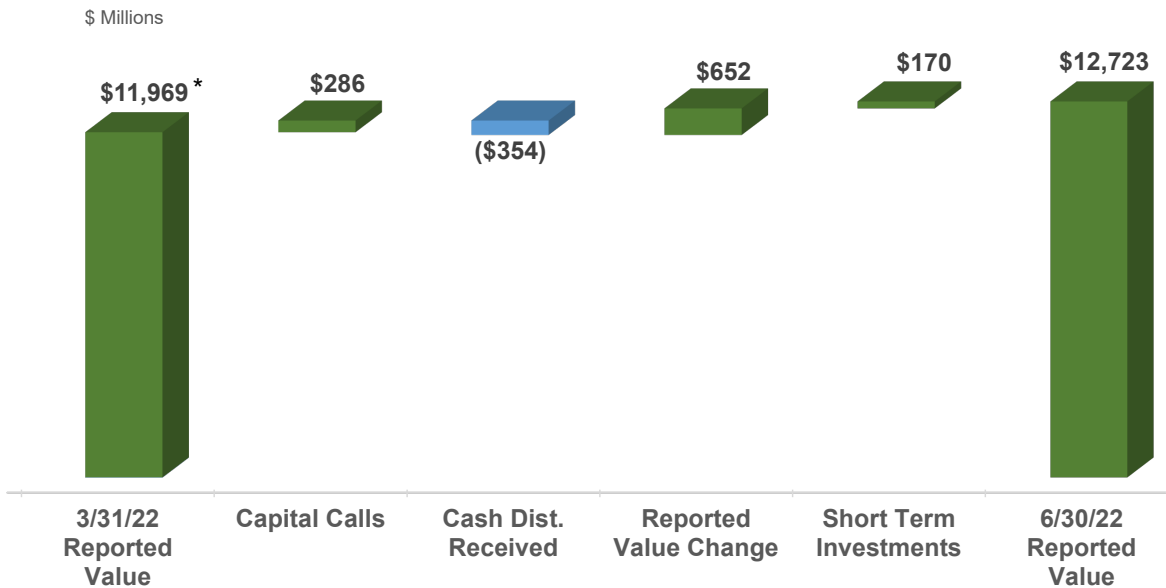
Market Value in Millions	
	<u>6/30/22</u>
Real Assets	\$8,612
Credit	\$2,763
Opportunistic	\$1,178
Short Term Investments	<u>\$170</u>
Total Investments	<u><u>\$12,723</u></u>

SMRS

Real Return and Opportunistic

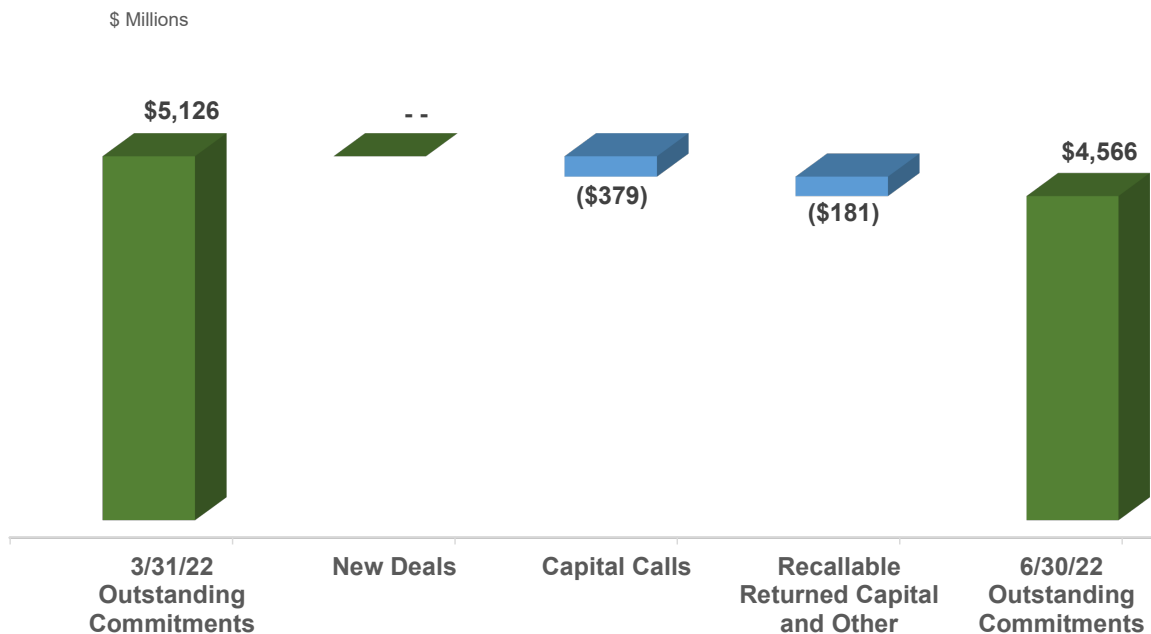
6/30/22

Invested Commitments



* Includes investments transferred from RROD to ARD and from PED to RROD for better strategic alignment.

Outstanding Commitments



SMRS

Real Return and Opportunistic

6/30/22

Net Market Value by Entity

	Net Market Value	Unfunded Commitment
* Abernathy	\$ 280,670,437	\$ 17,446,992
* Abernathy II	8,078,409	2,702,650
American Industrial Partners VII, LP	60,229,345	21,171,142
Angelo Gordon Credit Solutions Fund	106,554,158	15,325,340
Angelo Gordon Credit Solutions Fund II, LP	22,687,743	77,500,000
Apollo European Principal Finance Fund II	6,254,023	8,216,340
Apollo HK TMS Investments Holdings, LP	0	0
Axton Holdings	3,577,352,843	0
Blackstone Strategic Capital Holdings (Side Car)	99,455,933	7,593,052
Blackstone Strategic Capital Holdings, LP	129,499,449	27,265,390
Blue Peninsula Fund, LP	148,338,844	19,423,183
Broadriver III	148,538,691	61,596,382
BSCH II	109,608,171	154,715,672
BSCH Parallel (MLG) I, LP	281,211,175	0
Castle Credit SMRS Holdings, LLC	150,684,641	81,739,828
Centerbridge SCP III	13,335,618	3,025,715
Centerbridge SCP III, LP – Flex, LP	85,157,970	8,482,446
CircleUp Credit Fund I, LP	24,163,869	3,853,779
Clearlake Capital Partners VI, LP	104,788,775	0
Clearlake Opportunities Partners II, LP	36,551,877	43,460,283
Clearlake Opportunities Partners III, LP	0	100,000,000
Content Holdings, LLC	333,203,720	28,354,311
Credit Opportunity Fund III	8,750,414	19,335,463
FCO MA MI, LP	128,034,194	30,587,646
Financial Credit Investment II	234,966,832	265,946,931
Financial Credit Investment III	202,255,033	201,199,833
Green Equity Investors IX, LP	0	275,000,000
Green Range Holdings LLC	2,461,955,233	1,042,305,337
GSO Credit Alpha Fund	22,820,300	37,910,064
HarbourVest Direct Lending Fund (L), LP	78,273,393	45,000,000
Hopen Life Science Fund II	3,511,634	365,000
HPS Mezzanine Partners 2019, LP	46,187,690	7,908,933
HPS Red Cedar Fund	289,739,455	144,646,206
Jade Equity Investors II, LP	0	150,000,000
KKR Lending Partners	4,100,011	8,917,164

	Net Market Value	Unfunded Commitment
KKR Lending Partners II	10,040,985	11,737,239
MidCap Finco Holdings, LTD	314,149,754	0
New Fortress Energy HLDGS	1,257,857,024	0
Nyanza II, LLC	79,045,525	220,325,164
Orion Co-Investments III, LP	0	0
* Ren Venture Fund II	36,420,936	0
* Ren Venture Fund III	29,256,443	5,000,000
Riverside Credit Solutions FD I, LP	34,945,021	9,039,123
Shamrock Capital Content Fund I, L.P	26,601,260	36,976,009
Sixth Street Agriculture Partners I, LP	46,201,082	58,300,358
Sixth Street Growth Partners I, LP	256,690,089	83,447,520
Sixth Street Growth Partners II (A), LP	0	200,000,000
Sixth Street Opportunities Partners IV, LP	88,790,208	23,677,457
Sixth Street Opportunities Partners V (A), LP	21,363,364	103,636,636
Sixth Street SSLE II (USD Feeder)	34,777,255	84,838,204
Sixth Street TAO Partners, LP	225,858,936	120,568,259
SJC Direct Lending Fund II	0	38,261,315
SJC Direct Lending Fund III	127,576,928	21,105,434
SJC Direct Lending Fund III Co-Invest G-III	40,142,621	0
SJC Onshore Direct Lending Fund IV – SMRS, LP	137,074,017	253,746,044
* Social Network Holdings	260,163,070	5,590,289
Specialty Loan Fund III	196,114	5,638,845
Sycamore Partners III, LP	80,288,279	30,294,083
TPG Rise Climate I	23,148,028	230,104,641
Turning Rock Fund I, LP	55,937,414	16,319,293
Turning Rock Fund II	22,264,485	52,838,676
Vida Insurance Credit Opportunity Fund II	69,930,076	39,419,993
Warburg Pincus Energy, L.P.	67,338,680	4,000,000
Total Real Return and Opportunistic	\$ 12,553,017,473	\$ 4,565,859,664
Short-Term Investments & Other	170,329,020	
Grand Total	\$ 12,723,346,493	\$ 4,565,859,664

* Fund of Funds

** New Commitment

State of Michigan Retirement System

DEFINED CONTRIBUTION REVIEW

State of Michigan Investment Board Meeting
September 22, 2022



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	6/30/22	6/30/21
State of Michigan 401(k)	\$7,485	\$8,606
State of Michigan 457	1,759	2,084
Pension Plus 401(k) & 457	1,706	1,696
EAA	10	13
Total	\$10,960	\$12,400

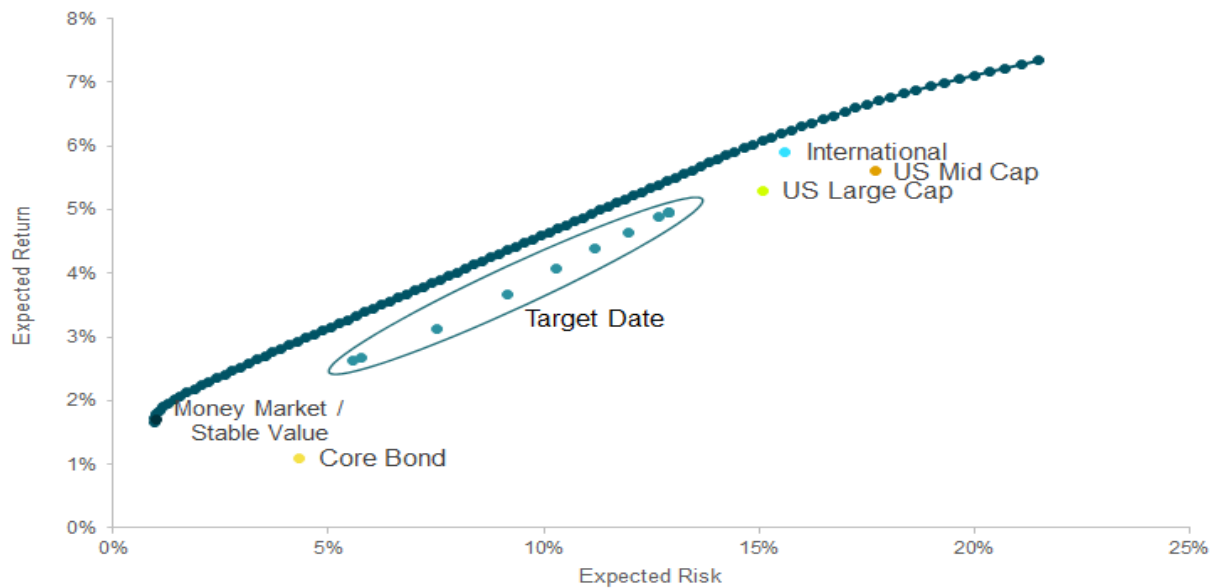
(\$ in millions)

*Loan Fund \$192M as of 6/30/22

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

Market Environment and Outlook

The U.S. and non-U.S. financial markets sustained sizeable losses in the second quarter — including commodities, which until June had posted positive returns. With stock market losses of more than 20%, large capitalization growth and technology stocks sank deeper into bear market territory.

Globally, bonds also sustained losses as persistent high inflation and attempts to control it by raising interest rates, sent yields up and prices down. The only assets to post positive returns were short maturity debt instruments such as one- to three-month U.S. Treasury bills.

Russia's war on Ukraine continued to warp market dynamics, pushing a surge in inflation. In response, the Federal Reserve pivoted to raising interest rates aggressively. The Fed policy response prompted worries that rate hikes would overshoot the need to curb inflation and cause a recession. Economic data began to show signs of slowdown in manufacturing and job growth, though prices continued to climb. On average, the number of S&P 500 companies issuing negative earnings per share (EPS) guidance for calendar year 2022 increased, though that number was about the middle of the range for the last 10 years. Investors responded to these signals with accelerated stock selling, which pressured prices lower.

In July, the Feds raised rates 75 bps lifting the federal funds rate to 2.25%. Stocks rallied after the Fed's raised rates and hinted that the pace of rates rises would eventually slow. Following the Fed's rate increase, the July Jobs report was much stronger than expected with 528,000 jobs added and unemployment falling to 3.5%. The stronger than expected employment data signaled the pace of interest rate hikes may be even faster to cool the economy, bond yields rose, and stocks declined.

Update on SECURE Act 2.0

In March, 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.

The House's version of Secure Act 2.0 focuses on incentivizing people to save more, improving retirement plans and lowering costs for employers.

Allow People to Save More

- **Expands automatic enrollment in retirement plans.** Automatically enroll all new, eligible employees at a 3% contribution rate that would tick up by 1% annually until it reaches 10%. Companies that are less than three years old or employ 10 or fewer people would be exempt, as would church plans and government plans.
- **Promotes the saver's credit.** Extra tax deductions when lower earners save for retirement. The bill increases the number of employees who qualify and sets the credit at 50%, rather than having it decline as you earn more. These changes would be implemented starting in 2027.

- **Raises catch-up contribution limits.** Employees ages 62 to 64 could contribute an additional \$10,000 to their 401(k) or 403(b) plans. Catch-up contributions for these plans are currently \$6,500 and \$3,000, respectively, for savers 50 or over. Meanwhile, beginning in 2023, these catch-up contributions would be taxed as Roth contributions, meaning they would be subject to income tax before being invested for retirement. The bill would also index the IRA catch-up contribution limit of \$1,000 to inflation.
- **Offers extra assistance to student loan borrowers.** Employees making payments on their student loans but not saving for retirement would be able to get employer matching contributions.

Improve Retirement Plans

- **Delay required minimum distributions (RMDs).** The original Secure Act increased the age when withdrawals were required to age 72. Secure Act 2.0 would increase it once again: to 73 by 2022, to 74 by 2029 and finally to 75 by 2032.
- **Make it easier to buy annuities.** Ease certain RMD requirements for annuity options and make Qualified Longevity Annuity Contracts (QLACs) more appealing by increasing the amount of your retirement savings you're allowed to use to buy a policy.
- **Allows collective investment trusts (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 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."

Lower Costs for Employers

- **Grant tax credits for small businesses.** The bill would change the three-year small employer startup tax credit by raising the credit to 100% from 50% for companies with up to 100 employees (up from 50), with a per-employee cap of \$1,000.
- **Help small 403(b) plans.** The Secure Act lowered costs and regulations so small businesses could join up and take part in so-called multiple employer plans (MEP). Secure Act 2.0 would extend that treatment to 403(b) plans, which are typically offered by nonprofits and government entities.
- **Ease up on plan paperwork.** The bill would also lessen penalties for some reporting mistakes.

Four months after the House passed their version of Secure Act 2.0, the Senate Finance Committee unanimously voted in favor of the EARN Act - Enhancing American Retirement Now and the Senate Health, Education, Labor and Pensions (HELP) Committee advanced the RISE and SHINE Act. Eventually the two bills will be consolidated into one package and voted upon by the entire Senate. Should it pass, the bill would then need to be reconciled with the House's version of Secure Act 2.0. While many of the individual provisions of both Senate bills were included in the House's Secure Act 2.0, there were a few distinct policies that could offer even more aid to retirement savers:

- **Emergency savings accounts.** The Rise & Shine Act would give companies the option to offer emergency savings accounts linked to an employee's retirement saving plan. Employees could opt to save up to 3% of their annual pay, or a maximum of \$2,500, as an after-tax contribution.
- **Encourage employees to invest for retirement.** If a workplace plan automatically enrolls its workers, yet a worker decides not to participate, the Rise & Shine Act would require employers to prompt these non-participating employees to reconsider their decision at least every three years.
- **Offer retirement plans for domestic employees.** The EARN Act would allow employers of domestic workers, such as nannies, to offer a retirement plan through a Simplified Employee Pension IRA (SEP IRA).

SMRS

Defined Contribution Strategies

6/30/22

Markets	Amount		% of Total	Fee per \$1,000
QDIA (\$ in Millions)				
	6/30/22	6/30/21		
Total Target Date Fund	\$3,177	\$3,351	29.0%	\$0.55
Tier I Index Funds				
State Street S&P 500 Index Fund	\$1,560	\$1,777		\$0.13
State Street Bond Market Index Fund	1,029	1,102		0.20
State Street Global All Cap Equity ex-U.S. Index Fund	724	870		0.45
State Street S&P Mid Cap Index Fund	647	771		0.20
BlackRock Government Short-Term Investment CL F	232	223		0.56
BlackRock S&P Small Cap 600 Equity Index CL F	156	187		0.30
BlackRock Emerging Markets Index CL F	106	147		0.69
Total Tier I Index	\$4,455	\$5,077	40.6%	\$0.25
Tier II Active Funds				
Stable Value Fund	\$1,273	\$1,234		\$2.20
Dodge & Cox Stock Fund	614	697		4.10
Jennison Large Cap Growth Fund	382	612		2.90
American Funds EuroPacific Growth R6	242	362		4.60
T. Rowe Price Mid-Cap Value Fund	139	150		6.20
Artisan Mid Cap Fund	116	186		6.90
Voya Small Cap Growth Equity Fund	115	175		3.30
PIMCO Total Return I Fund	103	123		4.70
Virtus Ceredex Small-Cap Value Eq I	63	76		6.50
Prudential High Yield Fund	41	46		3.80
Total Tier II Active	\$3,089	\$3,659	28.2%	\$3.44
Tier III				
Total Self Directed Brokerage Account	\$239	\$311	2.2%	NA
Total Defined Contribution Assets	\$10,960	\$12,400	100.0%	\$1.23

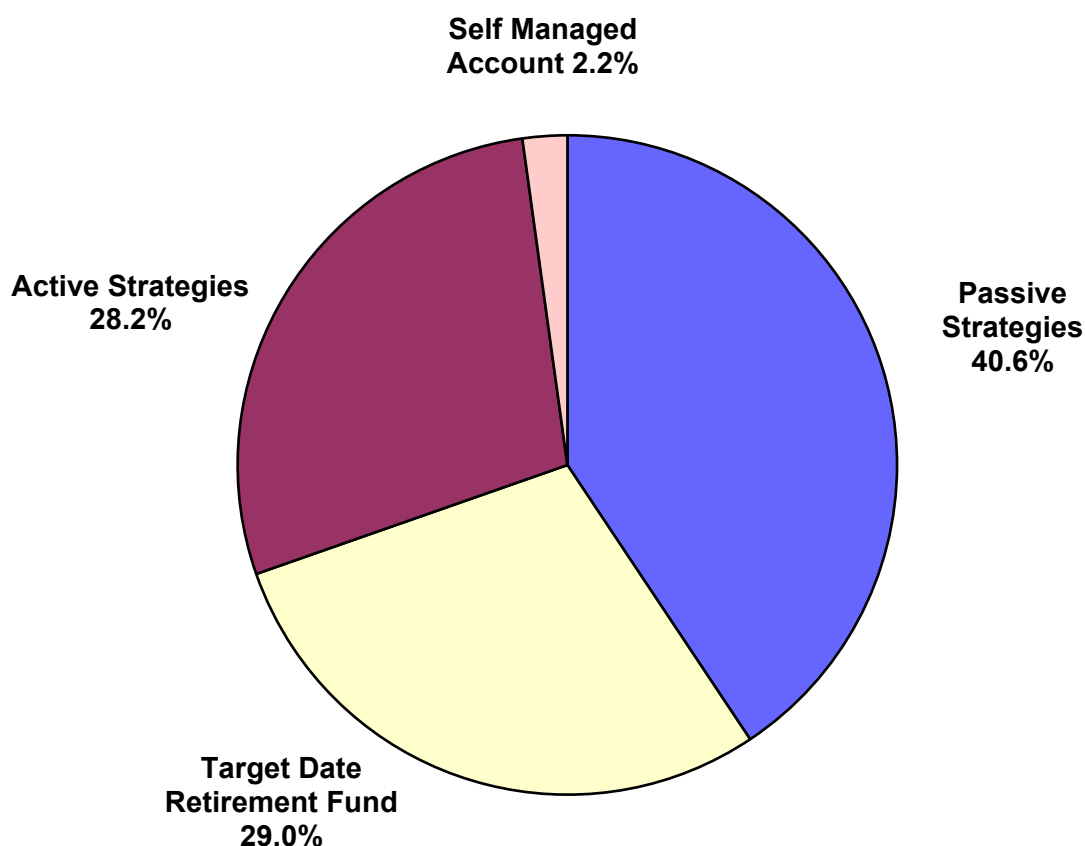
*Loan Fund \$192M as of 6/30/22

NOTE: Totals may not be exact due to rounding.

SMRS

Defined Contribution by Investment Strategy

6/30/22



Market Value in Millions				
	6/30/22		6/30/21	
Passive Strategies	\$4,455	40.6%	\$5,077	41.0%
Target Date Retirement Fund	3,177	29.0%	3,352	27.0%
Active Strategies	3,089	28.2%	3,659	29.5%
Self Managed Account	239	2.2%	311	2.5%
Total Investments	\$10,960	100.0%	\$12,400	100.0%

*Loan Fund \$192M as of 6/30/22

Note: Totals may not be exact due to rounding.

Defined Contribution Performance by Fund

6/30/22

<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	\$113,632,674	(8.1)	3.4	4.0	4.1
State Street Income Custom Index		(8.1)	3.3	4.0	4.2
Morningstar Target-Date Retirement		(10.5)	1.5	2.8	3.7
<i>Variance State Street Income Custom Index</i>		0.0	0.1	0.0	(0.1)
<i>Variance Morningstar Target-Date Retirement</i>		2.4	1.9	1.2	0.4
State Street Target Retirement 2020 Fund	\$131,196,827	(9.0)	4.3	5.0	6.2
State Street 2020 Custom Index		(9.1)	4.2	5.0	6.2
Morningstar Target-Date 2020		(12.1)	2.6	3.9	5.2
<i>Variance State Street 2020 Custom Index</i>		0.1	0.1	0.0	0.0
<i>Variance Morningstar Target-Date 2020</i>		3.1	1.7	1.1	1.0
State Street Target Retirement 2025 Fund	\$252,233,403	(11.9)	4.9	5.8	7.1
State Street 2025 Custom Index		(12.0)	4.9	5.7	7.1
Morningstar Target-Date 2025		(12.8)	3.2	4.4	6.1
<i>Variance State Street 2025 Custom Index</i>		0.1	0.0	0.1	0.0
<i>Variance Morningstar Target-Date 2025</i>		0.9	1.7	1.4	1.0
State Street Target Retirement 2030 Fund	\$314,846,044	(14.6)	5.0	6.0	7.5
State Street 2030 Custom Index		(14.7)	4.9	5.9	7.6
Morningstar Target-Date 2030		(13.7)	3.8	5.0	6.7
<i>Variance State Street 2030 Custom Index</i>		0.1	0.1	0.1	(0.1)
<i>Variance Morningstar Target-Date 2030</i>		(0.9)	1.2	1.0	0.8
State Street Target Retirement 2035 Fund	\$356,591,384	(15.7)	5.2	6.2	7.9
State Street 2035 Custom Index		(15.7)	5.2	6.2	8.0
Morningstar Target-Date 2035		(14.6)	4.5	5.6	7.5
<i>Variance State Street 2035 Custom Index</i>		0.0	0.0	0.0	(0.1)
<i>Variance Morningstar Target-Date 2035</i>		(1.1)	0.7	0.6	0.4
State Street Target Retirement 2040 Fund	\$359,844,555	(16.3)	5.5	6.5	8.3
State Street 2040 Custom Index		(16.3)	5.4	6.4	8.3
Morningstar Target-Date 2040		(15.3)	4.9	5.9	7.7
<i>Variance State Street 2040 Custom Index</i>		0.0	0.1	0.1	0.0
<i>Variance Morningstar Target-Date 2040</i>		(1.0)	0.6	0.6	0.6
State Street Target Retirement 2045 Fund	\$387,019,413	(16.9)	5.7	6.6	8.4
State Street 2045 Custom Index		(17.0)	5.6	6.6	8.5
Morningstar Target-Date 2045		(15.7)	5.3	6.3	8.2
<i>Variance State Street 2045 Custom Index</i>		0.1	0.1	0.0	(0.1)
<i>Variance Morningstar Target-Date 2045</i>		(1.2)	0.4	0.3	0.2
State Street Target Retirement 2050 Fund	\$496,332,297	(17.5)	5.8	6.7	8.5
State Street 2050 Custom Index		(17.5)	5.7	6.6	8.5
Morningstar Target-Date 2050		(16.0)	5.4	6.3	8.1
<i>Variance State Street 2050 Custom Index</i>		0.0	0.1	0.1	0.0
<i>Variance Morningstar Target-Date 2050</i>		(1.5)	0.4	0.4	0.4
State Street Target Retirement 2055 Fund	\$521,428,396	(17.4)	5.7	6.7	8.5
State Street 2055 Custom Index		(17.5)	5.7	6.6	8.5
Morningstar Target-Date 2055		(16.1)	5.5	6.4	8.5
<i>Variance State Street 2055 Custom Index</i>		0.1	0.0	0.1	0.0
<i>Variance Morningstar Target-Date 2055</i>		(1.3)	0.2	0.3	0.0

<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	\$229,441,394	(17.4)	5.7	6.7	N/A
State Street 2060 Custom Index		(17.5)	5.7	6.6	N/A
Morningstar Target-Date 2060		(16.1)	5.5	6.5	N/A
Variance State Street 2060 Custom Index		0.1	0.0	0.1	N/A
Variance Morningstar Target-Date 2060		(1.3)	0.2	0.2	N/A
State Street Target Retirement 2065 Fund	\$14,380,215	(17.5)	N/A	N/A	N/A
State Street 2065 Custom Index		(17.5)	N/A	N/A	N/A
Morningstar Target-Date 2065+		(16.5)	N/A	N/A	N/A
Variance State Street 2065 Custom Index		0.0	N/A	N/A	N/A
Variance Morningstar Target-Date 2065+		(1.0)	N/A	N/A	N/A
TIER 1					
State Street S&P 500 Index Fund	\$ 1,559,848,050	(10.6)	10.6	11.3	12.9
S&P 500 Index		(10.6)	10.6	11.3	13.0
Morningstar Large Blend		(11.8)	8.5	9.3	11.0
Variance S&P 500 Index		0.0	0.0	0.0	(0.1)
Variance Morningstar Large Blend		1.2	2.1	2.0	1.9
State Street Bond Market Index Fund	1,029,272,045	(10.3)	(0.9)	0.9	1.5
Bloomberg U.S. Aggregate Index		(10.3)	(0.9)	0.9	1.5
Morningstar Intermediate-Term Bond		(10.8)	(1.1)	0.6	1.6
Variance Bloomberg U.S. Aggregate Index		0.0	0.0	0.0	0.0
Variance Morningstar Intermediate-Term Bond		0.5	0.2	0.3	(0.1)
State Street Global All Cap Equity ex-U.S. Index Fund	724,313,619	(19.6)	1.8	2.7	5.2
MSCI ACWI ex USA IMI (Net)		(19.9)	1.6	2.5	5.0
Morningstar Foreign Large Blend		(18.8)	1.1	1.9	4.8
Variance MSCI ACWI ex USA IMI (Net)		0.3	0.2	0.2	0.2
Variance Morningstar Foreign Large Blend		(0.8)	0.7	0.8	0.4
State Street S&P Mid Cap Index Fund	647,005,420	(14.7)	6.8	7.0	10.8
S&P 400 Index		(14.6)	6.9	7.0	10.9
Morningstar Mid-Cap Blend		(14.0)	6.5	6.6	9.6
Variance S&P 400 Index		(0.1)	(0.1)	0.0	(0.1)
Variance Morningstar Mid-Cap Blend		(0.7)	0.3	0.4	1.2
BlackRock Government Short-Term Investment CL F	232,070,313	0.2	0.6	1.1	0.6
BofA Merrill Lynch US 3-Month Treasury Bill Index		0.2	0.6	1.1	0.6
Variance BofA Merrill Lynch US 3-Month Treasury Bill Index		0.0	0.0	0.0	0.0
BlackRock S&P Small Cap 600 Equity Index CL F	156,496,104	(16.8)	7.3	N/A	N/A
S&P SmallCap 600 Index		(16.8)	7.3	N/A	N/A
Morningstar Small Blend		(17.6)	5.3	N/A	N/A
Variance S&P SmallCap 600 Index		0.0	0.0	N/A	N/A
Variance Morningstar Small Blend		0.8	2.0	N/A	N/A
BlackRock Emerging Markets Index CL F	106,052,756	(25.2)	0.5	2.2	N/A
MSCI Emerging Market (Net)		(25.3)	0.6	2.2	N/A
Morningstar Diversified Emerging Mkts		(26.2)	0.0	1.4	N/A
Variance MSCI Emerging Market (Net)		0.1	(0.1)	0.0	N/A
Variance Morningstar Diversified Emerging Mkts		1.0	0.5	0.8	N/A
TIER 2					
Stable Value Fund	\$ 1,273,268,613	1.8	2.2	2.3	2.2
Bloomberg US Govt/Credit A+Interm Index		(6.7)	(0.2)	1.0	1.2
Hueler Universe		1.7	2.0	2.1	2.0
Variance Bloomberg US Govt/Credit A+Interm Index		8.5	2.4	1.3	1.0
Variance Hueler Universe		0.1	0.2	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	613,846,863	(7.3)	11.0	9.8	13.0
<i>Russell 1000 Value Index</i>		(6.8)	6.9	7.2	10.5
<i>Morningstar Large Value</i>		(5.0)	7.7	7.6	10.0
<i>Variance Russell 1000 Value Index</i>		(0.5)	4.1	2.6	2.5
<i>Variance Morningstar Large Value</i>		(2.3)	3.3	2.2	3.0
Jennison Large Cap Growth Fund	381,524,314	(32.8)	7.8	12.1	N/A
<i>Russell 1000 Growth Index</i>		(18.8)	12.6	14.3	N/A
<i>Morningstar Large Growth</i>		(24.6)	7.7	10.6	N/A
<i>Variance Russell 1000 Growth Index</i>		(14.0)	(4.8)	(2.2)	N/A
<i>Variance Morningstar Large Growth</i>		(8.2)	0.1	1.5	N/A
American Funds EuroPacific Growth R6	242,049,225	(27.7)	1.5	3.1	6.3
<i>MSCI EAFE Index - Net Div</i>		(17.8)	1.1	2.2	5.4
<i>Morningstar Foreign Large Blend</i>		(18.8)	1.1	1.9	4.8
<i>Variance MSCI EAFE Index - Net Div</i>		(9.9)	0.4	0.9	0.9
<i>Variance Morningstar Foreign Large Blend</i>		(8.9)	0.4	1.2	1.5
T. Rowe Price Mid-Cap Value Fund	139,268,671	(6.3)	9.5	7.4	11.1
<i>Russell Midcap Value Index</i>		(10.0)	6.7	6.3	10.6
<i>Morningstar Mid-Cap Value</i>		(8.0)	7.4	6.3	9.8
<i>Variance Russell Midcap Value Index</i>		3.7	2.8	1.1	0.5
<i>Variance Morningstar Mid-Cap Value</i>		1.7	2.1	1.1	1.3
Artisan Mid Cap Fund	115,722,073	(32.4)	5.9	10.1	11.5
<i>Russell Midcap Growth Index</i>		(29.6)	4.3	8.9	11.5
<i>Morningstar Mid-Cap Growth</i>		(29.2)	4.7	8.2	10.3
<i>Variance Russell Midcap Growth Index</i>		(2.8)	1.6	1.2	0.0
<i>Variance Morningstar Mid-Cap Growth</i>		(3.2)	1.2	1.9	1.2
Voya Small Cap Growth Equity Fund	115,249,744	(28.5)	0.3	2.2	8.0
<i>Russell 2000 Growth Index</i>		(33.4)	1.4	4.8	9.3
<i>Morningstar Small Growth</i>		(30.8)	3.7	7.1	9.8
<i>Variance Russell 2000 Growth Index</i>		4.9	(1.1)	(2.6)	(1.3)
<i>Variance Morningstar Small Growth</i>		2.3	(3.4)	(4.9)	(1.8)
PIMCO Total Return I Fund	103,376,401	(11.1)	(0.8)	1.0	1.9
<i>Bloomberg U.S. Aggregate Index</i>		(10.3)	(0.9)	0.9	1.5
<i>Morningstar Intermediate Core-Plus Bond</i>		(11.0)	(0.7)	1.0	1.9
<i>Variance Bloomberg U.S. Aggregate Index</i>		(0.8)	0.1	0.1	0.4
<i>Variance Morningstar Intermediate Core-Plus Bond</i>		(0.1)	(0.1)	0.0	0.0
Virtus Ceredex Small-Cap Value Eq I	63,416,300	(11.8)	3.2	4.3	8.6
<i>Russell 2000 Value Index</i>		(16.3)	6.2	4.9	9.1
<i>Morningstar Small Value</i>		(12.0)	7.6	5.2	8.8
<i>Variance Russell 2000 Value Index</i>		4.5	(3.0)	(0.6)	(0.5)
<i>Variance Morningstar Small Value</i>		0.2	(4.4)	(0.9)	(0.2)
Prudential High Yield Fund	40,896,962	(12.1)	1.0	2.9	N/A
<i>Bloomberg U.S. Corp. HY 1% Issuer Cap Index</i>		(12.8)	0.0	2.0	N/A
<i>Morningstar High Yield Bond</i>		(12.1)	(0.4)	1.3	N/A
<i>Variance Bloomberg U.S. Corp. HY 1% Issuer Cap Index</i>		0.7	1.0	0.9	N/A
<i>Variance Morningstar High Yield Bond</i>		0.0	1.4	1.6	N/A
TIER 3					
Self Directed	238,892,014				
TOTAL	\$10,959,516,088				

Loan Fund: \$191,599,430

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.