

STATE OF MICHIGAN INVESTMENT BOARD MEETING

December 9, 2021

State of Michigan Retirement System
Quarterly Investment Review



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

**STATE OF MICHIGAN INVESTMENT BOARD MEETING
DECEMBER 9, 2021**

Agenda



- 9:30 a.m.** **Call to Order and Opening Remarks**
Approval of the 9/16/21 SMIB Meeting Minutes
- 9:35 a.m.** **Executive Summary & Performance for Periods Ending 9/30/21**
Current Asset Allocation Review – Receive and File
Markets Review and Outlook – Receive and File
- 9:45 a.m.** **Guest Speaker:**
Jan Garfinkle, Founder and Managing Partner - Arboretum Ventures
- 10:15 a.m.** **Review of Investment Reports**

Fixed Income Update
- **Private Equity – Receive and File**
 - **Domestic Equity – Receive and File**
 - **International Equity – Receive and File**
 - **Real Return & Opportunistic – Receive and File**
 - **Real Estate & Infrastructure – Receive and File**
 - **Absolute Return – Receive and File**
 - **Defined Contribution – Receive and File**
- Basket Clause – Receive and File**
- 10:25 a.m.** **Guest Speaker:**
Jeffrey Moore, CFA - Fidelity Investments
- 10:55 a.m.** **Public Comment**
- 11:00 a.m.** **Closing Remarks ~ Adjournment**



2022 Meeting Schedule

Thursday, March 24, 2022
Thursday, June 23, 2022
Thursday, September 22, 2022
Thursday, December 8, 2022

All meetings start at 9:30 a.m.

State of Michigan Retirement System

MINUTES

State of Michigan Investment Board Meeting

December 9, 2021



Jon M. Braeutigam
Chief Investment Officer
Bureau of Investments

STATE OF MICHIGAN INVESTMENT BOARD

September 16, 2021 Meeting Minutes

Board Members Present

Chairman – Treasurer Rachael Eubanks – via Microsoft Teams - Lansing, MI
Ms. Dina Richard – via Microsoft Teams – Kewadin, MI
Mr. Reginald Sanders – via Microsoft Teams – Portage, MI
Mr. James Nicholson – Absent
Mr. David Massaron – Absent

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

Jon Braeutigam	Lori Barrett	Todd Warstler
Robert Brackenbury	Patrick Moraniec	Jack Behar
Karl Borgquist	Daniel Quigley	Semone James
Greg Parker	Woodrow Tyler	Lan Chen
Jim Elkins	Mark Porrell	Travis Haney
Peter Woodford	Karen Stout	Max Kotary
Annette Russell	Molly Jason	Craig Coulter
Jamie Prevo	Pavel Stolarczyk	Jim Lim
Allison Wardlaw	Taylor Broekstra	Erin Mock
Tim McEnery	Ryan Rathman	Nick Tawil
Giles Feldpausch	Mary Pollock	Steve Cummings
Chad Houghton	Barb Becker	John Karagoulis
Dave Klauka	Betty Nicklesen	Aaron Bandy
Mitchell Brussel	Lewis Brody	

Many others were present via Microsoft Teams teleconference.

Opening Remarks:

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

Approval of Minutes:

Approval of the June 10, 2021 SMIB Meeting Minutes – Motion to approve by Reginald Sanders.
Seconded: Dina Richard. The vote was unanimous to approve.

AGENDA

Executive Summary

Mr. Jon Braeutigam, Chief Investment Officer for the Bureau of Investments, reviewed the executive summary performance section discussing performance returns and markets as of June 30, 2021.

Mr. Braeutigam stated that the 1-year return ending June 30, 2021, was 33.4%. It was a great year for most markets and most pension funds, producing the best return since 1983 on an absolute basis. On a relative basis, the SMRS compared well to peers at 27.3%. He stated that

the best benchmark is the long-term return because that is what the system is dependent on, not just any one year. One-year returns have a lot of volatility. In this timeframe, the volatility was on the upside, but that is not always the case, as we all know.

The 10-year return was 10.4% and that compares to peer returns of 9.2%. Looking at the absolute returns, it has been a very good 10 years. It has been a declining interest rate period and that is a win to both the equity and the bond markets. Over that time, the markets have been very favorable to investors, especially risk investors.

Mr. Braeutigam discussed market values and market value percentages by plan. He reviewed asset allocation stating that it is broadly diversified, mostly slanted towards equity, explaining the reasons for this. Asset allocation targets were reviewed as well as sources and uses of cash.

Mr. Braeutigam stated that 20 new commitments were made during the quarter. Twelve of these were in the private equity area, five in the real estate area, one in real return and two were absolute return commitments. No one commitment was greater than \$150 million. Questions were presented and answered.

Asset Allocation Review, Markets Review and Outlook

Mr. Gregory Parker, Director of Investments – Public Markets discussed the market review and outlook section.

Mr. Parker first discussed the Annual Total Returns of Key Asset Classes 2001-2020 chart stating its value. He briefly explained the Capital Markets assumptions table which comes from SMRS's consultant AON. The presented return and risk assumptions are in line with most market strategists. In general, the assumed rates of return have been trending lower over the past few years. Mr. Parker explained the capital markets graph, stating that in order to earn the 6 to 8% rate of return it is necessary to be invested in higher risk assets.

Mr. Parker discussed the US Treasury curve over the various maturities. The graph shows that longer term interest rates have increased a little bit by about 1/2% to 3/4%. On the short end, rates have actually fallen. The graph of the S&P 500 was explained, stating that over the past year there has been like a "rocket ship" of appreciation in the market. Some of the money that is affecting the short-term market is finding its way into the equity markets. The foreign markets have increased as well partly due to money flowing into the foreign markets.

Mr. Parker stated that risk assets continue to do very well and yet we still believe that the future long-term rates of return are going to be below average. This is due to starting valuations and starting interest rates, but also perhaps some of the future returns are being realized in the near term.

Review of Venture Capital

Mr. Travis Haney, Senior Investment Manager and Mr. Ryan Rathman, Senior Assistant Investment Manager explained the Venture Capital Division story and how the division got to where it is currently, providing commentary on performance and highlights in new areas they continue to work on.

Mr. Rathman began by stating that the State of Michigan has been investing in venture capital, and private equity more broadly, since 1983. In 2016 the Venture Capital Division (VCD) was established from the Private Equity division. The VCD believes there is value in investing in thoughtful growth investments and continues to invest with its core platform managers while

selectively investing with specialized growth managers. The Division has grown substantially, beginning with 11 managers to now having 41.

Mr. Haney then touched on how much work it takes to cultivate relationships and that work is not accomplished without a great team. He could not be happier with the current team. He also stated that although there are now 41 managers, they are not all large managers.

He stated that equities have been very good across the board. Returns have been fantastic and given the focus in tech and healthcare, those spaces have done well as a result of the pandemic and the acceleration of the digital shift.

The VCD performance is remarkable, having earned a 105.9% 1-year return. The co-investments have generated \$550 million in fee savings. Mr. Haney explained the portfolio's value creation, stating that the portfolio had an NAV starting 3-31-20 of \$1.6 billion and in one year generated almost \$1.7 billion in additional value for the fund. On top of that, it generated \$700 million in distributions which is money placed back in the bank to be distributed to the beneficiaries.

Mr. Rathman wrapped up, discussing potential areas of expansion for the division. Mr. Haney answered questions that were presented and then introduced the guest speaker.

Guest Speaker – Jim Lim, Managing GP – Greenspring Associates

Mr. Lim presented an overview of Greenspring Associates and their relationship with SMRS. He explained the venture capital environment including current tailwinds and headwinds, gave a global venture capital update and discussed emerging managers. He fielded questions from the Board.

Review of remaining Investment Reports and Basket Clause – Received and Filed

Public Comment:

One comment was placed, a resident of Detroit, taxpayer and a member of the Downtown Crenshaw Rising group expressed concern regarding SMRS's investment in the Baldwin Hills Crenshaw Mall.

Closing Remarks

Chairman Eubanks stated that the next meeting is scheduled for December 9, 2021 and will be held via Microsoft Teams.

Adjournment:

Motion to adjourn by Reginald Sanders. Seconded by Dina Richard. The meeting concluded at 11:03 am.

Approved:

Rachael Eubanks, Chairman

State of Michigan Retirement System

EXECUTIVE SUMMARY

State of Michigan Investment Board Meeting

December 9, 2021



Gregory J. Parker, CFA

Director of Investments – Public Markets

Director of Asset Allocation

Bureau of Investments

EXECUTIVE SUMMARY

September 30, 2021

Performance

Great peer comparison.

MPSERS Plan (9/30/21)	1-Year	3-Years	5-Years	7-Years	10-Years
Annualized Returns	27.7%	12.4%	12.5%	10.3%	11.4%
Policy Returns	20.6%	11.7%	11.8%	10.1%	11.3%
Peer Median Returns*	22.5%	11.2%	10.7%	8.9%	10.2%

*State Street Universe greater than \$10 billion.

- In aggregate, the SMRS market value as of September 30, 2021 was \$95.4 billion, which is the highest level in its history.
- 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 was in the lowest quartile for the longer time horizons.
- Over a very long horizon, since 1979, the annualized rate of return on the plan assets has been approximately 9.7%.
- Compounding at higher than peer returns can add significant value. For example, based on the \$47.5 billion September 2011 market value, a ten-year annualized return of 11.4% compared to the 10.2% peer median return has added approximately \$14.4 billion in excess value.
- Most asset classes earned returns comparable to or better than peer median returns over the longer-term in addition to meeting or exceeding the asset class specific benchmarks.

Asset Allocation

A low return environment.

- Given the low rates of return available in the capital markets for safe assets, and in order to earn the actuarial rate of return, additional risks (primarily equity risk) must be assumed. At the end of September 2021, the equity risk (beta) is approximately 0.37 which is the lowest measurement in three decades, and it is lower than peer median at approximately 0.58.
- Liquidity is another fundamental risk assumed and it is managed through asset allocation. The plans have outstanding capital commitments to fund approximately \$15.8 billion in illiquid assets, primarily in private equity. In the June 2021 quarter, \$1.6 billion of new commitments were made.
- The combined systems paid out approximately \$1.65 billion net of contributions over the past twelve months ending in September 2021. Over the past year, the allocation to private equity was reduced by \$1.05 billion, real estate by \$243 million, long-term fixed income was reduced by \$112 million, real return & opportunistic by \$72 million, short term cash by \$21 million, and domestic equity by \$18 million. Over the past year, the allocation to absolute return increased by \$842 million and the allocation to international equity by \$65 million.

NEW COMMITMENTS

July 1, 2021 – September 30, 2021

(\$ Millions)

Asset class	Fund Name / (Managed By)	Commitment
Private Equity		
	Carlyle Partners VIII, L.P. (TC Group VIII, LLC)	\$ 200
	Clearlake Capital Partners VII, L.P. (Clearlake Capital Management VII, L.P.)	200
	Riverside Micro-Cap Fund VI, L.P. (Riverside Partners, LLC)	125
	Carlyle Partners Growth, L.P. (CP Growth GP, LLC)	50
	Permira Growth Opportunities II SCSp (Permira Portfolio Management Limited)	50
	Michigan Growth Capital Partners IV, L.P. (Beringea Invest Michigan, LLC)	25
Real Return & Opportunistic Division		
	TPG Rise Climate I (TPG Capital)	250
	Nyanza II, LLC (Great Mountain Partners, LLC)	150
	Angelo Gordon CSF II, L.P. (Angelo Gordon)	100
Fixed Income Division-Absolute Return		
	SMRS-HVDL LLC (HarbourVest Partners)	300
	Farallon Special Situations Fund II, L.P. (Farallon Capital Management)	100
TOTAL		\$1,550

State of Michigan Retirement System

PERFORMANCE

State of Michigan Investment Board Meeting

December 9, 2021



Jon M. Braeutigam
Chief Investment Officer
Bureau of Investments

Bureau of Investments

Mission Statement

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

SMRS Goals

Maintain sufficient liquidity to pay benefits.

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

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

Diversify assets to reduce risk.

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

MPSERS PENSION

Time-Weighted Rates of Return

Periods Ending September 30, 2021

	% of Portfolio 9/30/21	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	11.4	11	10.3	11	12.5	16	12.4	17	27.7	9	2.2	26
Median - Greater than \$10 Billion ²		10.2		8.9		10.7		11.2		22.5		1.4	
MPSERS Total Plan Policy		11.3		10.1		11.8		11.7		20.6		2.0	
PRIVATE EQUITY AND VENTURE CAPITAL	23.3	16.1	9	16.8	13	20.7	10	22.6	11	55.3	15	11.2	16
Median ²		11.3		10.6		12.2		12.8		34.5		6.7	
Private Equity and VC Benchmark ³		18.3		17.5		21.1		22.2		44.9		9.3	
DOMESTIC EQUITIES	23.0	16.6	16	13.6	22	17.0	13	14.8	18	33.4	15	-0.9	76
Median ²		14.4		11.2		14.1		13.9		29.6		-0.3	
S&P 1500 Index		16.5		13.8		16.6		15.5		31.4		0.4	
INTERNATIONAL EQUITIES	16.3	9.0	35	7.3	38	10.3	41	9.8	34	26.0	56	-3.0	76
Median ²		8.8		6.7		9.9		9.3		26.2		-1.9	
MSCI ACWI ex USA Net Index		7.6		5.7		8.9		8.0		23.9		-3.0	
REAL RETURN AND OPPORTUNISTIC	12.2	11.7		11.5		13.6		13.8		24.2		-0.9	
50% (CPI + 4%) + 50% (actuarial rate) ⁴		7.2		7.2		7.3		7.0		8.3		1.8	
FIXED INCOME	10.1	4.2	30	4.5	23	4.2	27	5.7	64	4.0	9	0.6	16
Median ²		4.1		3.8		3.7		5.9		0.1		0.1	
Bloomberg US Agg Index		3.0		3.3		2.9		5.4		-0.9		0.1	
REAL ESTATE & INFRASTRUCTURE	7.0	9.2	52	8.1	54	6.9	49	4.8	59	13.7	49	6.1	32
Median ²		9.3		8.1		6.8		5.9		12.6		3.5	
NCREIF Property Index ⁵		7.6		6.7		5.5		5.4		10.7		4.9	
NCREIF Open Fund Index Net		8.9		7.9		6.6		6.1		13.6		6.4	
ABSOLUTE RETURN	5.4	6.0		5.2		7.2		7.4		15.6		2.2	
1-Month T-Bill + 400 bps		4.6		4.8		5.1		5.1		4.1		4.0	
HFR Benchmark ⁶		3.7		3.5		4.8		5.3		12.4		0.7	
CASH EQUIVALENTS	2.7	1.0		1.2		1.5		1.5		0.2		0.1	
1 Month T-Bill		0.6		0.8		1.1		1.1		0.1		0.0	

¹ Annualized Returns and Percentile Rank.

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

³ SP500 + 300 bps with a 3 month lag.

⁴ History prior to 12/1/18 reflects 50% (CPI +5%) + 50% (actuarial rate). Current actuarial rate is 6.8%.

⁵ NCREIF Property Index is NPI minus 130 bps.

⁶ 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 9/30/21

	1 Year	2 Year	3 Year	4 Year	5 Year	6 Year	7 Year	8 Year	9 Year	10 Year
MPSERS	27.7	16.0	12.4	12.2	12.5	11.7	10.3	11.0	11.1	11.4
Public Plan - Median (> \$10 billion)*	22.5	14.8	11.2	10.3	10.7	10.4	8.9	9.2	9.6	10.2
Rank	9	15	17	12	16	16	11	7	6	11
bp Difference - Median	521	120	123	193	184	129	142	180	156	119

Consecutive For Years Ending

	09/21	09/20	09/19	09/18	09/17	09/16	09/15	09/14	09/13	09/12
MPSERS	27.7	5.3	5.6	11.6	13.8	7.6	2.6	15.6	12.5	13.4
Public Plan - Median (> \$10 billion)*	22.5	6.8	5.5	8.0	12.8	9.4	-0.2	10.1	12.7	15.1
Rank	9	84	49	6	22	90	6	5	55	74
bp Difference - Median	521	-153	6	358	103	-177	279	551	-20	-169

MSERS

Cumulative For Years Ending 9/30/21

	1 Year	2 Year	3 Year	4 Year	5 Year	6 Year	7 Year	8 Year	9 Year	10 Year
MSERS	27.8	16.0	12.4	12.2	12.5	11.7	10.3	11.0	11.1	11.4
Public Plan - Median (> \$1 billion)*	22.4	14.8	11.1	10.2	10.7	10.4	8.9	9.1	9.6	10.1
Rank	6	21	17	14	21	21	14	4	12	17
bp Difference - Median	544	115	133	199	185	126	144	189	155	123

Consecutive For Years Ending

	09/21	09/20	09/19	09/18	09/17	09/16	09/15	09/14	09/13	09/12
MSERS	27.8	5.3	5.6	11.5	13.8	7.6	2.6	15.5	12.5	13.4
Public Plan - Median (> \$1 billion)*	22.4	7.5	4.7	8.4	12.7	9.7	-0.2	10.3	12.4	15.3
Rank	6	83	34	7	27	89	5	5	50	79
bp Difference - Median	544	-221	87	310	109	-209	277	522	6	-192

*State Street Public Funds Universe

Cumulative and Consecutive Total Fund Returns

MSPRS

Cumulative For Years Ending 9/30/21

	1 Year	2 Year	3 Year	4 Year	5 Year	6 Year	7 Year	8 Year	9 Year	10 Year
MSPRS	27.7	16.0	12.4	12.2	12.5	11.7	10.3	10.9	11.1	11.3
Public Plan - Median (> \$1 billion)*	22.4	14.8	11.1	10.2	10.7	10.4	8.9	9.1	9.6	10.1
Rank	7	22	20	15	22	21	15	5	16	20
bp Difference - Median	536	113	131	197	184	125	143	186	153	119

Consecutive For Years Ending

	09/21	09/20	09/19	09/18	09/17	09/16	09/15	09/14	09/13	09/12
MSPRS	27.7	5.3	5.6	11.5	13.8	7.6	2.5	15.5	12.4	13.3
Public Plan - Median (> \$1 billion)*	22.4	7.5	4.7	8.4	12.7	9.7	-0.2	10.3	12.4	15.3
Rank	7	82	35	7	27	89	5	5	50	86
bp Difference - Median	536	-218	84	309	109	-210	276	514	1	-205

MJRS

Cumulative For Years Ending 9/30/21

	1 Year	2 Year	3 Year	4 Year	5 Year	6 Year	7 Year	8 Year	9 Year	10 Year
MJRS	26.4	15.4	12.0	11.9	12.3	11.5	10.2	10.7	10.9	11.2
Public Plan - Median (> \$1 billion)*	22.4	14.8	11.1	10.2	10.7	10.4	8.9	9.1	9.6	10.1
Rank	11	30	27	18	22	23	19	10	20	21
bp Difference - Median	405	53	92	168	162	107	127	166	131	106

Consecutive For Years Ending

	09/21	09/20	09/19	09/18	09/17	09/16	09/15	09/14	09/13	09/12
MJRS	26.4	5.3	5.6	11.5	13.9	7.6	2.5	14.9	12.1	13.9
Public Plan - Median (> \$1 billion)*	22.4	7.5	4.7	8.4	12.7	9.7	-0.2	10.3	12.4	15.3
Rank	11	82	35	7	27	89	5	5	62	67
bp Difference - Median	405	-217	85	307	117	-209	274	457	-33	-139

*State Street Public Funds Universe

State of Michigan Retirement System

ASSET ALLOCATION REVIEW

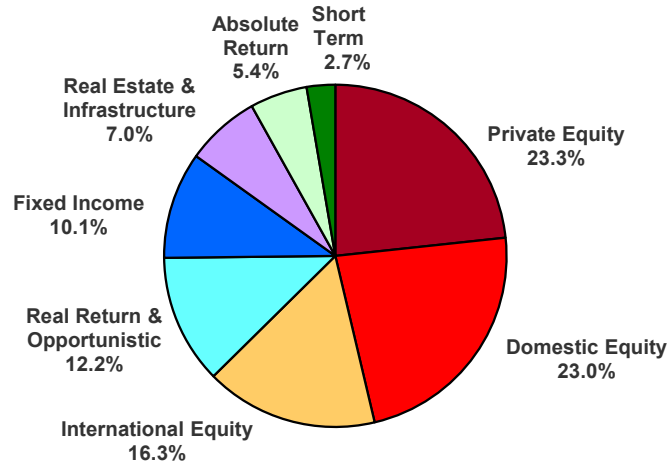
State of Michigan Investment Board Meeting
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Jon M. Braeutigam
Chief Investment Officer
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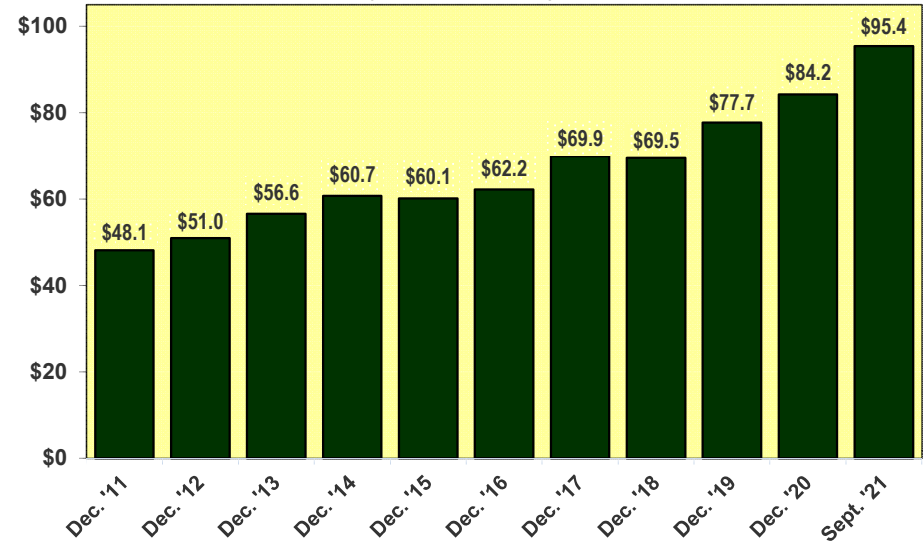
STATE OF MICHIGAN RETIREMENT SYSTEM PROFILE - SEPTEMBER 2021

Asset Allocation ~ 9/30/21



Market Value*

(Billions of Dollars)



Asset Allocation By Market Value
(In Millions)

Investment Strategies	9/30/2021		9/30/2020	
Private Equity	\$22,255	23.3%	\$15,206	19.9%
Domestic Equity	21,958	23.0%	16,491	21.6%
International Equity	15,538	16.3%	12,315	16.1%
Real Return & Opportunistic	11,600	12.2%	9,456	12.4%
Fixed Income	9,656	10.1%	9,448	12.4%
Real Estate & Infrastructure	6,710	7.0%	6,180	8.1%
Absolute Return	5,116	5.4%	3,707	4.8%
Short Term***	2,568	2.7%	3,613	4.7%
TOTAL	\$95,401	100.0%	\$76,416	100.0%

Market Value By Plan ~ 9/30/21

(in Millions)

	Pension Plan Mkt. Value	OPEB** Mkt. Value	Combined Mkt. Value	%
MPERS	\$63,135	\$10,450	\$73,585	77.1%
MSERS - (closed)	14,486	4,830	19,316	20.3%
MSPRS	1,830	358	2,188	2.3%
MJRS - (closed)	300	12	312	0.3%
TOTAL	\$79,751	\$15,650	\$95,401	100.0%

MSERS includes the Military Pension Fund

Short Term Equivalents (in Billions)

Short Term Strategy***	\$2.6	
Short Term in Other Inv. Strategies	2.3	
TOTAL SHORT TERM	\$4.9	5.1% of Total Funds

15th Largest State Public Retirement System in the U.S.

Pensions & Investments survey - February 8, 2021 issue

*The combined net payout for the plans for FY 2020 was \$1.6 billion with \$22.9 billion paid out FY 2010 thru FY 2020 (Pension CAFRs). This represents the amount paid to beneficiaries in excess of employer and employee contributions.

**OPEB - Other Post Employment Benefits

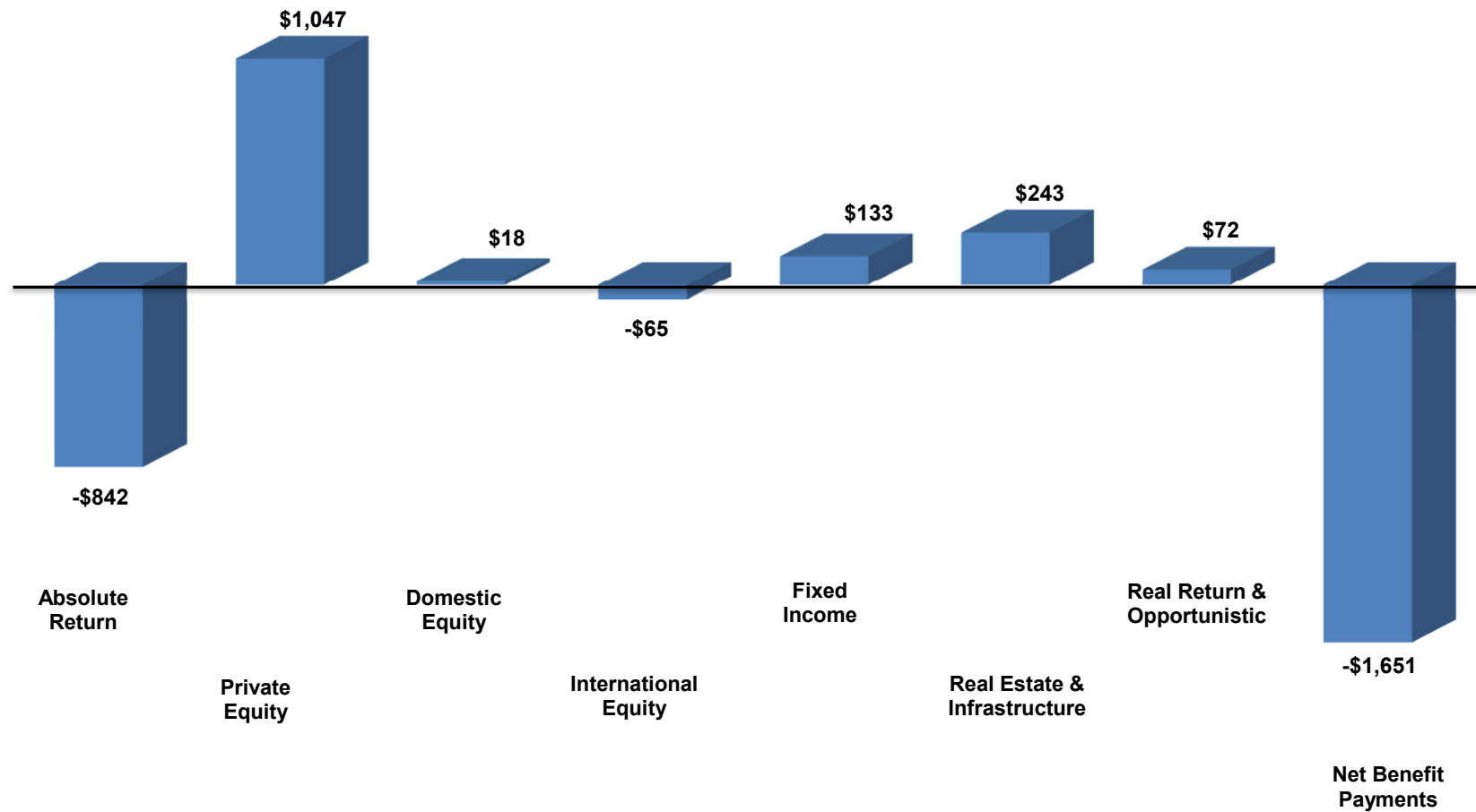
Sources and Uses of Cash

October 2020 ~ September 2021

10/01/20 Short-Term Cash Balance: \$ 3,614

9/30/21 Short-Term Cash Balance: 2,570

Net Short-Term Cash Decrease: \$1,044



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 9/30/21

	MPSERS		MSERS		MSPRS		MJRS		SMRS
Asset Class	9/30/21	Target*	9/30/21	Target*	9/30/21	Target*	9/30/21	Target*	Ranges
Private Equity	23.3%	16.0%	23.3%	16.0%	23.3%	16.0%	23.3%	16.0%	13% - 25%
Domestic Equity	23.0%	25.0%	23.0%	25.0%	23.0%	25.0%	23.0%	25.0%	17% - 32%
International Equity	16.3%	15.0%	16.3%	15.0%	16.3%	15.0%	16.3%	15.0%	12% - 22%
Real Return & Opportunistic	12.2%	12.5%	12.7%	12.5%	12.2%	12.5%	12.2%	12.5%	8% - 18%
Long Term Fixed Income	10.1%	10.5%	10.3%	10.5%	10.1%	10.5%	10.1%	10.5%	8% - 18%
Real Estate & Infrastructure	7.0%	10.0%	7.0%	10.0%	7.0%	10.0%	7.0%	10.0%	8% - 18%
Absolute Return	5.4%	9.0%	5.1%	9.0%	5.4%	9.0%	5.4%	9.0%	5% - 11%
Short Term Fixed Income	2.7%	2.0%	2.2%	2.0%	2.7%	2.0%	2.7%	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

December 9, 2021



Gregory J. Parker, CFA

Director of Investments – Public Markets

Director of Asset Allocation

Bureau of Investments

CAPITAL MARKETS

Return and Risk Assumptions, Benchmark and Outlook

A starting point.

MPSERS Plan	Assumed Return* (Arithmetic)	Standard Deviation*	Trailing 10-Year (Benchmark**)
Private Equity	11.0%	25.0%	18.3%
International Equity	8.8%	21.5%	7.6%
Real Ret/Opportunistic	8.1%	9.5%	7.2%
Domestic Equity	7.1%	18.2%	16.5%
Real Estate (Core)	7.6%	15.0%	7.6%
Absolute Return	4.9%	9.0%	3.7%
Long-Term Fixed Income	2.1%	4.0%	3.0%
Short-Term	1.7%	1.5%	0.6%

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

** Investment Policy Statement; Annualized Returns

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

Overview

A market update.

- Capital market assumptions used for determining strategic asset allocations are being reduced across the board, and especially for safer, publicly traded fixed income securities. This is the general opinion for most consultants, investment banks, and other market participants. The reason for this phenomenon is the low interest rate environment caused by the policies of the Federal Reserve (Fed) and other central banks, as well as the run-up in prices for most risk assets over the past several years.
- Fundamentally, the market's returns on equity continue to be historically higher than average and some of the largest companies in the market today are less cyclical (economically sensitive) than past market leaders. These facts lend support to the argument that higher valuations are justified, and therefore the market could perhaps continue to deliver historical average rates of return in the future.
- The commodities prices broadly, as measured by the CRB index, are up sharply at 54% over the 12-month period ending September 2021. Many economists maintain the viewpoint that these prices reflect some short-term supply and demand imbalances. Alternative viewpoints suggest that the Federal Reserve's monetary policies, and the U.S. government's fiscal policies have created structural imbalances and will cause longer-term inflation to be higher than normal.
- Despite the negative real yields, at the end of September the market is only pricing in one Federal Reserve interest rate hike by the end of 2022.
- Dividend yields on REITs at the end of September 2021 were estimated to be around 2.8%, which is nearly 1.3% higher than the yield of the 10-year U.S. Treasury. This is at the historical metric and may be seen as fairly attractive.

U.S. Fixed Income

Tough valuations in Fixed Income.

- Interest rates in the U.S. were virtually unchanged for the quarter ending September 2021.
- Longer term interest rates have been rising over the past year, however short-term rates (1 year maturity and in) continued to fall. Because of this, the U.S. Treasury rate curve is slightly steeper than average.
- 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.
- Despite the negative real yields, at the end of September the market is only pricing in one Federal Reserve interest rate hike by the end of 2022.
- Both investment grade and high yield spreads have tightened considerably. Today spreads are at their tightest levels since the early months of 2007.
- Some believe that rates have upward pressure due to a healing economy and inflation rates higher than nominal rates. This potentially places some stronger headwinds on bond returns. However, as long as the Federal Reserve's policy rate remains at these levels, the shape of the yield curve could put a lid of sorts on the longer dated rates.
- At the end of September 2021, the 10-year U.S. Treasury rate was at 1.49%. A 10-year U.S. Treasury rate of 2.0 – 2.5% would be at the top end of the trading range for longer rates going back to the 1980's.

Domestic Equity

Another good quarter for risk assets.

- The broad U.S. stock market return for the one year ending September 2021 was 31.4%.
- Many domestic equity valuation metrics are above historical averages. Consequently, the returns over the next cycle may not be as strong as the historical average of 11% – 12% year-over-year total returns.
- Fundamentally, the market's returns on equity continue to be historically higher than average and some of the largest companies in the market today are less cyclical (economically sensitive) than past market leaders. These facts lend support to the argument that higher valuations are justified, and therefore the market could perhaps continue to deliver historical average rates of return in the future.
- The year ending September 2021 was great for risk assets. The small cap Russell 2000 outperformed the larger cap S&P 500 by 17.7%. The value style also had a good year relative to the growth style, outperforming by 9.1%. However, over longer time periods, value and small caps have underperformed.

International Equity

Trailing U.S. equities.

- International equities underperformed domestic equities for the year ending September 2021 by -7.4%. Over the past three, five, seven, and ten years, the international market index, MSCI ACWI ex USA, underperformed the S&P 1500 index by -7.5%, -7.6%, -8.2%, and -9.0% annualized, respectively.
- Within international equities, emerging market returns lagged developed markets over the past year, underperforming by -8.3%.
- Based on a price-to-earnings valuation multiple, excluding non-earning companies, developed international markets trade at approximately a 30% discount to U.S. counterparts while emerging markets are at a 40% discount.

Real Estate

Comparing public vs. private real estate.

- Over the one year ending September 2021, the NAREIT index increased by 31.5% including dividends which was 17.9% higher 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 September 2021 were estimated to be around 2.8%, which is nearly 1.3% higher than the yield of the 10-year U.S. Treasury. This is at the historical metric and may be seen as fairly attractive.

Hedge Funds

Estimating the asset class return.

- Over the past five years, the Absolute Return portfolio's return has had a monthly beta of approximately 0.2 and annualized alpha of 2.1%.
- Based on an expected annualized equity market return of approximately 7.1%, should historical hedge fund betas and alphas continue, a 3.5% annualized net return seems like a reasonable assumed rate of return for hedge funds. This return is approximately 3-month U.S. Libor plus 350 basis points. However, it should also be noted that in the past after times of market dislocations, the realized alpha has been higher.

Commodities





Inflation; transitory or something else?





- As the economic recovery has gained momentum, and Fed policy remains ultra-accommodative, the attention has turned towards inflation.
- The commodities prices broadly, as measured by the CRB index, are up sharply at 54% over the 12-month period ending September 2021. Many economists maintain the viewpoint that these prices reflect some short-term supply and demand imbalances. Alternative viewpoints suggest that the Federal Reserve's monetary policies, and the U.S. government's fiscal policies have created structural imbalances and will cause longer-term inflation to be higher than normal.

Annual Total Returns of Key Asset Classes 2001 - 2020

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

	Annualized Returns 2001 - 2020																			
Return Risk		Cash		Infl.		Hedge		Gov't		Int'l		Corp.		US Eq.		R.E.				Return Risk
		1.50%		2.04%		3.19%		4.34%		5.69%		6.10%		7.71%		8.19%				
		0.83%		1.34%		5.28%		4.61%		19.88%		5.60%		17.32%		4.61%				

 - 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

FIXED INCOME REVIEW

State of Michigan Investment Board Meeting
December 9, 2021



Daniel J. Quigley
Senior Investment Manager
Fixed Income Division

EXECUTIVE SUMMARY

Performance

MPSERS Plan (9/30/21)	1-Year	3-Years	5-Years	7-Years	10-Years
Annualized Returns	4.0%	5.7%	4.2%	4.5%	4.2%
Bloomberg Barclays US Agg	-0.9%	5.4%	2.9%	3.3%	3.0%
Peer Median Returns	0.1%	5.9%	3.7%	3.8%	4.1%
Percentile Rank vs. Peers*	9	64	27	23	30

*State Street Universe greater than \$1 billion

- The fixed income portfolio outperformed its benchmark and peer group on a one-year basis. This outperformance was driven by a continued recovery in risk assets, particularly for structured fixed income and high yield bonds. The portfolio also maintains a shorter duration than the benchmark, which has helped recent performance as interest rates have increased over the past year.
- The negative performance of the U.S. Aggregate Bond Index on a one-year basis was driven by the increase in intermediate and long-term interest rates. U.S. Treasuries and RMBS had a negative performance, returning -3.3% and -0.4% respectively on a one-year basis. Investment Grade Corporate bonds had a one-year return of 1.7% as credit spread tightening helped to offset interest rate related price declines.
- The year-over-year (YOY) tightening of spreads for high yield credit and structured credit securities was the main driver of performance on a one-year basis. The High Yield Fixed Income sleeve of the portfolio had a one-year return of 11.1% while the Structured Fixed Income sleeve returned 10.3% on a year-over-year (YOY) basis.

Strategy Update

- The objective of the Fixed Income Division portfolio is to meet or exceed the returns of the Bloomberg U.S. Aggregate Bond Index while satisfying the overall characteristics of a core fixed income portfolio. These characteristics are: income, liquidity, principal preservation, and diversification from equity market risk. The portfolio has a higher yield than the benchmark while having a risk profile that is similar to the long-term volatility experienced in traditional core fixed income. The yield-to-maturity of the portfolio is currently 2.8% versus a benchmark yield of 1.6%. 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 September 30, 2021, 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 61.6%. This includes a 21.8% allocation to U.S. Treasuries, TIPS, and cash.
 - Plus: The portfolio maintains a strategic out-of-benchmark allocation to high-yield corporate debt, securitized credit, and global fixed income strategies as market opportunities allow. This allocation increases the portfolio yield and total return potential but results in lower liquidity and higher volatility. The allocation to the Plus portfolio was 38.4% as of September 30, 2021.

Tactical Update

- The allocation to securitized credit, primarily in CMBS, ABS, non-agency RMBS, and CLO securities, was 26.9% of the portfolio at the end of the quarter. The combination of low interest rate duration and high coupon income (often floating rate) offers attractive characteristics for the overall fixed income portfolio in this low interest rate environment. This portion of the portfolio experienced large mark-to-market losses in the first quarter of 2020 but has recovered meaningfully since that selloff. The one-year return on this portfolio was 10.3%.
- The allocation to high-yield strategies was 4.4% at the end of the quarter. This out-of-benchmark position has outperformed for the quarter and on a one-year basis. This has been driven by credit spread compression as well as having a shorter interest rate duration than the benchmark in a rising interest rate environment. The one-year performance of this allocation was 11.1%, outperforming the core index by roughly 1,200 basis points (bp).
- The portfolio has a meaningful allocation to floating rate securities, including AAA CLO investments and investment-grade floating rate corporate bonds. This allocation accounts for approximately 18% 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 was relatively stable during the quarter but has steepened on a one-year basis. The spread between 2-year and 10-year U.S. Treasury Notes has increased by 65 bp on a YOY basis, ending September at 121 bp. This has been driven primarily by an 80 bp increase on the 10-year U.S. Treasury yield over the year as this note ended the quarter with a yield of 1.49%.
- Inflation expectations were relatively flat for the quarter with ten-year breakeven inflation ending the quarter at 2.38%, this is approximately 40 bp above the 5-year average for this metric.
- Credit markets softened slightly during the quarter as markets digested record corporate bond supply. HY spreads ended the quarter at 289 bp, 21 bp higher for the quarter. These spreads are still well below historical averages and have declined by 228 bp for the year. Investment grade corporate bond spreads also increased during the quarter by 4 bp to 84bp. This compares to a 5-year average of 117 bp.
- Emerging Markets credit spreads ended the quarter at 302 bp, 33 bp higher than their June 30 level. EM spreads have decreased by 47 bp for the year, leading to positive performance but underperforming U.S. High Yield debt by roughly 800 bp.
- The recovery of Commercial Mortgage Backed Securities (CMBS) was strong as securitized assets outperformed corporate credit last quarter. BBB CMBS spreads declined by 330 bp over the previous year, ending September at 271 bp.

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 by Strategy

9/30/21

	Amount	Total	% of Total
Core (\$ in Millions)			
FID Internal	\$5,015		
PIMCO Mortgage Fund	594		
PGIM Investment Grade Credit	233		
Total Core		\$5,841	60.5%
Tactical			
Fidelity Tactical	\$529		
Total Tactical		\$529	5.5%
Securitized Debt			
TICP CLO Debt	\$827		
Met West Securitized Ops	675		
Principal CMBS	503		
Fortress Credit ABI	374		
Napier Park ABS Income	167		
Napier Park Strategic Loan	46		
Putnam DMS	4		
Total Securitized Debt		\$2,595	26.9%
High Yield			
PGIM High Yield	\$363		
Crescent Direct Lending	47		
Columbia Management	12		
Total High Yield		\$422	4.4%
Global			
T. Rowe Global Multi-Sector	\$268		
Total Global		\$268	2.8%

TOTAL

\$9,656

100.0%

NOTE: Totals may not be exact due to rounding.

SMRS

Fixed Income Holdings Portfolio Characteristics

Benchmark: Barclays Aggregate

9/30/21

Characteristic	Portfolio	Benchmark
Average Maturity (Yrs)	8.2	8.7
Duration (Yrs)	5.7	6.7
Spread Duration (Yrs)	6.5	6.6
Coupon (%)	2.9	2.5
Yield to Maturity (%)	2.8	1.6
Credit Rating	A	AA
VaR (%)	5.8	6.2
Tracking Error (%)	2.8	NA
Beta (vs S&P 500)	0.07	-0.01

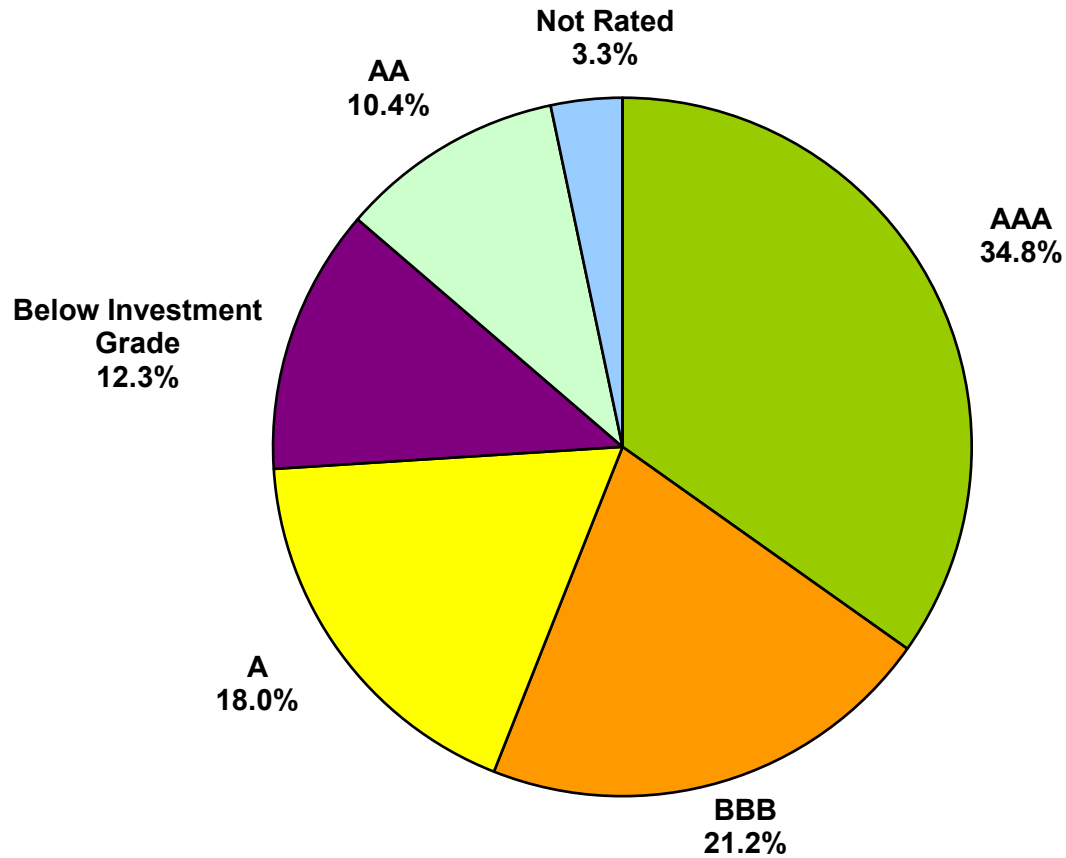
Commentary

<u>Objectives</u>	<u>Highlights</u>
Income:	The coupon of the portfolio is approximately 40 bps higher than the benchmark. Price movement has been the main driver of U.S. bond market returns for the year, but Income is the primary driver of long-term performance.
Liquidity:	23.1% of the portfolio is invested in cash, U.S. Treasuries, and TIPS. These investments can be liquidated via same-day trading.
Principal Preservation:	The portfolio has a large allocation to U.S. Treasuries and carries an investment-grade credit rating.
Diversification:	The equity beta of the portfolio is roughly 0.1 meaning that the portfolio returns have a low correlation with equity market movements.

SMRS

Fixed Income By Rating

9/30/21



Market Value in Millions				
9/30/21				
	Assets	Percent	Benchmark	Difference
AAA	\$3,356	34.8%	69.2%	-34.4%
AA	1,009	10.4%	3.0%	7.4%
A	1,742	18.0%	11.2%	6.8%
BBB	2,046	21.2%	13.4%	7.8%
* Below Investment Grade	1,186	12.3%	0.4%	11.9%
Not Rated	317	3.3%	2.8%	0.5%
Total Investments	\$9,656	100.0%	100.0%	

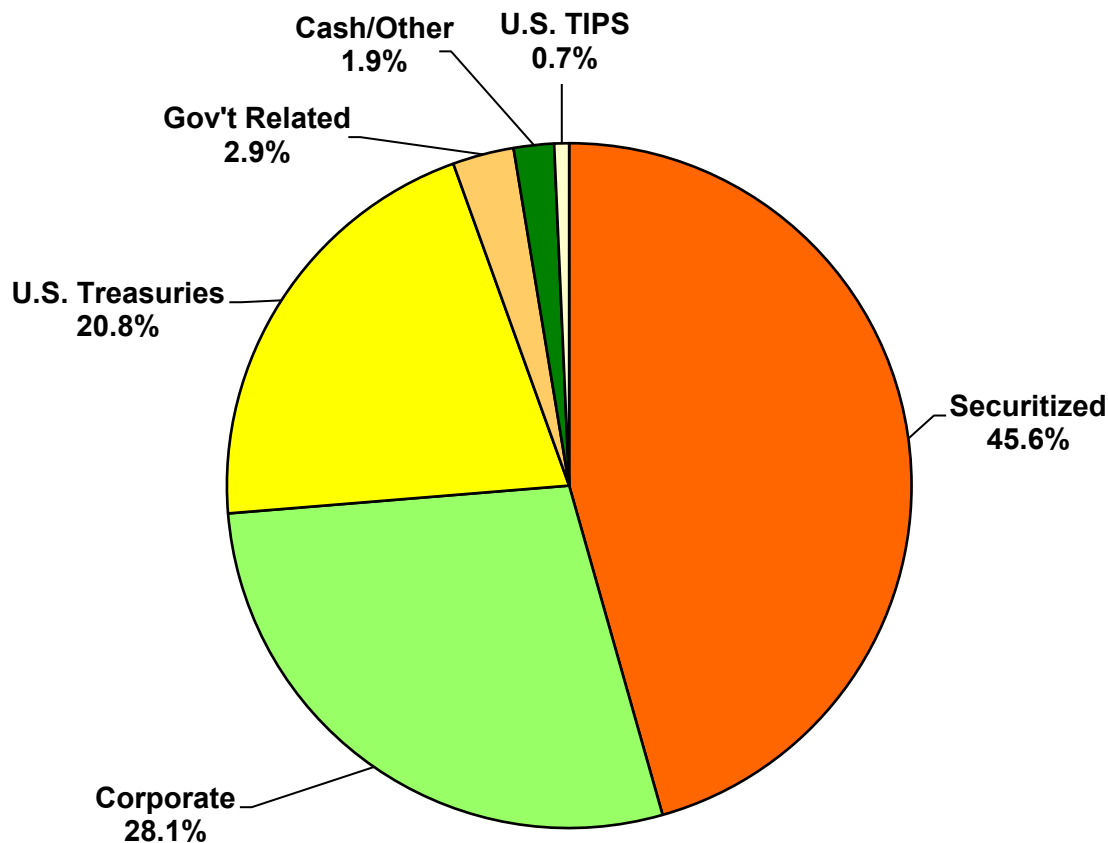
* Comprised of approximately 7.3% High Yield Credit and 5.0% High Yield RMBS/ABS

Benchmark: Barclays US Aggregate

SMRS

Fixed Income By Asset Type

9/30/21



Market Value in Millions				
9/30/21				
	Assets	Percent	Benchmark	Difference
Securitized	\$4,406	45.6%	30.0%	15.6%
Corporate	2,710	28.1%	26.0%	2.1%
U.S. Treasuries	2,014	20.8%	38.4%	-17.6%
Government Related	276	2.9%	5.6%	-2.7%
Cash/Other	185	1.9%	0.0%	1.9%
U.S. TIPS	65	0.7%	0.0%	0.7%
Total Investments	\$9,656	100.0%	100.0%	

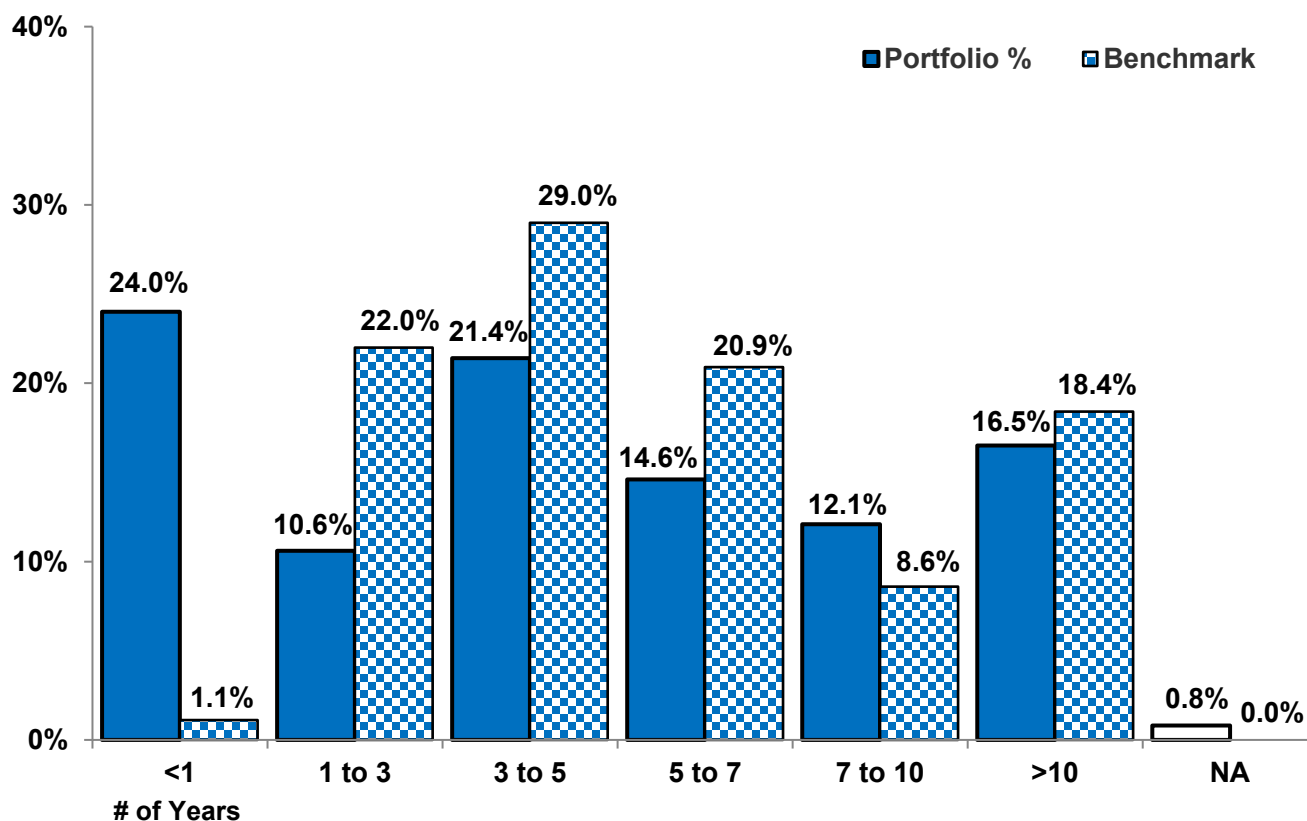
Benchmark: Barclays US Aggregate

SMRS

Duration Distribution

Fixed Income Composite Versus Benchmark

9/30/21



Source: Factset

Market Value in Millions					
Duration	Assets	Portfolio Weight	Benchmark Weight	Portfolio Duration*	Benchmark Duration*
<1	\$2,314	24.0%	1.1%	-0.1	0.9
1 to 3	1,028	10.6%	22.0%	2.2	2.0
3 to 5	2,064	21.4%	29.0%	4.1	3.9
5 to 7	1,408	14.6%	20.9%	5.9	5.9
7 to 10	1,168	12.1%	8.6%	8.3	8.1
>10	1,596	16.5%	18.4%	18.1	16.9
NA	78	0.8%	0.0%	0.0	0.2
Total	\$9,656	100.0%	100.0%	5.7	6.6

* Effective Duration

Benchmark: Barclays US Aggregate

Total Fixed Income Performance - Net of Fees (MPERS)

9/30/21

	<u>Market Value</u>	<u>1-Year</u>	<u>3-Years</u>	<u>5-Years</u>	<u>7-Years</u>	<u>10-Years</u>
Total Fixed Income	\$9,655,584,174	3.74%	5.45%	4.00%	4.28%	4.03%
<i>Bloomberg/Barclays Aggregate Bond Index</i>	<i>N/A</i>	<i>-0.90%</i>	<i>5.36%</i>	<i>2.94%</i>	<i>3.26%</i>	<i>3.01%</i>
Internal Core Fixed Income	\$5,014,745,215	-0.22%	5.71%	3.71%	4.14%	3.72%
Externally Managed Fixed Income	\$4,640,838,959	7.60%	5.02%	4.41%	4.43%	4.50%
PIMCO Mortgage Fund	594,057,037	-1.03%	4.03%			
<i>Bloomberg/Barclays US MBS Agy Fixed Indx</i>	<i>N/A</i>	<i>-0.43%</i>	<i>4.03%</i>			
Investment Grade Credit	\$232,656,732	3.21%	8.04%	5.06%	5.17%	5.26%
PGIM Investment Grade	232,656,732	3.21%	8.04%	5.06%	5.17%	5.36%
<i>Bloomberg/Barclays Credit Index</i>	<i>N/A</i>	<i>1.45%</i>	<i>7.10%</i>	<i>4.37%</i>	<i>4.51%</i>	<i>4.60%</i>
Tactical Fixed Income	\$528,613,644	4.68%	6.85%	5.13%	4.69%	7.20%
Fidelity Tactical Bond Fund	528,613,644	4.68%	7.11%	5.24%	5.29%	
<i>Bloomberg/Barclays Aggregate Bond Index</i>	<i>N/A</i>	<i>-0.90%</i>	<i>5.36%</i>	<i>2.94%</i>	<i>3.26%</i>	<i>3.01%</i>
High Yield Fixed Income	\$422,366,906	11.06%	7.83%	6.59%	6.35%	
Columbia Management High Yield	11,584,190	7.92%	6.76%	5.78%	5.83%	
PGIM High Yield	363,365,907	12.41%	8.69%	7.33%	6.82%	
Crescent Direct Lending	47,416,809	8.87%	6.02%			
<i>Bloomberg/Barclays US HY BA/B 2% Cap</i>	<i>N/A</i>	<i>9.80%</i>	<i>7.48%</i>	<i>6.44%</i>	<i>5.92%</i>	
Structured Fixed Income	\$2,595,245,092	10.31%	3.98%			
Principal CMBS	503,035,945	10.27%	5.38%	4.64%	4.50%	7.32%
MetWest Securitized Opportunities	674,737,675	3.66%	4.29%	4.51%	3.84%	
Napier Park ABS Income	166,698,974	34.28%	13.56%	12.63%		
Napier Park Strategic Loan LP	45,850,547	1.94%	3.64%			
TICP CLO Debt	827,265,877	7.89%	6.11%			
Fortress ABI	373,866,998	10.28%				
Putnam DMS	3,789,076	4.22%				
<i>Bloomberg/Barclays Aggregate Bond Index</i>	<i>N/A</i>	<i>-0.90%</i>	<i>5.36%</i>	<i>2.94%</i>	<i>3.26%</i>	<i>3.01%</i>
<i>Blended CMBS Benchmark</i>	<i>N/A</i>	<i>1.00%</i>	<i>5.71%</i>	<i>2.95%</i>	<i>4.21%</i>	<i>4.92%</i>
Global Fixed Income	\$267,899,548	2.50%	5.01%	3.91%		
T. Rowe Global Multi-Sector	267,899,548	3.69%	5.89%	4.27%		
<i>Custom GMS Benchmark</i>	<i>N/A</i>	<i>2.14%</i>	<i>5.31%</i>	<i>4.09%</i>		

State of Michigan Retirement System

PRIVATE EQUITY REVIEW

State of Michigan Investment Board Meeting
December 9, 2021



Peter A. Woodford
Senior Investment Manager
Private Equity Division

EXECUTIVE SUMMARY

Performance

MPSERS Plan (9/30/21)	1-Year	3-Years	5-Years	7-Years	10-Years
Annualized Returns	55.3%	22.6%	20.7%	16.8%	16.1%
PE Benchmark Returns	44.9%	22.2%	21.1%	17.5%	18.3%
Peer Median Returns	34.5%	12.8%	12.2%	10.6%	11.3%
Percentile Rank vs. Peers*	15	11	10	13	9

*State Street Universe greater than \$1 billion

- Private equity returns have been strong relative to peer median returns, ranking in the top 9% 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 underperformed the S&P by 50 basis points (ten-year S&P 500 return 16.6%) and underperformed the benchmark by 2.2%.
- For the twelve months ending September 30, 2021, the Private Equity Division returned approximately \$1.05 billion to the plan, net of contributions. General Partners are incentivized to exit investments at current valuations and distribution activity should remain healthy if the economic expansion continues.
- Commitments closed during the quarter include:
 - \$200 million to Carlyle Partners VIII, L.P., managed by TC Group VIII, L.L.C.
 - \$200 million to Clearlake Capital Partners VII, L.P., managed by Clearlake Capital Management VII, LP.
 - \$125 million to Riverside Micro-Cap Fund VI, L.P., managed by Riverside Partners L.L.C.
 - \$50 million to Carlyle Partners Growth, L.P., managed by CP Growth GP, L.L.C.
 - \$50 million to Permira Growth Opportunities II, SCSp, managed by Permira Portfolio Management Limited.
 - \$25 million to Michigan Growth Capital Partners IV, L.P., managed by Beringea Invest Michigan L.L.C.

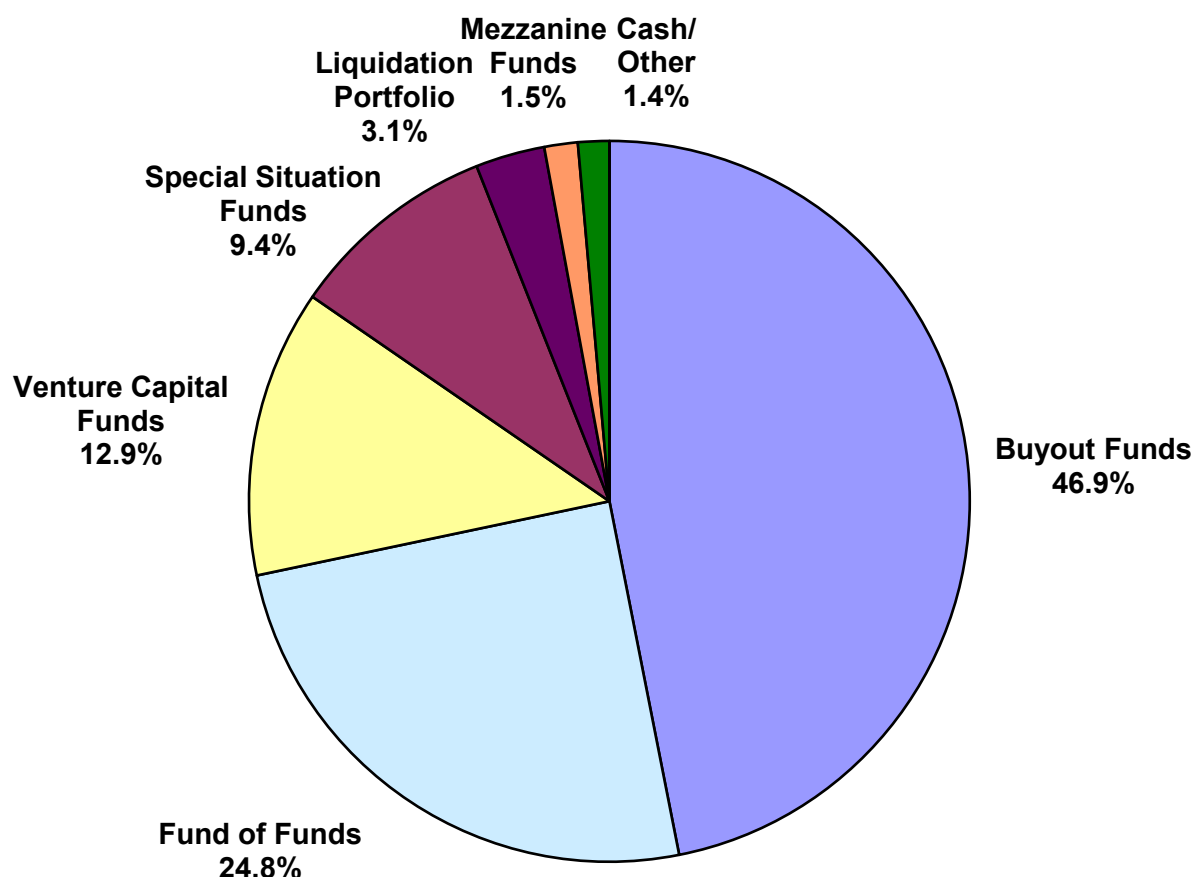
Strategy Update

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

9/30/21



Market Value in Millions				
	9/30/21		9/30/20	
Buyout Funds	\$10,445	46.9%	\$7,057	46.4%
Fund of Funds	5,516	24.8%	3,293	21.7%
Venture Capital Funds	2,878	12.9%	1,680	11.0%
Special Situation Funds	2,084	9.4%	1,806	11.9%
Liquidation Portfolio	681	3.1%	821	5.4%
Mezzanine Funds	332	1.5%	317	2.1%
Cash/Other	319	1.4%	232	1.5%
Total	\$22,255	100.0%	\$15,206	100.0%

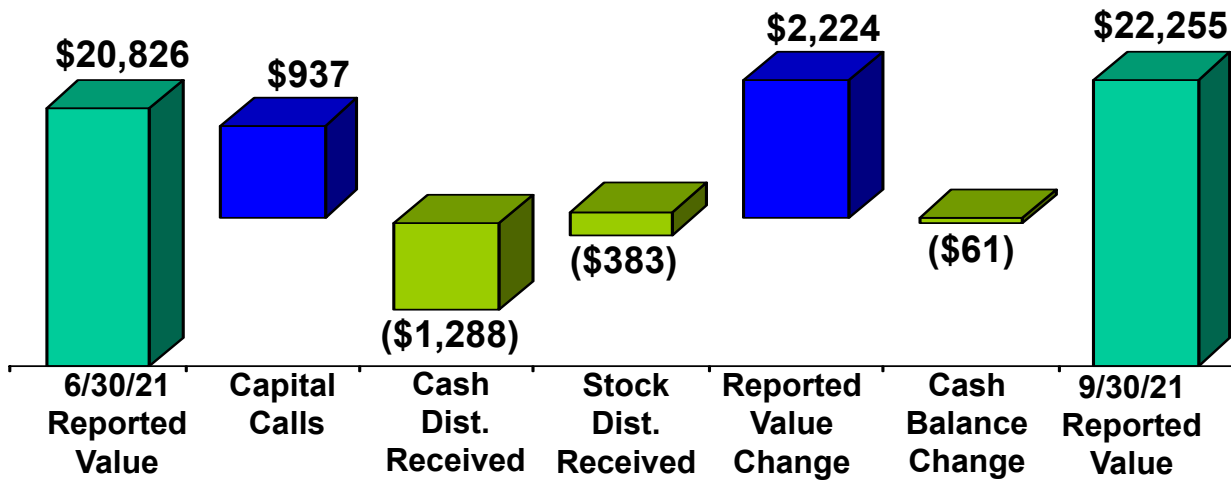
SMRS

Private Equity

9/30/21

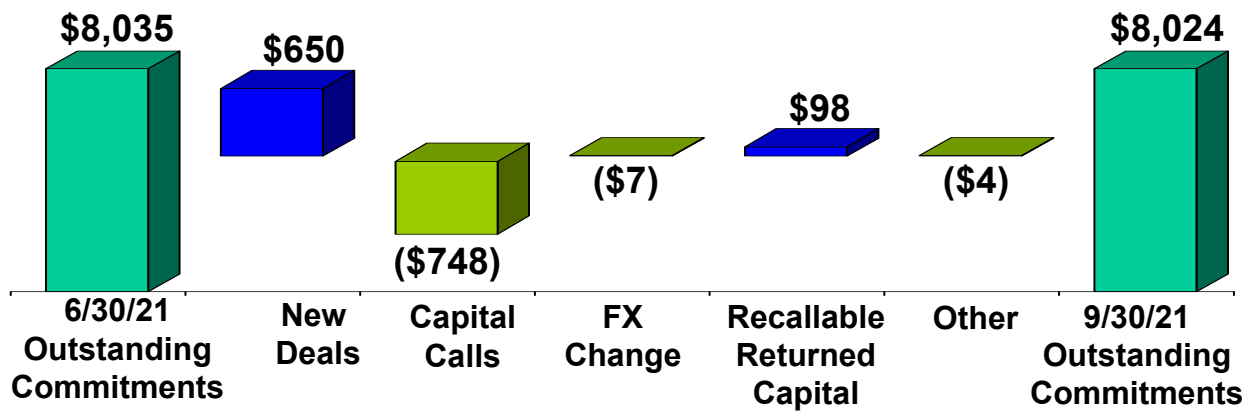
Invested Commitments

(\$ in Millions)



Outstanding Commitments

(\$ in Millions)

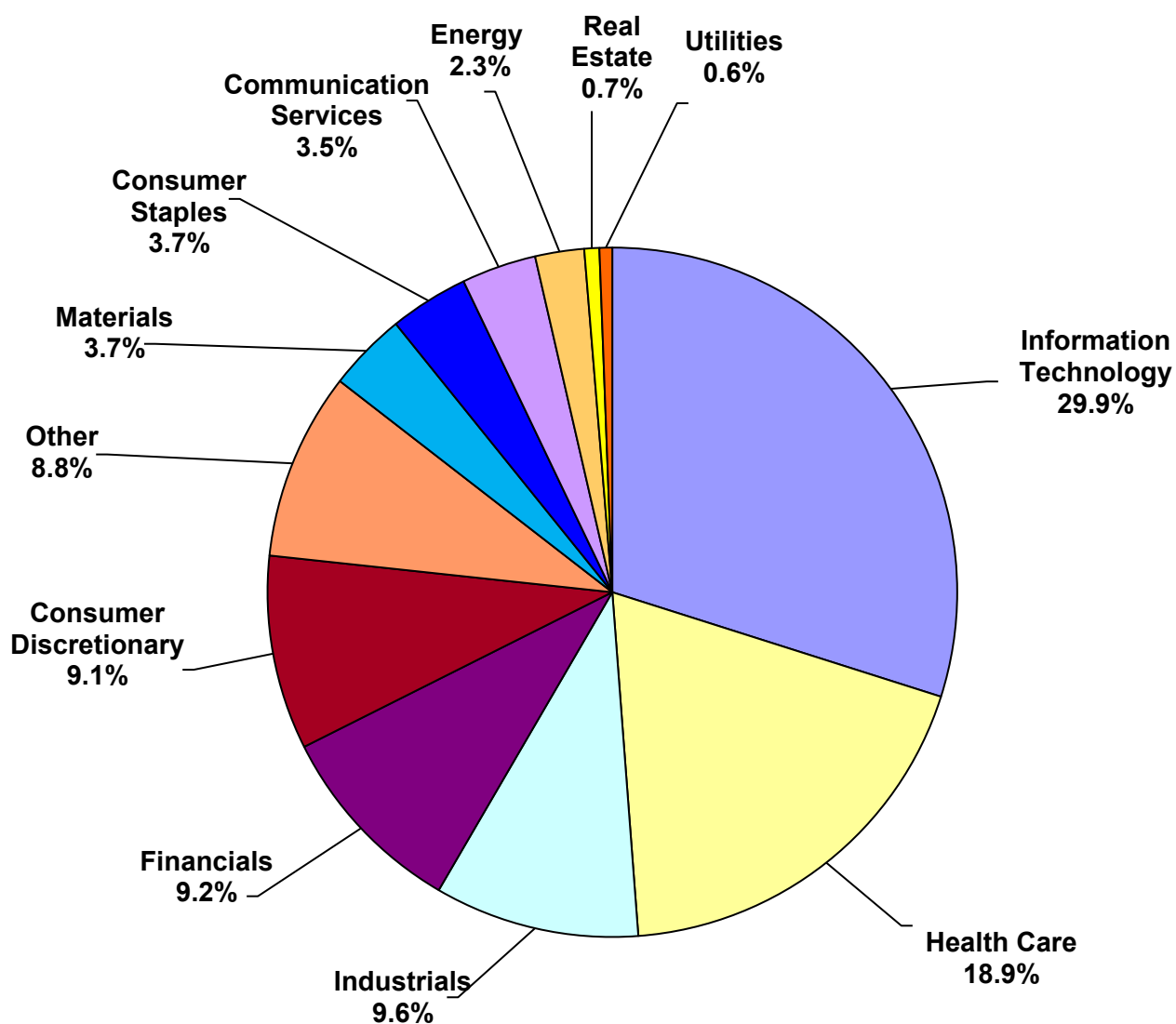


SMRS

Private Equity

9/30/21

Investments by Industry



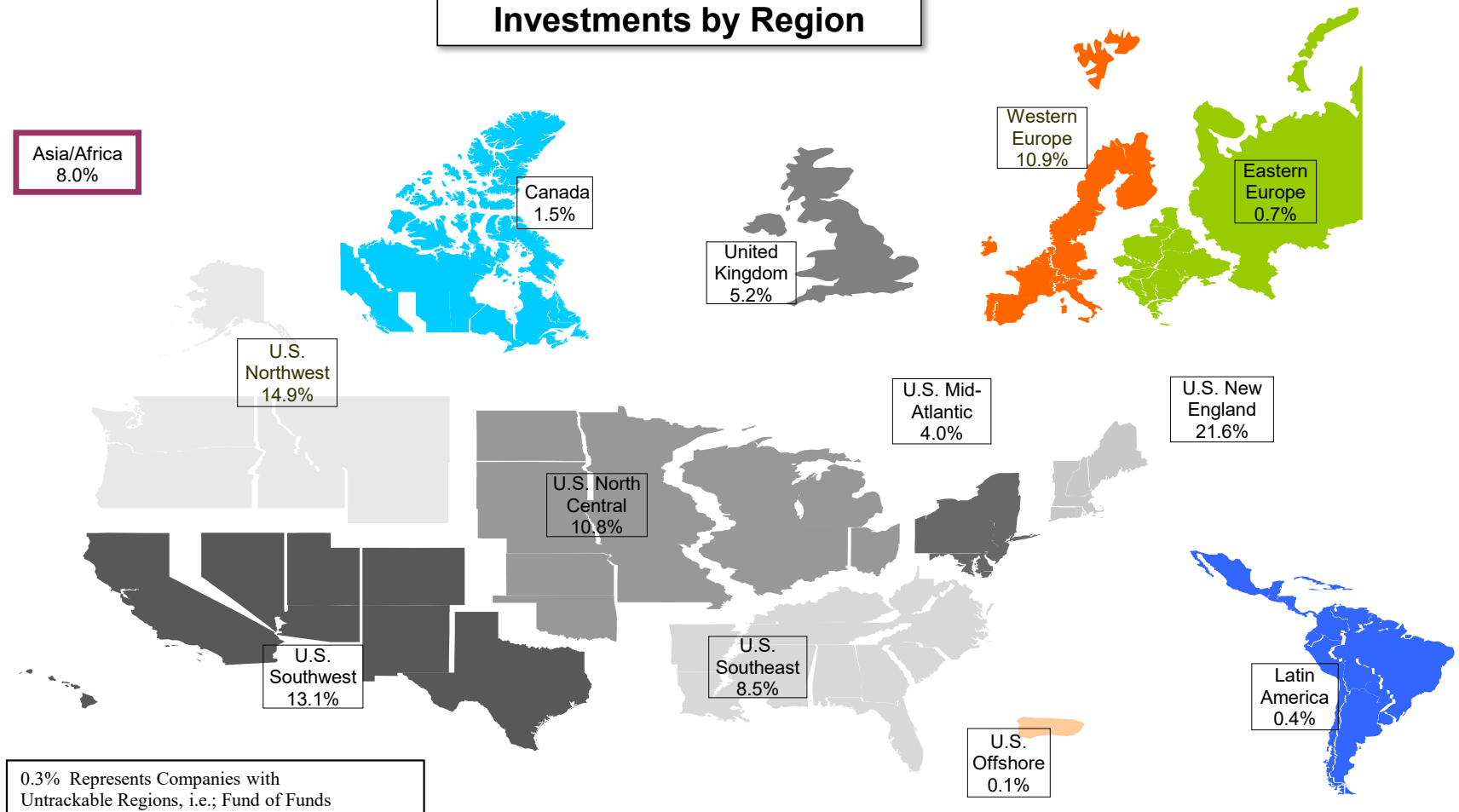
These numbers are based on the most recent available General Partner Data; primarily 6/30/21 and are subject to change.

SMRS

Private Equity

9/30/21

Investments by Region



Geographic Report: North America 74%, Europe 17%, Asia 8%, Other 1%

SMRS

Private Equity

9/30/21

Portfolio by Vintage Year

(\$ in Millions)

Asset Vintage	Reported Value	Outstanding Commitment	Total Exposure
1986-2005	\$ 433	\$ 97	\$ 530
2006*	193	110	303
2007	107	103	210
2008	283	74	357
2009	42	1	43
2010	278	4	282
2011	655	94	749
2012	1,164	64	1,228
2013	250	74	324
2014	1,656	215	1,871
2015	7,194	604	7,798
2016	3,021	416	3,437
2017	1,695	556	2,251
2018	2,788	1,324	4,112
2019	1,393	1,273	2,666
2020	619	799	1,418
2021	165	2,216	2,381
Income Accruals	1	0	1
Cash	284	0	284
Act. Small Cap - Stock Dist	35	0	35
Total	\$ 22,255	\$ 8,024	\$ 30,279

*Liquidation portfolio is 2006 vintage

FX Exposure

(\$ in Millions)

	Reported Value	Outstanding Commitment	Total Exposure	Total (USD)
Euro (\$1.16/ €)	€ 597	€ 323	€ 920	\$1,066

SMRS

Private Equity

9/30/21

Top 10 Sponsors

(\$ in Millions)

Asset Type	Reported Value	Outstanding Commitment	Total
HarbourVest Partners	\$ 5,518	\$ 799	\$ 6,317
KKR	807	285	1,092
Insight Venture Partners	898	160	1,058
The Carlyle Group	535	519	1,054
Advent International	723	215	938
Leonard Green & Partners	620	318	938
Warburg Pincus	730	128	858
Blackstone Private Equity	574	213	787
Veritas Capital	650	116	766
Thoma Bravo	605	111	716
Top 10 Total Value	\$ 11,660	\$ 2,863	\$ 14,523

Cash Weighted Rates of Return*

(Net IRR)	Current Qtr.	1-Year	3-Year	5-Year	10-Year
Buyout	12.2%	56.7%	24.4%	22.9%	17.0%
Fund of Funds	9.5%	41.2%	20.3%	19.4%	16.5%
Mezzanine	10.0%	27.1%	13.4%	13.7%	12.2%
Special Situations	10.3%	46.4%	15.9%	15.6%	12.6%
Venture Capital	11.7%	91.0%	35.6%	30.8%	22.0%

*These numbers are based on most recent available General Partner reported data; primarily 6/30/21 and are subject to change.

SMRS

Private Equity

9/30/21

Net Market Values by Ownership Entity

	<u>Adjusted Reported Value</u>	<u>Unfunded Commitment</u>
5AM Opportunities I, L.P.	\$ 28,111,933	\$ 3,975,000
5AM Opportunities II, L.P.	3,998,093	21,375,000
5AM Ventures VI, L.P.	23,305,676	5,400,000
5AM Ventures VII, L.P.	0	25,000,000
Accel Europe I, L.P.	1,465,717	1
Accel Europe II	24,367,282	3,300,000
Accel Growth Fund II, L.P.	13,240,137	0
Accel Growth Fund III, L.P.	12,030,253	280,000
Accel Growth Fund IV L.P.	40,728,631	990,000
Accel Growth Fund V L.P.	33,699,166	3,278,554
Accel Growth Fund VI L.P.	4,125,000	20,875,000
Accel IX, L.P.	1,568,854	4,522,725
Accel Leaders Fund 3, L.P.	16,749,857	22,800,000
Accel Leaders Fund II L.P.	13,444,707	0
Accel Leaders Fund L.P.	23,821,243	0
Accel London V L.P.	68,445,184	1,320,000
Accel London VI, L.P.	13,969,255	4,375,000
Accel London VII, L.P.	1,875,000	10,625,000
Accel VI-S	1,938,113	652,611
Accel VI, L.P.	756,959	0
Accel X, L.P.	6,326,384	0
Accel XI, L.P.	7,475,221	1,440,000
Accel XII, L.P.	19,231,946	980,000
Accel XIII, L.P.	14,613,303	1,900,000
Accel XIV L.P.	9,675,060	2,650,000
Accel XV, L.P.	1,800,000	8,200,000
Acorn Bioventures, L.P.	76,554,932	25,000,000
Advent Global Private Equity V	4,789,575	8,700,000
Advent International GPE IX, L.P.	202,065,545	126,847,917
Advent International GPE VI-A LP	20,751,298	0
Advent International GPE VII-B, L.P.	126,552,840	12,000,000
Advent International GPE VIII-B, L.P.	326,665,755	11,474,998
Advent International LAPEF VII	5,733,856	53,400,000
Advent Latin American Private Equity Fund VI, L.P.	36,119,982	2,975,000
Affinity Asia Pacific Fund III, L.P.	10,784,984	8,520,204
Affinity Asia Pacific Fund IV, L.P.	67,620,909	16,745,393

	Adjusted Reported Value	Unfunded Commitment
Affinity Asia Pacific Fund V L.P.	52,178,627	135,172,838
AIP VII, L.P.	34,982,524	37,392,680
Apax Digital II, L.P.	0	100,000,000
Apax Digital, L.P.	37,465,336	24,498,888
Apax Europe Fund VI, L.P.	22,398,431	2,450,945
Apax Europe VII, L.P.	1,568,992	1,726,118
Apax IX, L.P.	236,875,110	18,943,491
Apax US VII, L.P.	2,578,219	417,509
Apax VIII - B, L.P.	45,983,128	5,890,984
Apax X USD L.P.	62,304,587	99,375,000
Apollo Investment Fund IX, L.P.	60,818,622	46,010,130
Apollo Investment Fund VIII L.P. Arboretum Ventures II, L.P.	62,291,897	13,336,501
	899,589	0
Arboretum Ventures III, L.P.	7,137,366	0
Arboretum Ventures IV, L.P.	45,652,684	6,810,000
Arboretum Ventures V, L.P.	17,912,140	19,180,000
Ares Corporate Opportunities Fund II Ares Corporate Opportunities Fund III, L.P.	127,175	11,423,773
	5,539,733	6,656,978
Ares Corporate Opportunities Fund IV, L.P.	52,334,524	13,765,069
ASF VIII B, L.P.	68,718,010	102,926,598
AXA ASF Miller Co-Investment, L.P.	324,297	6,656,684
Axiom Asia 6, L.P.	10,141,858	39,750,000
Axiom Asia Co-Investment Fund I, L.P.	62,880,592	8,643,182
Axiom Asia Co-Investment Fund II, L.P.	10,000,899	39,999,101
Axiom Asia IV, L.P.	66,411,715	9,950,886
Axiom Asia Private Capital Fund III, L.P.	95,339,316	5,250,002
Axiom Asia V, L.P.	42,228,373	20,200,000
BC European Capital IX, L.P.	98,071,776	6,728,702
BC European Capital VII, L.P.	753,242	0
BC European Capital VIII, L.P.	4,307,208	9,035,691
Berkshire Fund IX Coinvestment Fund, L.P.	51,482,331	13,288,223
Berkshire Fund IX, L.P.	189,973,441	23,548,598
Berkshire Fund VI, L.P.	22,083,461	7,600,677
Berkshire Fund VII, L.P.	6,582,317	2,805,875
Berkshire Fund VIII, L.P.	107,840,343	9,046,368
Berkshire Fund X, L.P.	0	150,000,000
Blackstone Capital Partners IV, L.P.	2,574,830	4,580,765
Blackstone Capital Partners V, L.P.	5,211,225	13,069,148
Blackstone Capital Partners V-S, L.P.	960,505	712,476
Blackstone Capital Partners VI, L.P.	169,210,173	32,467,341
Blackstone Capital Partners VII, L.P.	327,693,481	20,557,815
Blackstone Capital Partners VIII L.P.	67,764,845	141,106,688
Bridgepoint Europe IV, L.P.	13,546,390	4,982,665
Carlyle Europe Partners II, L.P.	861,671	1,043,797
Carlyle Europe Partners III, L.P.	696,223	1,734,201
Carlyle Europe Partners IV, L.P.	82,663,390	10,874,533

	Adjusted Reported Value	Unfunded Commitment
Carlyle Europe Partners V, S.C.SP.	46,882,881	99,861,703
** Carlyle Partners Growth, L.P.	0	50,000,000
Carlyle Partners V L.P.	25,335,728	53,227,845
Carlyle Partners VI, L.P.	202,734,906	8,685,035
Carlyle Partners VII, L.P.	176,347,198	93,170,364
** Carlyle Partners VIII, L.P.	0	200,000,000
Centerbridge Capital Partners III, L.P.	79,379,729	13,403,240
Cerberus SMRS Partners, L.P.	25,075,599	23,304,657
Charlesbank Equity Fund IX, L.P.	81,405,060	15,561,769
Charlesbank Equity Fund X, L.P.	16,872,281	83,127,719
Charlesbank Equity Overage Fund X, L.P.	8,769,927	41,434,075
Charlesbank Fund IX Overage Allocation Program	48,442,547	1,953,081
CircleUp Credit Fund I, L.P.	22,046,585	2,953,415
CLEARLAKE CAPITAL PARTNERS VI, L.P.	65,687,349	24,569,826
** Clearlake Capital Partners VII, L.P.	0	200,000,000
Clearlake Opportunities Partners II, L.P.	27,876,936	55,939,901
Coller International Partners V, L.P.	6,779,867	2,000,000
Coller International Partners VI, L.P.	28,402,879	29,059,273
Coller International Partners VII, L.P.	109,660,383	44,654,951
Crescent Mezzanine Partners VI, L.P.	15,555,615	5,681,254
Crescent Mezzanine Partners VII, L.P.	86,334,004	55,186,452
CVC Capital Partners VII, L.P.	167,968,557	70,590,445
CVC Capital Partners VIII, L.P.	0	115,894,997
Dover Street IX, L.P.	76,832,587	18,000,000
Dover Street X, L.P.	58,833,524	94,500,000
EnCap Energy Capital Fund X, L.P.	38,569,122	3,366,284
FIMI Opportunity 6, L.P.	56,124,000	8,863,638
FirstMark Capital I, L.P.	123,360,289	196,596
FirstMark Capital IV, L.P.	83,000,013	4,725,000
FirstMark Capital OF I, L.P.	42,054,149	0
FirstMark Capital OF II, L.P.	105,214,825	0
FirstMark Capital OF III, L.P.	32,529,728	10,850,000
FirstMark Capital V, L.P.	11,761,405	22,575,000
Flagship Pioneering Fund VII, L.P.	13,200,145	185,000,000
Flagship Pioneering Special Opportunities Fund II, L.P.	64,832,833	38,500,000
Flagship Pioneering VI, L.P.	206,612,186	15,375,000
Flagship Ventures Fund 2004, L.P.	49,431	0
Flagship Ventures Fund 2007, L.P.	3,830,455	0
Flagship Ventures Fund IV, L.P.	226,870,855	0
Flagship Ventures Fund V, L.P.	148,409,729	0
Flagship Ventures Opportunities Fund I, L.P.	60,064,214	2,000,000
Fox Paine Capital Fund II, L.P.	23,860,093	15,382,699
FS Equity Partners VII, L.P.	93,800,509	10,907,482
FS Equity Partners VIII, L.P.	42,738,233	36,415,473
GCM Grosvenor Fund Investment Program I, L.P.	6,080,889	1,517,748
GCM Grosvenor Fund Investment Program II, L.P.	18,814,358	13,067,284

	Adjusted Reported Value	Unfunded Commitment
GCM Grosvenor Fund Investment Program III - 2004 GCM	41,085,870	4,404,554
Grosvenor Fund Investment Program III - 2006 GCM	57,774,173	6,265,112
Grosvenor Fund Investment Program V, L.P.	42,973,275	8,788,942
GCM Grosvenor Fund Investment Program VI, L.P. GCM	22,700,512	1,856,097
Grosvenor Fund Investment Program VIII, L.P. GCM	104,679,228	11,980,905
Grosvenor SeasPriFIP LP (PIS06-10)	36,179,528	13,832,103
GCM Grosvenor SeasPriFIP LP (PIS14)	227,031,346	10,763,509
GCM Grosvenor SeasPriFIP LP (Seed)	10,755,369	16,517,219
Genstar Capital Partners IX, L.P.	82,559,684	9,263,067
Genstar Capital Partners VIII, L.P.	85,005,997	4,391,866
Genstar Capital Partners X, L.P.	0	100,000,000
Genstar IX Opportunities Fund I, L.P.	51,128,605	10,679,724
Genstar VIII Opportunities Fund I, L.P.	63,699,341	2,116,130
Genstar X Opportunities Fund I, L.P.	4,691,667	20,308,333
Golden Bell Azalea, LLC	25,858,787	0
Green Equity Investors V, L.P.	15,012,492	24,920,675
Green Equity Investors VI, L.P.	184,250,611	9,900,414
Green Equity Investors VII, L.P.	279,737,050	56,381,737
Green Equity Investors VIII, L.P.	106,026,346	147,419,016
Greenspring Master G, L.P.	310,493,163	354,000,000
Greenspring Micro II, L.P.	23,071,751	7,216,263
GSO Capital Opportunities Fund II, L.P.	8,084,067	7,875,581
GSO Capital Opportunities Fund III, L.P.	49,238,925	21,367,563
GSO COF III Co-Investment Fund, L.P.	15,027,247	22,604,330
GTCR Fund XIII, L.P.	4,573,494	46,470,000
HarbourVest Credit Opportunities Fund II, LP	27,057,150	50,250,000
HarbourVest Dover Street VIII, L.P.	15,564,922	5,400,000
HarbourVest Int'l III Partnership, L.P.	151,215	1,200,000
Harbourvest Partners Co-Investment Fund IV, L.P.	114,671,463	19,107,835
HarbourVest Partners Co-Investment Fund V, L.P.	261,412,225	45,000,000
Harbourvest Partners Co-Investment Fund VI, L.P.	0	200,000,000
HarbourVest Partners Mezzanine Income Fund, L.P.	58,950,439	16,310,000
HarbourVest V Partnership, L.P.	123,934	300,000
HarbourVest VI - Direct Fund, L.P.	1,588,377	750,000
HarbourVest VI Partnership, L.P.	326,220	2,000,000
Harvest Partners VII, L.P.	75,081,260	3,728,267
Harvest Partners VIII, L.P.	81,876,747	26,513,758
Hellman & Friedman Capital Partners X, L.P.	0	99,820,740
HPS Mezzanine Partners III, L.P.	42,682,585	3,166,394
Insight Partners Fund X Follow-On Fund, L.P.	30,297,987	22,500,000
Insight Partners XI, L.P.	133,452,024	12,500,000
Insight Partners XII, L.P.	37,500,000	112,500,000
Insight Venture Partners Growth-Buyout Coinvest Fund	122,082,569	4,970,616
Insight Venture Partners IX, L.P.	332,007,114	4,987,231
Insight Venture Partners X, L.P.	242,316,899	2,611,260
Jade Equity Investors, L.P.	35,229,900	79,102,198

	Adjusted Reported Value	Unfunded Commitment
Kelso Investment Associates IX, L.P.	58,517,498	9,158,653
Kelso Investment Associates VII, L.P.	147,251	0
Kelso Investment Associates VIII, L.P.	18,755,705	7,191,927
Kelso Investment Associates X, L.P.	92,748,348	31,035,291
Khosla Ventures III, L.P.	41,643,932	750,000
Khosla Ventures IV, L.P.	103,337,912	950,000
Khosla Ventures Opportunity I, L.P.	12,375,453	13,600,000
Khosla Ventures Seed D, L.P.	11,425,982	1,910,000
Khosla Ventures Seed E, L.P.	536,490	4,400,000
Khosla Ventures V, L.P.	103,628,618	1,750,000
Khosla Ventures VI, L.P.	75,499,861	11,775,000
Khosla Ventures VII, L.P.	10,205,408	39,950,000
KKR 2006 Fund, L.P.	50,764,354	6,102,869
KKR Americas Fund XII, L.P.	274,800,858	59,888,569
KKR Asian, L.P.	914,732	0
KKR Asian Fund II, L.P.	40,478,702	239,698
KKR Asian Fund III, L.P.	116,418,997	25,910,675
KKR China Growth Fund, L.P.	11,840,819	3,383,656
KKR European Fund II, L.P.	1,064,730	0
KKR European Fund III, L.P.	5,261,216	6,430,608
KKR European Fund IV L.P.	125,255,901	330,287
KKR European Fund V (USD) SCSp	84,867,975	52,239,567
KKR Millennium Fund, L.P.	232,956	0
KKR North America Fund XI, L.P.	94,607,495	5,582,229
KKR North America Fund XIII SCSp	0	125,000,000
Lead Edge Capital IV, L.P.	31,127,576	4,231,624
Lead Edge Capital V, L.P.	27,547,279	8,786,545
Lightspeed Opportunity Fund, L.P.	28,705,102	4,750,000
Lightspeed Venture Partners Select IV, L.P.	19,976,690	7,750,000
Lightspeed Venture Partners VII, L.P.	9,520,030	0
Lightspeed Venture Partners XIII, L.P.	7,022,220	4,000,000
Menlo Special Opportunities Fund II, L.P.	28,431,463	7,515,852
Menlo Ventures IX, L.P.	1,190,531	0
Menlo Ventures X, L.P.	2,841,430	0
Menlo Ventures XI, L.P.	22,470,617	0
Menlo Ventures XIV, L.P.	11,704,412	350,000
Menlo Ventures XV, L.P.	7,128,771	17,500,000
Meritech Capital Partners Franchise Fund, L.P.	2,692,328	12,300,000
Meritech Capital Partners IV, L.P.	3,549,071	300,000
Meritech Capital Partners V, L.P.	85,162,715	900,000
Meritech Capital Partners VI, L.P.	71,298,857	2,656,250
Meritech Capital Partners VII, L.P.	14,680,873	28,793,750
Michigan Growth Capital Partners II, L.P.	155,627,939	1,624,421
Michigan Growth Capital Partners III, L.P.	133,276,383	28,036,832
** Michigan Growth Capital Partners IV, L.P.	0	25,000,000
Michigan Growth Capital Partners, LP	13,227,122	7,342,841

	Adjusted Reported Value	Unfunded Commitment
Michigan SEMF Barings	13,152,764	136,514,242
Michigan SEMF Grosvenor	15,080,105	134,457,036
New Leaf Biopharma Opportunities II, L.P.	147,442,232	8,000,000
New Leaf Growth Fund I, L.P.	51,524,895	0
New Leaf Ventures II, L.P.	5,367,584	0
New Leaf Ventures III, L.P.	51,741,139	0
New Leaf Ventures IV, L.P.	52,219,316	18,687,500
Nordic Capital VI, L.P.	125,415	1
Nordic Capital VII, L.P.	0	3,241,177
Nordic Capital VIII, L.P. (Alpha)	42,743,200	6,964,237
Oak Investment Partners X, L.P.	196,416	0
Oak Investments Partners IX, L.P.	17,571	0
Oaktree Opportunities Fund X, L.P.	23,665,822	5,100,000
Oaktree Opportunities Fund Xb, L.P.	54,029,000	28,000,000
OCM Opportunities Fund IX, L.P.	52,838,405	0
OCM Opportunities Fund VII (B), L.P.	44,781	2,500,000
OCM Opportunities Fund VII, L.P.	354,458	0
OCM Opportunities Fund VIII B, L.P.	13,637,820	0
OCM Opportunities Fund VIII, L.P.	470,389	0
OCM Principal Opportunities Fund IV, L.P.	43,809	4,996,637
Ocqueoc Holdings, LLC	286,814	48,112,490
Odyssey Investment Partners Fund VI, L.P.	45,170,093	59,721,401
Parthenon Investors II, L.P.	744,917	3,175,229
Parthenon Investors III, L.P.	92,977,802	2,656,037
Parthenon Investors IV, L.P.	54,909,621	1,188,794
Peninsula Fund VI, L.P.	27,530,889	3,017,896
Permira Growth Opportunities I, L.P.1	48,897,455	23,244,666
** Permira Growth Opportunities II, SCSp	0	50,000,000
Permira VII L.P. 1	54,580,570	37,359,199
PPC Fund II, L.P.	85,473,686	7,920,403
Public Pension Capital, LLC	67,458,459	39,405,697
Renaissance Venture Capital Fund IV, L.P.	1,716,234	23,250,000
Rhone Partners V, L.P.	155,123,168	1,337,894
Riverside Capital Appreciation Fund VI, L.P.	27,714,569	5,231,320
Riverside Capital Appreciation Fund VII, L.P.	93,979,390	33,438,633
Riverside Micro Cap Fund I, L.P.	16,213,883	5,632,976
Riverside Micro-Cap Fund II, L.P.	6,360,332	2,735,834
Riverside Micro-Cap Fund III, L.P. Riverside	122,320,758	3,913,101
Micro-Cap Fund IV, L.P.	86,109,547	3,617,302
Riverside Micro-Cap Fund IV B, L.P.	21,029,951	713,421
Riverside Micro-Cap Fund V, L.P.	63,092,799	50,558,380
** Riverside Micro-Cap Fund VI, L.P.	0	125,000,000
Science Ventures Fund II, L.P.	33,585,296	2,300,000
Science Ventures Fund III, L.P.	8,514,282	17,500,000
Shamrock Capital Content Fund I, L.P	25,146,385	32,428,143
Shamrock Growth Capital Fund IV, L.P.	43,534,321	2,426,116

	Adjusted Reported Value	Unfunded Commitment
Silver Lake Partners II, L.P.	9,904	3,531,586
Silver Lake Partners III, L.P.	11,602,266	11,910,583
Silver Lake Partners IV, L.P.	96,600,422	1,457,480
Silver Lake Partners V, L.P.	95,532,986	11,583,940
Silver Lake Partners VI, L.P.	33,671,665	45,714,952
Silver Lake SL SPV-2, L.P.	61,693,155	0
SK Capital Partners V, L.P.	34,405,487	18,985,356
SKCP Catalyst Fund I-A, L.P.	14,875,232	20,335,379
SM/TCP L.P.	10,271,290	1,386,616
SMRS - TOPE LLC	4,335,050,622	165,920,571
SMRS-CAPP LLC	160,481,197	13,331,651
SMRS-NCRP LLC	406,764,512	166,958,521
Summit Partners Growth Equity Fund X, L.P.	62,214,282	51,024,566
Sycamore Partners III, L.P.	44,241,353	55,569,581
TCW/Crescent Mezzanine Partners V, LLC	890,750	12,395,466
TCW/Crescent Mezzanine Partners VC Secondary	381,587	0
The Huron Fund III, L.P.	6,376,562	2,072,756
The Huron Fund IV, L.P.	23,153,242	384,454
The Huron Fund V, L.P.	16,282,709	14,695,157
The Veritas Capital Vantage Fund, L.P.	643,102	59,356,898
Thoma Bravo Discover Fund II, L.P.	110,241,577	13,418,180
Thoma Bravo Fund XII, L.P.	246,387,975	26,441,887
Thoma Bravo Fund XIII, L.P.	169,977,026	25,027,953
Thoma Bravo XIV, L.P.	78,315,043	46,422,153
TI Platform BOV, L.P.	13,013,837	5,921,377
TI Platform Fund II, L.P.	12,292,065	4,600,989
TI Platform Fund III, L.P.	0	25,000,000
TI Platform SMRS SMA, L.P.	48,865,563	15,451,041
TPG Healthcare Partners, L.P.	21,908,858	15,615,726
TPG IV, L.P. (Texas Pacific Group IV)	80,537	211,725
TPG Partners VI, L.P.	18,878,787	7,467,821
TPG Partners VIII, L.P.	74,860,041	74,864,438
TPG Partners, VII, L.P.	116,469,696	12,076,030
TPG V, L.P. (Texas Pacific Group V)	747,330	5,841,509
Trilantic Capital Partners V (North America) Fund A, L.P.	28,700,739	2,606,288
Trilantic Capital Partners VI (North America) L.P.	42,815,609	36,007,075
TSG6, L.P.	45,138,955	20,531,764
TSG7 A L.P.	157,978,214	26,995,373
TSG8, L.P.	73,874,134	74,997,813
Turnbridge Capital Partners I , L.P.	47,875,344	30,387,163
Veritas Capital Fund V, L.P.	157,252,643	8,898,273
Veritas Capital Fund VI, L.P.	299,547,959	20,162,369
Veritas Capital Fund VII, L.P.	79,157,751	27,673,158
Veritas V Co-Investors, L.P.	113,390,441	0
Vista Equity Endeavor Fund I, L.P.	47,087,464	14,204,132
Vista Equity Endeavor Fund II, L.P.	12,296,155	51,922,466

	Adjusted Reported Value	Unfunded Commitment
Vista Equity Partners Fund V, L.P.	71,171,677	10,903,696
Vista Equity Partners Fund VI, L.P.	104,403,105	16,932,064
Vista Equity Partners VII, L.P.	61,953,236	19,745,313
Vista Foundation Fund III, L.P.	24,313,713	6,890,288
Vista Foundation Fund IV, L.P.	27,318,277	45,492,612
Warburg Pincus China-Southeast Asia II, L.P.	22,748,627	56,512,500
Warburg Pincus China, L.P.	61,889,153	2,632,500
Warburg Pincus Energy MCIP, L.P.	0	10,396,887
Warburg Pincus Energy, L.P.	57,326,156	10,323,679
Warburg Pincus Equity Partners, L.P.	1,177,426	0
Warburg Pincus Financial Sector, L.P.	55,616,422	6,727,500
Warburg Pincus Global Growth, L.P.	130,646,226	38,437,500
Warburg Pincus Private Equity IX, L.P.	2,207,959	0
Warburg Pincus Private Equity X, L.P.	7,332,731	0
Warburg Pincus Private Equity XI, L.P.	110,810,911	0
Warburg Pincus Private Equity XII Secondary, L.P.	35,042,804	337,500
Warburg Pincus Private Equity XII, L.P.	245,662,385	2,362,500
* Total Private Equity	\$21,936,382,227	\$ 8,023,576,629
Cash	248,921,612	0
Active Small Cap Cash	35,252,709	0
Active Small Cap	34,785,322	0
Income Accruals	(6)	0
Grand Total	\$22,255,341,864	\$ 8,023,576,629

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

** New Commitments made during quarter reported

State of Michigan Retirement System

DOMESTIC EQUITY REVIEW

State of Michigan Investment Board Meeting
December 9, 2021



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

EXECUTIVE SUMMARY

Performance

MPSERS Plan (9/30/21)	1-Year	3-Years	5-Years	7-Years	10-Years
Annualized Returns	33.4%	14.8%	17.0%	13.6%	16.6%
S&P 1500	31.4%	15.5%	16.6%	13.8%	16.5%
Peer Median Return	29.6%	13.9%	14.1%	11.2%	14.4%
Percentile Rank vs. Peers *	15	18	13	22	16

*State Street Universe greater than \$1 billion

- In the quarter ended September 30, 2021, the Domestic Equity Division outperformed its peer group over all time periods and matched or exceeded the S&P 1500 Index over one, five and ten years. During the past year, performance was 200 basis points (bps) ahead of the benchmark with incurred tracking error of 2.5%.
- A number of managers in SMRS' portfolio, both internal and external, and across both value and growth styles, contributed to strong performance during the past year.
- On the internal management side, SMRS' value-oriented strategies beat the S&P 1500 by over 15% and the S&P 1500 Value benchmark by over 10%.
- SMRS' Disruptive Innovation Momentum fund returned nearly 58%, outperforming the S&P 1500 by over 20% and its MSCI Momentum benchmark by over 30%.
- SMRS Large Cap Consistent Growth outperformed the S&P 1500 by over 200 basis points as well as the S&P 1500 Growth index by over 300 basis points.
- On the external manager side, Michigan-based Seizert Capital Partners turned in an outstanding performance, besting the S&P 1500 by over 18% and the S&P 1500 Value benchmark by nearly 15%.
- Michigan-based Ancora Asset Management beat the market by over 16% as well as its small-cap benchmark by nearly 1%.
- Bivium Capital, one of the managers of our emerging manager program, outperformed both the S&P 1500 and its S&P 500 benchmark by over 100 basis points.

Asset Class Goal

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

Strategy Update

- The Domestic Equity Division continues to be positioned for an economic recovery, with a portfolio beta of 1.07 and a relative overweight to small cap, value and momentum stocks.
- We are paying close attention to the impact of the Fed's monetary accommodation during the past year, as M2 money supply is up over 30%.
- If that money is fully spent by consumers and businesses, with rates remaining low, it could lead to further demand-driven inflationary pressure and thus higher interest rates down the road. Such higher rates, coupled with continued appreciation of equity markets, could make stocks less appealing over time. That said, conditions currently remain favorable for equity markets, as growth is strong and interest rates remain low.
- DED sector overweights include health care, financials, communication services and utilities. Underweights include consumer discretionary, consumer staples and industrials. The division's portfolio trades at nearly a 15% discount to the S&P 1500, despite higher levels of profitability and faster rates of reinvestment.
- Domestic Equity hired a new manager, Patient Capital, on October 1, 2021. Patient Capital is managed by Samantha McLemore, who has been Bill Miller's co-portfolio manager on the highly successful Opportunity Trust strategy for nearly the past 15 years. Like Ark Investments, with Patient Capital we saw an opportunity to fund a talented and experienced manager early in the lifecycle of her firm. As a result, were able to lock in an attractive fee structure, and will hopefully benefit from the outstanding returns going forward that she has produced in the past.

Market Environment and Outlook

- At ~20X forward earnings, equity markets trade at a premium to their long-term historical average of 15.7X and roughly in line with their twenty-five-year average of 21X.
- Meanwhile 10-year treasury bonds trade at a yield of ~1.5%, or nearly 70X earnings, versus their long-term historical average of 5%, or ~20X earnings.
- Factoring this in, alongside the enormous influx of money injected into the financial system by the Federal Reserve, the continued growth of the economy, potential further economic stimulus, and the continued availability of many attractively valued companies, stocks remain a reasonable alternative to bonds and bond-like asset classes.
- Long-term we expect the market to return roughly 8.7%, driven by a dividend yield of 1.5% and dividend per share growth of 7.2%.
- Dividend per share growth is expected to be driven by 4.4% economic growth + 2.8% growth in the form of share buybacks. Such growth is higher than the S&P 500 thirty-year historical dividend growth rate, as today's companies are more profitable than in the past, and therefore can spend more on share buybacks than was the case historically.

SMRS

Domestic Equity Strategies

9/30/21

Markets	Amount	Total	% of Total
Internal Indexed (\$ in Millions)			
Indexed Portfolios	\$10,379		
Total Indexed		\$10,379	47.3%
Internal Active			
Active Portfolios	\$7,246		
Total Internal Active		\$7,246	33.0%
External Active			
Los Angeles Capital	\$925		
Mellon Capital	653		
ARK Investments	625		
Martin Currie US LT Unconstrained	597		
Seizert Capital Partners	573		
Clarkston Capital Partners	494		
Bivium Capital	131		
Attucks Asset Management	130		
Ancora	106		
Managed Asset Portfolios	<u>99</u>		
Total External Active		\$4,333	19.7%

Total Domestic Equity

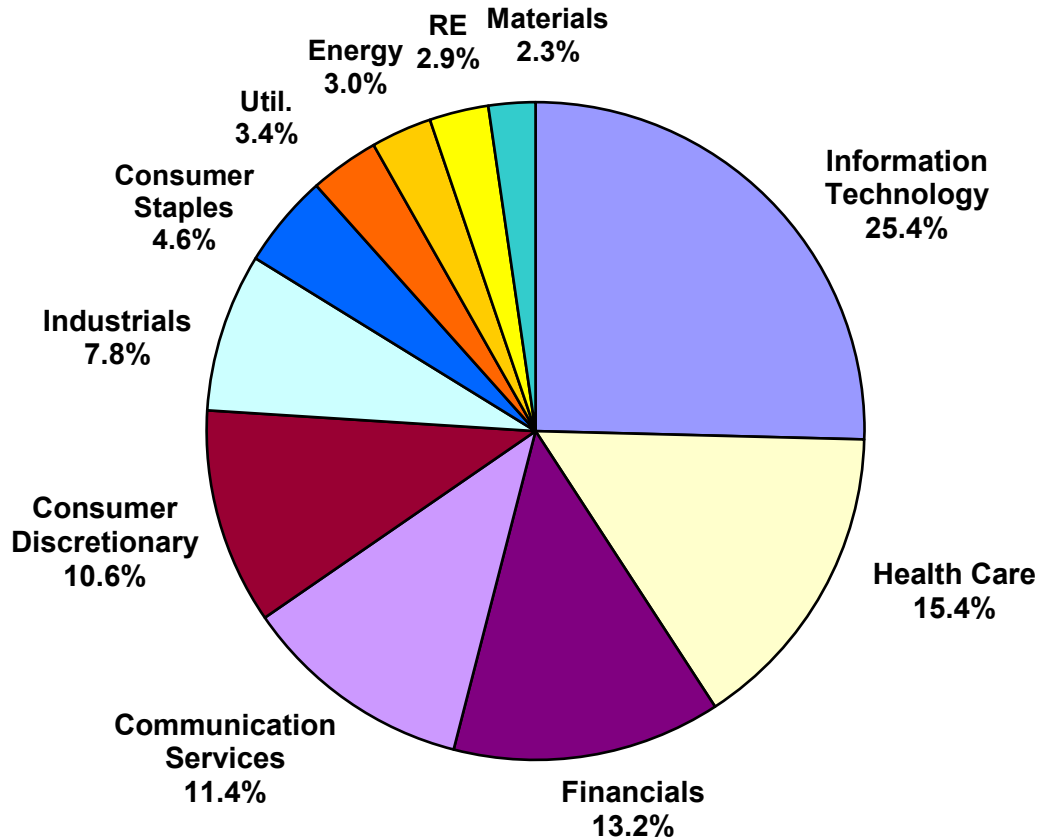
\$21,958

100.0%

SMRS

Domestic Equity By Sector

9/30/21



Market Value in Millions				
9/30/21				
	Assets	Percent	Benchmark	Difference
Information Technology	\$5,581	25.4%	26.5%	-1.1%
Health Care	3,374	15.4%	13.1%	2.3%
Financials	2,909	13.2%	11.8%	1.4%
Communication Services	2,510	11.4%	10.5%	0.9%
Consumer Discretionary	2,339	10.6%	12.6%	-2.0%
Industrials	1,708	7.8%	8.8%	-1.0%
Consumer Staples	1,011	4.6%	5.6%	-1.0%
Utilities	738	3.4%	2.5%	0.9%
Energy	651	3.0%	2.8%	0.2%
Real Estate	642	2.9%	3.1%	-0.2%
Materials	495	2.3%	2.7%	-0.4%
Total	\$21,958	100.0%	100.0%	

Benchmark: S&P 1500

SMRS

Domestic Equities Composite

9/30/21

	<u>9/30/21</u>	<u>6/30/21</u>	<u>3/31/21</u>	<u>12/31/20</u>
Assets (\$ in Millions):	\$21,958	\$22,169	\$20,408	\$19,046
Number of Securities:	2,992	2,965	1,346	1,317
Active Share:	28%	32%	36%	37%

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.

	<u>SMRS</u>	<u>S&P 1500</u>
Characteristics:		
Market Cap. (\$ in Billions)	\$442.9	\$526.3
FY1 P/E	17.0	19.6
P/E upside to S&P 1500	14.9%	0.0
Return on Equity	24.8%	17.4%
Risk Metrics		
Beta	1.07	1.00
Tracking Error	1.8%	0.0%
Projected Returns		
Dividend Yield	1.5%	1.5%
Buyback Yield	2.9%	2.8%
Reinvestment Rate	<u>6.2%</u>	<u>4.4%</u>
Projected Investment Return	10.6%	8.7%

TOP TEN EXPOSURES - Domestic Equities vs S&P 1500

9/30/21

<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>
Microsoft Corporation	4.6%	Microsoft Corporation	5.5%
Apple, Inc.	4.2%	Apple, Inc.	5.5%
Amazon.com, Inc.	2.8%	Amazon.com Inc.	3.5%
Facebook, Inc., Class A	2.4%	Alphabet Inc., Class A	2.1%
Alphabet Inc., Class A	1.9%	Alphabet Inc., Class C	1.9%
Bristol-Myers Squibb Company	1.8%	Facebook, Inc., Class A	1.9%
AT&T, Inc.	1.5%	Tesla, Inc.	1.6%
Alphabet Inc., Class C	1.4%	NVIDIA Corporation	1.3%
Athene Holding Ltd., Class A	1.3%	Berkshire Hathaway Inc. Class B	1.3%
NVIDIA Corporation	<u>1.3%</u>	JPMorgan Chase & Company	<u>1.2%</u>
TOTAL	<u>23.2%</u>	TOTAL	<u>25.8%</u>

Manager Performance - Net of Fees

9/30/21

<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	\$9,741,148,284	30.1%	15.9%	16.9%	14.1%	--	N/A
S&P 500		30.0%	16.0%	16.9%	14.0%	--	
Style & Risk Adjusted Benchmark		29.9%	16.0%	16.9%	14.0%	--	
Lipper Large-Cap Core		28.8%	15.2%	15.9%	12.9%	--	
Excess Return		0.0%	0.0%	0.0%	0.1%	--	
Alpha		0.1%	0.0%	0.0%	0.1%	--	
Pct. Rank vs. Lipper Large-Cap Core		41	45	38	21	--	
SMRS Large-Cap Core	1,952,138,119	74.4%	14.6%	19.0%	13.5%	10.6%	8/31/07
S&P 500		30.0%	16.0%	16.9%	14.0%	10.2%	
Style & Risk Adjusted Benchmark		52.9%	11.0%	15.7%	13.6%	12.1%	
Lipper Large-Cap Core		28.8%	15.2%	15.9%	12.9%	9.6%	
Excess Return		44.4%	-1.4%	2.1%	-0.6%	0.4%	
Alpha		21.5%	3.5%	3.3%	-0.1%	-1.5%	
Pct Rank vs Lipper Large-Cap Core		1	65	2	43	16	
SMRS All-Cap Garp	1,816,193,124	22.7%	8.8%	12.4%	9.7%	12.7%	4/30/11
S&P 1500 Super Composite		31.4%	15.5%	16.6%	13.8%	13.9%	
Style & Risk Adjusted Benchmark		28.8%	14.7%	15.8%	13.2%	13.7%	
Lipper Multi-Cap Core		31.1%	13.6%	14.6%	11.7%	12.0%	
Excess Return		-8.7%	-6.7%	-4.1%	-4.1%	-1.3%	
Alpha		-6.0%	-5.9%	-3.4%	-3.5%	-1.1%	
Pct. Rank vs. Lipper Multi-Cap Core		89	91	84	87	39	
SMRS Large-Cap Growth	976,230,332	25.7%	20.4%	22.1%	16.9%	12.4%	5/31/05
S&P 500 Growth		28.9%	20.2%	21.1%	17.4%	12.5%	
Style & Risk Adjusted Benchmark		27.7%	19.8%	20.9%	17.4%	12.5%	
Lipper Large-Cap Growth		25.8%	20.4%	21.3%	17.0%	12.2%	
Excess Return		-3.1%	0.1%	0.9%	-0.5%	-0.1%	
Alpha		-2.0%	0.5%	1.2%	-0.5%	-0.1%	
Pct Rank vs Lipper Large-Cap Growth		52	55	42	58	37	
LA Capital All-Cap Growth	925,316,181	27.5%	15.8%	17.2%	15.7%	13.1%	5/31/05
S&P 1500 Growth		29.5%	19.5%	20.5%	17.0%	12.4%	
Style & Risk Adjusted Benchmark		27.1%	18.1%	19.2%	15.3%	10.2%	
Lipper Multi-Cap Growth		27.6%	20.5%	20.9%	16.1%	11.9%	
Excess Return		-2.0%	-3.7%	-3.4%	-1.4%	0.7%	
Alpha		0.4%	-2.3%	-2.0%	0.4%	2.9%	
Pct. Rank vs. Lipper Multi-Cap Growth		54	85	83	49	23	
Value, Quality, Momentum Composite	870,881,503	--	--	--	--	29.7%	10/1/20
S&P 1500		--	--	--	--	31.4%	
Style & Risk Adjusted Benchmark		--	--	--	--	32.4%	
Lipper Multi-Cap Core		--	--	--	--	31.1%	
Excess Return		--	--	--	--	-1.7%	
Alpha		--	--	--	--	-2.7%	
Pct. Rank vs. Lipper Multi-Cap Core		--	--	--	--	61	
Large-Cap Consistent Growth	719,567,628	32.5%	19.3%	21.4%	--	17.0%	3/1/15
S&P 500		30.0%	16.0%	16.9%	--	13.7%	
Style & Risk Adjusted Benchmark		35.2%	20.1%	20.9%	--	16.6%	
Lipper Large-Cap Core		28.8%	15.2%	15.9%	--	12.5%	
Excess Return		2.4%	3.3%	4.5%	--	3.4%	
Alpha		-2.8%	-0.7%	0.5%	--	0.4%	
Pct. Rank vs. Lipper Large-Cap Core		13	2	1	--	1	
Mellon US Equity Enhanced	652,897,358	21.3%	22.7%	--	--	25.7%	3/1/17
S&P 500		30.0%	16.0%	--	--	16.1%	
Style & Risk Adjusted Benchmark		37.3%	16.2%	--	--	17.1%	
Lipper Large-Cap Core		28.8%	15.2%	--	--	15.3%	
Excess Return		-8.7%	6.7%	--	--	9.5%	
Alpha		-16.0%	6.5%	--	--	8.5%	
Pct. Rank vs. Lipper Large-Cap Core		94	1	--	--	1	

<u>Fund Name</u>	<u>Market Value</u>	<u>1-Year</u>	<u>3-Years</u>	<u>5-Years</u>	<u>7-Years</u>	<u>Inception</u>	<u>Inception Date</u>
SMRS Mid-Cap Index	637,681,982	43.4%	11.0%	13.2%	12.0%	--	N/A
S&P 400		43.7%	11.1%	13.0%	11.6%	--	
Style & Risk Adjusted Benchmark		43.6%	11.0%	12.9%	11.5%	--	
Lipper Mid-Cap Core		39.6%	11.1%	12.1%	9.9%	--	
Excess Return		-0.3%	-0.1%	0.2%	0.4%	--	
Alpha		-0.2%	0.0%	0.3%	0.4%	--	
Pct. Rank vs. Lipper Mid-Cap Core		28	51	31	15	--	
Ark Investments	624,824,454	29.1%	25.6%	32.8%	--	34.3%	3/1/16
S&P 1500 Growth		29.5%	19.5%	20.5%	--	20.9%	
Style & Risk Adjusted Benchmark		79.7%	12.7%	31.8%	--	32.0%	
Lipper Multi-Cap Growth		27.6%	20.5%	20.9%	--	21.2%	
Excess Return		-0.5%	6.2%	12.3%	--	13.4%	
Alpha		-50.7%	12.9%	1.0%	--	2.3%	
Pct. Rank vs. Lipper Multi-Cap Growth		38	14	4	--	3	
Martin Currie	596,859,561	--	--	--	--	27.4%	11/1/20
S&P 1500 Growth		--	--	--	--	33.2%	
Style & Risk Adjusted Benchmark		--	--	--	--	36.0%	
Lipper Multi-Cap Growth		--	--	--	--	30.3%	
Excess Return		--	--	--	--	-5.8%	
Alpha		--	--	--	--	-8.6%	
Pct. Rank vs. Lipper Multi-Cap Growth		--	--	--	--	75	
Seizert Capital Partners	572,964,585	48.8%	13.9%	14.9%	11.5%	14.3%	11/30/09
S&P 1500 Value		34.3%	10.5%	11.7%	9.9%	12.4%	
Style & Risk Adjusted Benchmark		33.3%	10.4%	11.5%	10.0%	12.5%	
Lipper Multi-Cap Value		38.7%	9.5%	11.1%	8.9%	11.3%	
Excess Return		14.5%	3.3%	3.2%	1.6%	1.9%	
Alpha		15.5%	3.4%	3.4%	1.6%	1.9%	
Pct. Rank vs. Lipper Multi-Cap Value		13	7	5	8	3	
Clarkston Capital Small/Mid-Cap	494,265,579	26.6%	12.5%	11.9%	12.5%	12.1%	1/1/14
S&P 400		47.7%	10.6%	13.2%	11.9%	10.9%	
Style & Risk Adjusted Benchmark		54.3%	8.2%	10.1%	9.2%	8.5%	
Lipper Mid-Cap Core		39.6%	11.1%	12.1%	9.9%	9.3%	
Excess Return		-21.1%	1.9%	-1.2%	0.6%	1.3%	
Alpha		-27.7%	4.2%	1.8%	3.3%	3.6%	
Pct. Rank vs. Lipper Mid-Cap Core		96	26	53	9	5	
Disruptive Innovation Momentum	269,212,446	57.8%	--	--	--	53.8%	9/1/20
MSCI Momentum Index		19.7%	--	--	--	13.9%	
Style & Risk Adjusted Benchmark		83.1%	--	--	--	59.0%	
Lipper Multi-Cap Growth		27.6%	--	--	--	22.3%	
Excess Return		38.1%	--	--	--	39.9%	
Alpha		-25.3%	--	--	--	-5.2%	
Pct. Rank vs. Lipper Multi-Cap Growth		1	--	--	--	1	
Bivium Capital Partners	130,685,212	32.4%	9.0%	11.4%	9.0%	7.2%	11/30/07
S&P 1500 Value		34.3%	10.5%	11.7%	9.9%	7.2%	
Style & Risk Adjusted Benchmark		31.3%	15.8%	11.5%	9.7%	10.1%	
Lipper Multi-Cap Value		38.7%	9.5%	11.1%	8.9%	6.8%	
Excess Return		-1.9%	-1.5%	-0.3%	-0.9%	0.0%	
Alpha		1.1%	-6.7%	-0.1%	-0.7%	-3.0%	
Pct. Rank vs. Lipper Multi-Cap Value		80	55	43	43	43	
Attucks Asset Management	130,130,896	29.3%	8.9%	11.2%	9.0%	7.4%	11/30/07
S&P 1500		31.4%	15.5%	16.6%	13.8%	9.9%	
Style & Risk Adjusted Benchmark		30.4%	10.0%	11.0%	9.5%	9.9%	
Lipper Multi-Cap Core		31.1%	13.6%	14.6%	11.7%	8.5%	
Excess Return		-2.1%	-6.6%	-5.4%	-4.9%	-2.5%	
Alpha		-1.1%	-1.2%	0.2%	-0.5%	-2.4%	
Pct. Rank vs. Lipper Multi-Cap Core		64	91	89	89	76	

<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>
Ancora	106,448,762	48.5%	10.3%	--	--	10.6%	10/1/17
S&P 1000		47.7%	10.6%	--	--	11.8%	
Style & Risk Adjusted Benchmark		54.3%	8.7%	--	--	9.2%	
Lipper Mid-Cap Core		39.6%	11.1%	--	--	11.2%	
<i>Excess Return</i>		0.8%	-0.3%	--	--	-1.2%	
<i>Alpha</i>		-5.8%	1.6%	--	--	1.4%	
<i>Pct. Rank vs. Lipper Mid-Cap Core</i>		13	66	--	--	62	
Managed Asset Portfolios	98,998,883	27.9%	11.3%	12.6%	--	13.7%	2/29/16
S&P 1500 Value		34.3%	10.5%	11.7%	--	13.1%	
Style & Risk Adjusted Benchmark		27.9%	8.2%	13.1%	--	13.6%	
Lipper Multi-Cap Value		38.7%	9.5%	11.1%	--	12.3%	
<i>Excess Return</i>		-6.4%	0.7%	0.9%	--	0.5%	
<i>Alpha</i>		0.0%	3.0%	-0.5%	--	0.0%	
<i>Pct. Rand vs. Lipper Multi-Cap Value</i>		87	22	21	--	22	

State of Michigan Retirement System

INTERNATIONAL EQUITY REVIEW

State of Michigan Investment Board Meeting

December 9, 2021



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

EXECUTIVE SUMMARY

Performance

MPSERS Plan (9/30/21)	1-Year	3-Years	5-Years	7-Years	10-Years
Annualized Returns	26.0%	9.8%	10.3%	7.3%	9.0%
MSCI ACWI ex USA Returns	23.9%	8.0%	8.9%	5.7%	7.6%
Peer Median Returns	26.2%	9.3%	9.9%	6.7%	8.8%
Percentile Rank vs. Peers*	56	34	41	38	35

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

- The International Equity Division (IED) outperformed both peers and the division's benchmark over the three, five, seven, and ten year periods.
- The portfolio outperformed the benchmark by 2.1% over the last twelve months.
- Outperformance was driven by the value factor, quality factor, information technology sector and energy sector.

Asset Class Goals

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

Strategy

- The division allocates capital with the intention of persistent exposure to the quality factor, momentum factor, and value factor.
- Persistent factor exposures should create consistent, transparent, and efficient returns.
- Current portfolio drivers of risk and return.
 - Tracking error of the portfolio is approximately 1.4%, which is below the division's risk budget of 3.0%.
 - The division's core strategy of exposure to the quality, value, and momentum factors (QVM), accounts for collectively 10.2% of the total tracking error, indicating that long-term, the portfolio is not materially exposed to any one single risk.
- Quarterly changes to International Equity Division allocation.
 - Rebalanced \$1.0 billion of equity swaps to match the division's long-term equity factor strategy.
 - Allocated \$200.0 million to WCM Focused Growth International fund. The strategy seeks to identify companies with attractive fundamentals and a high probability for superior growth in the future.

Market Environment and Outlook

Market Performance

- International stock markets were up year-to-date through September 5.9%. Over the last twelve months stocks have risen 23.9%. Fundamentals have accelerated year-over-year, supporting the above average returns over the last year.
- Performance of the quality, value, and momentum factors remains strategically important to the IED. The value factor outperformed the MSCI ACWI ex USA by 7.6% year-to-date. The quality factor has matched the benchmark and the momentum factor continues to lag, underperforming the benchmark by -5.9% year-to-date. IED's core strategy remains balanced and consistent, outperforming the division's benchmark again this year by 1.9% year-to-date.
- Emerging markets underperformed the MSCI ACWI ex USA by -7.1% year-to-date. Developed markets outperformed the broader index by 3.3%.
- The U.S. dollar is up year-to-date 4.8%.
- Commodities have surged in 2021, up 29.3% year-to-date, outperforming international stocks by 23.4%. Oil and copper are both up 54.6% and 16.2% for the year, indicating a full recovery is underway. Gold has declined -7.3% this year.
- Global government interest rates (index weighted) remain subdued, at approximately 1.3%.

Outlook

- Global stock markets and commodity markets have looked beyond trailing economic fundamentals in anticipation of a fully reopened economy and potentially the emergence of global inflation. Record levels of central bank liquidity have driven stock markets to new market highs despite an above average global recession which is different than prior economic cycles.
- More recently, several signs indicate the global economy is accelerating. International stock markets have delivered exceptional growth. Earnings per share grew at 44.0% year over year which has led to a contraction in market multiple of nearly 17.0%.
- Europe top line sales and earnings expanded year-over-year at 3.2% and 50.8%. This marks an upward acceleration in trailing fundamentals for Europe. Forward looking sales and earnings per share have continued to improve and are expected to be up over the next 12 months, 5.4% and 9.2% respectively.
- Japan has been slower in its recovery relative to other nations. Sales per share declined -4.3% year-over-year. Earnings per share have bottomed and begun expanding, up 36.8% since last year. Forward looking sales and earnings growth are forecasted at 3.9% and 13.7%.

- Central banks are fully committed to an “anything it takes” policy. The vast amounts of liquidity have offset the gap between high market valuations and actual fundamentals. Year-to-date the fundamentals strengthened especially as the markets lapped lower year-over-year comparisons. Forward looking estimates, especially sales per share, appear to be moderating in some markets indicating above average top line sales growth for next year may be challenging.
- Central bank policies may not remain in place if inflation continues to trend well above targets in 2022. Currently the market believes the narrative that inflation will moderate at some point next year. Persistently high inflation may force the banks to taper more quickly, leading markets to reassess how much support will central banks provide to indebted governments. Significantly higher interest rates may potentially lead to lower equity market multiples.
- Analysts’ expectations are high with forward-looking earnings per share growth estimated at 10.6% for the MSCI ACWI ex USA index.
- Go-forward returns for the MSCI ACWI ex USA index on an annualized basis are estimated at 8.1%. This rate is based on the current price and actual fundamentals over multiple periods to remove fundamental variability, better estimating the earnings power of the index.
- A ten-year blended international government yield of 1.3% implies an international equity risk premium of 6.8%. The equity risk premium increased slightly during the quarter due to small increases to the long-term earnings projections of the index.

Conclusion

International stock market fundamentals are accelerating. Global government bond yields remain near all-time lows as central banks remain committed to ultra-accommodative monetary policies not seen since the Great Financial Crisis. The policies in Japan, Europe, and now the U.S. are open-ended inflation targeting processes.

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 10.6% in the next twelve months. The market trades at 16.1x price to earnings which is below its twenty-three-year average of 17.0x. The annualized go-forward return of 8.1% is still a wide spread relative to global risk-free rates. To capture the spread to bonds, international stock investors will need a long investment horizon as the short-term environment may experience increased volatility.

SMRS

International Equity Strategies

9/30/21

Markets	Amount	Total	% of Total
Active (\$ in Millions)			
BlackRock MSCI	\$2,614		
Wellington	1,087		
IED Quality Equity	765		
Martin Currie	564		
Lazard	306		
UBS	199		
WCM	189		
Total Active		\$5,724	36.8%
Stock Plus			
Internal	\$3,851		
PIMCO	2,441		
Total Stock Plus		\$6,292	40.5%
Indexed			
SSGA	\$1,833		
BlackRock	1,689		
Total Indexed		\$3,522	22.7%

TOTAL

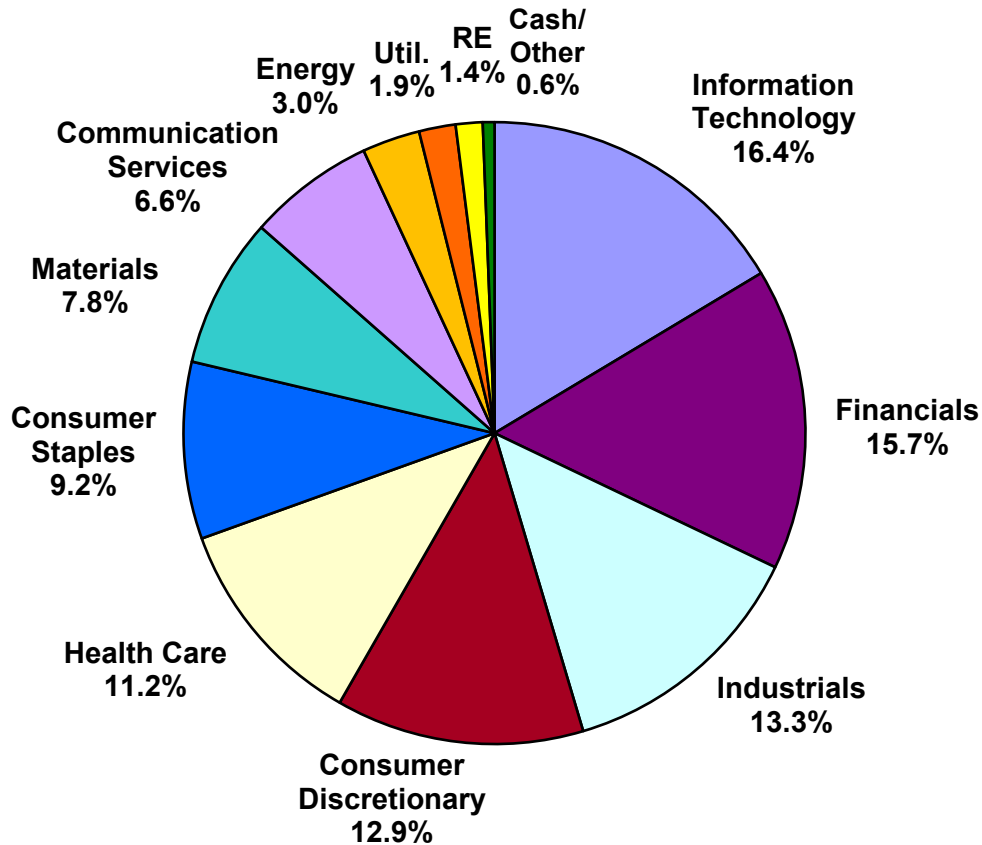
\$15,538

100.0%

SMRS

International Equity By Sector

9/30/21



Market Value in Millions				
9/30/21				
	Assets	Percent	Benchmark	Difference
Information Technology	\$2,549	16.4%	12.9%	3.5%
Financials	2,441	15.7%	19.4%	-3.7%
Industrials	2,066	13.3%	12.0%	1.3%
Consumer Discretionary	2,008	12.9%	12.9%	0.0%
Health Care	1,732	11.2%	9.3%	1.9%
Consumer Staples	1,430	9.2%	8.4%	0.8%
Materials	1,218	7.8%	8.1%	-0.3%
Communication Services	1,022	6.6%	6.3%	0.3%
Energy	467	3.0%	5.2%	-2.2%
Utilities	290	1.9%	3.0%	-1.1%
Real Estate	221	1.4%	2.5%	-1.1%
Total Investments	\$15,444	99.4%	100.0%	
Cash/Other	94	0.6%	0.0%	0.6%
Total	\$15,538	100.0%	100.0%	

Benchmark: MSCI ACWI ex USA

SMRS

International Equities

9/30/21

Date:	<u>9/30/21</u>	<u>6/30/21</u>	<u>3/31/21</u>	<u>12/31/20</u>
Assets (\$ in Millions):	\$15,538	\$16,043	\$15,094	\$14,527
Number of Securities:	2,639	2,624	2,632	2,616
Active Share:	33%	33%	34%	34%

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	10.7%	9.3%	9.4%	8.1%
Sustainable Growth Rate	7.7%	6.5%	7.5%	6.1%
Dividend Yield	2.1%	1.9%	2.1%	2.0%
Buyback Yield	0.1%	0.0%	-0.2%	0.0%
Collateral Yield	0.8%	0.8%	--	--
Risk:				
Beta	0.99	--	1.00	--
Volatility	17.8%	--	18.0%	--
Tracking Error	1.4%	--	0.0%	--
Information Ratio	0.9	0.9	--	--
Fundamental:				
Average Capitalization (\$ in Billions)	104.5	--	94.9	--
Price/Earnings	15.8	20.2	17.6	21.9
Price/Book	1.9	2.2	2.0	2.3
ROE	11.7%	10.7%	11.3%	10.7%

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	2.6%	\$309.4	47.7	\$403.7
Taiwan Semiconductor Manufacturing Co., Ltd.	2.4%	539.8	25.9	374.5
Tencent Holdings	1.8%	568.8	25.2	272.7
Samsung Electronics Co., Ltd.	1.5%	422.0	12.3	233.5
Roche Holding	1.5%	323.5	17.1	226.4
Nestle S.A.	1.4%	340.1	25.4	221.3
Alibaba Group	1.2%	396.2	15.9	183.4
Novo Nordisk A/S Class B	1.0%	171.7	30.9	153.1
Toyota Motor Corporation	0.8%	292.4	10.6	129.9
SAP SE	<u>0.8%</u>	<u>166.4</u>	19.7	<u>116.6</u>
TOTAL	<u>14.9%</u>	<u>\$3,530.2</u>		<u>\$2,315.1</u>

International Equity Performance - Net of Fees
9/30/21

<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	\$15,538,269,862	25.7%	9.5%	10.1%	7.1%	6.5%	1/1/04
MSCI ACWI ex USA		23.9%	8.0%	8.9%	5.7%	6.5%	
Lipper International Multi-Cap Core		24.5%	7.1%	8.3%	5.7%	5.9%	
Excess Return		1.8%	1.5%	1.1%	1.4%	0.0%	
Pct Rank vs. Lipper International Multi-Cap Core		39	4	7	8	14	
Total International Active Strategy	\$5,724,923,942	22.4%	9.6%	9.9%	7.0%	6.0%	5/1/05
MSCI ACWI ex USA		23.9%	8.0%	8.9%	5.7%	5.7%	
Lipper International Multi-Cap Core		24.5%	7.1%	8.3%	5.7%	5.4%	
Excess Return		1.0%	2.0%	1.3%	1.5%	0.6%	
Pct Rank vs. Lipper International Multi-Cap Core		78	4	11	8	21	
BlackRock MSCI Systematic Return	2,614,239,075	25.9%	--	--	--	14.8%	12/1/18
MSCI ACWI ex USA		23.9%	--	--	--	11.4%	
Lipper International Multi-Cap Core		24.5%	--	--	--	10.8%	
Excess Return		2.0%	--	--	--	3.3%	
Pct Rank vs. Lipper International Multi-Cap Core		34	--	--	--	3	
IED Quality Equity	764,787,523	17.3%	--	--	--	20.5%	2/1/20
MSCI ACWI ex USA		23.9%	--	--	--	11.8%	
Lipper International Multi-Cap Core		24.5%	--	--	--	11.2%	
Excess Return		-6.6%	--	--	--	8.7%	
Pct Rank vs. Lipper International Multi-Cap Core		92	--	--	--	1	
Martin Currie International Long-Term	564,460,640	26.2%	18.0%	--	--	16.5%	2/1/17
MSCI ACWI ex USA		23.9%	8.0%	--	--	9.1%	
Lipper International Multi-Cap Core		24.5%	24.5%	--	--	8.4%	
Excess Return		2.3%	10.0%	--	--	7.4%	
Pct Rank vs. Lipper International Multi-Cap Core		28	28	--	--	1	
Wellington IRE	543,880,206	28.1%	9.1%	10.1%	6.8%	5.6%	12/1/05
MSCI World ex USA		26.5%	7.9%	8.9%	5.7%	5.1%	
Lipper International Multi-Cap Core		24.5%	7.1%	8.3%	5.7%	4.9%	
Excess Return		1.6%	1.2%	1.2%	1.1%	0.5%	
Pct Rank vs. Lipper International Multi-Cap Core		13	6	7	12	20	
Wellington Emerging Markets Local Equity	342,521,465	13.4%	8.4%	8.2%	5.6%	6.9%	12/1/11
MSCI Emerging Market Index		18.2%	8.6%	9.2%	5.6%	5.6%	
Lipper Emerging Markets		22.4%	10.0%	9.1%	5.4%	5.5%	
Excess Return		-4.8%	-0.2%	-1.1%	0.0%	1.3%	
Pct Rank vs. Lipper Emerging Markets		85	58	67	49	27	
Lazard/Wilmington International Equity	306,225,000	22.5%	7.5%	7.5%	5.3%	4.3%	6/1/14
MSCI World ex USA		26.5%	7.9%	8.9%	5.7%	4.8%	
Lipper International Large-Cap Core		24.5%	7.1%	8.3%	5.7%	4.9%	
Excess Return		-4.0%	-0.4%	-1.4%	-0.4%	-0.5%	
Pct Rank vs. Lipper International Large-Cap Core		77	49	77	79	80	
Wellington Select China Equity	201,750,906	4.8%	--	--	--	28.3%	9/1/19
MSCI China On shore		16.6%	--	--	--	50.2%	
Lipper Emerging Markets		22.4%	--	--	--	15.3%	
Excess Return		-11.8%	--	--	--	-21.9%	
Pct Rank vs. Lipper Emerging Markets		97	--	--	--	6	
UBS China A Opportunity Fund	198,654,276	-0.5%	--	--	--	17.7%	5/1/20
MSCI China On shore		16.6%	--	--	--	41.4%	
Lipper Emerging Markets		22.4%	--	--	--	30.9%	
Excess Return		-17.1%	--	--	--	-23.7%	
Pct Rank vs. Lipper Emerging Markets		99	--	--	--	97	
WCM Focused Growth International	188,404,851	--	--	--	--	--	10/1/21
MSCI ACWI ex USA		--	--	--	--	--	
Lipper International Large-Cap Core		--	--	--	--	--	
Excess Return		--	--	--	--	--	
Pct Rank vs. Lipper International Large-Cap Core		--	--	--	--	--	

<u>Fund Name</u>	<u>Market Value</u>	<u>1-Year</u>	<u>3-Years</u>	<u>5-Years</u>	<u>7-Years</u>	<u>Inception</u>	<u>Inception Date</u>
Total International Stock Plus Strategy	\$6,291,835,965	30.2%	10.1%	10.6%	7.4%	8.3%	1/1/09
MSCI ACWI ex USA		23.9%	8.0%	8.9%	5.7%	8.1%	
Lipper International Multi-Cap Core		24.5%	7.1%	8.3%	5.7%	7.9%	
<i>Excess Return</i>		6.3%	2.1%	1.6%	1.7%	0.2%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		9	3	4	6	26	
Internal Stock Plus	3,850,895,761	31.7%	9.8%	9.5%	6.8%	7.0%	9/1/11
MSCI ACWI ex USA		23.9%	8.0%	8.9%	5.7%	6.2%	
Lipper International Multi-Cap Core		24.5%	7.1%	8.3%	5.7%	6.8%	
<i>Excess Return</i>		7.8%	1.7%	0.6%	1.1%	0.9%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		5	3	12	12	33	
PIMCO StocksPLUS	2,440,940,203	27.9%	--	--	--	14.5%	4/1/19
MSCI ACWI ex USA		23.9%	--	--	--	10.7%	
Lipper International Multi-Cap Core		24.5%	--	--	--	10.3%	
<i>Excess Return</i>		4.0%	--	--	--	3.7%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		15	--	--	--	3	

Total International Index Strategy	\$3,521,509,955	24.1%	8.3%	9.7%	6.9%	8.3%	7/1/09
MSCI ACWI ex USA		23.9%	8.0%	8.9%	5.7%	7.3%	
Lipper International Multi-Cap Core		24.5%	7.1%	8.3%	5.7%	7.5%	
<i>Excess Return</i>		0.2%	0.2%	0.7%	1.3%	1.1%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		64	24	12	8	12	
SSGA MSCI ACWI ex USA Index	1,832,596,860	24.1%	8.3%	--	--	6.4%	11/1/17
MSCI ACWI ex USA		23.9%	8.0%	--	--	6.1%	
Lipper International Multi-Cap Core		24.5%	7.1%	--	--	5.4%	
<i>Excess Return</i>		0.2%	0.3%	--	--	0.3%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		65	26	--	--	22	
Blackrock ACWI ex USA Index	1,688,913,095	24.2%	8.3%	--	--	5.8%	3/1/18
MSCI ACWI ex USA		23.9%	8.0%	--	--	5.6%	
Lipper International Multi-Cap Core		24.5%	7.1%	--	--	5.3%	
<i>Excess Return</i>		0.3%	0.2%	--	--	0.3%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		64	26	--	--	40	

State of Michigan Retirement System

REAL RETURN & OPPORTUNISTIC REVIEW

State of Michigan Investment Board Meeting
December 9, 2021



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

EXECUTIVE SUMMARY

Performance

MPSERS Plan (9/30/21)	1-Year	3-Years	5-Years	7-Years	10-Years
Real & Opportunistic	24.2%	13.8%	13.6%	11.5%	11.7%
Custom Benchmark	8.3%	7.0%	7.3%	7.2%	7.2%

- The portfolio value is \$11.6 billion with a one-year return of 24.2%. As global markets stalled due to the COVID-19 delta variant in the third quarter of 2021, the valuation of our portfolio holdings held steady.
- Performance for the year was driven by i) income earned from entertainment royalties, investments in asset managers, credit investments, and natural resource strategies; and ii) capital appreciation of our natural resources and media and entertainment assets.

Strategy Update

- The objective of the Real Return & Opportunistic portfolio is to provide an inflation hedge and/or to gain exposure to attractive opportunities that may not fit in another plan portfolio.
- During the quarter, the Real Return & Opportunistic portfolio continued to benefit from exposure to assets with low equity beta and diversity of strategy, industry, and geography.
- The Real Return & Opportunistic portfolio has approximately \$4.2 billion of unfunded commitments. Four new commitments were made during the quarter:
 - \$250 million in TPG Rise Climate I, L.P., a closed-end global climate change private equity fund, managed by TPG Capital.
 - \$150 million in Nyanza II, LLC, a closed-end music and entertainment private equity fund, managed by Great Mountain Partners, LLC.
 - \$100 million in Angelo Gordon Credit Solutions Fund II, L.P., a closed-end credit fund that provides financing solutions across credit markets, managed by Angelo Gordon.
- 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

9/30/21

Top Ten Advisors or Entities

(\$ in Millions)

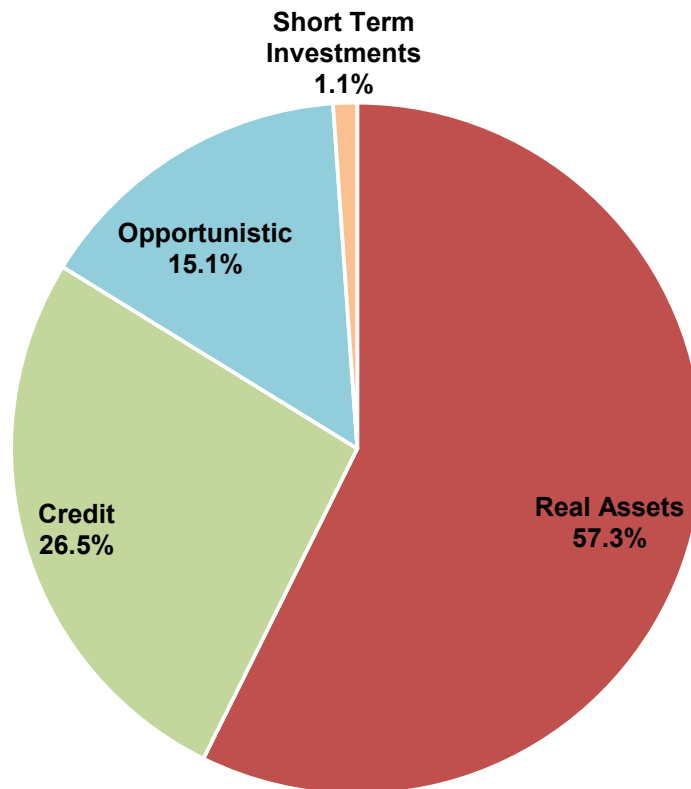
Advisor or Entity	Market Value
Great Mountain Partners	\$ 4,188
Apollo Global Management	1,046
Barings Alternative Investments	973
Domain Capital Group LLC	792
Sixth Street Partners	658
Blackstone Alternative Asset Management	425
Kayne Anderson Capital Advisors	369
HPS Partners	338
Ridgewood Energy	305
Czech Asset Management	297
Total Market Value	\$ 9,391

SMRS

Real Return and Opportunistic

9/30/21

Investments By Strategy



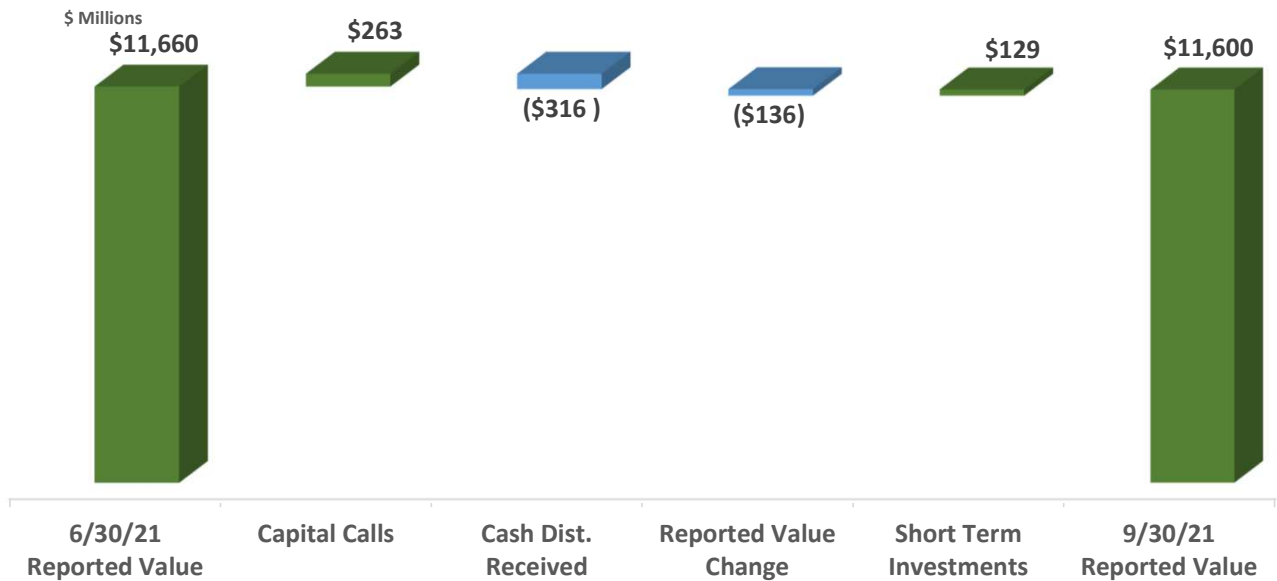
Market Value in Millions	
	<u>9/30/21</u>
Real Assets	\$6,650
Credit	\$3,071
Opportunistic	\$1,750
Short Term Investments	<u>\$129</u>
Total Investments	<u><u>\$11,600</u></u>

SMRS

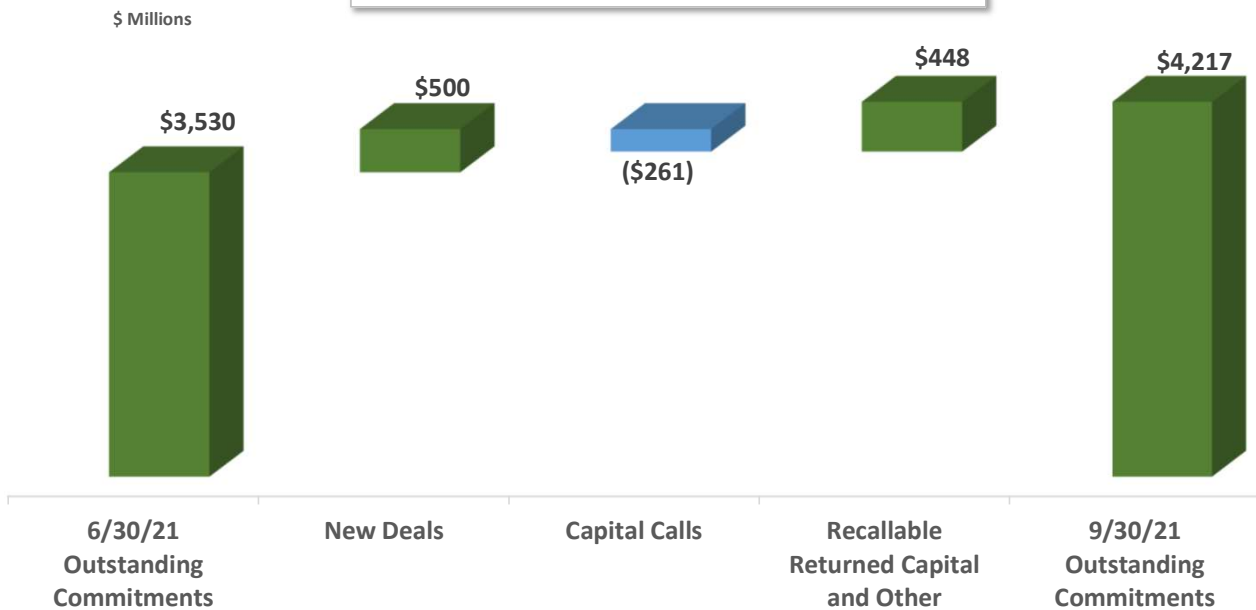
Real Return and Opportunistic

9/30/21

Invested Commitments



Outstanding Commitments



SMRS

Real Return and Opportunistic

9/30/21

Net Market Value by Entity

	Net Market Value	Unfunded Commitment
* Abernathy	\$ 264,756,162	\$ 14,557,806
* Abernathy II	6,418,825	3,828,049
Altus Midstream	12,080,250	0
Angelo Gordon Credit Solutions Fund	100,485,100	20,325,340
** Angelo Gordon Credit Solutions Fund II, L.P.	-	100,000,000
Apollo European Principal Finance Fund II	7,114,317	7,798,840
Apollo HK TMS Investments Holdings LP	196,138	0
Axton Holdings	3,081,354,805	0
Barings Asset Based Income Fund I	204,764,979	73,612,674
Barings Global Real Asset Fund I	74,483,578	18,221,310
Blackstone Capital Opportunities Fund IV, L.P.	12,426,564	287,773,109
Blackstone COF IV Co-Investment Fund, L.P.	-	37,500,000
Blackstone Strategic Capital Holdings, LP	114,454,392	34,593,609
Blue Peninsula Fund LP	156,905,707	30,402,634
Broadriver III	130,240,852	48,938,747
BSCH Parallel (MLG) I LP	244,396,706	0
BSCH II	66,572,799	200,786,344
Blackstone Strategic Capital Holdings (Side Car)	85,653,464	15,530,498
Carlyle Energy Mezzanine Opportunity Fund II	20,933,780	7,589,277
Carlyle IEP Co-Invest (Varo)	14,015,169	1,826,324
Carlyle International Energy Partners	52,891,268	13,004,679
Carlyle International Energy Partners II	21,448,043	131,513,624
Castle Credit SMRS Holdings LLC	128,361,630	60,599,584
Centerbridge SCP III	20,136,609	1,525,715
Centerbridge SCP III, LP – Flex, L.P.	62,811,015	27,569,030
Content Holdings, LLC	323,315,429	90,203,182
Credit Opportunity Fund III	9,516,858	19,197,929
Energy Recap and Restructuring	12,327,922	0
ERR MI Holdings LP	2,163,697	6,386,426
FCO MA MI LP	163,531,748	32,827,681
Financial Credit Investment II	246,397,699	194,583,962
Financial Credit Investment III	217,325,780	175,967,239
Flywheel Energy Co-Invest	51,875,350	7,000,000
Fortress Transportation & Infrastructure	95,858,306	0
Greatrock LLC	109,511,393	10,700,000
Greatrock II LLC	4,097,951	5,000,000
Global Maritime	82,877,386	3,414,854

	Net Market Value	Unfunded Commitment
GSO Credit Alpha Fund	28,458,313	37,910,064
HarbourVest Direct Lending Fund (L) L.P.	32,571,735	68,750,000
Hopen Life Science Fund II	3,533,082	165,000
HPS Red Cedar Fund	297,111,740	137,739,242
HPS Mezzanine Partners 2019, L.P.	38,493,852	14,049,728
Kayne Anderson Energy Fund VII, LP	27,594,385	7,611,307
Kayne Anderson Private Energy Income Fund	131,136,095	26,509,770
Kayne Anderson Private Energy Income Fund II	52,022,064	112,343,573
Kayne Solutions Fund	56,476,590	189,280,435
KKR Energy Income & Growth Fund	38,027,502	1,811,455
KKR Lending Partners	4,842,815	8,917,164
KKR Lending Partners II	14,172,468	11,737,239
Lakewater	131,414,766	76,518,504
Lakewater II	83,165,624	22,022,364
Lakewater III	248,941,302	89,179,025
Lakewater IV	31,653,202	16,275,315
Lakewater V	84,782,314	23,323,672
Marathon CLO Equity Fund	13,920,962	0
Merit Energy Partners I LP	29,613,809	0
MidCap Finco Holdings LTD	308,026,454	0
Mortgage Servicing Rights	53,191,082	15,662,214
Napier Park Aircraft Leasing Vehicle I, LLC	47,716,728	0
Napier Park AL Rollover Fund I	56,425,985	20,483,228
Nash Co-Investment	15,260,259	94,259
New Fortress Energy HLDGS	978,606,218	0
NGP Natural Resources XII	97,741,202	49,318,792
** Nyanza II, LLC	-	150,000,000
Orion Mine Finance	49,966,018	0
Orion Mine Finance 1A	40,122,529	0
Orion Mine Finance Co-Fund II LP	7,304,015	0
Orion Co-Investments III, LP	73,205	0
Orion Mine Finance II	113,095,521	7,494,843
Orion Mine Finance III LP	29,877,116	50,041,175
Redding Ridge Holdings, LP	101,845,729	15,155,765
* Ren Venture Fund II	38,717,838	500,000
* Ren Venture Fund III	21,371,652	9,500,000
Ridgewood Energy Oil & Gas II	79,594,424	4,014,096
Ridgewood Energy Oil & Gas III	168,179,900	83,900,566
Ridgewood Fund II Co-Invest (REOG)	23,654,969	3,024,775
Riverside Credit Solutions FD I LP	25,400,182	17,746,522
RPEP Energy Opportunistic Institutional Partners	33,892,972	4,691,687
Sixth Street SSLE II (USD Feeder)	24,225,533	101,607,255
SJC Direct Lending Fund II	1	38,129,174
SJC Direct Lending Fund III	158,452,104	23,671,042

	Net Market Value	Unfunded Commitment
SJC Direct Lending Fund III Co-Invest G-III	41,840,833	0
SJC Onshore Direct Lending Fund IV – SMRS-L.P.	96,627,707	153,037,689
* Social Network Holdings	197,047,142	5,701,027
Specialty Loan Fund III	2,337,383	5,812,365
Sprott Private Resource Lending (US), LP	7,330,775	0
Sprott PRL(M) LP	1,360,190	0
Sprott PRL(M-Co-Invest) LP	150,622	0
Structured Credit Recovery Fund IV	155,568,694	112,004,345
Terra Co-Investment	49,804,972	14,000,000
TICP CLO Partners II	38,655,979	1,480,904
TICP CLO Partners III	59,531,789	40,312,912
** TPG Rise Climate I	-	250,000,000
TSSP Agriculture Partners	42,427,221	111,227,244
TSSP Adjacent Opportunities Partners	234,072,987	96,856,685
TSSP Capital Solutions	190,148,218	163,805,806
TSSP Opportunities Partners IV	68,969,387	43,148,841
Turning Rock Fund I, LP	63,697,801	16,319,293
Turning Rock Fund II	-	75,000,000
Vida Insurance Credit Opportunity Fund II	107,830,976	2,480,092
Warwick (SMRS) Co-Invest, L.P.	35,118,141	2,089,081
Warwick Partners III	55,241,166	2,017,706
Total Real Return and Opportunistic	\$ 11,470,137,907	\$ 4,217,251,708
Short-Term Investments & Other	129,412,394	
Grand Total	\$ 11,599,550,301	\$ 4,217,251,708

* Fund of Funds

** **New Commitment**

State of Michigan Retirement System

REAL ESTATE AND INFRASTRUCTURE REVIEW

State of Michigan Investment Board Meeting
December 9, 2021



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

EXECUTIVE SUMMARY

Performance

MPSERS Plan (9/30/21)	1-Year	3-Years	5-Years	7-Years	10-Years
Annualized Returns	13.7%	4.8%	6.9%	8.1%	9.2%
NCREIF NPI	10.7%	5.4%	5.5%	6.7%	7.6%
Peer Median Returns	12.6%	5.9%	6.8%	8.1%	9.3%
Percentile Rank vs. Peers*	49	59	49	54	52

*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, exposure to infrastructure and recovery in the hospitality sector. Over the ten-year timeframe, the REID is outperforming the benchmark by 160 basis points.

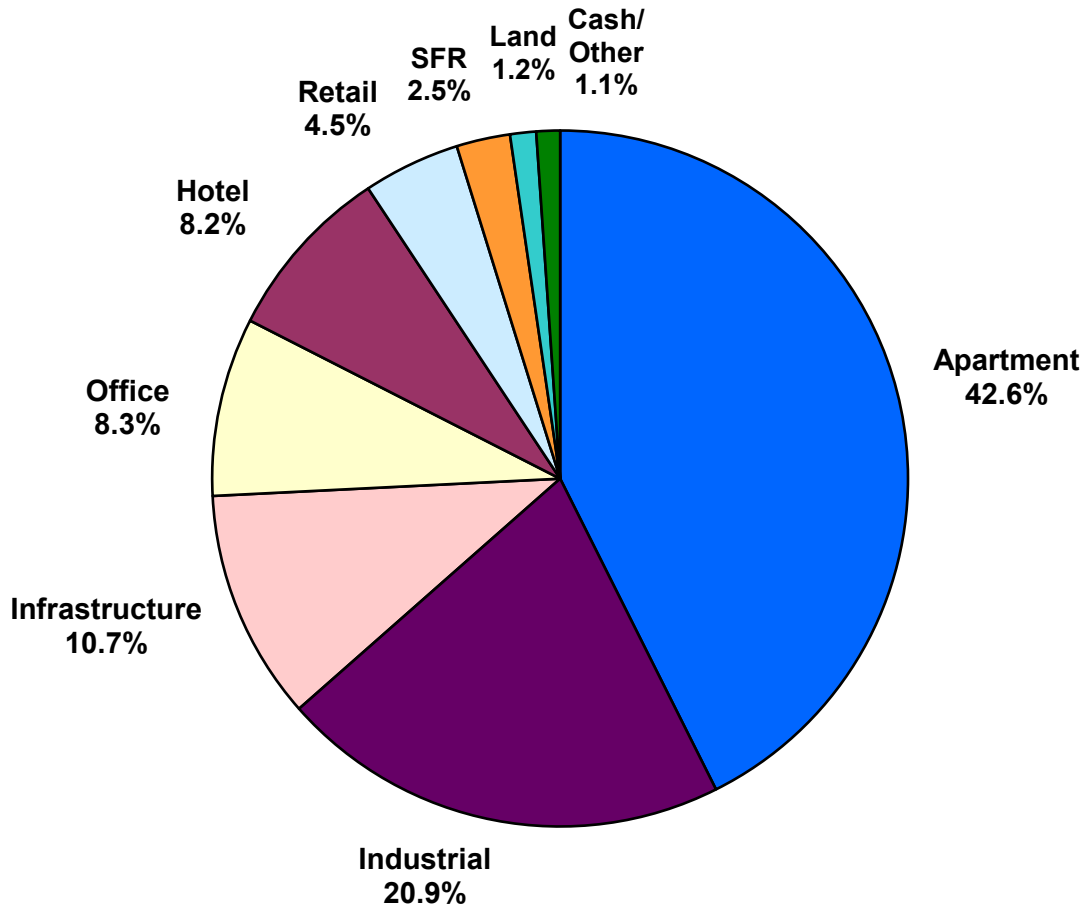
Strategy Update

- The COVID-19 global pandemic and Shelter-in-Place orders implemented to slow the spread of the virus resulted in major negative impacts to the US & world economies and certain segments of the commercial real estate and infrastructure markets. The US economy largely reopened by the end of the second quarter 2021. Subsequently, resurgent case numbers have resulted in some parts of the country bringing back mitigation measures. 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 and have experienced uneven recovery. In aggregate, volumes have largely recovered to 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 including credit strategies that are higher in the capital stack with a shorter projected hold period. We have selectively acquired properties where we can add value through management and leasing and have continued to develop properties at attractive risk-adjusted returns. The team continues to assemble portfolios in both traditional and non-traditional real estate sectors that we believe will become institutional property types, providing above market appreciation and total returns.
- We have been actively managing the portfolio with capital returned of approximately \$582 million, and funding for new or existing investments of just over \$706 million over the past 12 months.
- The REID has approximately \$2.1 billion in unfunded commitments. No new commitments were made during the quarter.

SMRS

Real Estate and Infrastructure

9/30/21



Market Value in Millions

	9/30/21		9/30/20	
Apartment	\$2,857	42.6%	\$2,639	42.7%
Industrial	1,401	20.9%	981	15.9%
Infrastructure	717	10.7%	690	11.2%
Office	558	8.3%	745	12.1%
Hotel	552	8.2%	527	8.5%
Retail	305	4.5%	324	5.2%
Single Family Residential (SFR)	166	2.5%	105	1.7%
Land	81	1.2%	100	1.6%
	<u>\$6,637</u>	<u>98.9%</u>	<u>\$6,111</u>	<u>98.9%</u>
Cash/Other	<u>73</u>	<u>1.1%</u>	<u>69</u>	<u>1.1%</u>
Total Investments	<u>\$6,710</u>	<u>100.0%</u>	<u>\$6,180</u>	<u>100.0%</u>

SMRS

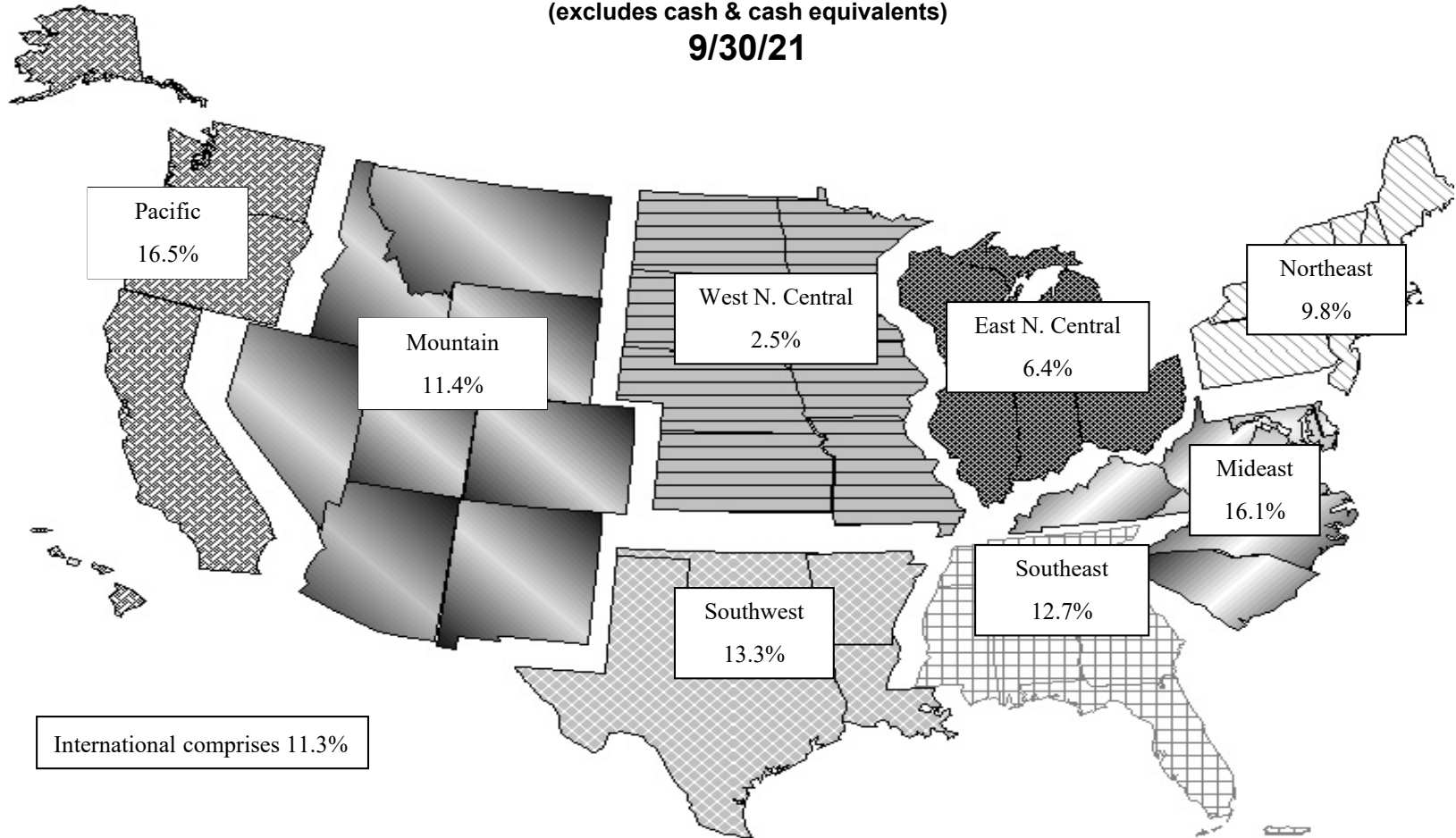
Real Estate by Region

Based on Market Value

(excludes cash & cash equivalents)

9/30/21

3



Geographic regions defined by NCREIF, whose property index composition is: Pacific 34.1%, Mountain 6.5%, West N. Central 1.1%, Southwest 10.5%, East N. Central 7.0%, Southeast 10.0%, Northeast 19.4%, Mideast 11.4%

SMRS

Real Estate and Infrastructure

9/30/21

Top Ten Advisors or Entity

Advisor or Entity	(\$ in millions)
	Market Value
MWT Holdings LLC	\$ 2,072
Principal Real Estate Investors	736
Clarion Partners	481
Blackstone Group	315
Domain Capital Advisors Inc	307
Five Star Realty Partners LLC	251
Rialto Capital Management LLC	179
Lone Star Global	161
L&B Realty Advisors	160
Transwestern Investment Management	158
	\$ 4,820

Occupancy by Property Type

	Apartment	Office	Industrial	Retail	Hotel
SMRS Portfolio	93.1%	85.1%	94.4%	83.5%	62.9%
National Average	93.8%	83.5%	93.6%	95.0%	61.0%

SMRS
Market Values by Ownership Entity
9/30/21
REAL ESTATE

	Market Value	Unfunded Commitment
801 Grand Avenue Capital, LLC	\$ 22,058,052	\$ 0
AEW Senior Housing III	3,836,424	623,266
AEW Senior Housing Investors IV	22,123,225	26,273,469
Apollo Asia Real Estate Fund	58,652,057	25,626,181
Asana Partners Fund I	29,298,416	2,449,559
Asana Partners Fund II	26,872,887	24,030,405
Avanath Affordable Housing II, LLC	34,355,662	0
Avanath II SMRS Co-Investment Fund LLC	27,777,201	0
Avanath Affordable Housing III	51,809,691	2,641,951
Avanath Affordable Housing IV	9,609,451	24,189,133
BentallGreenOak US Cold Storage LP	0	75,000,000
BGO Europe III Co Invest	11,863,867	17,283,634
Blackstone R/E Partners V, LP	2,034,023	0
Blackstone R/E Partners VI, LP	2,767,230	3,680,930
Blackstone R/E Partners VIII, LP	59,432,403	12,401,273
Blackstone R/E Partners IX, LP	134,998,958	126,601,558
Capri Urban Investors, LLC	920,452	0
Carlyle Realty Partners IX LP	0	100,000,000
CIM Commercial Trust Corp	5,324,689	0
CIM Fund III, LP	30,508,823	0
CIM Fund VIII, L.P.	86,344,714	0
CIM VI (Urban REIT), LLC	23,424,800	0
Clarion Gables Multifamily Trust, LP	33,048,012	0
Columbus Circle Holdings, LLC	202,743,668	109,765,512
Crown Small Cap Real Estate	13,886,333	4,402,500
DM2501, LLC	26,740,581	38,440,360
Domain GVA-1, LLC	143,598,820	1,940,056
Domain Hotel Properties, LLC	5,125,210	0
Eastport Properties, LLC	7,265,959	0
Gateway Capital Real Estate Fund II, LP	669,708	0
GreenOak Europe III, LP	42,560,753	46,153,896
Heitman Credit	48,245,738	0
Heitman Global RE Fund II	0	100,000,000
IDR Core Property Index Fund LLC	26,476,228	0
IMRF II CoInvest Spiga LP	33,744	0
India Property Fund II, LLC	14,500,795	3,411,411
Invesco Mortgage Recovery Feeder Fund	1,038,437	0
Invesco Mortgage Recovery Fund II, L.P.	23,922,780	26,390,889
Invesco Strategic Opportunities III, L.P.	28,356,734	82,461,385
IPF II Co-Invest LP	15,378,228	2,168,655
ISO III SMRS Sidecar, LP	30,423,815	2,334,000
JBC Funds North LaSalle LLC	14,788,397	0
JBC Opportunity Fund III, LP	495,673	0
KBS/SM Fund III, LP	205,372	0
KBS/SM Fund IV	131,105	0
L-A Saturn Acquisition	46,077,347	0

	Market Value	Unfunded Commitment
Landmark Real Estate Partners V, LP	5,822,878	0
LaSalle Asia Opportunity Fund III, LP	1,223,807	0
Lion Industrial Trust	300,342,248	100,000,000
Lion Mexico Fund, LP	4,153,090	0
Lombard GVA0016 (former AGL Annuity)	251,301,415	100,000,000
Lone Star Fund X LP	110,601,246	19,500,045
Lone Star Fund XI LP	50,565,655	181,894,355
Lubert-Adler Real Estate Fund VII, LP	52,492,291	4,663,662
M1 Westgate ColInvest LLC	490,153	0
M301W ColInvest LLC	469,432	0
MERS Acquisitions Ltd.	160,797,122	0
MIP Holdco LLC	115,210,766	5,759,653
MSREF V - International	2,274,286	0
MSRESS Fund III Institutional LP	5,273,087	0
MWT Holdings, LLC	2,072,522,207	0
Northpark Land Associates	38,154,474	1,025,476
Orange Investors LLC	390,803	0
Paladin Realty Brazil Investors III (USA), LP	5,742,989	0
Paladin Realty Latin America Investors IV-CI, LP	29,608,593	0
Paladin Realty TB COINV V LP	10,665,362	0
Penmain Office LLC	35,078,171	0
Principal Separate Account	714,017,448	137,731,698
Proprium RE Spec. Situations Fund, LP	108,420,915	0
Rialto Credit Partshp LP	19,710,645	0
Rialto Real Estate Fund, LP	18,805,015	0
Rialto Real Estate Fund II, LP	24,596,581	0
Rialto Real Estate Fund III-Debt, LP	42,746,323	0
Rialto Real Estate Fund III-Property, LP	41,088,736	0
Rialto Real Estate Fund IV-Debt, LP	33,049,165	68,000,000
SM Brell II LP	14,978,065	0
Stockbridge RE Fund II-C, LP	4,624,639	0
Strategic II LLC	104,043,974	76,651,608
TPG RE Finance Trust Inc. (TRTX)	59,724,116	0
TPG Real Estate Partners II	12,870,277	8,621,383
TPG Real Estate Partners III	27,463,277	33,056,161
TSP Fund III	506,286	74,493,714
TSP Spartan C-II LLC	20,230,581	0
TSP Value & Income Fund II, LP	22,968,662	13,369,382
Trophy Property Development LP	173,292	0
True North High Yield Invest. Fund II, LLC	1,082,797	0
True North Real Estate Fund III, LLC	26,215,662	5,000,000
	\$ 5,920,222,990	\$ 1,688,037,160
Short-Term Investments and Other	53,760,907	0
Total Real Estate Investments	\$ 5,973,983,897	\$ 1,688,037,160

* New or additional commitment made during the quarter reported

SMRS
Market Values by Ownership Entity
9/30/21

INFRASTRUCTURE

	Market Value	Unfunded Commitment
Arclight Energy Partners VI, LP	\$ 30,894,379	\$ 7,004,763
Arclight Energy Partners VII, LP	8,800,631	37,655,102
ASF VI Infrastructure B LP	10,548,199	5,992,354
ASF VII Infrastructure Fund B L.P.	21,621,079	12,794,112
ASF Como Co-Investment LP	1,584,731	1,392,046
Basalt Infrastructure Partners, LP	30,242,914	2,219,045
Blackstone Energy Partners, LP	13,835,349	4,728,291
Blackstone Energy Partners II, LP	72,356,823	15,365,148
Brookfield Infrastructure Fund II-B, L.P.	46,376,761	3,119,352
Customized Infrastructure Strategies, LP	11,087,568	4,503,415
Dalmore Capital Fund	68,455,529	0
GCM Grosvenor Infrastructure Investment Program, L.P.	67,822,807	0
GCM Grosvenor Customized Infrastructure Strategies II, L.P.	45,480,007	7,862,125
Global E&P Infrastructure Fund II L.P.	40,747,268	3,525,374
GSO Energy Select Opportunities Fund LP	18,840,174	23,027,260
GSO Energy Select Opportunities Fund II, LP	11,696,451	43,260,908
JPMorgan AIRRO India SideCar Fund US, LLC	80,679,230	1,103,288
JPMorgan AIRRO Fund II	10,204,685	7,013,452
Kayne Renewable Opportunities Partners, LP	15,954,292	89,103,202
KKR Eagle CoInvest L.P.	36,047,728	1,853,268
KKR Global Infrastructure Investors, LP	13,190	2,806,054
KKR Global Infrastructure Investors IV, LP	0	100,000,000
Ridgewood Water & Strategic Infrastructure Fund LP	14,940,878	33,490,785
RPEP SMRS Infra II, LLC	13,466,967	3,469,723
StonePeak Infrastructure Fund LP	45,394,738	9,456,616
	<hr/>	<hr/>
	\$ 717,092,378	\$ 420,745,683
Short-Term Investments and Other	19,141,745	0
	<hr/>	<hr/>
Total Infrastructure Investments	\$ 736,234,123	\$ 420,745,683
	<hr/>	<hr/>
TOTAL INVESTMENTS	\$ 6,710,218,020	\$ 2,108,782,843
	<hr/>	<hr/>

* New or additional commitment made during the quarter reported

State of Michigan Retirement System

ABSOLUTE RETURN REVIEW

State of Michigan Investment Board Meeting
December 9, 2021



Daniel J. Quigley
Senior Investment Manager
Absolute Return Strategy

EXECUTIVE SUMMARY

Performance

MPSERS Plan (9/30/21)	1-Year	3-Years	5-Years	7-Years	10-Years
Absolute Return	15.6%	7.4%	7.2%	5.2%	6.0%
HFRI FOF Conservative	12.4%	5.3%	4.8%	3.5%	3.7%

- The value of the Absolute Return portfolio is \$5.1 billion with a one-year return of 15.6%. Performance of the portfolio was positive for the third quarter, driven by manager selection and exposure to Credit and Multi-Strategy strategies. The portfolio allocation to diversifying strategies detracted slightly, driven by rates positioning, but these losses were more than offset by the positive return contribution from the other strategies.
- The credit allocation was the largest contributor to performance for the quarter. Managers specializing in residential mortgage strategies posted strong returns, driven by the strength in housing fundamentals, including continued growth in housing price appreciation. A decline in borrower forbearance rates further supported mortgage credit performance. Corporate credit managers also performed well as lower-rated and COVID-impacted credits continued to outperform higher-rated bonds and loans.
- The multi-strategy allocation also contributed to returns for the quarter. A hedge fund seeding strategy drove performance as underlying managers continued to raise capital and generate strong returns. Core multi-strategy managers that target low volatility, high Sharpe Ratios, and low beta profiles also performed well across asset classes, including equity activism, macro, and fixed income relative value. The portfolio allocation to special situations strategies detracted somewhat, driven by the sell-off in a structured investment in health insurer and select growth equity investments. Overall, multi-strategy managers served as effective diversifiers and reliable sources of alpha for the portfolio this quarter.

Strategy Update

- The objective of the Absolute Return portfolio is to diversify the total plans holdings, targeting returns above investment-grade fixed income while maintaining a 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:
 - \$300 million in SMRS-HVDL LLC, a dedicated and flexible private credit co-investment vehicle, created by HarbourVest Partners and SMRS, that will seek to invest in HarbourVest and SMRS sourced credit deals.

- \$100 million in Farallon Special Situations Fund II, L.P., a special situations fund managed by Farallon Capital Management that invests across the capital structure in illiquid special situation investments globally.
- In terms of allocation priorities, we will continue to increase exposure to high quality multi-strategy exposures, which act as a ballast to the portfolio. We will also build out allocations to credit-oriented strategies.

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

SMRS

Absolute Return Strategies

9/30/21

Net Market Value by Entity

	Net Market Value	Unfunded Commitment
* Tahquamenon Fund, L.P.	\$ 4,139,829,052	\$ 0
Cerberus Manitou Residential Loan Fund, L.P.	184,862,598	50,516,129
Acacia Coinvest, L.P.	150,318,907	150,318,907
AG Essential Housing, L.P.	114,475,902	88,000,000
PGIM Fixed Income Global Liquidity Relative Value Fund I, L.P.	110,385,926	0
JM IV, L.P.	98,107,115	8,492,400
SJC Direct Lending Revolver Fund III, L.P.	85,274,343	14,725,657
Kayne Anderson BDC, LLC	62,431,912	45,914,298
Kayne CLO Partners Fund II	59,712,767	40,468,583
* EnTrust White Pine Partners, L.P.	14,426,438	0
MP Securitized Credit Master Fund, L.P.	12,428,859	0
** Farallon Special Situations Fund II, L.P.	8,987,126	91,012,874
Monument Park, LLC	5	599,999,995
Visium Balanced Fund, L.P.	2	0
PIMCO Aviation Co-Invest Vehicle Onshore Feeder, L.P.	0	100,000,000
** SMRS-HVDL LLC	0	300,000,000
Total Absolute Return Strategies	\$ 5,041,240,951	\$ 1,489,448,843
Short-Term Investments & Other	75,095,653	0
Grand Total	\$ 5,116,336,604	\$ 1,489,448,843

* Fund of Funds

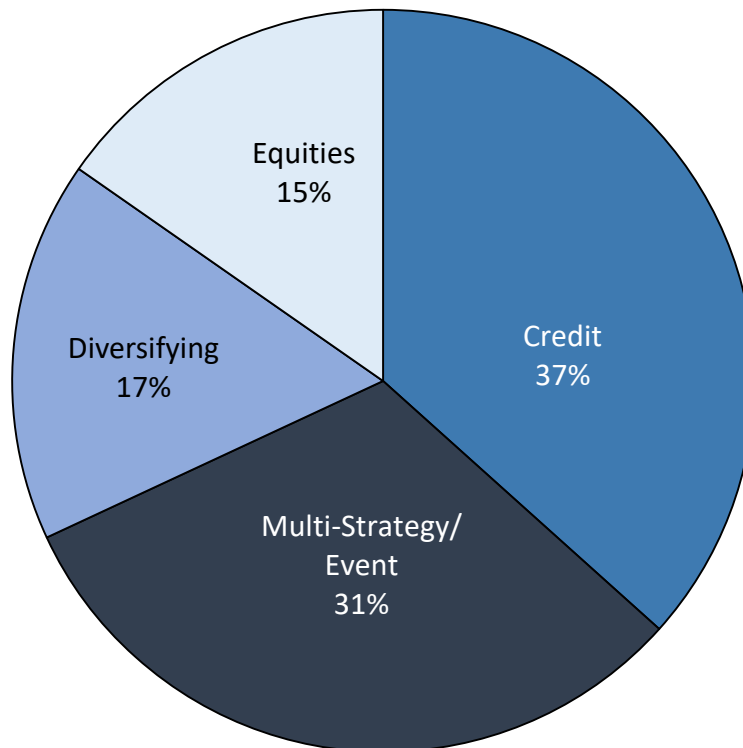
** New Commitment

SMRS

Absolute Return

9/30/21

Investments By Strategy



Strategy Breakdown			
Underlying Funds:	83	Median Position Size:	0.6%
Strategies:	4	Average Position Size:	1.2%
Relationships:	14	Largest Position Size:	8.1%

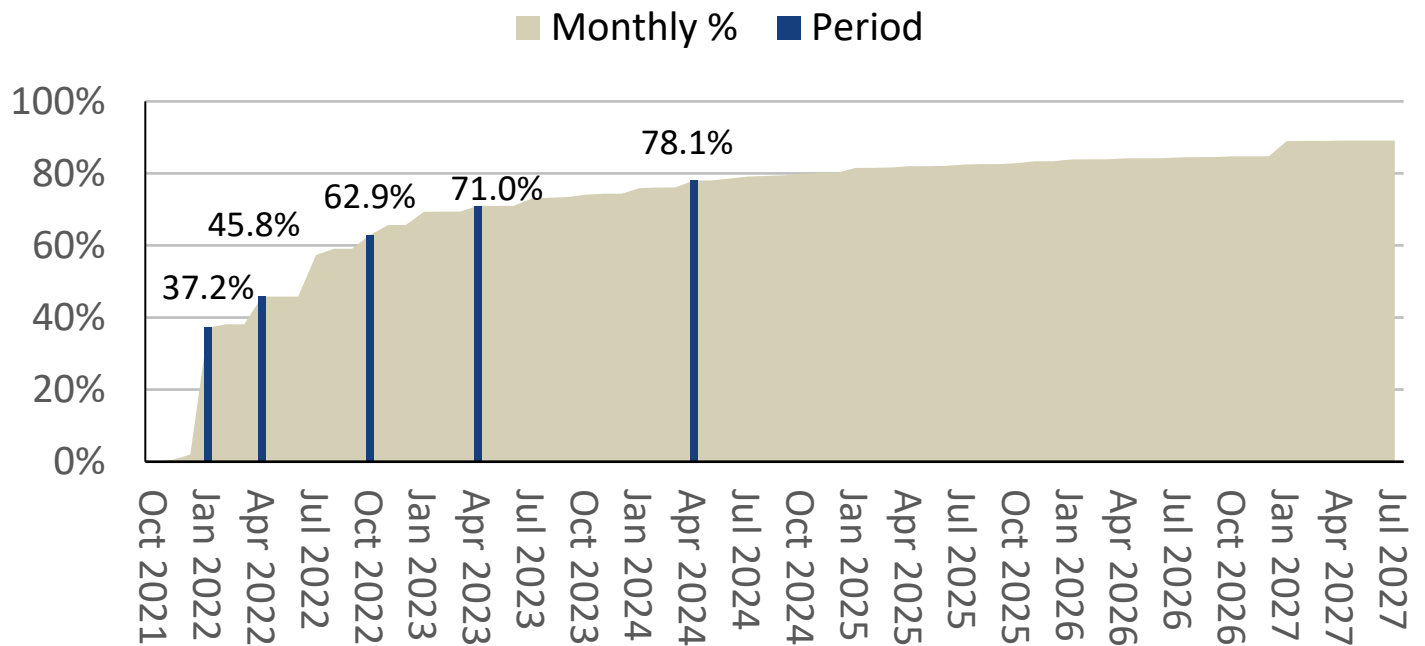
SMRS

Absolute Return

9/30/21

Liquidity Analysis

Redeemable	Marginal Allocation (% each period)	Aggregate Allocation (% since Analysis Date)
By 1/1/22	37.19%	37.19%
By 4/1/22	8.61%	45.80%
By 10/1/22	17.09%	62.89%
By 4/1/23	8.11%	70.99%
After 4/1/24	7.06%	78.05%
Illiquid	21.95%	100.00%
Total	100.00%	N/A



State of Michigan Retirement System

DEFINED CONTRIBUTION REVIEW

State of Michigan Investment Board Meeting
December 9, 2021



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

EXECUTIVE SUMMARY

Overview

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

Investments Options

Tier I: Target Date Funds and Passively Managed Index Funds

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

Tier II: Actively Managed Funds

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

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

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

SOM Plans	9/30/21	9/30/20
State of Michigan 401(k)	\$8,563	\$6,977
State of Michigan 457	2,047	1,835
Pension Plus 401(k) & 457	1,743	1,205
EAA	11	11
Total	\$12,364	\$10,028

(\$ in millions)

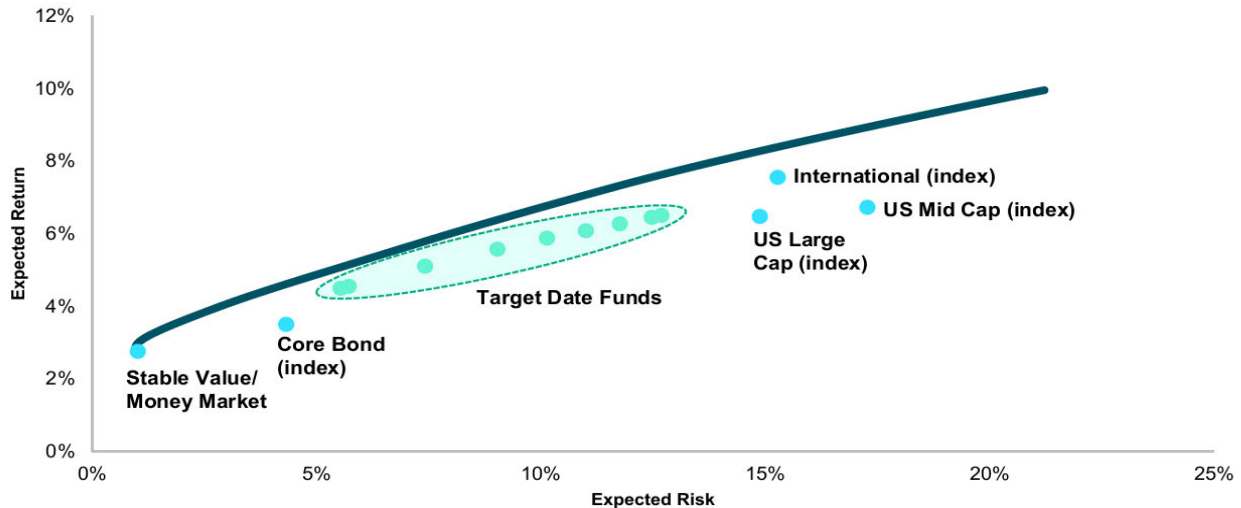
Investment Selection

- The selection of each investment option for the Plans is based on the prudence standards set by the Governing Documents and applicable law, with flexibility built-in to allow a search to take full advantage of strategic opportunities. The search will focus on finding opportunities which are tailored to the Plans' specific needs. The BOI, in consultation with the Office of Retirement Services (ORS), will establish search criteria that aligns with the purpose and objective an investment option is seeking to attain. Due diligence will be

completed with the goal of selecting a plan that, in the totality of circumstances, offers fair and reasonable investment options for the Plan participants.

- With respect to Tier III investments, the universe of available options is extensive. Since the selection of investments is directed solely by the participants which elect the Tier III option, the State does not provide any criteria for selecting or monitoring these non-core investment options.

Michigan DC Plan Efficient Frontier
Target Date & Select Core Funds Plotted



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

Market Environment and Outlook

Investor sentiment, which had ignored signs of the economy slowing early in the quarter, grew concerned in September as uncertainty intensified around the U.S. debt ceiling. Bond market volatility also increased during the quarter as inflation concerns caused mostly by supply-disruptions picked up. As a result, most global stock markets ended the third quarter flat to down slightly.

A significant increase in the personal consumption expenditures price index raised concerns over the prospect of rising inflation. This, along with the Federal Reserve announcing they would soon begin “tapering” their purchases of government bonds and mortgage-backed securities, which have helped the economy by keeping long-term interest rates low, resulted in a rise in interest rates. As a result, bond prices fell slightly in the quarter as the 10-year U.S. Treasury yield increased from 1.47% to 1.49%. Inflation expectations also pushed up prices of commodities such as oil, while gold declined as rising yields prompted investors to shift toward bonds.

The pullback in economic growth in the third quarter is expected to be temporary as the Delta variant works its way through and appears to be peaking. Several sources expect it will reach its peak in early November, level off, then begin to wind down later in the fourth quarter. As a result, expectations are for a ramp up in economic growth during the fourth quarter and this is expected to carry into the first half of 2022. Although the Fed is expected to begin

“tapering” sometime in 2022, monetary policy remains highly supportive of economic growth and expectations are it will not decline to a point where it will be a concern to financial markets for some time. While inflation remains an issue, and likely will carry into early 2022, it is not expected to get out of hand, and most economists believe it will be “transitory” and will lessen during the second half of 2022 as the supply chains and shortages return to normal.

Update on SECURE Act 2.0

Bills in both the House and the Senate aim to build on the SECURE Act passed in 2019. This legislation is called Securing a Strong Retirement Act and is nicknamed SECURE Act 2.0. There is enough bipartisan support for most of these measures to become law before the end of this year.

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

- **Increases in RMD Age-** under current law, participants are generally required to begin taking distributions from their retirement plans at age 72, an increase ushered in by the Secure Act. Secure Act 2.0 increases the RMD age further to 73, starting on Jan. 1 2022; to 74 starting on Jan.1 2029; and 75 starting on Jan. 1 2032.
- **Expands Auto-Enrollment in Retirement Plans-** the bill requires 401(k) and 403(b) plans to automatically enroll participants when they become eligible; employees may opt out of coverage. The initial automatic enrollment amount is at least 3% but no more than 10%, then each year that amount is increased by 1% until it reaches 10%. All current 401(k) and 403(b) plans are grandfathered. There is an exception of small businesses with 10 or fewer employees, new businesses (i.e., have been in business for less than three years) church plans and governmental plans.
- **Indexes IRA Catch-Up Limit-** under current law, the limit on IRA contributions is increased by \$1,000 (not indexed) for individuals who have attained age 50. The bill indexes such limits starting in 2023.
- **Higher Catch-Up Limits at age 62, 63, 64-** under current law, employees who have turned 50 are permitted to make catch-up contributions under a retirement plan. The limit on catch-up contributions for 2021 is \$6,500, except in the case of SIMPLE plans, for which the limit is \$3,000. The Act increase these limits to \$10,000 and \$5,000 (both indexed), respectively, for individuals who have attained ages 62, 63 and 64, but not age 65.
- **Student Loan Payments and Employer Matching-** the Secure Act 2.0 permits an employer to make matching contributions under a 401(k) plan, 303(b) or SIMPLE IRA with respect to “qualified student loan payments.” The provision is intended to assist employees who may not be able to save for retirement because they are overwhelmed with student debt and missing out on available matching contributions.
- **Boosts Small Employer Pension Plan Startup Credit-** makes changes to the credit by: increasing the startup credit from 50% to 100% for employers with up to 50 employees, and except in the case of defined benefit plans, and additional credit would

be provided. The amount of the new credit generally would be a percentage of the amount contributed by the employer on behalf of employees, up to a per-employee cap of \$1,000.

- **Allows CITs in 402(b) Plans-** under current law, 403(b) plan investments are generally limited to annuity contracts and mutual funds. This limitation cuts off 403(b) plan participants- generally employees of charities and public educational organizations- from access to collective investment trusts (CITs), which are often used by 401(a) plans due to their lower fees. The bill permits 403(b) custodial accounts to invest in collection 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.” The update would provide that ownership of an ETF’s shares by certain types of institutions that are necessary to the ETF’s structure would not preclude look-through treatment for the ETF, as long as it otherwise satisfies the current-law requirements for look-through treatment. Treasury regulations have prevented ETFs from being widely available through individual variable annuities. ETFs cannot satisfy the regulatory requirements to be “insurance-dedicated.”
- **Multiple Employer 403(b) Plans-** the bill allows 403(b) plans to participate in MEPs. Including pooled employer plans (PEPs), generally under the SECURE Act rules, including relief from the one bad apple rule so that the violations of one employer do not affect the tax treatment of employees.

SMRS
Defined Contribution Strategies
9/30/21

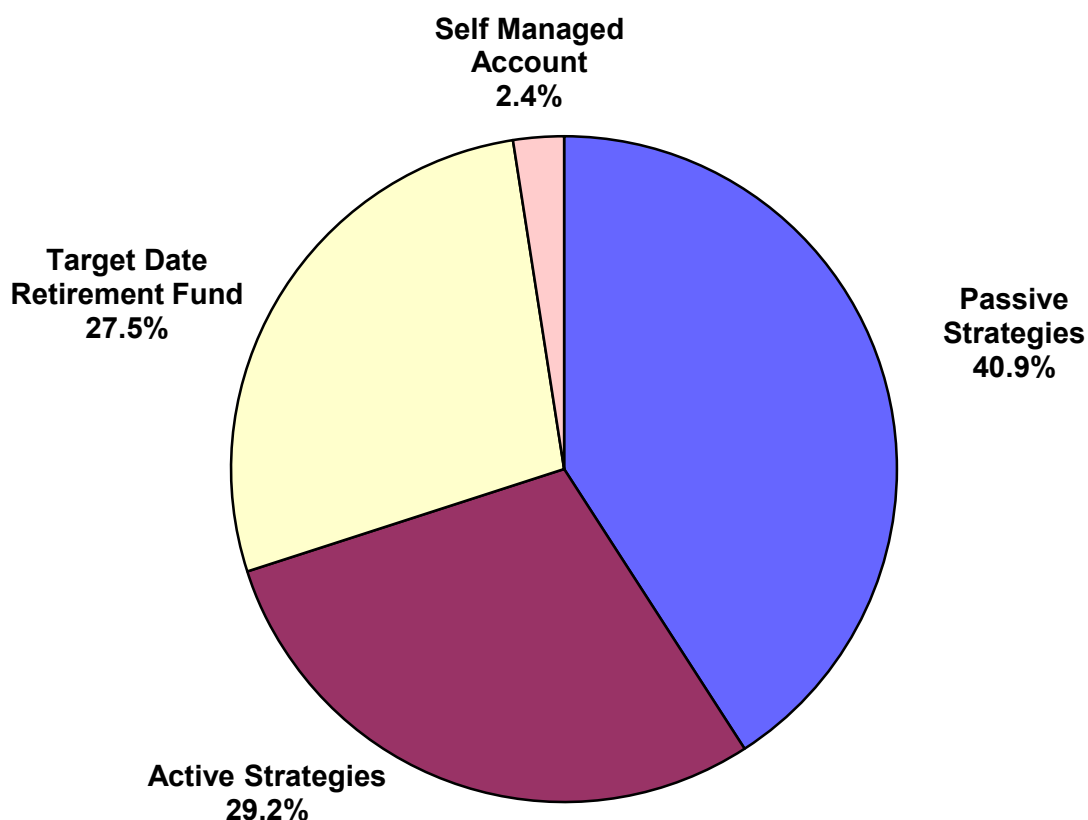
Markets	Amount		% of Total	Fee per \$1,000
QDIA (\$ in Millions)				
	<u>9/30/21</u>	<u>9/30/20</u>		
Total Target Date Fund	\$3,401	\$2,465	27.5%	\$0.70
Tier I Index Funds				
State Street S&P 500 Index Fund	\$1,781	\$1,423		\$0.13
State Street Bond Market Index Fund	1,128	997		0.20
State Street Global All Cap Equity ex-U.S. Index Fund	855	695		0.45
State Street S&P Mid Cap Index Fund	751	569		0.20
BlackRock Government Short-Term Investment CL F	224	244		0.56
BlackRock S&P Small Cap 600 Equity Index CL F	181	120		0.25
BlackRock Emerging Markets Index CL F	134	116		0.69
Total Tier I Index	\$5,054	\$4,164	40.9%	\$0.25
Tier II Active Funds				
Stable Value Fund	\$1,234	\$1,224		\$2.22
Dodge & Cox Stock Fund	674	482		4.15
Jennison Large Cap Growth Fund	610	550		2.83
American Funds EuroPacific Growth R6	348	306		4.60
Artisan Mid Cap Fund	193	166		6.63
Voya Small Cap Growth Equity Fund	164	133		3.30
T. Rowe Price Mid-Cap Value Fund	139	101		6.30
PIMCO Total Return I Fund	120	129		4.70
Virtus Ceredex Small-Cap Value Eq I	75	50		6.80
Prudential High Yield Fund	47	32		3.76
Oakmark Equity & Income I	0	0		0.00
Total Tier II Active	\$3,605	\$3,173	29.2%	\$3.56
Tier III				
Total Self Directed Brokerage Account	\$304	\$226	2.5%	NA
Total Defined Contribution Assets	\$12,364	\$10,028	100.0%	\$1.33

NOTE: Totals may not be exact due to rounding.

SMRS

Defined Contribution by Investment Strategy

9/30/21



Market Value in Millions				
	9/30/21		9/30/20	
Passive Strategies	\$5,054	40.9%	\$4,164	41.5%
Active Strategies	3,605	29.2%	3,173	31.6%
Target Date Retirement Fund	3,401	27.5%	2,465	24.6%
Self Managed Account	304	2.4%	226	2.3%
Total Investments	\$12,364	100.0%	\$10,028	100.0%

*Loan Fund \$194M as of 9/30/21

Note: Totals may not be exact due to rounding.

Defined Contribution Performance by Fund

9/30/21

<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	\$126,721,719	11.8	8.0	6.6	6.1
State Street Income Custom Index		11.8	8.0	6.5	6.1
Morningstar Target-Date Retirement		9.0	6.9	5.8	5.7
<i>Variance State Street Income Custom Index</i>		0.0	0.0	0.1	0.0
<i>Variance Morningstar Target-Date Retirement</i>		2.8	1.1	0.8	0.4
State Street Target Retirement 2020 Fund	\$149,380,577	14.7	9.1	8.3	8.8
State Street 2020 Custom Index		14.8	9.1	8.3	8.8
Morningstar Target-Date 2020		13.5	8.4	7.7	7.7
<i>Variance State Street 2020 Custom Index</i>		(0.1)	0.0	0.0	0.0
<i>Variance Morningstar Target-Date 2020</i>		1.2	0.7	0.6	1.1
State Street Target Retirement 2025 Fund	\$287,295,216	17.2	10.7	10.0	10.1
State Street 2025 Custom Index		17.3	10.7	10.0	10.1
Morningstar Target-Date 2025		15.3	9.1	8.7	8.9
<i>Variance State Street 2025 Custom Index</i>		(0.1)	0.0	0.0	0.0
<i>Variance Morningstar Target-Date 2025</i>		1.9	1.6	1.3	1.2
State Street Target Retirement 2030 Fund	\$338,927,281	18.8	11.7	11.0	10.9
State Street 2030 Custom Index		18.9	11.7	11.0	10.9
Morningstar Target-Date 2030		18.2	9.9	9.7	9.5
<i>Variance State Street 2030 Custom Index</i>		(0.1)	0.0	0.0	0.0
<i>Variance Morningstar Target-Date 2030</i>		0.6	1.8	1.3	1.4
State Street Target Retirement 2035 Fund	\$383,589,665	20.6	12.1	11.7	11.4
State Street 2035 Custom Index		20.8	12.1	11.6	11.4
Morningstar Target-Date 2035		21.3	10.7	10.9	10.7
<i>Variance State Street 2035 Custom Index</i>		(0.2)	0.0	0.1	0.0
<i>Variance Morningstar Target-Date 2035</i>		(0.7)	1.4	0.8	0.7
State Street Target Retirement 2040 Fund	\$393,521,959	22.4	12.5	12.2	11.9
State Street 2040 Custom Index		22.7	12.5	12.2	11.9
Morningstar Target-Date 2040		23.9	11.3	11.4	10.9
<i>Variance State Street 2040 Custom Index</i>		(0.3)	0.0	0.0	0.0
<i>Variance Morningstar Target-Date 2040</i>		(1.5)	1.2	0.8	1.0
State Street Target Retirement 2045 Fund	\$415,510,363	24.2	12.7	12.6	12.1
State Street 2045 Custom Index		24.5	12.7	12.6	12.1
Morningstar Target-Date 2045		25.6	11.7	12.1	11.6
<i>Variance State Street 2045 Custom Index</i>		(0.3)	0.0	0.0	0.0
<i>Variance Morningstar Target-Date 2045</i>		(1.4)	1.0	0.5	0.5
State Street Target Retirement 2050 Fund	\$532,753,972	25.2	13.0	12.8	12.2
State Street 2050 Custom Index		25.5	13.0	12.8	12.2
Morningstar Target-Date 2050		26.4	11.9	12.1	11.4
<i>Variance State Street 2050 Custom Index</i>		(0.3)	0.0	0.0	0.0
<i>Variance Morningstar Target-Date 2050</i>		(1.2)	1.1	0.7	0.8
State Street Target Retirement 2055 Fund	\$549,041,201	25.2	13.0	12.8	12.2
State Street 2055 Custom Index		25.5	13.0	12.8	12.2
Morningstar Target-Date 2055		26.8	12.0	12.4	11.8
<i>Variance State Street 2055 Custom Index</i>		(0.3)	0.0	0.0	0.0
<i>Variance Morningstar Target-Date 2055</i>		(1.6)	1.0	0.4	0.4

<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	\$217,444,542	25.2	13.0	12.8	N/A
State Street 2060 Custom Index		25.5	13.0	12.8	N/A
Morningstar Target-Date 2060		27.3	12.0	12.5	N/A
Variance State Street 2060 Custom Index		(0.3)	0.0	0.0	N/A
Variance Morningstar Target-Date 2060		(2.1)	1.0	0.3	N/A
State Street Target Retirement 2065 Fund	\$7,216,008	25.2	N/A	N/A	N/A
State Street 2065 Custom Index		25.5	N/A	N/A	N/A
Morningstar Target-Date 2065+		27.9	N/A	N/A	N/A
Variance State Street 2065 Custom Index		(0.3)	N/A	N/A	N/A
Variance Morningstar Target-Date 2065+		(2.7)	N/A	N/A	N/A
TIER 1					
State Street S&P 500 Index Fund	\$1,780,991,107	30.0	16.0	16.9	16.6
S&P 500 Index		30.0	16.0	16.9	16.6
Morningstar Large Blend		29.2	13.6	14.7	14.4
Variance S&P 500 Index		0.0	0.0	0.0	0.0
Variance Morningstar Large Blend		0.8	2.4	2.2	2.2
State Street Bond Market Index Fund	1,128,248,279	(1.0)	5.4	2.9	3.0
Bloomberg U.S. Aggregate Index		(0.9)	5.4	2.9	3.0
Morningstar Intermediate-Term Bond		(0.4)	5.1	2.9	3.2
Variance Bloomberg U.S. Aggregate Index		(0.1)	0.0	0.0	0.0
Variance Morningstar Intermediate-Term Bond		(0.6)	0.3	0.0	(0.2)
State Street S&P Mid Cap Index Fund	750,933,238	43.7	11.1	12.9	14.7
S&P 400 Index		43.7	11.1	13.0	14.7
Morningstar Mid-Cap Blend		38.9	10.8	12.0	13.1
Variance S&P 400 Index		0.0	0.0	(0.1)	0.0
Variance Morningstar Mid-Cap Blend		4.8	0.3	0.9	1.6
State Street Global All Cap Equity ex-U.S. Index Fund	854,901,205	24.5	8.4	9.2	8.0
MSCI ACWI ex USA IMI (Net)		25.2	8.3	9.1	7.7
Morningstar Foreign Large Blend		23.8	7.3	8.2	7.7
Variance MSCI ACWI ex USA IMI (Net)		(0.7)	0.1	0.1	0.3
Variance Morningstar Foreign Large Blend		0.7	1.1	1.0	0.3
BlackRock Government Short-Term Investment CL F	223,740,572	0.0	1.1	1.1	N/A
BofA Merrill Lynch US 3-Month Treasury Bill Index		0.1	1.2	1.2	N/A
Variance BofA Merrill Lynch US 3-Month Treasury Bill Index		(0.1)	(0.1)	(0.1)	N/A
BlackRock S&P Small Cap 600 Equity Index CL F	181,091,174	57.7	9.5	N/A	N/A
S&P SmallCap 600 Index		57.6	9.4	N/A	N/A
Morningstar Small Blend		50.4	9.0	N/A	N/A
Variance S&P SmallCap 600 Index		0.1	0.1	N/A	N/A
Variance Morningstar Small Blend		7.3	0.5	N/A	N/A
BlackRock Emerging Markets Index CL F	133,703,353	17.9	8.4	9.1	N/A
MSCI Emerging Market (Net)		18.2	8.6	9.2	N/A
Morningstar Diversified Emerging Mkts		21.2	9.4	8.6	N/A
Variance MSCI Emerging Market (Net)		(0.3)	(0.2)	(0.1)	N/A
Variance Morningstar Diversified Emerging Mkts		(3.3)	(1.0)	0.5	N/A
TIER 2					
Stable Value Fund	\$1,233,953,155	1.9	2.4	2.3	2.3
Bloomberg US Govt/Credit A+Interm Index		(1.0)	4.3	2.3	2.2
Hueler Universe		1.8	2.2	2.1	2.0
Variance Bloomberg US Govt/Credit A+Interm Index		2.9	(1.9)	0.0	0.1
Variance Hueler Universe		0.1	0.2	0.2	0.3

<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	674,186,604	50.1	12.5	14.9	16.0
<i>Russell 1000 Value Index</i>		35.0	10.1	10.9	13.5
<i>Morningstar Large Value</i>		34.5	9.3	11.0	12.4
<i>Variance Russell 1000 Value Index</i>		15.1	2.4	4.0	2.5
<i>Variance Morningstar Large Value</i>		15.6	3.2	3.9	3.6
Jennison Large Cap Growth Fund	610,204,062	25.6	23.9	25.4	N/A
<i>Russell 1000 Growth Index</i>		27.3	22.0	22.8	N/A
<i>Morningstar Large Growth</i>		26.9	19.2	20.1	N/A
<i>Variance Russell 1000 Growth Index</i>		(1.7)	1.9	2.6	N/A
<i>Variance Morningstar Large Growth</i>		(1.3)	4.7	5.3	N/A
American Funds EuroPacific Growth R6	348,015,809	24.8	13.2	12.2	10.6
<i>MSCI EAFE Index - Net Div</i>		25.7	7.6	8.8	8.1
<i>Morningstar Foreign Large Blend</i>		23.8	7.3	8.2	7.7
<i>Variance MSCI EAFE Index - Net Div</i>		(0.9)	5.6	3.4	2.5
<i>Variance Morningstar Foreign Large Blend</i>		1.0	5.9	4.0	2.9
Voya Small Cap Growth Equity Fund	163,570,418	31.2	8.1	11.1	14.0
<i>Russell 2000 Growth Index</i>		33.3	11.7	15.3	15.7
<i>Morningstar Small Growth</i>		39.1	14.8	17.7	16.0
<i>Variance Russell 2000 Growth Index</i>		(2.1)	(3.6)	(4.2)	(1.7)
<i>Variance Morningstar Small Growth</i>		(7.9)	(6.7)	(6.6)	(2.0)
T. Rowe Price Mid-Cap Value Fund	139,069,786	40.0	9.4	10.4	13.4
<i>Russell Midcap Value Index</i>		42.4	10.3	10.6	13.9
<i>Morningstar Mid-Cap Value</i>		46.7	9.0	10.2	12.6
<i>Variance Russell Midcap Value Index</i>		(2.4)	(0.9)	(0.2)	(0.5)
<i>Variance Morningstar Mid-Cap Value</i>		(6.7)	0.4	0.2	0.8
PIMCO Total Return I Fund	120,192,727	0.3	5.8	3.6	3.9
<i>Bloomberg U.S. Aggregate Index</i>		(0.9)	5.4	2.9	3.0
<i>Morningstar Intermediate Core-Plus Bond</i>		1.4	5.6	3.5	3.7
<i>Variance Bloomberg U.S. Aggregate Index</i>		1.2	0.4	0.7	0.9
<i>Variance Morningstar Intermediate Core-Plus Bond</i>		(1.1)	0.2	0.1	0.2
Artisan Mid Cap Fund	193,420,360	30.7	25.8	22.3	18.3
<i>Russell Midcap Growth Index</i>		30.5	19.1	19.3	17.5
<i>Morningstar Mid-Cap Growth</i>		33.4	18.2	18.6	16.0
<i>Variance Russell Midcap Growth Index</i>		0.2	6.7	3.0	0.8
<i>Variance Morningstar Mid-Cap Growth</i>		(2.7)	7.6	3.7	2.3
Virtus Ceredex Small-Cap Value Eq I	75,415,058	51.8	5.8	8.2	11.9
<i>Russell 2000 Value Index</i>		63.9	8.6	11.0	13.2
<i>Morningstar Small Value</i>		62.7	8.1	10.1	12.3
<i>Variance Russell 2000 Value Index</i>		(12.1)	(2.8)	(2.8)	(1.3)
<i>Variance Morningstar Small Value</i>		(10.9)	(2.3)	(1.9)	(0.4)
Prudential High Yield Fund	46,701,162	11.5	8.2	7.1	N/A
<i>Bloomberg U.S. Corp. HY 1% Issuer Cap Index</i>		11.2	6.7	6.4	N/A
<i>Morningstar High Yield Bond</i>		10.4	5.5	5.2	N/A
<i>Variance Bloomberg U.S. Corp. HY 1% Issuer Cap Index</i>		0.3	1.5	0.7	N/A
<i>Variance Morningstar High Yield Bond</i>		1.1	2.7	1.9	N/A
TIER 3					
Self Directed	303,957,171				
TOTAL	\$12,363,697,741				

Loan Fund: **\$193,972,931**

State of Michigan Retirement System

BASKET CLAUSE REVIEW

State of Michigan Investment Board Meeting
December 9, 2021



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

SMRS

Basket Clause Investments

9/30/21

<u>Asset Class</u>	<u>Value</u>
Total Absolute Return	\$ 5,041,240,955
Total Real Return and Opportunistic	754,986,388
Total Fixed Income	<u>80,971,374</u>
Total Basket Clause Investments	<u><u>\$ 5,877,198,717</u></u>

The basket clause investments on September 30, 2021, were \$5.9 billion or 6.2% of the total portfolio value of \$95.4 billion.

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

Disclaimer



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