

STATE OF MICHIGAN INVESTMENT BOARD MEETING

March 24, 2022

State of Michigan Retirement System
Quarterly Investment Review



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

STATE OF MICHIGAN INVESTMENT BOARD MEETING

MARCH 24, 2022

Agenda



- 9:30 a.m. **Call to Order and Opening Remarks**
Approval of the 12/9/21 SMIB Meeting Minutes
Approval of the 3/9/22 SMIB Special Meeting Minutes
Approval of Resolution of Appreciation for James Nicholson
- 9:35 a.m. **Executive Summary & Performance for Periods Ending 12/31/21**
- 9:50 a.m. **Current Asset Allocation Review**
Markets Review and Outlook
- 10:00 a.m. **Review of Investment Reports**
- **Fixed Income – Update**
 - **International Equity – Update**
 - **Domestic Equity – Update**

 - **Absolute Return – Receive and File**
 - **Private Equity – Receive and File**
 - **Real Estate & Infrastructure – Receive and File**
 - **Real Return & Opportunistic – Receive and File**
 - **Defined Contribution – Receive and File**
- 10:55 a.m. **Public Comment**
- 11:00 a.m. **Closing Remarks ~ Adjournment**



2022 Meeting Schedule

Thursday, 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

March 24, 2022



Jon M. Braeutigam
Chief Investment Officer
Bureau of Investments

STATE OF MICHIGAN INVESTMENT BOARD

December 9, 2021 Meeting Minutes

Board Members Present

Chairman – Treasurer Rachael Eubanks – via Microsoft Teams - Lansing, MI
Ms. Dina Richard – via Microsoft Teams – Northpoint, MI
Mr. Reginald Sanders – via Microsoft Teams – Portage, MI
Mr. James Nicholson – Absent
Mr. Chris Harkins – via Microsoft Teams – Lansing, MI

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

Jon Braeutigam	Jim Elkins	Craig Coulter
Robert Brackenbury	Lori Barrett	Vikram Ambekar
Karl Borgquist	Patrick Moraniec	Jane Weidman
Greg Parker	Daniel Quigley	Todd Warstler
Janet Sudac	Woodrow Tyler	Jack Behar
Peter Woodford	Aaron Bandy	Lan Chen
Annette Russell	Giles Feldpausch	Travis Haney
Bradley Hartwell	Erin Mock	Lewis Brody
Mitchell Kerkstra	Steve Strandberg	Jan Garfinkle
Tim McEnery	Taylor Broekstra	Betty Nicklesen
Mark Porrell	Tyler Isola	Jeffrey Moore
Mary Pollock	Steve Cummings	Jeff Gorette
Barb Becker	John Karagoulis	Dan Kidle
Royce Humm		

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 September 16, 2021, SMIB Meeting Minutes – Motion to approve by Dina Richard.
Seconded: Reginald Sanders. The vote was unanimous to approve.

AGENDA

Executive Summary

Mr. Jon Braeutigam, Chief Investment Officer for the Bureau of Investments, began by expressing his many reasons for being thankful in reflection of the Thanksgiving season. He stated his review would be brief to make time for the two speakers presenting today.

He reviewed the executive summary performance section discussing performance returns and markets as of September 30, 2021. The one-year return of 27.7% is the best seen since the fiscal year 1982. Focusing on the 10-year return, the annualized return of 11.4% compared to the 10.2% peer median return has added approximately \$14.4 billion in excess value.

Asset Allocation review shows 11 new commitments for the quarter totaling nearly \$1.6 billion, which is a little stronger than normal.

After giving his brief overview, Jon introduced the first speaker of the day. Jan Garfinkle of Arboretum Ventures.

Guest Speakers – Jan Garfinkle, Founder and Managing Partner and Dan Kidle, Managing Partner – Arboretum Ventures

Ms. Garfinkle presented an overview of the company which began in Ann Arbor, Michigan in 2002, with the vision to drive excess cost out of the healthcare systems, which is even more critical today. She introduced and discussed the investment team.

Mr. Dan Kidle spoke of Arboretum's investment strategy and some of their prior investments, expressing the founding premise once again of lowering health care costs while still providing great care to patients using an opportunistic approach within the sectors that fulfill that mission. He reviewed the company's portfolio summary explaining investments by stage, by geography and their 12 major exits, several of which are Michigan companies.

Ms. Garfinkle discussed Arboretum's fund performance. She highlighted their 16 Michigan investments and their return summary, stating that their return from Michigan companies has been phenomenal. She highlighted a company called NeuMoDx Molecular, an automated diagnostic platform for infectious disease testing which developed a COVID-19 PCR test in early 2020. They invested \$17.6 million and returned \$87.2 million in this Ann Arbor, Michigan based company.

Mr. Kidle highlighted an additional Ann Arbor company called Strata Oncology, which is an oncology diagnostic company guiding treatment selection for advanced cancer patients using genomic sequencing. Their initial investment was \$19 million with a third quarter 2021 valuation of \$140.7 million.

Mr. Kidle wrapped up by discussing healthcare industry trends such as labor shortages, increased involvement of individuals managing their healthcare and healthcare finances, the research space such as cell therapy and gene editing and finally, thinking about how healthcare gets paid for, healthcare plans and the continued transition to value-based care.

Mr. Kidle concluded by proudly explaining Arboretum's portfolio impact over 19 years. They created 60 portfolio companies, impacted over 10 million patients and created 4,200 plus jobs. Questions from the Board were answered.

Fixed Income Update

Mr. Dan Quigley, Senior Investment Manager, gave a brief update of the Fixed Income Division, reviewing the strategy of the division which is to meet the overall goal of the fixed income portfolio using the four driving principles. These are to provide income, liquidity, principal preservation and diversification from equity market risk. We accomplish that via a core plus strategy with the thought that most of our core management is done internally and then on plus we rely on external managers such as Fidelity. We believe that our managers add the most value to the plan when we rely on them to provide the best securities to select, or sectors to position towards, and as it relates to the characteristics targeting interest rates and liquidity, we find that it's best to handle that internally. This is the allocation and how the portfolio is broken down between core and plus.

From a performance standpoint, we feel like we've accomplished our goal. We've beat the index and exhibited performance similar to core managers but with a little bit of absolute return flavor to it. There is persistent leaning, at least over the last several years, to having higher income than the benchmark and having out of benchmark exposures. He further explained fixed income positioning.

In closing Mr. Quigley stated that meeting the objectives is never easy and went on to share a couple of the Division's success stories naming a few staff and their accomplishments.

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

Guest Speakers – Jeffrey Moore, CFA, Portfolio Manager and Jeff Goretti, VP, Relationship Manager – Fidelity Investments

Mr. Jeff Goretti gave a quick background stating that Fidelity has managed assets for the State of Michigan since 2006. They originally were hired to run a core bond portfolio and did that until around 2014 and then moved into a tactical bond strategy. Current assets in the portfolio are roughly \$530 million. Mr. Goretti expressed gratitude for the trusted partnership over these many years.

Mr. Jeffrey Moore, a portfolio manager for the State of Michigan spoke on the process they use in determining investments. One of those is how much risk to take, what do the yields around the world look like? He explained the yield curves around the US and stated that although the total return possibilities in the bond market are low, he believes the returns will be positive, even with the two Fed hikes he expects in 2022. There is a nice upward sloping yield curve at this time which is a gift to all investors.

Mr. Moore discussed inflation explaining how Fidelity researches it to come to the percentage of inflation, which is 4% at this time. They believe that at least two-thirds of this is aggregate demand which is a level that the Fed has to respond to. The Fed is now feeling the data has shifted from supply to demand. Fidelity believes that 4% is the number for the year. It will be difficult to make money in items that are inflation sensitive.

Mr. Moore discussed the Fed funds target rate further, explaining market expectations and Fed projections. His less sophisticated view of things is that the rate needs to be higher than zero so that people who have a positive bank account can make interest on their bank accounts. Their team also believes there will be two rate hikes this year.

Mr. Moore discussed the financial conditions index which is what he stated Fed Chairman Jerome Powell looks at daily. This can be easily found on Google and if it's above 100 it's easy conditions and if it's below 100 it's tight conditions. He discussed this concept further giving examples. The Board presented questions regarding this.

He discussed China briefly explaining the global population decline, people are not just getting older but there are less births. They believe the Chinese population will fall by 30 million a year in the next 4 to 5 years and doesn't stop, which is below replacement. India's fertility rate just went below replacement and India and China comprise one-third of the population. The SMIB, as a Board will need to discuss what population decline means. This has not occurred globally in over 300 years. Think about what happens to property rights, as this is linked to population. So, in addition to aging, we have population decline to think about. This is not trivial.

He finished up discussing the market structure, stating that nothing has changed since March 2020. Therefore, all the things that went wrong in 2020 that forced the Fed to get involved in such a big way are still outstanding. Be mindful that the playbook in 2020 is still in play because there is no other option at this stage. He discussed the banking system which he referred to as our “Achilles heel”, stating that it’s the size of 100% of GDP. There were no questions asked.

Public Comment:

Public comment was made by three callers of the Greenbrook Tenant Coalition, and Aaron Wissner, a State of Michigan retiree.

Closing Remarks:

Chairman Eubanks thanked those giving public comment. She listed off the 2022 SMIB meeting dates asking the Board to be mindful of these dates. She noted that we have reached the end of the Open Meetings Act electronic availability, stating that future meetings will be held in person.

Adjournment:

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

Approved:

Rachael Eubanks, Chairman

STATE OF MICHIGAN INVESTMENT BOARD SPECIAL MEETING

March 9, 2022 Meeting Minutes

Board Members Present

Chairman – Treasurer Rachael Eubanks
Mr. Reginald Sanders
Mr. Chris Harkins
Dina Richard – (Remotely via Microsoft Teams)

Members of the Public and Bureau of Investments Staff Present

Jon Braeutigam	Anthony Estell
Allison Wardlaw	Janet Sudac
Robert Brackenbury	Karl Borgquist

Many others were present via Microsoft Teams teleconference.

Opening Remarks:

Rachael Eubanks called the meeting to order at 9:03 am. Ms. Eubanks explained the reason for this meeting, noting Russia's actions, Governor Whitmer's request and SMRS' current exposure to Russian securities.

Mr. Jon Braeutigam, Chief Investment Officer for the Bureau of Investments, explained the reasons for this action item, the risks and challenges of adopting it, and the next steps moving forward subject to SMIB Board approval of the resolution to divest.

Action Item:

Consideration of Divestment from Russia and Belarus Policy

Motion by Reginald Sanders to approve, seconded by Chris Harkins. The motion to adopt the new policy was unanimously approved.

Public Comment:

There was no public comment.

Closing Remarks:

Chairman Eubanks thanked everyone for taking time out of their busy schedules for this special meeting.

Adjournment:

Motion to adjourn by Chris Harkins. Seconded by Reginald Sanders. The meeting concluded at 9:20 am.

Approved:

Rachael Eubanks, Chairman

State of Michigan Retirement System

RESOLUTION

State of Michigan Investment Board Meeting

March 24, 2022



Jon M. Braeutigam
Chief Investment Officer
Bureau of Investments

RESOLUTION HONORING

James B. Nicholson

Whereas,

James B. Nicholson, is Chairman of PVS Chemicals an international manufacturer, distributor and marketer of chemicals and related environmental services. Prior to joining PVS, Mr. Nicholson held positions with the First National Bank of Chicago in London, England and Dublin, Ireland. He currently serves as Chairman of the Board of the Community Foundation for Southeastern Michigan and the Futures Foundation. He is a current member and past Chairman of the Board of the Detroit Symphony Orchestra and Emeritus Board member of Detroit Public Television. He also serves on the boards of the Michigan Colleges Foundation and the Detroit Economic Club. Previously, Mr. Nicholson served as chair of the Michigan Strategic Fund, and

Whereas,

Mr. Nicholson was originally appointed to the Investment Advisory Committee, the precursor to the State of Michigan Investment Board, by Governor Rick Snyder in 2011, having been further appointed to Chair of the Investment Advisory Committee in 2015. Upon the establishment of the State of Michigan Investment Board in 2018, Mr. Nicholson was appointed as a member by Governor Snyder, where he has served until December 2021, and

Whereas,

During Mr. Nicholson's decade of service to the State of Michigan Retirement System, and under his thoughtful guidance, advice and fiduciary oversight, the overall pension fund assets have more than doubled from approximately \$48 billion in December 2011 to a record high of \$101 billion as of December 2021.

Now, be it resolved,

That the State of Michigan Investment Board extends its greatest appreciation to James B. Nicholson for his dedicated service and contributions to the State of Michigan Investment Board and the State of Michigan and wishes him all the best and much happiness in his future endeavors.

Ayes:

Nayes:

Recused:

East Lansing, Michigan

March 24, 2022

State of Michigan Retirement System

EXECUTIVE SUMMARY

State of Michigan Investment Board Meeting

March 24, 2022



Gregory J. Parker, CFA

Director of Investments – Public Markets

Director of Asset Allocation

Bureau of Investments

EXECUTIVE SUMMARY

December 31, 2021

Performance

Great peer comparison.

MPSERS Plan (12/31/21)	1-Year	3-Years	5-Years	7-Years	10-Years
Annualized Returns	22.2%	16.2%	13.4%	10.9%	11.7%
Policy Returns	16.5%	14.7%	12.2%	10.4%	11.4%
Peer Median Returns*	17.1%	15.1%	11.4%	9.4%	10.0%

*State Street Universe greater than \$10 billion.

- In aggregate, the SMRS market value as of December 31, 2021 was \$100 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 9.8%.
- Compounding at higher than peer returns can add significant value. For example, based on the \$49.7 billion December 2011 market value, a ten-year annualized return of 11.7% compared to the 10.0% peer median return added approximately \$21.1 billion in excess value.
- Most asset classes earned returns comparable to or better than peer median returns over the longer-term in addition to meeting or exceeding the asset class specific benchmarks.

Asset Allocation

A low return environment.

- Given the low rates of return available in the capital markets for safe assets, and in order to earn the actuarial rate of return, investment risks (primarily equity risk) must be assumed. The spread between the required rate of return, and the risk-free rate is approximately 600 bps. At the end of December 2021, the equity risk (beta) is approximately 0.38; lower than peer median at approximately 0.58.
- Liquidity is another fundamental risk assumed and it is managed through asset allocation. The plans have outstanding capital commitments to fund approximately \$15.4 billion in illiquid assets, primarily in private equity. In the December 2021 quarter, \$1.6 billion of new commitments were made.
- The combined systems paid out approximately \$1.74 billion net of contributions over the past twelve months ending in December 2021. Over the past year, the allocation to private equity was reduced by \$2.13 billion, long-term fixed income was reduced by \$112 million, short term fixed income by \$21.3 million, and domestic equity was reduced by \$20.4 million. Over the past year, the allocation to absolute return increased by \$2.09 billion, real estate by \$200 million and real return and opportunistic increased by \$127 million.

NEW COMMITMENTS

October 1, 2021 – December 31, 2021

(\$ Millions)

Asset class	Fund Name / (Managed By)	Commitment
Private Equity		
	Acorn Bioventures 2, LP (Acorn Capital Advisors GP 2, LLC)	\$ 100
	Summit Partners Growth Equity Fund XI-A, LP (SP XI, LLC)	100
	Thoma Bravo Fund XV, LP (Thoma Bravo, LLC)	100
	GTCR Strategic Growth Fund, LP (GTCR, LLC)	50
	Accel-KKR Growth Capital Fund IV, LP (AKKR Company, LLC)	40
Real Estate and Infrastructure		
	BentallGreenOak Europe Fund IV, LP (BentallGreenOak)	\$ 114
	IDR Core Property Index Fund, LLC (IDR Investment Management, LLC)	100
	GCM Customized Infrastructure Strategies III, LP (GCM CFI Group, LP)	100
	BlackRock MiREIT Fund (BlackRock Financial Management, Inc.)	100
	Heitman MiREIT Fund (Heitman Real Estate Securities, LLC)	100
	Principal MiREIT (Principal Real Estate Investors, LLC)	100
Real Return and Opportunistic		
	Sixth Street Growth Partners II (A), LP (Sixth Street Partners)	\$ 200
	Nyanza II, LLC (Great Mountain Partners, LLC)	150
	Sixth Street Opportunities Partners V (A), LP (Sixth Street Partners)	125
	Lakewater III (Barings Alternative Investments)	15
Absolute Return		
	Castle Credit SMRS Holdings, LLC Series C (Great Mountain Partners)	\$ 100
TOTAL		\$1,594

State of Michigan Retirement System

PERFORMANCE

State of Michigan Investment Board Meeting

March 24, 2022



Jon M. Braeutigam
Chief Investment Officer
Bureau of Investments

Bureau of Investments

Mission Statement

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

SMRS Goals

Maintain sufficient liquidity to pay benefits.

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

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

Diversify assets to reduce risk.

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

MPERS PENSION

Time-Weighted Rates of Return

Periods Ending December 31, 2021

	% of Portfolio 12/31/21	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	11.7	11	10.9	11	13.4	16	16.2	23	22.2	6	5.8	10
Median - Greater than \$10 Billion ²		10.0		9.4		11.4		15.1		17.1		4.8	
MPSERS Total Plan Policy		11.4		10.4		12.2		14.7		16.5		4.2	
DOMESTIC EQUITIES	23.6	16.3	21	14.2	25	17.9	13	24.7	20	25.7	34	8.8	37
Median ²		13.5		11.8		15.1		20.8		21.9		7.5	
S&P 1500 Index		16.4		14.7		18.0		25.6		28.5		10.7	
PRIVATE EQUITY AND VENTURE CAPITAL	23.1	17.7	7	18.3	12	21.8	13	24.5	8	51.9	21	9.0	6
Median ²		11.8		10.8		12.1		13.1		27.8		5.3	
Private Equity and VC Benchmark ³		20.1		17.4		20.4		19.4		33.8		1.3	
INTERNATIONAL EQUITIES	15.8	8.7	39	8.0	34	11.0	48	15.1	45	9.4	67	2.0	51
Median ²		8.7		7.5		10.9		14.9		10.3		2.1	
MSCI ACWI ex USA Net Index		7.4		6.6		9.6		13.2		7.8		1.8	
REAL RETURN AND OPPORTUNISTIC	12.3	12.0		11.9		14.2		13.3		15.2		5.4	
50% (CPI + 4%) + 50% (actuarial rate) ⁴		7.3		7.3		7.4		7.4		9.2		2.2	
FIXED INCOME	9.7	4.1	24	4.4	33	4.7	31	5.6	58	2.1	7	0.5	21
Median ²		3.9		3.7		4.3		5.7		-0.6		0.1	
Bloomberg US Agg Index		2.9		3.0		3.6		4.8		-1.5		0.0	
REAL ESTATE & INFRASTRUCTURE	7.7	10.0	46	8.6	57	8.1	51	6.5	70	21.3	32	7.6	37
Median ²		9.7		8.7		8.1		7.9		16.7		6.5	
NCREIF Property Index ⁵		7.9		7.2		6.4		7.0		16.2		5.8	
NCREIF Open Fund Index Net		9.4		8.6		7.7		8.2		21.0		7.7	
ABSOLUTE RETURN	6.2	6.4		5.4		7.5		8.0		16.3		1.9	
1-Month T-Bill + 400 bps		4.6		4.8		5.1		4.9		4.0		4.0	
HFR Benchmark ⁶		3.9		3.6		4.7		6.2		9.7		0.6	
CASH EQUIVALENTS	1.6	1.0		1.2		1.5		1.3		0.2		0.1	
1 Month T-Bill		0.6		0.8		1.1		0.9		0.0		0.0	

¹ Annualized Returns and Percentile Rank.

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

³ SP500 + 300 bps with a 3 month lag.

⁴ History 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 12/31/21

	1 Year	2 Year	3 Year	4 Year	5 Year	6 Year	7 Year	8 Year	9 Year	10 Year
MPSERS	22.2	16.6	16.2	12.7	13.4	12.4	10.9	11.0	11.6	11.7
Public Plan - Median (> \$10 billion)*	17.1	14.4	15.1	10.5	11.4	10.9	9.4	9.0	9.8	10.0
Rank	6	10	23	10	16	16	11	7	7	11
bp Difference - Median	516	224	114	217	200	141	155	199	173	168

Consecutive For Years Ending

	12/21	12/20	12/19	12/18	12/17	12/16	12/15	12/14	12/13	12/12
MPSERS	22.2	11.2	15.4	2.7	16.2	7.4	2.8	11.3	16.4	12.6
Public Plan - Median (> \$10 billion)*	17.1	11.9	16.4	-2.1	15.8	7.8	0.4	7.0	15.7	13.2
Rank	6	66	60	5	43	66	4	5	36	63
bp Difference - Median	516	-69	-106	477	42	-39	242	430	73	-53

MSERS

Cumulative For Years Ending 12/31/21

	1 Year	2 Year	3 Year	4 Year	5 Year	6 Year	7 Year	8 Year	9 Year	10 Year
MSERS	22.3	16.6	16.2	12.7	13.4	12.4	11.0	11.0	11.6	11.7
Public Plan - Median (> \$1 billion)*	16.6	14.4	15.1	10.3	11.2	10.8	9.4	8.9	9.8	9.9
Rank	3	8	23	9	18	18	10	4	8	12
bp Difference - Median	568	228	108	239	214	160	159	207	177	174

Consecutive For Years Ending

	12/21	12/20	12/19	12/18	12/17	12/16	12/15	12/14	12/13	12/12
MSERS	22.3	11.2	15.4	2.7	16.2	7.5	2.8	11.3	16.3	12.6
Public Plan - Median (> \$1 billion)*	16.6	12.2	17.5	-3.0	15.8	7.7	0.4	6.9	15.8	12.7
Rank	3	70	74	4	45	56	3	4	39	60
bp Difference - Median	568	-92	-209	570	46	-24	239	446	49	-11

*State Street Public Funds Universe

Cumulative and Consecutive Total Fund Returns

MSPRS

Cumulative For Years Ending 12/31/21

	<u>1 Year</u>	<u>2 Year</u>	<u>3 Year</u>	<u>4 Year</u>	<u>5 Year</u>	<u>6 Year</u>	<u>7 Year</u>	<u>8 Year</u>	<u>9 Year</u>	<u>10 Year</u>
MSPRS	22.2	16.6	16.2	12.7	13.4	12.4	10.9	11.0	11.5	11.6
Public Plan - Median (> \$1 billion)*	16.6	14.4	15.1	10.3	11.2	10.8	9.4	8.9	9.8	9.9
Rank	4	8	24	10	19	20	11	5	12	13
bp Difference - Median	562	226	105	236	213	158	157	205	174	171

Consecutive For Years Ending

	<u>12/21</u>	<u>12/20</u>	<u>12/19</u>	<u>12/18</u>	<u>12/17</u>	<u>12/16</u>	<u>12/15</u>	<u>12/14</u>	<u>12/13</u>	<u>12/12</u>
MSPRS	22.2	11.3	15.3	2.7	16.2	7.5	2.8	11.3	16.2	12.5
Public Plan - Median (> \$1 billion)*	16.6	12.2	17.5	-3.0	15.8	7.7	0.4	6.9	15.8	12.7
Rank	4	69	76	4	45	57	4	4	39	63
bp Difference - Median	562	-89	-214	569	46	-27	238	442	41	-18

MJRS

Cumulative For Years Ending 12/31/21

	<u>1 Year</u>	<u>2 Year</u>	<u>3 Year</u>	<u>4 Year</u>	<u>5 Year</u>	<u>6 Year</u>	<u>7 Year</u>	<u>8 Year</u>	<u>9 Year</u>	<u>10 Year</u>
MJRS	20.4	15.7	15.6	12.2	13.0	12.1	10.7	10.7	11.3	11.4
Public Plan - Median (> \$1 billion)*	16.6	14.4	15.1	10.3	11.2	10.8	9.4	8.9	9.8	9.9
Rank	11	18	42	13	20	21	16	12	18	20
bp Difference - Median	382	137	45	192	179	130	133	182	147	146

Consecutive For Years Ending

	<u>12/21</u>	<u>12/20</u>	<u>12/19</u>	<u>12/18</u>	<u>12/17</u>	<u>12/16</u>	<u>12/15</u>	<u>12/14</u>	<u>12/13</u>	<u>12/12</u>
MJRS	20.4	11.2	15.3	2.7	16.3	7.4	2.8	11.0	15.6	12.5
Public Plan - Median (> \$1 billion)*	16.6	12.2	17.5	-3.0	15.8	7.7	0.4	6.9	15.8	12.7
Rank	11	70	76	4	43	58	4	4	52	63
bp Difference - Median	382	-94	-215	566	55	-28	238	419	-16	-22

*State Street Public Funds Universe

State of Michigan Retirement System

ASSET ALLOCATION REVIEW

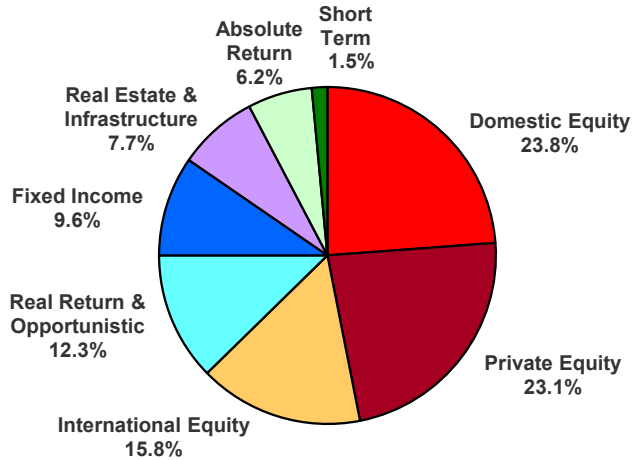
State of Michigan Investment Board Meeting
March 24, 2022



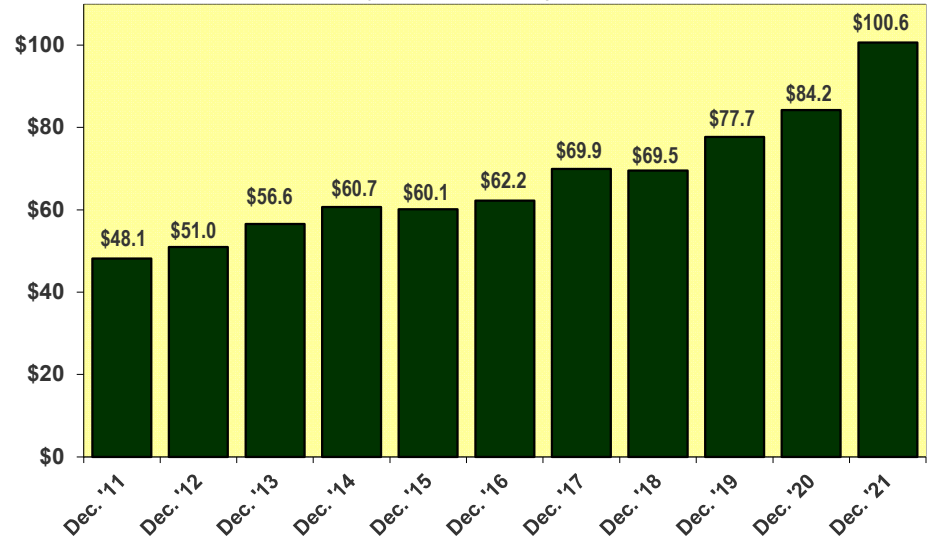
Jon M. Braeutigam
Chief Investment Officer
Bureau of Investments

STATE OF MICHIGAN RETIREMENT SYSTEM PROFILE - DECEMBER 2021

Asset Allocation ~ 12/31/21



**Market Value*
(Billions of Dollars)**



**Asset Allocation By Market Value
(In Millions)**

Investment Strategies	12/31/2021		12/31/2020	
	Mkt. Value	%	Mkt. Value	%
Domestic Equity	\$23,894	23.8%	\$19,046	22.6%
Private Equity	23,254	23.1%	17,063	20.3%
International Equity	15,889	15.8%	14,527	17.3%
Real Return & Opportunistic	12,371	12.3%	10,714	12.7%
Fixed Income	9,703	9.6%	9,667	11.5%
Real Estate & Infrastructure	7,713	7.7%	6,269	7.4%
Absolute Return	6,262	6.2%	3,551	4.2%
Short Term***	1,479	1.5%	3,356	4.0%
TOTAL	\$100,565	100.0%	\$84,193	100.0%

**Market Value By Plan ~ 12/31/21
(in Millions)**

Pension Plan	OPEB**		Combined	%
	Mkt. Value	Mkt. Value		
MPSERS	\$66,421	\$11,137	\$77,558	77.1%
MSERS - (closed)	15,109	5,271	20,380	20.3%
MSPRS	1,918	386	2,304	2.3%
MJRS - (closed)	311	12	323	0.3%
TOTAL	\$83,759	\$16,806	\$100,565	100.0%

MSERS includes the Military Pension Fund

Short Term Equivalents (in Billions)

Short Term Strategy***	\$1.5	
Short Term in Other Inv. Strategies	2.5	
TOTAL SHORT TERM	\$4.0	4.0% 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

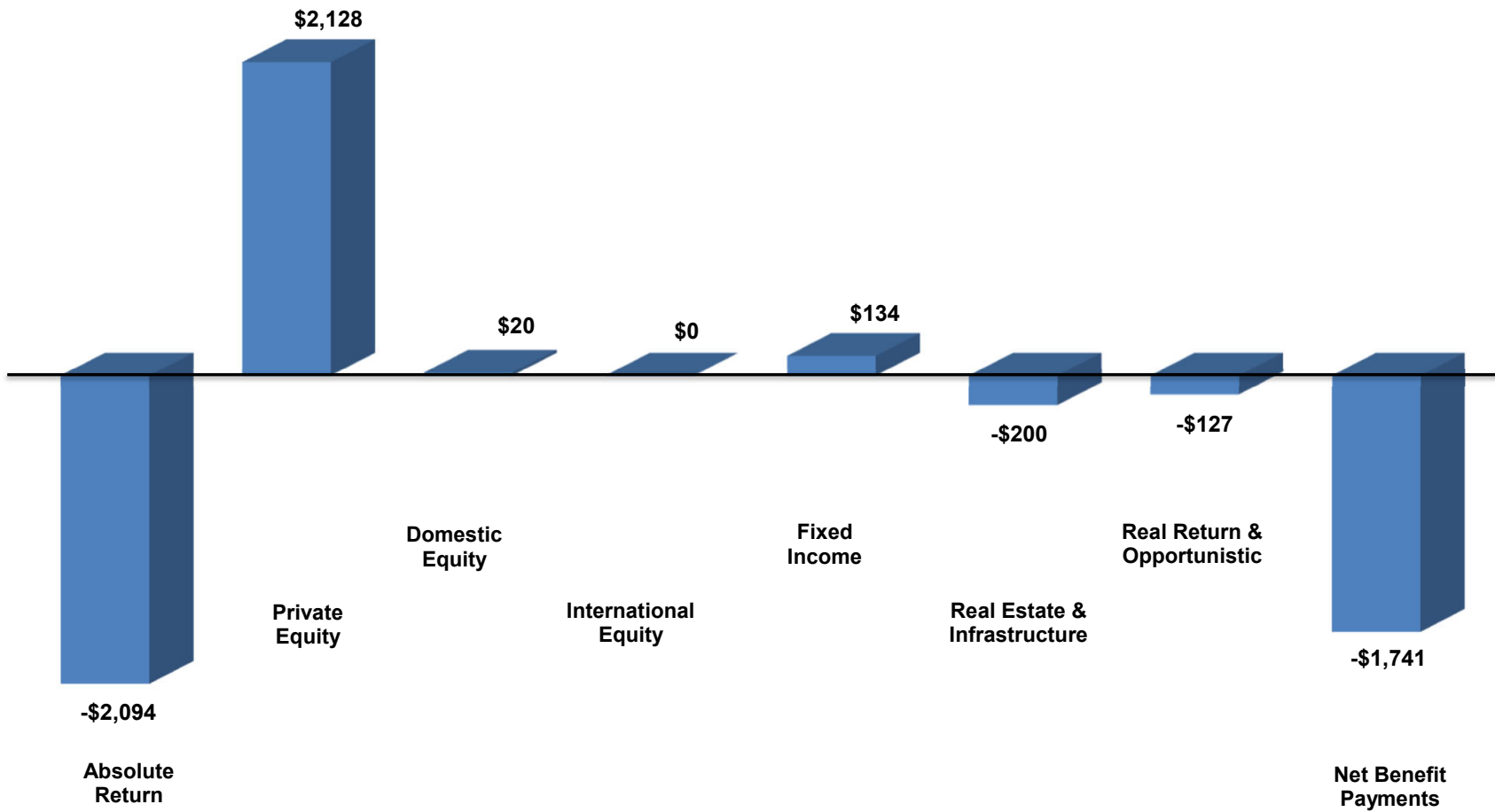
Sources and Uses of Cash

January 2021 ~ December 2021

1/01/21 Short-Term Cash Balance: \$ 3,359

12/31/21 Short-Term Cash Balance: 1,479

Net Short-Term Cash Decrease: \$1,880



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

Dollars in millions

Asset Allocation Targets As of 12/31/21

	MPSERS		MSERS		MSPRS		MJRS		SMRS
<i>Asset Class</i>	<i>12/31/21</i>	<i>Target*</i>	<i>12/31/21</i>	<i>Target*</i>	<i>12/31/21</i>	<i>Target*</i>	<i>12/31/21</i>	<i>Target*</i>	<i>Ranges</i>
Domestic Equity	23.6%	25.0%	23.9%	25.0%	23.8%	25.0%	23.9%	25.0%	17% - 32%
Private Equity	23.1%	16.0%	23.2%	16.0%	23.2%	16.0%	23.3%	16.0%	13% - 25%
International Equity	15.8%	15.0%	15.9%	15.0%	15.9%	15.0%	15.9%	15.0%	12% - 22%
Real Return & Opportunistic	12.3%	12.5%	12.3%	12.5%	12.3%	12.5%	12.4%	12.5%	8% - 18%
Long Term Fixed Income	9.7%	10.5%	9.7%	10.5%	9.7%	10.5%	9.7%	10.5%	8% - 18%
Real Estate & Infrastructure	7.7%	10.0%	7.7%	10.0%	7.7%	10.0%	7.7%	10.0%	8% - 18%
Absolute Return	6.2%	9.0%	6.2%	9.0%	6.2%	9.0%	6.3%	9.0%	5% - 11%
Short Term Fixed Income	1.6%	2.0%	1.1%	2.0%	1.2%	2.0%	0.8%	2.0%	1% - 8%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	

*Complies with basket clause and international restrictions.

State of Michigan Retirement System

MARKETS REVIEW AND OUTLOOK

State of Michigan Investment Board Meeting

March 24, 2022



Gregory J. Parker, CFA

Director of Investments – Public Markets

Director of Asset Allocation

Bureau of Investments

CAPITAL MARKETS

Return and Risk Assumptions, Benchmark and Outlook

A starting point.

MPSERS Plan	Assumed Return* (Arithmetic)	Standard Deviation*	Trailing 10-Year (Benchmark**)
Private Equity	11.2%	25.0%	20.0%
International Equity	8.9%	21.5%	7.4%
Real Ret/Oppportunistic	8.0%	9.5%	7.3%
Domestic Equity	7.1%	18.2%	16.4%
Real Estate (Core)	7.6%	15.0%	7.9%
Absolute Return	4.9%	9.0%	3.9%
Long-Term Fixed Income	2.1%	4.0%	2.9%
Short-Term	1.8%	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 30% over the 12-month period ending December 2021. The price for crude oil was up 66% year-over-year and ended December 2021 at \$66 per barrel. 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.
- At the end of December 2021, the 10-year U.S. Treasury rate was at 1.51%. 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.
- Dividend yields on REITs at the end of December 2021 were estimated to be around 2.5%, which is nearly 1.0% higher than the yield of the 10-year U.S. Treasury. This is slightly below the historical metric.

U.S. Fixed Income

Tough valuations in Fixed Income.

- Interest rates across the curve rose over the past year, reflecting a reflation in the economy. As of December 2021, the U.S. Treasury rate curve is at a historical average in terms of steepness.
- Interest rates at both the long and short end are earning less than the year-over-year increase in CPI. In fact, going back to the mid 1950's, the Fed Funds rate relative to the Year over Year change in CPI has never been lower. This fact is indicative of extremely accommodative Federal Reserve policies.
- Over the past year, investment grade corporate spreads have tightened by approximately 20 bps and are roughly 30 bps tighter than historical average. High yield spreads have tightened considerably over the past year; by approximately 80 bps. High yield spreads are about 150 bps tighter than normal.
- It would seem that rates have some upward pressure due to a healing economy and inflation rates higher than nominal rates. This potentially places some stronger headwinds on bond returns. However, as long as the Federal Reserve's policy rate remains at these levels, the shape of the yield curve could put a lid of sorts on the longer dated rates.
- At the end of December 2021, the 10-year U.S. Treasury rate was at 1.51%. 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 December 2021 was 28.5%.
- Many domestic equity valuation metrics are above historical averages; however, many analysts expect that fundamentals will continue to improve over the next twelve months. Consequently, the returns over the next cycle may not be as strong as the historical average of 11 – 12% year-over-year total returns, however they could still offer positive rates of return.
- Fundamentally, the market's returns on equity continue to be historically higher than average and some of the largest companies in the market today are less cyclical (economically sensitive) than past market leaders. These facts lend support to the argument that higher valuations are justified, and therefore the market could perhaps continue to deliver historical average rates of return in the future.
- The year ending December 2021 was great for U.S. equities, especially larger growth companies. The small cap Russell 2000 underperformed the larger cap S&P 500 by -13.9%. The value style also struggled for the year relative to the growth style, underperforming by -5.8%.

International Equity

Trailing U.S. equities.

- International equities dramatically underperformed domestic equities for the year ending December 2021 by -20.2%. Over the past three, five, seven, and ten years, the international market index, MSCI ACWI ex USA, underperformed the S&P 1500 index by -11.9%, -7.8%, -7.6%, and -8.6% annualized, respectively.
- Within international equities, emerging market returns underperformed developed markets over the past one, three, seven, and ten years by -15.4%, -3.3%, -0.8% and -2.5% annualized, respectively.
- Based on a price-to-earnings valuation multiple, excluding non-earning companies, developed international markets trade at approximately a 35% discount to U.S. counterparts while emerging markets are at a 45% discount.

Real Estate

Comparing public vs. private real estate.

- Over the one year ending December 2021, the NAREIT index increased by 41.3% including dividends which was 19.1% 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 December 2021 were estimated to be around 2.5%, which is nearly 1.0% higher than the yield of the 10-year U.S. Treasury. This is slightly below the historical metric.

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. However, the U.S. dollar increased in value over the past year ending December 2021 by 6.4% as measured by the DXY index, and it is near the midpoint of the past 5 year's trading range.
- The commodities prices broadly, as measured by the CRB index, are up sharply at 30% over the 12-month period ending December 2021. The price for crude oil was up 66% year-over-year and ended December 2021 at \$66 per barrel.
- Some 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 2002 - 2021

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021		
Best ↑	Gov't Bonds	Int'l Equity	Int'l Equity	Real Estate	Int'l Equity	Int'l Equity	Gov't Bonds	Int'l Equity	U.S. Equity	Real Estate	Int'l Equity	U.S. Equity	U.S. Equity	Real Estate	U.S. Equity	Int'l Equity	Real Estate	U.S. Equity	U.S. Equity	U.S. Equity	Best ↑	
	11.50%	40.82%	20.90%	20.06%	26.65%	16.65%	12.38%	41.44%	16.38%	14.26%	16.83%	32.80%	13.08%	13.32%	11.93%	27.19%	6.71%	30.90%	17.92%	28.45%		
	Corp. Bonds	U.S. Equity	Real Estate	Int'l Equity	Real Estate	Real Estate	Cash	U.S. Equity	Real Estate	Gov't Bonds	U.S. Equity	Int'l Equity	Real Estate	U.S. Equity	Real Estate	U.S. Equity	Inflation	Int'l Equity	Int'l Equity	Real Estate		
	10.52%	29.58%	14.48%	16.62%	16.59%	15.84%	2.05%	27.24%	13.11%	9.02%	16.17%	15.29%	11.81%	1.01%	7.97%	21.13%	1.91%	22.13%	10.65%	17.70%		
	Real Estate	Hedge Funds	U.S. Equity	U.S. Equity	U.S. Equity	Gov't Bonds	Inflation	Corp. Bonds	Int'l Equity	Corp. Bonds	Real Estate	Real Estate	Corp. Bonds	Gov't Bonds	Corp. Bonds	Real Estate	Cash	Corp. Bonds	Corp. Bonds	Int'l Equity		
	6.74%	9.01%	11.78%	5.65%	15.34%	8.67%	0.10%	16.05%	11.15%	8.35%	10.54%	10.99%	7.53%	0.86%	5.63%	6.96%	1.88%	14.54%	9.89%	8.29%		
	Hedge Funds	Real Estate	Hedge Funds	Hedge Funds	Hedge Funds	Hedge Funds	Corp. Bonds	Hedge Funds	Corp. Bonds	Inflation	Corp. Bonds	Hedge Funds	Gov't Bonds	Inflation	Int'l Equity	Corp. Bonds	Gov't Bonds	Gov't Bonds	Gov't Bonds	Gov't Bonds		Hedge Funds
	3.57%	8.99%	5.83%	5.13%	9.21%	7.68%	-3.07%	9.65%	8.46%	2.96%	9.37%	7.70%	4.92%	0.66%	4.50%	6.42%	0.88%	6.83%	7.94%	7.56%		
	Inflation	Corp. Bonds	Corp. Bonds	Inflation	Cash	U.S. Equity	Real Estate	Inflation	Gov't Bonds	U.S. Equity	Hedge Funds	Inflation	Hedge Funds	Hedge Funds	Inflation	Hedge Funds	Hedge Funds	Real Estate	Hedge Funds	Hedge Funds		Inflation
	2.39%	7.69%	5.25%	3.42%	4.81%	5.47%	-6.46%	2.72%	5.52%	1.75%	4.22%	1.49%	3.14%	0.37%	2.09%	3.88%	-1.05%	6.42%	4.75%	7.12%		
4	Cash	Gov't Bonds	Gov't Bonds	Cash	Corp. Bonds	Corp. Bonds	Hedge Funds	Cash	Hedge Funds	Cash	Gov't Bonds	Cash	Inflation	Cash	Hedge Funds	Gov't Bonds	Corp. Bonds	Hedge Funds	Real Estate	Cash		
	1.79%	2.36%	3.48%	3.06%	4.27%	5.10%	-19.86%	0.19%	5.07%	0.10%	2.02%	0.07%	0.68%	0.01%	1.89%	2.30%	-2.51%	4.40%	1.60%	0.05%		
	Int'l Equity	Inflation	Inflation	Gov't Bonds	Gov't Bonds	Cash	U.S. Equity	Gov't Bonds	Inflation	Hedge Funds	Inflation	Corp. Bonds	Cash	Corp. Bonds	Gov't Bonds	Inflation	U.S. Equity	Inflation	Inflation	Corp. Bonds		
-14.95%	1.88%	3.25%	2.65%	3.46%	5.03%	-36.72%	-2.19%	1.50%	-3.55%	1.70%	-2.01%	0.04%	-0.77%	1.05%	2.12%	-4.96%	2.29%	1.40%	-1.04%			
U.S. Equity	Cash	Cash	Corp. Bonds	Inflation	Inflation	Int'l Equity	Real Estate	Cash	Int'l Equity	Cash	Gov't Bonds	Int'l Equity	Int'l Equity	Cash	Cash	Int'l Equity	Cash	Cash	Gov't Bonds			
-21.30%	1.16%	1.33%	1.95%	2.55%	4.06%	-45.52%	-16.86%	0.13%	-13.71%	0.11%	-2.60%	-3.87%	-5.67%	0.27%	0.84%	-14.20%	2.28%	0.45%	-2.28%			
Worst ↓																					Worst ↓	

		Annualized Returns 2002 - 2021																			
Return		Cash		Inflat.		Hedge		Gov't.		Corp.		Int'l.		R.E.		US Eq.					Return
Risk		1.28%		2.31%		3.41%		3.85%		5.52%		7.26%		8.69%		9.68%					Risk
		0.77%		1.44%		5.31%		4.63%		5.74%		19.20%		4.75%		16.61%					

- Hedge Funds are represented by the HFRI FOF Conservative Index
- Inflation is represented by the U.S. Consumer Price Index (SA)
- International Equity is represented by the MSCI - AC World EX-USA Index
- Cash is represented by 30-day T-Bills
- U.S. Equity is represented by the S&P 1500 Index
- Real Estate is represented by the NCREIF National Property Index
- Corporate Bonds are represented by the BBG Barclays - U.S. Corp. Inv. Gd. Index
- Government Bonds are represented by the BBG Barclays - U.S. Government Index

State of Michigan Retirement System
FIXED INCOME REVIEW

State of Michigan Investment Board Meeting
March 24, 2022



Daniel J. Quigley
Senior Investment Manager
Fixed Income Division

EXECUTIVE SUMMARY

Performance

MPSERS Plan (12/31/21)	1-Year	3-Years	5-Years	7-Years	10-Years
Annualized Returns	2.1%	5.6%	4.7%	4.4%	4.1%
Bloomberg Barclays US Agg	-1.5%	4.8%	3.6%	3.0%	2.9%
Peer Median Returns	-0.6%	5.7%	4.3%	3.7%	3.9%
Percentile Rank vs. Peers*	7	58	31	33	24

*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 -2.3% and -1.0% respectively on a one-year basis. Investment Grade Corporate bonds also had a negative performance, returning -1.0% for the calendar year.
- 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 6.2% while the Structured Fixed Income sleeve returned 6.4% 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 December 31, 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 64.2%. This includes a 26.2% allocation to U.S. Treasuries, TIPS, and cash.
 - Plus: The portfolio maintains a strategic out-of-benchmark allocation to high-yield corporate debt, securitized credit, and global fixed income strategies as market opportunities allow. This allocation increases the portfolio yield and total return potential but results in lower liquidity and higher volatility. The allocation to the Plus portfolio was 35.8% as of December 31, 2021.

Tactical Update

- The allocation to securitized credit, primarily in CMBS, ABS, non-agency RMBS, and CLO securities, was 26.0% of the portfolio at the end of the quarter. The combination of low interest rate duration and high coupon income (often floating rate) offers attractive characteristics for the overall fixed income portfolio in this low interest rate environment. The one-year return on this portfolio was 6.4%.
- The allocation to high-yield strategies was 4.3% 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 6.2%, outperforming the core index by roughly 775 basis points (bp).
- The portfolio has a meaningful allocation to floating rate securities, including AAA CLO investments and investment-grade floating rate corporate bonds. This allocation accounts for approximately 20% of portfolio assets. This allocation will underperform during risk-off markets when interest rates decline, however, it should exhibit strong risk-adjusted return characteristics on a go forward basis in this low interest rate environment.

Market Environment and Outlook

- The yield curve for U.S. Treasury securities flattened during the quarter. The spread between 2-year and 10-year U.S. Treasury Notes decreased by 43 bp for the quarter, ending December at 78 bp. This has been driven primarily by a 46 bp increase on the 2-year U.S. Treasury yield as markets prepare for potential increases in the Federal Funds rate in the months ahead.
- Inflation expectations increased during the quarter with ten-year breakeven inflation ending the quarter at 2.59%, this is approximately 60 bp above the 5-year average for this metric.
- Credit markets were mixed during the quarter as investment grade (IG) spreads softened slightly while high yield (HY) spreads continued to tighten. IG spread increased by 8 bp during the quarter as markets digested record corporate bond supply, ending the year at 92 bp. HY spreads ended the quarter at 283 bp, 6 bp tighter for the quarter and 71 bp lower for the calendar year. These spreads are well below historical averages.
- Emerging Markets (EM) credit spreads ended the quarter at 297 bp after tightening by 5 bp for the quarter. EM spreads have increased by 21 bp for the year. This is partially due to the smaller amount of fiscal support available in emerging market economies when compared to their developed market counterparts.
- The recovery of Commercial Mortgage-Backed Securities (CMBS) took a breather as BBB CMBS spreads increased by 19 bp to 290 bp. Spread levels on these securities have decreased by 180 bp during the calendar year.

Conclusion

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

SMRS

Fixed Income Holdings Portfolio Characteristics

Benchmark: Barclays Aggregate

12/31/21

<u>Characteristic</u>	<u>Portfolio</u>	<u>Benchmark</u>
Average Maturity (Yrs)	8.3	8.7
Duration (Yrs)	6.0	6.7
Spread Duration (Yrs)	6.2	6.7
Coupon (%)	2.9	2.5
Yield to Maturity (%)	2.8	1.6
Credit Rating	A	AA
VaR (%)	6.9	6.4
Tracking Error (%)	3.1	NA
Beta (vs S&P 500)	0.07	-0.01

Commentary

Objectives

Income:

The coupon of the portfolio is approximately 40 bps higher than the benchmark. Interest rate movement has been the main driver of U.S. bond market returns for the year, but Income is the primary driver of long-term performance.

Liquidity:

26.2% of the portfolio is invested in cash, U.S. Treasuries, and TIPS. These investments can be liquidated via same-day trading.

Principal Preservation:

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

Diversification:

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

SMRS

Fixed Income by Strategy

12/31/21

	Amount	Total	% of Total
Core (\$ in Millions)			
FID Internal	\$5,137		
PIMCO Mortgage Fund	593		
PGIM Investment Grade Credit	233		
Total Core		\$5,963	61.5%
Tactical			
Fidelity Tactical	\$533		
Total Tactical		\$533	5.5%
Securitized Debt			
TICP CLO Debt	\$829		
Met West Securitized Ops	667		
Principal CMBS	513		
Fortress Credit ABI	375		
Napier Park ABS Income	89		
Putnam DMS	9		
Napier Park Strategic Loan	38		
Total Securitized Debt		\$2,521	26.0%
High Yield			
PGIM High Yield	\$366		
Columbia Management	11		
Crescent Direct Lending	42		
Total High Yield		\$420	4.3%
Global			
T. Rowe Global Multi-Sector	\$267		
Total Global		\$267	2.7%

TOTAL

\$9,703

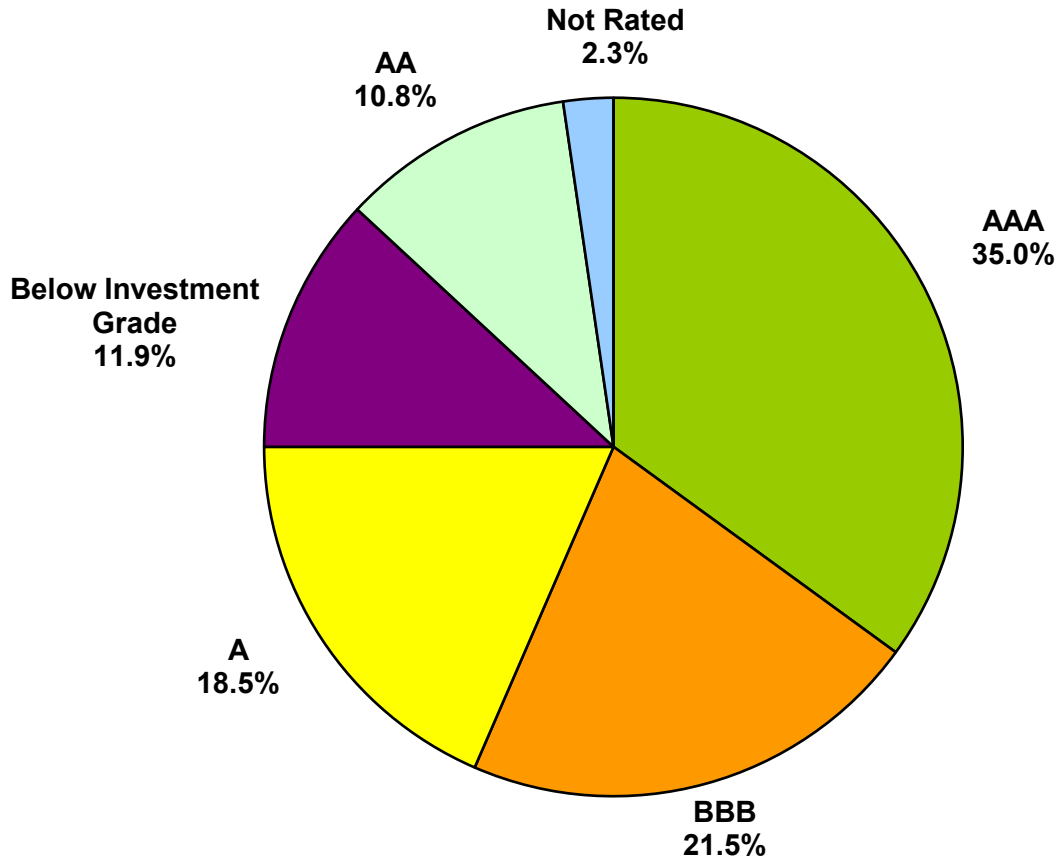
100.0%

NOTE: Totals may not be exact due to rounding.

SMRS

Fixed Income By Rating

12/31/21



Market Value in Millions				
12/31/21				
	<u>Assets</u>	<u>Percent</u>	<u>Benchmark</u>	<u>Difference</u>
AAA	\$3,393	35.0%	70.0%	-35.0%
AA	1,046	10.8%	2.6%	8.2%
A	1,798	18.5%	11.0%	7.5%
BBB	2,084	21.5%	13.3%	8.2%
* Below Investment Grade	1,159	11.9%	0.3%	11.6%
Not Rated	223	2.3%	2.8%	-0.5%
Total Investments	<u>\$9,703</u>	<u>100.0%</u>	<u>100.0%</u>	

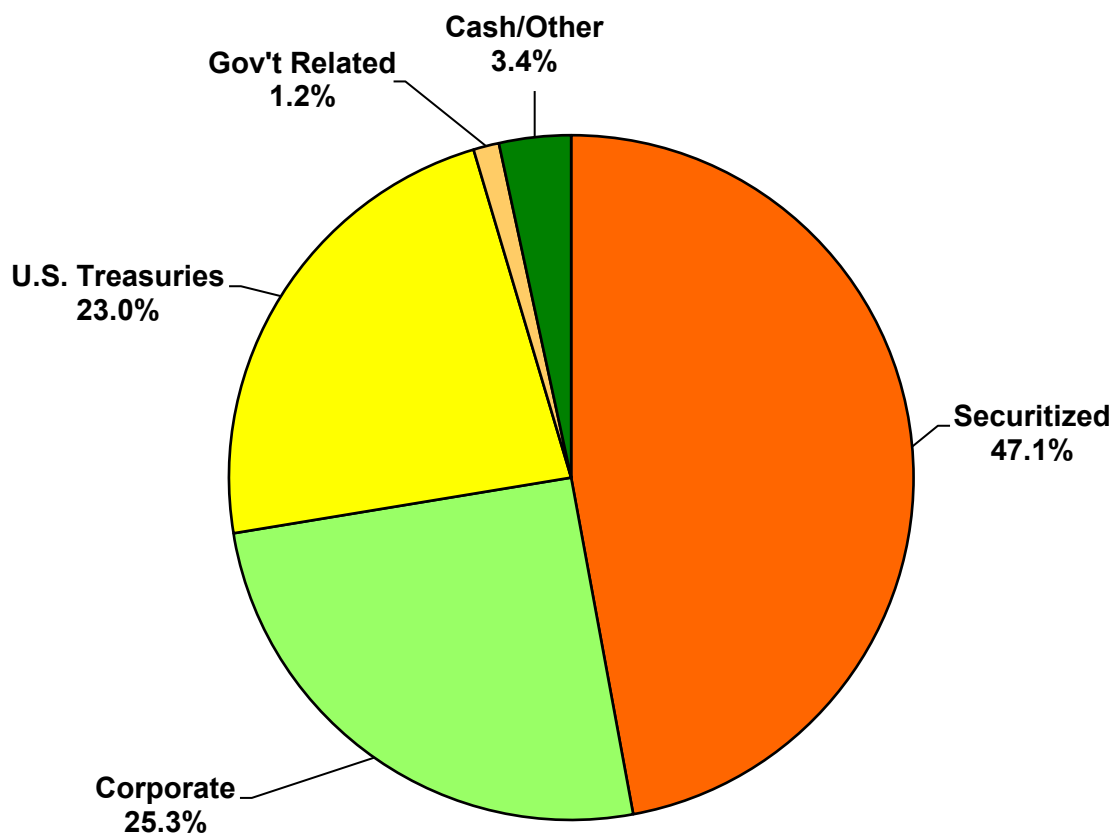
* Comprised of approximately 6.9% High Yield Credit and 5.0% High Yield RMBS/ABS

Benchmark: Barclays US Aggregate

SMRS

Fixed Income By Asset Type

12/31/21



Market Value in Millions				
12/31/21				
	<u>Assets</u>	<u>Percent</u>	<u>Benchmark</u>	<u>Difference</u>
Securitized	\$4,567	47.1%	23.5%	23.6%
Corporate	2,452	25.3%	28.5%	-3.2%
U.S. Treasuries	2,235	23.0%	42.4%	-19.4%
Government Related	114	1.2%	4.8%	-3.6%
Cash/Other	335	3.4%	0.8%	2.6%
Total Investments	<u>\$9,703</u>	<u>100.0%</u>	<u>100.0%</u>	

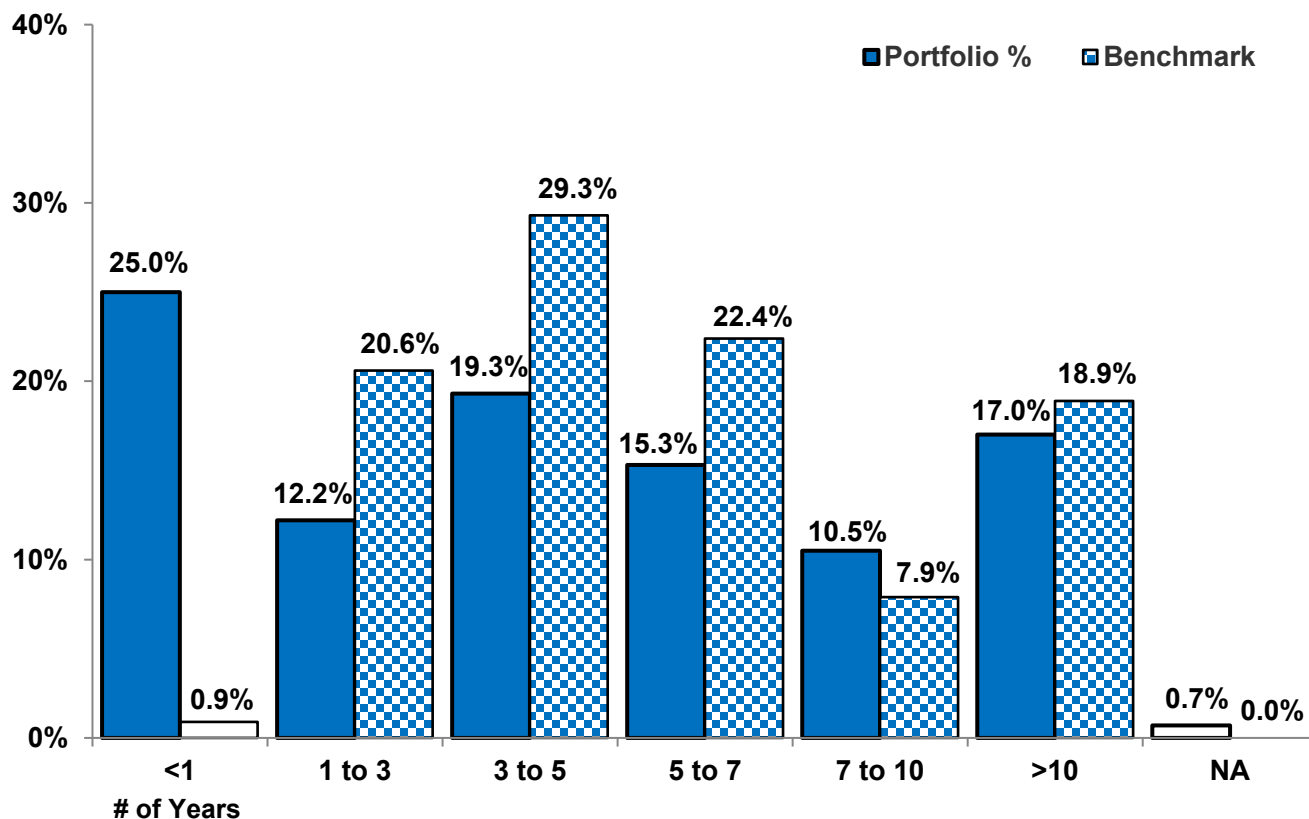
Benchmark: Barclays US Aggregate

SMRS

Duration Distribution

Fixed Income Composite Versus Benchmark

12/31/21



Source: Factset

Market Value in Millions					
Duration	Assets	Portfolio Weight	Benchmark Weight	Portfolio Duration*	Benchmark Duration*
<1	\$2,425	25.0%	0.9%	-0.4	0.9
1 to 3	1,183	12.2%	20.6%	2.2	2.0
3 to 5	1,872	19.3%	29.3%	4.1	3.9
5 to 7	1,488	15.3%	22.4%	6.1	5.9
7 to 10	1,019	10.5%	7.9%	8.5	8.2
>10	1,651	17.0%	18.9%	17.8	16.9
NA	65	0.7%	0.0%	1.8	0.1
Total	\$9,703	100.0%	100.0%	6.0	6.7

* Effective Duration

Benchmark: Barclays US Aggregate

Total Fixed Income Performance - Net of Fees (MPERS)

12/31/21

	<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	\$9,703,053,561	1.89%	5.39%	4.47%	4.15%	3.96%
<i>Bloomberg/Barclays Aggregate Bond Index</i>	<i>N/A</i>	<i>-1.54%</i>	<i>4.79%</i>	<i>3.57%</i>	<i>3.00%</i>	<i>2.90%</i>
Internal Core Fixed Income	\$5,136,911,228	-0.35%	5.47%	4.38%	4.02%	3.67%
Externally Managed Fixed Income	\$4,566,142,333	4.02%	5.19%	4.56%	4.32%	4.36%
PIMCO Mortgage Fund	592,548,844	-1.91%	3.24%			
<i>Bloomberg/Barclays US MBS Agy Fixed Indx</i>	<i>N/A</i>	<i>-1.04%</i>	<i>3.01%</i>			
Investment Grade Credit	\$233,111,208	-0.42%	8.19%	5.66%	4.94%	5.09%
PGIM Investment Grade	233,111,208	-0.42%	8.19%	5.66%	4.94%	5.16%
<i>Bloomberg/Barclays Credit Index</i>	<i>N/A</i>	<i>-1.08%</i>	<i>7.17%</i>	<i>5.05%</i>	<i>4.28%</i>	<i>4.45%</i>
Tactical Fixed Income	\$533,134,857	1.31%	7.28%	5.37%	4.71%	7.20%
Fidelity Tactical Bond Fund	533,134,857	1.31%	7.67%	5.62%	5.23%	
<i>Bloomberg/Barclays Aggregate Bond Index</i>	<i>N/A</i>	<i>-1.54%</i>	<i>4.79%</i>	<i>3.57%</i>	<i>3.00%</i>	<i>2.90%</i>
High Yield Fixed Income	\$419,585,581	6.24%	9.77%	6.64%	6.39%	
PGIM High Yield	365,673,946	6.95%	10.52%	7.28%	6.85%	
Crescent Direct Lending	42,444,936	6.87%	7.16%			
Columbia Management High Yield	11,466,698	1.60%	7.94%	5.41%	5.51%	
<i>Bloomberg/Barclays US HY BA/B 2% Cap</i>	<i>N/A</i>	<i>4.65%</i>	<i>9.07%</i>	<i>6.36%</i>	<i>6.07%</i>	
Structured Fixed Income	\$2,520,977,449	6.38%	3.94%	4.25%		
TICP CLO Debt	829,066,692	3.67%	6.90%			
MetWest Securitized Opportunities	667,324,755	1.86%	3.91%	4.30%	3.82%	
Principal CMBS	513,418,935	7.06%	5.40%	5.36%	4.66%	7.58%
Fortress ABI	375,271,791	8.88%				
Napier Park ABS Income	88,712,464	27.55%	13.30%	12.01%		
Napier Park Strategic Loan LP	38,430,217	-3.91%	2.82%	4.03%		
Putnam DMS	8,752,596	-1.90%				
<i>Bloomberg/Barclays Aggregate Bond Index</i>	<i>N/A</i>	<i>-1.54%</i>	<i>4.79%</i>	<i>3.57%</i>	<i>3.00%</i>	<i>2.90%</i>
<i>Blended CMBS Benchmark</i>	<i>N/A</i>	<i>-0.90%</i>	<i>4.91%</i>	<i>3.84%</i>	<i>3.60%</i>	<i>4.42%</i>
Global Fixed Income	\$266,784,395	-0.89%	5.03%	4.31%		
T. Rowe Global Multi-Sector	266,784,395	-0.17%	5.72%	4.66%		
<i>Custom GMS Benchmark</i>	<i>N/A</i>	<i>-1.06%</i>	<i>4.94%</i>	<i>4.14%</i>		

State of Michigan Retirement System

INTERNATIONAL EQUITY REVIEW

State of Michigan Investment Board Meeting

March 24, 2022



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

EXECUTIVE SUMMARY

Performance

MPSERS Plan (12/31/21)	1-Year	3-Years	5-Years	7-Years	10-Years
Annualized Returns	9.4%	15.1%	11.0%	8.0%	8.7%
MSCI ACWI ex USA Returns	7.8%	13.2%	9.6%	6.6%	7.4%
Peer Median Returns	10.3%	14.9%	10.9%	7.5%	8.7%
Percentile Rank vs. Peers*	67	45	48	34	39

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

- The International Equity Division (IED) outperformed both peers and the benchmark in all periods excluding the last year.
- The portfolio outperformed the benchmark by 1.6% over the last twelve months.
- Performance was driven by the value factor, information technology sector, financial sector, and energy sector.

Asset Class Goals

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

Strategy

- The division allocates capital with the intention of persistent exposure to the quality factor, momentum factor, and value factor.
- Persistent factor exposures create consistent, transparent, low-cost, efficient returns.
- Current portfolio drivers of risk and return.
 - The tracking error of the portfolio is approximately 1.4%, which is below the division's risk budget of 3.0%.
 - The division's core strategy of exposure to the quality, value, and momentum factors (QVM), accounts for collectively 20.4% of the total tracking error, indicating that long-term, the portfolio is not materially exposed to any single risk.
- Quarterly changes to International Equity Division allocation.
 - Rebalanced \$0.8 billion of equity swaps to match the division's long-term equity factor strategy.
 - Allocated \$170.0 million to the Baillie Gifford International Concentrated Growth Fund. The strategy seeks to identify exceptional international growth companies relative to their industry and over a long investment horizon.

- Invested \$90.0 million in the Baron Global Advantage Fund. The team identifies companies with open-ended growth potential and attempts to buy them at discount to their intrinsic value.

Market Environment and Outlook

Market Performance

- International stock markets were up 7.8% for the year. Fundamentals accelerated year-over-year, supporting the above-average compounded returns during the last two years. In 2021, analysts' forward-looking estimates were perpetually below actual earnings and today the estimates are not overly optimistic.
- Performance of the quality, value, and momentum factors (QVM) remains strategically important to the IED. The value factor and quality factor outperformed the MSCI ACWI ex USA in 2021 by 5.0%, and 3.1% respectively. The momentum factor continued to lag, underperforming the benchmark by -4.3% in 2021. IED's core strategy remains balanced and consistent, outperforming the division's benchmark for the third consecutive year. In 2021 the QVM strategy outpaced the benchmark by 2.4%.
- Emerging markets underperformed the MSCI ACWI ex USA this year by -10.4%. Developed markets outperformed the broader index by 4.8%.
- The U.S. dollar was up 6.3% in 2021.
- Commodities surged in 2021, up 27.3%, outperforming international stocks by 19.5%. Oil and copper are both up 54.6% and 16.2% for the year. Gold declined by -3.5% in 2021.
- Global government interest rates (index weighted) remain subdued, at approximately 1.1%. Interest rates have risen in the last six months but remain at low absolute levels relative to history.

Outlook

- Global stock, commodities, and real estate have risen at a pace that indicate significant global inflation across asset classes. 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.
- The global economy continued to expand. International stock markets' earnings per share grew at 22.9% year-over-year, leading to a -14.2% contraction in the market multiple.
- Europe top-line sales and earnings expanded year-over-year at 1.5% and 27.5%. Since last quarter, trailing fundamentals have continued to slow in Europe. Forward-looking sales and earnings per share are expected to be up over the next 12 months, 5.3% and 3.7% respectively.
- Japan's sales per share declined by -2.5% year-over-year. Earnings per share were above average in 2021 growing at 26.5%. Forward-looking sales and earnings growth are forecasted at 4.9% and 11.2%.

- Over the last two years, central banks' "anything it takes" policies have created tremendous amounts of money in the global financial system. 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 in 2022 will turn from accommodative to tightening if the banks want to reign in inflation. Currently, the market believes the narrative that inflation will moderate at some point in back half of 2022. Persistently high inflation may force the banks to taper more quickly, leading markets to reassess how much support central banks will provide to indebted governments. Significantly higher interest rates may potentially lead to a further contraction in equity market multiples.
- Analysts' forward-looking, one-year estimate for earnings per share growth is 5.5% 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 1.1% implies an international equity risk premium of 7.0%. 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 appear to be slowing back towards a more normal rate of growth. Global government bond yields remain near all-time lows as central banks stay 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 and recent inflation statistics indicate the central banks will most likely remove ultra-accommodative policies in 2022.

As stock markets lap their year-over-year fundamental comparisons, the question becomes what multiples investors are willing to pay if the growth projections moderate or even decline. International stocks are expected to grow earnings per share by 5.5% in the next twelve months. The market trades at 14.4x 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

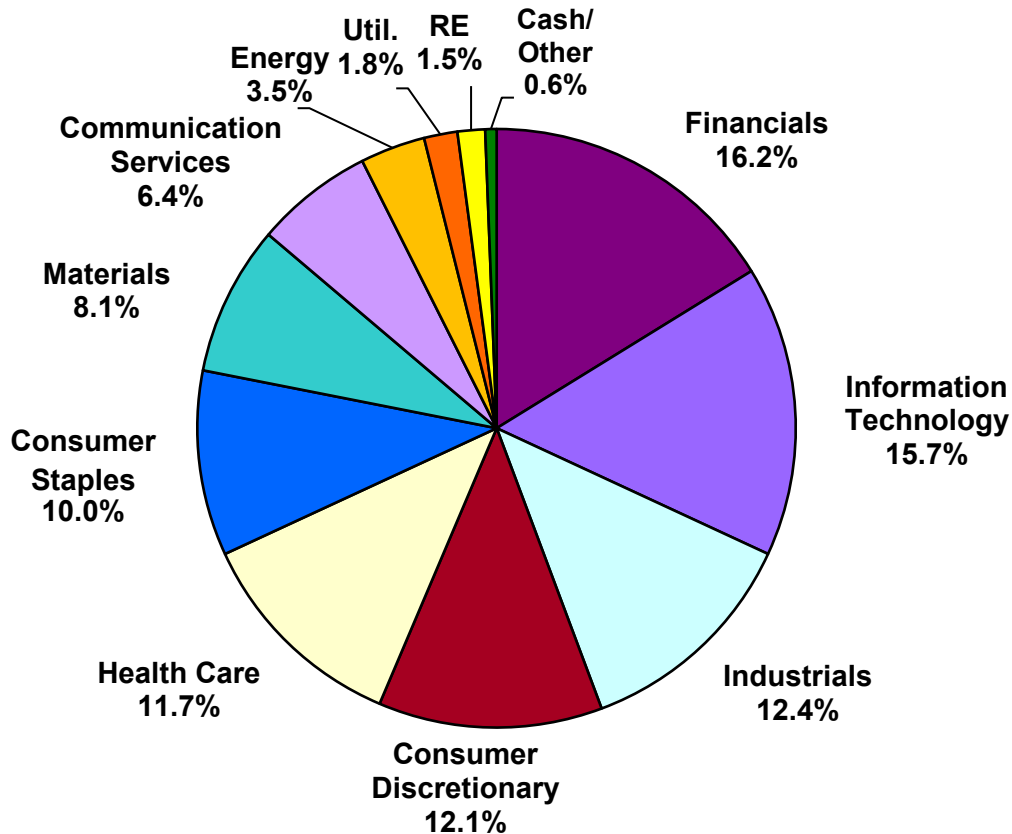
12/31/21

Markets	Amount	Total	% of Total
Active (\$ in Millions)			
BlackRock MSCI	\$2,678		
IED Quality Equity	931		
Wellington	889		
Martin Currie	601		
Lazard	306		
UBS	209		
WCM	197		
Baillie Gifford	154		
Baron	89		
Total Active		\$6,054	38.1%
Stock Plus			
Internal	\$3,766		
PIMCO	2,482		
Total Stock Plus		\$6,248	39.3%
Indexed			
SSGA	\$1,867		
BlackRock	1,720		
Total Indexed		\$3,587	22.6%
TOTAL		<u>\$15,889</u>	<u>100.0%</u>

SMRS

International Equity By Sector

12/31/21



Market Value in Millions				
12/31/21				
	<u>Assets</u>	<u>Percent</u>	<u>Benchmark</u>	<u>Difference</u>
Financials	\$2,573	16.2%	20.5%	-4.3%
Information Technology	2,491	15.7%	12.6%	3.1%
Industrials	1,969	12.4%	12.1%	0.3%
Consumer Discretionary	1,922	12.1%	12.0%	0.1%
Health Care	1,865	11.7%	8.9%	2.8%
Consumer Staples	1,586	10.0%	8.4%	1.6%
Materials	1,292	8.1%	8.2%	-0.1%
Communication Services	1,026	6.4%	6.3%	0.1%
Energy	555	3.5%	5.4%	-1.9%
Utilities	286	1.8%	3.1%	-1.3%
Real Estate	235	1.5%	2.5%	-1.0%
Total Investments	\$15,800	99.4%	100.0%	
Cash/Other	89	0.6%	0.0%	0.6%
Total	<u>\$15,889</u>	<u>100.0%</u>	<u>100.0%</u>	

Benchmark: MSCI ACWI ex USA

SMRS

International Equities

12/31/21

Date:	<u>12/31/21</u>	<u>9/30/21</u>	<u>6/30/21</u>	<u>3/31/21</u>
Assets (\$ in Millions):	\$15,889	\$15,538	\$16,043	\$15,094
Number of Securities:	2,506	2,639	2,624	2,632
Active Share:	32%	33%	33%	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	11.1%	9.3%	9.7%	8.1%
Sustainable Growth Rate	8.0%	6.5%	7.4%	6.1%
Dividend Yield	2.2%	1.9%	2.2%	2.1%
Buyback Yield	0.2%	0.1%	0.0%	0.0%
Collateral Yield	0.7%	0.7%	--	--
Risk:				
Beta	0.97	--	1.00	--
Volatility	16.4%	--	16.9%	--
Tracking Error	1.4%	--	0.0%	--
Information Ratio	1.1	0.8	--	--
Fundamental:				
Average Capitalization (\$ in Billions)	106.0	--	93.6	--
Price/Earnings	15.1	20.3	16.2	20.9
Price/Book	1.9	2.2	1.9	2.2
ROE	12.5%	11.0%	11.7%	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	2.1%	\$326.7	52.0	\$341.4
Tencent Holdings	2.0%	563.0	23.8	320.0
Taiwan Semiconductor Manufacturing Co., Ltd.	2.0%	576.4	27.0	312.9
Nestle S.A.	1.5%	392.6	28.5	240.2
Roche Holding	1.3%	363.1	18.8	214.2
Novo Nordisk A/S Class B	1.3%	198.5	35.6	209.2
Samsung Electronics Co., Ltd.	1.3%	442.5	13.0	205.8
Toyota Motor Corp.	1.1%	298.3	10.9	168.7
Alibaba Group Holding	1.0%	330.7	14.9	155.1
British American Tobacco	<u>0.8%</u>	<u>85.0</u>	8.4	<u>126.3</u>
TOTAL	<u>14.4%</u>	<u>\$3,576.7</u>		<u>\$2,293.8</u>

International Equity Performance - Net of Fees
12/31/21

<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	\$15,889,093,565	9.2%	14.9%	10.7%	7.8%	6.6%	1/1/04
MSCI ACWI ex USA		7.8%	13.2%	9.6%	6.6%	6.5%	
Lipper International Multi-Cap Core		10.4%	13.0%	9.1%	6.6%	6.0%	
Excess Return		1.4%	1.7%	1.0%	1.2%	0.0%	
Pct Rank vs. Lipper International Multi-Cap Core		72	11	5	10	19	

Total International Active Strategy*	\$6,053,801,646	6.8%	15.2%	10.6%	7.6%	6.0%	5/1/05
MSCI ACWI ex USA		7.8%	13.2%	9.6%	6.6%	6.2%	
Lipper International Multi-Cap Core		10.4%	13.0%	9.1%	6.6%	5.6%	
Excess Return		-1.1%	2.0%	1.0%	1.1%	-0.1%	
Pct Rank vs. Lipper International Multi-Cap Core		91	9	5	13	32	

BlackRock MSCI Systematic Return	2,677,560,329	10.5%	16.0%	--	--	14.4%	12/1/18
MSCI ACWI ex USA		7.8%	13.2%	--	--	11.1%	
Lipper International Multi-Cap Core		10.4%	13.0%	--	--	10.7%	
Excess Return		2.7%	2.8%	--	--	3.3%	
Pct Rank vs. Lipper International Multi-Cap Core		56	3	--	--	1	

IED Quality Equity**	930,903,302	11.1%	--	--	--	20.9%	2/1/20
MSCI ACWI ex USA		7.8%	--	--	--	11.2%	
Lipper International Multi-Cap Core		10.4%	--	--	--	11.1%	
Excess Return		3.2%	--	--	--	9.7%	
Pct Rank vs. Lipper International Multi-Cap Core		49	--	--	--	1	

Martin Currie International Long-Term	601,216,267	16.9%	26.3%	--	--	17.0%	2/1/17
MSCI ACWI ex USA		7.8%	13.2%	--	--	9.0%	
Lipper International Multi-Cap Core		10.4%	10.4%	--	--	8.6%	
Excess Return		9.1%	13.1%	--	--	8.0%	
Pct Rank vs. Lipper International Multi-Cap Core		4	4	--	--	1	

Wellington IRE	357,207,279	12.2%	15.2%	11.0%	7.7%	5.7%	12/1/05
MSCI World ex USA		12.6%	14.1%	9.6%	6.7%	5.8%	
Lipper International Multi-Cap Core		10.4%	13.0%	9.1%	6.6%	5.0%	
Excess Return		-0.5%	1.1%	1.3%	1.0%	-0.1%	
Pct Rank vs. Lipper International Multi-Cap Core		24	7	3	11	24	

Wellington Emerging Markets Local Equity	333,428,095	-6.3%	9.0%	9.1%	5.7%	6.5%	12/1/11
MSCI Emerging Market Index		-2.5%	10.9%	9.9%	6.1%	4.6%	
Lipper Emerging Markets		1.1%	12.5%	9.9%	6.1%	5.2%	
Excess Return		-3.8%	-1.9%	-0.8%	-0.4%	1.9%	
Pct Rank vs. Lipper Emerging Markets		84	82	62	62	29	

Lazard/Wilmington International Equity	305,775,000	6.3%	11.9%	8.4%	5.6%	4.1%	6/1/14
MSCI World ex USA		12.6%	14.1%	9.6%	6.7%	5.0%	
Lipper International Large-Cap Core		10.4%	13.0%	9.1%	6.6%	5.1%	
Excess Return		-6.4%	-2.1%	-1.3%	-1.2%	-0.9%	
Pct Rank vs. Lipper International Large-Cap Core		91	79	79	85	84	

Wellington Select China Equity	198,606,867	-12.3%	--	--	--	24.1%	9/1/19
MSCI China On shore		4.0%	--	--	--	27.7%	
Lipper Emerging Markets		1.1%	--	--	--	13.0%	
Excess Return		-16.4%	--	--	--	-3.6%	
Pct Rank vs. Lipper Emerging Markets		95	--	--	--	6	

UBS China A Opportunity Fund	208,553,528	-16.3%	--	--	--	18.2%	5/1/20
MSCI China On shore		4.0%	--	--	--	27.7%	
Lipper Emerging Markets		1.1%	--	--	--	24.9%	
Excess Return		-20.3%	--	--	--	-9.5%	
Pct Rank vs. Lipper Emerging Markets		98	--	--	--	86	

WCM Focused Growth International	197,417,295	--	--	--	--	6.4%	10/1/21
MSCI ACWI ex USA		--	--	--	--	1.8%	
Lipper International Large-Cap Core		--	--	--	--	2.5%	
Excess Return		--	--	--	--	4.6%	
Pct Rank vs. Lipper International Large-Cap Core		--	--	--	--	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>
Baillie Gifford Int'l Concentrated Growth	154,335,337	--	--	--	--	--	12/1/21
MSCI ACWI ex USA		--	--	--	--	--	
Lipper International Large-Cap Core		--	--	--	--	--	
<i>Excess Return</i>		--	--	--	--	--	
<i>Pct Rank vs. Lipper International Large-Cap Core</i>		--	--	--	--	--	
Baron Global Advantage	87,859,521	--	--	--	--	--	1/1/22
MSCI ACWI Index		--	--	--	--	--	
Lipper International Large-Cap Core		--	--	--	--	--	
<i>Excess Return</i>		--	--	--	--	--	
<i>Pct Rank vs. Lipper International Large-Cap Core</i>		--	--	--	--	--	

Total International Stock Plus Strategy**	\$6,248,194,687	12.3%	15.4%	11.1%	8.1%	8.3%	1/1/09
MSCI ACWI ex USA		7.8%	13.2%	9.6%	6.6%	8.1%	
Lipper International Multi-Cap Core		10.4%	13.0%	9.1%	6.6%	8.0%	
<i>Excess Return</i>		4.5%	2.2%	1.4%	1.6%	0.3%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		24	4	3	3	24	
Internal Stock Plus	3,766,523,430	13.9%	14.9%	10.5%	7.3%	7.2%	9/1/11
MSCI ACWI ex USA		7.8%	13.2%	9.6%	6.6%	6.2%	
Lipper International Multi-Cap Core		10.4%	13.0%	9.1%	6.6%	6.9%	
<i>Excess Return</i>		6.0%	1.8%	0.9%	0.7%	1.0%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		11	10	5	20	35	
PIMCO StocksPLUS	2,481,671,257	9.8%	--	--	--	13.8%	4/1/19
MSCI ACWI ex USA		7.8%	--	--	--	10.4%	
Lipper International Multi-Cap Core		10.4%	--	--	--	10.3%	
<i>Excess Return</i>		2.0%	--	--	--	3.3%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		63	--	--	--	2	

Total International Index Strategy	\$3,587,097,232	8.0%	13.4%	10.6%	7.8%	8.3%	7/1/09
MSCI ACWI ex USA		7.8%	13.2%	9.6%	6.6%	7.3%	
Lipper International Multi-Cap Core		10.4%	13.0%	9.1%	6.6%	7.6%	
<i>Excess Return</i>		0.2%	0.3%	1.0%	1.2%	1.1%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		83	53	5	10	18	
SSGA MSCI ACWI ex USA Index	1,866,755,613	8.0%	13.5%	--	--	6.4%	11/1/17
MSCI ACWI ex USA		7.8%	13.2%	--	--	6.1%	
Lipper International Multi-Cap Core		10.4%	10.4%	--	--	5.8%	
<i>Excess Return</i>		0.2%	0.3%	--	--	0.3%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		83	83	--	--	34	
Blackrock ACWI ex USA Index	1,720,341,619	8.1%	13.4%	--	--	6.0%	3/1/18
MSCI ACWI ex USA		7.8%	13.2%	--	--	5.7%	
Lipper International Multi-Cap Core		10.4%	13.0%	--	--	5.7%	
<i>Excess Return</i>		0.2%	0.2%	--	--	0.3%	
<i>Pct Rank vs. Lipper International Multi-Cap Core</i>		83	54	--	--	49	

* The total includes a balance of \$938,826 from the closed fund of LA Capital World.

** The amount includes the total of \$8,758,826 for the International Transition account.

State of Michigan Retirement System

DOMESTIC EQUITY REVIEW

State of Michigan Investment Board Meeting
March 24, 2022



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

EXECUTIVE SUMMARY

Performance

MPSERS Plan (12/31/21)	1-Year	3-Years	5-Years	7-Years	10-Years
Annualized Returns	25.7%	24.7%	17.9%	14.2%	16.3%
S&P 1500	28.5%	25.6%	18.0%	14.7%	16.4%
Peer Median Return	21.9%	20.8%	15.1%	11.8%	13.5%
Percentile Rank vs. Peers *	34	20	13	25	21

*State Street Universe greater than \$1 billion

- In the quarter ended December 31, 2021, the Domestic Equity Division outperformed its peer group over all time periods while underperforming the S&P 1500.
- During the past year, performance was 380 basis points (bps) ahead of peers and 280 basis points behind the S&P 1500, with incurred tracking error of 2.5%.
- While SMRS's value-based strategies generally performed well in 2021, exposure to small cap and especially momentum stocks hurt performance on the year.
- In particular, the disruptive innovation space, which tends to be characterized by small cap momentum stocks in the technology and healthcare sectors, suffered a significant correction, dropping by roughly 25% in a general market that was up over 28%.
- Despite the correction, DED was proactive and sold \$150M of exposure from Ark Investments in January through March of 2021, at or near the peak of Ark's then parabolic performance.
- Since inception, SMRS has liquidated over \$200M from Ark, covering the entire \$200M it funded the mandate with in 2016. Fund AUM remains well over \$400M.
- As we now believe that the companies Ark owns, which have a bright future, have gone from being richly priced to significantly undervalued, we added \$60M back to the space in January of 2022, at levels roughly 40%-50% lower than where we sold last year.
- Manager performance highlights for 2021 include Michigan's Seizert Capital Partners, which was up over 33% on the year, outperforming the S&P 1500 by over 500bps.

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

- SMRS hired a new manager in October of 2021, called Patient Capital. It is headed by Samantha McLemore, who for the past 15 years was co-manager of the acclaimed Miller Value Opportunity fund with Bill Miller. Bill Miller made a name for himself by beating the S&P 500 Index for 15 years in a row using an eclectic mix of deep value and technology investing.
- Samantha's performance, both as a part of Miller Value and on her own, has been stellar. Her eclectic approach, financial acumen, inclusive leadership style and deep research into the underlying companies her company owns give us confidence that such results are repeatable over the long term.
- We are excited about our relationship with Patient Capital and believe we have established another agreement with a talented up and coming manager at an attractive fee level, similar to our previous funding of Ark Investments and Clarkston Capital.
- This is in keeping with our general philosophy of investing with talented individuals and firms at index-like fee levels, hopefully combining the best attributes of both active and passive management.
- The Domestic Equity Division continues to be positioned for an economic recovery, with a portfolio beta of 1.06 and a relative overweight to small cap, momentum and to a lesser extent value stocks. DED sector overweights include health care, financials, communication services and utilities. Underweights include consumer discretionary, consumer staples, technology and industrials. The division's portfolio trades at roughly an 18% discount to the S&P 1500, despite higher levels of profitability and faster rates of reinvestment.

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 ~1.8%, or roughly 55X 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 and the continued availability of many attractively valued companies, stocks remain a reasonable alternative to bonds and bond-like asset classes. Inflation remains a concern but given the current disparity between equity and bond valuations, the Fed has room to raise rates further without significantly depressing stock valuations.
- Long-term we expect the market to return roughly 8.6%, driven by a dividend yield of 1.75% and dividend per share growth of 6.85%.

SMRS

Domestic Equity Strategies

12/31/21

Markets	Amount	Total	% of Total
Internal Indexed (\$ in Millions)			
Indexed Portfolios	\$11,501		
Total Indexed		\$11,501	48.1%
Internal Active			
Active Portfolios	\$7,608		
Total Internal Active		\$7,608	31.9%
External Active			
Los Angeles Capital	\$1,046		
Mellon Capital	756		
Martin Currie US LT Unconstrained	660		
Seizert Capital Partners	614		
ARK Investments	513		
Clarkston Capital Partners	512		
Patient Capital	186		
Attucks Asset Management	140		
Bivium Capital	139		
Ancora	113		
Managed Asset Portfolios	<u>106</u>		
Total External Active		\$4,785	20.0%

Total Domestic Equity

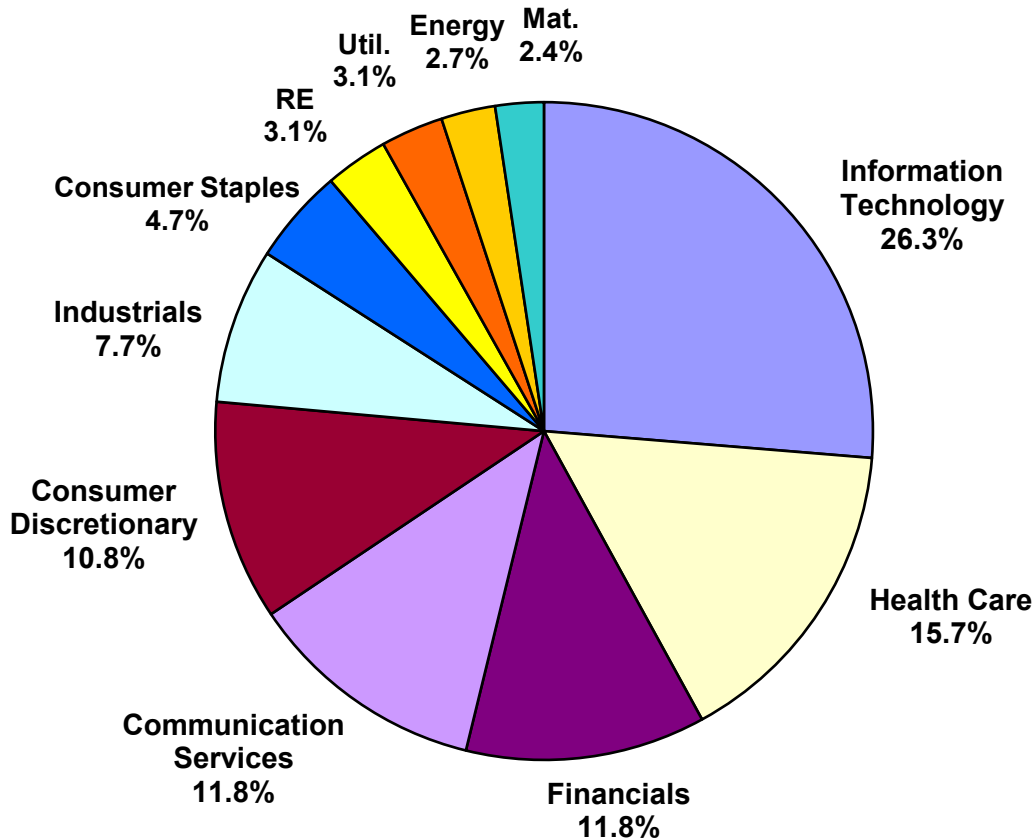
\$23,894

100.0%

SMRS

Domestic Equity By Sector

12/31/21



Market Value in Millions				
12/31/21				
	<u>Assets</u>	<u>Percent</u>	<u>Benchmark</u>	<u>Difference</u>
Information Technology	\$6,287	26.3%	28.0%	-1.7%
Health Care	3,756	15.7%	13.1%	2.6%
Financials	2,817	11.8%	11.0%	0.8%
Communication Services	2,815	11.8%	9.5%	2.3%
Consumer Discretionary	2,585	10.8%	12.7%	-1.9%
Industrials	1,830	7.7%	8.6%	-0.9%
Consumer Staples	1,121	4.7%	5.7%	-1.0%
Real Estate	741	3.1%	3.3%	-0.2%
Utilities	736	3.1%	2.5%	0.6%
Energy	636	2.7%	2.7%	0.0%
Materials	571	2.4%	2.9%	-0.5%
Total	<u>\$23,894</u>	<u>100.0%</u>	<u>100.0%</u>	

Benchmark: S&P 1500

SMRS

Domestic Equities Composite

12/31/21

Date:	<u>12/31/21</u>	<u>9/30/21</u>	<u>6/30/21</u>	<u>3/31/21</u>
Assets (\$ in Millions):	\$23,894	\$21,958	\$22,169	\$20,408
Number of Securities:	3,030	2,992	2,965	1,346
Active Share:	30%	28%	32%	36%

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

	SMRS	S&P 1500
Characteristics:		
Market Cap. (\$ in Billions)	\$481.7	\$620.4
FY1 P/E	17.1	20.7
P/E upside to S&P 1500	21.3%	0.0
Return on Equity	28.5%	17.4%
Risk Metrics		
Beta	1.07	1.00
Tracking Error	1.8%	0.0%
Projected Returns		
Dividend Yield	1.5%	1.8%
Buyback Yield	3.1%	3.0%
Reinvestment Rate	<u>6.2%</u>	<u>3.8%</u>
Projected Investment Return	10.8%	8.6%

TOP TEN EXPOSURES – Domestic Equities vs S&P 1500 12/31/21

<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	4.8%	Apple, Inc.	6.3%
Apple, Inc.	4.8%	Microsoft Corporation	5.8%
Meta Platforms, Inc., Class A	2.8%	Amazon.com, Inc.	3.3%
Amazon.com, Inc.	2.7%	Alphabet Inc., Class A	2.0%
AT&T, Inc.	2.6%	Tesla, Inc.	2.0%
Bristol-Myers Squibb Company	2.1%	Alphabet Inc., Class C	1.8%
Alphabet Inc., Class A	1.9%	Meta Platforms, Inc., Class A	1.8%
NVIDIA Corporation	1.7%	NVIDIA Corporation	1.7%
Athene Holding Ltd., Class A	1.4%	Berkshire Hathaway Inc., Class B	1.3%
Alphabet Inc., Class C	<u>1.3%</u>	UnitedHealth Group, Inc.	<u>1.1%</u>
TOTAL	<u>26.1%</u>	TOTAL	<u>27.1%</u>

Manager Performance - Net of Fees

12/31/21

<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	\$10,809,781,753	28.6%	26.0%	18.5%	15.0%	--	N/A
S&P 500		28.7%	26.1%	18.5%	14.9%	--	
Style & Risk Adjusted Benchmark		28.7%	26.0%	18.4%	14.9%	--	
Lipper Large-Cap Core		26.8%	24.8%	17.6%	13.8%	--	
<i>Excess Return</i>		-0.1%	-0.1%	0.0%	0.1%	--	
<i>Alpha</i>		-0.1%	0.0%	0.0%	0.1%	--	
<i>Pct. Rank vs. Lipper Large-Cap Core</i>		29	42	35	20	--	
SMRS Large-Cap Core	2,075,070,901	44.1%	24.6%	18.8%	13.5%	10.9%	8/31/07
S&P 500		28.7%	26.1%	18.5%	14.9%	10.8%	
Style & Risk Adjusted Benchmark		30.7%	27.7%	15.8%	13.7%	8.7%	
Lipper Large-Cap Core		26.8%	24.8%	17.6%	13.8%	10.2%	
<i>Excess Return</i>		15.4%	-1.5%	0.3%	-1.4%	0.0%	
<i>Alpha</i>		13.4%	-3.1%	3.0%	-0.2%	2.2%	
<i>Pct Rank vs Lipper Large-Cap Core</i>		1	62	30	64	27	
SMRS All-Cap Garp	2,059,420,675	29.2%	19.5%	13.8%	11.0%	13.7%	4/30/11
S&P 1500 Super Composite		28.4%	25.6%	17.9%	14.7%	14.7%	
Style & Risk Adjusted Benchmark		28.0%	24.2%	18.0%	14.5%	14.5%	
Lipper Multi-Cap Core		24.1%	23.1%	15.7%	12.4%	12.6%	
<i>Excess Return</i>		0.8%	-6.2%	-4.2%	-3.6%	-1.0%	
<i>Alpha</i>		1.2%	-4.7%	-4.2%	-3.5%	-0.8%	
<i>Pct. Rank vs. Lipper Multi-Cap Core</i>		15	84	82	81	33	
SMRS Large-Cap Growth	1,079,107,522	26.3%	31.7%	25.0%	17.7%	12.9%	5/31/05
S&P 500 Growth		32.0%	32.2%	24.1%	18.7%	13.1%	
Style & Risk Adjusted Benchmark		31.9%	30.6%	23.5%	18.6%	13.1%	
Lipper Large-Cap Growth		22.0%	30.4%	23.3%	17.5%	12.5%	
<i>Excess Return</i>		-5.7%	-0.5%	0.9%	-1.0%	-0.2%	
<i>Alpha</i>		-5.6%	1.1%	1.5%	-0.9%	-0.2%	
<i>Pct Rank vs Lipper Large-Cap Growth</i>		27	37	30	53	39	
LA Capital All-Cap Growth	1,046,409,701	29.4%	26.2%	19.6%	16.6%	13.7%	5/31/05
S&P 1500 Growth		31.2%	31.4%	23.3%	18.2%	13.0%	
Style & Risk Adjusted Benchmark		27.8%	29.4%	21.6%	16.3%	10.5%	
Lipper Multi-Cap Growth		15.5%	29.7%	22.2%	16.2%	12.1%	
<i>Excess Return</i>		-1.7%	-5.2%	-3.7%	-1.7%	0.7%	
<i>Alpha</i>		1.6%	-3.2%	-2.0%	0.3%	3.2%	
<i>Pct. Rank vs. Lipper Multi-Cap Growth</i>		8	78	69	39	17	
Value, Quality, Momentum Composite	941,032,947	23.5%	--	--	--	31.0%	10/1/20
S&P 1500		28.4%	--	--	--	35.0%	
Style & Risk Adjusted Benchmark		25.7%	--	--	--	35.8%	
Lipper Multi-Cap Core		24.1%	--	--	--	32.5%	
<i>Excess Return</i>		-4.9%	--	--	--	-4.0%	
<i>Alpha</i>		-2.1%	--	--	--	-4.8%	
<i>Pct. Rank vs. Lipper Multi-Cap Core</i>		69	--	--	--	68	
Large-Cap Consistent Growth	770,333,552	29.4%	30.4%	23.6%	20.2%	17.8%	3/1/15
S&P 500		28.7%	26.1%	18.5%	14.9%	14.9%	
Style & Risk Adjusted Benchmark		38.8%	33.3%	23.7%	18.7%	18.1%	
Lipper Large-Cap Core		26.8%	24.8%	17.6%	13.8%	13.7%	
<i>Excess Return</i>		0.7%	4.3%	5.1%	5.3%	2.9%	
<i>Alpha</i>		-9.4%	-2.9%	-0.1%	1.6%	-0.3%	
<i>Pct. Rank vs. Lipper Large-Cap Core</i>		21	1	1	1.0%	1	
Mellon US Equity Enhanced	755,973,142	27.2%	37.7%	--	--	27.9%	3/1/17
S&P 500		28.7%	26.1%	--	--	17.8%	
Style & Risk Adjusted Benchmark		47.0%	25.0%	--	--	19.3%	
Lipper Large-Cap Core		26.8%	24.8%	--	--	16.8%	
<i>Excess Return</i>		-1.5%	11.6%	--	--	10.2%	
<i>Alpha</i>		-19.9%	12.7%	--	--	8.6%	
<i>Pct. Rank vs. Lipper Large-Cap Core</i>		49	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	690,857,959	24.5%	21.3%	13.3%	12.2%	--	N/A
S&P 400		24.8%	21.4%	13.1%	11.8%	--	
Style & Risk Adjusted Benchmark		24.7%	21.3%	13.0%	11.7%	--	
Lipper Mid-Cap Core		24.9%	20.8%	12.7%	10.5%	--	
<i>Excess Return</i>		-0.2%	-0.1%	0.2%	0.4%	--	
<i>Alpha</i>		-0.1%	0.0%	0.2%	0.4%	--	
<i>Pct. Rank vs. Lipper Mid-Cap Core</i>		55	44	41	18	--	
Martin Currie	660,168,014	22.2%	--	--	--	34.2%	11/1/20
S&P 1500 Growth		31.2%	--	--	--	42.0%	
Style & Risk Adjusted Benchmark		36.7%	--	--	--	47.7%	
Lipper Multi-Cap Growth		15.5%	--	--	--	30.1%	
<i>Excess Return</i>		-9.0%	--	--	--	-7.8%	
<i>Alpha</i>		-14.5%	--	--	--	-13.5%	
<i>Pct. Rank vs. Lipper Multi-Cap Growth</i>		32	--	--	--	37	
Seizert Capital Partners	614,151,341	32.8%	22.9%	14.5%	12.2%	14.7%	11/30/09
S&P 1500 Value		25.4%	18.7%	11.8%	10.4%	12.9%	
Style & Risk Adjusted Benchmark		22.7%	18.2%	11.4%	10.3%	12.9%	
Lipper Multi-Cap Value		26.3%	17.9%	11.4%	9.4%	11.8%	
<i>Excess Return</i>		7.5%	4.2%	2.7%	1.8%	1.8%	
<i>Alpha</i>		10.2%	4.7%	3.1%	1.8%	1.8%	
<i>Pct. Rank vs. Lipper Multi-Cap Value</i>		10	8	10	8	3	
Ark Investments	512,544,599	-24.5%	29.4%	30.6%	--	28.2%	3/1/16
S&P 1500 Growth		31.2%	31.4%	23.3%	--	22.4%	
Style & Risk Adjusted Benchmark		44.0%	26.6%	34.8%	--	33.7%	
Lipper Multi-Cap Growth		15.5%	29.7%	22.2%	--	21.3%	
<i>Excess Return</i>		-55.6%	-2.0%	7.4%	--	5.7%	
<i>Alpha</i>		-68.4%	2.8%	-4.2%	--	-5.6%	
<i>Pct. Rank vs. Lipper Multi-Cap Growth</i>		100	48	10	--	11	
Clarkston Capital Small/Mid-Cap	511,245,178	8.3%	18.1%	11.8%	11.6%	12.2%	1/1/14
S&P 400		25.3%	21.0%	12.9%	11.9%	11.5%	
Style & Risk Adjusted Benchmark		28.5%	17.2%	10.4%	9.4%	9.1%	
Lipper Mid-Cap Core		24.9%	20.8%	12.7%	10.5%	10.2%	
<i>Excess Return</i>		-17.1%	-2.9%	-1.1%	-0.3%	0.7%	
<i>Alpha</i>		-20.2%	0.9%	1.3%	2.2%	3.1%	
<i>Pct. Rank vs. Lipper Mid-Cap Core</i>		100	86	66	26	9	
Disruptive Innovation Momentum	208,161,336	-26.4%	--	--	--	17.0%	9/1/20
MSCI Momentum Index		13.5%	--	--	--	14.3%	
Style & Risk Adjusted Benchmark		46.5%	--	--	--	59.0%	
Lipper Multi-Cap Growth		15.5%	--	--	--	21.8%	
<i>Excess Return</i>		-39.9%	--	--	--	2.7%	
<i>Alpha</i>		-72.9%	--	--	--	-42.0%	
<i>Pct. Rank vs. Lipper Multi-Cap Growth</i>		100	--	--	--	81	
Patient Capital	186,061,084	--	--	--	--	-7.0%	10/1/21
S&P 1500 Value		--	--	--	--	8.2%	
Style & Risk Adjusted Benchmark		--	--	--	--	9.9%	
Lipper Multi-Cap Value		--	--	--	--	7.5%	
<i>Excess Return</i>		--	--	--	--	-15.1%	
<i>Alpha</i>		--	--	--	--	-16.9%	
<i>Pct. Rank vs. Lipper Multi-Cap Value</i>		--	--	--	--	100	
Attucks Asset Management	140,186,050	23.7%	17.1%	11.7%	9.7%	7.9%	11/30/07
S&P 1500		28.4%	25.6%	17.9%	14.7%	10.5%	
Style & Risk Adjusted Benchmark		23.0%	17.7%	11.2%	9.9%	10.5%	
Lipper Multi-Cap Core		24.1%	23.1%	15.7%	12.4%	8.9%	
<i>Excess Return</i>		-4.8%	-8.6%	-6.2%	-5.0%	-2.6%	
<i>Alpha</i>		0.7%	-0.7%	0.6%	-0.2%	-2.6%	
<i>Pct. Rank vs. Lipper Multi-Cap Core</i>		68	92	89	88	78	

<u>Fund Name</u>	<u>Market Value</u>	<u>1-Year</u>	<u>3-Years</u>	<u>5-Years</u>	<u>7-Years</u>	<u>Inception</u>	<u>Inception Date</u>
Bivium Capital Partners	139,421,177	24.1%	17.7%	11.3%	9.2%	7.5%	11/30/07
S&P 1500 Value		25.4%	18.7%	11.8%	10.4%	7.6%	
Style & Risk Adjusted Benchmark		27.4%	26.2%	18.3%	15.0%	10.8%	
Lipper Multi-Cap Value		26.3%	17.9%	11.4%	9.4%	7.2%	
<i>Excess Return</i>		-1.3%	-1.0%	-0.5%	-1.1%	-0.1%	
<i>Alpha</i>		-3.3%	-8.6%	-7.0%	-5.8%	-3.2%	
<i>Pct. Rank vs. Lipper Multi-Cap Value</i>		71	50	50	54	43	
Ancora	113,087,402	22.9%	20.5%	--	--	11.5%	10/1/17
S&P 1000		25.3%	21.0%	--	--	12.9%	
Style & Risk Adjusted Benchmark		29.8%	17.7%	--	--	10.5%	
Lipper Mid-Cap Core		24.9%	20.8%	--	--	12.6%	
<i>Excess Return</i>		-2.4%	-0.5%	--	--	-1.4%	
<i>Alpha</i>		-6.8%	2.8%	--	--	1.1%	
<i>Pct. Rank vs. Lipper Mid-Cap Core</i>		70	58	--	--	67	
Managed Asset Portfolios	106,005,368	18.6%	17.5%	13.7%	--	14.4%	2/29/16
S&P 1500 Value		25.4%	18.7%	11.8%	--	14.0%	
Style & Risk Adjusted Benchmark		18.7%	14.6%	8.9%	--	14.7%	
Lipper Multi-Cap Value		26.3%	17.9%	11.4%	--	13.2%	
<i>Excess Return</i>		-6.8%	-1.3%	1.9%	--	0.3%	
<i>Alpha</i>		-0.1%	2.9%	4.8%	--	-0.3%	
<i>Pct. Rank vs. Lipper Multi-Cap Value</i>		94	55	14	--	24	

State of Michigan Retirement System

ABSOLUTE RETURN REVIEW

State of Michigan Investment Board Meeting
March 24, 2022



Daniel J. Quigley
Senior Investment Manager
Absolute Return Strategy

EXECUTIVE SUMMARY

Performance

MPSERS Plan (12/31/21)	1-Year	3-Years	5-Years	7-Years	10-Years
Absolute Return	16.3%	8.0%	7.5%	5.4%	6.4%
HFRI FOF Conservative	9.7%	6.2%	4.7%	3.6%	3.9%

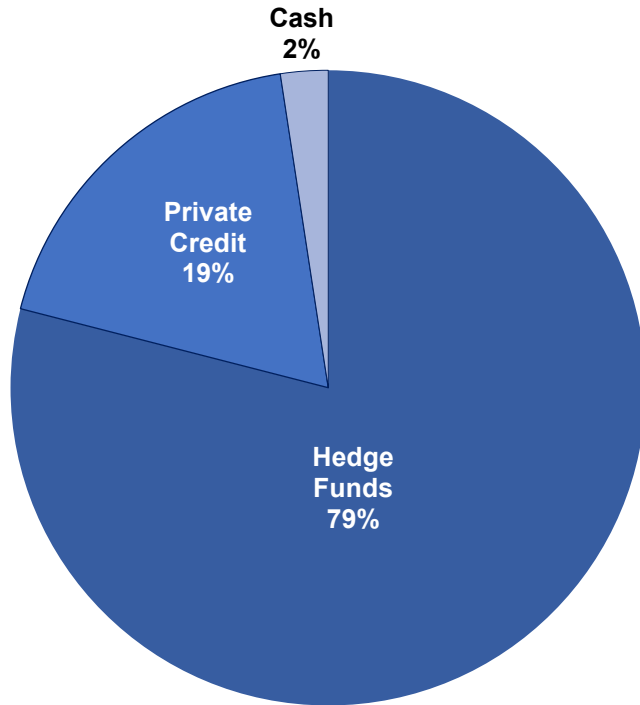
- The value of the Absolute Return portfolio is \$6.3 billion with a one-year return of 16.3%. Performance of the portfolio was positive for the fourth quarter, driven by manager selection and exposure to Credit, Equities and Multi-Strategy strategies. Diversifying strategy detracted, driven by Macro-Rates exposure, but these losses were more than offset by the positive return contribution from the other strategies.
- Credit strategies were the largest contributor to performance for the quarter. Residential mortgages maintained their strong performance, driven by continued strength in housing fundamentals from a persistent undersupply leading to continued growth in housing price appreciation, and a decline in borrower forbearance rates further supporting mortgage credit performance. Corporate credit managers also performed well, driven by coupon income and credit-specific catalysts/modest spread tightening.
- Equities and Multi-Strategy also contributed to returns in the Hedge Fund portfolio for the quarter. Equity strategies contributed positively for the quarter, with some performance dispersion across managers. In Multi-Strategy, the portfolio's core managers, in a combination of non-directional exposures across asset classes, including equity activism, macro and fixed income relative value, outperformed with broad based gains. 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 with lower volatility than the equity portfolio. The portfolio utilizes a diverse mix of managers that invest both long and short to target specific exposures and seek to hedge out unwanted risk.
- Commitments closed during the quarter include:
 - \$100 million in Castle Credit SMRS Holdings, LLC Series C, a vehicle managed by Great Mountain Partners in a real estate lease strategy. The fund is cash yielding and invests in high quality, mission-critical, single tenant, net leased properties that are diversified by industry.
- In terms of allocation priorities, we will continue to increase exposure to a variety of private credit strategies. We will also continue to review and assess the relative attractiveness of high-quality multi-strategy and fundamental equity managers, which act as a ballast to the portfolio.

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

SMRS
Absolute Return
12/31/21
Total Investments by Asset Type



Market Value in Millions		
		12/31/21
Hedge Funds	\$	<u>4,947</u>
Private Credit		1,165
Cash		<u>150</u>
Total Investments	\$	<u><u>6,262</u></u>

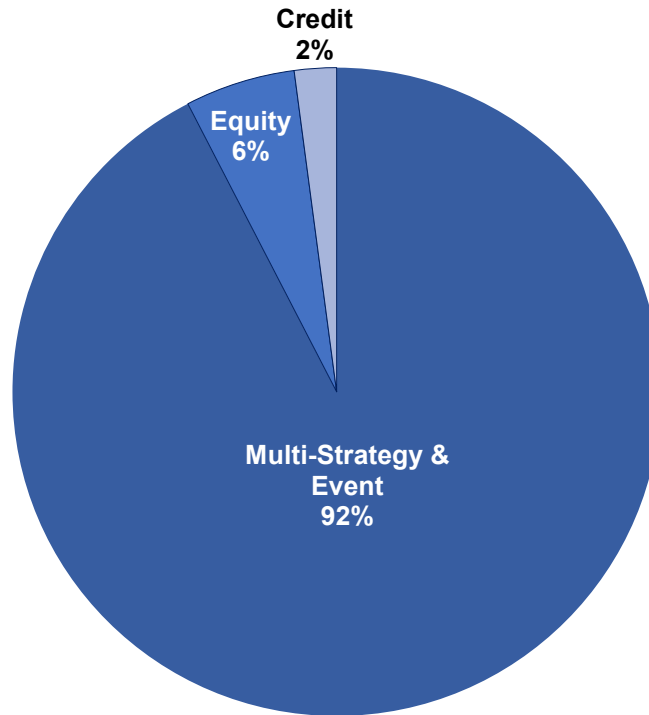
NOTE: Totals may not be exact due to rounding.

SMRS

Absolute Return

12/31/21

Hedge Fund Investments by Strategy



Market Value in Millions		
		12/31/21
Multi-Strategy & Event	\$	<u>4,572</u>
Equity		271
Credit		<u>103</u>
Total Investments	\$	<u><u>4,947</u></u>

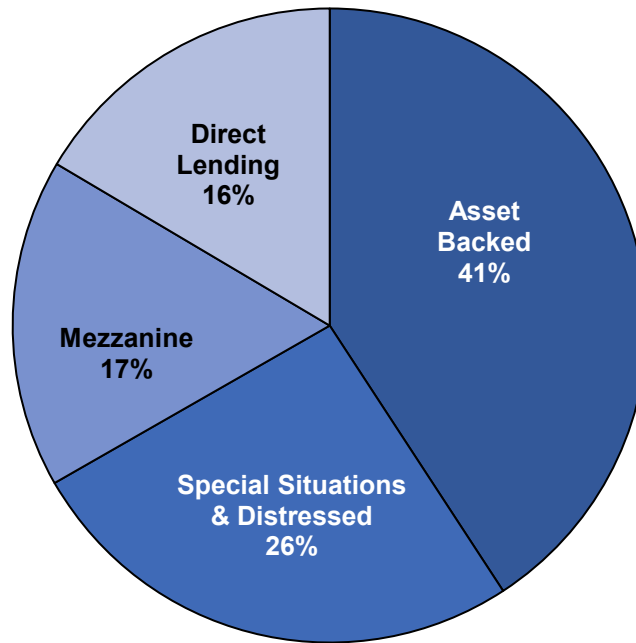
NOTE: Totals may not be exact due to rounding.

SMRS

Absolute Return

12/31/21

Private Credit Investments by Strategy



Market Value in Millions		
		12/31/21
Asset Backed	\$	<u>475</u>
Special Situations & Distressed		302
Mezzanine		195
Direct Lending		<u>192</u>
Total Investments	\$	<u><u>1,165</u></u>

NOTE: Totals may not be exact due to rounding.

SMRS

Absolute Return

12/31/21

Net Market Value by Entity

	Net Market Value	Unfunded Commitment
* Tahquamenon Fund, LP	\$ 4,559,011,336	\$ 0
Cerberus Manitou Residential Loan Fund, LP	195,346,915	44,064,516
Acacia Coinvest, LP	172,338,455	75,000,000
AG Essential Housing, LP	148,830,512	58,000,000
PGIM Fixed Income Global Liquidity Relative Value Fund I, LP	103,440,049	0
JM IV, LP	99,156,159	983,770
SJC Direct Lending Revolver Fund III, LP	90,683,925	9,316,075
Centerbridge Capital Partners III, LP	79,425,436	12,774,858
Crescent Mezzanine Partners VII, LP	79,083,997	64,347,734
Kayne Anderson BDC, LLC (KABDC)	60,712,299	45,854,997
Oaktree Opportunities Fund Xb, LP	57,000,344	28,000,000
OCM Opportunities Fund IX, LP	55,465,872	0
Irradiant CLO Partners Fund II, LP (fka Kayne CLO Partners FD II)	55,209,117	44,766,229
HarbourVest Partners Mezzanine Income Fund	51,543,983	16,310,000
** Castle Credit SMRS Holdings, LLC Series C	50,000,000	50,000,000
HPS Mezzanine Partners III, LP	41,280,460	4,383,497
SMRS-HVDL LLC	40,800,000	159,200,000
HarbourVest Credit Opportunities Fund II, LP	34,576,292	42,750,000
Peninsula Fund VI, LP	28,444,804	1,510,528
Oaktree Opportunities Fund X, LP	22,926,465	5,100,000
Cerberus SMRS Partners, LP	21,548,292	23,304,657
Farallon Special Situations Fund II, LP	21,423,354	78,105,392
OCM Opportunities Fund VIIIb, LP	13,439,614	0
EnTrust White Pine Partners, LP	13,412,556	0
Crescent Mezzanine Partners VI, LP	10,855,642	5,560,568
MP Securitized Credit Fund, LP	4,157,906	0
TCW/Crescent Mezzanine Partners V, LP	733,779	0
Oaktree Opportunities Fund VIII, LP	432,521	0
OCM Opportunities Fund VII, LP	367,399	0
TCW/Crescent Mezzanine Partners VC Secondary	336,113	0
OCM Opportunities Fund VIIIb, LP	45,725	2,500,000
OCM Principal Opportunities Fund IV, LP	2,831	5,002,377
Monument Park LLC	5	0
* Visium Balanced Fund, LP	2	0
PIMCO Aviation Co-Invest Vehicle Onshore Feeder LP	0	100,000,000
Total Absolute Return Strategies	\$ 6,112,032,158	\$ 876,835,196
Short-Term Investments & Other	150,320,170	0
Grand Total	\$ 6,262,352,328	\$ 876,835,196

* Fund of Funds

** New Commitment

State of Michigan Retirement System

PRIVATE EQUITY REVIEW

State of Michigan Investment Board Meeting
March 24, 2022



Peter A. Woodford
Senior Investment Manager
Private Equity Division

EXECUTIVE SUMMARY

Performance

MPSERS Plan (12/31/21)	1-Year	3-Years	5-Years	7-Years	10-Years
Annualized Returns	51.9%	24.5%	21.8%	18.3%	17.7%
PE Benchmark Returns	33.8%	19.4%	20.4%	17.4%	20.1%
Peer Median Returns	27.8%	13.1%	12.1%	10.8%	11.8%
Percentile Rank vs. Peers*	21	8	13	12	7

*State Street Universe greater than \$1 billion

- Private equity returns have been strong relative to peer median returns, ranking in the top 7% of peers over the past ten years. Outperformance to peers is attributable to strategy as well as fund and co-investment selectivity.
- It is not unusual for private equity returns to lag the public benchmark returns during periods of expansion and lead the public benchmark during periods of contraction. Over the last 10 years, the Private Equity Division outperformed the S&P by 110 basis points (ten-year S&P 500 return 16.6%) and underperformed the benchmark by 2.4%.
- For the twelve months ending December 31, 2021, the Private Equity Division returned approximately \$2.13 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:
 - \$100 million to Acorn Bioventures 2, LP, managed by Acorn Capital Advisors GP 2, LLC
 - \$100 million to Summit Partners Growth Equity XI-A, LP, managed by SP XI, LLC
 - \$100 million to Thoma Bravo XV, LP, managed by Thoma Bravo, LLC
 - \$50 million to GTCR Strategic Growth, LP, managed by GTCR, LLC
 - \$40 million to Accel-KKR Growth Capital IV, LP, managed by AKKR Company, LLC

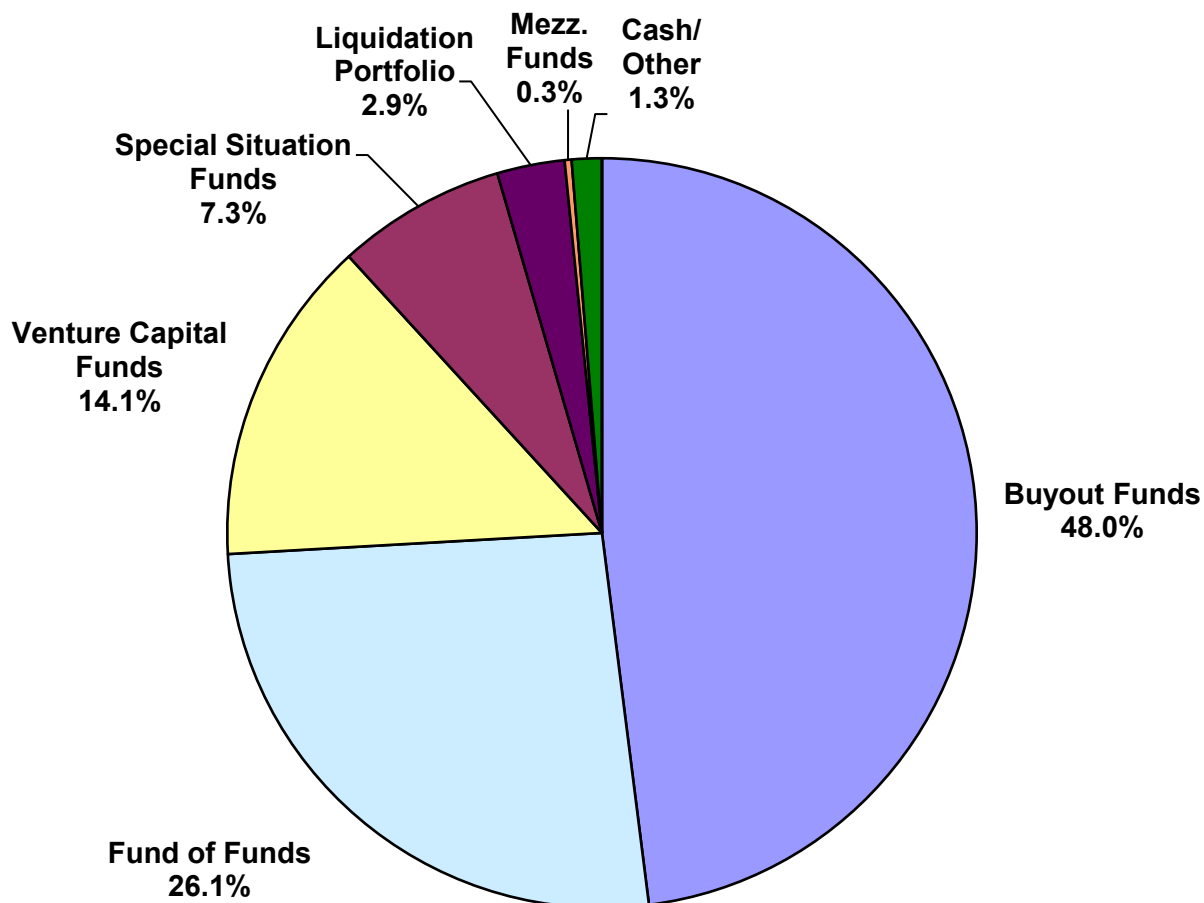
Strategy Update

The strategy for the next twelve months will focus on new sponsors raising capital and existing sponsors raising successor funds. This may be a combination of buyout, venture capital, secondary, and growth equity funds seeking new commitments. Co-investments continue to play an important role in both averaging down costs and targeting specific investments with attractive risk/return characteristics.

SMRS

Private Equity

12/31/21



Market Value in Millions				
	12/31/21		12/31/20	
Buyout Funds	\$11,159	48.0%	\$7,942	46.6%
Fund of Funds	6,059	26.1%	3,944	23.1%
Venture Capital Funds	3,277	14.1%	1,771	10.4%
Special Situation Funds	1,700	7.3%	1,808	10.6%
Liquidation Portfolio	682	2.9%	824	4.8%
Mezzanine Funds	71	0.3%	375	2.2%
Cash/Other	306	1.3%	399	2.3%
Total	<u>\$23,254</u>	<u>100.0%</u>	<u>\$17,063</u>	<u>100.0%</u>

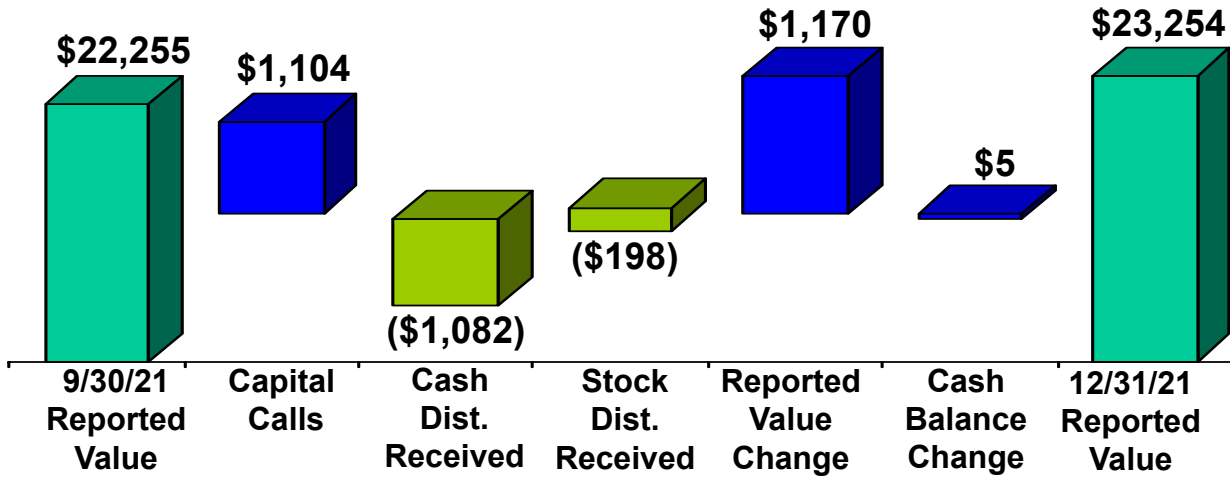
SMRS

Private Equity

12/31/21

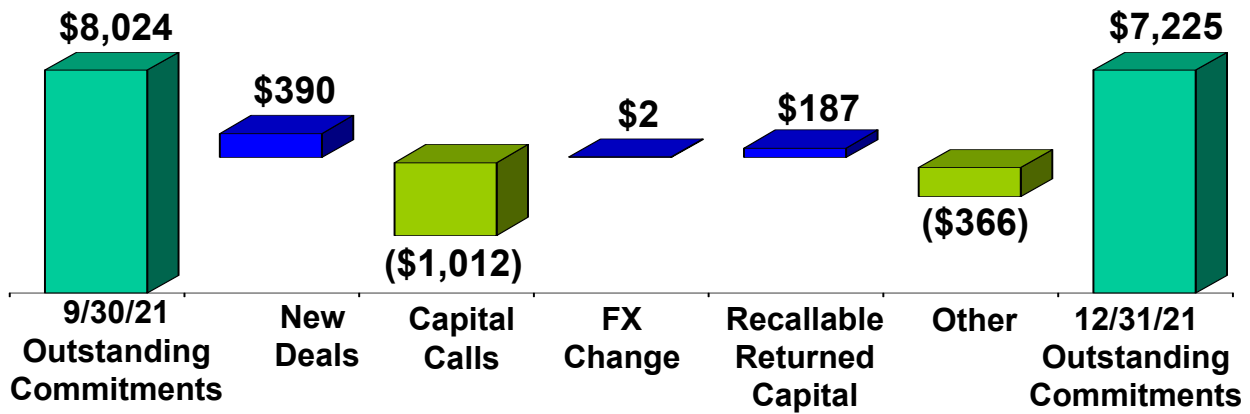
Invested Commitments

(\$ in Millions)



Outstanding Commitments

(\$ in Millions)

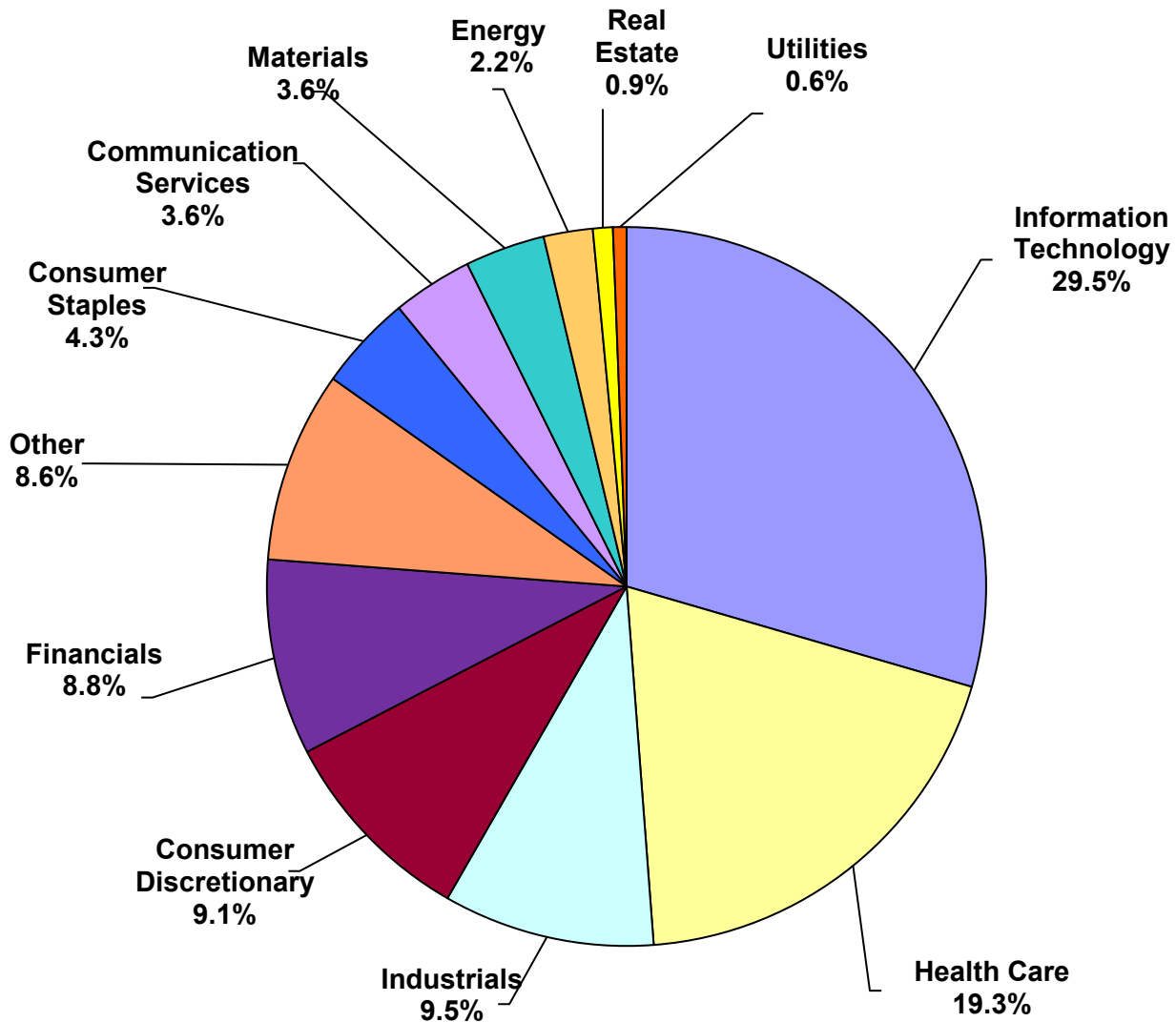


SMRS

Private Equity

12/31/21

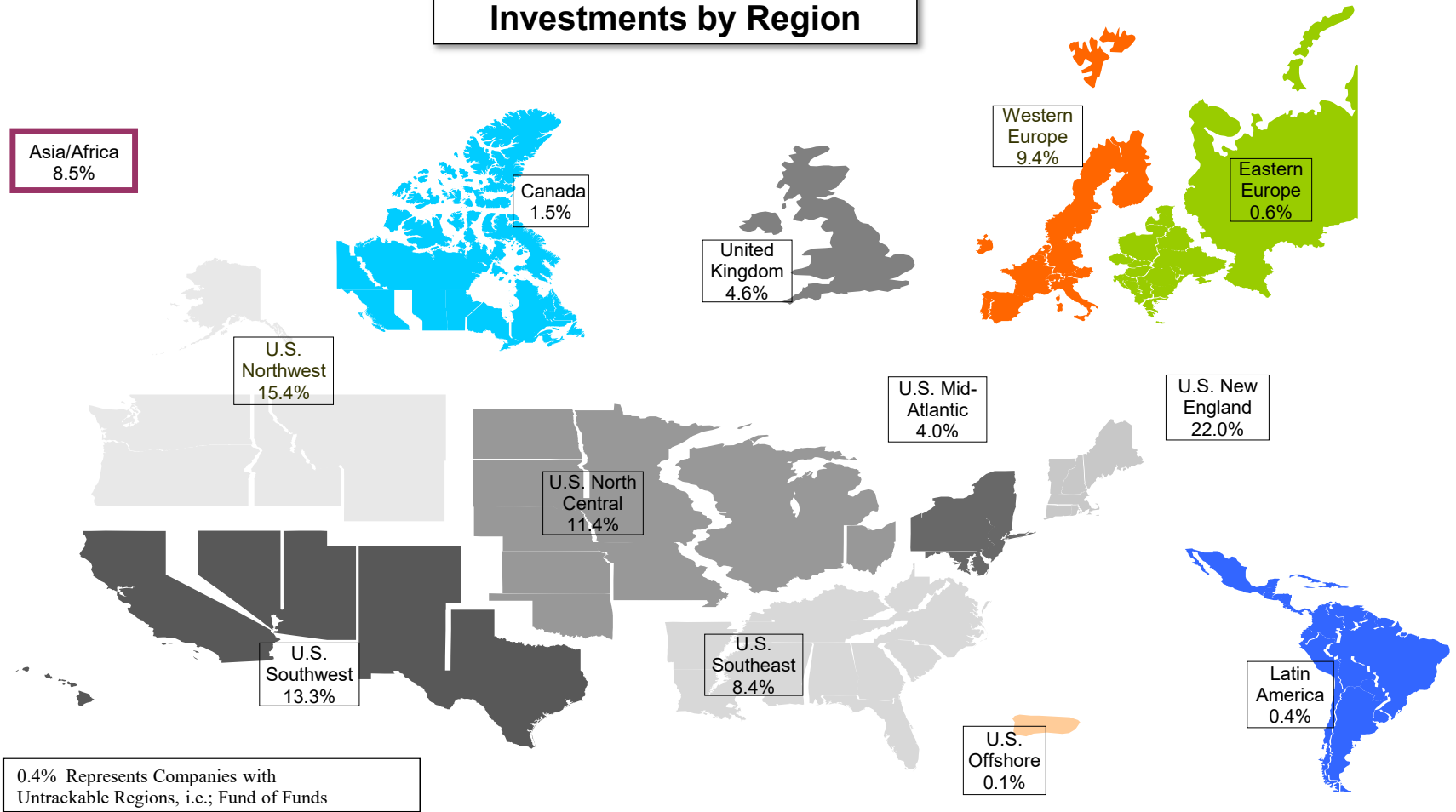
Investments by Industry



These numbers are based on the most recent available General Partner Data; primarily 9/30/21 and are subject to change.

SMRS Private Equity 12/31/21

Investments by Region



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

SMRS

Private Equity

12/31/21

Portfolio by Vintage Year

(\$ in Millions)

Asset Vintage	Reported Value	Outstanding Commitment	Total Exposure
1986-2005	\$ 383	\$ 96	\$ 479
2006*	186	105	291
2007	96	88	184
2008	250	71	321
2009	32	1	33
2010	392	4	396
2011	636	92	728
2012	1,001	58	1,059
2013	214	50	264
2014	1,488	164	1,652
2015	7,518	588	8,106
2016	2,947	314	3,261
2017	1,933	353	2,286
2018	3,124	1,185	4,309
2019	1,750	897	2,647
2020	716	664	1,380
2021	280	2,496	2,776
Income Accruals	1	0	1
Cash	290	0	290
Act. Small Cap - Stock Dist	17	0	17
Total	\$ 23,254	\$ 7,225	\$ 30,479

*Liquidation portfolio is 2006 vintage

FX Exposure

(\$ in Millions)

	Reported Value	Outstanding Commitment	Total Exposure	Total (USD)
Euro (\$1.14/ €)	€ 688	€ 329	€ 1,017	\$1,156

SMRS

Private Equity

12/31/21

Top 10 Sponsors

(\$ in Millions)

Asset Type	Reported Value	Outstanding Commitment	Total
HarbourVest Partners	\$ 5,838	\$ 762	\$ 6,600
Insight Venture Partners	1,003	133	1,136
KKR	819	251	1,070
Advent International	859	198	1,057
The Carlyle Group	588	433	1,021
Leonard Green & Partners	685	221	906
Warburg Pincus	773	106	879
Thoma Bravo	663	193	856
Veritas Capital	695	103	798
Blackstone Private Equity	564	212	776
Top 10 Total Value	\$ 12,487	\$ 2,614	\$ 15,101

Cash Weighted Rates of Return*

(Net IRR)	Current Qtr.	1-Year	3-Year	5-Year	10-Year
Buyout	8.0%	52.3%	26.2%	24.3%	19.5%
Fund of Funds	9.3%	39.9%	22.4%	21.1%	17.8%
Mezzanine	3.8%	24.0%	12.4%	10.7%	11.1%
Special Situations	6.2%	47.2%	18.6%	16.5%	14.7%
Venture Capital	15.0%	99.5%	39.2%	33.4%	23.8%

*These numbers are based on most recent available General Partner reported data; primarily 9/30/21 and are subject to change.

Net Market Values by Ownership Entity

	<u>Adjusted Reported Value</u>	<u>Unfunded Commitment</u>
5AM Opportunities I, LP	\$ 30,684,202	\$ 2,775,000
5AM Opportunities II, LP	4,391,250	21,375,000
5AM Ventures VI, LP	24,474,264	4,000,000
5AM Ventures VII, LP	625,000	24,375,000
Accel Europe I, LP	1,419,329	1
Accel Europe II	24,754,436	3,300,000
Accel Growth Fund II, LP	18,298,398	0
Accel Growth Fund III, LP	16,016,100	280,000
Accel Growth Fund IV, LP	43,047,134	0
Accel Growth Fund V, LP	42,429,524	1,028,554
Accel Growth Fund VI, LP	11,931,867	12,875,000
Accel IX, LP	1,604,561	4,522,725
Accel Leaders Fund 3, LP	27,667,486	11,800,000
Accel Leaders Fund II, LP	15,266,357	0
Accel Leaders Fund LP	23,992,974	0
Accel London V, LP	66,572,671	1,320,000
Accel London VI, LP	20,165,378	3,000,000
Accel London VII, LP	2,788,433	9,625,000
Accel VI-S	1,937,421	652,611
Accel VI, LP	755,649	0
Accel X, LP	6,595,444	0
Accel XI, LP	8,112,661	1,440,000
Accel XII, LP	23,612,316	980,000
Accel XIII, LP	18,260,304	1,900,000
Accel XIV, LP	10,262,396	2,050,000
Accel XV, LP	2,622,337	7,300,000
** Accel-KKR Growth Capital Fund IV, LP	0	40,000,000
** Acorn Bioventures 2, LP	0	100,000,000
Acorn Bioventures, LP	84,635,413	20,000,000
Advent Global Private Equity V	4,846,860	8,700,000
Advent International GPE IX, LP	368,232,893	109,347,917
Advent International GPE VI-A, LP	22,854,643	0
Advent International GPE VII-B, LL	99,673,480	12,000,000
Advent International GPE VIII-B, LP	316,657,065	11,474,998
Advent International LAPEF VII	7,001,612	53,400,000
Advent Latin American Private Equity Fund VI, LP	39,411,923	2,975,000
Affinity Asia Pacific Fund III, LP	9,342,648	8,520,204
Affinity Asia Pacific Fund IV, LP	68,747,386	16,745,393
Affinity Asia Pacific Fund V, LP	57,199,347	128,621,356
Apax Digital II, LP	0	100,000,000
Apax Digital, LP	46,409,026	22,980,238
Apax Europe Fund VI	21,278,662	2,404,948
Apax Europe VII, LP	916,713	1,693,724
Apax IX, LP	271,343,801	21,402,349

	Adjusted Reported Value	Unfunded Commitment
Apax US VII	2,475,737	417,509
Apax VIII - B, LP	45,516,068	5,661,905
Apax X USD, LP	80,276,628	77,725,821
Apollo Investment Fund IX, L.P.	57,484,616	50,289,343
Apollo Investment Fund VIII, LP	56,818,520	13,286,936
Arboretum Ventures II	889,818	0
Arboretum Ventures III, LP	6,828,139	0
Arboretum Ventures IV, LP	41,145,477	6,810,000
Arboretum Ventures V, LP	20,526,773	17,255,000
Ares Corporate Opportunities Fund II	126,036	11,423,773
Ares Corporate Opportunities Fund III, LP	4,930,324	6,656,978
Ares Corporate Opportunities Fund IV, LP	50,254,054	13,765,069
ASF VIII B	91,264,276	84,586,063
AXA ASF Miller Co-Investment	312,155	6,656,684
Axiom Asia 6, LP	11,513,899	39,750,000
Axiom Asia Co-Investment Fund I, LP	60,669,986	8,643,182
Axiom Asia Co-Investment Fund II, LP	9,903,622	39,999,101
Axiom Asia IV, LP	77,454,457	9,950,886
Axiom Asia Private Capital Fund III, LP	71,712,874	5,250,002
Axiom Asia V, LP	45,282,497	17,250,000
BC European Capital IX	92,267,864	6,602,425
BC European Capital VII, LP	753,241	0
BC European Capital VIII, LP	4,164,522	8,866,118
Berkshire Fund IX Coinvestment Fund, LP	53,030,530	6,435,897
Berkshire Fund IX, LP	204,453,010	11,839,124
Berkshire Fund VI, LP	22,206,680	7,600,677
Berkshire Fund VII, LP	6,693,732	2,805,875
Berkshire Fund VIII, LP	87,519,357	9,046,368
Berkshire Fund X, LP	13,677,956	140,421,793
Blackstone Capital Partners IV	2,599,100	4,580,765
Blackstone Capital Partners V	5,176,516	12,930,407
Blackstone Capital Partners V-S	1,143,176	712,476
Blackstone Capital Partners VI, LP	137,615,619	32,467,043
Blackstone Capital Partners VII, LP	340,366,560	20,557,815
Blackstone Capital Partners VIII, LP	76,963,903	141,106,688
Bridgepoint Europe IV	11,553,201	5,349,565
Carlyle Europe Partners II	0	1,024,208
Carlyle Europe Partners III	1,614,028	1,701,655
Carlyle Europe Partners IV, LP	84,755,025	10,670,451
Carlyle Europe Partners V, S.C.SP.	54,413,020	91,344,712
Carlyle Partners Growth, LP	0	50,000,000
Carlyle Partners V, LP	23,239,675	53,227,845
Carlyle Partners VI, LP	166,387,653	8,685,035
Carlyle Partners VII, LP	258,196,757	15,992,076
Carlyle Partners VIII, LP	0	200,000,000
Charlesbank Equity Fund IX, LP	89,791,765	11,572,894
Charlesbank Equity Fund X, LP	22,738,919	77,103,876

	Adjusted Reported Value	Unfunded Commitment
Charlesbank Equity Overage Fund X, LP	15,966,179	34,324,745
Charlesbank Fund IX Overage Allocation Program	48,639,158	1,953,081
Clearlake Capital Partners VII, LP	0	200,000,000
Coller International Partners V, LP	6,972,692	2,000,000
Coller International Partners VI, LP	23,996,346	29,059,273
Coller International Partners VII, LP	113,151,150	44,654,951
CVC Capital Partners VII, LP	210,936,157	25,153,733
CVC Capital Partners VIII, LP	22,068,872	91,506,580
Dover Street IX, LP	76,379,442	17,000,000
Dover Street X, LP	71,123,671	87,000,000
FIMI Opportunity 6, LP	57,945,545	5,363,638
FirstMark Capital I, LP	107,791,523	196,596
FirstMark Capital IV, LP	94,507,197	4,375,000
FirstMark Capital OF I, LP	36,075,040	0
FirstMark Capital OF II, LP	101,572,483	0
FirstMark Capital OF III	34,659,147	9,800,000
FirstMark Capital V, LP	22,694,491	18,200,000
Flagship Pioneering Fund VII, LP	24,705,834	181,000,000
Flagship Pioneering Special Opportunities Fund II, LP	81,048,277	37,500,000
Flagship Pioneering VI	296,438,752	11,625,000
Flagship Ventures Fund 2004	49,433	0
Flagship Ventures Fund 2007, LP	4,025,787	0
Flagship Ventures Fund IV, LP	345,678,054	0
Flagship Ventures Fund V	143,146,685	0
Flagship Ventures Opportunities Fund I, LP	53,654,663	1,500,000
Fox Paine Capital Fund II, LP	24,267,939	15,382,699
FS Equity Partners VII, LP	103,728,435	9,661,241
FS Equity Partners VIII, LP	47,581,135	36,415,473
GCM Grosvenor Fund Investment Program I, LP	6,350,574	1,517,748
GCM Grosvenor Fund Investment Program II, LP	19,166,795	13,067,284
GCM Grosvenor Fund Investment Program III - 2004	46,315,206	4,404,554
GCM Grosvenor Fund Investment Program III - 2006	54,743,481	6,265,112
GCM Grosvenor Fund Investment Program V, LP	41,564,843	8,803,989
GCM Grosvenor Fund Investment Program VI, LP	23,260,948	1,809,609
GCM Grosvenor Fund Investment Program VIII, LP	108,267,675	8,765,805
GCM Grosvenor SeasPriFIP, LP (PIS06-10)	39,819,485	13,832,103
GCM Grosvenor SeasPriFIP, LP (PIS14)	214,467,974	6,522,831
GCM Grosvenor SeasPriFIP, LP (Seed)	10,563,171	16,510,010
Genstar Capital Partners IX, LP	92,788,079	5,050,154
Genstar Capital Partners VIII, LP	88,803,349	4,189,063
Genstar Capital Partners X, LP	11,117,099	88,882,901
Genstar IX Opportunities Fund I, LP	61,871,227	4,570,477
Genstar VIII Opportunities Fund I, LP	66,357,908	2,012,955
Genstar X Opportunities Fund I, LP	4,675,694	20,308,333
Golden Bell Azalea, LLC	42,785,681	0
Green Equity Investors V	12,594,725	24,920,675
Green Equity Investors VI, LP	159,237,921	8,025,414

	Adjusted Reported Value	Unfunded Commitment
Green Equity Investors VII, LP	270,174,748	56,381,737
Green Equity Investors VIII, LP	200,795,306	56,841,234
Greenspring Master G, LP	404,488,649	312,000,000
Greenspring Micro II, LP	33,211,249	5,966,263
GSO Capital Opportunities Fund II, LP	7,012,974	7,812,824
GSO Capital Opportunities Fund III, LP	47,951,630	21,364,932
GSO COF III Co-Investment Fund, LP	15,368,132	22,408,534
GTCR Fund XIII, LP	5,352,903	44,625,000
** GTCR Strategic Growth Fund, LP	0	50,000,000
HarbourVest Dover Street VIII, LP	13,951,528	5,400,000
HarbourVest Int'l III Partnership	149,437	1,200,000
Harbourvest Partners Co-Investment Fund IV, LP	104,802,300	19,107,835
HarbourVest Partners Co-Investment Fund V, LP	251,003,696	45,000,000
Harbourvest Partners Co-Investment Fund VI, LP	0	200,000,000
HarbourVest V Partnership	123,805	300,000
HarbourVest VI - Direct Fund, LP	2,128,162	750,000
HarbourVest VI Partnership	370,148	2,000,000
Harvest Partners VII, LP	94,596,134	3,728,267
Harvest Partners VIII	102,533,384	9,764,483
Hellman & Friedman Capital Partners X, LP	12,180,097	87,640,643
Insight Partners Fund X Follow-On Fund, LP	35,624,665	17,500,000
Insight Partners XI, LP	159,807,022	5,000,000
Insight Partners XII, LP	51,783,548	97,500,000
Insight Venture Partners GB Coinvestment Fund, LP	130,535,285	4,970,616
Insight Venture Partners IX, LP	367,463,363	4,987,231
Insight Venture Partners X, LP	257,771,544	3,282,099
Jade Equity Investors, LP	41,849,723	75,270,030
Kelso Investment Associates IX, LP	60,803,257	9,144,801
Kelso Investment Associates VII	147,217	0
Kelso Investment Associates VIII	18,597,335	7,191,927
Kelso Investment Associates X, LP	111,901,479	24,834,715
Khosla Ventures III, LP	32,163,580	750,000
Khosla Ventures IV, LP	121,571,066	950,000
Khosla Ventures Opportunity I, LP	16,680,016	9,100,000
Khosla Ventures Seed D, LP	12,630,750	1,620,000
Khosla Ventures Seed E, LP	1,273,580	3,840,000
Khosla Ventures V, LP	129,966,019	1,750,000
Khosla Ventures VI, LP	88,527,803	9,150,000
Khosla Ventures VII, LP	16,814,264	33,100,000
KKR 2006 Fund, LP	44,616,090	6,102,869
KKR Americas Fund XII, LP	302,927,468	29,336,463
KKR Asian	563,946	395,007
KKR Asian Fund II, LP	37,301,132	239,698
KKR Asian Fund III	129,338,168	23,823,775
KKR China Growth Fund	11,571,747	3,344,848
KKR European Fund II	1,063,247	0
KKR European Fund III	5,214,860	6,430,608

	Adjusted Reported Value	Unfunded Commitment
KKR European Fund IV, LP	99,460,427	291,546
KKR European Fund V (USD) SCSp	93,134,811	51,133,925
KKR Millennium Fund	232,956	0
KKR North America Fund XI, LP	93,612,620	5,328,174
KKR North America Fund XIII SCSp	0	125,000,000
Lead Edge Capital IV, LP	34,063,690	4,231,624
Lead Edge Capital V, LP	26,030,371	8,786,545
Lightspeed Opportunity Fund, LP	32,538,263	1,500,000
Lightspeed Venture Partners Select IV, LP	25,700,193	4,750,000
Lightspeed Venture Partners VII, LP	9,521,540	0
Lightspeed Venture Partners XIII, LP	10,248,148	1,800,000
Menlo Special Opportunities Fund II, LP	35,598,922	3,015,852
Menlo Ventures IX, LP	1,190,499	0
Menlo Ventures X, LP	2,483,219	0
Menlo Ventures XI, LP	26,426,800	0
Menlo Ventures XIV, LP	16,148,106	350,000
Menlo Ventures XV, LP	12,562,588	12,500,000
Meritech Capital Partners Franchise Fund, LP	3,563,389	11,400,000
Meritech Capital Partners IV, LP	7,863,651	300,000
Meritech Capital Partners V, LP	61,176,778	900,000
Meritech Capital Partners VI, LP	63,144,993	2,656,250
Meritech Capital Partners VII, LP	19,515,563	24,650,000
Michigan Growth Capital Partners II, LP	158,786,015	1,242,999
Michigan Growth Capital Partners III, LP	114,225,109	27,674,987
Michigan Growth Capital Partners IV, LP	240,647	24,759,353
Michigan Growth Capital Partners, LP	14,060,041	7,181,384
Michigan SEMF Barings	27,942,449	123,543,945
Michigan SEMF Grosvenor	17,427,717	132,769,536
New Leaf Biopharma Opportunities II, LP	146,780,917	8,000,000
New Leaf Growth Fund I, LP	50,124,899	0
New Leaf Ventures II, LP	5,341,778	0
New Leaf Ventures III, LP	51,487,052	0
New Leaf Ventures IV, LP	53,688,585	17,750,000
Nordic Capital VI, LP	143,934	1
Nordic Capital VIII, LP (Alpha)	39,269,438	6,833,540
Oak Investment Partners X, LP	0	0
Oak Investments Partners IX, LP	16,188	0
Ocqueoc Holdings, LLC	399,418	47,999,886
Odyssey Investment Partners Fund VI, LP	58,860,579	46,138,594
Parthenon Investors II	921,217	3,175,229
Parthenon Investors III	53,545,102	2,656,037
Parthenon Investors IV, LP	56,864,927	1,188,794
Permira Growth Opportunities I, LP 1	47,771,109	23,244,666
Permira Growth Opportunities II SCSp	0	50,000,000
Permira VII LP 1	71,557,589	24,482,932
PPC Fund II	72,622,266	11,558,068
Public Pension Capital, LLC	70,634,003	39,124,228

	Adjusted Reported Value	Unfunded Commitment
Renaissance Venture Capital Fund IV, LP	2,430,985	22,500,000
Rhone Partners V, LP	166,357,784	0
Riverside Capital Appreciation Fund VI, LP	28,013,188	5,231,320
Riverside Capital Appreciation Fund VII, LP	105,314,529	24,753,419
Riverside Micro Cap Fund I, LP	16,112,637	5,632,976
Riverside Micro-Cap Fund II, LP	6,937,728	2,735,834
Riverside Micro-Cap Fund III, LP	61,846,679	3,913,101
Riverside Micro-Cap Fund IV	89,090,256	3,617,302
Riverside Micro-Cap Fund IV B, LP	21,520,765	713,421
Riverside Micro-Cap Fund V, LP	87,726,100	33,982,905
Riverside Micro-Cap Fund VI, LP	0	125,000,000
Science Ventures Fund II, LP	33,751,612	2,300,000
Science Ventures Fund III, LP	8,363,863	17,500,000
Shamrock Capital Content Fund I, P	24,842,238	32,293,282
Shamrock Growth Capital Fund IV, LP	53,110,107	2,426,116
Silver Lake Partners II	0	3,531,586
Silver Lake Partners III	8,386,546	11,910,583
Silver Lake Partners IV, LP	95,284,748	1,524,187
Silver Lake Partners V, LP	97,252,381	6,799,573
Silver Lake Partners VI, LP	37,001,983	45,508,501
Silver Lake SL SPV-2	64,268,781	0
SK Capital Partners V, LP	51,857,189	569,116
SKCP Catalyst Fund I-A, LP	22,922,051	18,509,312
SMRS - TOPE LLC	4,707,795,820	222,835,071
SMRS-CAPP LLC	192,623,227	0
SMRS-NCRP LLC	417,259,090	161,958,521
Summit Partners Growth Equity Fund X, LP	80,624,136	37,144,565
** Summit Partners Growth Equity Fund XI-A, LP	0	100,000,000
The Huron Fund III, LP	6,544,171	2,072,756
The Huron Fund IV, LP	17,529,483	382,593
The Huron Fund V, LP	16,461,510	14,695,157
The Veritas Capital Vantage Fund, LP	6,332,466	53,024,432
Thoma Bravo Discover Fund II, LP	119,557,937	23,650,734
Thoma Bravo Fund XII, LP	256,056,638	26,441,887
Thoma Bravo Fund XIII, LP	179,491,367	25,027,953
** Thoma Bravo Fund XV, LP	0	100,000,000
Thoma Bravo XIV	107,456,847	18,339,560
TI Platform BOV, LP	14,628,292	5,222,239
TI Platform Fund II, LP	14,037,366	3,466,388
TI Platform Fund III	0	25,000,000
TI Platform SMRS SMA, LP	65,743,716	50,000,000
TPG Healthcare Partners, LP	16,376,732	14,496,999
TPG IV (Texas Pacific Group IV)	77,352	211,725
TPG Partners VI, LP	16,773,810	7,467,821
TPG Partners VIII, LP	71,656,135	69,233,515
TPG Partners, VII, LP	104,900,431	7,215,797
TPG V (Texas Pacific Group V)	736,025	5,841,509

	Adjusted Reported Value	Unfunded Commitment
Trilantic Capital Partners V (North America) Fund A, LP	28,760,063	2,360,756
Trilantic Capital Partners VI (North America), LP	59,794,995	18,921,586
TSG6, LP	59,085,144	20,531,764
TSG7 A, LP	227,089,681	26,308,498
TSG8, LP	73,260,616	74,384,178
Veritas Capital Fund V, LP	173,671,566	8,898,273
Veritas Capital Fund VI, LP	296,177,671	23,815,608
Veritas Capital Fund VII, LP	102,619,713	17,616,103
Veritas V Co-Investors, LP	116,182,963	0
Vista Equity Endeavor Fund I, LP	47,997,492	14,204,132
Vista Equity Endeavor Fund II,P	12,946,079	51,922,466
Vista Equity Partners Fund V, LP	65,728,690	10,673,598
Vista Equity Partners Fund VI, LP	114,219,803	16,343,338
Vista Equity Partners VII, LP	68,964,536	19,837,845
Vista Foundation Fund III, LP	26,624,544	6,890,288
Vista Foundation Fund IV, LP	28,051,119	45,580,367
Warburg Pincus China-Southeast Asia II, LP	27,471,451	52,762,500
Warburg Pincus China, LP	61,268,866	1,296,782
Warburg Pincus Energy MCIP, LP	0	10,396,887
Warburg Pincus Energy, LP	69,044,564	10,347,898
Warburg Pincus Equity Partners, LP	1,177,268	0
Warburg Pincus Financial Sector, LP	61,491,184	6,727,500
Warburg Pincus Global Growth, LP	154,799,900	22,200,000
Warburg Pincus Private Equity IX	2,281,655	0
Warburg Pincus Private Equity X, LP	7,473,721	0
Warburg Pincus Private Equity XI, LP	108,688,831	0
Warburg Pincus Private Equity XII Secondary, LP	34,800,709	337,500
Warburg Pincus Private Equity XII, LP	244,134,028	2,362,500
* Total Private Equity	\$22,947,595,566	\$ 7,225,246,742
Cash	262,677,821	0
Active Small Cap Cash	26,888,350	0
Active Small Cap	16,603,052	0
Income Accruals	(4)	0
Grand Total	\$23,253,764,784	\$ 7,225,246,742

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

** New Commitment made during quarter reported

State of Michigan Retirement System

REAL ESTATE AND INFRASTRUCTURE REVIEW

State of Michigan Investment Board Meeting
March 24, 2022



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

EXECUTIVE SUMMARY

Performance

MPSERS Plan (12/31/21)	1-Year	3-Years	5-Years	7-Years	10-Years
Annualized Returns	21.3%	6.5%	8.1%	8.6%	10.0%
NCREIF NPI	16.2%	7.0%	6.4%	7.2%	7.9%
Peer Median Returns	16.7%	7.9%	8.1%	8.7%	9.7%
Percentile Rank vs. Peers*	32	70	51	57	46

*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 210 basis points.

Strategy Update

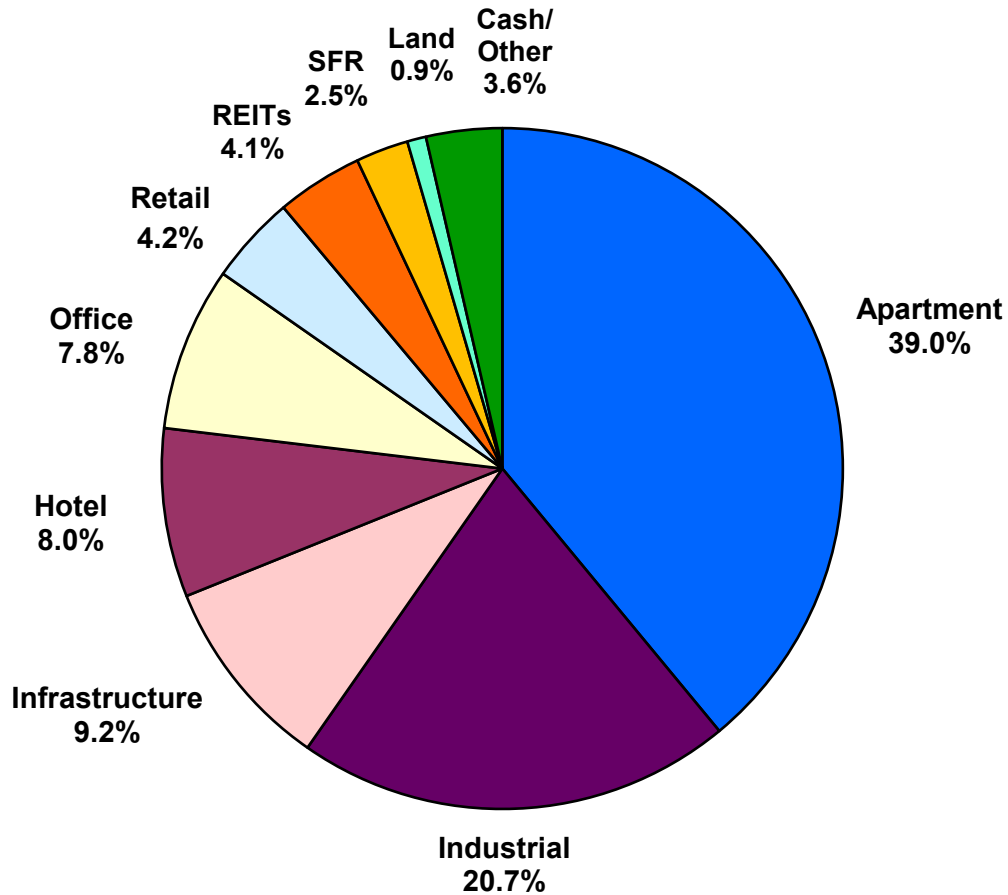
- The COVID-19 global pandemic and Shelter-in-Place orders implemented to slow the spread of the virus resulted in major negative impacts to the US and world economies, and certain segments of the commercial real estate and infrastructure markets in 2020 and to a lesser extent 2021. While the US economy largely reopened by the end of the second quarter 2021, resurgent case numbers as a new variant spread 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. 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 the potential for above market appreciation and total returns.
- We have been actively managing the portfolio with capital returned of approximately \$662 million, and funding for new or existing investments of approximately \$1.1 billion over the past 12 months.
- The REID has approximately \$2.7 billion in unfunded commitments. Six (6) new commitments were made during the quarter.
 - €100 million in BentallGreenOak Europe Fund IV, LP, a closed-end European multi-strategy real estate fund concentrating in the industrial/logistics sector, managed by BentallGreenOak.

- \$100 million in IDR Core Property Index Fund, LLC, an open-end ODCE index fund investing, on a weighted basis, in 22 funds in the NFI-ODCE Index. The fund seeks to track the ODCE Index with a tracking error of 12 basis points or less, managed by IDR Investment Management, LLC.
- \$100 million in GCM Grosvenor Customized Infrastructure Strategies III, LP, a closed-end global, multi-strategy infrastructure co-investment, and secondaries fund, managed by GCM Customized Fund Investment Group, LP.
- \$100 million in BlackRock MiREIT Fund, a Custodial Account vehicle investing primarily in the US REIT sector with the ability for limited international REIT investments, managed by BlackRock Financial Management, Inc.
- \$100 million in Heitman MiREIT Fund, a Custodial Account vehicle investing primarily in the US REIT sector with the ability for limited international REIT investments, managed by Heitman Real Estate Securities, LLC.
- \$100 million in Principal MiREIT, a Custodial Account vehicle investing primarily in the US REIT sector with the ability for limited international REIT investments, managed by Principal Real Estate Investors, LLC.

SMRS

Real Estate and Infrastructure

12/31/21

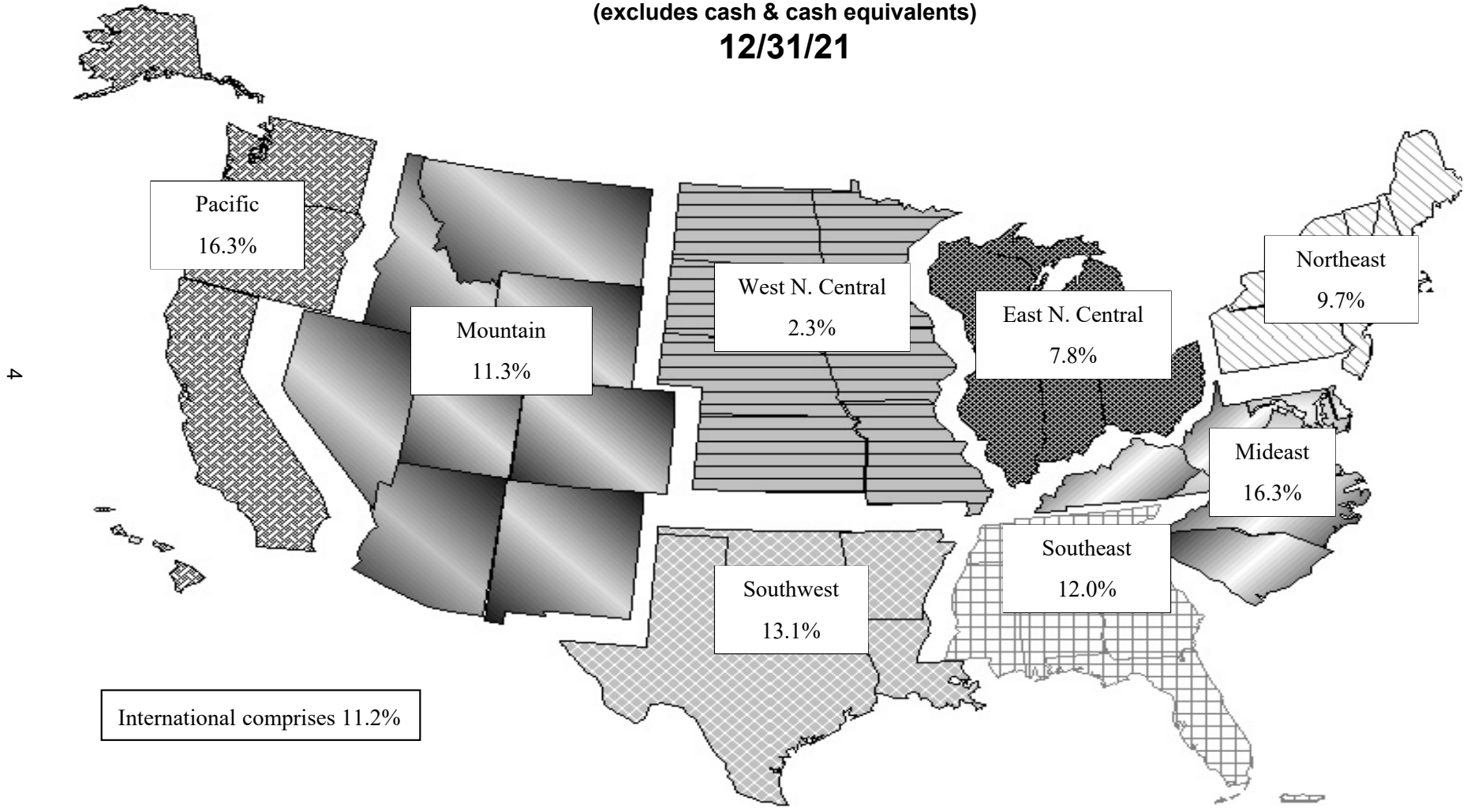


Market Value in Millions				
	<u>12/31/21</u>		<u>12/31/20</u>	
Apartment	\$3,011	39.0%	\$2,664	42.5%
Industrial	1,596	20.7%	1,070	17.1%
Infrastructure	714	9.2%	715	11.4%
Hotel	617	8.0%	523	8.3%
Office	606	7.8%	709	11.3%
Retail	322	4.2%	296	4.7%
REITs	314	4.1%	0	0.0%
Single Family Residential (SFR)	190	2.5%	128	2.0%
Land	67	0.9%	116	1.9%
	<u>\$7,437</u>	<u>96.4%</u>	<u>\$6,221</u>	<u>99.2%</u>
Cash/Other	<u>276</u>	<u>3.6%</u>	<u>48</u>	<u>0.8%</u>
Total Investments	<u>\$7,713</u>	<u>100.0%</u>	<u>\$6,269</u>	<u>100.0%</u>

SMRS

Real Estate by Region

Based on Market Value
(excludes cash & cash equivalents)
12/31/21



Geographic regions defined by NCREIF, whose property index composition is: Pacific 34.2%, Mountain 6.6%, West N. Central 1.1%, Southwest 10.4%, East N. Central 6.8%, Southeast 10.3%, Northeast 19.3%, Midwest 11.3%

SMRS
Real Estate and Infrastructure
12/31/21

**Top Ten
Advisors or Entity**

<u>Advisor or Entity</u>	<u>Market Value</u>
	(\$ in millions)
MWT Holdings, LLC	\$ 2,312
Principal Real Estate Investors	892
Clarion Partners	580
Blackstone Group	332
Domain Capital Advisors Inc	280
Bentall Kennedy	268
Five Star Realty Partners, LLC	249
Lone Star Global	187
Rialto Capital Management, LLC	179
L&B Realty Advisors	170
	\$ 5,449

**Occupancy
by Property Type**

	Apartment	Office	Industrial	Retail	Hotel
SMRS Portfolio	94.0%	81.6%	98.2%	85.9%	64.8%
National Average	94.2%	83.2%	94.0%	95.2%	64.8%

SMRS
Market Values by Ownership Entity
12/31/21
REAL ESTATE

	<u>Market Value</u>	<u>Unfunded Commitment</u>
801 Grand Avenue Capital, LLC	\$ 22,360,050	\$ 0
AEW Senior Housing III	3,756,614	547,246
AEW Senior Housing Investors IV	23,128,687	25,185,969
Apollo Asia Real Estate Fund	60,883,947	25,626,181
Asana Partners Fund I	31,896,975	2,449,559
Asana Partners Fund II	31,057,428	24,030,405
Avanath Affordable Housing II, LLC	69,211	0
Avanath II SMRS Co-Investment Fund, LLC	429,313	0
Avanath Affordable Housing III	52,030,535	2,641,951
Avanath Affordable Housing IV	11,783,444	21,996,199
BentallGreenOak US Cold Storage, LP	0	75,000,000
BGO Europe III Co Invest	19,409,486	17,667,836
* BentallGreenOak Europe IV, LP	0	113,730,000
* BlackRock MiREIT Fund	105,596,921	0
Blackstone R/E Partners V, LP	1,690,161	2,087,026
Blackstone R/E Partners VI, LP	2,066,555	3,680,930
Blackstone R/E Partners VIII, LP	61,337,075	10,683,643
Blackstone R/E Partners IX, LP	149,432,761	89,182,244
Capri Urban Investors, LLC	663,362	0
Carlyle Realty Partners IX, LP	0	100,000,000
CIM Commercial Trust Corp	4,319,698	0
CIM Fund III, LP	30,939,304	0
CIM Fund VIII, LP	86,123,222	0
CIM VI (Urban REIT), LLC	23,540,305	0
Clarion Gables Multifamily Trust, LP	35,956,904	0
Columbus Circle Holdings, LLC	170,629,192	186,225,870
Crown Small Cap Real Estate	13,621,903	4,402,500
DM2501, LLC	12,466,079	31,027,158
Domain GVA-1, LLC	22,935,803	1,940,056
Domain Hotel Properties, LLC	199,070,342	0
Eastport Properties, LLC	16,898,170	0
Gateway Capital Real Estate Fund II, LP	667,542	0
Great Lakes Property Group Trust	22,054	0
GreenOak Europe III, LP	61,418,394	24,902,539
Heitman Credit	48,354,551	0
Heitman Global RE Fund II	0	100,000,000
* Heitman MiREIT Fund	105,136,184	0
* IDR Core Property Index Fund, LLC	27,998,786	100,000,000
IMRF II CoInvest Spiga, LP	31,769	2,615,000
India Property Fund II, LLC	12,352,580	5,448,995
Invesco Mortgage Recovery Feeder Fund	1,034,238	2,152,585
Invesco Mortgage Recovery Fund II, LP	24,514,107	21,394,854
Invesco Strategic Opportunities III, LP	27,770,381	82,461,385
IPF II Co-Invest, LP	12,096,856	2,168,655
ISO III SMRS Sidecar, LP	29,513,891	2,334,000
JBC Funds North LaSalle, LLC	14,054,837	0
JBC Opportunity Fund III, LP	495,673	0
KBS/SM Fund III, LP	164,516	0

	<u>Market Value</u>	<u>Unfunded Commitment</u>
KBS/SM Fund IV	127,580	0
L-A Saturn Acquisition	72,957,694	0
L&B Spartan Holdings	9,699,050	0
Landmark Real Estate Partners V, LP	5,808,642	0
LaSalle Asia Opportunity Fund III, LP	1,219,178	0
Lion Industrial Trust	341,093,312	100,000,000
Lion Mexico Fund, LP	4,080,667	0
Lombard GVA0016 (former AGL Annuity)	249,207,893	100,000,000
Lone Star Fund X, LP	102,182,790	21,734,113
Lone Star Fund XI, LP	85,712,509	146,668,342
Lubert-Adler Real Estate Fund VII, LP	43,535,710	4,663,662
M1 Westgate CoInvest, LLC	49,499	0
M301W CoInvest, LLC	454,961	0
MERS Acquisitions Ltd.	160,645,935	0
MIP Holdco, LLC	115,526,622	7,900,155
MSREF V - International	1,978,648	0
MSRESS Fund III Institutional, LP	5,097,735	0
MWT Holdings, LLC	2,312,604,206	0
Northpark Land Associates	37,881,978	1,025,476
Orange Investors, LLC	386,785	0
Paladin Realty Brazil Investors III (USA), LP	2,710,067	0
Paladin Realty Latin America Investors IV-CI, LP	28,198,308	0
Paladin Realty TB COINV V, LP	9,031,715	0
Penmain Office, LLC	36,722,932	0
* Principal MiREIT	103,734,531	0
Principal Separate Account	321,817,684	10,519,206
Proprium RE Spec. Situations Fund, LP	109,733,117	0
Rialto Credit Partnership, LP	12,059,758	0
Rialto Real Estate Fund, LP	18,388,875	0
Rialto Real Estate Fund II, LP	26,371,549	0
Rialto Real Estate Fund III-Debt, LP	41,753,505	0
Rialto Real Estate Fund III-Property, LP	35,640,093	0
Rialto Real Estate Fund IV-Debt, LP	45,441,873	54,765,586
SM Brell II, LP	14,821,227	0
SMP Data Center	445,269,525	454,639,917
Stockbridge RE Fund II-C, LP	4,574,477	0
Strategic II, LLC	187,558,335	142,800,155
TPG RE Finance Trust Inc. (TRTX)	59,434,661	0
TPG Real Estate Partners II	13,251,754	7,928,211
TPG Real Estate Partners III	32,561,162	19,749,857
TSP Fund III	352,840	74,493,714
TSP Spartan C-II, LLC	18,965,633	0
TSP Value & Income Fund II, LP	19,250,113	14,619,318
Trophy Property Development, LP	162,130	0
True North High Yield Invest. Fund II, LLC	1,080,436	0
True North Real Estate Fund III, LLC	23,707,461	5,000,000
	\$ 6,722,564,958	\$ 2,248,090,497
Short-Term Investments and Other	260,334,363	0
Total Real Estate Investments	\$ 6,982,899,321	\$ 2,248,090,497

* New or additional commitment made during the quarter reported

SMRS
Market Values by Ownership Entity
12/31/21

INFRASTRUCTURE

	Market Value	Unfunded Commitment
Arclight Energy Partners VI, LP	\$ 31,327,310	\$ 7,004,763
Arclight Energy Partners VII, LP	17,266,258	30,240,004
ASF VI Infrastructure B, LP	10,086,293	5,992,354
ASF VII Infrastructure Fund B, LP	23,054,443	11,560,305
ASF Como Co-Investment, LP	1,639,515	1,613,312
Basalt Infrastructure Partners, LP	30,830,446	2,219,045
Blackstone Energy Partners, LP	12,778,411	4,728,291
Blackstone Energy Partners II, LP	74,458,144	15,365,147
Brookfield Infrastructure Fund II-B, LP	46,036,939	3,119,352
Customized Infrastructure Strategies, LP	10,781,163	4,501,790
Dalmore Capital Fund	67,866,115	0
GCM Grosvenor Infrastructure Investment Program, LP	69,550,147	3,165,729
GCM Grosvenor Customized Infrastructure Strategies II, LP	41,556,396	8,194,270
* GCM Grosvenor Customized Infrastructure Strategies III, LP	0	100,000,000
Global E&P Infrastructure Fund II, LP	32,279,920	2,851,665
GSO Energy Select Opportunities Fund, LP	19,080,339	23,026,107
GSO Energy Select Opportunities Fund II, LP	11,443,571	40,039,140
JPMorgan AIRRO India SideCar Fund US, LLC	83,160,310	785,826
JPMorgan AIRRO Fund II	10,412,294	6,800,131
Irradiant Renewables Opportunities Partners	11,720,742	90,708,399
KKR Eagle ColInvest, LP	37,338,745	1,853,268
KKR Global Infrastructure Investors, LP	30,449	0
KKR Global Infrastructure Investors IV, LP	0	100,000,000
Ridgewood Water & Strategic Infrastructure Fund, LP	26,020,922	24,029,460
RPEP SMRS Infra II, LLC	13,537,639	3,469,723
StonePeak Infrastructure Fund, LP	32,135,570	8,806,301
	\$ 714,392,080	\$ 500,074,383
Short-Term Investments and Other	16,067,747	0
Total Infrastructure Investments	\$ 730,459,827	\$ 500,074,383
TOTAL INVESTMENTS	\$ 7,713,359,152	\$ 2,748,164,880

* New or additional commitment made during the quarter reported

State of Michigan Retirement System

REAL RETURN & OPPORTUNISTIC REVIEW

State of Michigan Investment Board Meeting
March 24, 2022



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

EXECUTIVE SUMMARY

Performance

MPSERS Plan (12/31/21)	1-Year	3-Years	5-Years	7-Years	10-Years
Real & Opportunistic	15.2%	13.3%	14.2%	11.9%	12.0%
Custom Benchmark	9.2%	7.4%	7.4%	7.3%	7.3%

- The portfolio value is \$12.2 billion with a one-year return of 15.2%. As global markets rose due to a better understanding of the impacts of the COVID-19 delta variant, the valuation of the portfolio holdings increased as well.
- Performance for the year was driven by i) income earned from entertainment royalties, investments in asset managers, credit investments, and natural resource strategies; and ii) capital appreciation of 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 \$4.5 billion of unfunded commitments. Two new commitments and two new follow-on financings were made during the quarter:
 - \$200 million in Sixth Street Growth Partners II (A), LP, a closed end structured finance fund, managed by Sixth Street Partners.
 - \$150 million of follow-on capital in Nyanza II, LLC, a closed-end music and entertainment private equity fund, managed by Great Mountain Partners, LLC.
 - \$125 million in Sixth Street Opportunities Partners V (A), LP, a closed end opportunistic credit fund, managed by Sixth Street Partners.
 - \$15 million of follow-on capital to Lakewater III, LLC, an opportunistic separate account, managed by Barings Alternative Investments.
- In addition to monitoring the impact of COVID-19 and pace of economic recovery, staff remains focused on finding differentiated strategies that are additive to the current portfolio mix and continues to favor private credit opportunities and niche strategies that are scalable. Specifically, opportunities that have defensible, contractual cash flows and offer structural downside protections are especially attractive. Staff continues to be selective and favor experienced investment teams with a proven track record.

SMRS

Real Return and Opportunistic

12/31/21

Top Ten Advisors or Entities

(\$ in Millions)

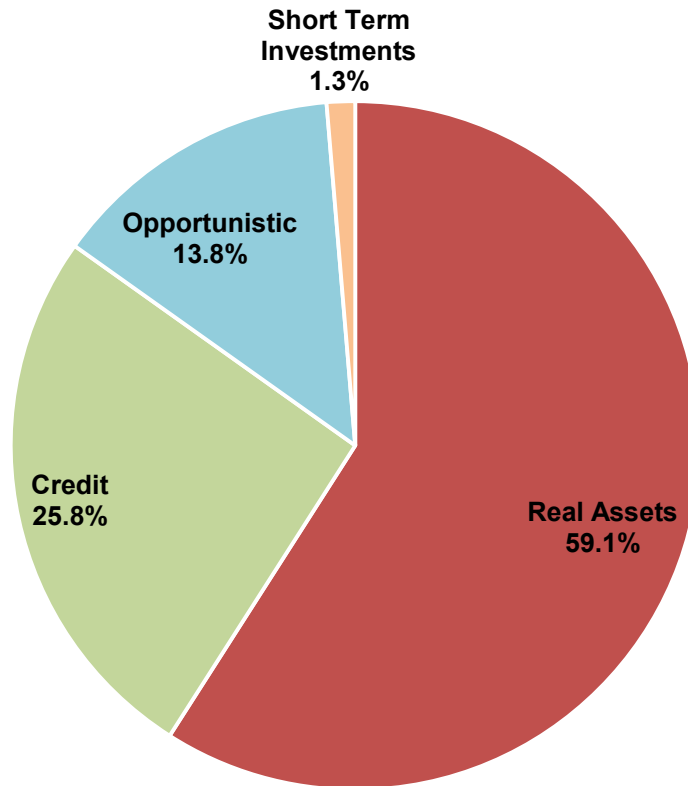
<u>Advisor or Entity</u>	<u>Market Value</u>
Great Mountain Partners	\$ 4,594
Apollo Global Management	1,013
Domain Capital Group, LLC	786
Barings Alternative Investments	749
Sixth Street Partners	699
Blackstone Alternative Asset Management	497
Kayne Anderson Capital Advisors	425
HPS Partners	350
Ridgewood Energy	319
Czech Asset Management	284
Total Market Value	\$ 9,716

SMRS

Real Return and Opportunistic

12/31/21

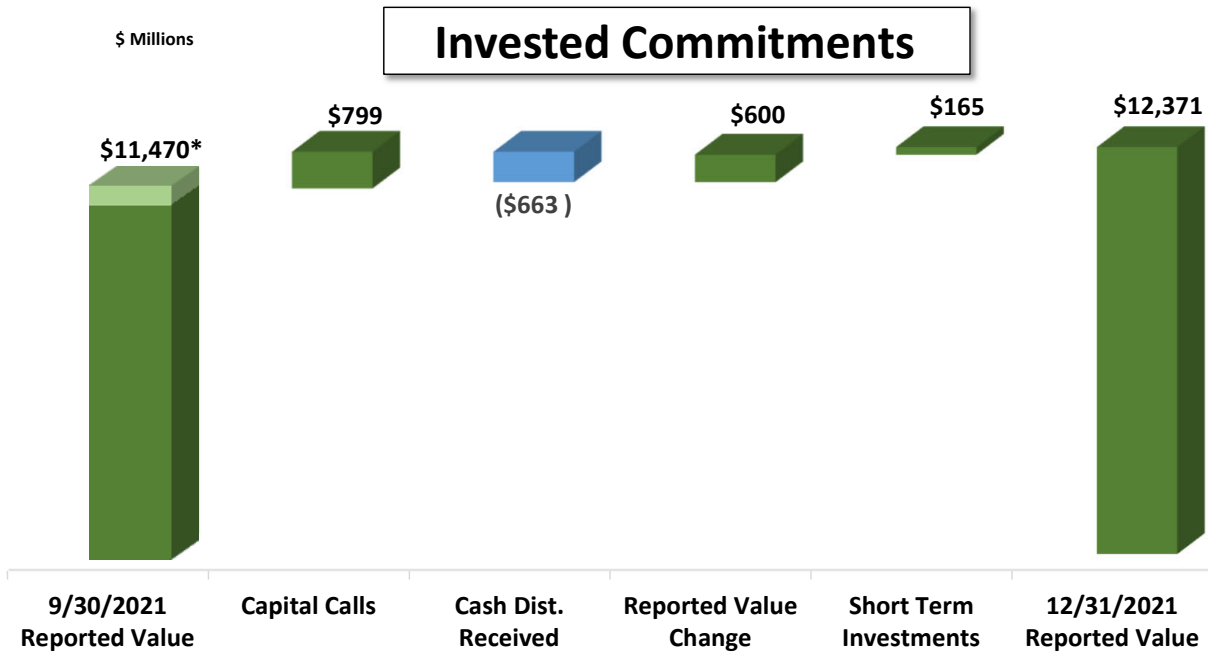
Investments By Strategy



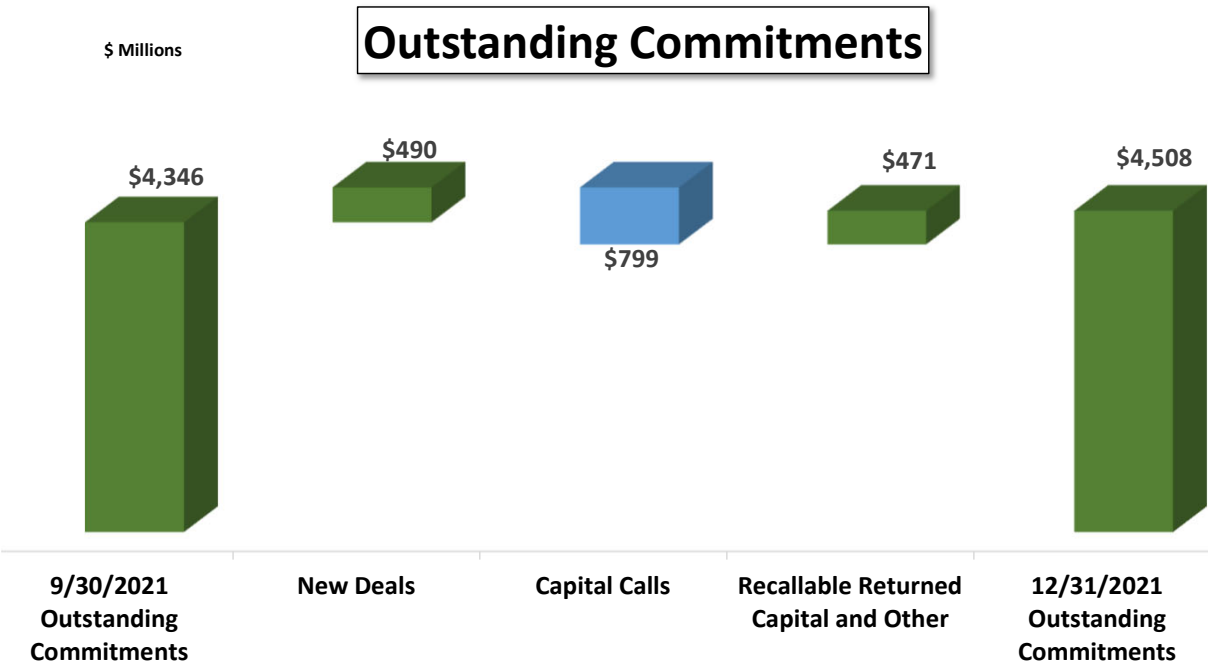
Market Value in Millions	
	<u>12/31/21</u>
Real Assets	\$7,305
Credit	\$3,190
Opportunistic	\$1,710
Short Term Investments	<u>\$165</u>
Total Investments	<u><u>\$12,371</u></u>

SMRS

Real Return and Opportunistic 12/31/21



* Light green represents eight investments valued at \$302 million that were transferred from PED to RRO for better strategic alignment of the portfolios.



SMRS

Real Return and Opportunistic

12/31/21

Net Market Value by Entity

	Net Market Value	Unfunded Commitment
* Abernathy	\$ 271,101,047	\$ 14,947,242
* Abernathy II	6,349,162	3,815,562
Altus Midstream	10,729,250	0
American Industrial Partners VII, LP	53,332,962	22,027,001
Angelo Gordon Credit Solutions Fund	95,822,976	26,325,340
Angelo Gordon Credit Solutions Fund II, LP	-	100,000,000
Apollo European Principal Finance Fund II	6,872,766	8,849,687
Apollo HK TMS Investments Holdings, LP	194,092	0
Axton Holdings	3,606,733,315	0
Barings Asset Based Income Fund I	212,970,126	73,612,674
Barings Global Real Asset Fund I	87,976,035	14,123,750
Blackstone Capital Opportunities Fund IV, LP	23,141,383	127,380,966
Blackstone COF IV Co-Investment Fund, LP	4,957,558	32,542,442
Blackstone Strategic Capital Holdings (Side Car)	96,377,772	7,593,052
Blackstone Strategic Capital Holdings, LP	121,084,731	35,248,426
Blue Peninsula Fund, LP	145,838,305	25,672,871
Broadriver III	148,063,877	62,363,110
BSCH II	106,629,054	160,615,017
BSCH Parallel (MLG) I, LP	269,686,245	0
Carlyle Energy Mezzanine Opportunity Fund II	21,673,594	7,589,277
Carlyle IEP Co-Invest (Varo)	14,013,661	832,168
Carlyle International Energy Partners	53,966,529	13,004,679
Carlyle International Energy Partners II	23,256,791	131,513,624
Castle Credit SMRS Holdings, LLC	137,306,872	89,777,365
Centerbridge SCP III	16,262,811	3,025,715
Centerbridge SCP III, LP – Flex, LP	78,465,604	13,569,030
CircleUp Credit Fund I, LP	22,362,765	2,953,415
Clearlake Capital Partners VI, LP	82,183,120	14,908,841
Clearlake Opportunities Partners II, LP	29,020,545	55,947,804
Content Holdings, LLC	312,247,767	36,247,610
Credit Opportunity Fund III	8,687,482	19,394,287
EnCap Energy Capital Fund X, LP	37,243,590	2,869,346
Energy Recap and Restructuring	9,615,680	7,085,025
ERR MI Holdings, LP	2,181,349	6,384,482
FCO MA MI, LP	148,800,566	31,915,972
Financial Credit Investment II	239,942,784	251,802,840
Financial Credit Investment III	216,982,578	181,475,436

	Net Market Value	Unfunded Commitment
Flywheel Energy Co-Invest	48,523,891	7,000,000
Fortress Transportation & Infrastructure	109,228,613	0
Global Maritime	109,649,053	3,414,854
Greatrock II, LLC	42,078,961	0
Greatrock, LLC	118,069,217	14,912,233
GSO Credit Alpha Fund	28,233,129	37,910,064
HarbourVest Direct Lending Fund (L), LP	48,521,634	75,000,000
Hopen Life Science Fund II	3,528,876	165,000
HPS Mezzanine Partners 2019, LP	45,413,933	9,259,283
HPS Red Cedar Fund	302,800,750	136,735,745
Kayne Anderson Energy Fund VII, LP	26,976,312	7,675,374
Kayne Anderson Private Energy Income Fund	139,242,118	26,665,979
Kayne Anderson Private Energy Income Fund II	48,635,348	113,453,336
Kayne Solutions Fund	110,518,841	128,276,229
KKR Energy Income & Growth Fund	37,673,574	1,814,254
KKR Lending Partners	4,501,090	8,917,164
KKR Lending Partners II	13,014,243	11,737,239
Lakewater	24,411,351	0
Lakewater II	31,979,338	0
** Lakewater III	151,244,790	0
Lakewater IV	30,892,555	0
Lakewater V	49,472,479	13,205,743
Marathon CLO Equity Fund	14,414,287	0
Merit Energy Partners I, LP	29,748,655	0
MidCap Finco Holdings, LTD	307,513,897	0
Mortgage Servicing Rights	50,985,328	15,662,214
Napier Park Aircraft Leasing Vehicle I, LLC	47,601,394	0
Napier Park AL Rollover Fund I	45,603,936	20,299,143
Nash Co-Investment	15,743,344	94,259
New Fortress Energy HLDGS	828,884,193	0
NGP Natural Resources XII	97,795,762	50,174,071
** Nyanza II, LLC	20,895,522	279,104,478
Orion Co-Investments III, LP	57,258	0
Orion Mine Finance	49,089,290	0
Orion Mine Finance 1A	40,901,773	0
Orion Mine Finance Co-Fund II, LP	6,067,517	35,000,000
Orion Mine Finance II	104,149,084	6,072,016
Orion Mine Finance III, LP	38,371,743	43,901,533
Redding Ridge Holdings, LP	107,038,058	15,155,765
* Ren Venture Fund II	37,240,648	500,000
* Ren Venture Fund III	27,783,518	6,500,000
Ridgewood Energy Oil & Gas II	77,559,577	3,656,541
Ridgewood Energy Oil & Gas III	180,473,229	71,994,719
Ridgewood Fund II Co-Invest (REOG)	23,321,674	3,005,227

	Net Market Value	Unfunded Commitment
Riverside Credit Solutions FD I, LP	25,200,587	17,746,522
RPEP Energy Opportunistic Institutional Partners	37,822,622	3,795,156
Sixth Street Agriculture Partners I, LP	44,642,395	58,300,358
Sixth Street Growth Partners I, LP	198,819,958	151,003,986
** Sixth Street Growth Partners II (A), LP	-	200,000,000
Sixth Street Opportunities Partners IV, LP	83,496,011	28,709,953
** Sixth Street Opportunities Partners V (A), LP	-	125,000,000
Sixth Street SSLE II (USD Feeder)	32,804,264	93,871,615
Sixth Street TAO Partners, LP	234,211,889	107,279,418
SJC Direct Lending Fund II	1	38,261,315
SJC Direct Lending Fund III	137,146,227	23,671,042
SJC Direct Lending Fund III Co-Invest G-III	41,274,136	0
SJC Onshore Direct Lending Fund IV – SMRS, LP	105,750,428	143,931,268
SM/TCP, LP	10,242,853	36,298,477
* Social Network Holdings	196,303,425	5,590,289
Specialty Loan Fund III	2,198,388	5,812,365
Sprott Private Resource Lending (US), LP	6,551,385	95,415,574
Sprott PRL(M), LP	1,005,507	24,006,633
Sprott PRL(M-Co-Invest), LP	150,622	25,000,000
Structured Credit Recovery Fund IV	125,729,253	147,962,518
Sycamore Partners III, LP	46,887,942	50,608,818
Terra Co-Investment	50,644,470	14,000,000
TICP CLO Partners II	38,690,580	1,480,904
TICP CLO Partners III	65,852,450	33,345,666
TPG Rise Climate I	-	250,000,000
Turnbridge Capital Partners I, LP	52,494,486	5,347,068
Turning Rock Fund I, LP	57,955,757	16,319,293
Turning Rock Fund II	15,061,541	59,938,459
Vida Insurance Credit Opportunity Fund II	102,619,310	8,213,972
Warwick (SMRS) Co-Invest, LP	35,822,353	2,089,081
Warwick Partners III	57,787,440	2,017,706
Total Real Return and Opportunistic	\$ 12,205,090,806	\$ 4,507,693,973
Short-Term Investments & Other	165,471,483	
Grand Total	\$ 12,370,562,289	\$ 4,507,693,973

* Fund of Funds

**** New Commitment**

State of Michigan Retirement System

DEFINED CONTRIBUTION REVIEW

State of Michigan Investment Board Meeting
March 24, 2022



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

EXECUTIVE SUMMARY

Overview

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

Investments Options

Tier I: Target Date Funds and Passively Managed Index Funds

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

Tier II: Actively Managed Funds

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

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

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

SOM Plans	12/31/21	12/31/20
State of Michigan 401(k)	\$8,967	\$7,782
State of Michigan 457	2,088	1,980
Pension Plus 401(k) & 457	1,911	1,430
EAA	12	12
Total	\$12,978	\$11,204

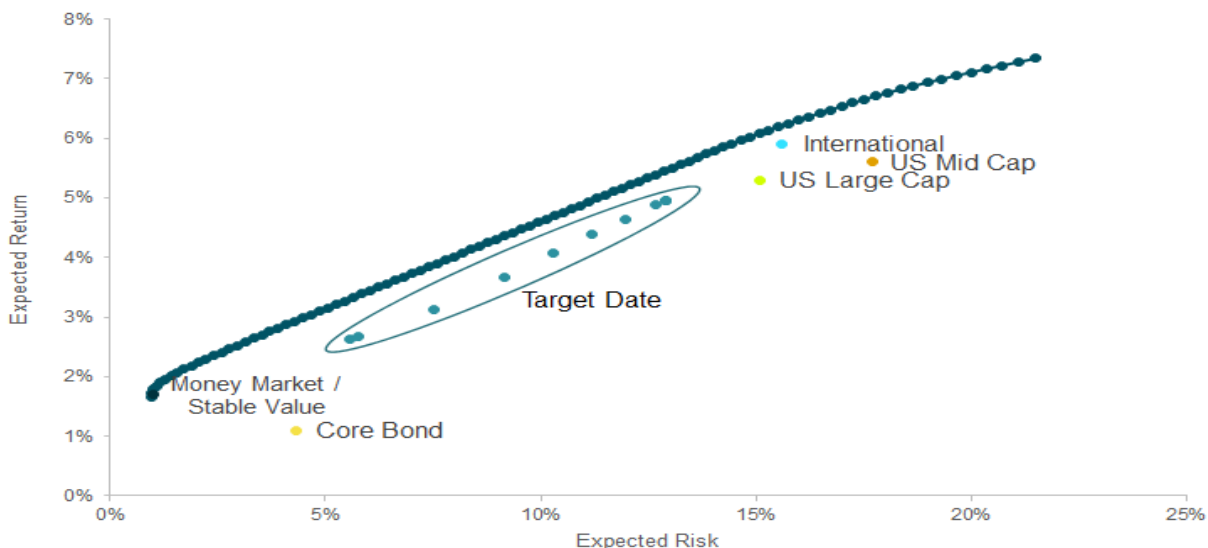
(\$ in millions)

*Loan Fund \$192M as of 12/31/21

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



Plan Update

On November 23, 2021, Voya announced the acquisition of Tygh Capital Management (TCM). TCM will be the new managers for the Voya Small Cap Growth Fund. The transition will occur over the first quarter of 2022 with the name to remain the same, Voya Small Cap Growth Equity Fund.

Market Environment and Outlook

The financial markets broadly delivered an upbeat 2021 fourth quarter, with strong gains among the major U.S. equity indexes and decent returns among international developed market equities. By contrast, emerging market equities and fixed income assets generally struggled. While the market trajectory was upward, the path through the quarter was bumpy.

Investors expressed concerns about rising prices and wages, fading fiscal stimulus, and looming monetary tightening by the Federal Reserve. Strong consumer balance sheets and easy access to credit have supported consumer demand, but supply chain bottlenecks and labor market frictions have constrained output and propelled prices higher. Inflation is now at levels last seen in the 1980s, and the Fed has accelerated its plans to raise interest rates in 2022.

Despite several retrenchments, the S&P 500 index gained 11.03% for the quarter. The Bloomberg U.S. Aggregate Bond index, a broad market gauge, was about flat, returning 0.01%; the yield on the widely watched 10-year U.S. Treasury note also was flat. By contrast, the Bloomberg Commodity index lost 1.56%.

S&P 500 companies have been able to pass through rising prices to consumers; as a result, earnings growth should be solid in 2022, if not as spectacular as in 2021. Equity markets should have room to absorb modestly higher interest rates. Funding costs remain at record low levels and strong fundamentals should help insulate credit-sensitive debt instruments from rising rates.

The U.S. economy has had a bumpy recovery with higher than expected inflation but is still on strong footing as we enter 2022, and further progress on the pandemic at home and abroad will continue to be a tailwind for the global economic recovery. The labor market rebound is under way with the January unemployment report showing surprising labor market strength. This upside surprise, coupled with a more hawkish Fed's stance, pushed 10-year Treasury yields past 2% in February 2022.

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 to 75 starting on Jan. 1, 2032.
- **Expands Auto-Enrollment in Retirement Plans-** the bill requires 401(k) and 403(b) plans to automatically enroll participants when they become eligible; employees may opt out of coverage. The initial automatic enrollment amount is at least 3% but no more than 10%, then each year that amount is increased by 1% until it reaches 10%. All current 401(k) and 403(b) plans are grandfathered. There is an exception of small businesses with 10 or fewer employees, new businesses (i.e., have been in business for less than three years) church plans and governmental plans.

- **Higher Catch-Up Limits at age 62, 63, 64** - under current law, employees who have turned 50 are permitted to make catch-up contributions under a retirement plan. The limit on catch-up contributions for 2021 is \$6,500, except in the case of SIMPLE plans, for which the limit is \$3,000. The Act increase these limits to \$10,000 and \$5,000 (both indexed), respectively, for individuals who have attained ages 62, 63 and 64, but not age 65.
- **Student Loan Payments and Employer Matching** - the SECURE Act 2.0 permits an employer to make matching contributions under a 401(k) plan, 303(b) or SIMPLE IRA with respect to “qualified student loan payments.” The provision is intended to assist employees who may not be able to save for retirement because they are overwhelmed with student debt and missing out on available matching contributions.
- **Boosts Small Employer Pension Plan Startup Credit** - makes changes to the credit by: increasing the startup credit from 50% to 100% for employers with up to 50 employees, and except in the case of defined benefit plans, an additional credit would be provided. The amount of the new credit generally would be a percentage of the amount contributed by the employer on behalf of employees, up to a per-employee cap of \$1,000.
- **Allows CITs in 403(b) Plans** - under current law, 403(b) plan investments are generally limited to annuity contracts and mutual funds. This limitation cuts off 403(b) plan participants, generally employees of charities and public educational organizations, from access to collective investment trusts (CITs), which are often used by 401(k) plans due to their lower fees. The bill permits 403(b) custodial accounts to invest in collective investment trusts.
- **Opens the Door for ETFs in Variable Annuities** - SECURE 2.0 directs the Treasury Department to update regulations to facilitate the creation of a new type of ETF that is “insurance-dedicated.” Treasury regulations have prevented ETFs from being widely available through individual variable annuities. ETFs cannot satisfy the regulatory requirements to be “insurance-dedicated.”

SMRS

Defined Contribution Strategies

12/31/21

Markets	Amount		% of Total	Fee per \$1,000
QDIA (\$ in Millions)				
	<u>12/31/21</u>	<u>12/31/20</u>		
Total Target Date Fund	\$3,665	\$2,869	28.2%	\$0.55
Tier I Index Funds				
State Street S&P 500 Index Fund	\$1,966	\$1,559		\$0.13
State Street Bond Market Index Fund	1,145	1,049		0.20
State Street Global All Cap Equity ex-U.S. Index Fund	876	792		0.45
State Street S&P Mid Cap Index Fund	806	675		0.20
BlackRock Government Short-Term Investment CL F	225	243		0.56
BlackRock S&P Small Cap 600 Equity Index CL F	192	144		0.25
BlackRock Emerging Markets Index CL F	131	138		0.69
Total Tier I Index	\$5,341	\$4,600	41.2%	\$0.24
Tier II Active Funds				
Stable Value Fund	\$1,224	\$1,256		\$2.22
Dodge & Cox Stock Fund	706	556		4.15
Jennison Large Cap Growth Fund	637	596		2.83
American Funds EuroPacific Growth R6	340	353		4.60
Artisan Mid Cap Fund	188	194		6.63
Voya Small Cap Growth Equity Fund	164	168		3.30
T. Rowe Price Mid-Cap Value Fund	148	115		6.30
PIMCO Total Return I Fund	120	133		4.70
Virtus Ceredex Small-Cap Value Eq I	81	61		6.50
Prudential High Yield Fund	50	37		3.76
Total Tier II Active	\$3,657	\$3,469	28.2%	\$3.56
Tier III				
Total Self Directed Brokerage Account	\$315	\$266	2.4%	NA
Total Defined Contribution Assets	<u>\$12,978</u>	<u>\$11,204</u>	<u>100.0%</u>	\$1.26

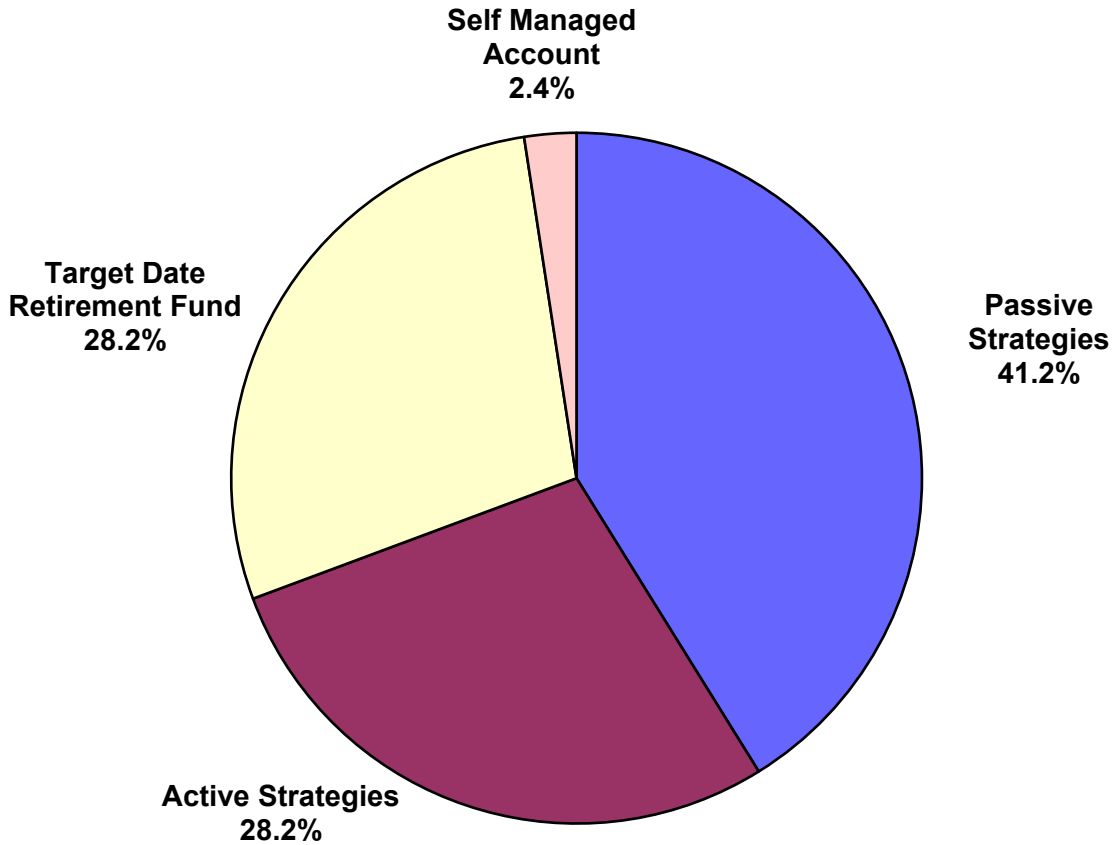
*Loan Fund \$192M as of 12/31/21

NOTE: Totals may not be exact due to rounding.

SMRS

Defined Contribution by Investment Strategy

12/31/21



Market Value in Millions				
	12/31/21		12/31/20	
Passive Strategies	\$5,341	41.2%	\$4,600	41.0%
Active Strategies	3,657	28.2%	3,469	31.0%
Target Date Retirement Fund	3,665	28.2%	2,869	25.6%
Self Managed Account	315	2.4%	266	2.4%
Total Investments	\$12,978	100.0%	\$11,204	100.0%

*Loan Fund \$192M as of 12/31/21

Note: Totals may not be exact due to rounding.

Defined Contribution Performance by Fund 12/31/21

<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	\$127,731,858	8.1	10.3	7.2	5.8
State Street Income Custom Index		8.1	10.3	7.2	5.9
Morningstar Target-Date Retirement		5.5	9.0	6.4	5.5
<i>Variance State Street Income Custom Index</i>		0.0	0.0	0.0	(0.1)
<i>Variance Morningstar Target-Date Retirement</i>		2.6	1.3	0.8	0.3
State Street Target Retirement 2020 Fund	\$153,301,827	9.8	12.6	9.0	8.3
State Street 2020 Custom Index		9.8	12.5	9.0	8.3
Morningstar Target-Date 2020		8.5	11.8	8.4	7.4
<i>Variance State Street 2020 Custom Index</i>		0.0	0.1	0.0	0.0
<i>Variance Morningstar Target-Date 2020</i>		1.3	0.8	0.6	0.9
State Street Target Retirement 2025 Fund	\$300,302,324	11.0	15.3	10.9	9.6
State Street 2025 Custom Index		11.0	15.2	10.8	9.6
Morningstar Target-Date 2025		9.7	13.2	9.5	8.5
<i>Variance State Street 2025 Custom Index</i>		0.0	0.1	0.1	0.0
<i>Variance Morningstar Target-Date 2025</i>		1.3	2.1	1.4	1.1
State Street Target Retirement 2030 Fund	\$367,621,061	11.6	16.9	12.0	10.4
State Street 2030 Custom Index		11.5	16.8	11.9	10.4
Morningstar Target-Date 2030		11.6	14.8	10.5	9.2
<i>Variance State Street 2030 Custom Index</i>		0.1	0.1	0.1	0.0
<i>Variance Morningstar Target-Date 2030</i>		0.0	2.1	1.5	1.2
State Street Target Retirement 2035 Fund	\$411,808,916	12.4	17.9	12.6	11.0
State Street 2035 Custom Index		12.4	17.8	12.6	11.0
Morningstar Target-Date 2035		13.7	16.5	11.7	10.3
<i>Variance State Street 2035 Custom Index</i>		0.0	0.1	0.0	0.0
<i>Variance Morningstar Target-Date 2035</i>		(1.3)	1.4	0.9	0.7
State Street Target Retirement 2040 Fund	\$420,946,606	13.4	18.7	13.2	11.4
State Street 2040 Custom Index		13.3	18.6	13.1	11.4
Morningstar Target-Date 2040		15.4	17.7	12.4	10.6
<i>Variance State Street 2040 Custom Index</i>		0.1	0.1	0.1	0.0
<i>Variance Morningstar Target-Date 2040</i>		(2.0)	1.0	0.8	0.8
State Street Target Retirement 2045 Fund	\$450,471,895	14.2	19.4	13.6	11.7
State Street 2045 Custom Index		14.1	19.4	13.5	11.7
Morningstar Target-Date 2045		16.6	18.6	13.0	11.3
<i>Variance State Street 2045 Custom Index</i>		0.1	0.0	0.1	0.0
<i>Variance Morningstar Target-Date 2045</i>		(2.4)	0.8	0.6	0.4
State Street Target Retirement 2050 Fund	\$578,340,236	14.6	19.8	13.8	11.7
State Street 2050 Custom Index		14.6	19.8	13.7	11.8
Morningstar Target-Date 2050		17.1	18.9	13.1	11.1
<i>Variance State Street 2050 Custom Index</i>		0.0	0.0	0.1	(0.1)
<i>Variance Morningstar Target-Date 2050</i>		(2.5)	0.9	0.7	0.6
State Street Target Retirement 2055 Fund	\$600,805,463	14.6	19.8	13.8	11.8
State Street 2055 Custom Index		14.6	19.8	13.7	11.8
Morningstar Target-Date 2055		17.2	19.1	13.4	11.6
<i>Variance State Street 2055 Custom Index</i>		0.0	0.0	0.1	0.0
<i>Variance Morningstar Target-Date 2055</i>		(2.6)	0.7	0.4	0.2

<u>Fund Name</u>	<u>Market Value</u>	<u>1-Year</u>	<u>3-Years</u>	<u>5-Years</u>	<u>10-Years</u>
State Street Target Retirement 2060 Fund	\$244,238,714	14.6	19.8	13.8	N/A
<i>State Street 2060 Custom Index</i>		14.6	19.8	13.7	N/A
<i>Morningstar Target-Date 2060</i>		17.4	19.2	13.5	N/A
<i>Variance State Street 2060 Custom Index</i>		0.0	0.0	0.1	N/A
<i>Variance Morningstar Target-Date 2060</i>		(2.8)	0.6	0.3	N/A
State Street Target Retirement 2065 Fund	\$9,364,896	14.6	N/A	N/A	N/A
<i>State Street 2065 Custom Index</i>		14.6	N/A	N/A	N/A
<i>Morningstar Target-Date 2065+</i>		17.5	N/A	N/A	N/A
<i>Variance State Street 2065 Custom Index</i>		0.0	N/A	N/A	N/A
<i>Variance Morningstar Target-Date 2065+</i>		(2.9)	N/A	N/A	N/A
TIER 1					
State Street S&P 500 Index Fund	\$1,966,012,213	28.7	26.0	18.5	16.5
<i>S&P 500 Index</i>		28.7	26.1	18.5	16.6
<i>Morningstar Large Blend</i>		25.4	22.9	16.0	14.3
<i>Variance S&P 500 Index</i>		0.0	(0.1)	0.0	(0.1)
<i>Variance Morningstar Large Blend</i>		3.3	3.1	2.5	2.2
State Street Bond Market Index Fund	\$1,145,406,030	(1.6)	4.8	3.6	2.8
<i>Bloomberg U.S. Aggregate Index</i>		(1.5)	4.8	3.6	2.9
<i>Morningstar Intermediate-Term Bond</i>		(1.5)	4.7	3.4	3.0
<i>Variance Bloomberg U.S. Aggregate Index</i>		(0.1)	0.0	0.0	(0.1)
<i>Variance Morningstar Intermediate-Term Bond</i>		(0.1)	0.1	0.2	(0.2)
State Street Global All Cap Equity ex-U.S. Index Fund	\$875,791,054	8.7	13.8	10.0	7.7
<i>MSCI ACWI ex USA IMI (Net)</i>		8.5	13.6	9.8	7.6
<i>Morningstar Foreign Large Blend</i>		9.8	13.2	9.2	7.5
<i>Variance MSCI ACWI ex USA IMI (Net)</i>		0.2	0.2	0.2	0.1
<i>Variance Morningstar Foreign Large Blend</i>		(1.1)	0.6	0.8	0.2
State Street S&P Mid Cap Index Fund	\$805,737,761	24.7	21.4	13.1	14.1
<i>S&P 400 Index</i>		24.8	21.4	13.1	14.2
<i>Morningstar Mid-Cap Blend</i>		23.6	20.4	12.4	12.6
<i>Variance S&P 400 Index</i>		(0.1)	0.0	0.0	(0.1)
<i>Variance Morningstar Mid-Cap Blend</i>		1.1	1.0	0.7	1.5
BlackRock Government Short-Term Investment CL F	\$225,058,131	0.0	0.9	1.1	N/A
<i>BofA Merrill Lynch US 3-Month Treasury Bill Index</i>		0.0	1.0	1.1	N/A
<i>Variance BofA Merrill Lynch US 3-Month Treasury Bill Index</i>		0.0	(0.1)	0.0	N/A
BlackRock S&P Small Cap 600 Equity Index CL F	\$192,279,851	26.8	20.1	N/A	N/A
<i>S&P SmallCap 600 Index</i>		26.8	20.1	N/A	N/A
<i>Morningstar Small Blend</i>		23.8	19.2	N/A	N/A
<i>Variance S&P SmallCap 600 Index</i>		0.0	0.0	N/A	N/A
<i>Variance Morningstar Small Blend</i>		3.0	0.9	N/A	N/A
BlackRock Emerging Markets Index CL F	\$130,602,593	(2.8)	10.8	9.9	N/A
<i>MSCI Emerging Market (Net)</i>		(2.5)	10.9	9.9	N/A
<i>Morningstar Diversified Emerging Mkts</i>		0.3	11.8	9.6	N/A
<i>Variance MSCI Emerging Market (Net)</i>		(0.3)	(0.1)	0.0	N/A
<i>Variance Morningstar Diversified Emerging Mkts</i>		(3.1)	(1.0)	0.3	N/A
TIER 2					
Stable Value Fund	\$1,223,919,804	1.8	2.3	2.3	2.2
<i>Bloomberg US Govt/Credit A+Interm Index</i>		(1.6)	3.4	2.6	2.1
<i>Hueler Universe</i>		1.8	2.2	2.1	2.0
<i>Variance Bloomberg US Govt/Credit A+Interm Index</i>		3.4	(1.1)	(0.3)	0.1
<i>Variance Hueler Universe</i>		0.0	0.1	0.2	0.2

<u>Fund Name</u>	<u>Market Value</u>	<u>1-Year</u>	<u>3-Years</u>	<u>5-Years</u>	<u>10-Years</u>
Dodge & Cox Stock Fund	\$705,933,230	31.9	20.7	14.0	15.5
<i>Russell 1000 Value Index</i>		25.2	17.6	11.2	13.0
<i>Morningstar Large Value</i>		26.1	17.4	11.4	12.1
<i>Variance Russell 1000 Value Index</i>		6.7	3.1	2.8	2.5
<i>Variance Morningstar Large Value</i>		5.8	3.3	2.6	3.4
Jennison Large Cap Growth Fund	\$636,880,701	18.9	34.3	27.1	N/A
<i>Russell 1000 Growth Index</i>		27.6	34.1	25.3	N/A
<i>Morningstar Large Growth</i>		20.5	28.9	21.8	N/A
<i>Variance Russell 1000 Growth Index</i>		(8.7)	0.2	1.8	N/A
<i>Variance Morningstar Large Growth</i>		(1.6)	5.4	5.3	N/A
American Funds EuroPacific Growth R6	\$339,565,966	2.8	18.0	12.9	10.0
<i>MSCI EAFE Index - Net Div</i>		11.3	13.5	9.5	8.0
<i>Morningstar Foreign Large Blend</i>		9.8	13.2	9.2	7.5
<i>Variance MSCI EAFE Index - Net Div</i>		(8.5)	4.5	3.4	2.0
<i>Variance Morningstar Foreign Large Blend</i>		(7.0)	4.8	3.7	2.5
Artisan Mid Cap Fund	\$187,709,114	11.1	34.3	23.2	17.6
<i>Russell Midcap Growth Index</i>		12.7	27.5	19.8	16.6
<i>Morningstar Mid-Cap Growth</i>		13.2	27.1	19.0	15.2
<i>Variance Russell Midcap Growth Index</i>		(1.6)	6.8	3.4	1.0
<i>Variance Morningstar Mid-Cap Growth</i>		(2.1)	7.2	4.2	2.4
Voya Small Cap Growth Equity Fund	\$164,055,065	5.2	18.8	11.0	12.5
<i>Russell 2000 Growth Index</i>		2.8	21.2	14.5	14.1
<i>Morningstar Small Growth</i>		11.1	24.8	17.3	14.7
<i>Variance Russell 2000 Growth Index</i>		2.4	(2.4)	(3.5)	(1.6)
<i>Variance Morningstar Small Growth</i>		(5.9)	(6.0)	(6.3)	(2.2)
T. Rowe Price Mid-Cap Value Fund	\$147,945,482	24.5	17.9	10.4	13.2
<i>Russell Midcap Value Index</i>		28.3	19.6	11.2	13.4
<i>Morningstar Mid-Cap Value</i>		29.4	18.4	10.4	12.2
<i>Variance Russell Midcap Value Index</i>		(3.8)	(1.7)	(0.8)	(0.2)
<i>Variance Morningstar Mid-Cap Value</i>		(4.9)	(0.5)	0.0	1.0
PIMCO Total Return I Fund	\$119,956,155	(0.6)	5.4	4.2	3.7
<i>Bloomberg U.S. Aggregate Index</i>		(1.5)	4.8	3.6	2.9
<i>Morningstar Intermediate Core-Plus Bond</i>		(0.8)	5.3	3.9	3.5
<i>Variance Bloomberg U.S. Aggregate Index</i>		0.9	0.6	0.6	0.8
<i>Variance Morningstar Intermediate Core-Plus Bond</i>		0.2	0.1	0.3	0.2
Virtus Ceredex Small-Cap Value Eq I	\$81,049,677	27.8	15.3	8.4	11.5
<i>Russell 2000 Value Index</i>		28.3	18.0	9.1	12.0
<i>Morningstar Small Value</i>		31.6	18.3	8.9	11.3
<i>Variance Russell 2000 Value Index</i>		(0.5)	(2.7)	(0.7)	(0.5)
<i>Variance Morningstar Small Value</i>		(3.8)	(3.0)	(0.5)	0.2
Prudential High Yield Fund	\$49,534,942	6.4	10.0	7.1	N/A
<i>Bloomberg U.S. Corp. HY 1% Issuer Cap Index</i>		5.2	8.6	6.1	N/A
<i>Morningstar High Yield Bond</i>		4.7	7.3	5.0	N/A
<i>Variance Bloomberg U.S. Corp. HY 1% Issuer Cap Index</i>		1.2	1.4	1.0	N/A
<i>Variance Morningstar High Yield Bond</i>		1.7	2.7	2.1	N/A
Self Directed	315,376,424				
TOTAL	\$12,977,747,994				

Loan Fund: \$191,677,851

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.