

MONTANA

BOARD OF INVESTMENTS

REGULAR BOARD MEETING
December 6-7, 2022

COMMITTEE MEETINGS

- A. Audit Committee – Maggie Peterson, Chair** **9:30 AM**
Members Barry, Nelson, Fladmo, and Trost
1. Public Comment – *Public Comment on issues with Committee Jurisdiction*
 2. Approval of October 26, 2022, Committee Minutes
 3. Executive Director Comments
 4. FY 2022 – Financial Audit – Status
 5. Draft FY 2022 Financial Statements – **Decisions**
 6. Draft FY 2022 Annual Report – **Decision**
 7. Annual Statutory Compliance Checklist – **Decision**
 8. Annual Audit Charter Compliance – **Decision**
 9. Audit Committee Checklist

- B. Loan Committee – Jack Prothero, Chair** **10:45 AM**
Members Meredith, Barry, Cohea, and Nelson
1. Public Comment – *Public Comment on issues with Committee Jurisdiction*
 2. Approval of October 26, 2022, and October 27, 2022, Committee Meeting Minutes
 3. Executive Director Comments
 4. Montana Down Payment Assistance Loan Program (MDPALP) Update
 5. MDPALP Loan Request - **Decision**

- Tab 1 CALL TO ORDER – Karl Englund, Chairman** **11:30 AM**
- A. Notice of Video Recording of Meeting
 - B. Roll Call
 - C. Public Comment – *Public Comment on issues with Board Jurisdiction*
 - D. Approval of the October 26-27, 2022, Meeting Minutes
 - E. Administrative Business
 1. Audit Committee Report – **Decisions**
 - F. Comments from Pension Board Members
 - G. Comments from Board Legislative Liaisons

- Tab 2 EXECUTIVE DIRECTOR REPORTS – Dan Villa** **11:45 AM**
- A. Member Requests from Prior Meeting
 - B. Monthly Snapshot
 - C. 2023 Work Plan
 - D. 2023 Legislative Session
 - E. LPAC Reporting
 - F. Securities Litigation Annual Review
 - G. Policy 10.217 Authorization of Investment Vendors

- BREAK FOR LUNCH** **12:00 PM**

Tab 3 TRS AND MPERA RELATIONSHIP **1:00 PM**
Shawn Graham, Executive Director, Teachers Retirement System
Dore Schwinden, Executive Director, Montana Public Employee Retirement Administration
Bill Holahan, Deputy Director, Montana Public Employee Retirement Administration

Tab 4 INVESTMENTS – NEW COMMITMENTS **1:45 PM**
A. Real Estate/Real Assets
B. Private Investments

Tab 5 ASSET ALLOCATION RANGE APPROVAL – Decision – Jon Putnam **2:15 PM**

BREAK **2:45 PM**

Tab 6 MONTANA LOAN PROGRAM – Doug Hill **3:00 PM**
A. Commercial and Residential Portfolios Report

Tab 7 BOND PROGRAM – Louise Welsh **3:15 PM**
A. INTERCAP
1. Activity Report
2. Staff Approved Loans Report

ADJOURN

December 7, 2022

RECONVENE AND CALL TO ORDER – Karl Englund, Chairman **9:30 AM**
A. Roll Call
B. Notice of Video Recording and Meeting
C. Public Comment – *Public Comment on issues within Board Jurisdiction*

Tab 8 RVK INVESTMENT UPDATE **9:45 AM**

Tab 9 CIO INVESTMENT UPDATE **10:30 AM**

RECAP OF STAFF TO DO LIST AND ADJOURNMENT – Karl Englund, Chairman **11:30 AM**

Appendix

- A. Annual Board Meeting Schedule
- B. 2022/2023 Work Plan
- C. Acronym Index
- D. Terminology List

MONTANA

BOARD OF INVESTMENTS

REGULAR BOARD MEETING MINUTES

October 26-27, 2022

Meeting recordings are posted at: <https://leg.mt.gov/lsc/>
(timestamps may differ)

Call to Order

The Board of Investment's meeting was called to order by Board Chairman Karl Englund at 1:00 p.m. on Wednesday, October 26, 2022.

Attendance

Board Members Present: Karl Englund, Jack Prothero, Bruce Nelson, Diane Fladmo, Jeff Meredith, Maggie Peterson, Mark Barry, Terry Cohea, Daniel Trost

Board Members Absent: None

Legislative Liaisons Present: Rep. Ken Walsh

Legislative Liaisons Absent: Sen. Ryan Lynch

Board Staff Present: Brenda Thomas, Dan Villa, Dan Whyte, Dan Zarling, Doug Hill, Eron Krpan, Ethan Hurley, Jason Brent, John Carpenter, John Romasko, Jon Putnam, Julie Feldman, Kelsey Gauthier, Kirsten Haswell, Louise Welsh, Peggy MacEwen, Peggy Saarela, Rob Samson, Sam Holman, Savannah Morgan, Sheli Jacoby, Steve Strong, Tammy Lindgren, Teri Kolnik, Thomas Winkler

Interested Parties Present: Jim Voytko – RVK; Becky Gratsinger with RVK; Joepeth Ibis – With Intelligence; Gregg Gethard - PEI Media; Matt Rogers – With Intelligence; Franco Wang – CEM; Daniel Griffiths - CEM

October 26, 2022

Tab 1 CALL TO ORDER (00:06)

A. Notice of Video Recording (00:15)

Chairman Englund advised of audio and video recording of the meeting.

B. Roll Call (00:23)

Roll was taken. Nine Board members were present, forming a quorum.

C. Public Comment (01:10)

Chairman Englund asked for public comment. None was given.

D. Approval of Minutes (01:22)

August 3-4, 2022, Regular Board Meeting Minutes, August 16, 2022, Special Meeting Minutes, and September 23, 2022, Special Meeting Minutes

Member Peterson moved to approve. Member Cohea seconded the motion, which passed unanimously.

E. Administrative Business

1. Audit Committee Report (02:01)

Committee Chair Peterson briefed the Board.

Chair Peterson moved to approve the Wipfli SOC Audit Draft Report. Member Cohea seconded the motion, which passed unanimously.

2. Loan Committee Report (05:16)

Committee Chair Prothero briefed the Board.

Chair Prothero moved to approve the Department of Transportation's INTERCAP loan request for \$4,000,000. Member Barry seconded the motion, which passed unanimously.

Chair Prothero moved to approve the Inter-agency Service Agreement with the Governor's Office of Budget and Program Planning (OBPP). Member Peterson seconded the motion, which passed unanimously.

3. HR Committee Report (08:19)

Committee Chair Cohea briefed the Board.

Member Peterson moved to approve the new policy 30.110 Leave Policy for Board Staff, with a few edits previously discussed. Member Trost seconded the motion, which passed unanimously.

Chair Cohea moved to approve the staff recommendation to hire Thomas Winkler as the Board's Director of Private Investments. Member Peterson seconded the motion, which passed unanimously.

F. Comments from Pension Board Members

Member Trost briefed the Board. (11:51)

Member Peterson briefed the Board. (18:22)

G. Comments from Board Legislative Liaisons

Rep. Walsh briefed the Board. (23:32)

Tab 2 EXECUTIVE DIRECTOR REPORTS (24:48)

A. Monthly Snapshot

Executive Director Villa briefed the Board.

B. 2023 Board Meeting Calendar

Executive Director Villa briefed the Board.

Member Prothero motioned to approve the calendar as presented. Member Meredith seconded the motion, which passed unanimously.

Tab 3 BENCHMARK REVIEW – CEM, Inc. (29:35)

Franco Wang and Daniel Griffiths from CEM briefed the Board and answered questions.

Tab 4 ASSET ALLOCATION RANGE RECOMMENDATION (00:03)

Jon Putnam briefed the Board and answered questions.

ADJOURN

October 27, 2022

CALL TO ORDER (00:06)

A. Notice of Video Recording (00:07)

Chairman Englund advised of audio and video recording of the meeting.

B. Roll Call (00:17)

Roll was taken. Eight Board members were present including Chairman Karl Englund, Jack Prothero, Bruce Nelson, Diane Fladmo, Maggie Peterson, Mark Barry, Dan Trost, and Jeff Meredith, forming a quorum.

C. Public Comment (01:04)

Chairman Englund asked for public comment. None was given.

Tab 5 INVESTMENTS – NEW COMMITMENTS (01:50)

A. Real Estate/Real Assets (01:55)

Ethan Hurley briefed the Board.

B. Private Investments (29:45)

Thomas Winkler briefed the Board.

Tab 6 SEPARATE ACCOUNTS INVESTMENTS REVIEW (38:22)

John Romasko, Kirsten Haswell, John Carpenter, and Kelsey Gauthier briefed the Board and answered questions.

Tab 7 INVESTMENT POLICY STATEMENTS (01:47:25)

A. Kirsten Haswell briefed the Board and answered questions.

B. Member Nelson motioned to approve the proposed new Hail Insurance Fund Policy Statement. Member Fladmo seconded the motion, which passed unanimously.

RECAP OF STAFF TO DO LIST AND ADJOURNMENT (01:51:51)

Chairman Englund and Executive Director Villa listed items for follow-up.

Chairman Englund adjourned the meeting at 11:30 a.m.

MONTANA BOARD OF INVESTMENTS

APPROVE: _____

Karl J. Englund, Chairman

ATTEST: _____

Dan Villa, Executive Director

DATE: _____

MONTANA

BOARD OF INVESTMENTS

To: Members of the Board
From: Dan Villa, Executive Director
Date: December 6, 2022
Re: Executive Director Report

- A. Member Requests from Prior Meeting
- B. Monthly Snapshot - *attached*
- C. 2023 Work Plan - *attached*
- D. 2023 Legislative Session

I have built a BOI bill tracker for our internal use. Please let me know if you'd like the login and password to the LAWS System. As I did last session, I will send a weekly update to the Board with actions, drafts, or other pertinent news that will impact the Board's investment mission. From time to time, I may include news related to other topics that aren't directly related to BOI but which may impact us (for example, changes in HR policy, state employee pay, etc).

I will have pertinent committee assignments and a budget update available for you at the meeting.

- E. LPAC Reporting - *attached*
- F. Securities Litigation Annual Review - *attached*
- G. Policy 10.217 Authorization of Investment Vendors - *attached*

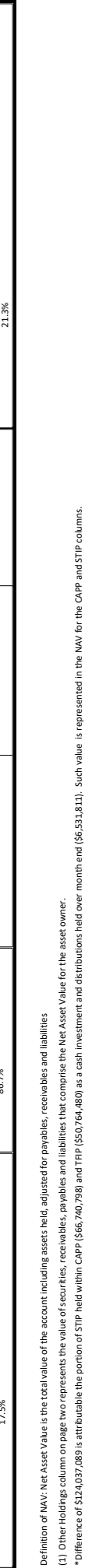
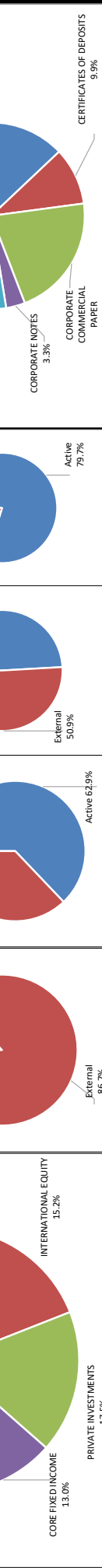
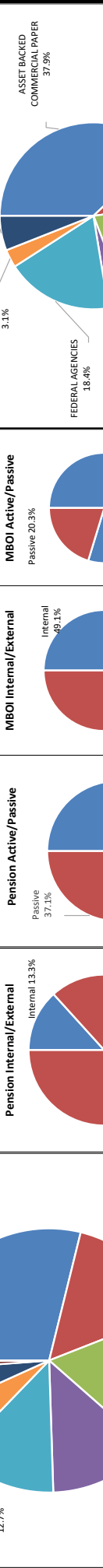
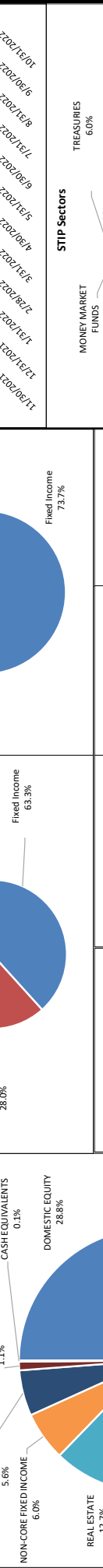
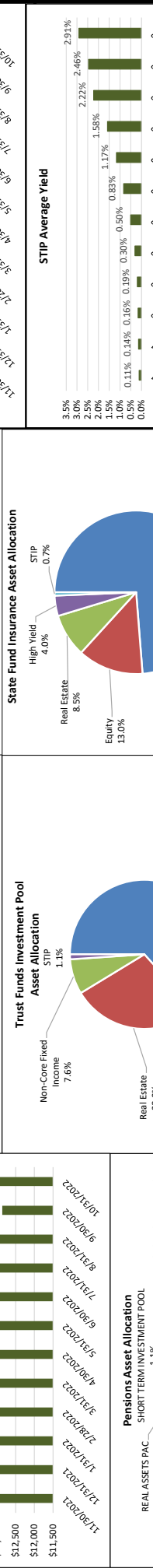
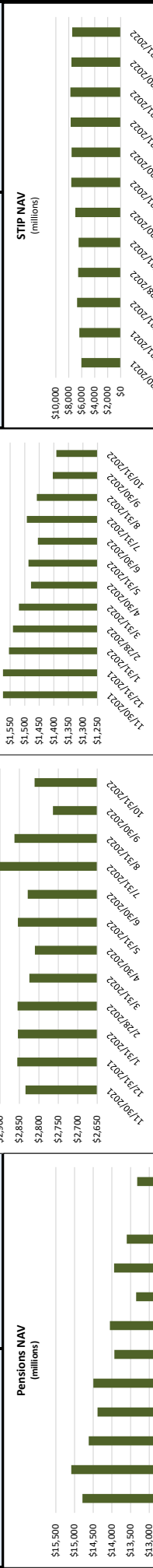


MBOI Snapshot

Asset Management View
10/31/2022 Unaudited

Assets Under Management \$25,120,513,673

Pensions		TFIP		State Fund		Other Fixed Income & Pending	
NAV	%	NAV	%	NAV	%	NAV	%
\$3,842,200,986	28.84%	\$1,770,463,506	63.20%	\$1,026,053,128	73.74%	\$116,114,975	
\$2,024,257,428	15.19%	\$787,017,705	28.09%	\$181,375,156	13.04%		
\$2,326,653,314	17.46%	\$214,066,256	7.64%	\$118,944,443	8.55%	\$2,917,884,822	38.96%
\$1,732,298,473	13.00%	\$29,913,561	1.07%	\$55,890,541	4.02%	\$1,431,763,683	19.12%
\$1,694,244,979	12.72%	\$1,694,244,979	12.72%	\$1,147,347	0.66%	\$1,378,820,451	18.41%
\$799,222,169	6.00%	\$2,801,461,028	100.00%	\$1,391,410,614	100.00%	\$1,017,422,715	13.59%
\$744,344,284	5.59%					\$446,778,107	5.97%
\$139,912,270	1.05%					\$171,426,828	2.29%
\$19,706,061	0.15%					\$124,590,484	1.66%
\$13,322,839,963	100.00%					\$7,488,687,092	100.00%



Definition of NAV: Net Asset Value is the total value of the account including assets held, adjusted for payables, receivables and liabilities

(1) Other Holdings column on page two represents the value of securities, receivables, payables and liabilities that comprise the Net Asset Value for the asset owner.

*Difference of \$124,037,089 is attributable the portion of STIP held within CAPP (\$66,740,798) and TRIP (\$50,764,480) as a cash investment and distributions held over month end (\$6,531,811). Such value is represented in the NAV for the CAPP and STIP columns.

BOI WORK AND EDUCATION PLAN

2022

2023

February 16-17

Education:

Outreach Efforts for the Board - In-State Loan and INTERCAP Programs
Short Term Investment Pool

Reports:

Ethics Policy
Disaster Recovery and Emergency Preparedness
Quarterly Reports
In-State Loan Reports
INTERCAP Reports

Committee Meetings:

Audit: Financial Audit Report

April 20

Education:

Domestic Equity Asset Class Review
RVK Annual Capital Market Assumptions

Reports:

Benchmarks Used by the Board

May 25-26

Education:

MT Buildings (Board as Landlord/Tenant Holdings)
Investment Policy Statement Review
Real Estate Asset Class Review

Reports:

Budget Status FYTD
Quarterly Reports
In-State Loan Reports
INTERCAP Reports

Committee Meetings:

Audit: Accounting Staff Review
HR: Staffing Level Review
HR: Exempt Staff Compensation Review

August 3-4

Education:

Core Fixed Income Asset Class Review
Budget Proposal for FY24-25

Reports:

Proxy Voting
Budget Status Prior FY
Quarterly Reports
In-State Loan Reports
INTERCAP Reports

Committee Meetings:

Audit: SOC I, Type 2 Report

October 26-27

Education:

Separate Accounts Investment Review
First Reading - Asset Allocation Range Recommendation

Reports:

CEM, Inc Cost Reporting Analysis

Committee Meetings:

HR: Exempt Staff Performance Review

December 6-7

Education:

2023 Legislative Session
Policy 217 - Reauthorization of Investment Vendors
Adoption - Asset Allocation Range Approval

Reports:

Quarterly Reports
In-State Loan Reports
INTERCAP Reports

Committee Meetings:

Audit: Annual Report and Financial Statements

February 22-23

Education:

Cash Management of State Monies
Custodial Banking Relationship and Continuity

Reports:

Ethics Policy
Disaster Recovery and Emergency Preparedness
Quarterly Reports
In-State Loan Reports
INTERCAP Reports

Committee Meetings:

Audit: Financial Compliance Audit Report

April 12

Education:

International Equities Asset Class Review
RVK Annual Capital Market Assumptions

Reports:

Benchmarks Used by the Board

May 24-25

Education:

State Government Customer Relationships
Investment Policy Statement Review
Real Assets Asset Class Review

Reports:

Budget Status FYTD
Quarterly Reports
In-State Loan Reports
INTERCAP Reports

Committee Meetings:

Audit: Accounting Staff Review
HR: Staffing Level Review
HR: Exempt Staff Performance and Compensation Review

August 23-24

Education:

Trust Funds Investment Review
Non-Core Fixed Income Asset Class Review

Reports:

Budget Status Prior FY
Quarterly Reports
In-State Loan Reports
INTERCAP Reports

Committee Meetings:

Audit: SOC I, Type 2 Report

October 11

Education:

Private Investments Asset Class Review
First Reading - Asset Allocation Range Recommendation

Reports:

Securities Lending

Committee Meetings:

HR: Exempt Staff Performance Review

December 13-14

Education:

MPERA and TRS Relationship
Policy 217 - Reauthorization of Investment Vendors
Adoption - Asset Allocation Range Approval

Reports:

Quarterly Reports
In-State Loan Reports
INTERCAP Reports

Committee Meetings:

Audit: Annual Report and Financial Statements

MONTANA

BOARD OF INVESTMENTS

TO: Member of the Board
FROM: Eron Krpan, Director of Investment Operations
DATE: December 6, 2022
RE: Securities Litigation Review

The Board has policies specific to securities litigation (Board Policy 10.250). In general, the Executive Director is responsible for overseeing the process involving securities litigation matters, which generally fall into three possible subsets: class actions, antitrust litigation, or other actions where the Board takes a lead. The Board directs how its staff, attorneys and other agents are to operate depending on class action or other action such as in a lead plaintiff status.

Board policy states, in part: “The Board shall take reasonable, cost-effective steps to identify, pursue, and collect upon claims under state and federal securities laws for losses suffered by the Board on its investments because of alleged or proven violations of securities laws.”

In meeting this requirement, the Board’s contract with State Street Bank requires: “Contractor will track all necessary Board transaction data that will permit the Board to participate in class action litigation and will file as appropriate on behalf of the Board to participate in class action litigation. Contractor will also be required to feed such data to the Board’s litigation monitoring providers.”

State Street Bank files the necessary documentation, on the Board’s behalf, to join a U.S. securities class action lawsuit. It provides litigation information updated daily through its web portal. A sample of a partial litigation status report is attached (the full report is many pages).

For larger claims, and as a cross check on securities litigation matters, the Board has three securities class action monitoring firms to identify and evaluate potential claims that may merit commencing separate litigation, filing motions as lead or co-lead plaintiff, or opting out of a class action settlement. The Board utilizes Barrack, Rodos & Bacine; Bernstein, Litowitz, Berger & Grossmann LLP; and FRT for this purpose.

The Board requires that “The Executive Director, the Chief Investment Officer, the Board’s legal counsel, and the Board’s investment consultant shall receive reports from the Monitoring Firm, regarding the status of all securities class action litigation matters in which the Board is or could be a member.”

Retained firms provide reports to the Executive Director monthly and will recommend higher involvement than just joining in a blanket class action in certain cases.

Amounts Received

Settlement amounts from securities litigation are sporadic and, in some years, nominal.

	FY2022	FY2021	FY2020	FY2019	FY2018	FY2017	FY2016
Pensions Total	\$ 485,309	\$ 496,429	\$ 270,560	\$ 420,476	\$ 216,052	\$ 166,246	\$ 433,936
Domestic Equity	\$ 370,904	\$ 105,642	\$ 212,781	\$ 419,280	\$ 213,583	\$ 144,367	\$ 427,505
International Equity	\$ 74,246	\$ 383,422	\$ 4,117	\$ 903	\$ 883	\$ 21,879	\$ 6,431
Fixed Income	\$ 40,158	\$ 360	\$ 53,661	\$ 293	\$ 1,586	\$ -	\$ -
Private Investments		\$ 4,135					
Real Estate		\$ 2,781					
Trust Fund Investment Pool	\$ 13,038	\$ 180	\$ 55	\$ 344	\$ 1,137	\$ -	\$ -
State Fund	\$ 13,570	\$ 180	\$ 187	\$ 1,375	\$ -	\$ 8,217	\$ -
Short Term Investment Pool (STIP)	\$ 115,287						
Other	\$ 10,075	\$ 90					
Total Settlements	\$ 637,279	\$ 496,789	\$ 270,802	\$ 422,195	\$ 217,189	\$ 174,463	\$ 433,936

NOTE: Only reflective of security litigation recovered by custodian or external parties

Antitrust and Non-U.S. Securities Litigation

Historically, most institutional investors exclusively filed U.S. securities class actions settlements. In recent years U.S. antitrust class actions have become more prominent and non-U.S. securities class actions in select countries have evolved beyond requiring investors to be named as parties in active litigation. In more active jurisdictions, participation is decided on a case-by-case basis depending on the size of the claim, risk of cost shifting and requirements on staff time to prepare materials or attend hearings.

Recently Completed Antitrust, Global, and Bankruptcy Filings

Antitrust Litigation								
Type	Case	Settlement Amount	Preliminary Loss Estimate	Recognized Loss	Participation Date/Deadline	\$ Recovered	Estimated Pay Date	Status
Antitrust	LIBOR	\$590m	NA	NA	12/20/2018		3/29/2023	Settled
Antitrust	Euroyen Based Derivatives	\$236m	NA	NA	9/25/2018		12/27/2022	Settled
Antitrust	FOREX*	\$2.3b	NA	NA	5/16/2018	\$10,173	3/31/2021	Settled
Antitrust	ISDAfix	\$96m	NA	NA	12/23/2018	\$2,845	7/27/2021	Settled
Antitrust	Euribor	\$491.5m	NA	NA	7/31/2019		12/29/2023	Settled
Antitrust	GSE Bonds	\$386.5m	NA	NA	5/12/2020	\$199,238	3/31/2022	Settled
Antitrust	E-Mini	\$15m	NA	NA	8/12/2021		TBD	Settled
Antitrust	SSA Bonds	\$95.5m	NA	NA	4/16/2021		TBD	Settled
Antitrust	Mexican Government Bonds	\$20.7m	NA	NA	11/29/2021		TBD	Settled

*FOREX payments have begun

Non-U.S. Litigation								
Type	Case	Settlement Amount	Preliminary Loss Estimate	Recognized Loss	Participation Date	\$ Recovered	Estimated Pay Date	Status
Global Active	Novo Nordisk - Denmark	Not Established	\$871,988		8/5/2019		Not Available	Under Investigation
Global Passive	Fortis**	\$1.5b	\$9,234	\$3,927	7/28/2019	\$44,541	3/31/2021	Settled
Global Passive	AMP Ltd.	Not Established	Not Available		11/20/2020		Not Available	Under Investigation
Global Passive	Brambles Ltd.	Not Established	\$112,331		10/22/2021		Not Available	Settled
Global Passive	Commonwealth Bank of Australia	Not Established	Not Available		6/6/2022		Not Available	Settled
Global Passive	Crown Resorts	\$125m	Not Available		1/24/2022		Not Available	Settled
Global Passive	Pitcher Partners	\$41m	Not Available		10/20/2022		Not Available	Settled
ADR/Global	BONY Mellon ADR	\$72.5m	Not Available	Not Available	8/15/2019	\$46,622	11/30/2020	Settled
ADR/Global	Citibank ADR	\$14.75m	Not Available	Not Available	8/12/2019		3/29/2023	Settled
ADR/Global	JP Morgan ADR	\$9.5m	Not Available	Not Available	9/19/2019		3/29/2023	Settled

**Pending payment

Bankruptcy								
Type	Case	Settlement Amount	Preliminary Loss Estimate	Recognized Loss	Participation Date	\$ Recovered	Estimated Pay Date	Status
Bankruptcy	PG&E Corporation	Not Established	Not Available	Not Available	Not Available		Not Available	Reorganizing

Corporate Governance/Class Actions
Class Action Status

Date:

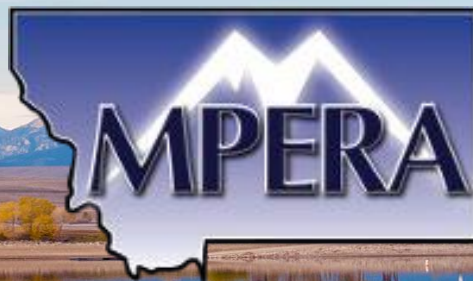
Funds: All Funds Selected

View Date: November 16, 2022



STATE STREET.

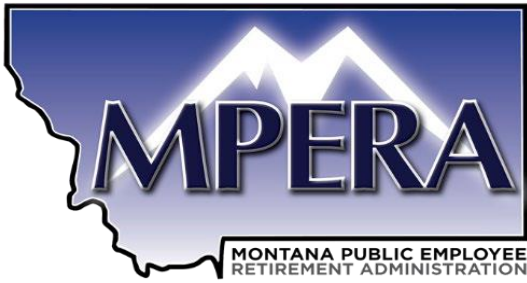
Docket #	Event Name	Class Period Start Date	Class Period End Date	Event Status	Expiration Date
Claims Administrator					
603-MD-1512	ELECTRONIC DATA SYS CORP	02/07/2001	09/18/2002	PROOF OF CLAIM	04/19/2006
EPIO					
01-cv-1451-REB-CBS	QWEST COMMUNICATIONS INTERNATI	05/24/1999	07/28/2002	PROOF OF CLAIM	05/02/2006
GILARDI AND CO LLC					
00-1990 (SRC)	BRISTOL MYERS SQUIBB CO	10/19/1999	03/20/2002	PROOF OF CLAIM	06/30/2006
GARDEN CITY GROUP INC					
02 Cv. 8801(GEL)	AT&T CORP (SALOMON ANALYST)	11/29/1999	06/14/2002	PROOF OF CLAIM	09/12/2006
BERDON CLAIMS ADMINISTRATION LLC					
2001-CV-1856(RMB)	NORTEL NETWORKS CORP (I)	10/24/2000	02/15/2001	PROOF OF CLAIM	11/20/2006
GARDEN CITY GROUP INC					
C-00-4263 VRW	QUINTUS CORP	11/15/1999	11/15/2000	PROOF OF CLAIM	11/22/2006
BERDON CLAIMS ADMINISTRATION LLC					
MDL-1594	Federal Home Loan Mortgage Cor	07/15/1999	11/20/2003	PROOF OF CLAIM	12/07/2006
GARDEN CITY GROUP INC					
205-CV-05868-AB	PEGASUS COMMUNICATIONS CORP	11/09/2000	06/02/2004	PROOF OF CLAIM	12/13/2006
STRATEGIC CLAIMS SERVICES					
C-01-20418-JW(PVT)	CISCO SYSTEMS INC	11/10/1999	02/06/2001	PROOF OF CLAIM	12/21/2006
GILARDI AND CO LLC					
02 C 07527	SEARS ROEBUCK + CO	10/24/2001	10/17/2002	PROOF OF CLAIM	01/05/2007
GARDEN CITY GROUP INC					
02-CV-72-SPF (FHM)	Williams Companies Inc	07/24/2000	07/22/2002	PROOF OF CLAIM	02/16/2007
GARDEN CITY GROUP INC					
C-02-2270-JW(PVT)	VERISIGN INC	01/25/2001	04/25/2002	PROOF OF CLAIM	04/03/2007
GILARDI AND CO LLC					
02-CV-271	PNC FINL SVCS GROUP INC	07/19/2001	07/18/2002	PROOF OF CLAIM	05/11/2007
RSM MCGGLADREY					
02-CV-3692 (JES)	EDISON SCHS INC	11/10/1999	05/14/2002	PROOF OF CLAIM	07/20/2007



Montana Public Employee Retirement Administration

Montana Public Employees' Retirement Board Valuation Results June 30, 2022

**Dore Schwinden, Executive Director, MPERA
William Holahan, Deputy Director, MPERA**



Benefit Financing

➤ Basic Retirement Funding Equation

$$C + I = B + E$$

C= Contributions

I= Investments

B= Benefits Paid

E= Expenses (administration)

B depends on

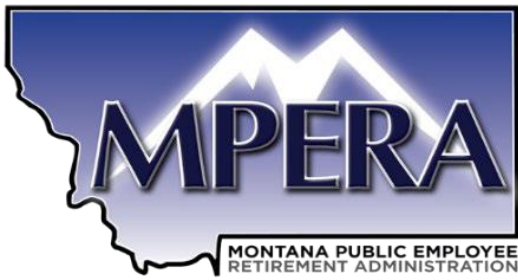
Plan Provisions

Experience

C depends on

Short Term: Actuarial Assumptions
Actuarial Cost Method

Long Term: I, B, E

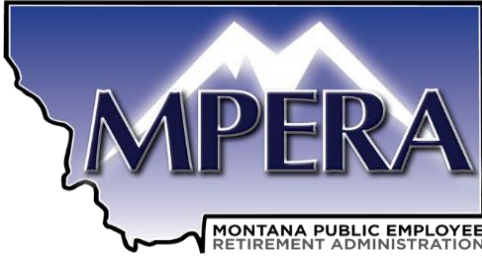


Participation in MPERA

- State, local governments, and certain employees of the Montana University system, & school districts are covered by MPERA.

- 43,279 Active Employees Including DC and 457 Members
- 30,005 Retirees & Beneficiaries (all DB systems)
- 39,557 Inactive (all DB systems)

- 563 Employers (DB)
- 225 Volunteer Fire Departments



Comments on Valuation for PERS

➤ Asset returns

- Market asset returns averaged -4.21% vs. 7.65% expected (11.86% less than expected).
- Actuarial asset returns averaged 8.02% vs. 7.65% expected (0.37% more than expected).

➤ **Market value of assets** are \$121,914,618 less than the actuarial value of assets. The asset valuation method being used is a four-year smoothing.

➤ Funded Ratio

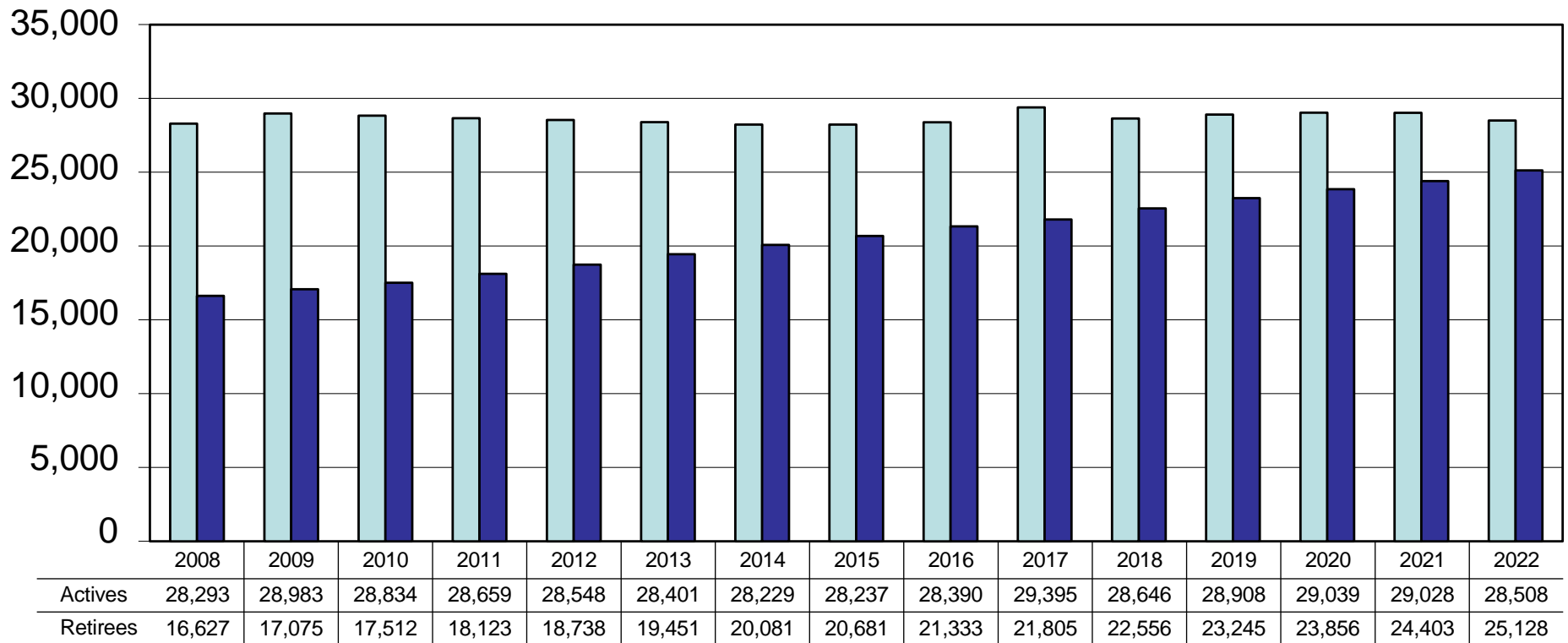
-Funding decreased from 76.34% to 75.01%

➤ Amortization Period

-Amortization period increased from 28 years to 32 years



PERS Active and Retired Membership



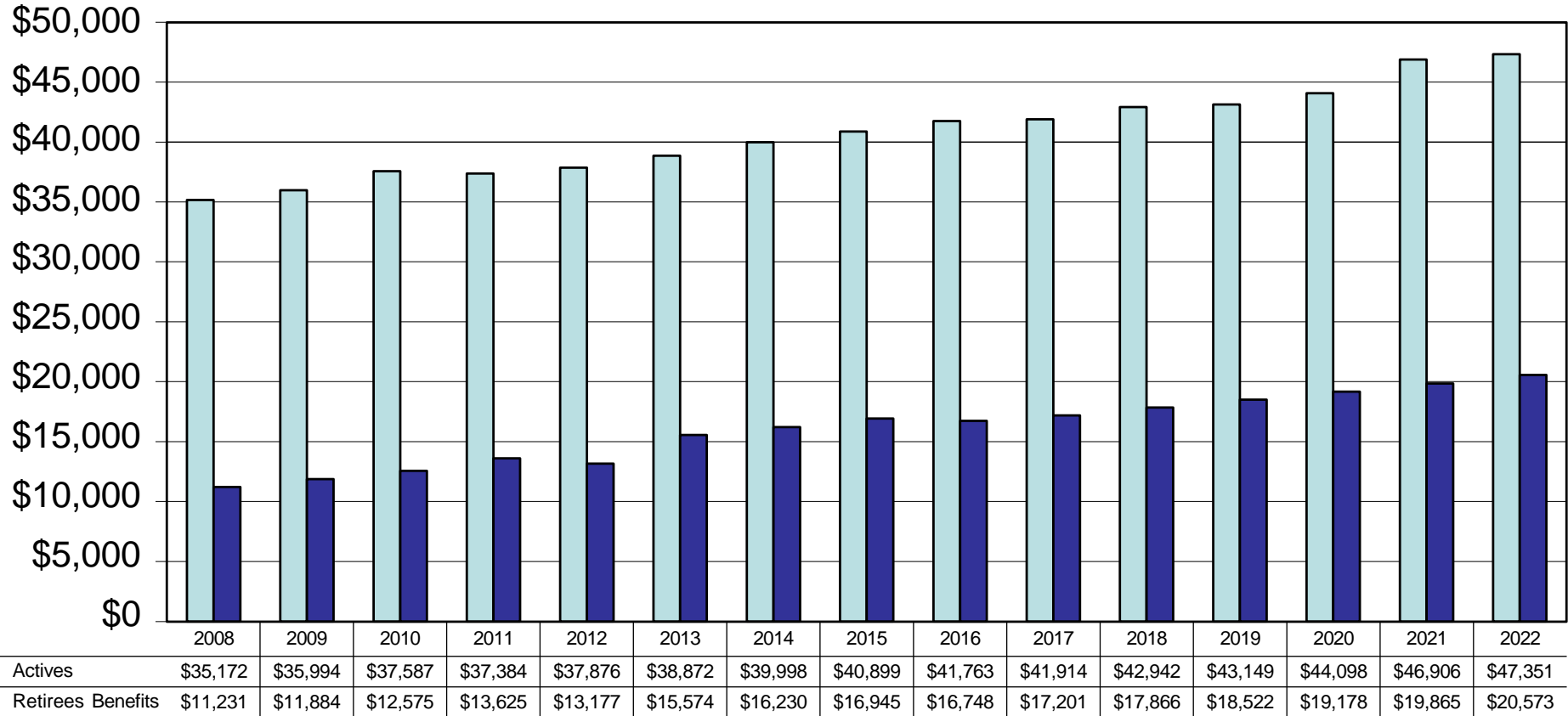
0.1% annual increase for active members since 2008; 1.8% decrease for 2022.

3.0% annual increase for retired members since 2008; 3.0% increase for 2022.

1.7 active per retiree 14 years ago; 1.13 active per retiree now.

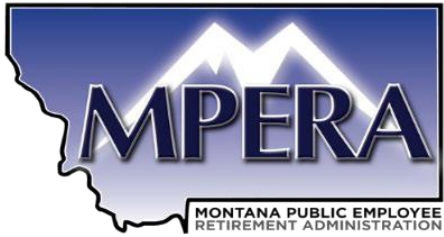


PERS Average Salary and Benefits



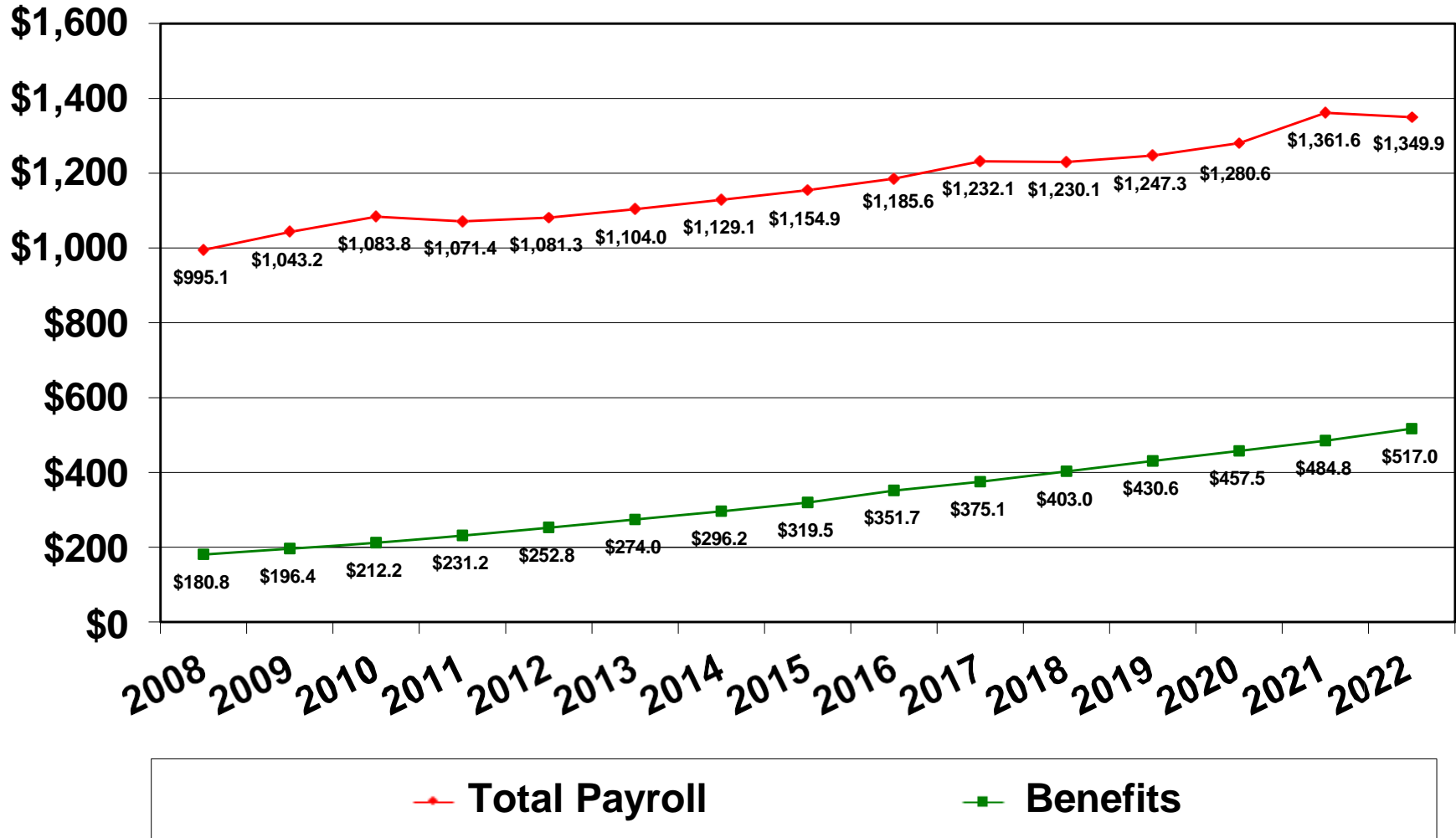
2.1% annual increase for average salary since 2008; 0.9% increase for 2022.

4.4% annual increase for average benefits since 2008; 3.6% increase for 2022.



PERS Payroll & Benefits

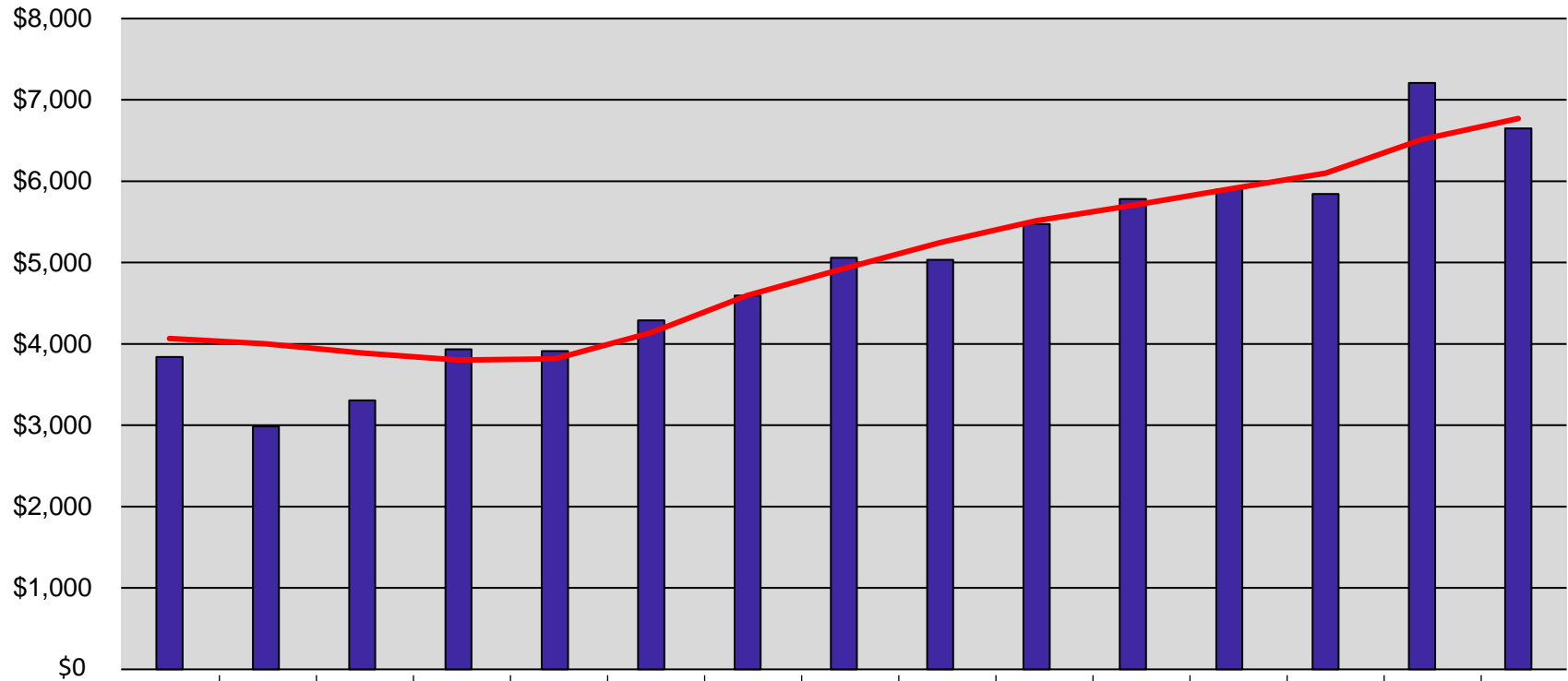
(\$ Millions)





PERS Assets

(\$ Millions)



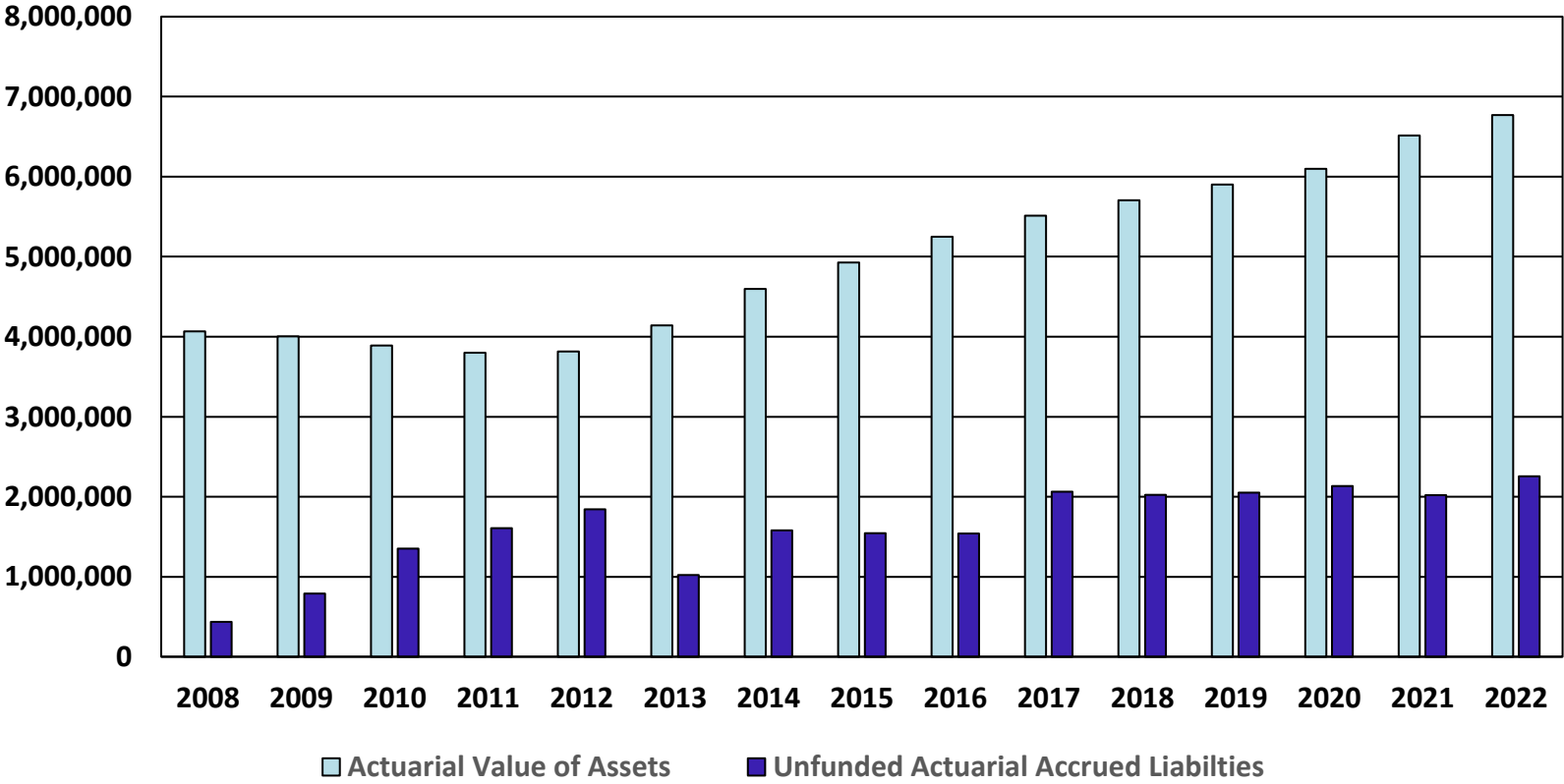
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Market Value	\$3,841	\$2,988	\$3,304	\$3,933	\$3,913	\$4,290	\$4,596	\$5,061	\$5,033	\$5,473	\$5,780	\$5,903	\$5,845	\$7,210	\$6,649
Actuarial Value	\$4,065	\$4,002	\$3,890	\$3,801	\$3,817	\$4,140	\$4,596	\$4,927	\$5,248	\$5,514	\$5,705	\$5,903	\$6,099	\$6,515	\$6,771

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Market Return	(4.9)%	(20.9)%	12.9%	21.7%	2.3%	13.0%	17.1%	4.6%	2.0%	11.9%	8.9%	5.7%	2.7%	27.8%	(4.2)%
Actuarial Return	7.6%	(0.2)%	(1.2)%	(0.1)%	3.3%	11.9%	13.2%	9.6%	9.3%	8.1%	6.7%	7.1%	7.1%	10.8%	8.02%



PERS Actuarial Assets vs UAAL

(\$ Millions)

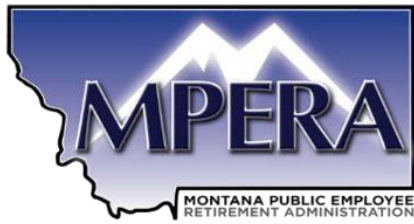




PERS Funding Results

		Before Exp. Study	After Exp. Study
	July 1, 2021 Valuation	July 1, 2022 Valuation	July 1, 2022 Valuation
Total Normal Cost Rate	9.71%	9.65%	9.72%
Administrative Expense Load	0.29%	0.35%	0.00%
Rate to Amortize UAL	6.83%	6.93%	7.21%
Transfer to DB Education Fund	<u>0.04%</u>	<u>0.04%</u>	<u>0.04%</u>
Statutory Funding Rate*	16.87%	16.97%	16.97%
Actuarial Accrued Liability	\$8,534.6 million	\$8,730.4 million	\$9,026.8 million
Actuarial Value of Assets	\$6,515.0 million	\$6,770.8 million	\$6,770.8 million
Unfunded Accrued Liability	\$2,019.6 million	\$1,959.6 million	\$2,256.0 million
Funded Ratio	76.34%	77.55%	75.01%
Amortization Period*	28 Years	27 Years	32 Years

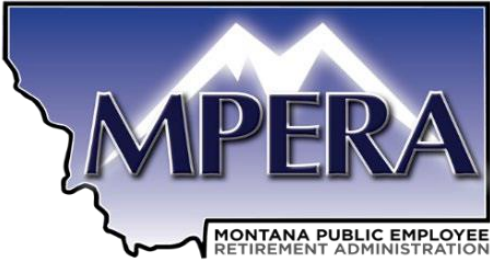
* Reflects anticipated increases in employer supplemental contribution rates and projected State revenue. Payable in fiscal year immediately following the valuation date.



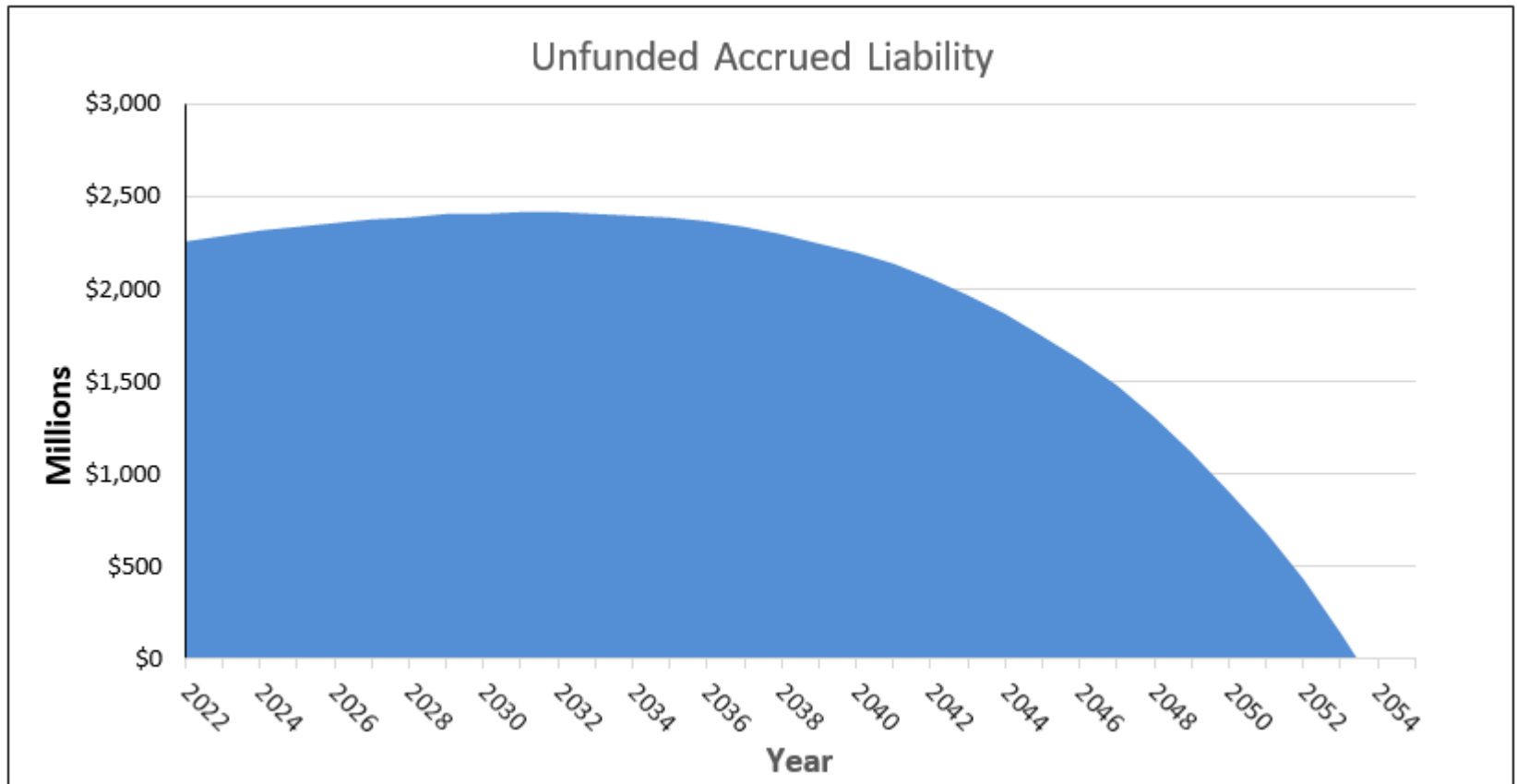
Valuation Results - Other Plans

System	Funded Ratio			Amortization Period			Statutory Rate	30-Year Funding Rate		
	2022			2022				2022		
	Exp. Study			Exp. Study				Exp. Study		
	2021	Before	After	2021	Before	After		2021	Before	After
JRS***	177%	180%	174%	0	0	0	7.00%	(11.97%)	(13.76%)	(8.99%)
HPORS**	67%	70%	66%	26	22	47	51.38%	48.81%	46.61%	56.53%
SRS	83%	84%	79%	18	17	33	23.61%	21.36%	21.05%	23.88%
GWPORS	85%	89%	83%	35	34	DNA	19.56%	19.85%	19.76%	24.21%
MPORS	74%	76%	71%	15	13	24	52.78%	43.13%	41.92%	50.67%
FURS	86%	88%	81%	6	5	12	57.66%	34.03%	32.65%	45.83%
VFCA*	99%	107%	91%	1	0	3	5% of premium taxes	\$351,815	\$0	\$1,060,482

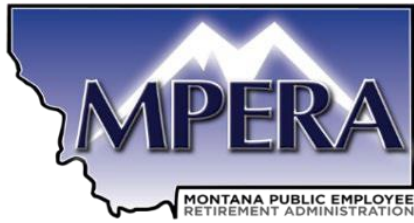
- * The actual contributions for the fiscal year ending 2021 and 2022 were \$2,591,791 and \$2,851,975, respectively.
- ** Calculation of amortization period includes state special revenue transfers.
- *** Employer contribution holiday beginning July 1, 2021 through June 30, 2023. Beginning July 1, 2023, employer contributions will resume at a reduced rate of 14.00% until the funded ratio drops below 120%.



Level Dollar vs. Level Percent of Pay



Projected UAAL- Level % of Pay



ASOP 4

- Effective for measurement dates on/after February 15, 2023 (July 1, 2023 valuation for MPERA)
- Changes Impacting Public Plans
 - Disclose Low-Default Risk Obligation Measure (LDRM)
 - Disclose Reasonable Actuarially Determined Contribution (ADC)
 - New guidance on amortization of the unfunded actuarial accrued liability
 - Assess implications of Contribution Allocation Procedure (CAP) or Funding Policy
 - Other changes
 - Output Smoothing Methods
 - Addressing contribution lag
 - Gain/loss analysis



TRS

Montana Teachers' Retirement System

Montana Teachers' Retirement System Valuation Results July 1, 2022

Shawn Graham, Executive Director

trs.mt.gov



Benefit Financing



➤ Basic Retirement Funding Equation

$$C + I = B + E$$

C = Contributions

I = Investment Income

B = Benefits Paid

E = Expenses (administration)



Participation in TRS



- Teachers, administrators, specialists and others employed in a teaching or educational services capacity by a public school district, state agency, county, community college, Montana University System or educational cooperative are covered by TRS.

– Active members	19,975
– Inactive members	7,671
– Retirees and Beneficiaries	17,369
– Employers	362



Comments on Valuation



➤ Asset returns

- Market asset return -4.13% vs. 7.50% expected (11.63% less than expected).
- Actuarial asset return 8.14% vs. 7.50% expected (0.64% more than expected).

➤ Market value of assets are \$75,147,197 less than the actuarial value of assets. Unrecognized investment gains/losses will be recognized over the next three years

- 2023 Investment Gain of \$10.7 million
- 2024 Investment Gain of \$60.2 million
- 2025 Investment Loss of \$146.1 million



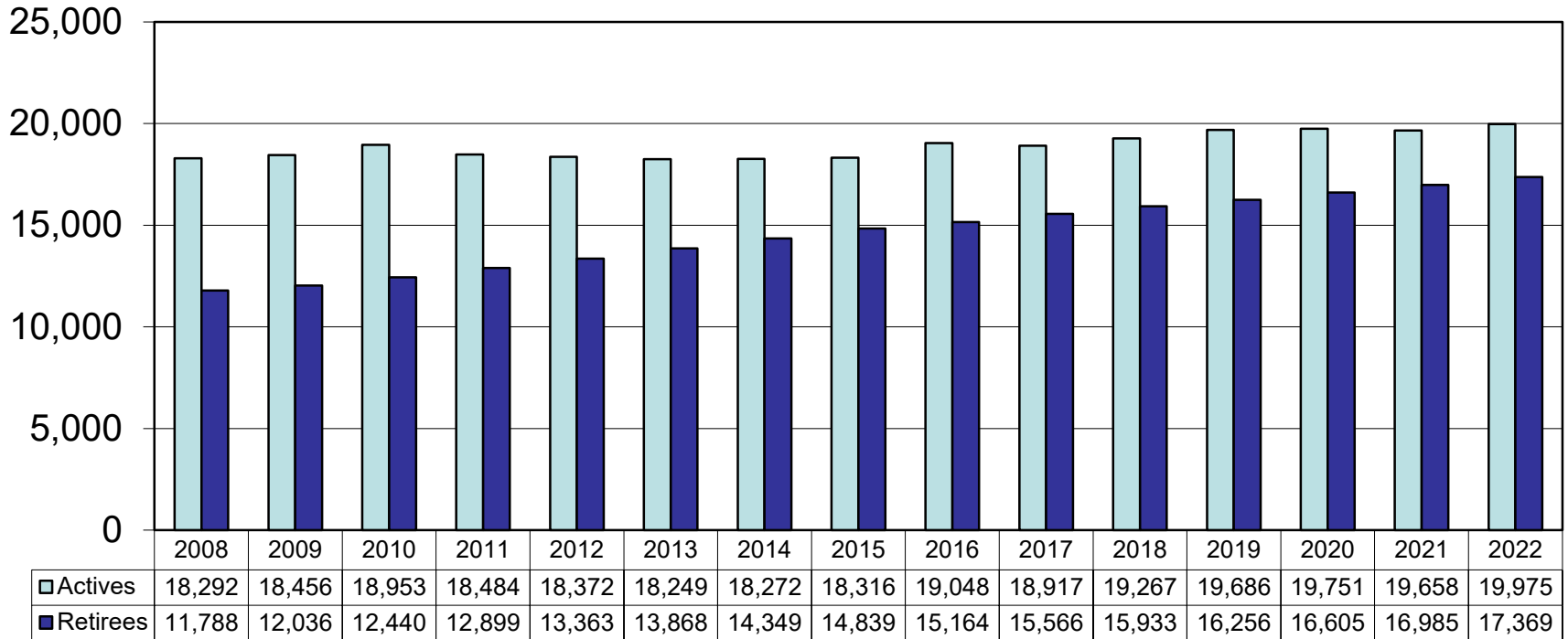
Comments on Valuation



- **Funded Ratio**
 - Funding increased from 71.43% to 71.73%
- **Amortization Period**
 - Amortization period increased from 24 years to 25 years



Active and Retired Membership



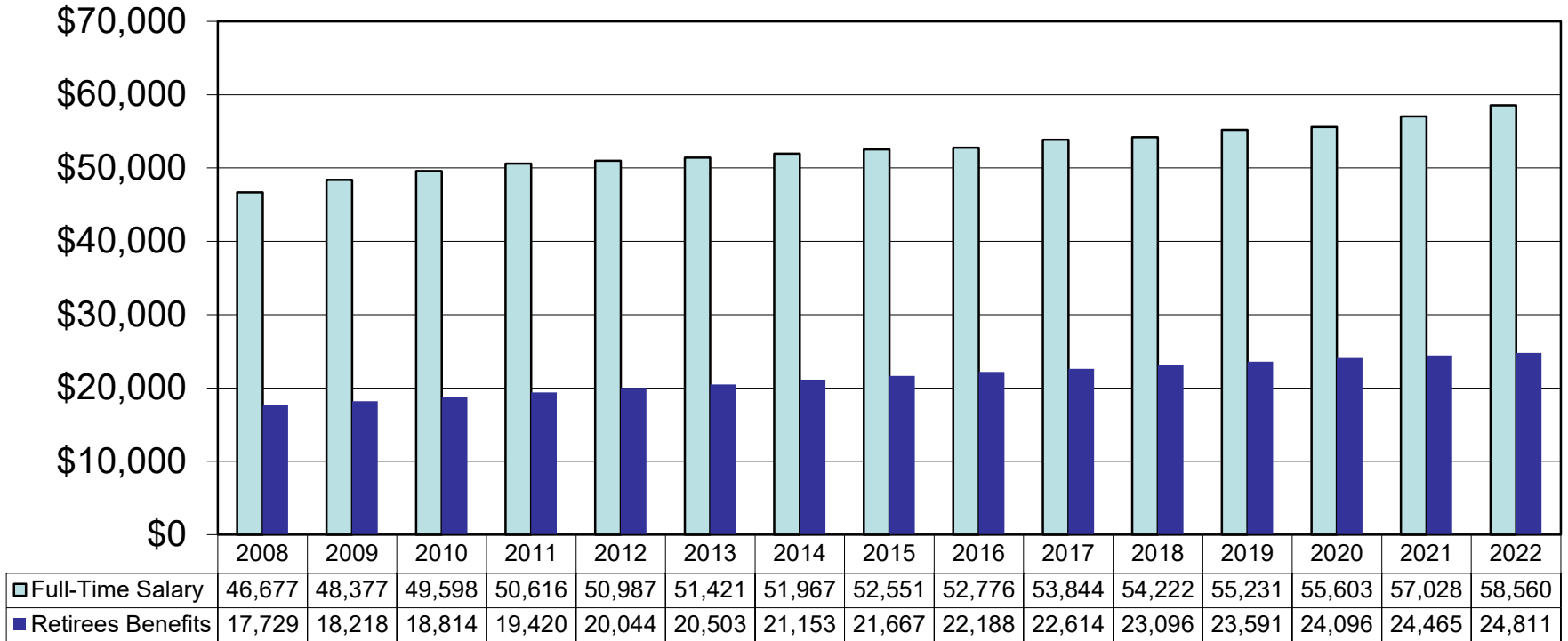
0.6% annual increase for active members since 2008; 1.6% increase for 2022.

2.8% annual increase for retired members since 2008; 2.3% increase for 2022.

1.6 actives per retiree 14 years ago; 1.2 actives per retiree now.



Average Salary and Benefits

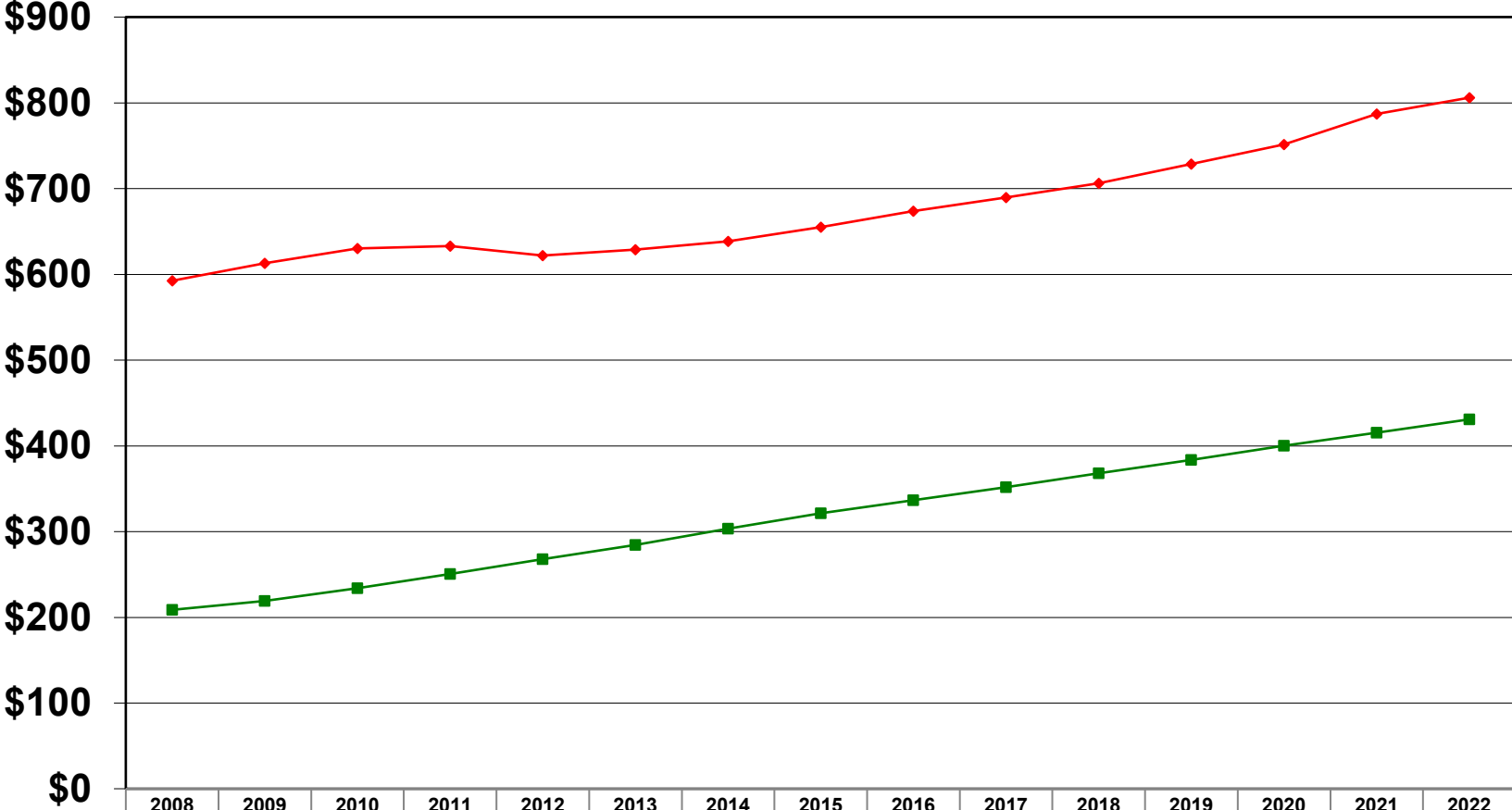


1.6% annual increase for average salary since 2008; 2.7% increase for 2022.

2.4% annual increase for average benefits since 2008; 1.4% increase for 2022.



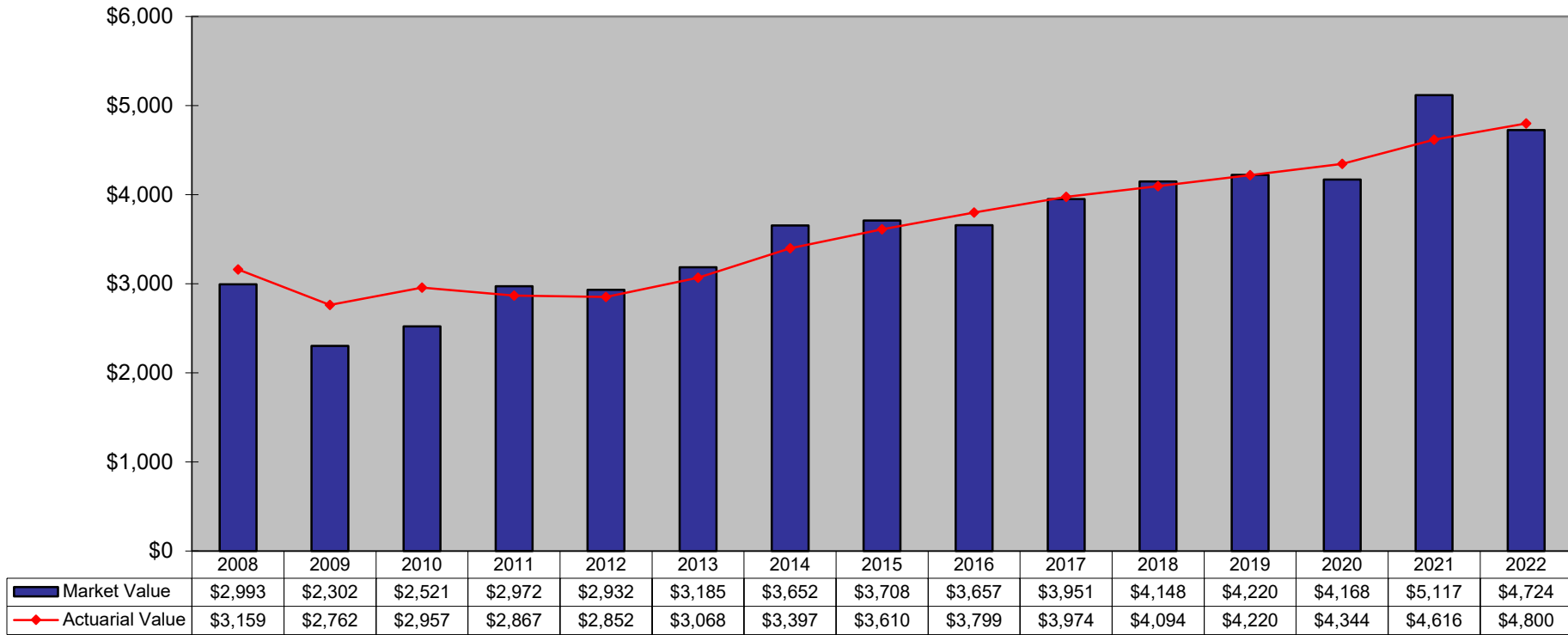
Payroll & Benefits (Millions)



Full-time Payroll	\$592.5	\$613.1	\$630.4	\$633.0	\$622.1	\$628.8	\$638.5	\$655.2	\$673.9	\$689.6	\$706.4	\$728.8	\$751.5	\$787.2	\$806.1
Benefits	\$209.0	\$219.3	\$234.0	\$250.5	\$267.9	\$284.3	\$303.5	\$321.5	\$336.5	\$352.0	\$368.0	\$383.5	\$400.1	\$415.5	\$430.9



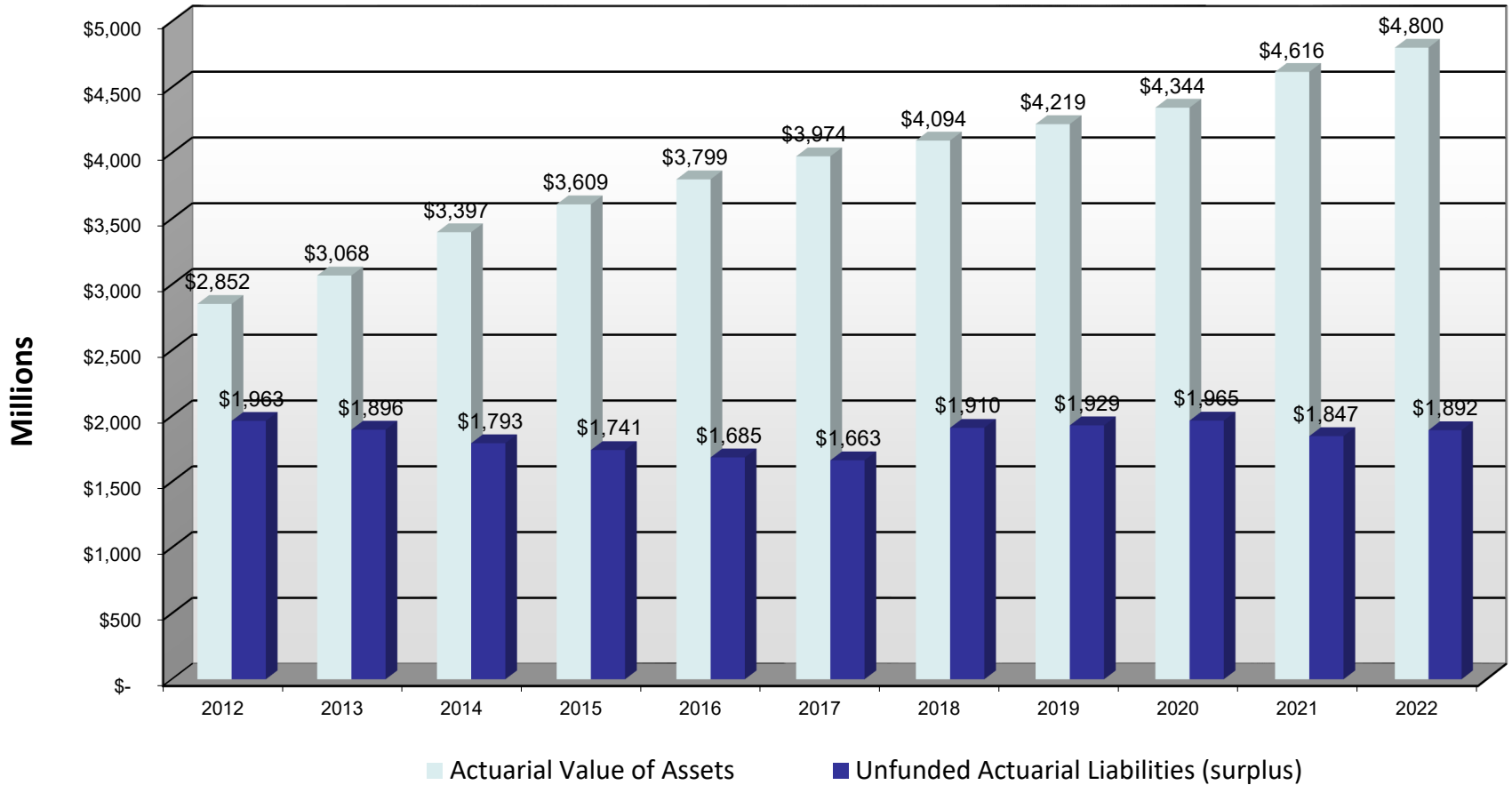
Assets (\$ Millions)



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Market Return	(4.9)%	(20.8)%	12.9%	21.7%	2.2%	12.9%	17.1%	4.6%	2.1%	11.9%	8.8%	5.7%	2.7%	27.7%	(4.1)%
Actuarial Return	7.2%	(10.3)%	9.8%	(0.1)%	3.2%	12.0%	13.2%	9.6%	8.8%	8.2%	6.9%	7.0%	7.0%	10.7%	8.1%



Actuarial Assets vs. UAAL





Funding Results



	July 1, 2021 Valuation	July 1, 2022 Valuation (Prior to Exp. Study)	July 1, 2022 Valuation (Reflecting Experience Study)
Total Normal Cost Rate	9.67%	9.58%	10.87%
Less Member Rate	<u>8.15%</u>	<u>8.15%</u>	<u>8.15%</u>
Employer Normal Cost Rate	1.52%	1.43%	2.72%
Administrative Expense Load	0.46%	0.39%	0.00%
Rate to Amortize UAL	<u>9.78%</u>	<u>10.04%</u>	<u>9.14%</u>
Total Employer Statutory Rate	11.76%	11.86%	11.86%
Actuarial Accrued Liability	\$6,463.2 million	\$6,613.1 million	\$6,691.3 million
Actuarial Value of Assets	\$4,616.3 million	\$4,799.6 million	\$4,799.6 million
Unfunded Accrued Liability	\$1,846.9 million	\$1,813.5 million	\$1,891.7 million
Funded Ratio	71.43%	72.58%	71.73%
Amortization Period*	24 Years	22 Years	25 Years

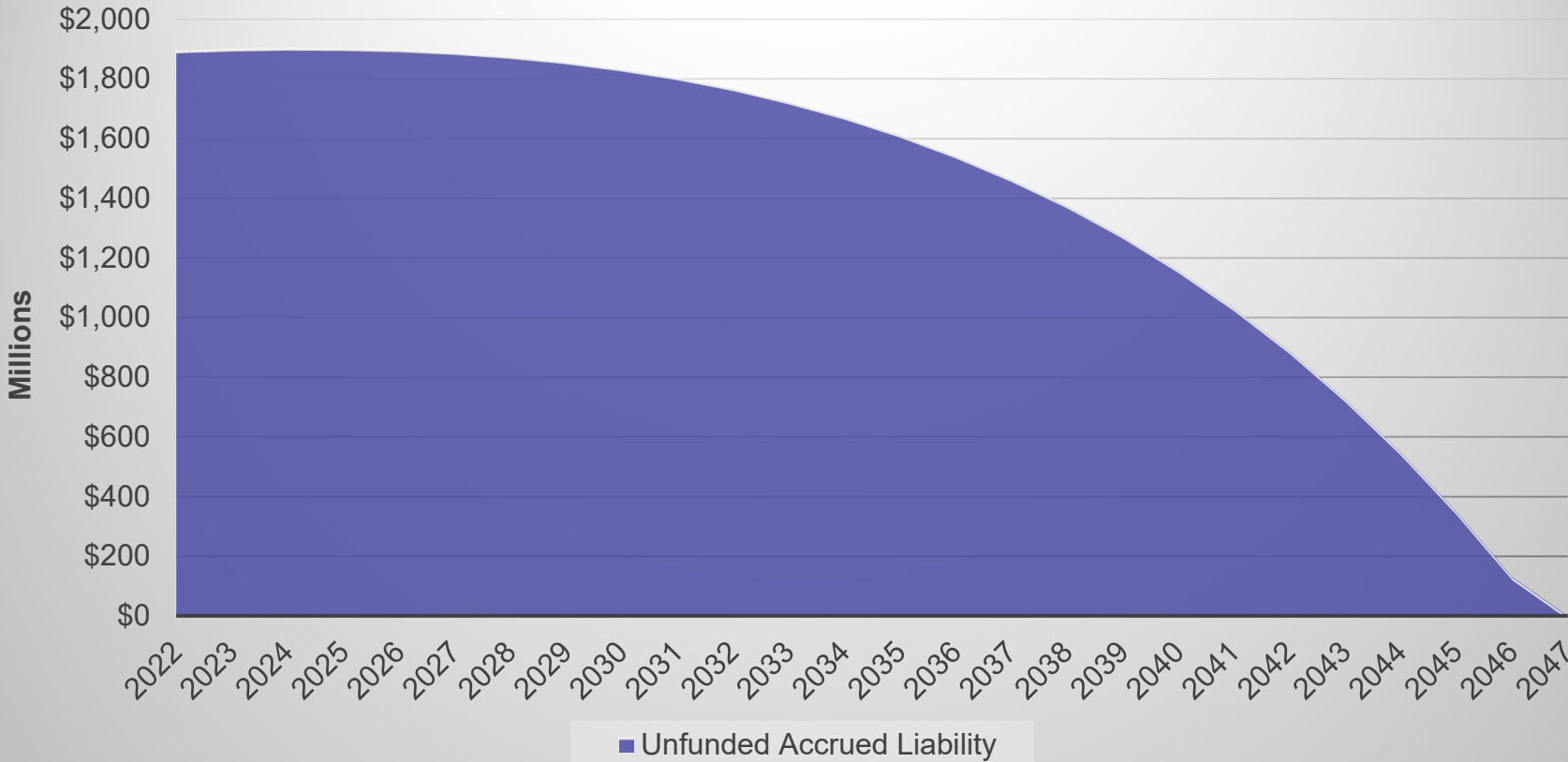
* Reflects anticipated increase in employer supplemental contribution rate



Progress Toward 100% Funding



Unfunded Accrued Liability





ASOP 4



- Effective for measurement dates on/after February 15, 2023 (July 1, 2023 valuation for TRS)
- Changes Impacting Public Plans
 - Disclose Low-Default Risk Obligation Measure (LDRM)
 - Disclose Reasonable Actuarially Determined Contribution (ADC)
 - New guidance on amortization of the unfunded actuarial accrued liability
 - Assess implications of Contribution Allocation Procedure (CAP) or Funding Policy
 - Other changes
 - Output Smoothing Methods
 - Addressing contribution lag
 - Gain/loss analysis

Asset Allocation

Jon Putnam – Chief Investment Officer

Date: October 26, 2022

Key Considerations

- Asset Allocation is critical to the long-term success of the portfolios managed by BOI. Annual approval of the asset allocation is an essential task of the Board.
- Diversification of the portfolio protects against extreme outcomes.
- There is no asset allocation that is “right” for every plan. The expected return and potential risk changes over time.
- The recommended asset allocation should consider the funding objectives, the characteristics of the plan/account, and the opportunity set of investments.
- Actual results measured over shorter time frames will deviate from the long-term assumptions. This does not mean the long-term assumptions are wrong.

Asset Allocation Process

- Determine if there have been any changes in client objectives and constraints.
- Evaluate any long-term shifts in the global economic environment.
 - Review Capital Market Assumptions produced by RVK and other market participants.
- All senior investment staff submit proposed asset allocations.
- RVK calculates multiple scenarios using the Mean Variance Optimization (MVO) model.
 - Process of weighing risk versus return to determine the most efficient portfolio.
 - Limitations of MVO include:
 - Sensitive to changes in expected return, variance, and correlation of assets
 - Constraints must be applied to avoid concentrated portfolios
 - Assumes an efficient market with rational participants
- Qualitative judgment must be applied to the process.
- Asset allocation meeting in Portland with RVK to discuss views.

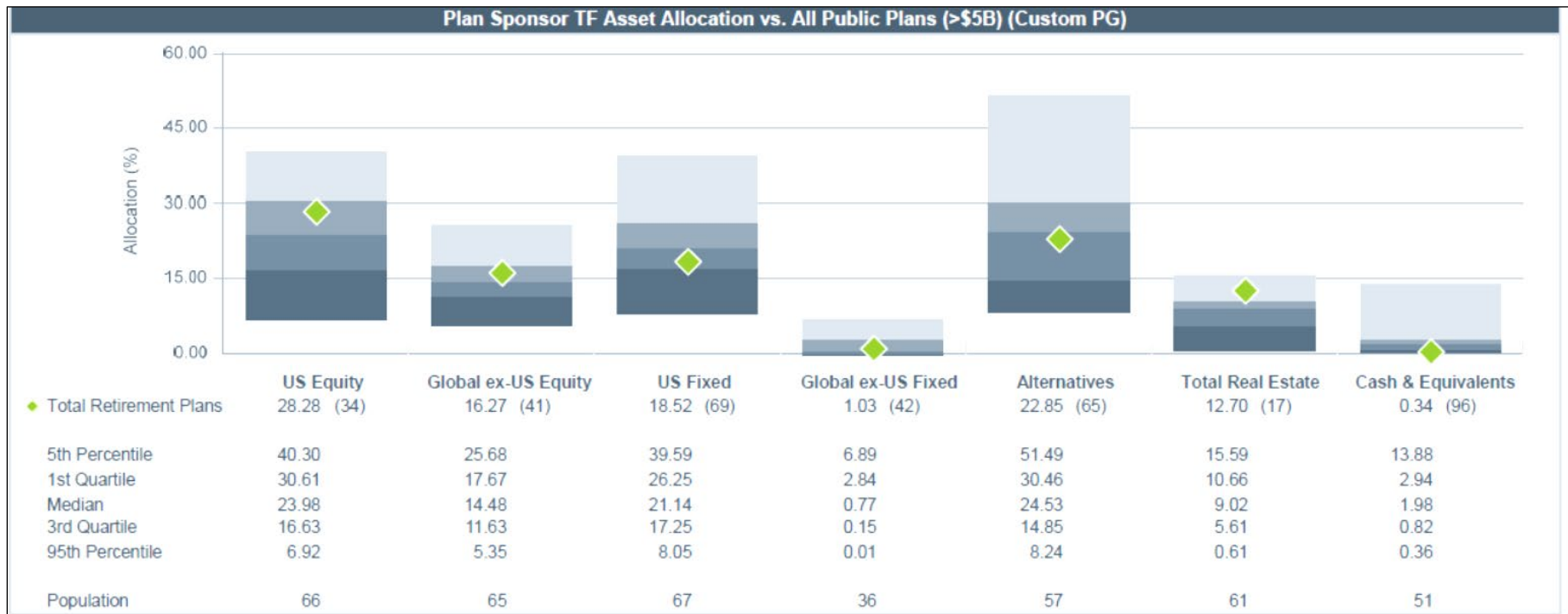
Net Cash Need

- Consideration of liquidity needs is a critical component of asset allocation. Avoid being a forced seller.

Public Employees' Retirement System (PERS)					
<i>Year End</i>	<i>Market Value of Assets (MVA)</i>			<i>Net Cash Flow as a Percent of MVA</i>	
	<i>Assets (MVA)</i>	<i>Contributions</i>	<i>Benefit Payments</i>	<i>Net Cash Flow</i>	<i>Percent of MVA</i>
6/30/2015	\$5,061,058	\$230,067	\$336,885	-\$106,818	-2.11%
6/30/2016	\$5,032,807	\$230,471	\$359,842	-\$129,371	-2.57%
6/30/2017	\$5,472,519	\$233,063	\$384,700	-\$151,637	-2.77%
6/30/2018	\$5,779,994	\$243,385	\$415,158	-\$171,773	-2.97%
6/30/2019	\$5,903,306	\$243,613	\$441,225	-\$197,612	-3.35%
6/30/2020	\$5,845,474	\$252,009	\$468,018	-\$216,009	-3.70%
6/30/2021	\$7,210,027	\$267,771	\$496,392	-\$228,621	-3.17%
6/30/2022	\$6,648,899	\$266,891	\$532,117	-\$265,226	-3.99%
* PERS 2022 Actuarial Valuation Study					
Teachers' Retirement System (TRS)					
<i>Year End</i>	<i>Market Value of Assets (MVA)</i>			<i>Net Cash Flow as a Percent of MVA</i>	
	<i>Assets (MVA)</i>	<i>Contributions</i>	<i>Benefit Payments</i>	<i>Net Cash Flow</i>	<i>Percent of MVA</i>
6/30/2015	\$3,708,386	\$202,896	\$311,079	-\$108,183	-2.92%
6/30/2016	\$3,656,831	\$205,287	\$328,216	-\$122,929	-3.36%
6/30/2017	\$3,950,705	\$210,521	\$343,449	-\$132,928	-3.36%
6/30/2018	\$4,148,324	\$214,833	\$361,026	-\$146,193	-3.52%
6/30/2019	\$4,220,286	\$220,949	\$376,738	-\$155,789	-3.69%
6/30/2020	\$4,167,840	\$228,563	\$393,336	-\$164,773	-3.95%
6/30/2021	\$5,116,849	\$231,360	\$412,724	-\$181,364	-3.54%
6/30/2022	\$4,724,449	\$243,409	\$428,240	-\$184,831	-3.91%
* TRS 2022 Actuarial Valuation Study					

Comparison to Peers

- BOI's biggest difference to peers:
 - Overweight Public Equities
 - Underweight U.S. Fixed Income
 - No Hedge Fund Exposure
 - Overweight Real Estate



Source: RVK Quarterly Investment Performance Analysis 06/30/22

Summary

- Review and approval of the asset allocation is a critical task for the Board.
- Selection of an asset allocation is an imperfect process but is a valuable exercise.
- Consideration of liquidity is important to meet participant needs and avoid forced selling.
- Staff constantly evaluates and adjusts portfolios within the approved asset allocation ranges.

MONTANA

BOARD OF INVESTMENTS

TO: Members of the Board
FROM: Jon Putnam, Chief Investment Officer
DATE: October 26, 2022
RE: Proposed Asset Allocation – November Vote

After discussion with staff and RVK, I am proposing changes to the asset allocation for CAPP as shown in the table below. The redline of the proposed Montana Public Retirement Plans, Policy Number 40.201 follows this memo.

Asset Class	Current Range	Proposed Range	Current Midpoint	Proposed Midpoint	Midpoint Difference
Domestic Equity	24 - 36%	23 - 35%	30%	29%	-1
International Equity	12 - 22%	10 - 20%	17%	15%	-2
Private Investments	11 - 19%	12 - 20%	15%	16%	+1
Real Assets	2 - 8%	3 - 9%	5%	6%	+1
Real Estate	6 - 14%	7 - 15%	10%	11%	+1
Core Fixed Income	9 - 19%	9 - 19%	14%	14%	0
Non-Core Fixed Income	5 - 9%	5 - 9%	7%	7%	0
Cash Equivalents *	0 - 5%	0 - 5%	2% *	2% *	0

* Target of 2% for Cash Equivalents is lower than the midpoint of the proposed range

Asset Allocation Changes

The rationale for each of the asset allocation changes are discussed below:

A. Increase the midpoint of Private Investments from 15% to 16%.

The expected return for Private Investments is higher than all other asset classes based on the 2022 Long-Term Capital Market Assumptions for RVK and other industry sources.

BOI has demonstrated an ability to successfully invest in private markets with excellent long-term returns.

B. Reduce the midpoint of Domestic Equity from 30% to 29%.

Staff recommends reducing our public equity exposure in favor of private equity exposure. The number of public companies have been shrinking as firms decide to remain private for longer. 87% of companies with greater than \$100M in revenue are private.

C. Increase the midpoint of Real Assets from 5% to 6% and increase the midpoint of Real Estate from 10% to 11%.

Both Real Assets and Real Estate offer attractive total returns with steady cash flows to pay benefits. They are also strong diversifiers to the equity exposure in the portfolio.

D. Reduce the midpoint of International Equity from 17% to 15%.

Staff believes significant uncertainty exists in International Equities including geopolitical conflict and the intensification of trade disputes.

Despite low valuations, risks are elevated across geographies and staff remains cautious.

Questions

A. When would these changes take effect?

The board will vote on the proposal at the November board meeting.

If the board approves the proposal at the November meeting, the asset allocation changes would take effect at that time.

B. Are there any proposed changes to other BOI portfolios?

There are no changes proposed to the asset allocation for Trust Funds Investment Pool (TFIP) or State Fund Investment Pool (SFIP) at this time.

MONTANA

BOARD OF INVESTMENTS

BOARD ADOPTED POLICY

POLICY NUMBER: 40.201
~~2021~~December 6, 2022

EFFECTIVE DATE: ~~November 30,~~

TITLE: Montana Public Retirement Plans
~~2020~~November 30, 2021
 Asset Allocation Ranges

SUPERSEDES: ~~November 19,~~

BOARD ADOPTION: ~~November 30, 2021~~December 6, 2022

REVIEWED:

I. Appendix I: Montana Public Retirement Plans Asset Allocation Ranges

A. Permitted Ranges:

1. Approved ~~November 30, 2021~~December 6, 2022.

Asset Class Allocations		
Asset Class	Range Low	Range High
Domestic Equities	24 <u>23</u>	36 <u>35</u>
International Equities	12 <u>10</u>	22 <u>20</u>
Private Investments	11 <u>12</u>	19 <u>20</u>
Real Assets	23	89
Real Estate	67	1415
Core Fixed Income	9	19
Non-Core Fixed Income	5	9
Cash ¹	0	5
Total		
<p>¹ The combined cash at the plan level and the CAPP level is subject to the range.</p> <p>² Montana Public Retirement Plans shall have no greater than 5% of the Net Asset Value managed by any one external manager using an active investment strategy.</p>		

MONTANA

BOARD OF INVESTMENTS

To: Members of the Board
From: Doug Hill, Director In-State Loan Programs
Date: December 7, 2022
Subject: Commercial and Residential Loan Portfolios

The Participation Loan Program reflected an outstanding balance, as of November 1, 2022, of \$97,114,900 and represents 42 loans with a yield of 2.53%. There are currently six loan reservations that total \$18,757,931 and four loans committed that total \$23,401,500. There are no past due loans.

The Infrastructure Loan Program reflected an outstanding balance, as of November 1, 2022, of \$10,643,178 and represents 8 loans with a yield of 4.07%. There is one loan reservation for \$2,733,224. There are no past due loans.

The Intermediary Relending Program reflected an outstanding balance, as of November 1, 2022, of \$4,907,546 and represents 38 loans with a yield of 2.00%. There is one loan committed for \$500,000. There are no past due loans.

The Science and Tech portfolio reflected an outstanding balance, as of November 1, 2022, of \$7,793,711 and represents 3 loans with a yield of 2.76%. There are no past due loans.

The Montana Facility Finance Authority portfolio reflected an outstanding balance, as of November 1, 2022, of \$11,915,308 and represents 15 loans with a yield of 2.10%. There is currently one loan reservation for \$625,000. There are no past due loans.

The Veterans Home Loan Mortgage portfolio reflected an outstanding balance, as of October 28, 2022, of \$46,938,492 and represents 269 loans with a yield of 1.69%. There are nine reservations totaling \$2,367,790 with a projected yield of 3.72%. There are four loans over 90 days past due totaling \$747,969, or 1.59% of the portfolio.

The Multifamily Coal Trust Homes Program reflected an outstanding balance, as of October 22, 2022, of \$6,223,884 and represents five loans with a yield of 2.57%. There are three reservations totaling \$8,680,953 with a projected yield of 2.68%. There are no past due loans.

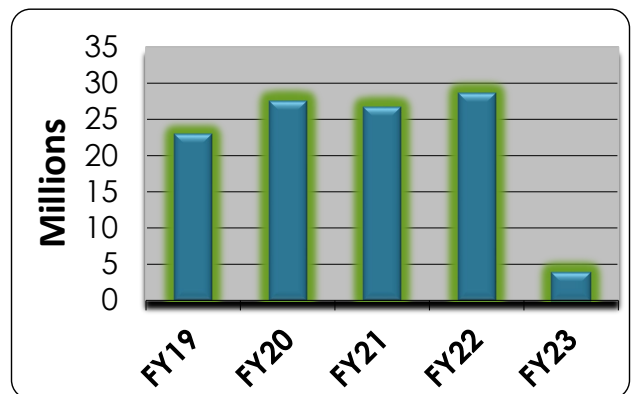
The Residential loan portfolio reflected an outstanding balance, as of October 22, 2022, of \$1,588,809 and represents 47 loans with a yield of 6.33%. There are no outstanding reservations. There are two loan past due over 90 days.

The Montana Down Payment Assistance Program reflected an outstanding balance, as of November 1, 2022, of \$2,350,000 and represents ten loans. There are currently eighty-four loan reservations that total \$58,105,986 and thirty loans committed that total \$18,867,470.

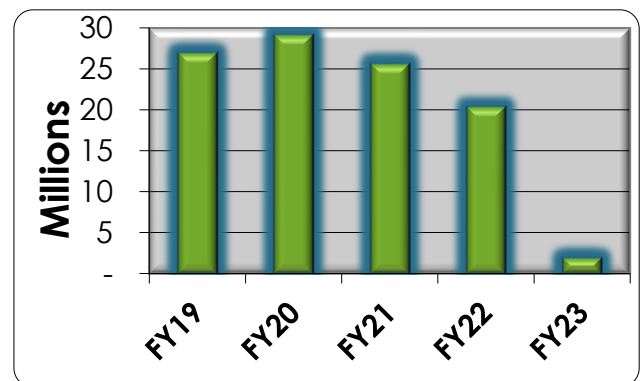
Bond Series 2022:		Loans:	
Outstanding	68,706,869	Outstanding	64,120,529
Available for Drawdown	51,293,131	Pending Commitments	24,771,068
Total Committed		682,924,885	
Total Funded		655,927,580	

FY2022		
Month	Commitments	Fundings
July-22	800,000	646,447
August	2,938,536	131,707
September	22,085	1,448,082
October		
November		
December		
January		
February		
March		
April		
May		
June-23		
To Date	3,760,621	2,226,236

Commitments FY18-FY23



Fundings FY18-FY23



Note: Commitments include withdrawn and expired loans.

Variable Loan Rate History February 16, 2015 - February 15, 2023

February 16, 2015 - February 15, 2016	<u>1.25%</u>	February 16, 2019 - February 15, 2020	<u>3.37%</u>
February 16, 2016 - February 15, 2017	<u>1.55%</u>	February 16, 2020 - February 15, 2021	<u>2.50%*</u>
February 16, 2017 - February 15, 2018	<u>2.50%</u>	February 16, 2021 - February 15, 2022	<u>1.65%</u>
February 16, 2018 - February 15, 2019	<u>3.15%</u>	February 16, 2022 - February 15, 2023	<u>1.55%**</u>

*BOI decreased interest rates for INTERCAP loans to 1.00% until August 15, 2020 in response to the COVID-19 pandemic.

**1.50% for borrowers set up with Autopay.

MONTANA

BOARD OF INVESTMENTS

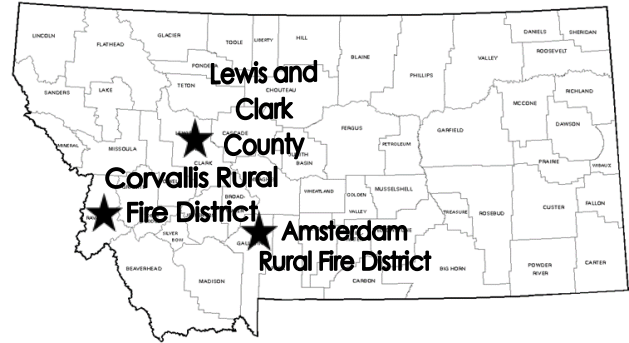
I N T E R C A P

TO: Members of the Board

FROM: Louise Welsh,
Sr. Bond Program Officer

DATE: December 6, 2022

RE: INTERCAP Staff Approved Loans Committed – Staff approved the following loans from July 1, 2022, to September 30, 2022.



Borrower:	Amsterdam Rural Fire District
Purpose:	Purchase existing fire station and property
Staff Approval Date:	July 27, 2022
Board Loan Amount:	\$ 800,000
Other Funding Sources:	\$ 50,000
Total Project Cost:	\$ 850,000
Term:	15 years

Borrower:	Corvallis Rural Fire District
Purpose:	Pumper Truck
Staff Approval Date:	August 23, 2022
Board Loan Amount:	\$ 300,000
Other Funding Sources:	\$ 43,750
Total Project Cost:	\$ 343,750
Term:	7 years

Borrower:	Lewis and Clark County
Purpose:	Long Gulch RID road improvements
Staff Approval Date:	September 1, 2022
Board Loan Amount:	\$ 22,085
Other Funding Sources:	\$ 0
Total Project Cost:	\$ 22,085
Term:	7 years



Quarterly Investment Performance Analysis

Montana Board of Investments

Period Ended: September 30, 2022



Montana Board of Investments
Comparative Performance
Retirement Plans

As of September 30, 2022

	QTD/ FYTD	CYTD	1 Year	3 Years	5 Years	7 Years	10 Years	20 Years	2021	2020	2019	2018	2017	Since Incep.	Inception Date
Public Employees' Retirement - Net	-3.09	-12.63	-8.41	6.42	6.24	7.52	7.81	7.53	17.61	11.94	16.77	-2.63	14.80	7.49	07/01/1994
Public Employees' Benchmark	-3.19	-15.91	-12.03	4.25	4.85	6.71	7.44	N/A	14.31	11.58	20.45	-5.57	15.35	N/A	
Difference	0.10	3.28	3.62	2.17	1.39	0.81	0.37	N/A	3.30	0.36	-3.68	2.94	-0.55	N/A	
Public Employees' Retirement - Gross	-2.96	-12.22	-7.69	7.03	6.87	8.11	8.38	8.01	18.32	12.53	17.44	-2.03	15.34	7.83	07/01/1994
All Public Plans (>\$5B) Total Fund Median	-4.58	-15.60	-11.14	5.42	5.92	7.42	7.35	7.81	16.96	12.11	17.28	-2.62	16.17	7.78	
Rank	19	32	20	16	23	19	3	30	33	41	43	43	67	45	
Teachers' Retirement - Net	-3.10	-12.65	-8.43	6.41	6.24	7.52	7.81	7.53	17.61	11.93	16.78	-2.64	14.76	7.50	07/01/1994
Teachers' Benchmark	-3.21	-15.93	-12.06	4.22	4.83	6.69	7.40	N/A	14.29	11.53	20.43	-5.57	15.32	N/A	
Difference	0.11	3.28	3.63	2.19	1.41	0.83	0.41	N/A	3.32	0.40	-3.65	2.93	-0.56	N/A	
Teachers' Retirement - Gross	-2.97	-12.24	-7.72	7.02	6.86	8.10	8.38	8.01	18.32	12.52	17.45	-2.03	15.31	7.84	07/01/1994
All Public Plans (>\$5B) Total Fund Median	-4.58	-15.60	-11.14	5.42	5.92	7.42	7.35	7.81	16.96	12.11	17.28	-2.62	16.17	7.78	
Rank	20	32	20	16	23	19	3	30	33	41	43	44	67	44	
Police Retirement - Net	-3.08	-12.63	-8.41	6.41	6.24	7.52	7.82	7.49	17.58	11.95	16.80	-2.63	14.79	7.37	07/01/1994
Police Benchmark	-3.16	-15.89	-12.01	4.24	4.85	6.71	7.44	N/A	14.24	11.60	20.44	-5.57	15.33	N/A	
Difference	0.08	3.26	3.60	2.17	1.39	0.81	0.38	N/A	3.34	0.35	-3.64	2.94	-0.54	N/A	
Police Retirement - Gross	-2.95	-12.22	-7.69	7.02	6.87	8.11	8.38	7.97	18.28	12.54	17.47	-2.02	15.33	7.71	07/01/1994
All Public Plans (>\$5B) Total Fund Median	-4.58	-15.60	-11.14	5.42	5.92	7.42	7.35	7.81	16.96	12.11	17.28	-2.62	16.17	7.78	
Rank	19	32	20	16	23	19	3	34	33	41	43	43	67	57	

Net performance shown is net of all manager fees and expenses (Net-All). All Public Plans > \$5B Total Fund Median is reported gross of fees. Benchmark returns reflect unmanaged indices which are not impacted by management fees. Fiscal year ends on 06/30. Since inception performance may vary from State Street reported performance due to calculation methodology differences. Retirement plan benchmarks' inception dates were updated to 1/1/2011.



Montana Board of Investments
Comparative Performance
Retirement Plans

As of September 30, 2022

	QTD/ FYTD	CYTD	1 Year	3 Years	5 Years	7 Years	10 Years	20 Years	2021	2020	2019	2018	2017	Since Incep.	Inception Date
Firefighters' Retirement - Net	-3.08	-12.63	-8.40	6.42	6.25	7.52	7.82	7.51	17.58	11.95	16.79	-2.62	14.79	7.36	07/01/1994
Firefighters' Benchmark	-3.16	-15.89	-12.01	4.24	4.85	6.71	7.44	N/A	14.23	11.59	20.44	-5.57	15.33	N/A	
Difference	0.08	3.26	3.61	2.18	1.40	0.81	0.38	N/A	3.35	0.36	-3.65	2.95	-0.54	N/A	
Firefighters' Retirement - Gross	-2.95	-12.22	-7.69	7.02	6.87	8.11	8.38	7.99	18.28	12.53	17.46	-2.01	15.34	7.70	07/01/1994
All Public Plans (>\$5B) Total Fund Median	-4.58	-15.60	-11.14	5.42	5.92	7.42	7.35	7.81	16.96	12.11	17.28	-2.62	16.17	7.78	
Rank	19	32	20	16	23	19	3	31	33	41	43	43	67	57	
Sheriffs' Retirement - Net	-3.08	-12.62	-8.40	6.43	6.25	7.53	7.81	7.53	17.61	11.94	16.75	-2.62	14.80	7.40	07/01/1994
Sheriffs' Benchmark	-3.18	-15.90	-12.02	4.25	4.85	6.72	7.44	N/A	14.30	11.58	20.43	-5.56	15.35	N/A	
Difference	0.10	3.28	3.62	2.18	1.40	0.81	0.37	N/A	3.31	0.36	-3.68	2.94	-0.55	N/A	
Sheriffs' Retirement - Gross	-2.95	-12.21	-7.68	7.04	6.87	8.11	8.38	8.01	18.32	12.53	17.42	-2.02	15.34	7.74	07/01/1994
All Public Plans (>\$5B) Total Fund Median	-4.58	-15.60	-11.14	5.42	5.92	7.42	7.35	7.81	16.96	12.11	17.28	-2.62	16.17	7.78	
Rank	19	32	20	16	23	19	3	30	32	41	44	43	67	56	
Highway Patrol Retirement - Net	-3.08	-12.61	-8.39	6.43	6.26	7.53	7.82	7.55	17.62	11.94	16.78	-2.62	14.79	7.39	07/01/1994
Highway Patrol Benchmark	-3.18	-15.88	-12.00	4.27	4.87	6.72	7.45	N/A	14.31	11.60	20.45	-5.56	15.34	N/A	
Difference	0.10	3.27	3.61	2.16	1.39	0.81	0.37	N/A	3.31	0.34	-3.67	2.94	-0.55	N/A	
Highway Patrol Retirement - Gross	-2.95	-12.20	-7.67	7.04	6.88	8.11	8.39	8.03	18.33	12.53	17.45	-2.01	15.33	7.73	07/01/1994
All Public Plans (>\$5B) Total Fund Median	-4.58	-15.60	-11.14	5.42	5.92	7.42	7.35	7.81	16.96	12.11	17.28	-2.62	16.17	7.78	
Rank	19	32	20	16	23	19	3	30	32	41	43	43	67	56	

Net performance shown is net of all manager fees and expenses (Net-All). All Public Plans > \$5B Total Fund Median is reported gross of fees. Benchmark returns reflect unmanaged indices which are not impacted by management fees. Fiscal year ends on 06/30. Since inception performance may vary from State Street reported performance due to calculation methodology differences. Retirement plan benchmarks' inception dates were updated to 1/1/2011.



Montana Board of Investments
Comparative Performance
Retirement Plans

As of September 30, 2022

	QTD/ FYTD	CYTD	1 Year	3 Years	5 Years	7 Years	10 Years	20 Years	2021	2020	2019	2018	2017	Since Incep.	Inception Date
Game Wardens' Retirement - Net	-3.09	-12.63	-8.41	6.41	6.24	7.52	7.81	7.50	17.62	11.91	16.77	-2.62	14.81	7.41	07/01/1994
Game Wardens' Benchmark	-3.19	-15.91	-12.04	4.24	4.85	6.71	7.44	N/A	14.30	11.56	20.45	-5.56	15.36	N/A	
Difference	0.10	3.28	3.63	2.17	1.39	0.81	0.37	N/A	3.32	0.35	-3.68	2.94	-0.55	N/A	
Game Wardens' Retirement - Gross	-2.96	-12.22	-7.69	7.02	6.86	8.11	8.37	7.97	18.32	12.50	17.44	-2.01	15.35	7.75	07/01/1994
All Public Plans (>\$5B) Total Fund Median	-4.58	-15.60	-11.14	5.42	5.92	7.42	7.35	7.81	16.96	12.11	17.28	-2.62	16.17	7.78	
Rank	19	32	20	16	23	19	3	34	32	42	43	43	67	55	
Judges' Retirement - Net	-3.10	-12.65	-8.42	6.42	6.24	7.52	7.81	7.54	17.63	11.94	16.78	-2.64	14.82	7.40	07/01/1994
Judges' Benchmark	-3.21	-15.94	-12.06	4.24	4.85	6.72	7.44	N/A	14.31	11.59	20.47	-5.57	15.37	N/A	
Difference	0.11	3.29	3.64	2.18	1.39	0.80	0.37	N/A	3.32	0.35	-3.69	2.93	-0.55	N/A	
Judges' Retirement - Gross	-2.97	-12.24	-7.71	7.03	6.87	8.11	8.38	8.02	18.34	12.53	17.45	-2.03	15.36	7.74	07/01/1994
All Public Plans (>\$5B) Total Fund Median	-4.58	-15.60	-11.14	5.42	5.92	7.42	7.35	7.81	16.96	12.11	17.28	-2.62	16.17	7.78	
Rank	20	32	20	16	23	19	3	30	32	41	43	44	67	56	
Volunteer Firefighters' Retirement - Net	-3.11	-12.65	-8.42	6.42	6.24	7.50	7.81	7.52	17.61	11.94	16.79	-2.64	14.79	7.22	07/01/1994
Volunteer Firefighters' Benchmark	-3.21	-15.94	-12.06	4.26	4.86	6.71	7.45	N/A	14.37	11.59	20.47	-5.59	15.33	N/A	
Difference	0.10	3.29	3.64	2.16	1.38	0.79	0.36	N/A	3.24	0.35	-3.68	2.95	-0.54	N/A	
Volunteer Firefighters' Retirement - Gross	-2.98	-12.24	-7.71	7.03	6.86	8.08	8.37	7.99	18.31	12.53	17.46	-2.04	15.34	7.56	07/01/1994
All Public Plans (>\$5B) Total Fund Median	-4.58	-15.60	-11.14	5.42	5.92	7.42	7.35	7.81	16.96	12.11	17.28	-2.62	16.17	7.78	
Rank	20	32	20	16	23	20	3	30	33	41	43	44	67	67	

Net performance shown is net of all manager fees and expenses (Net-All). All Public Plans > \$5B Total Fund Median is reported gross of fees. Benchmark returns reflect unmanaged indices which are not impacted by management fees. Fiscal year ends on 06/30. Since inception performance may vary from State Street reported performance due to calculation methodology differences. Retirement plan benchmarks' inception dates were updated to 1/1/2011.

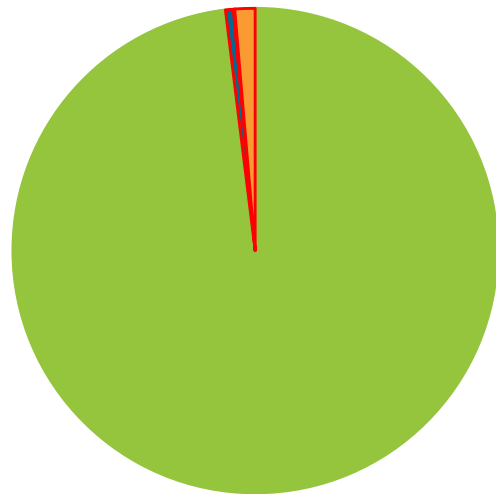


Montana Board of Investments
 Asset Allocation by Segment
 Retirement Plans

As of September 30, 2022

	Consolidated Asset Pension Pool (CAPP)		Short Term Investment Pool (STIP)		Total Fund	
	(\$)	%	(\$)	%	(\$)	%
Public Employees' Retirement	6,299,584,667	48.99	69,386,440	39.72	6,368,971,107	48.87
Teachers' Retirement	4,464,410,720	34.72	82,793,796	47.40	4,547,204,517	34.89
Firefighters' Retirement	560,637,889	4.36	5,822,350	3.33	566,460,238	4.35
Police Retirement	514,584,018	4.00	5,374,205	3.08	519,958,223	3.99
Sheriffs' Retirement	439,664,796	3.42	4,731,426	2.71	444,396,222	3.41
Game Wardens' Retirement	248,860,601	1.94	2,883,098	1.65	251,743,699	1.93
Highway Patrol Retirement	168,561,591	1.31	2,012,374	1.15	170,573,965	1.31
Judges' Retirement	118,154,296	0.92	1,220,114	0.70	119,374,411	0.92
Volunteer Firefighters' Retirement	44,503,975	0.35	450,873	0.26	44,954,848	0.34
Retirement Plans Total Fund Composite	12,858,962,553	98.66	174,674,676	1.34	13,033,637,229	100.00

September 30, 2022 : \$13,033,637,229

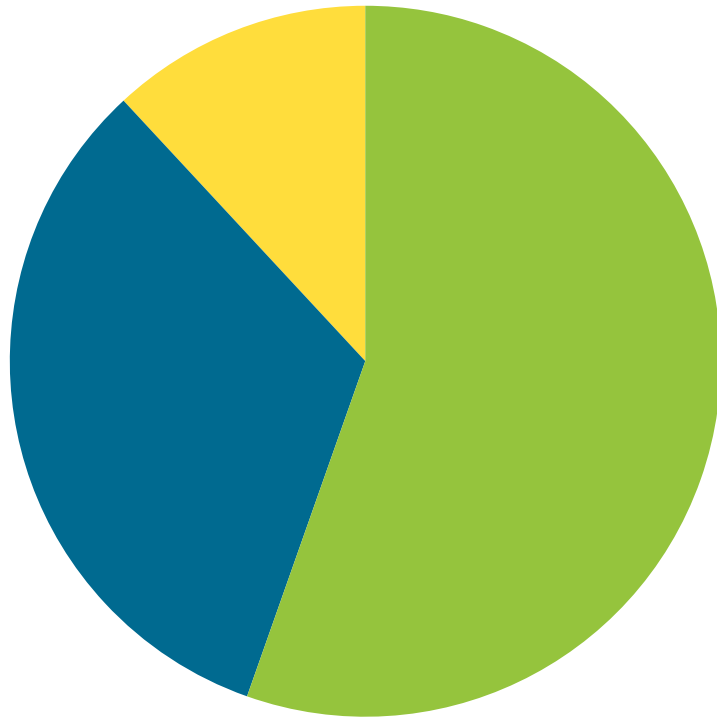


Segments	Market Value (\$)	Allocation (%)
CAPP Ex Cash	12,779,128,027	98.05
CAPP Cash Pension	67,748,385	0.52
CAPP Asset Class Cash	12,086,141	0.09
Short Term Investment Pool (STIP)	174,674,676	1.34
Total Cash	254,509,202	1.95

Allocations shown may not sum up to 100% exactly due to rounding. Retirement Plan market values may differ from State Street due to uninvested amounts not included in segment totals.



September 30, 2022 : \$23,210,303,833



	Market Value (\$)	Allocation (%)
Consolidated Asset Pension Pool (CAPP)	12,858,962,587	55.40
Short Term Investment Pool	7,587,425,707	32.69
Trust Funds Investment Pool	2,763,915,540	11.91

Allocations shown may not sum up to 100% exactly due to rounding. Market values do not include pending transactions.

Montana Board of Investments
Comparative Performance
Investment Pools

As of September 30, 2022

	QTD/ FYTD	CYTD	1 Year	3 Years	5 Years	7 Years	10 Years	2021	2020	2019	2018	2017	Since Incep.	Inception Date
Consolidated Asset Pension Pool (CAPP)	-3.14	-12.78	-8.52	6.50	6.33	N/A	N/A	17.83	12.10	17.12	-2.74	N/A	6.99	04/01/2017
CAPP Custom Benchmark	-3.25	-16.11	-12.20	4.48	5.05	N/A	N/A	14.57	12.38	20.70	-5.64	N/A	5.79	
Difference	0.11	3.33	3.68	2.02	1.28	N/A	N/A	3.26	-0.28	-3.58	2.90	N/A	1.20	
Trust Funds Investment Pool	-3.68	-7.96	-6.91	0.20	1.95	2.40	2.66	1.49	7.23	8.98	0.45	4.01	5.47	10/01/1995
Trust Fund Custom Benchmark	-2.04	-6.52	-5.11	0.46	2.01	2.18	2.04	0.71	7.51	8.72	0.01	3.54	4.69	
Difference	-1.64	-1.44	-1.80	-0.26	-0.06	0.22	0.62	0.78	-0.28	0.26	0.44	0.47	0.78	
Short Term Investment Pool	0.32	0.58	0.61	0.63	1.20	1.06	0.79	0.11	0.73	2.28	1.98	1.11	2.24	04/01/1997
Short Term Custom Index	0.56	0.75	0.76	0.52	1.12	1.00	0.75	0.04	0.36	2.14	1.95	1.15	2.17	
Difference	-0.24	-0.17	-0.15	0.11	0.08	0.06	0.04	0.07	0.37	0.14	0.03	-0.04	0.07	
iMoney.net Money Fund (Gross) Median	0.60	0.84	0.87	0.74	1.33	1.17	0.88	0.15	0.73	2.45	2.15	1.21	2.25	
Difference	-0.28	-0.26	-0.26	-0.11	-0.13	-0.11	-0.09	-0.04	0.00	-0.17	-0.17	-0.10	-0.01	

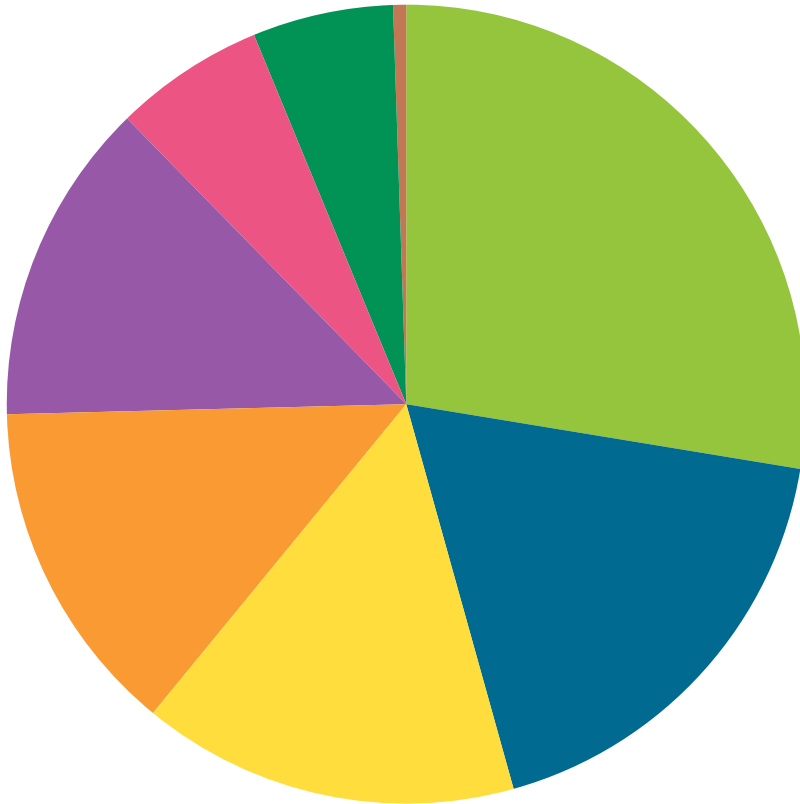
Performance shown is net of all manager fees and expenses (Net-All). Benchmark returns reflect unmanaged indices which are not impacted by management fees. Fiscal year ends on 06/30. See the Addendum for custom index specification. Since inception performance may vary from State Street reported performance due to calculation methodology differences.



Montana Board of Investments
 Asset Allocation
 Consolidated Asset Pension Pool (CAPP)

As of September 30, 2022

September 30, 2022 : \$12,858,962,741



	Market Value (\$)	Allocation (%)
Domestic Equity	3,548,540,438	27.60
Private Investments	2,323,536,810	18.07
International Equity	1,962,415,601	15.26
Core Fixed Income	1,757,699,197	13.67
Real Estate	1,682,833,573	13.09
Non-Core Fixed Income	783,381,097	6.09
Real Assets*	732,807,638	5.70
Cash Pension	67,748,385	0.53

Allocations shown may not sum up to 100% due to rounding.
 *Formerly the Natural Resources pension asset class.



Montana Board of Investments
Comparative Performance
Consolidated Asset Pension Pool (CAPP)

As of September 30, 2022

	QTD/ FYTD	CYTD	1 Year	3 Years	5 Years	7 Years	10 Years	2021	2020	2019	2018	2017	Since Incep.	Inception Date
Domestic Equity	-4.35	-24.48	-17.48	7.84	8.23	10.45	11.14	27.17	20.09	30.75	-7.09	20.79	8.86	05/01/2003
Domestic Equity Custom Index	-4.45	-24.66	-17.61	7.87	8.75	11.08	11.50	26.12	21.10	31.14	-5.20	21.05	9.53	
Difference	0.10	0.18	0.13	-0.03	-0.52	-0.63	-0.36	1.05	-1.01	-0.39	-1.89	-0.26	-0.67	
International Equity	-9.67	-27.66	-26.40	-1.25	-0.57	3.60	3.47	7.83	13.35	22.86	-14.99	28.67	3.88	04/01/1997
International Equity Custom Index	-9.69	-26.92	-25.72	-1.27	-0.78	3.38	3.16	8.53	11.12	21.63	-14.76	27.81	4.12	
Difference	0.02	-0.74	-0.68	0.02	0.21	0.22	0.31	-0.70	2.23	1.23	-0.23	0.86	-0.24	
Core Fixed Income	-4.54	-13.37	-13.35	-2.52	-0.06	0.59	1.11	-1.54	8.25	6.90	0.95	2.29	5.05	04/01/1995
Core Fixed Income Custom Index	-4.75	-14.61	-14.60	-3.24	-0.64	0.19	0.64	-1.54	7.51	6.39	0.68	2.57	4.38	
Difference	0.21	1.24	1.25	0.72	0.58	0.40	0.47	0.00	0.74	0.51	0.27	-0.28	0.67	
Non-Core Fixed Income	-1.36	-15.42	-15.23	-1.68	0.69	2.89	3.33	3.21	6.40	13.98	-2.27	5.99	5.98	06/01/2009
Bloomberg US HY 2% Issuer Cap Index	-0.64	-14.73	-14.15	-0.47	1.56	4.12	3.94	5.26	7.05	14.32	-2.08	7.50	7.06	
Difference	-0.72	-0.69	-1.08	-1.21	-0.87	-1.23	-0.61	-2.05	-0.65	-0.34	-0.19	-1.51	-1.08	
Real Assets	1.31	10.61	12.76	5.03	3.96	N/A	N/A	21.24	-13.43	-2.18	5.55	N/A	4.47	04/01/2017
Real Assets Custom Index	-5.89	-7.97	-4.11	-0.54	-0.22	4.54	-1.08	13.32	-12.32	13.06	-11.75	13.70	0.96	
Difference	7.20	18.58	16.87	5.57	4.18	N/A	N/A	7.92	-1.11	-15.24	17.30	N/A	3.51	
Real Estate	1.60	11.30	19.05	10.40	9.51	9.63	10.21	20.00	-0.35	6.97	9.19	9.17	5.26	06/01/2006
Real Estate Custom Index	4.54	20.58	28.31	2.99	6.04	6.76	8.33	13.64	-19.66	25.84	-4.57	5.99	5.88	
Difference	-2.94	-9.28	-9.26	7.41	3.47	2.87	1.88	6.36	19.31	-18.87	13.76	3.18	-0.62	
Cash Pension	0.37	0.78	0.82	0.74	1.27	N/A	N/A	0.13	0.84	2.28	2.00	N/A	1.24	05/01/2017
Short Term Custom Index	0.56	0.75	0.76	0.52	1.12	1.00	0.75	0.04	0.36	2.14	1.95	1.15	1.12	
Difference	-0.19	0.03	0.06	0.22	0.15	N/A	N/A	0.09	0.48	0.14	0.05	N/A	0.12	
Private Investments*	0.31	7.29	13.90	19.96	16.81	14.61	14.38	39.81	10.91	12.95	11.55	15.20	13.32	05/01/2002
Private Investments Custom Index	-1.47	-19.68	-17.24	6.54	6.00	8.25	12.25	16.54	18.90	27.38	-9.99	20.59	10.30	
Difference	1.78	26.97	31.14	13.42	10.81	6.36	2.13	23.27	-7.99	-14.43	21.54	-5.39	3.02	

For additional information on the Private Investments Custom Index, please see the Addendum.

*Performance is based on the prior quarter's fair market value adjusted for cash flows during the most recent quarterly period.

Performance shown is net of all manager fees and expenses (Net-All). Benchmark returns reflect unmanaged indices which are not impacted by management fees. Fiscal year ends on 06/30. Please see Addendum for custom index specification. Since inception performance may vary from State Street reported performance due to calculation methodology differences.

Montana Board of Investments
Comparative Performance
Investment Pools

As of September 30, 2022

	QTD/ FYTD	CYTD	1 Year	3 Years	5 Years	7 Years	10 Years	2021	2020	2019	2018	2017	Since Incep.	Inception Date
Domestic Equity	-4.34	-24.46	-17.44	8.04	8.49	10.73	11.43	27.47	20.37	31.13	-6.78	21.16	9.14	05/01/2003
All Public Plans-US Equity Segment Median	-4.86	-24.16	-17.32	6.94	7.71	9.96	10.61	24.57	18.92	30.04	-5.83	20.31	9.07	
Rank	31	57	52	24	29	26	23	30	32	28	74	31	47	
Population	59	58	58	50	47	46	37	70	67	65	66	89	11	
International Equity	-9.65	-27.53	-26.22	-0.95	-0.26	3.93	3.80	8.18	13.71	23.28	-14.72	29.06	4.28	04/01/1997
All Public Plans-Intl. Equity Segment Median	-9.65	-27.15	-25.84	0.00	0.49	4.27	4.55	9.51	12.76	23.71	-13.63	28.75	N/A	
Rank	52	58	54	62	66	76	79	74	45	62	78	46	N/A	
Population	62	59	59	54	54	53	42	69	68	65	68	84	N/A	
Core Fixed Income	-4.53	-13.34	-13.32	-2.47	-0.02	0.63	1.15	-1.48	8.31	6.94	1.00	2.34	5.18	04/01/1995
IM U.S. Broad Market Core Fixed Income (SA+CF) Median	-4.55	-14.43	-14.48	-2.70	0.18	1.07	1.37	-1.23	8.51	9.19	0.06	4.01	4.89	
Rank	49	15	12	30	79	87	76	66	54	98	8	99	16	
Population	123	123	123	123	119	117	111	145	154	156	162	167	58	
Non-Core Fixed Income	-1.32	-15.24	-14.97	-1.26	1.17	3.40	3.84	3.64	6.91	14.60	-1.71	6.58	6.51	06/01/2009
IM U.S. High Yield Bonds (SA+CF) Median	-0.43	-13.23	-12.46	0.08	2.03	4.05	4.16	5.30	6.54	14.23	-1.64	7.47	7.07	
Rank	93	88	91	92	91	86	67	91	42	41	53	74	80	
Population	140	140	140	138	133	125	110	160	175	188	198	201	89	
Trust Funds Investment Pool	-3.63	-7.79	-6.71	0.33	2.06	2.50	2.76	1.59	7.30	9.06	0.53	4.10	5.54	10/01/1995
All Public Plans-US Fixed Income Segment Median	-4.22	-13.97	-13.76	-1.82	0.61	1.57	1.66	-0.11	8.59	9.25	-0.25	4.59	N/A	
Rank	31	15	7	3	1	8	10	12	78	53	22	62	N/A	
Population	64	64	63	55	54	52	44	73	74	68	72	85	N/A	
Real Estate	1.74	12.09	20.10	11.68	11.06	11.15	11.72	21.37	1.11	8.65	11.12	10.91	6.69	06/01/2006
All Public Plans-Real Estate Segment Median	0.81	13.50	22.54	12.70	11.01	11.24	11.99	20.84	1.66	7.65	9.04	8.84	N/A	
Rank	31	66	69	67	48	57	65	47	72	39	15	26	N/A	
Population	43	41	40	30	24	19	14	41	38	35	27	32	N/A	

Performance shown is gross of fees. Fiscal year ends on 06/30. Since inception performance may vary from State Street reported performance due to calculation methodology differences. The All Public Plans US Equity, Intl Equity, US Fixed Income, and Real Estate segments currently do not have enough members to calculate trailing period returns.

Montana Board of Investments
Comparative Performance
Equity Composites

As of September 30, 2022

	QTD/ FYTD	CYTD	1 Year	3 Years	5 Years	7 Years	10 Years	2021	2020	2019	2018	2017	Since Incep.	Inception Date
Domestic Large Cap Equity - Net	-4.60	-24.66	-16.91	8.65	9.36	11.40	11.82	28.39	21.44	31.06	-4.71	21.66	8.18	12/01/2006
S&P 500 Index (Cap Wtd)	-4.88	-23.87	-15.47	8.16	9.24	11.40	11.70	28.71	18.40	31.49	-4.38	21.83	8.29	
Difference	0.28	-0.79	-1.44	0.49	0.12	0.00	0.12	-0.32	3.04	-0.43	-0.33	-0.17	-0.11	
Domestic Large Cap Equity - Gross	-4.60	-24.65	-16.89	8.80	9.52	11.57	11.98	28.61	21.66	31.29	-4.52	21.82	8.39	12/01/2006
IM U.S. Large Cap Equity (SA+CF) Median	-4.87	-23.65	-15.47	7.38	8.71	10.89	11.57	27.35	18.37	30.45	-4.84	21.82	8.38	
Rank	43	63	60	27	33	32	35	37	35	42	46	50	50	
Domestic Mid Cap Equity - Net	-2.49	-21.56	-15.01	6.04	6.02	8.32	9.62	25.15	13.53	28.03	-10.75	19.45	7.90	01/01/2005
Russell Mid Cap Index	-3.44	-24.27	-19.39	5.19	6.48	8.79	10.30	22.58	17.10	30.54	-9.06	18.52	8.47	
Difference	0.95	2.71	4.38	0.85	-0.46	-0.47	-0.68	2.57	-3.57	-2.51	-1.69	0.93	-0.57	
Domestic Mid Cap Equity - Gross	-2.49	-21.56	-15.01	6.04	6.17	8.62	10.02	25.15	13.53	28.11	-10.28	20.18	8.32	01/01/2005
IM U.S. Mid Cap Equity (SA+CF) Median	-3.17	-22.66	-15.86	6.01	6.87	9.23	10.72	24.73	14.25	30.24	-9.69	19.05	9.06	
Rank	40	46	41	48	63	69	74	44	58	65	55	46	84	
Domestic Small Cap Equity - Net	-0.60	-22.23	-16.63	6.30	5.68	8.72	10.03	27.56	13.07	25.76	-10.51	15.65	10.66	03/01/2003
Russell 2000 Index	-2.19	-25.10	-23.50	4.29	3.55	7.51	8.55	14.82	19.96	25.53	-11.01	14.65	9.56	
Difference	1.59	2.87	6.87	2.01	2.13	1.21	1.48	12.74	-6.89	0.23	0.50	1.00	1.10	
Domestic Small Cap Equity - Gross	-0.60	-22.22	-16.58	6.59	6.05	9.17	10.56	28.00	13.50	26.25	-10.09	16.27	11.17	03/01/2003
IM U.S. Small Cap Equity (SA+CF) Median	-2.98	-23.53	-19.30	6.09	5.51	8.85	10.18	23.86	17.64	25.82	-10.34	15.12	11.42	
Rank	19	40	37	44	43	44	42	33	59	47	49	44	56	

Net performance shown is net of all manager fees and expenses (Net-All). Gross returns are compared to median performance of similar managers. A peer group of similar managers may not exist for all composites. Fiscal year ends on 06/30. Since inception performance may vary from State Street reported performance due to calculation methodology differences.

Montana Board of Investments
Comparative Performance
Equity Composites

As of September 30, 2022

	QTD/ FYTD	CYTD	1 Year	3 Years	5 Years	7 Years	10 Years	2021	2020	2019	2018	2017	Since Incep.	Inception Date
International Large Cap Passive - Net	-10.10	-26.45	-25.13	-1.44	-0.72	3.62	3.23	7.76	10.81	21.59	-14.04	27.79	4.47	06/01/2009
MSCI ACW Ex US Index (USD) (Net)	-9.91	-26.50	-25.17	-1.52	-0.81	3.29	3.01	7.82	10.65	21.51	-14.20	27.19	4.28	
Difference	-0.19	0.05	0.04	0.08	0.09	0.33	0.22	-0.06	0.16	0.08	0.16	0.60	0.19	
International Large Cap Passive - Gross	-10.09	-26.42	-25.09	-1.39	-0.66	3.68	3.30	7.82	10.88	21.66	-13.98	27.88	4.54	06/01/2009
International Equity Active - Net	-9.22	-28.78	-27.69	-0.92	-0.24	4.08	4.37	7.77	15.91	25.83	-16.18	30.82	2.96	04/01/1997
MSCI ACW Ex US Index (USD) (Net)	-9.91	-26.50	-25.17	-1.52	-0.81	3.29	3.01	7.82	10.65	21.51	-14.20	27.19	4.19	
Difference	0.69	-2.28	-2.52	0.60	0.57	0.79	1.36	-0.05	5.26	4.32	-1.98	3.63	-1.23	
International Equity Active - Gross	-9.09	-28.48	-27.30	-0.41	0.28	4.63	4.90	8.30	16.50	26.48	-15.73	31.50	3.47	04/01/1997
IM International Large Cap Core Equity (SA+CF) Median	-9.25	-27.47	-25.49	-0.50	0.09	3.84	4.70	12.09	11.76	23.49	-14.32	27.80	5.94	
Rank	42	66	76	48	47	31	41	79	29	31	69	18	100	
International Value - Net	-9.41	-23.61	-22.35	-0.64	0.11	4.45	4.21	9.32	9.31	20.76	-13.97	30.72	1.53	11/01/2006
MSCI ACW Ex US Val Index (USD) (Net)	-10.44	-21.00	-20.02	-2.15	-2.12	2.24	1.87	10.46	-0.77	15.72	-13.97	22.66	1.00	
Difference	1.03	-2.61	-2.33	1.51	2.23	2.21	2.34	-1.14	10.08	5.04	0.00	8.06	0.53	
International Value - Gross	-9.29	-23.33	-21.98	-0.15	0.61	4.98	4.75	9.85	9.87	21.37	-13.52	31.39	2.10	11/01/2006
IM International Large Cap Value Equity (SA+CF) Median	-10.38	-23.72	-22.79	-0.78	-0.73	3.44	4.09	11.70	4.55	21.15	-14.75	25.50	2.85	
Rank	27	45	43	37	27	13	31	64	27	46	38	10	66	
International Growth - Net	-8.40	-32.93	-31.42	-2.01	-0.29	3.82	3.78	3.79	23.08	31.39	-16.09	28.01	2.09	11/01/2006
MSCI ACW Ex US Grth Index (USD) (Net)	-9.37	-31.84	-30.22	-1.38	0.18	4.09	3.95	5.09	22.20	27.34	-14.43	32.01	2.83	
Difference	0.97	-1.09	-1.20	-0.63	-0.47	-0.27	-0.17	-1.30	0.88	4.05	-1.66	-4.00	-0.74	
International Growth - Gross	-8.28	-32.65	-31.05	-1.49	0.25	4.40	4.33	4.33	23.74	32.10	-15.61	28.74	2.63	11/01/2006
IM International Large Cap Growth Equity (SA+CF) Median	-8.90	-32.88	-30.25	0.15	1.40	5.03	5.46	11.00	23.67	29.68	-13.50	31.99	4.05	
Rank	40	50	55	77	70	64	94	83	50	26	69	69	94	
International Small Cap - Net	-9.94	-30.62	-30.41	-0.43	-1.09	3.48	4.90	11.57	14.63	23.91	-18.90	33.61	3.22	09/01/2006
MSCI ACWI Ex US Sm Cap Index IMI (USD) (Net)	-8.37	-29.37	-28.93	0.38	-0.56	3.98	4.44	12.93	14.24	22.42	-18.20	31.65	3.82	
Difference	-1.57	-1.25	-1.48	-0.81	-0.53	-0.50	0.46	-1.36	0.39	1.49	-0.70	1.96	-0.60	

Gross of fees performance is not available (N/A) for the International Small Cap composite which currently consists of BlackRock ACWI Ex-US Small Cap (CF), Templeton Investment Counsel (SA), and American Century Investment Mgmt (SA).

Net performance shown is net of all manager fees and expenses (Net-All). Gross returns are compared to median performance of similar managers. A peer group of similar managers may not exist for all composites. Fiscal year ends on 06/30. Since inception performance may vary from State Street reported performance due to calculation methodology differences.



Montana Board of Investments
Comparative Performance
Domestic Equity Managers

As of September 30, 2022

	QTD/ FYTD	CYTD	1 Year	3 Years	5 Years	7 Years	10 Years	2021	2020	2019	2018	2017	Since Incep.	Inception Date
Domestic Large Cap Equity														
BlackRock MSCI US Equity Index (SA) - Net	-4.70	-24.81	-17.24	8.11	N/A	N/A	N/A	26.95	21.33	N/A	N/A	N/A	8.67	04/01/2019
MSCI US Index (USD) (Gross)	-4.70	-24.81	-17.23	8.13	9.19	11.31	11.66	26.97	21.37	31.64	-4.50	21.90	8.70	
Difference	0.00	0.00	-0.01	-0.02	N/A	N/A	N/A	-0.02	-0.04	N/A	N/A	N/A	-0.03	
BlackRock MSCI US Equity Index (SA) - Gross	-4.69	-24.80	-17.23	8.12	N/A	N/A	N/A	26.96	21.34	N/A	N/A	N/A	8.69	04/01/2019
IM U.S. Large Cap Core Equity (SA+CF) Median	-4.84	-23.04	-15.41	7.63	8.80	10.82	11.68	27.78	17.56	30.09	-5.04	22.08	8.29	
Rank	45	71	68	39	N/A	N/A	N/A	56	29	N/A	N/A	N/A	40	
Northern Trust MSCI US Index (SA) - Net	-4.70	-24.81	-17.23	8.12	N/A	N/A	N/A	26.97	21.34	31.70	N/A	N/A	9.27	11/01/2018
MSCI US Index (USD) (Gross)	-4.70	-24.81	-17.23	8.13	9.19	11.31	11.66	26.97	21.37	31.64	-4.50	21.90	9.27	
Difference	0.00	0.00	0.00	-0.01	N/A	N/A	N/A	0.00	-0.03	0.06	N/A	N/A	0.00	
Northern Trust MSCI US Index (SA) - Gross	-4.70	-24.81	-17.22	8.13	N/A	N/A	N/A	26.98	21.36	31.71	N/A	N/A	9.28	11/01/2018
IM U.S. Large Cap Core Equity (SA+CF) Median	-4.84	-23.04	-15.41	7.63	8.80	10.82	11.68	27.78	17.56	30.09	-5.04	22.08	9.04	
Rank	46	71	68	38	N/A	N/A	N/A	56	29	31	N/A	N/A	43	
iShares:Core S&P Tot USM (ITOT) - Net	-4.62	-24.82	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-21.97	12/01/2021
S&P Tot Mkt Index	-4.56	-24.92	-18.05	7.51	8.48	10.80	11.29	25.66	20.79	30.90	-5.30	21.16	-22.06	
Difference	-0.06	0.10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.09	
iShares:Core S&P 500 (IVV) - Net	-4.90	-22.89	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-19.37	12/01/2021
S&P 500 Index (Cap Wtd)	-4.88	-23.87	-15.47	8.16	9.24	11.40	11.70	28.71	18.40	31.49	-4.38	21.83	-20.46	
Difference	-0.02	0.98	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.09	
Domestic Mid Cap Equity														
iShares:Core S&P Md-Cp (IJH) - Net	-2.48	-21.56	-15.00	6.04	5.19	N/A	N/A	25.15	13.53	26.24	-13.95	N/A	5.57	07/01/2017
S&P Mid Cap 400 Index (Cap Wtd)	-2.46	-21.52	-15.25	6.01	5.82	8.74	10.04	24.76	13.66	26.20	-11.08	16.24	6.17	
Difference	-0.02	-0.04	0.25	0.03	-0.63	N/A	N/A	0.39	-0.13	0.04	-2.87	N/A	-0.60	

Net performance shown is net of all manager fees and expenses (Net-All). Gross returns are compared to median performance of similar managers. A peer group of similar managers may not exist for all funds. Fiscal year ends on 06/30. Since inception performance may vary from State Street reported performance due to calculation methodology differences.

Montana Board of Investments
Comparative Performance
Domestic Equity Managers

As of September 30, 2022

	QTD/ FYTD	CYTD	1 Year	3 Years	5 Years	7 Years	10 Years	2021	2020	2019	2018	2017	Since Incep.	Inception Date
Domestic Small Cap Equity														
BlackRock MSCI USA Small Cap Index (SA) - Net	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	08/01/2022
MSCI US Sm Cap Index (USD) (Net)	-2.44	-23.57	-20.89	5.34	5.08	8.36	9.45	19.11	18.32	26.74	-10.40	16.75	-11.83	
Difference	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
BlackRock MSCI USA Small Cap Index (SA) - Gross	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	08/01/2022
iShares:Russ 2000 ETF (IWM) - Net	-2.11	-25.12	-23.76	4.37	N/A	N/A	N/A	14.32	20.90	25.52	N/A	N/A	3.13	05/01/2018
Russell 2000 Index	-2.19	-25.10	-23.50	4.29	3.55	7.51	8.55	14.82	19.96	25.53	-11.01	14.65	3.08	
Difference	0.08	-0.02	-0.26	0.08	N/A	N/A	N/A	-0.50	0.94	-0.01	N/A	N/A	0.05	

Gross of fees performance is not available (N/A) for the following funds: iShares:Core S&P Tot USM (ITOT), iShares:Core S&P 500 (IVV), iShares:Core S&P Md-Cp (IJH), and iShares:Russ 2000 ETF (IWM).

The current annual expense ratios for the iShares:Core S&P Tot USM (ITOT), iShares:Core S&P 500 (IVV), iShares:Core S&P Md-Cp (IJH), and iShares:Russ 2000 ETF (IWM) are 0.03%, 0.03%, 0.05%, and 0.19%, respectively.

See the Addendum for custom index specification.

Net performance shown is net of all manager fees and expenses (Net-All). Gross returns are compared to median performance of similar managers. A peer group of similar managers may not exist for all funds. Fiscal year ends on 06/30. Since inception performance may vary from State Street reported performance due to calculation methodology differences. BlackRock MSCI USA Small Cap Index was transitioned from a commingled fund to a separate account structure during Q3 2022 to obtain a lower fee structure.



Montana Board of Investments
Comparative Performance
International Equity Managers

As of September 30, 2022

	QTD/ FYTD	CYTD	1 Year	3 Years	5 Years	7 Years	10 Years	2021	2020	2019	2018	2017	Since Incep.	Inception Date
International Developed Large Cap Equity														
Acadian Asset Non-US Equity (SA) - Net	-8.94	-23.12	-20.33	1.78	1.37	6.69	5.74	16.67	8.89	19.38	-13.44	34.76	2.76	11/01/2006
MSCI ACW Ex US Val Index (USD) (Net)	-10.44	-21.00	-20.02	-2.15	-2.12	2.24	1.87	10.46	-0.77	15.72	-13.97	22.66	1.00	
Difference	1.50	-2.12	-0.31	3.93	3.49	4.45	3.87	6.21	9.66	3.66	0.53	12.10	1.76	
Acadian Asset Non-US Equity (SA) - Gross	-8.83	-22.84	-19.95	2.28	1.88	7.23	6.29	17.23	9.45	19.98	-12.99	35.45	3.32	11/01/2006
IM ACWI Ex US Value (SA+CF) Median	-10.46	-24.45	-24.26	-0.80	-0.68	3.58	4.07	11.05	6.52	21.34	-14.78	26.02	2.76	
Rank	19	24	11	13	14	5	10	7	43	59	26	8	32	
Lazard Asset Management (SA) - Net	-9.95	-24.17	-24.14	-2.50	-0.91	2.62	N/A	4.11	9.59	21.70	-14.32	27.00	0.61	06/01/2015
Lazard Custom Index	-9.91	-26.50	-25.17	-1.52	-1.27	2.88	2.31	7.82	10.65	21.51	-15.55	22.66	0.30	
Difference	-0.04	2.33	1.03	-0.98	0.36	-0.26	N/A	-3.71	-1.06	0.19	1.23	4.34	0.31	
Lazard Asset Management (SA) - Gross	-9.83	-23.89	-23.76	-2.01	-0.41	3.15	N/A	4.62	10.14	22.31	-13.88	27.65	1.13	06/01/2015
IM ACWI Ex US Value (SA+CF) Median	-10.46	-24.45	-24.26	-0.80	-0.68	3.58	4.07	11.05	6.52	21.34	-14.78	26.02	1.33	
Rank	32	34	45	66	46	66	N/A	94	39	42	35	38	62	
BlackRock ACW Ex US SuperFund A (CF) - Net	-9.88	-26.30	-24.94	-1.32	-0.60	3.52	3.22	8.00	10.81	21.77	-13.99	27.49	4.49	06/01/2009
MSCI ACW Ex US Index (USD) (Net)	-9.91	-26.50	-25.17	-1.52	-0.81	3.29	3.01	7.82	10.65	21.51	-14.20	27.19	4.28	
Difference	0.03	0.20	0.23	0.20	0.21	0.23	0.21	0.18	0.16	0.26	0.21	0.30	0.21	
BlackRock ACW Ex US SuperFund A (CF) - Gross	-9.86	-26.26	-24.89	-1.26	-0.54	3.59	3.30	8.07	10.89	21.85	-13.93	27.58	4.57	06/01/2009
IM All ACWI Ex US (SA+CF) Median	-9.32	-27.93	-26.10	-0.49	0.32	4.01	4.71	9.74	14.60	24.97	-14.64	28.74	5.90	
Rank	61	37	37	62	67	63	82	63	60	66	43	62	86	
iShares:MSCI EAFE ETF (EFA) - Net	-10.37	-27.12	-25.05	-1.95	-0.70	N/A	N/A	11.47	7.71	22.03	-12.88	N/A	0.27	07/01/2017
MSCI EAFE Index (USD) (Net)	-9.36	-27.09	-25.13	-1.83	-0.84	2.84	3.67	11.26	7.82	22.01	-13.79	25.03	0.20	
Difference	-1.01	-0.03	0.08	-0.12	0.14	N/A	N/A	0.21	-0.11	0.02	0.91	N/A	0.07	
Baillie Gifford (SA) - Net	-9.85	-39.79	-39.34	-2.44	-0.83	3.92	N/A	1.69	34.22	34.34	-17.35	31.99	1.64	06/01/2015
MSCI ACW Ex US Grth Index (USD) (Net)	-9.37	-31.84	-30.22	-1.38	0.18	4.09	3.95	5.09	22.20	27.34	-14.43	32.01	1.93	
Difference	-0.48	-7.95	-9.12	-1.06	-1.01	-0.17	N/A	-3.40	12.02	7.00	-2.92	-0.02	-0.29	
Baillie Gifford (SA) - Gross	-9.74	-39.58	-39.05	-1.98	-0.36	4.43	N/A	2.16	34.86	34.99	-16.93	32.66	2.14	06/01/2015
IM ACWI Ex US Growth (SA+CF) Median	-8.52	-32.98	-31.39	0.01	1.14	5.04	5.08	9.00	22.14	29.57	-13.78	32.56	2.95	
Rank	87	92	94	82	79	66	N/A	91	13	9	85	49	71	

Net performance shown is net of all manager fees and expenses (Net-All). Gross returns are compared to median performance of similar managers. A peer group of similar managers may not exist for all funds. Fiscal year ends on 06/30. Since inception performance may vary from State Street reported performance due to calculation methodology differences. See the Addendum for custom index specification.



Montana Board of Investments
Comparative Performance
International Equity Managers

As of September 30, 2022

	QTD/ FYTD	CYTD	1 Year	3 Years	5 Years	7 Years	10 Years	2021	2020	2019	2018	2017	Since Incep.	Inception Date
Invesco (SA) - Net	-7.38	-27.21	-24.64	-1.72	0.09	3.68	N/A	5.60	14.84	29.29	-15.17	24.92	1.45	06/01/2015
MSCI ACW Ex US Grth Index (USD) (Net)	-9.37	-31.84	-30.22	-1.38	0.18	4.09	3.95	5.09	22.20	27.34	-14.43	32.01	1.93	
Difference	1.99	4.63	5.58	-0.34	-0.09	-0.41	N/A	0.51	-7.36	1.95	-0.74	-7.09	-0.48	
Invesco (SA) - Gross	-7.24	-26.89	-24.20	-1.15	0.67	4.32	N/A	6.20	15.51	30.05	-14.64	25.70	2.07	06/01/2015
IM ACWI Ex US Growth (SA+CF) Median	-8.52	-32.98	-31.39	0.01	1.14	5.04	5.08	9.00	22.14	29.57	-13.78	32.56	2.95	
Rank	11	15	13	67	59	69	N/A	77	83	45	56	91	72	
International Developed Small Cap Equity														
American Century Investment Mgmt (SA) - Net	-6.82	-36.61	-37.83	-0.15	-0.39	3.94	N/A	6.24	31.60	29.44	-20.76	43.80	2.52	03/01/2014
MSCI ACW Ex US Sm Cap Grth Index (USD) (Net)	-7.96	-33.85	-33.36	0.49	-0.08	4.09	4.50	11.53	23.69	24.61	-18.27	33.64	2.42	
Difference	1.14	-2.76	-4.47	-0.64	-0.31	-0.15	N/A	-5.29	7.91	4.83	-2.49	10.16	0.10	
American Century Investment Mgmt (SA) - Gross	-6.63	-36.22	-37.31	0.67	0.43	4.81	N/A	7.10	32.68	30.50	-20.09	44.99	3.38	03/01/2014
IM ACWI Ex US Growth (SA+CF) Median	-8.52	-32.98	-31.39	0.01	1.14	5.04	5.08	9.00	22.14	29.57	-13.78	32.56	3.29	
Rank	2	77	89	38	68	58	N/A	65	26	42	100	6	43	
BlackRock MSCI ACW Ex US Sm Cap Index (CF) - Net	-8.39	-29.18	-28.75	0.48	-0.34	4.22	4.66	12.84	14.45	22.68	-17.85	31.96	4.74	02/01/2012
MSCI ACWI Ex US Sm Cap Index IMI (USD) (Net)	-8.37	-29.37	-28.93	0.38	-0.56	3.98	4.44	12.93	14.24	22.42	-18.20	31.65	4.52	
Difference	-0.02	0.19	0.18	0.10	0.22	0.24	0.22	-0.09	0.21	0.26	0.35	0.31	0.22	
BlackRock MSCI ACW Ex US Sm Cap Index (CF) - Gross	-8.38	-29.13	-28.68	0.59	-0.23	4.35	4.81	12.98	14.50	22.90	-17.74	32.15	4.89	02/01/2012
Templeton Investment Counsel (SA) - Net	-11.27	-33.09	-32.85	-3.30	-2.52	1.71	N/A	11.79	9.98	24.17	-18.48	33.07	0.79	03/01/2014
Templeton Custom Index	-8.37	-29.37	-28.93	0.38	-1.06	3.85	4.35	12.93	14.24	22.42	-19.75	29.72	1.64	
Difference	-2.90	-3.72	-3.92	-3.68	-1.46	-2.14	N/A	-1.14	-4.26	1.75	1.27	3.35	-0.85	
Templeton Investment Counsel (SA) - Gross	-11.08	-32.66	-32.29	-2.50	-1.70	2.58	N/A	12.71	10.91	25.20	-17.78	34.21	1.66	03/01/2014
IM ACWI Ex US Value (SA+CF) Median	-10.46	-24.45	-24.26	-0.80	-0.68	3.58	4.07	11.05	6.52	21.34	-14.78	26.02	1.50	
Rank	61	91	94	82	76	73	N/A	36	33	26	84	8	42	
Acadian Ex US Small Cap (SA) - Net	-10.54	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-22.30	03/01/2022
MSCI ACW Ex US Sm Cap Index (USD) (Net)	-8.37	-29.37	-28.93	0.38	-0.56	3.98	4.44	12.93	14.24	22.42	-18.20	31.65	-23.68	
Difference	-2.17	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.38	
Acadian Ex US Small Cap (SA) - Gross	-10.39	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-22.06	03/01/2022
IM All ACWI Ex US (SA+CF) Median	-9.32	-27.93	-26.10	-0.49	0.32	4.01	4.71	9.74	14.60	24.97	-14.64	28.74	-22.54	
Rank	71	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	40	

Net performance shown is net of all manager fees and expenses (Net-All). Gross returns are compared to median performance of similar managers. A peer group of similar managers may not exist for all funds. Fiscal year ends on 06/30. Since inception performance may vary from State Street reported performance due to calculation methodology differences. See the Addendum for custom index specification.



Montana Board of Investments
Comparative Performance
International Equity Managers

As of September 30, 2022

	QTD/ FYTD	CYTD	1 Year	3 Years	5 Years	7 Years	10 Years	2021	2020	2019	2018	2017	Since Incep.	Inception Date
International Emerging Equity														
BlackRock MSCI Emg Mkts Index NL (CF) - Net	-11.68	-27.25	-28.20	-2.34	-2.04	3.64	0.80	-2.82	17.92	18.12	-14.69	37.05	0.79	02/01/2012
MSCI Emg Mkts Index (USD) (Net)	-11.57	-27.16	-28.11	-2.07	-1.81	3.88	1.05	-2.54	18.31	18.42	-14.57	37.28	1.04	
Difference	-0.11	-0.09	-0.09	-0.27	-0.23	-0.24	-0.25	-0.28	-0.39	-0.30	-0.12	-0.23	-0.25	
BlackRock MSCI Emg Mkts Index NL (CF) - Gross	-11.67	-27.21	-28.14	-2.24	-1.94	3.76	0.95	-2.71	18.04	18.25	-14.60	37.16	0.94	02/01/2012
iShares:Core MSCI EmMkts (IEMG)	-12.39	-29.10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-29.10	01/01/2022
MSCI Emg Mkts IM Index (USD) (Net)	-10.79	-26.79	-27.51	-1.20	-1.44	3.96	1.27	-0.28	18.39	17.65	-15.05	36.83	-26.79	
Difference	-1.60	-2.31	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-2.31	

Gross of fees performance is not available (N/A) for the following funds: iShares:MSCI EAFE ETF (EFA), International Equity Pool STIF, and iShares:Core MSCI Em Mkts (IEMG).

The current annual expense ratios for the iShares:MSCI EAFE ETF (EFA), and iShares:Core MSCI Em Mkts (IEMG): are 0.32%, and 0.09%, respectively.

Net performance shown is net of all manager fees and expenses (Net-All). Gross returns are compared to median performance of similar managers. A peer group of similar managers may not exist for all funds. Fiscal year ends on 06/30. Since inception performance may vary from State Street reported performance due to calculation methodology differences. See the Addendum for custom index specification.

Montana Board of Investments
 Comparative Performance
 Core Fixed Income Managers

As of September 30, 2022

	QTD/ FYTD	CYTD	1 Year	3 Years	5 Years	7 Years	10 Years	2021	2020	2019	2018	2017	Since Incep.	Inception Date
US Fixed Income Aggregate - Net	-4.51	-13.25	-13.27	N/A	N/A	N/A	N/A	-1.52	7.65	N/A	N/A	N/A	-2.94	12/01/2019
Bloomberg US Agg Bond Index	-4.75	-14.61	-14.60	-3.26	-0.27	0.54	0.89	-1.55	7.51	8.72	0.01	3.54	-3.53	
Difference	0.24	1.36	1.33	N/A	N/A	N/A	N/A	0.03	0.14	N/A	N/A	N/A	0.59	
Reams Asset Core Plus (SA) - Net	-4.89	-14.66	-14.27	-0.43	1.62	1.96	1.96	-1.25	17.14	8.08	1.31	3.21	4.31	10/01/2008
Reams Custom Index	-4.45	-14.90	-14.92	-3.20	-0.24	0.78	1.11	-1.10	7.58	8.72	0.01	3.83	2.96	
Difference	-0.44	0.24	0.65	2.77	1.86	1.18	0.85	-0.15	9.56	-0.64	1.30	-0.62	1.35	
Reams Asset Core Plus (SA) - Gross	-4.84	-14.54	-14.11	-0.24	1.81	2.15	2.14	-1.07	17.35	8.28	1.49	3.38	4.50	10/01/2008
IM U.S. Broad Market Core+ FI (SA+CF) Median	-4.32	-14.64	-14.65	-2.32	0.51	1.54	1.82	-0.25	8.98	9.90	-0.24	4.78	4.10	
Rank	93	46	28	10	7	22	26	86	3	93	5	95	31	

Net performance shown is net of all manager fees and expenses (Net-All). Gross returns are compared to median performance of similar managers. Fiscal year ends on 06/30. Since inception performance may vary from State Street reported performance due to calculation methodology differences.



Montana Board of Investments
Comparative Performance
Non-Core Fixed Income Managers

As of September 30, 2022

	QTD/ FYTD	CYTD	1 Year	3 Years	5 Years	7 Years	10 Years	2021	2020	2019	2018	2017	Since Incep.	Inception Date
Neuberger Berman High Yield (SA) - Net	-0.26	-14.95	-14.26	-1.02	1.10	3.42	3.38	4.76	6.30	13.75	-1.99	5.80	5.13	01/01/2010
Bloomberg US HY 2% Issuer Cap Index	-0.64	-14.73	-14.15	-0.47	1.56	4.12	3.94	5.26	7.05	14.32	-2.08	7.50	5.54	
Difference	0.38	-0.22	-0.11	-0.55	-0.46	-0.70	-0.56	-0.50	-0.75	-0.57	0.09	-1.70	-0.41	
Neuberger Berman High Yield (SA) - Gross	-0.21	-14.82	-14.08	-0.73	1.46	3.81	3.79	4.96	6.75	14.26	-1.56	6.27	5.57	01/01/2010
IM U.S. High Yield Bonds (SA+CF) Median	-0.43	-13.23	-12.46	0.08	2.03	4.05	4.16	5.30	6.54	14.23	-1.62	7.47	5.71	
Rank	32	87	84	84	81	67	72	59	44	50	49	78	62	
Oaktree US High Yield (SA) (CAPP) - Net	-0.44	-13.92	-13.13	-0.47	N/A	N/A	N/A	4.91	6.56	15.44	-3.99	N/A	1.37	01/01/2018
Bloomberg US HY 2% Issuer Cap Index	-0.64	-14.73	-14.15	-0.47	1.56	4.12	3.94	5.26	7.05	14.32	-2.08	7.50	1.54	
Difference	0.20	0.81	1.02	0.00	N/A	N/A	N/A	-0.35	-0.49	1.12	-1.91	N/A	-0.17	
Oaktree US High Yield (SA) (CAPP) - Gross	-0.34	-13.71	-12.82	-0.04	N/A	N/A	N/A	5.34	7.07	16.02	-3.47	N/A	1.83	01/01/2018
IM U.S. High Yield Bonds (SA+CF) Median	-0.43	-13.23	-12.46	0.08	2.03	4.05	4.16	5.30	6.54	14.23	-1.64	7.47	2.04	
Rank	43	63	59	60	N/A	N/A	N/A	49	40	17	92	N/A	63	
Shenkman High Yield Fixed Income (SA) (CAPP) - Net	-0.18	-12.16	-11.73	-0.14	N/A	N/A	N/A	4.24	6.32	13.65	-1.96	N/A	1.62	12/01/2017
Bloomberg US HY 2% Issuer Cap Index	-0.64	-14.73	-14.15	-0.47	1.56	4.12	3.94	5.26	7.05	14.32	-2.08	7.50	1.58	
Difference	0.46	2.57	2.42	0.33	N/A	N/A	N/A	-1.02	-0.73	-0.67	0.12	N/A	0.04	
Shenkman High Yield Fixed Income (SA) (CAPP) - Gross	-0.08	-11.91	-11.39	0.29	N/A	N/A	N/A	4.68	6.82	14.18	-1.46	N/A	2.08	12/01/2017
IM U.S. High Yield Bonds (SA+CF) Median	-0.43	-13.23	-12.46	0.08	2.03	4.05	4.16	5.30	6.54	14.23	-1.64	7.47	2.06	
Rank	25	33	34	43	N/A	N/A	N/A	71	44	51	46	N/A	47	
Cohen & Steers Preferred Securities (SA) - Net	-1.50	-13.49	-13.61	N/A	N/A	N/A	N/A	3.70	N/A	N/A	N/A	N/A	-3.25	11/01/2020
Cohen & Steers Preferred Securities Custom Benchmark	-2.10	-14.66	-14.90	N/A	N/A	N/A	N/A	2.72	N/A	N/A	N/A	N/A	-4.68	
Difference	0.60	1.17	1.29	N/A	N/A	N/A	N/A	0.98	N/A	N/A	N/A	N/A	1.43	
Cohen & Steers Preferred Securities (SA) - Gross	-1.42	-13.27	-13.32	N/A	N/A	N/A	N/A	4.06	N/A	N/A	N/A	N/A	-2.92	11/01/2020
Payden & Rygel EMD (SA) - Net	-5.26	-23.43	-24.46	N/A	N/A	N/A	N/A	-3.49	N/A	N/A	N/A	N/A	-15.87	01/01/2021
Payden & Rygel EMD Custom Benchmark	-4.61	-22.35	-23.18	N/A	N/A	N/A	N/A	-3.92	N/A	N/A	N/A	N/A	-15.41	
Difference	-0.65	-1.08	-1.28	N/A	N/A	N/A	N/A	0.43	N/A	N/A	N/A	N/A	-0.46	
Payden & Rygel EMD (SA) - Gross	-5.18	-23.23	-24.20	N/A	N/A	N/A	N/A	-3.14	N/A	N/A	N/A	N/A	-15.57	01/01/2021
IM Emerging Markets Debt (SA+CF) Median	-4.04	-18.51	-19.81	-4.92	-2.09	1.79	0.78	-2.29	6.71	14.30	-5.29	12.46	-13.85	
Rank	85	79	77	N/A	N/A	N/A	N/A	57	N/A	N/A	N/A	N/A	76	

Net performance shown is net of all manager fees and expenses (Net-All). Gross returns are compared to median performance of similar managers. Fiscal year ends on 06/30. Since inception performance may vary from State Street reported performance due to calculation methodology differences. No peer group is shown for Cohen & Steers Preferred Securities (SA) due to the lack of suitable Preferred Securities peer groups.



Montana Board of Investments
Comparative Performance
TFIP Fixed Income Managers

As of September 30, 2022

	QTD/ FYTD	CYTD	1 Year	3 Years	5 Years	7 Years	10 Years	2021	2020	2019	2018	2017	Since Incep.	Inception Date
Trust Funds Investment Pool Fixed Income	-4.07	-13.08	-12.86	-1.89	0.68	1.33	1.71	-0.47	8.84	9.12	0.25	3.83	5.12	10/01/1995
Bloomberg US Agg Bond Index	-4.75	-14.61	-14.60	-3.26	-0.27	0.54	0.89	-1.55	7.51	8.72	0.01	3.54	4.25	
Difference	0.68	1.53	1.74	1.37	0.95	0.79	0.82	1.08	1.33	0.40	0.24	0.29	0.87	
Trust Funds Investment Pool Fixed Income	-4.07	-13.08	-12.86	-1.89	0.68	1.33	1.71	-0.47	8.84	9.12	0.25	3.83	5.12	10/01/1995
IM U.S. Broad Market Core Fixed Income (SA+CF) Median	-4.55	-14.43	-14.48	-2.70	0.18	1.07	1.37	-1.23	8.51	9.19	0.06	4.01	4.68	
Rank	15	11	8	14	17	21	17	22	36	55	30	61	4	
Shenkman High Yield Fixed Income (SA) (TFIP) - Net	-0.15	-12.28	-11.85	-0.22	N/A	N/A	N/A	4.31	6.05	N/A	N/A	N/A	0.27	07/01/2019
Bloomberg US HY 2% Issuer Cap Index	-0.64	-14.73	-14.15	-0.47	1.56	4.12	3.94	5.26	7.05	14.32	-2.08	7.50	-0.03	
Difference	0.49	2.45	2.30	0.25	N/A	N/A	N/A	-0.95	-1.00	N/A	N/A	N/A	0.30	
Shenkman High Yield Fixed Income (SA) (TFIP) - Gross	-0.05	-12.03	-11.52	0.21	N/A	N/A	N/A	4.74	6.54	N/A	N/A	N/A	0.70	07/01/2019
IM U.S. High Yield Bonds (SA+CF) Median	-0.43	-13.23	-12.46	0.08	2.03	4.05	4.16	5.30	6.54	14.23	-1.64	7.47	0.59	
Rank	23	35	36	46	N/A	N/A	N/A	67	51	N/A	N/A	N/A	46	
Oaktree US High Yield (SA) (TFIP) - Net	-0.51	-13.72	-12.99	-0.34	N/A	N/A	N/A	4.93	6.72	N/A	N/A	N/A	0.20	08/01/2019
Bloomberg US HY 2% Issuer Cap Index	-0.64	-14.73	-14.15	-0.47	1.56	4.12	3.94	5.26	7.05	14.32	-2.08	7.50	-0.21	
Difference	0.13	1.01	1.16	0.13	N/A	N/A	N/A	-0.33	-0.33	N/A	N/A	N/A	0.41	
Oaktree US High Yield (SA) (TFIP) - Gross	-0.42	-13.51	-12.68	0.09	N/A	N/A	N/A	5.36	7.25	N/A	N/A	N/A	0.63	08/01/2019
IM U.S. High Yield Bonds (SA+CF) Median	-0.43	-13.23	-12.46	0.08	2.03	4.05	4.16	5.30	6.54	14.23	-1.64	7.47	0.46	
Rank	50	59	55	50	N/A	N/A	N/A	48	37	N/A	N/A	N/A	43	
Neuberger Berman High Yield (SA) (TFIP) - Net	-0.30	-14.86	-14.17	N/A	N/A	N/A	N/A	4.62	N/A	N/A	N/A	N/A	2.69	04/01/2020
Bloomberg US HY 2% Issuer Cap Index	-0.64	-14.73	-14.15	-0.47	1.56	4.12	3.94	5.26	7.05	14.32	-2.08	7.50	3.90	
Difference	0.34	-0.13	-0.02	N/A	N/A	N/A	N/A	-0.64	N/A	N/A	N/A	N/A	-1.21	
Neuberger Berman High Yield (SA) (TFIP) - Gross	-0.25	-14.73	-14.00	N/A	N/A	N/A	N/A	4.81	N/A	N/A	N/A	N/A	2.96	04/01/2020
IM U.S. High Yield Bonds (SA+CF) Median	-0.43	-13.23	-12.46	0.08	2.03	4.05	4.16	5.30	6.54	14.23	-1.64	7.47	4.24	
Rank	37	86	80	N/A	N/A	N/A	N/A	64	N/A	N/A	N/A	N/A	83	

Net performance shown is net of all manager fees and expenses (Net-All). Gross returns are compared to median performance of similar managers. Fiscal year ends on 06/30. Since inception performance may vary from State Street reported performance due to calculation methodology differences.



Montana Board of Investments
Comparative Performance
Trust Accounts

As of September 30, 2022

	QTD/ FYTD	CYTD	1 Year	3 Years	5 Years	7 Years	10 Years	2021	2020	2019	2018	2017	Since Incep.	Inception Date
Abandoned Mine Trust	0.53	0.79	0.82	0.71	1.21	1.13	1.13	0.13	0.73	2.41	1.85	1.04	3.67	12/01/1993
Barker Hughesville St Response	-2.65	-6.22	-5.24	N/A	N/A	N/A	N/A	1.36	N/A	N/A	N/A	N/A	-1.10	05/01/2020
Belt Water Treatment Plant Fund	-2.54	-6.02	-5.05	0.70	N/A	N/A	N/A	1.34	6.80	8.56	N/A	N/A	2.64	03/01/2018
Big Sky Economic Development Fund	-2.93	-6.79	-5.75	0.57	2.13	2.51	2.72	1.45	7.12	8.67	0.48	3.97	4.24	07/01/2005
Butte Area One Restoration	-2.33	-5.47	-4.62	0.65	1.95	2.08	2.00	1.26	6.07	6.76	1.24	2.92	2.82	11/01/2008
Clark Fork River Restoration	-2.32	-5.37	-4.52	0.53	1.87	2.03	2.06	1.19	5.65	7.04	0.96	2.85	3.07	11/01/2008
Coal Tax Cultural Trust Fund	-2.90	-6.68	-5.66	0.57	2.12	2.50	2.71	1.43	6.99	8.64	0.47	3.96	5.51	12/01/1993
Coal Tax Park Acquisition	-2.74	-6.43	-5.44	0.59	2.13	2.50	2.70	1.37	6.86	8.63	0.48	3.96	5.49	12/01/1993
East Helena Compensation Fund	-0.25	-0.78	-0.54	0.90	1.86	1.92	N/A	0.42	2.65	5.52	1.20	2.56	1.78	01/01/2013
East Helena Greenway Trail Maintenance	-2.02	-4.88	-4.06	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-1.48	03/01/2021
Endowment for Children	-2.95	-6.64	-5.62	0.58	2.11	2.45	2.64	1.41	7.01	8.54	0.46	3.89	4.18	08/01/2007
Flying J CECRA Facilities Fund	-2.63	-6.20	-5.21	N/A	N/A	N/A	N/A	1.36	N/A	N/A	N/A	N/A	-1.06	05/01/2020
FWP License Account	-0.94	-2.91	-2.54	-0.07	0.86	0.87	0.78	0.46	1.85	3.33	1.50	1.11	2.62	11/01/1997
FWP Mitigation Trust Fund	-1.94	-4.74	-4.04	0.12	1.28	1.16	1.13	0.98	3.84	5.46	1.14	1.15	3.54	12/01/1993
FWP Real Property Trust	-2.80	-6.56	-5.57	0.54	2.10	2.45	2.63	1.38	6.83	8.62	0.51	3.80	4.93	12/01/1993
Group Benefits	-0.60	-1.70	-1.40	0.47	1.29	1.22	1.14	0.63	2.05	4.01	1.37	1.30	3.57	12/01/1993
Harold Hamm Endowment	-2.69	-6.31	-5.31	0.61	2.10	N/A	N/A	1.43	6.71	8.45	0.57	1.11	1.86	07/01/2016
Invasive Species Trust Fund	-2.28	-6.12	-5.06	N/A	N/A	N/A	N/A	1.19	N/A	N/A	N/A	N/A	-2.17	10/01/2020
Libby Asbestos Site State Cost	-2.50	-5.89	-4.95	N/A	N/A	N/A	N/A	1.25	N/A	N/A	N/A	N/A	-0.98	05/01/2020
Luttrell Pit - Operational & Maintenance	-2.27	-5.55	-4.56	N/A	N/A	N/A	N/A	1.36	N/A	N/A	N/A	N/A	-0.83	05/01/2020
Montana Pole	-2.13	-5.22	-4.41	0.56	1.94	2.21	2.33	1.14	5.61	7.48	0.74	3.38	4.65	09/01/1996
Montana State University	-0.16	-0.66	-0.49	0.46	1.20	1.14	0.95	0.30	1.30	2.87	1.87	1.39	1.80	08/01/2004
Montana Tech-UM Agency Funds	0.33	0.38	0.47	0.68	1.27	1.15	0.89	0.20	1.01	2.56	1.91	1.22	1.67	03/01/2003
MT BOI - Clark Fork Site	-2.71	-6.40	-5.38	0.56	2.03	2.35	2.44	1.44	6.65	8.00	0.67	3.64	3.59	11/01/2008
MT BOI UOFM Other	-0.50	-1.46	-1.16	1.05	1.78	1.81	1.70	0.73	3.47	4.54	1.42	2.15	2.72	08/01/2002
MUS Group Insurance	-0.05	-0.54	-0.39	0.62	1.39	1.28	1.20	0.26	1.70	3.39	1.96	1.09	1.23	10/01/2011
MUS Workers Compensation	-0.41	-1.26	-0.94	0.72	1.62	N/A	N/A	0.46	2.55	4.43	1.62	1.80	1.51	04/01/2016

Performance shown is gross of fees. Fiscal year ends on 06/30. Since inception performance may vary from State Street reported performance due to calculation methodology differences.



Montana Board of Investments
Comparative Performance
Trust Accounts

As of September 30, 2022

	QTD/ FYTD	CYTD	1 Year	3 Years	5 Years	7 Years	10 Years	2021	2020	2019	2018	2017	Since Incep.	Inception Date
Older Montanans Trust	-2.93	-6.70	-5.69	0.61	2.14	2.50	2.68	1.41	7.19	8.62	0.49	3.87	4.04	08/01/2007
Permanent Coal Trust Excl Crp	-1.81	-3.90	-3.00	1.25	2.35	2.62	2.87	1.82	5.57	6.81	1.28	3.49	5.31	12/01/1993
PERS Defined Cont Disability	-5.51	-21.16	-17.40	2.55	3.95	4.78	N/A	13.16	14.06	20.77	-4.88	14.57	4.72	09/01/2015
Potter Trust Fund	-2.69	-6.33	-5.33	0.62	2.12	N/A	N/A	1.41	6.78	8.47	0.51	3.87	2.23	06/01/2016
Resource Indemnity Trust	-3.03	-6.96	-5.90	0.55	2.15	2.54	2.75	1.48	7.23	8.88	0.44	4.01	5.58	12/01/1993
School Facilities Fund	-2.87	-6.82	-5.82	0.49	N/A	N/A	N/A	1.39	6.97	7.88	-0.13	N/A	1.81	01/01/2018
Smelter Hill Up Restorative	-2.46	-5.81	-4.88	0.40	1.63	1.61	1.53	1.29	5.62	5.64	1.57	1.85	1.91	11/01/2008
State Fund Insurance	-3.35	-10.35	-9.18	0.34	1.99	2.60	2.85	3.04	7.62	9.65	0.38	5.05	5.05	12/01/1993
Streamside Tailings Operable Unit	-2.59	-6.03	-5.12	0.58	2.01	2.34	2.52	1.27	6.47	7.92	0.57	3.69	4.79	02/01/1999
Subsequent Injury Fund	0.55	0.80	0.83	0.71	1.24	1.10	0.81	0.13	0.73	2.28	1.98	1.11	2.84	12/01/1993
Tobacco Trust Fund	-2.97	-6.90	-5.84	0.54	2.11	2.50	2.72	1.51	7.10	8.67	0.46	3.96	4.98	01/01/2001
Treasurers	0.35	0.39	0.40	0.53	1.13	1.01	0.78	0.10	0.63	2.28	1.97	1.07	2.67	12/01/1993
Treasure State Endowment	-2.99	-6.88	-5.83	0.55	2.14	2.53	2.74	1.47	7.15	8.81	0.46	4.00	5.46	12/01/1993
Treasure State Reg. Water System	-2.99	-6.87	-5.82	0.56	2.14	2.52	2.73	1.47	7.15	8.80	0.45	4.00	5.13	06/01/2000
Trust and Legacy Account	-2.96	-6.89	-5.84	0.56	2.15	2.53	2.75	1.47	7.19	8.84	0.43	4.00	6.15	07/01/1991
UCFRB Assess/Litig Cost Rec	-3.00	-6.87	-5.83	0.43	2.01	2.39	2.57	1.53	6.68	8.50	0.49	3.77	5.07	07/01/1999
UCFRB Restoration Fund	-2.89	-6.68	-5.67	0.52	2.10	2.40	2.58	1.36	6.90	8.52	0.67	3.73	5.00	06/01/1999
Upper Blackfoot Response	0.26	0.20	0.32	0.84	1.61	1.60	1.41	0.32	1.55	4.24	1.49	1.90	1.47	09/01/2010
Weed Control Trust	-3.03	-6.96	-5.90	0.55	2.15	2.54	2.76	1.48	7.23	8.88	0.44	4.01	4.80	12/01/1993
Wildlife Habitat Trust	-2.80	-6.53	-5.55	0.53	2.08	2.43	2.62	1.38	6.75	8.54	0.51	3.78	4.93	12/01/1993
Yellowstone Pipeline Cleanup Fund	-1.26	-3.15	-2.58	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-1.13	04/01/2021
Zortman/Landusky LT H2O	0.53	0.79	0.82	0.70	1.24	1.11	1.06	0.13	0.73	2.28	1.98	1.01	5.84	09/01/1999
Z/L Long Term H2O Trust Fund	0.53	0.79	0.82	0.70	1.24	1.13	1.04	0.13	0.73	2.28	1.98	1.08	3.78	09/01/2005

Performance shown is gross of fees. Fiscal year ends on 06/30. Since inception performance may vary from State Street reported performance due to calculation methodology differences.

Performance Notes

- All gross and net performance data is provided by State Street Analytics (SSA). Reported gross returns for the retirement plans prior to 07/01/2002 are net of all fees.
- Gross performance for the retirement plans is calculated with fee accruals provided by Montana's Accounting department.
- Gross of fees performance is not available (N/A) for the following funds: SPDR S&P 500 ETF (SPY), Domestic Equity Pool STIF, iShares:Core S&P Md-Cp (IJH), iShares:Russ 2000 ETF (IWM), iShares:MSCI EAFE ETF (EFA), and International Equity Pool STIF. The current annual expense ratios are as listed below.

Index Notes

- Retirement plan custom benchmarks are provided by State Street Bank and are calculated daily using actual allocations.
- The CAPP Custom Benchmark consists of the portfolio weighted average of the primary benchmark for each CAPP asset class.
- The Short Term Custom Benchmark consists of 100% ICE 1 Mo LIBOR Index (USD) through 4/30/2018, and 100% Federal Reserve US Treasury 1 Mo Constant Maturity Index thereafter.
- The Domestic Equity Custom Index consists of 100% S&P 1500 Comp Index through 04/30/2017 and 100% MSCI USA IM Index (USD) (Gross) thereafter.
- The International Equity Custom Index consists of 100% MSCI EAFE Index (USD) (Net) through 10/31/2006, 100% MSCI ACW Ex US Index (USD) (Net) through 06/30/2007, 92.5% MSCI ACW Ex US Index (USD) (Net) and 7.5% MSCI ACW Ex US SC IM Index (USD) (Net) through 02/28/2014, and 100% MSCI ACW Ex-US IM Index thereafter.
- The Real Estate Custom Index consists of 100% NCREIF ODCE Index (AWA) (Net) (1 Qtr Lag) through 03/31/2017, 100% MSCI US REIT Index (USD) (Gross) through 06/30/2020, and 100% NCREIF ODCE (AWA) (1 Qtr Lag) Index thereafter.
- The Private Investments Custom Index consists of 100% S&P 1500 Comp Index+4% (1 Qtr Lag) through 03/31/2017, 100% MSCI US Small Cap Index (USD) (Gross) through 12/31/2020, and the portfolio weighted MSCI US SC / S&P LSTA US Leverage Loan 100 Index for PE / PC thereafter.
- The Lazard Custom Index consists of 100% MSCI ACW Ex US Value Index (USD) (Net) through 6/30/2018 and 100% MSCI ACW Ex US Index (USD) (Net) thereafter.
- The Templeton Custom Index consists of 100% MSCI ACW Ex US Small Cap Value Index (USD) (Net) through 5/31/2018, and 100% MSCI ACW Ex US Small Cap Index (USD) (Net) thereafter.
- The Reams Custom Index consists of 100% Bloomberg US Unv Bond Index through 03/31/2017, 100% Bloomberg US Agg Bond Index through 12/31/2019, and 100% Bloomberg US Unv Bond Index thereafter.
- The Cohen & Steers Custom Index consists of 60% ICE BofAML US IG Institutional Capital Securities Index, 20% ICE BofAML Core Fixed Rate Preferred Securities Index, and 20% Bloomberg Barclays Developed Market USD Contingent Capital Index.
- The Payden & Rygel Custom Index consists of 70% JP Morgan EMBI Global Diversified Index, 30% JP Morgan GBI-EM Global Diversified Index.
- The JPM US Equity Custom Benchmark consists of 100% S&P 500 Index (Cap Weighted) through 06/30/2019 and 100% MSCI US Index (USD) (Gross) thereafter.
- The Real Assets Custom Index consists of 100% MSCI All Country World Commodity Producers Index (USD) (Net) through 12/31/2020 and 33.33% MSCI All Country World Commodity Producers Index (USD) (Net), 33.33% MSCI All Country World Infrastructure Index, 33.33% Bloomberg Barclays Global Inflation Linked US TIPS Index thereafter.
- The Core Fixed Income Custom Index consists of 100% Bloomberg US Agg Bond Index through 03/31/2017, the portfolio weighted average of Broad Fixed Income - PAC Custom Blend, Bloomberg US Corp Inv Grade Index, Bloomberg US MBS Index, Bloomberg US Int TIPS Index, Bloomberg US Trsy Int Trm Index through 11/30/2019, and 100% Bloomberg US Agg Bond Index thereafter.
- The plan sponsor peer group was updated from All Public Plans >\$3B Total Fund Median to All Public Plans >\$5B Total Fund Median.
- As of 07/01/2021, the Trust Fund Custom Index Benchmark is the portfolio weighted averaged of the primary benchmark, consisting of NCREIF ODCE Index (1Q lag), Bloomberg US High Yield - 2% Issuer Cap Index, and Bloomberg US Aggregate Bond Index.

Trust Accounts Comments

- Barker Hughesville St Response, Libby Asbestos Site State Cost, Flying J CECRA Facilities Fund, and Luttrell Pit - Operations and Maintenance were added in 05/2020.
- The Belt Water Treatment Plant Fund was added in 03/2018.
- The School Facilities Fund was added in 01/2018.
- The Potter Trust Fund and the Harold Hamm Endowment were added in 06/2016.
- MUS Workers Compensation was added in 04/2016.
- The Invasive Species Trust Fund was added in 10/2020.
- The East Helena Greenway Trail Maintenance Fund was added in 03/2021.
- The Yellowstone Pipeline Cleanup Fund was added in 04/2021.

Manager Transition Comments

- BlackRock MSCI USA Small Cap Index was transitioned from a commingled fund to a separate account structure during Q3 2022 to obtain a lower fee structure.
- Neuberger Berman High Yield (SA) and TFIP Private Real Estate were funded in the Trust Fund Investment Pool during Q1 2020.
- Post High Yield Plus (SA), GMO:Bchmk-Fr All;III (GBMFX), and PIMCO:All Asset;Inst (PAAIX) were liquidated during Q3 2019.

Manager Transition Comments (cont.)

- Oaktree US High Yield Fixed Income (SA) and Shenkman High Yield Fixed Income (SA) were funded in the Trust Fund Investment Pool during Q3 2019.
- Artisan Partners (SA), Iridian Asset Management (SA), Congress Mid Cap Growth (SA), TimeSquare Capital Management (SA), and Alliance Bernstein (SA) were liquidated in Q2 2019.
- BlackRock MSCI US Equity Index (CF) was transitioned into a separately managed account during Q1 2019.
- Effective 05/2014, ING rebranded to Voya. The ING Investment Management (SA) has been updated to Voya Investment Management (SA) to reflect the change.
- iShares S&P SmallCap 600 Index ETF (IJR) was liquidated in 01/2016.
- SPDR S&P 500 ETF (SPY) was initially funded in 09/2015, was then liquidated in 12/2015, and was re-funded in 10/2016.
- iShares:MSCI Em Mkts (EEM) was funded in 12/2016.
- SPDR S&P 500 ETF (SPY) was liquidated in 01/2017.
- DFA Emg Mkts Sm Cap;I (DEMSX) was funded in 02/2017.
- Wells Capital Management (SA), Domestic Equity Pool SPIF, and International Equity Pool SPIF were liquidated in 10/2016. Wells Capital Management (SA) residual assets from liquidation were distributed in 03/2017.
- Nicholas Investment Partners was liquidated in 07/2016. Residual assets from liquidation were distributed in 03/2017.
- BlackRock Equity Index Fund A (CF) and BlackRock Mid Cap Equity Index A (CF) were liquidated in 05/2017.
- BlackRock MSCI US Equity Index (CF), BlackRock MSCI US Sm Cap Equity Index (CF), and iShares:Core S&P Md-Cp (IJH) were funded in 06/2017.
- SPDR S&P 500 ETF (SPY) and iShares:MSCI EAFE ETF (EFA) were re-funded in 06/2017.
- INTECH Enhanced Plus was liquidated in 06/2017.
- Residual assets from the liquidation of AllianceBernstein Int'l Value (SA), Martin Currie (SA), Hansberger Global Investors (SA), and Aberdeen Total Return Bond Strategy (SA) were distributed in 06/2017.
- Effective 07/2016, the Metropolitan West Capital Management legal entity merged into the Wells Capital Management Incorporated legal entity. The Metropolitan West Capital Mgmt (SA) has been updated to Wells Capital Management (SA) to reflect the change.
- Analytic Investors 130/30 (SA) was liquidated in 09/2017.
- Oaktree US High Yield (SA) and Shenkman High Yield Fixed Income (SA) were funded in 12/2017.
- Congress Mid Cap Growth (SA) was funded in 02/2018.
- Jacobs Levy 130/30 Large Cap (SA) was funded in 03/2018.
- iShares:Russ 2000 ETF (IWM) was funded in 04/2018.
- Voya Investment Management (SA) was liquidated in 07/2018.
- Northern Trust MSCI US Equity Index (SA), GMO:Bchmk-Fr All;III (GBMFX), and PIMCO:All Asset;Inst (PAAIX) were funded during Q4 2018.
- Cohen & Steers Preferred Securities (SA) was funded in 10/2020.
- Payden & Rygel EMD (SA) was funded in 12/2020.
- DFA US Sm Cap Tr (CF) was liquidated in 11/2021.
- Jacobs Levy 130/30 Large Cap (SA) was liquidated in 11/2021.
- J.P. Morgan 130/30 (SA) was liquidated in 11/2021.
- T. Rowe U.S. Structured Research (SA) was liquidated in 11/2021.
- Vaughan Nelson Management (SA) was liquidated in 11/2021.
- iShares:Core S&P Tot USM (ITOT) was funded in 11/2021.
- iShares:Core S&P 500 (IVV) was funded in 11/2021.
- SPDR S&P 500 ETF (SPY) was liquidated in 12/2021.
- iShares:Core MSCI EmMkts (IEMG) was funded in 12/2021.
- iShares:MSCI Em Mkts (EEM) was liquidated in 01/2022.
- DFA Intl Sm Co;I (DFISX) was liquidated in 02/2022.
- DFA Emg Mkts Sm Cap;I (DEMSX) was liquidated in 02/2022.
- Acadian Ex US Small Cap (SA) was funded in 02/2022.

Miscellaneous Comments

- Fiscal year ends on 06/30.
- During Q4 2019 Diversifying Strategies investments were liquidated and Investment Grade Credit, US Treasury & Agency, and TIPS were consolidated into the Core Fixed Income composite.
- Non-Core Fixed Income currently consists of High Yield and EMD.
- Private Investments currently consist of Private Equity, Private Credit, Venture Capital, and Passive ETFs.
- During Q1 2021 the Natural Resources PAC was renamed to the Real Assets PAC.

**Montana Board of Investments
Fee Schedule**

As of September 30, 2022

	Fee Schedule	Market Value As of 09/30/2022 (\$)
iShares:Core S&P Tot USM (ITOT)	0.03 % of Assets	156,374,049
iShares:Core S&P 500 (IVV)	0.03 % of Assets	116,256,398
iShares:Core S&P Md-Cp (IJH)	0.05 % of Assets	15,930,335
iShares:Russ 2000 ETF (IWM)	0.19 % of Assets	69,473,045
iShares:MSCI EAFE ETF (EFA)	0.32 % of Assets	116,164,740
iShares:Core MSCI EmMkts (IEMG)	0.09 % of Assets	60,328,576

ETF fees are sourced from Morningstar and/or the investment manager. Mutual fund fees are provided by staff.

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Investment Update

Board Meeting: December 6-7, 2022

Information as of: September 30, 2022

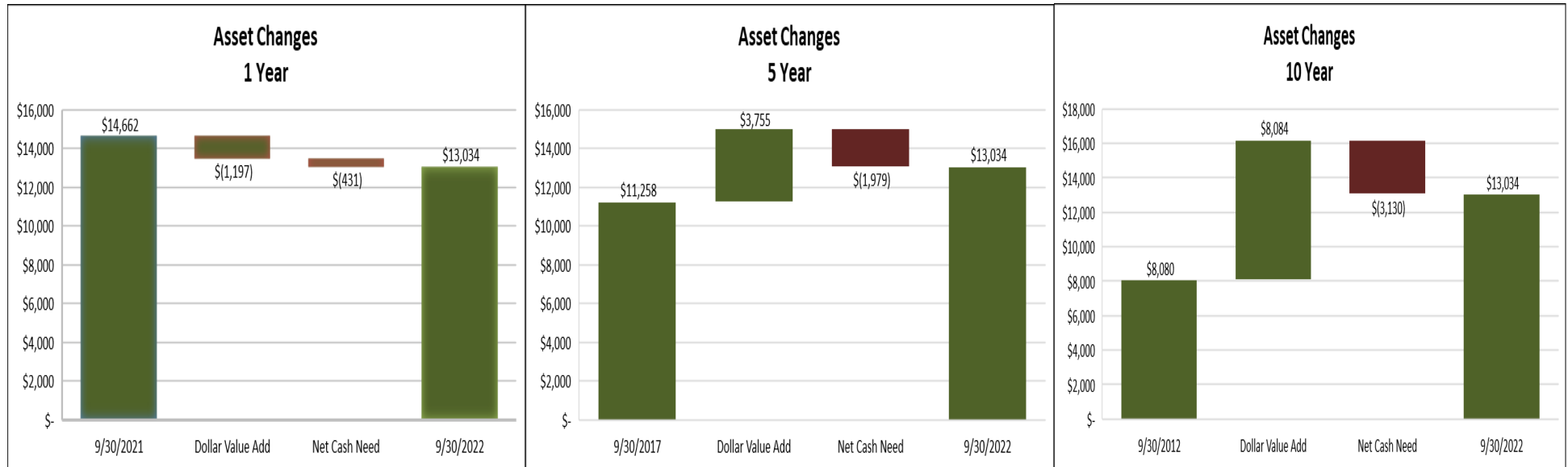
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CIO Update

Retirement Plans Net Performance



* Dollar values are in \$1,000,000

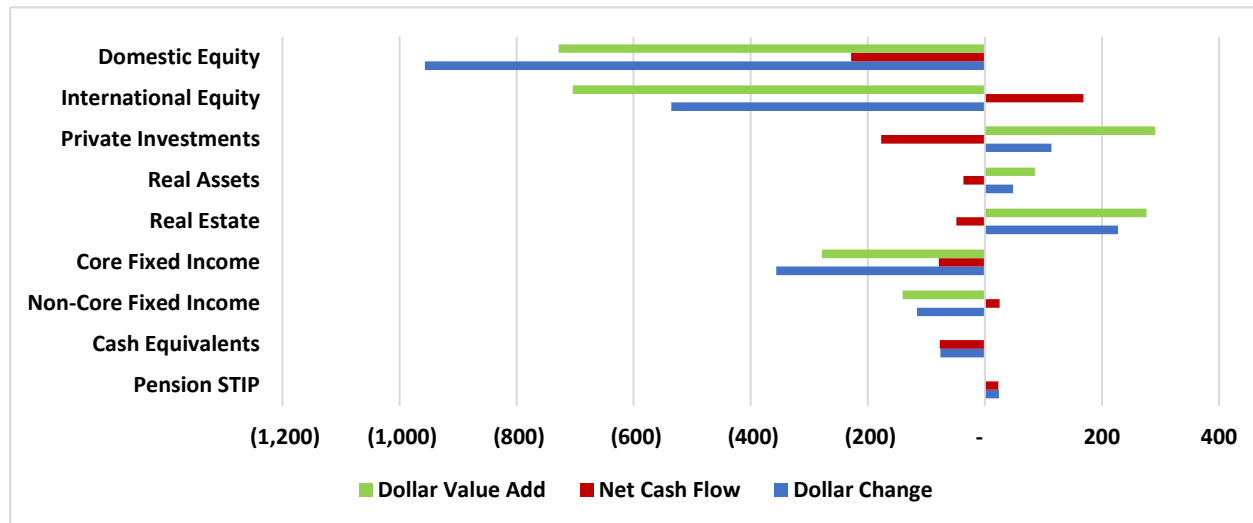
- Dollar Value Added – The total dollar return of the portfolio including income and capital gains.
- Net Cash Need - The total dollar amount distributed from portfolio assets to meet the deficit of contributions minus distributions.
 - A red bar indicates an aggregate net outflow by all plans even though some plans may have experienced net inflows.
 - Though aggregates are shown, each plan is independent and not able to rely on other plans to meet their respective liabilities.

CIO Update

Retirement Plans Net Performance

	9/30/2021 (NAV)	9/30/2022 (NAV)	Dollar Change	Net Cash Flow	Dollar Value Add
Domestic Equity	4,505.4	3,548.5	(956.9)	(228.6)	(728.2)
International Equity	2,497.9	1,962.4	(535.5)	168.5	(704.0)
Private Investments	2,210.0	2,323.5	113.5	(177.1)	290.6
Real Assets	684.6	732.8	48.2	(36.9)	85.1
Real Estate	1,455.4	1,682.8	227.5	(48.7)	276.2
Core Fixed Income	2,114.4	1,757.7	(356.7)	(78.6)	(278.1)
Non-Core Fixed Income	899.1	783.4	(115.7)	25.0	(140.7)
Cash Equivalents	143.9	67.7	(76.1)	(76.9)	0.8
Pension STIP	150.8	174.7	23.9	22.8	1.0
Grand Total	14,661.5	13,033.6	(1,627.9)	(430.5)	(1,197.4)

* Dollar values are in \$1,000,000



CIO Update

Retirement Plans Net Performance

	9/30/2021 (NAV)	9/30/2022 (NAV)	Dollar Change	Net Cash Flows	Dollar Value Added
Public Employees Retirement	7,226.3	6,369.0	(857.3)	(268.8)	(588.5)
Teachers Retirement	5,114.2	4,547.2	(566.9)	(151.7)	(415.2)
Firefighters Retirement	614.2	566.5	(47.8)	3.7	(51.5)
Police Officers Retirement	569.2	520.0	(49.2)	(1.9)	(47.3)
Sheriffs Retirement	489.1	444.4	(44.7)	(3.8)	(40.9)
Game Wardens Retirement	275.7	251.7	(24.0)	(0.8)	(23.2)
Highway Patrol Retirement	189.5	170.6	(18.9)	(3.2)	(15.7)
Judges Retirement	134.1	119.4	(14.8)	(3.7)	(11.0)
Vol Firefighters Retirement	49.2	45.0	(4.3)	(0.3)	(4.0)
Grand Total	14,661.5	13,033.6	(1,627.9)	(430.5)	(1,197.4)

* Dollar values are in \$1,000,000

CIO Update

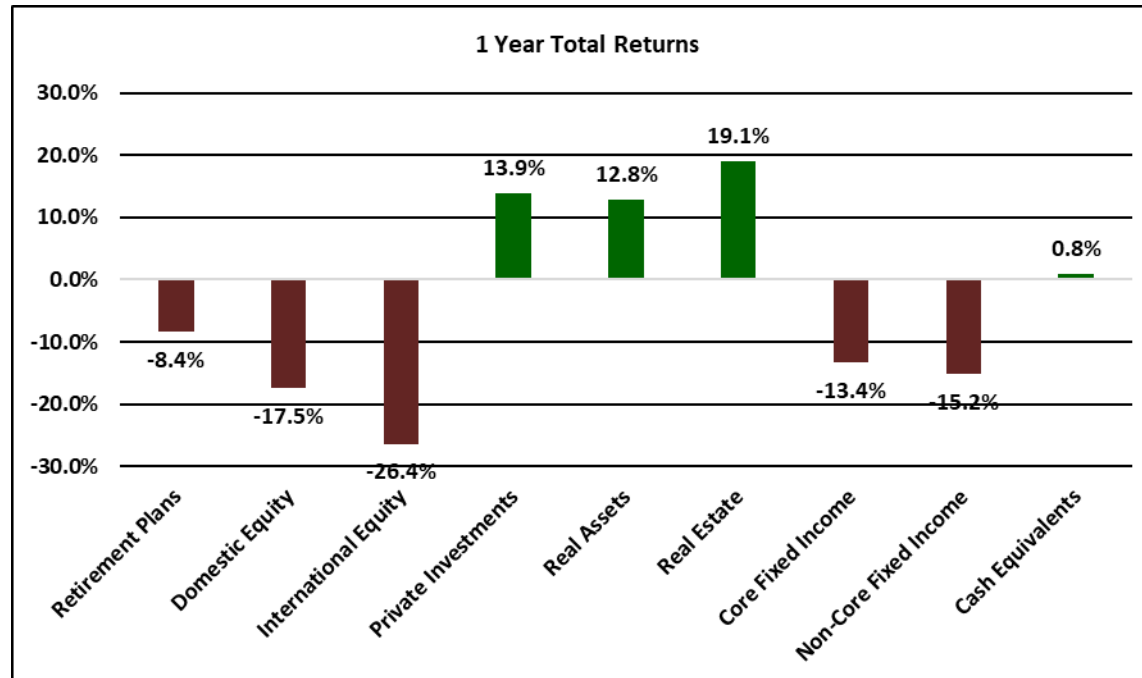
Retirement Plans Net Performance

Name	1 Year	3 Year	5 Year	10 Year	20 Year	Since Inception
PUBLIC EMPLOYEES RETIREMENT	-8.41%	6.42%	6.24%	7.81%	7.53%	7.49%
TEACHERS RETIREMENT	-8.43%	6.41%	6.24%	7.81%	7.53%	7.50%
FIREFIGHTERS RETIREMENT	-8.40%	6.42%	6.25%	7.82%	7.51%	7.36%
POLICE OFFICERS RETIREMENT	-8.41%	6.41%	6.24%	7.82%	7.49%	7.37%
SHERIFFS RETIREMENT	-8.40%	6.43%	6.25%	7.81%	7.53%	7.40%
GAME WARDENS RETIREMENT	-8.41%	6.41%	6.24%	7.81%	7.50%	7.41%
HIGHWAY PATROL RETIREMENT	-8.39%	6.43%	6.26%	7.82%	7.55%	7.39%
JUDGES RETIREMENT	-8.42%	6.42%	6.24%	7.81%	7.54%	7.40%
VOL FIREFIGHTERS RETIREMENT	-8.42%	6.42%	6.24%	7.81%	7.52%	7.22%

Inception 7/1/1994

CIO Update

Retirement Plans Asset Class Net Performance



CIO Update

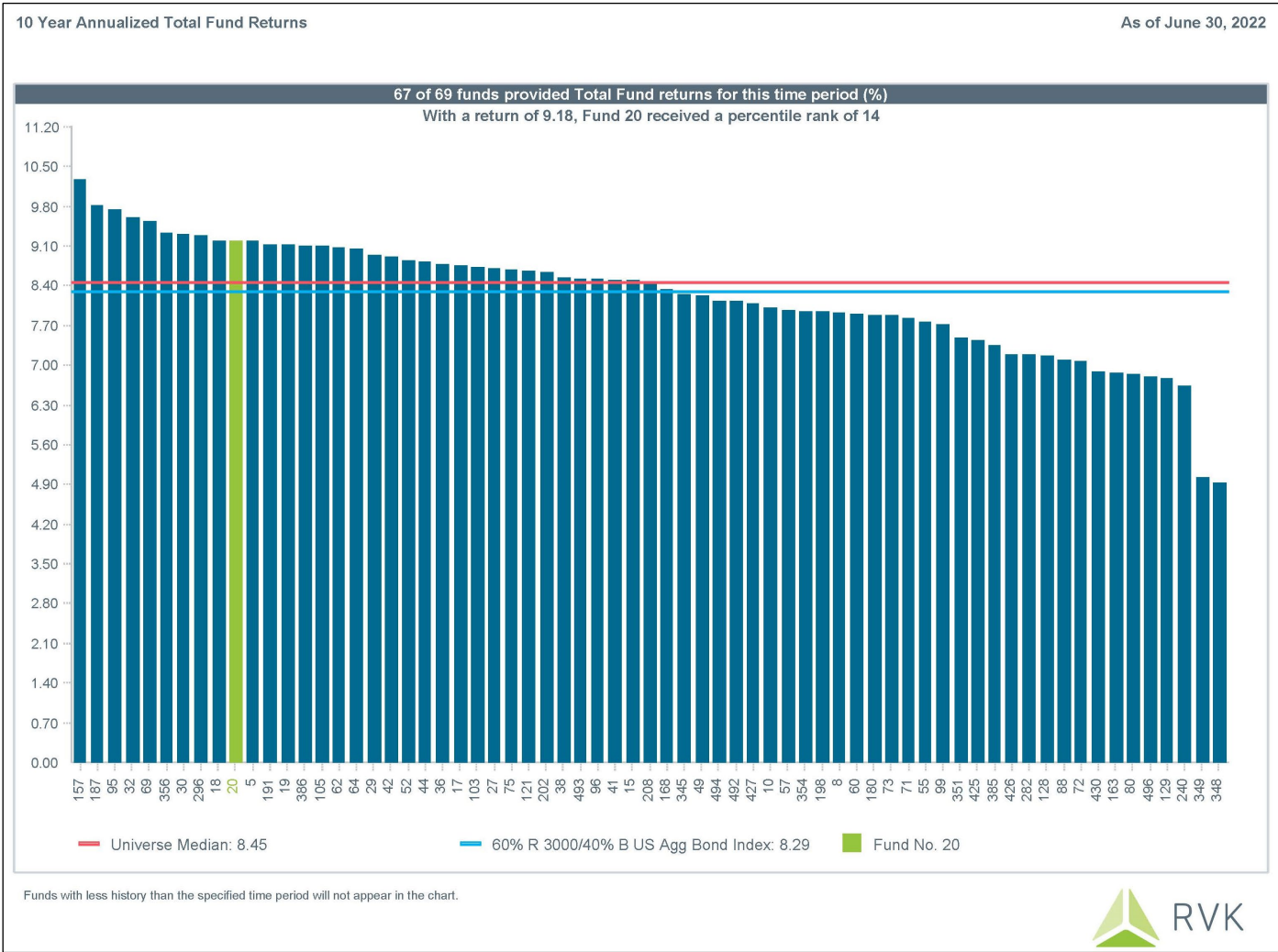
Retirement Plans Asset Class Allocation

	9/30/2022 (NAV)	% of Total	Mid Point	Deviation from Mid Point	Board Approved Ranges
Domestic Equity	3,548.5	27.2%	30.0%	-2.8%	24% - 36%
International Equity	1,962.4	15.1%	17.0%	-1.9%	12% - 22%
Private Investments	2,323.5	17.8%	15.0%	2.8%	11% - 19%
Real Assets	732.8	5.6%	5.0%	0.6%	2% - 8%
Real Estate	1,682.8	12.9%	10.0%	2.9%	6% - 14%
Core Fixed Income	1,757.7	13.5%	14.0%	-0.5%	9% - 19%
Non-Core Fixed Income	783.4	6.0%	7.0%	-1.0%	5% - 9%
Cash Equivalents + Pension STIP	242.4	1.9%	2.0%	-0.1%	0% - 5%
	13,033.6	100.0%	100.0%		

CIO Update

Performance vs. Peers

Montana Public Employees Retirement System – 10 Year Return



28th percentile over 1 Yr
18th percentile over 5 Yr
14th percentile over 10 Yr

CIO Update

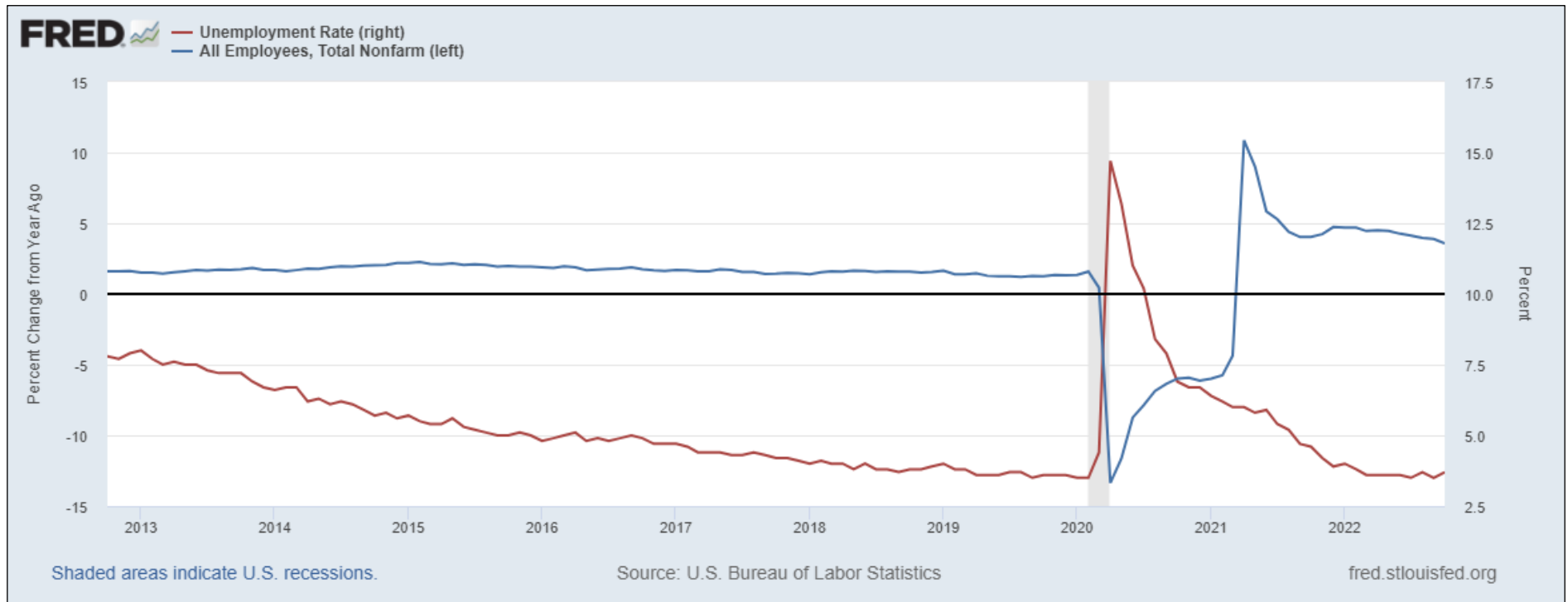
Economic Environment

- **Leading Economic Index** – Steady decline over the last 6 months.
- **Job Growth** – Non-Farm Payrolls increased 347K on average over the last 6 months. Job growth was 261K in October.
- **Retail Sales** – Retail sales growth has moderated from the strong numbers in 2021 and early 2022. However, recent data has been mixed.
- **Inflation** – CPI ex. Food and Energy is up 6.3% Y/Y in October. However, Core CPI increased a more modest 0.3%.
- **Housing** – Existing home sales and housing starts have fallen sharply as mortgage rates increased.
- **Currency** – The U.S. Dollar has been exceptionally strong versus major world currencies. This puts a damper on U.S. exports and makes imports cheaper.

CIO Update

Economic Environment

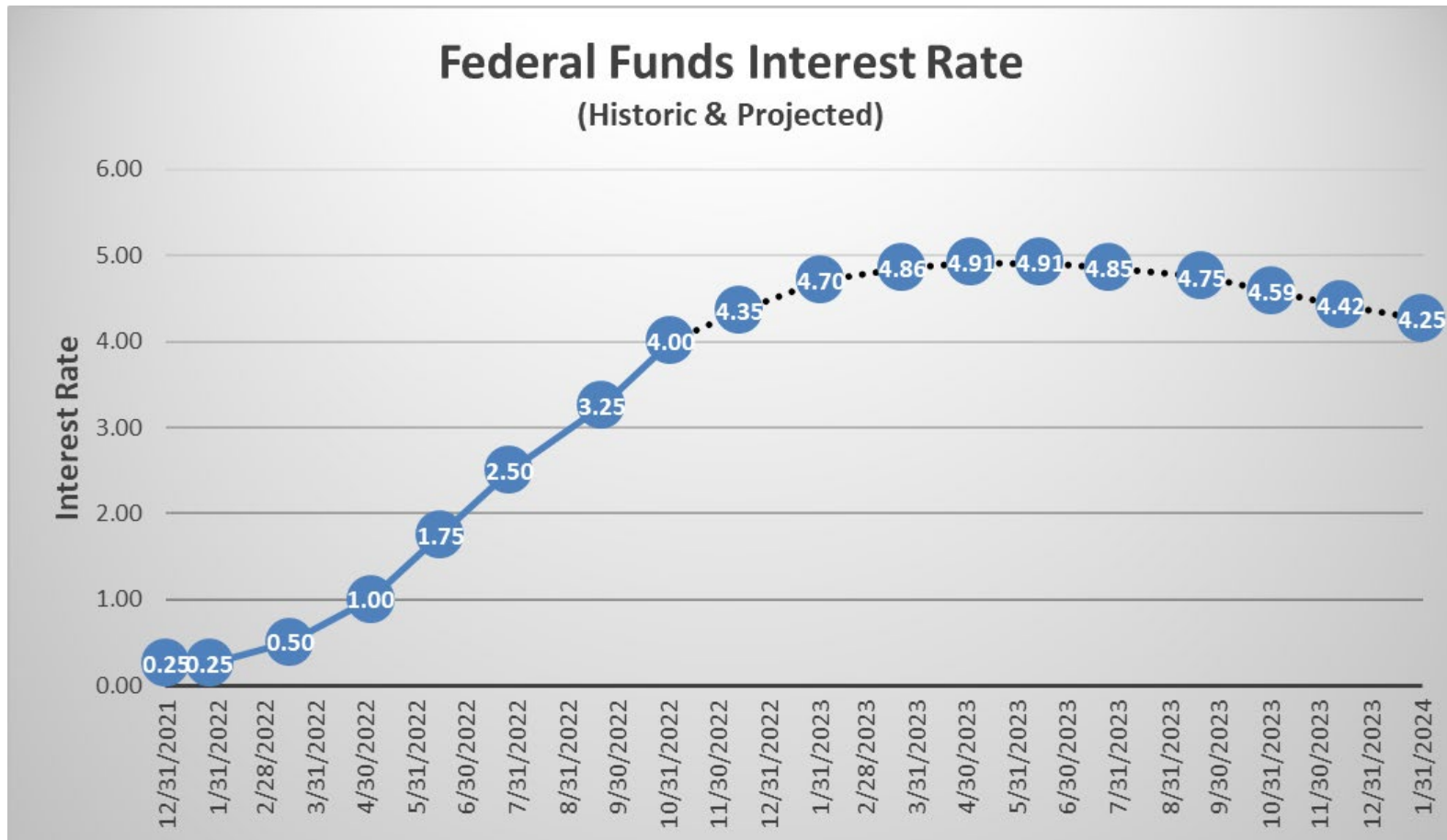
The unemployment rate remains low, and the addition of new jobs is high compared to history.



CIO Update

Economic Environment

The Federal Reserve is raising interest rates and shrinking the size of its balance sheet to reduce inflation. The terminal rate was estimated at 3.5% in June and is now almost 5%.

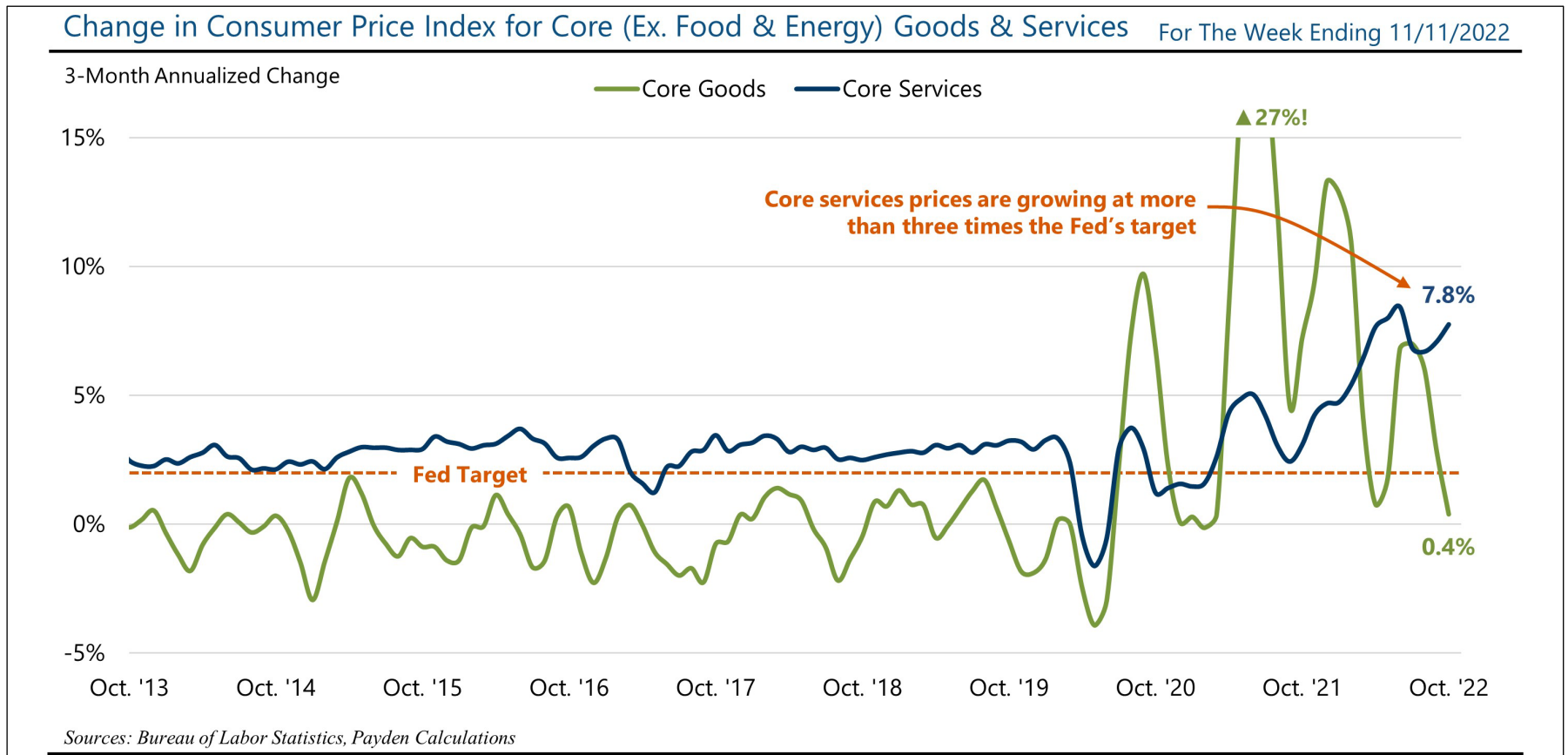


Source: Bloomberg 11/14/22

CIO Update

Economic Environment

Inflation in Core Services is still well above the Federal Reserves 2% target.



CIO Update

- Uncertainty around global inflation and the path of monetary policy, company earnings, and geopolitical conflict remain significant investment challenges.
- Continue to maintain adequate liquidity while investing within parameters of Private Investment/Real Estate/Real Asset pacing.
- Ongoing investment manager due diligence/networking particularly with existing high conviction managers.
- Public markets reviewing fees especially within international equities. Completed contract updates for external public managers.
- Ongoing work with new and existing clients to meet their needs.
- On boarding Solovis/Solovis Risk systems will be a multi-quarter project. Potential changes to investment update in February.

Macro Attribution

Key Takeaways – 1 Year

Strategic Asset Allocation - *What was the performance of our midpoint weighted benchmark portfolio?*

- Every benchmark except for Real Estate and Cash had negative contributions to the pension, policy-neutral, -13.5% return.
- The Real Estate asset class benchmark, the NCREIF ODCE, was the largest positive contributor.

Tactical Asset Allocation - *Did the actual asset class weights add additional return over the midpoint weighted benchmark portfolio?*

- On average, we were slightly overweight Real Estate and Private Investments, while being slightly underweight or at the midpoint weight for the remaining asset classes.
- About \$323M of equity asset classes and \$107.6M of fixed income/cash asset classes were sold during the year to fund the pension net cash need of \$-430.5M.
- In aggregate, the overweighting/underweighting of the asset classes relative to their benchmarks decreased the pension portfolio's return by 33 bs.

Style Selection - *Did the portfolio benchmarks add additional return over their asset class benchmarks?*

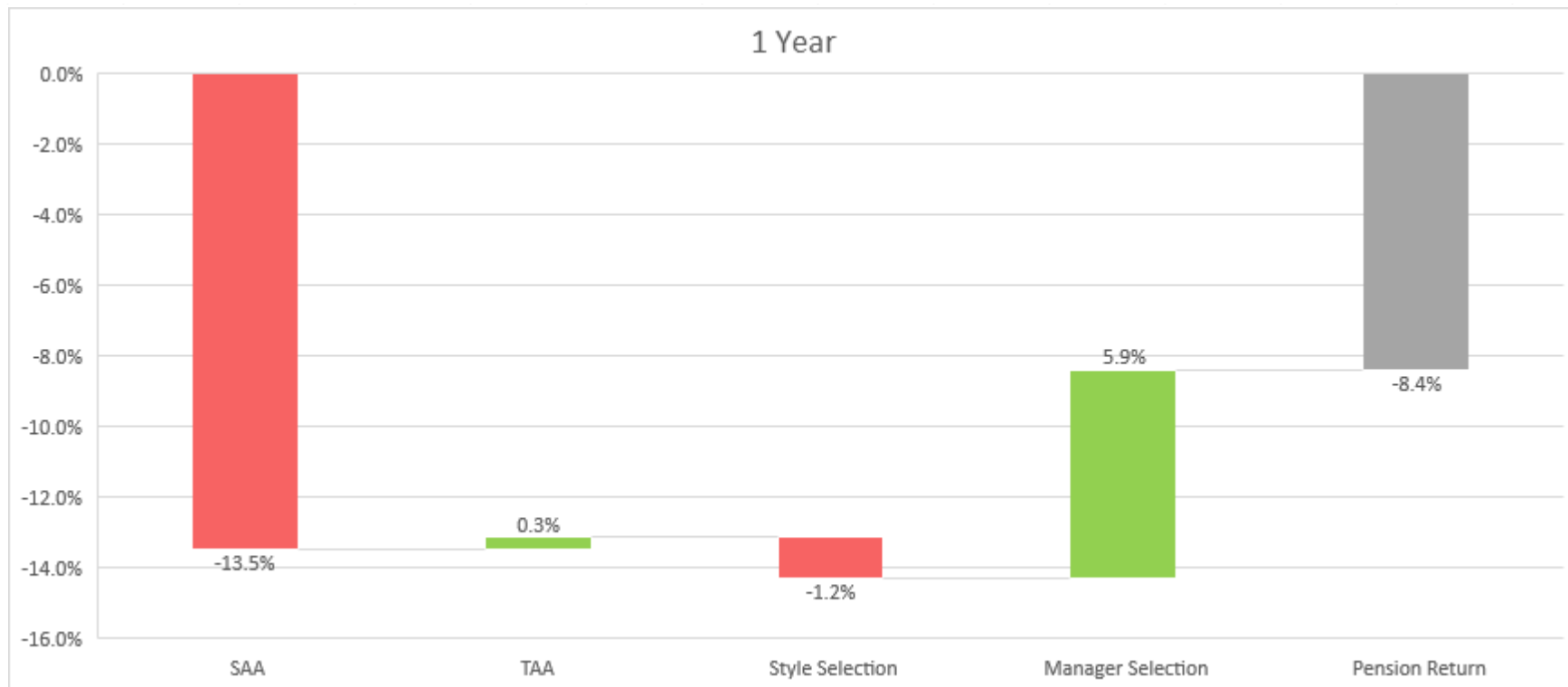
- Slightly higher exposure to developed growth benchmarks was the primary reason for International style underperformance of 10 bps.
- The Real Assets portfolio has about 55% exposure to commodities versus 33% in the custom benchmark. The strong outperformance of the Commodity Producers Index relative to Infrastructure and TIPS resulted in style outperformance of about 22 bps.
- Exposure to public REIT and public CMBS indexes caused style underperformance of 113 bps as private Real Estate assets outperformed public assets.
- Exposure to the EMD benchmark within Non-Core Fixed Income led to a slight style underperformance of 13 bps.

Manager Selection - *Did the portfolio managers add additional return over their portfolio benchmarks?*

- In International Equity, there was a notable outperformer and underperformer for total underperformance of 10 bps.
- Within Core Fixed Income, our internal portfolio was a significant outperformer adding 20 bps.
- Within Non-Core Fixed Income, most managers slightly outperformed adding 6 bps overall.
- Private Investments was by far the main contributor to manager selection outperformance. Much of this can be attributed to the lag in pricing of private investments.
- Real Assets had manager selection effects of 62 bps, with Infrastructure, Commodities, and TIPS adding positive effects.
- Real Estate selection effects were also strong this period contributing 63bps

Note: The publicly traded benchmarks for private asset classes are an imperfect proxy for actual holdings due to the pricing of private assets lagging their publicly traded benchmarks.

Macro Attribution



Strategic Asset Allocation (SAA) - The return that would have been achieved if we had invested in our asset class benchmarks at the midpoint weights

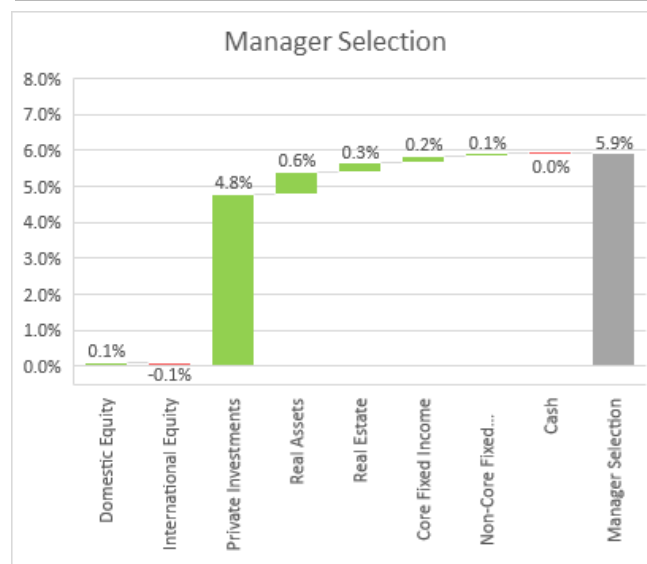
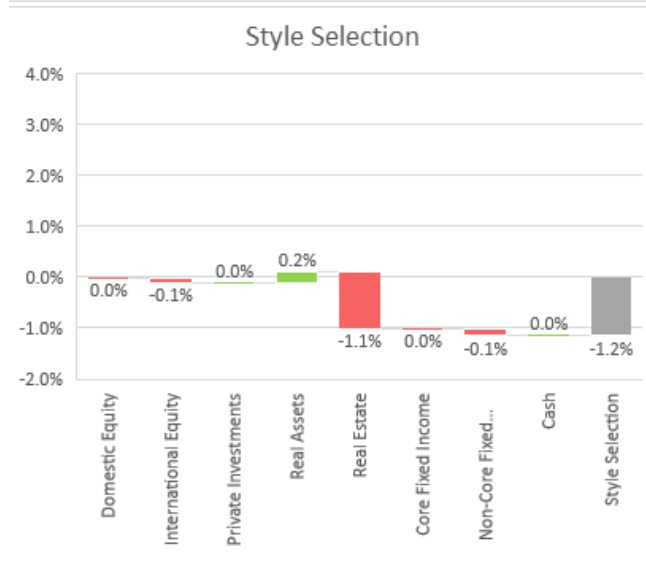
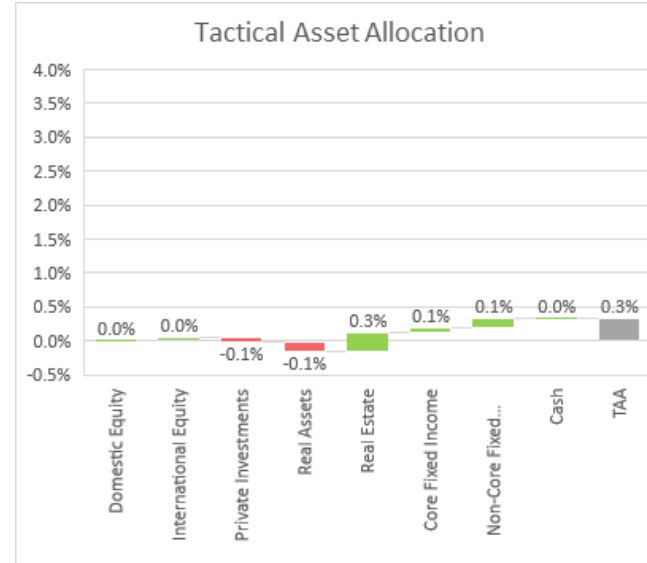
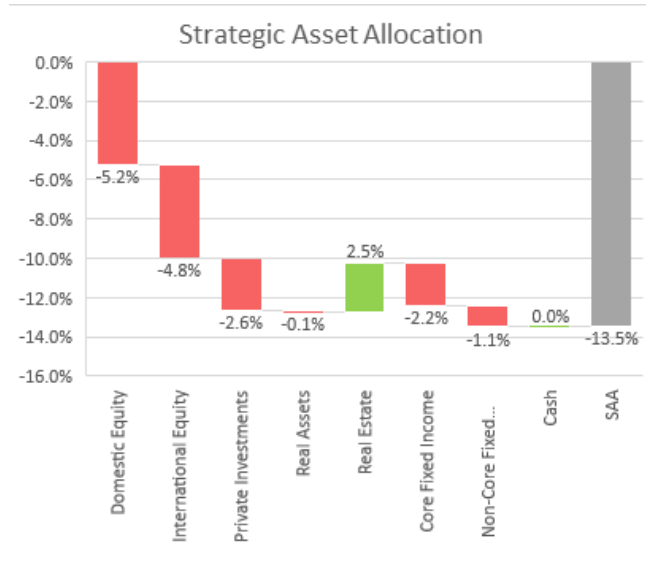
Tactical Asset Allocation (TAA) - The *additional* return earned by investing in the asset class benchmarks at our actual rather than midpoint weights.

Style Selection (SS) - The *additional* return earned by investing in the underlying manager benchmarks rather than the asset class benchmarks.

Manager Selection - The *additional* return earned by investing in the underlying managers rather than the underlying manager benchmarks.

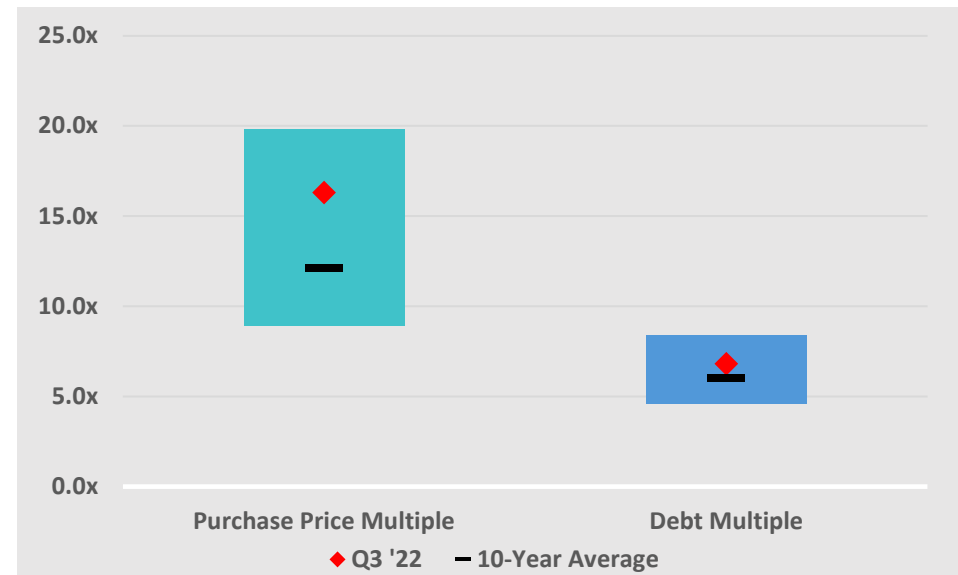
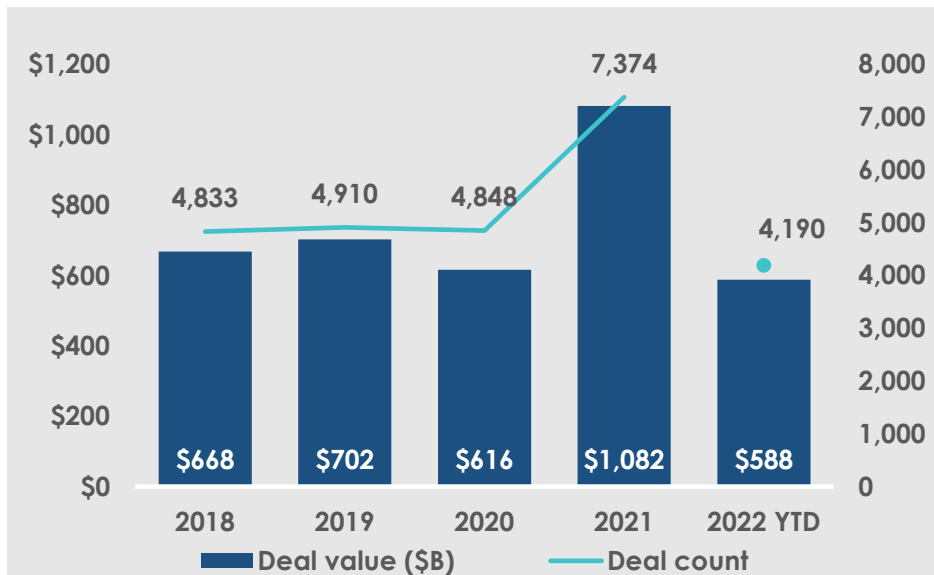
* The valuation lag observed in Private Equity, Real Estate, and Natural Resources are likely to lead to large differences in returns between these asset classes and their benchmarks in short-mid term time periods. The manager selection component is therefore likely to be large for these asset class in the short and medium term.

Macro Attribution

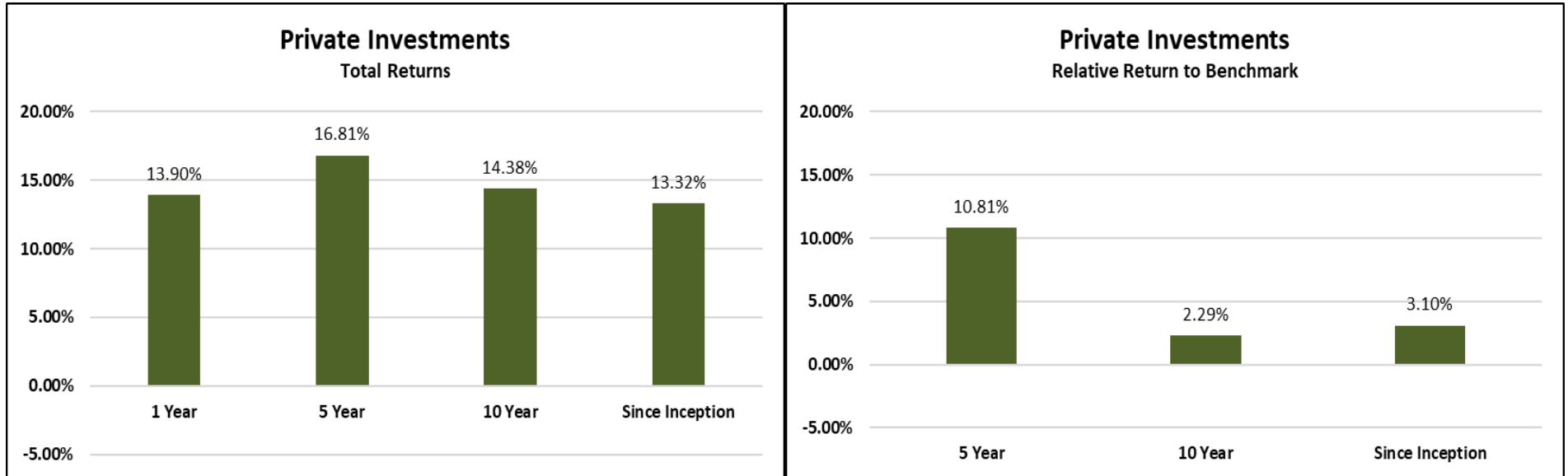


Private Investments Environment

- Coming off a record year driven by fiscal and monetary stimulus, US Buyout activity appears to be modestly declining and returning to average levels from a deal value and deal count perspective.
- US Buyout median valuations and debt usage remain at elevated levels compared to longer term historical averages.
- Overall fund-raising YTD is on par with 2021 but is expected to slow for the remainder of the year due to the denominator effect.



Private Investments Net Performance



Private Investments Pension Asset Class (PAC) Custom Blend:

- From inception to 3/31/2017: S&P 1500 + 4% Qtr Lag
- 4/1/2017 to 12/31/2020: MSCI USA Small Cap Index
- 1/1/2021 to present: The portfolio weighted average of MSCI USA Small Cap Index and S&P LSTA US Leveraged Loan 100 Index
- Inception – 5/1/2002

Private Investments

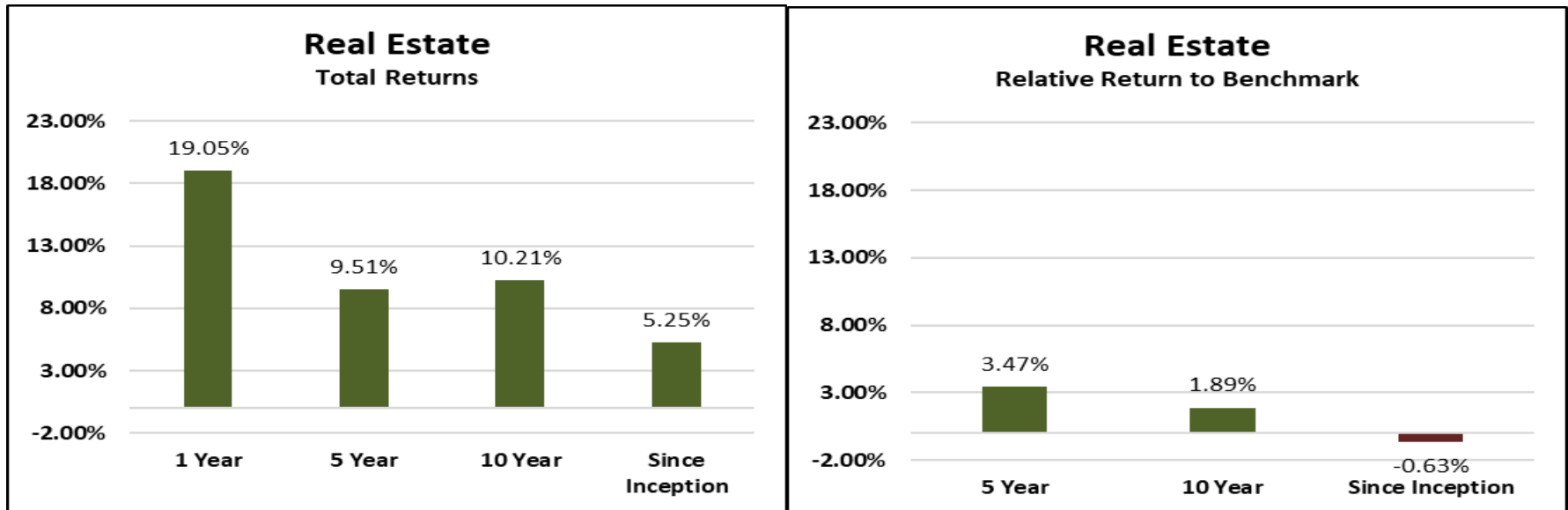
Characteristics and Activity

- Total Market Value of \$2.3 billion as of 9/30/22.
- North American-centric at ~70%, ~16% non-US developed, and ~14% emerging markets.
- Direct/primary fund exposure focus at ~84% vs. Fund-of-Funds at ~16%.
- Primarily focused on existing Private Investment relationships.
- Net Cash Flow Profile
 - -\$18.6 million for quarter ending 9/30/22
- Two new commitments
 - Audax Private Equity Fund VII - \$60M
 - Deerpath Capital Advantage VI - \$75M

Real Estate Environment

- Operating fundamentals normalizing, price declines and slowing transaction volume taking hold as cost of capital rises, price discovery still elusive.
- Debt markets cautious, at a stand still in many cases, rates up significantly.
- Sept. '22 CMBS delinquency rate remains low at 2.92%, challenges may lie ahead.
- The Green Street Commercial Property Price Index decreased 7% in October. The all-property index is down -13% YTD '22.
- REITs down approx. 24% through Oct. '22.
- Fundraising pace substantially below prior years, \$82B raised through Oct. '22.
- Dry powder remains elevated, standing at approx. \$421B through Oct. '22.
- Summary points – The cycle is turning, prices down, transactions decelerating, rates up, debt markets cautious to closed, delinquencies/distress likely on the horizon, REITs down, fundraising off, dry powder remains elevated.

Real Estate Net Performance



Real Estate – Pension Asset Class (PAC) Custom Blend:

- From inception to 3/31/2017: NCREIF ODCE 1 Qtr Lag (Net)
- 4/1/2017 to 6/30/2020: MSCI US REIT Index Gross
- 7/1/2020 to present: NCREIF ODCE 1 Qtr Lag (Net)
- Inception – 6/1/2006

Real Estate

Characteristics and Activity

- Total Net Asset Value of approx. \$1.68B as of 9/30/22.
- US-centric, broadly diversified across property types, markets, and geographies.
- Continued focus on operators with property and market specific expertise.
- Continued focus on longer duration holds, cash flow.
- Focus on existing, high conviction managers, reducing open-end core real estate exposure.
- Cash Flow Profile
 - Negative cash flow of \$28.1M for the quarter ending 9/30/22
- One new investment commitment
 - Sweet Grass-Equus, LP - \$100M
- Total Leverage – 42.1% as of 6/30/22
 - Debt – 21.3%
 - Core/Core-plus – 29.2%
 - Non-Core – 50.6%

Real Assets Environment

- Tight supplies globally, demand uncertainty remains with slowing economy, continued China lockdowns, Russian sanctions, price caps on Russian crude exports.
- Prices up YTD, US production stable at 12M barrels per day through Oct., rig count is up.
- MLPs up 11.5% YTD through Sept., capacity utilization approx. 90%, yielding approx. 7%.
- Nonresidential construction spend ticked up slightly in Sept. offsetting the decline in homebuilding.
- Sept '22 housing starts down 8.6% versus June '22 and 7.2% versus Sept. '21.
- Lumber prices in the US have continued to weaken, down 38% YOY through Sept. '22.
- PNW sawlog pricing elevated on demand, southern timber prices down in 3Q22.
- Fundraising ahead of '21, with \$163B raised through Oct. '22.
- Real assets dry powder remains high at approx. \$415B through Oct. '22.
- Summary points – Oil outlook remains uncertain, US production steady, MLPs up, construction slowing, housing market correcting, timber mixed, lumber falling back to earth, strong fundraising environment with plenty of dry powder in the system.

Real Assets Net Performance



Real Assets – Pension Asset Class (PAC) Custom Blend:

- From inception to 12/31/2020: MSCI ACWI Commodity Producers Index
- 1/1/2021 to present: 33.33% MSCI ACWI Commodity Producers Index, 33.33% MSCI ACWI Infrastructure Index, 33.34% Bloomberg Barclays US TIPS Index
- Inception – 4/1/2017

Real Assets

Characteristics and Activity

- Total Net Asset Value of approx. \$732M as of 9/30/22.
 - Commodities-Related Portfolio – approx. \$415M as of 9/30/22
 - Infrastructure-Related Portfolio – approx. \$198M as of 9/30/22
 - Inflation-linked Bonds (TIPs) Portfolio – approx. \$119M as of 9/30/22
- Portfolios are primarily North American-centric, international exposure continues to grow with recent infrastructure commitments.
- Continued focus on longer duration holds, cash flow.
- Exploring other types of strategies to further diversify and gain new exposures.
- Cash Flow Profile
 - Negative cash flow of \$11.8M for the quarter ending 9/30/22
- One new investment commitment
 - CBRE Musselshell Infrastructure Investments, LP - \$100M
- Timber Portfolio Total Leverage – 5.0% as of 6/30/22

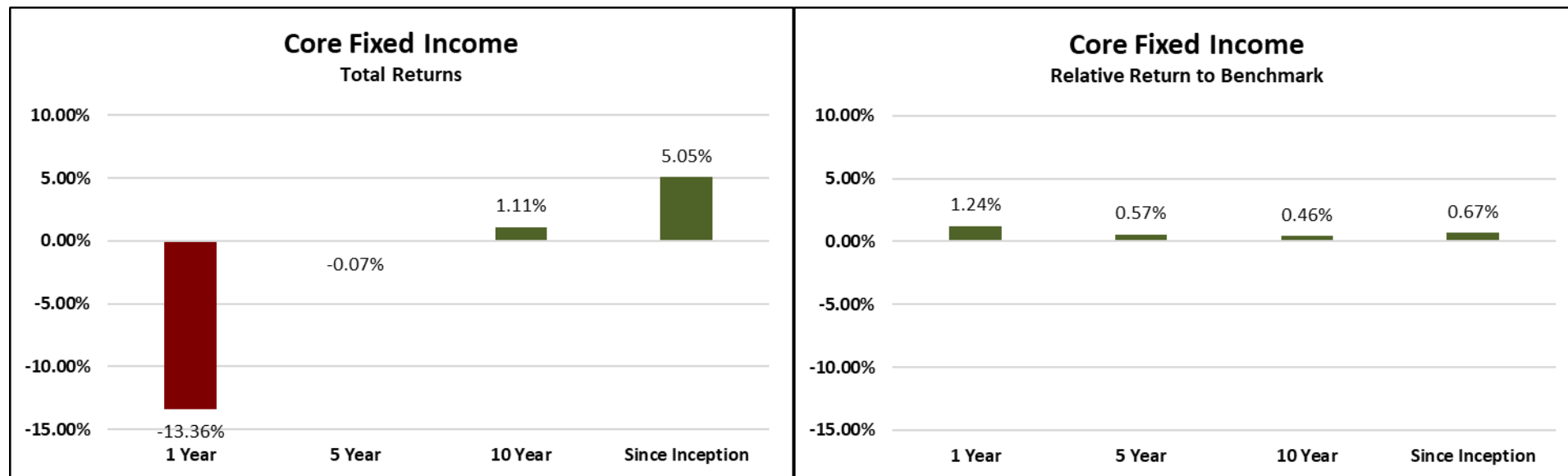
Core Fixed Income Environment

- The U.S. Treasury curve saw a dramatic, non-parallel shift up in yields year over year. Yields on the front-end increased almost 400 bps. Increase on the long-end was smaller, resulting in inversion of the 2yr-10yr curve of 45 bps.
- The Federal Reserve increased short-term rates 5 times for a total of 300 bps after having held the Effective Funds Rate near zero for two years.
- Headline inflation posted an increase of 8.2% year over year. Core inflation was 6.6% year over year.
- Money market yields continued to increase with Ninety Day CP yields at 370 bps at period end.
- Spreads on corporate bonds saw significant volatility, finishing the year up 74 bps.

Core Fixed Income Environment

- Spreads on mortgage-backed securities (MBS) ended the year at 70 bps, up 42 bps. MBS spreads ranged from 18 bps to 85 bps during the year.
- The Barclays Aggregate returned -14.60% on the year. The loss was mainly due to higher interest rates along with increased risk spreads.
- Bond market liquidity was adequate with reduced corporate new issuance. Bid/ask spreads saw increased volatility related to market uncertainty around inflation and the Federal Reserve's reaction to it.

Core Fixed Income Net Performance



Core Fixed Income - Pension Asset Class (PAC) Custom Blend:

- From Inception to 04/01/2017: Bloomberg Barclays U.S. Aggregate Bond Index
- 4/1/2017 to 11/29/2019: Intermediate TIPS, Intermediate US Treasury & Agency, Intermediate Investment Grade Credit, Mortgage Backed, and Diversified Strategies PACs.
- 11/29/2019 to present: Bloomberg Barclays U.S. Aggregate Bond Index
- Inception – 4/1/1995

Core Fixed Income

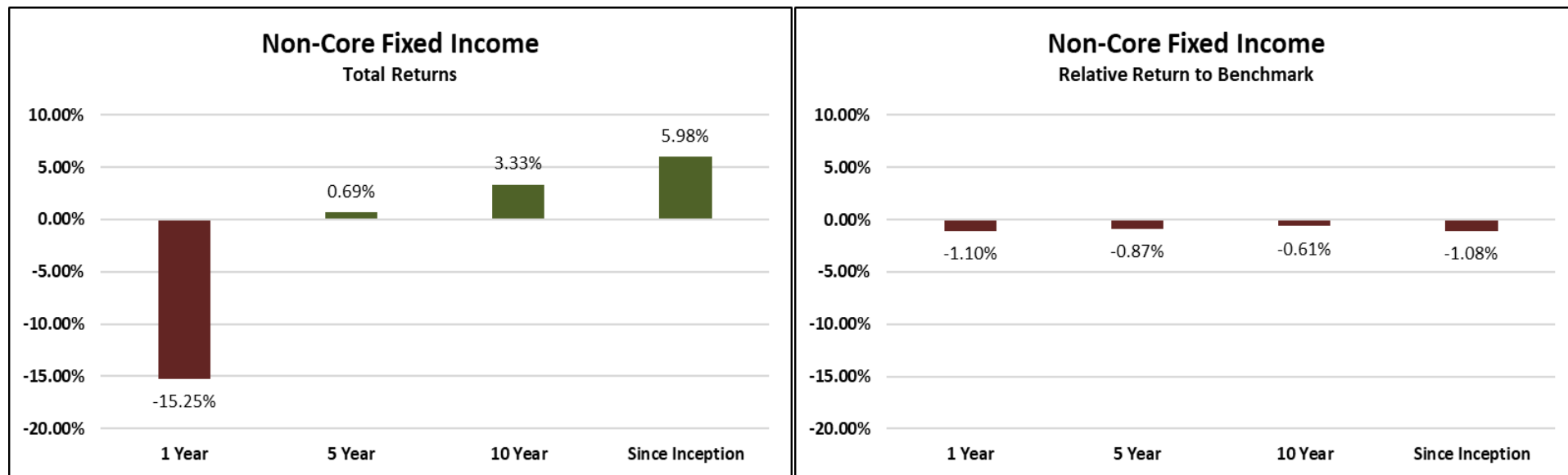
Performance, Characteristics, and Activity

- Negative total return of -13.36% on the year. The internal portfolio outperformed the index by 133 bps. Reams outperformed by 65 bps.
- Reams outperformed due to an underweight to MBS. The internal portfolio outperformed the index on short duration and underweight to corporates, partially offset by unfavorable curve positions.
- Total market value of approx. \$1.64 billion at year end.
- Duration was approx. 99% of the benchmark at quarter end. Significantly underweight the long end of the curve.
- Portfolio was overweight Treasuries/Agencies and underweight spread product at the end of the quarter. The duration of corporate securities was significantly shorter than the index.

Non-Core Fixed Income Environment

- High yield bond rates ended the quarter above 9%, as inflation, a hawkish Fed tone, and concerns about the trajectory of economic growth pressured risk assets. High yield bonds now trade at a deep discount to par.
- High yield bonds outperformed investment grade fixed income and lower-quality credits underperformed higher-rated bonds.
- Issuance for High Yield, Preferreds, and Emerging Market Debt remains weak as borrowers are reluctant to issue debt at higher interest rates.
- The general risk-off sentiment in global markets, geopolitical tensions, and a strong US Dollar continue to weigh especially hard on Emerging Market Debt.

Non-Core Fixed Income Net Performance



Non-Core Fixed Income - Pension Asset Class (PAC) Custom Blend:

- From Inception to present Bloomberg Barclays US High Yield – 2% Issuer Cap
- High Yield Asset Class name changed to Non-Core Fixed Income 11/30/19
- Inception Date: 6/1/2009

Non-Core Fixed Income

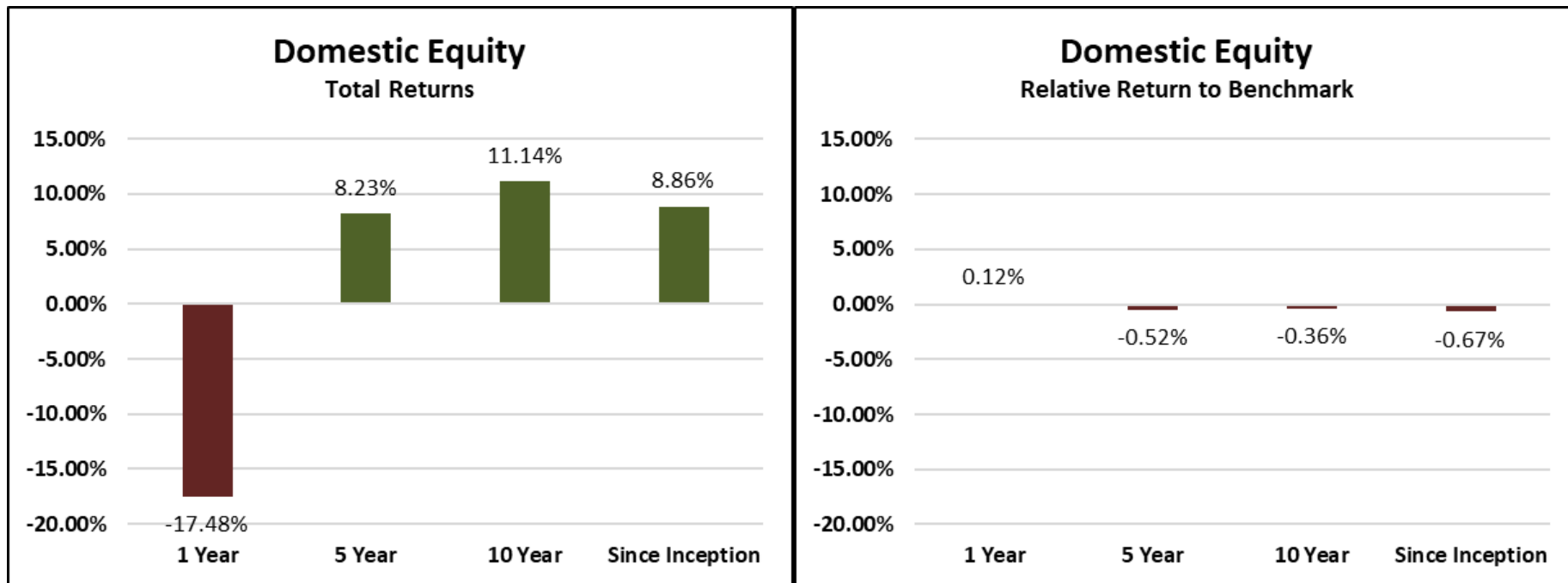
Performance, Characteristics, and Activity

- US High Yield rallied early in 3Q22, but persistently high inflation and a more hawkish tone from the Fed led to a reversal in risk markets, leaving the high yield index down -0.64% for the period
- Manager performance was strong, as a conservative approach to US High Yield provided downside protection. The Emerging Market Debt strategy was the only mandate in the asset class to underperform in the quarter, as a slightly down-in-quality positioning weighed on relative returns.
- Exposure to Preferred Securities and Emerging Market Debt has been a drag on returns vs. the asset class benchmark. The asset class underperformed by -0.72% in the period and by -1.08% over the last twelve months.
- There were no changes to the roster of managers nor were there any contributions or withdrawals to/from managers in the asset class during the period.

Domestic Equity Environment

- Hopes for easing inflation and a Fed pause were dashed mid-quarter, sending equity markets into the red for the quarter after a strong, early-quarter rally.
- In a reversal from the first half of 2022, Growth stocks outperformed Value stocks and Small Caps outperformed Large Caps.
- At the end of September, the S&P 500 was valued at 15.1x the next 12-month earnings estimates, continuing the downward slide in multiples that began at the start of 2022. The drop in equities YTD has been solely due to multiple contraction, as earnings growth has been positive.
- The top 10 constituents of the S&P 500 were valued at 21.5x, well off the high of 32.5x in 2021 but still above the long-term average of 20.0x. The remaining stocks in the index traded at 13.4x, below the long-term average of 15.7x. The top 10 stocks in the S&P 500 comprised 28.8% of the index, down from almost 32% in 2021.

Domestic Equity Net Performance



Domestic Equity - Pension Asset Class (PAC) Custom Blend:

- From inception to 4/30/2017: S&P 1500 Super Composite
- 5/1/2017 to present: MSCI USA IMI, Gross
- Inception Date: 5/1/2003

Domestic Equity Performance

- The domestic equities asset class outperformed its benchmark during the quarter by +0.10% and outperformed for the last twelve months by +0.13%.
- The overweight to Small Caps was the primary driver of outperformance vs. the asset class benchmark in the quarter.

Domestic Equity

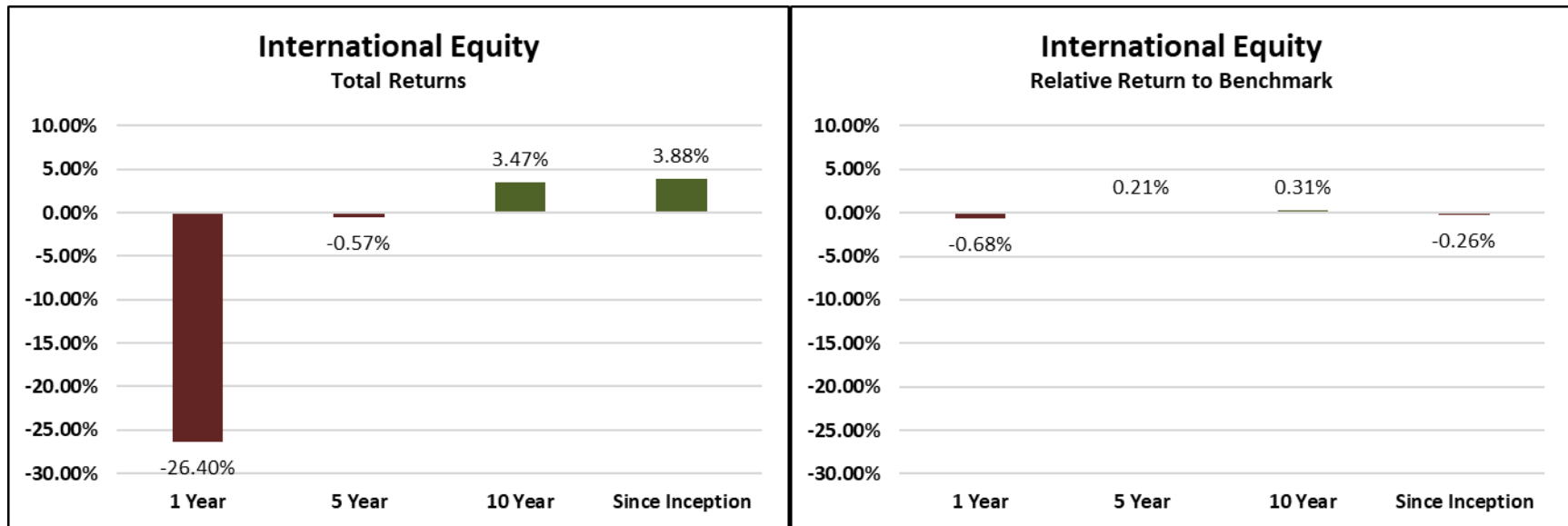
Characteristics and Activity

- The asset class consists entirely of indexed investments as of November 2021.
- Small Cap stocks are modestly overweight to the benchmark index weight.
- Cash at the asset class level is minimal per policy.
- There were no changes to the roster of managers during the quarter and flows were limited to minor rebalancing activity.
- The Small Cap index fund was moved from a commingled fund to a separately managed account. All domestic equity index funds are now in separately managed accounts.
- After quarter-end, the Small Cap ETF was changed in favor of a lower-cost option.

International Equity Environment

- International equities markets saw similar dynamics to those in the US, with Growth stocks outperforming Value stocks and Small Caps outperforming Large Caps.
- Developed markets outperformed Emerging Markets, as geopolitical tensions and a sharp sell-off in Chinese stocks weighed on EM returns. The MSCI World ex-US Index posted a -9.20% return, while emerging market stocks returned -11.57% (MSCI EM).
- A strong US Dollar continues to be a headwind for International equities, as US stocks outperformed International equities in 3Q22 as well as year-to-date.
- At quarter end, the MSCI All Country World ex-US Index was valued at 10.8x estimated next 12-month earnings, below its 20-year average and at a historically large discount to US Equities (-28%).

International Equity Net Performance



International Equity – Pension Asset Class (PAC) Custom Blend:

- From inception to 10/31/2006: MSCI EAFE, Net
- 11/1/2006 to 6/30/2007: MSCI ACWI ex-US, Net
- 7/1/2007 to 2/28/2014: 92.5% ACWI ex-US + 7.5% ACWI ex-US Small Cap
- 3/1/2014 to present: MSCI ACWI ex-US IMI, Net
- Inception Date: 4/1/1997

International Equity Performance

- The international equities asset class outperformed its benchmark during the quarter by +0.02% and underperformed for the last twelve months by -0.68%.
- Manager performance was mixed in 3Q22, with no discernable trend of either Growth, Value, Large Cap, or Small Cap managers outperforming.
- The asset class has underperformed its benchmark for the 1-year period but has outperformed over the 5-year and 10-year periods ended September 30.

International Equity

Characteristics and Activity

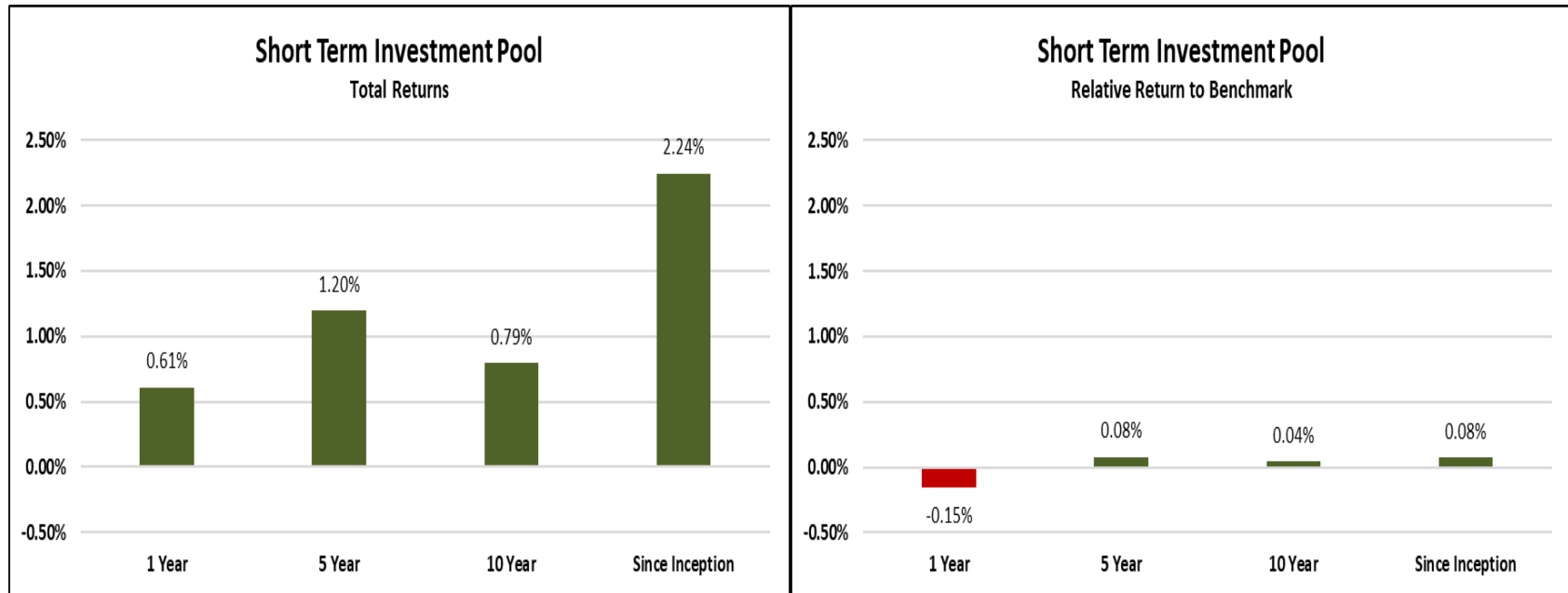
- The asset class has an approximately even split between active and indexed investments.
- Small capitalization stocks are slightly overweight.
- Exposure to Emerging Markets is roughly at the benchmark weight.
- Cash at the asset class level is minimal per policy.
- There were no changes to the roster of managers nor were there in- or outflows in the asset class in the quarter.
- After quarter-end, the EAFE ETF was changed in favor of a lower-cost option.

Short Term Investment Pool

Performance, Characteristics, and Activity

- The yield on STIP was 2.72% at the end of September.
- Underperformed the index by 15 bps over the year, net of fees, as expected during a rapidly increasing rate environment.
- Good performance versus the index over 3, 5, & 10 years.
- Treasuries, Agencies, and Government money market funds made up just under 30% of the Pool on 9/30/22, about the same as 9/30/21.
- Local Government participants' percentage was 20.1% on 9/30/22, down from 26.3% a year ago.
- The STIP assets were \$7.59 billion on 9/30/22, up over \$1.5 billion from 9/30/21.
- The STIP reserve was \$59.46 million on 9/30/22.

Short Term Investment Pool Net Performance



Short Term Investment Pool (STIP) Custom Blend:

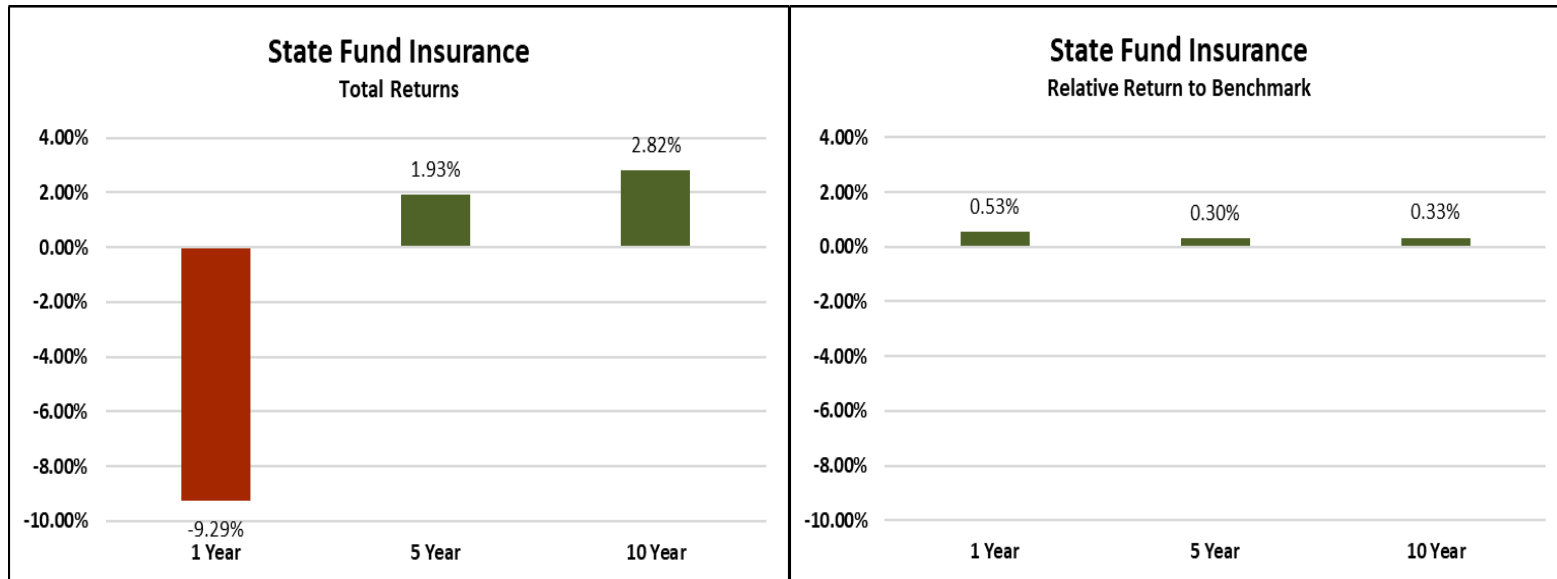
- Inception to 4/30/2018 - LIBOR 1 Month
- 5/1/2018 to present: Federal Reserve US Treasury 1M Constant Maturity Index
- Inception - 4/1/1997

State Fund Investment Portfolio

Performance, Characteristics, and Activity

- Total portfolio return was -9.29% over the last year, led by Real Estate at 20.82%.
- Portfolio outperformed the benchmark by 53 bps over the year.
- The Investment Grade portfolio returned -10.41% over the year, outperforming its index by 144 bps due to short duration partially offset by an overweight to spread product.
- Total market value of approx. \$1.40B at quarter end.
- Duration was short of the benchmark at quarter end.
- Continued overweight to spread product and underweight to Treasuries. Continue to add to MBS over time.

State Fund Investment Pool Net Performance



Montana State Fund Investment Pool (SFIP) Custom Blend:

- Inception to 3/31/2020 - Bloomberg Barclays Intermediate Aggregate Bond Index
- 3/31/20 To present - State Fund Custom Benchmark: Proportionately weighted Bloomberg Barclays Intermediate Aggregate Bond Index, S&P 500 Index, MSCI ACWI ex U.S. Index, NCREIF ODCCE Index
- Inception – 12/1/1993

Trust Funds Investment Portfolio Performance

- The Pool underperformed the benchmark by 180 bps on the year. The underperformance was driven by the relative underperformance of Real Estate.
- Non-Core Fixed Income had a return of -5.20%.
- The internal portfolio returned -12.90%, outperforming its benchmark by 144 bps due to short duration.

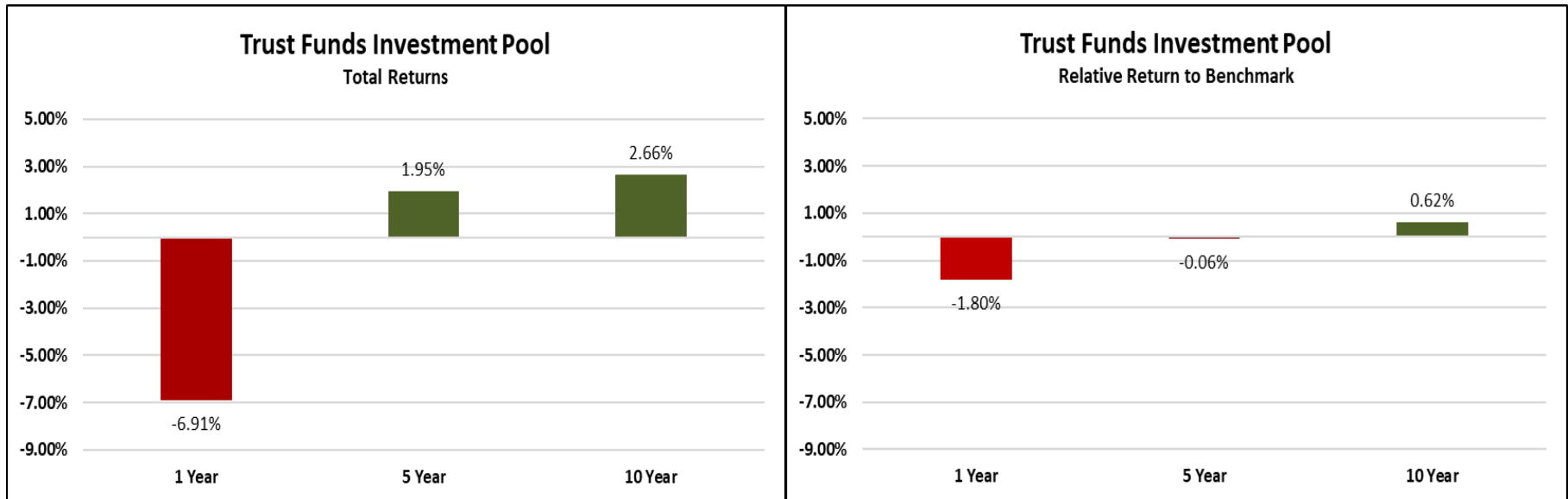
Trust Funds Investment Portfolio

Characteristics and Activity

- Total market value of approx. \$2.76B at quarter end.
- TFBP duration was slightly below the benchmark at quarter end. Portfolio remained significantly underweight the long end of the curve.
- TFBP maintained a neutral weight to spread product.
- Real Estate was 27% of the TFIP at quarter end.
- Staff continues to increase and diversify Real Estate holdings consistent with the 2020 change to the IPS.

Trust Funds Investment Portfolio

Net Performance

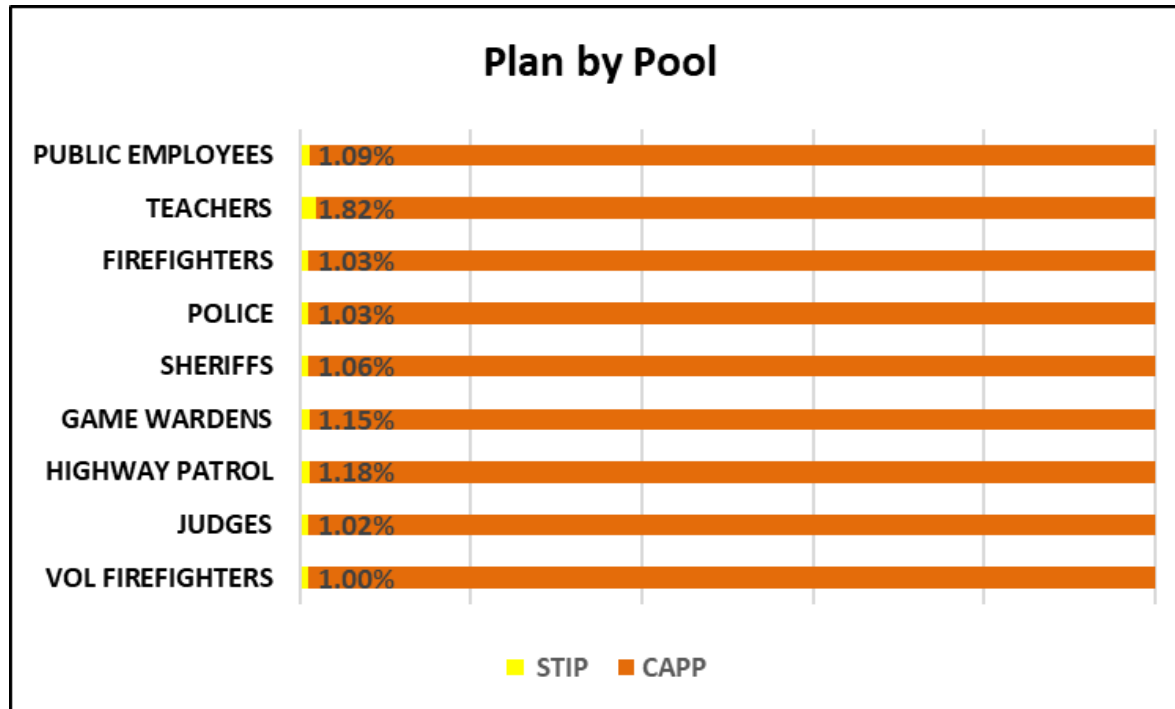


Trust Funds Investment Pool Custom Blend:

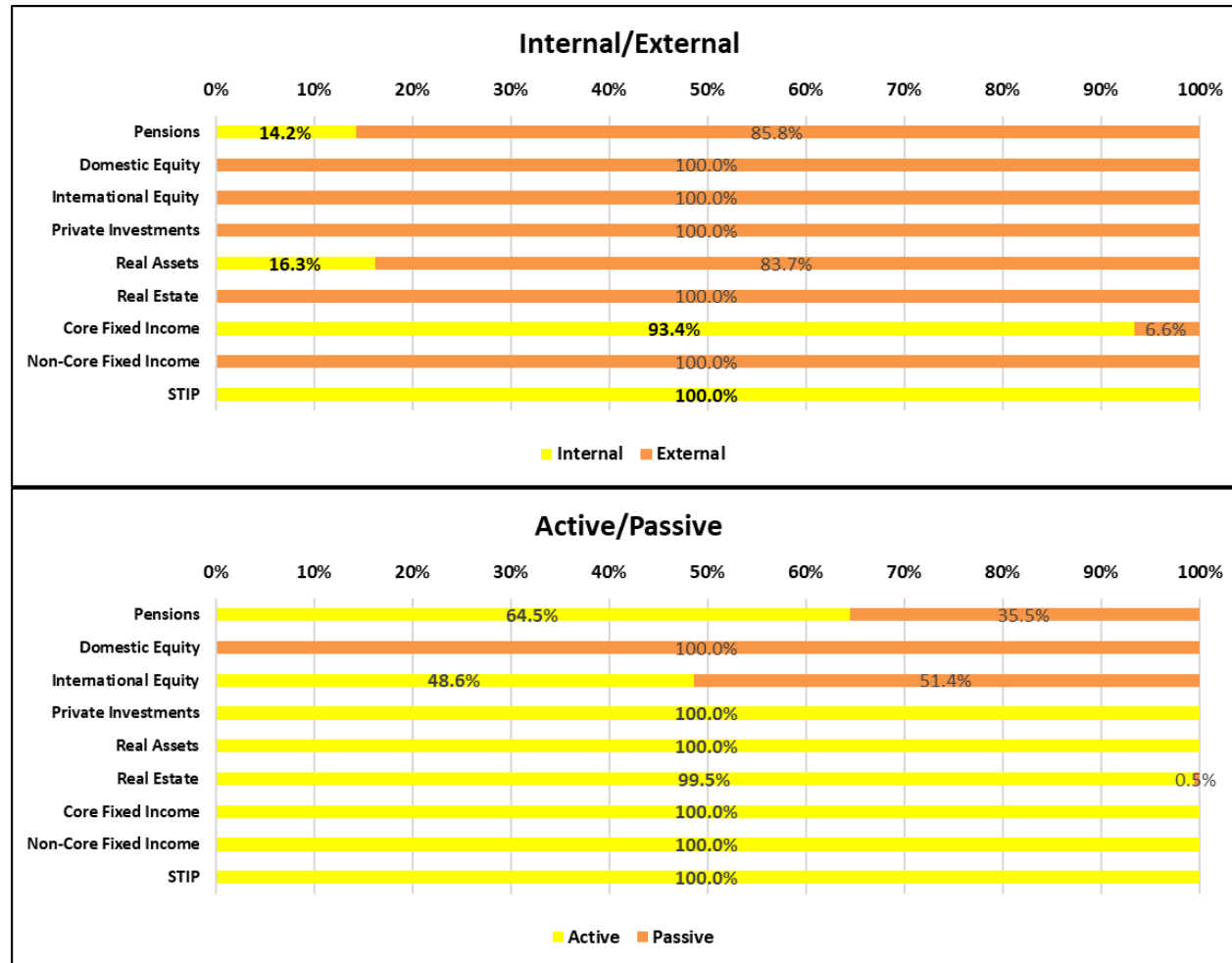
- Since Inception to 6/30/21 - Bloomberg Barclays U.S. Aggregate Bond Index
- 6/30/21 to present - Proportionately weighted Bloomberg Barclays US Aggregate Bond Index, Bloomberg Barclays US High Yield – 2% Issuer Cap Index and the NCREIF ODCE Index
- Inception - 10/1/1995

APPENDIX

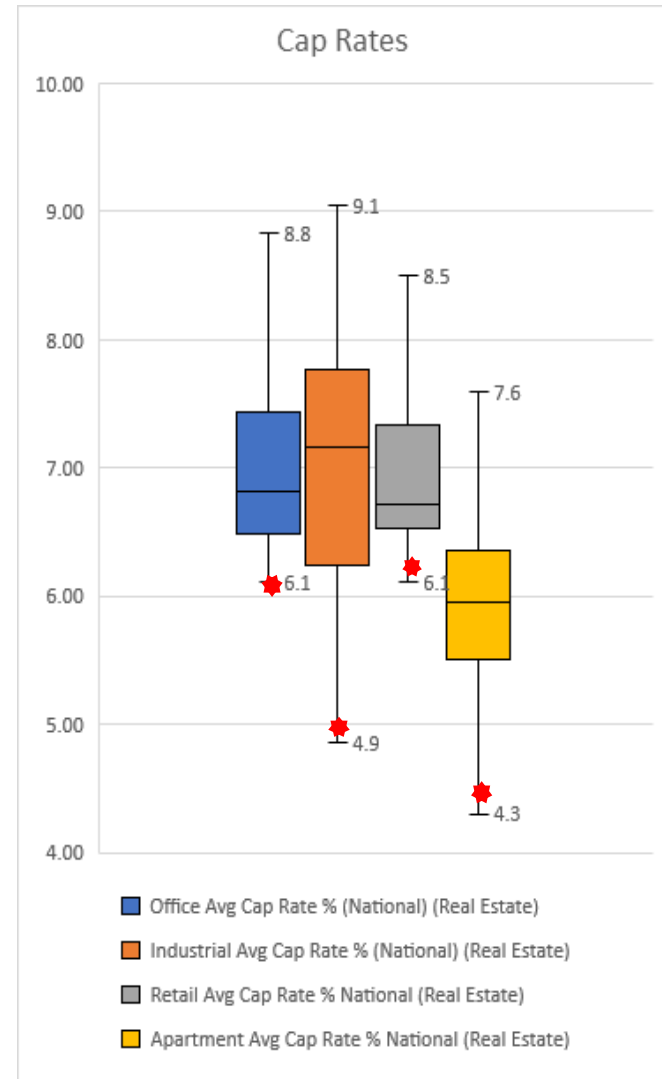
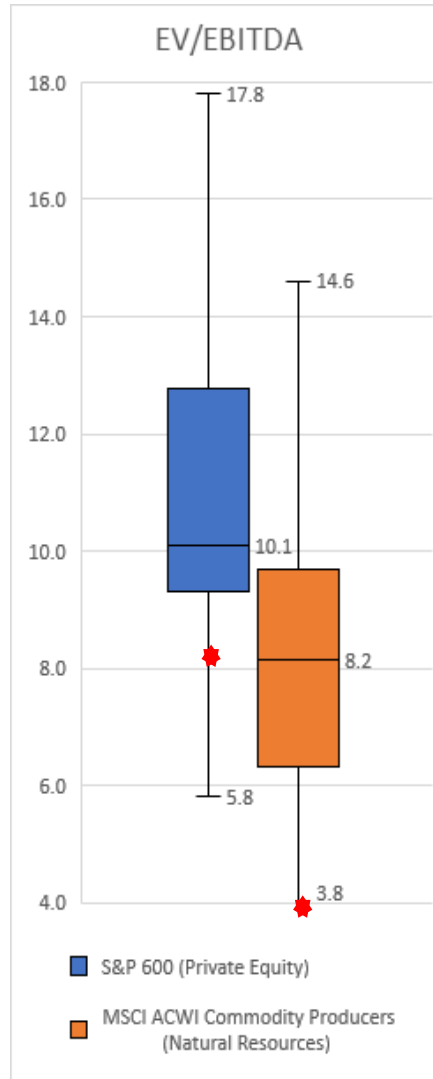
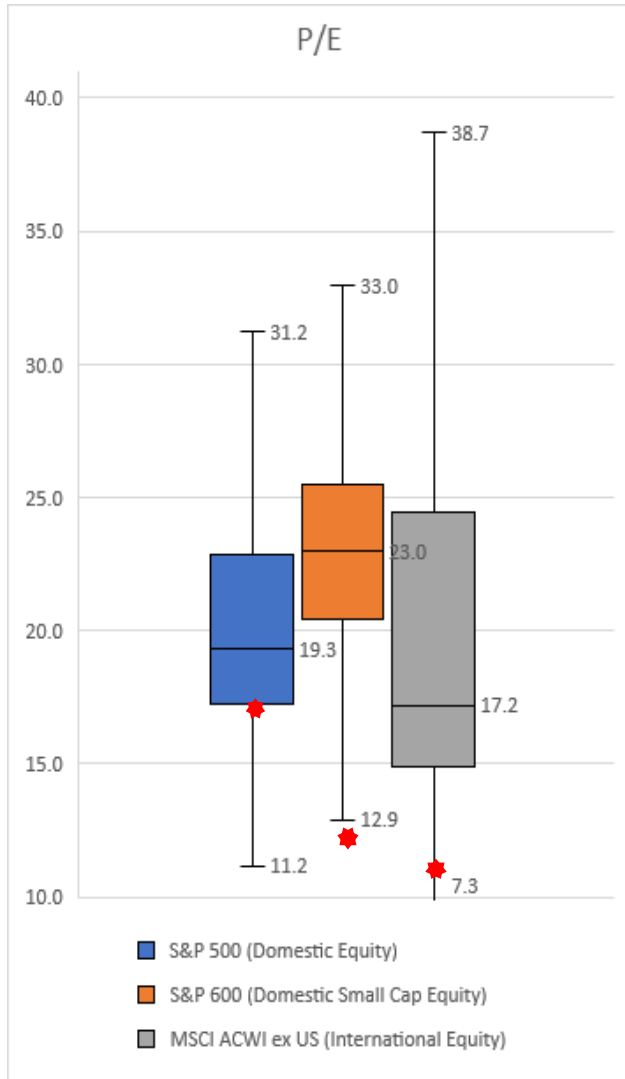
Retirement Plans Allocations by Pool



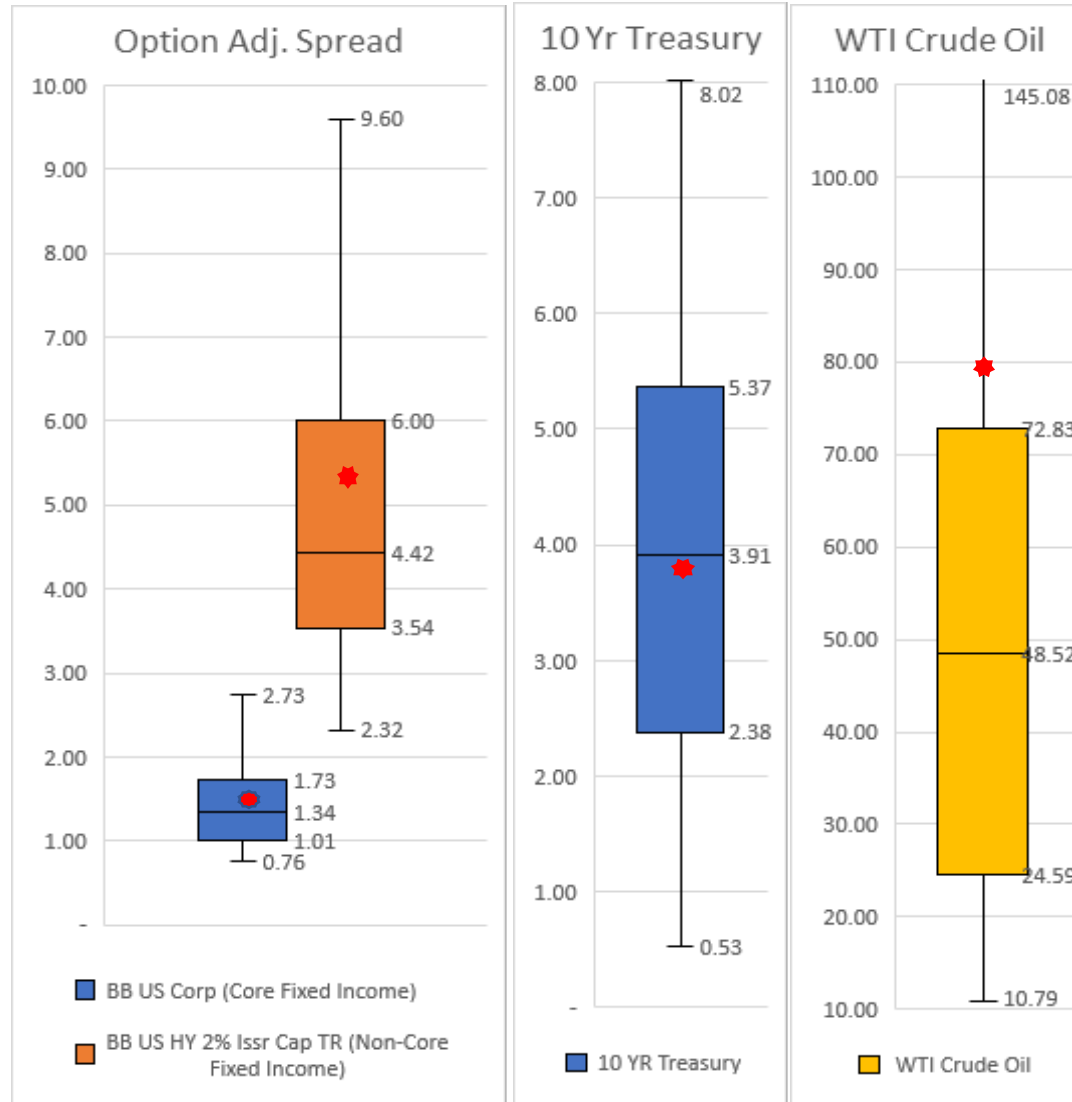
Retirement Plans Characteristics



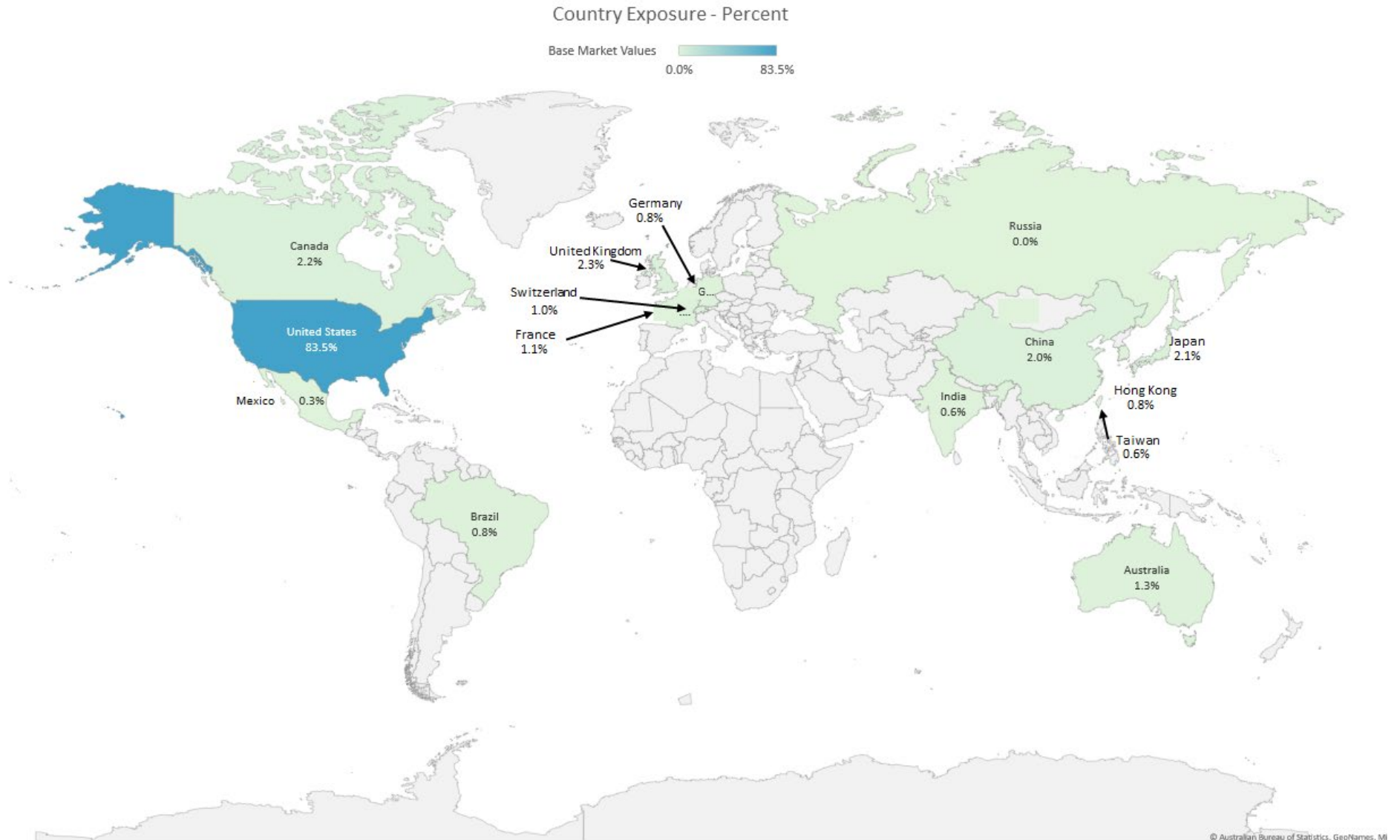
Risk Management Benchmark Valuation



Risk Management Benchmark Valuation

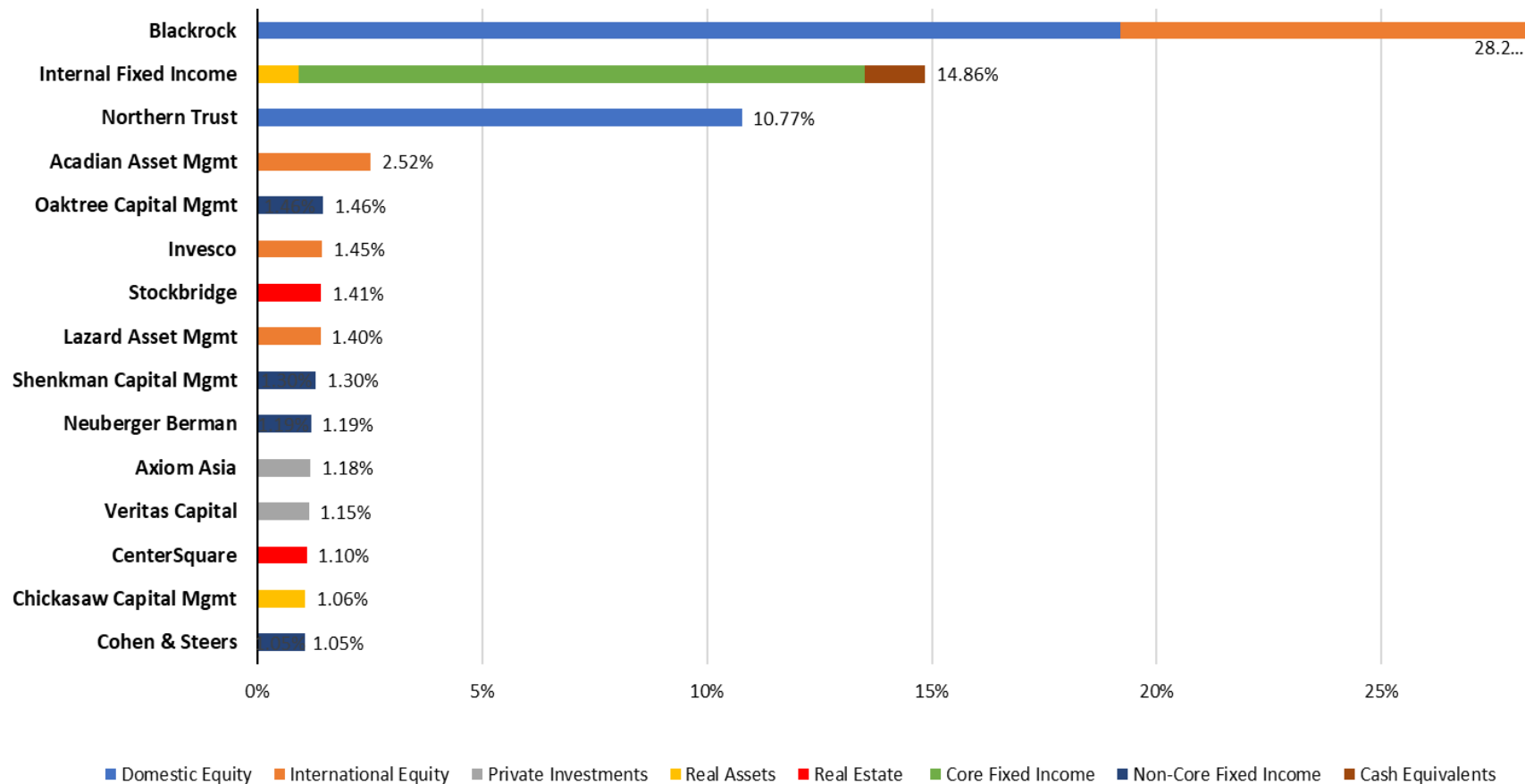


Risk Management Pension Geographic



Risk Management Pension Holdings

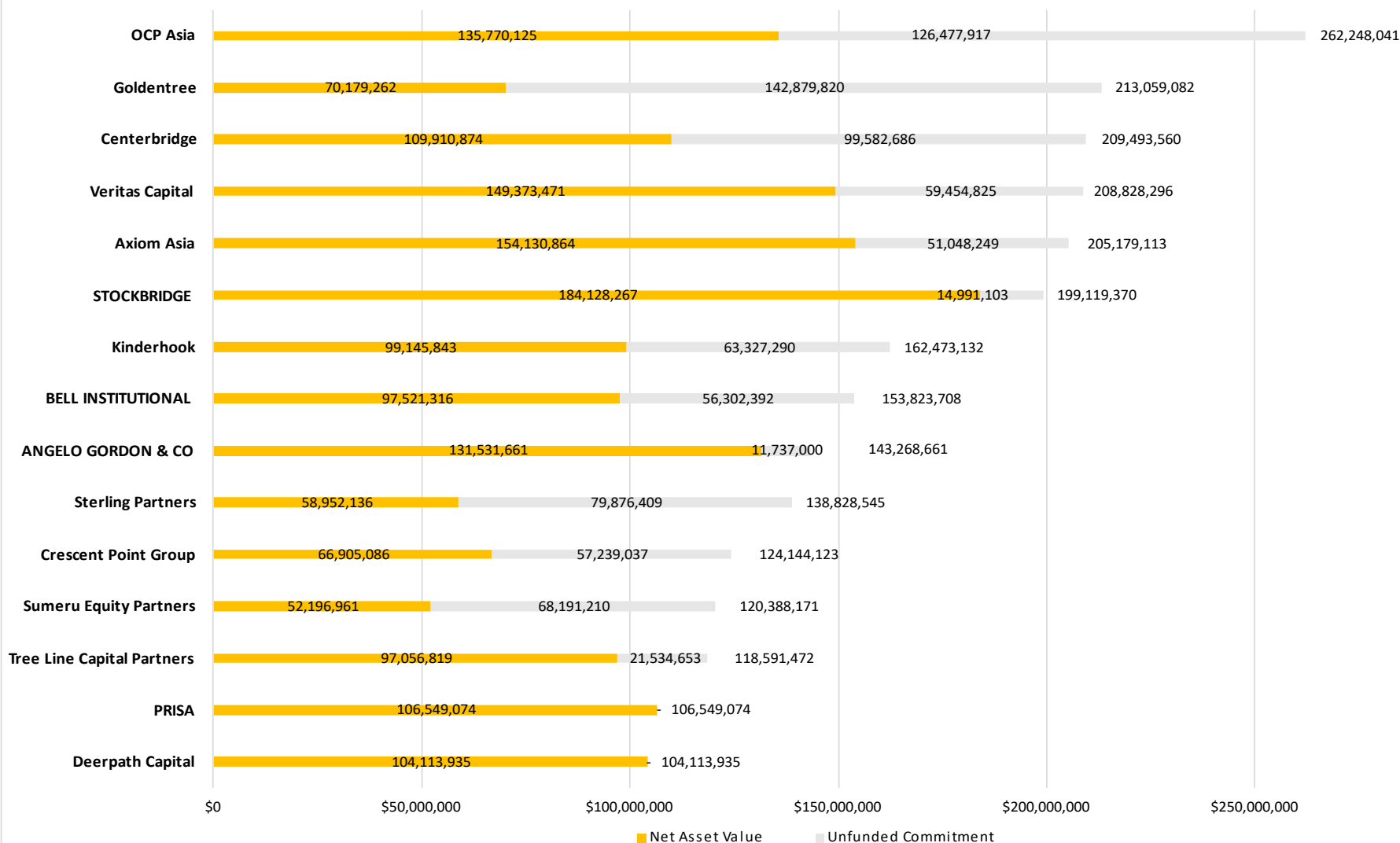
Top 15 Managers



*Montana Public Retirement Plans shall have no greater than 5% of its Net Asset Value managed by any one external manager using an active investment strategy

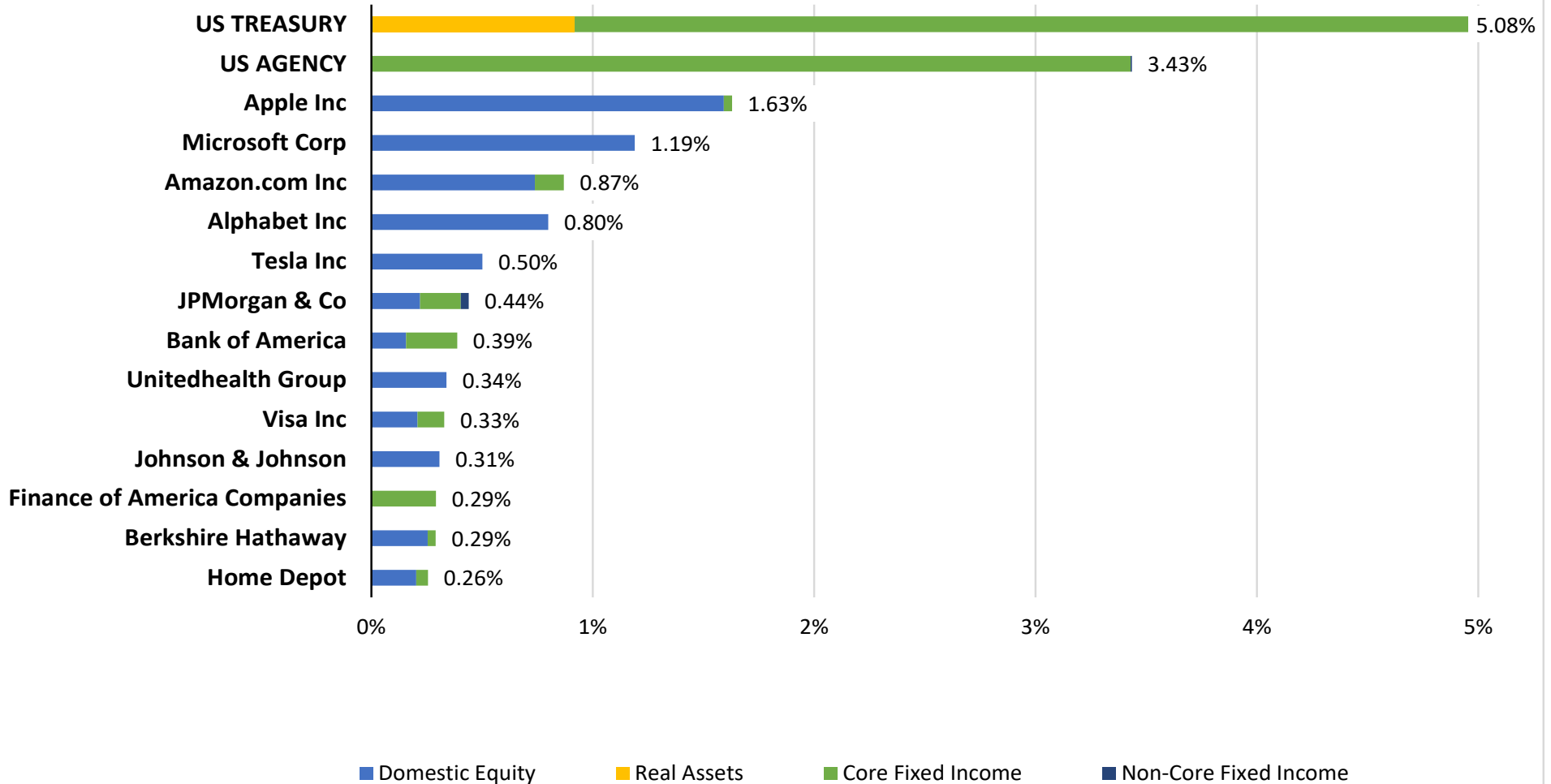
Risk Management Pension Holdings

Top 15 Private Managers

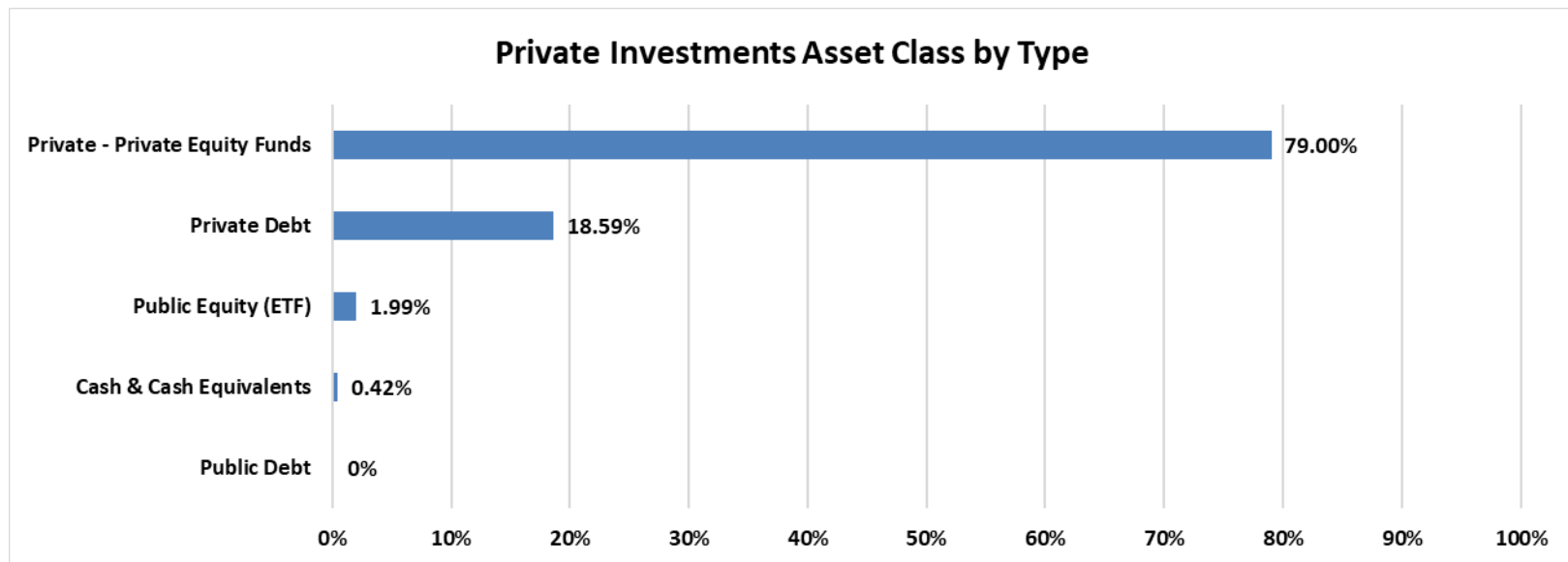


Risk Management Pension Holdings

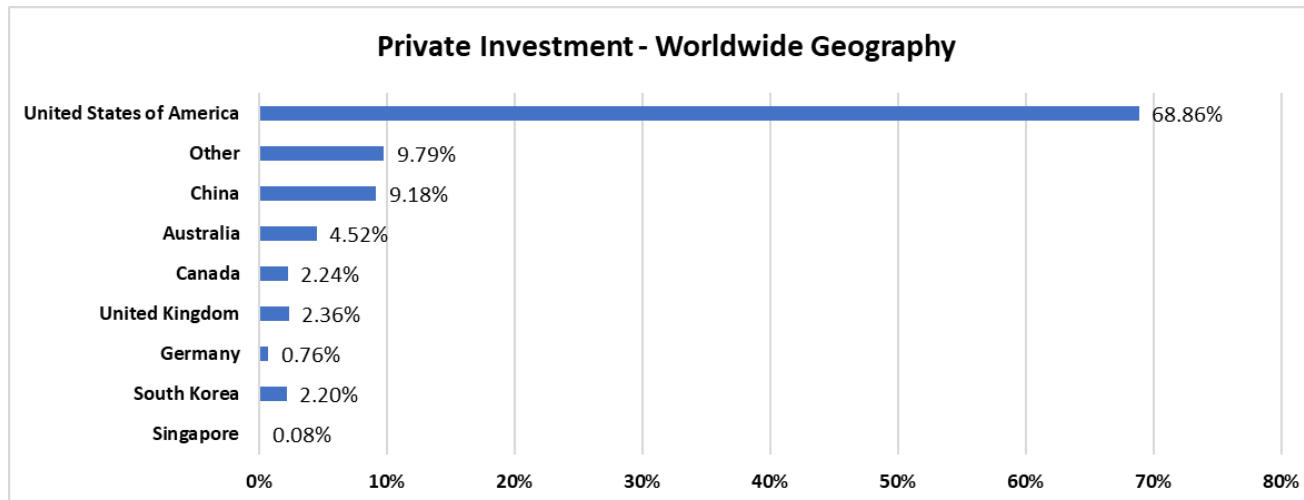
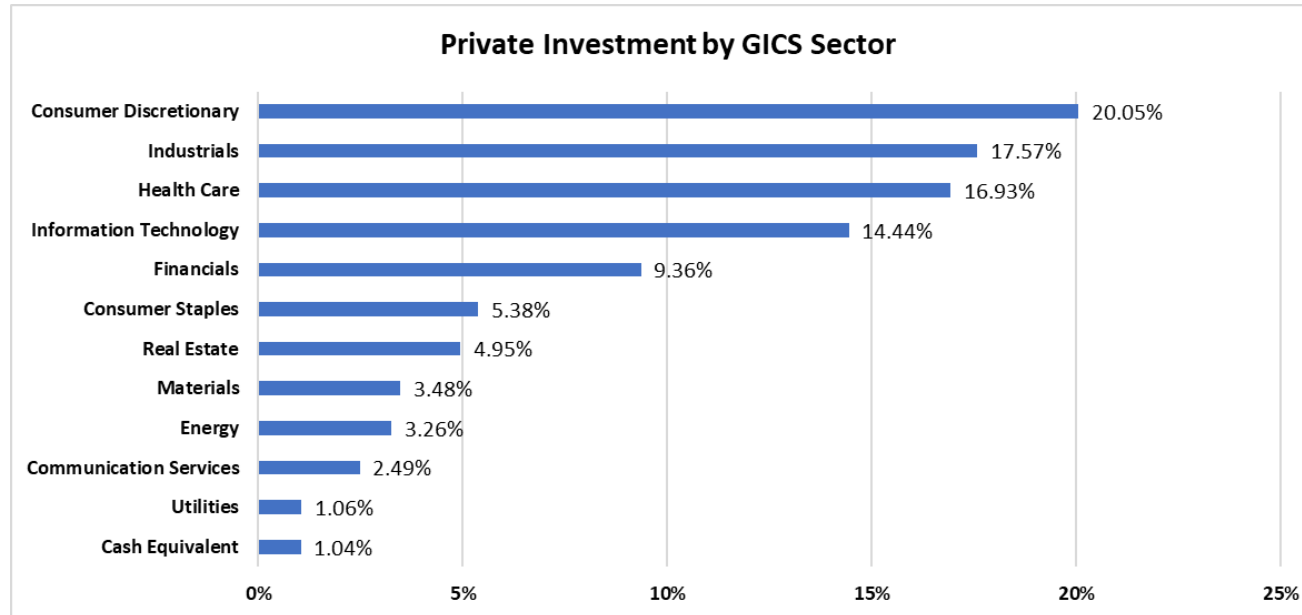
Top 15 Issuers



Private Investments Characteristics

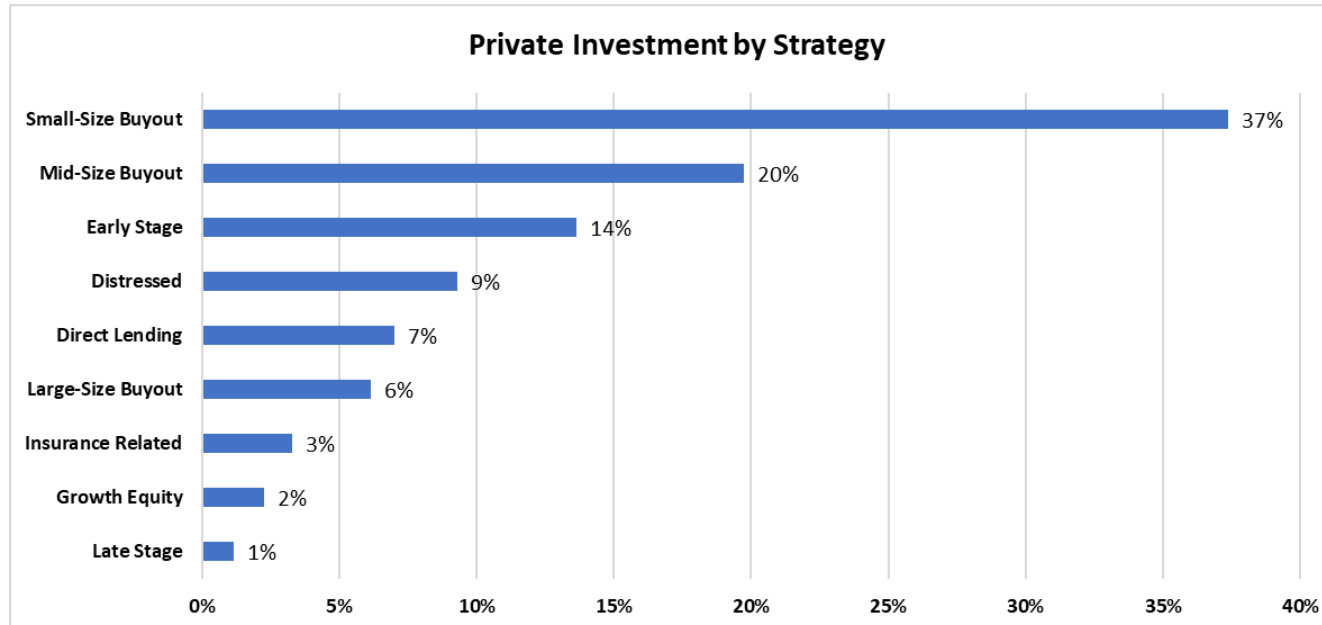
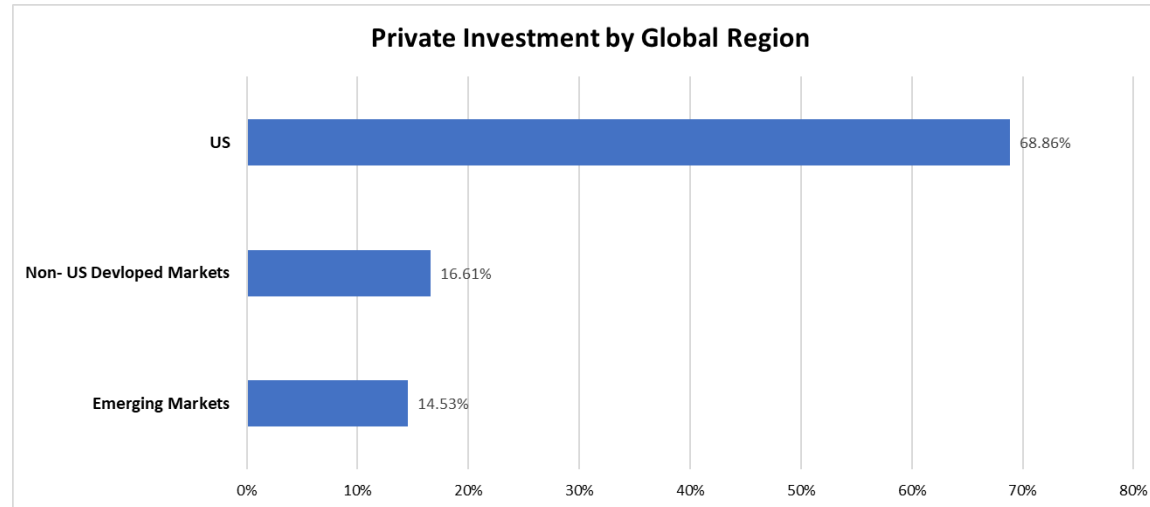


Private Investments Characteristics



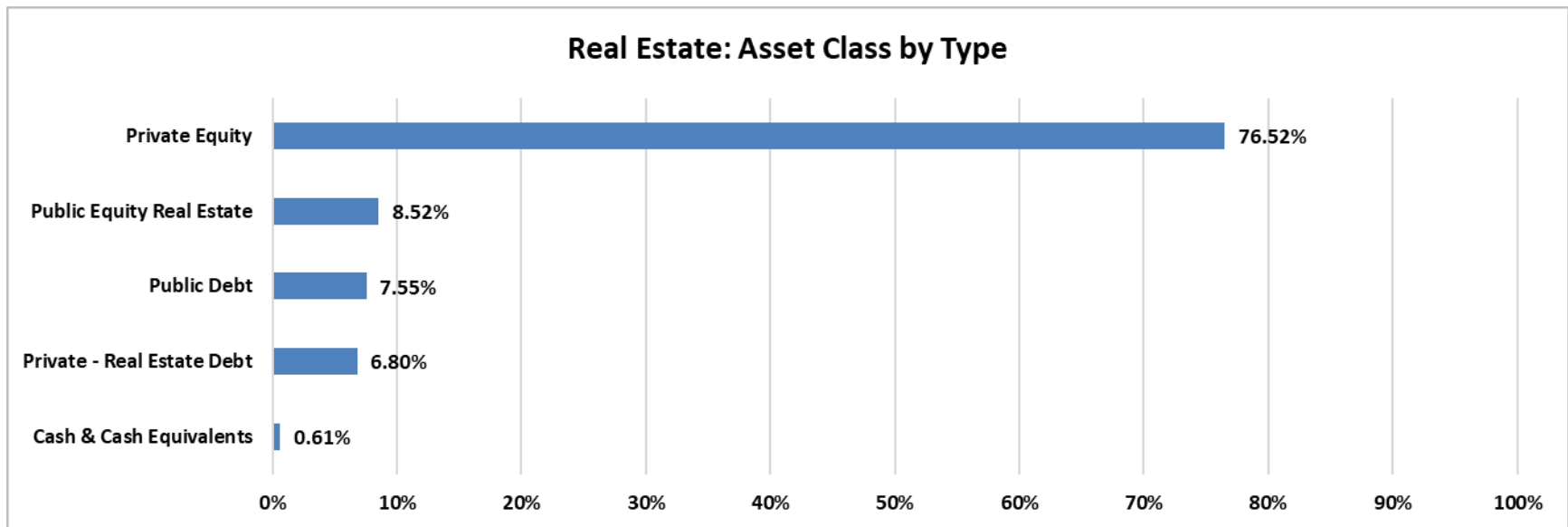
Note: Data reflects most recent GP-reported holdings as of 6/30/22
September 30, 2022

Private Investments Characteristics

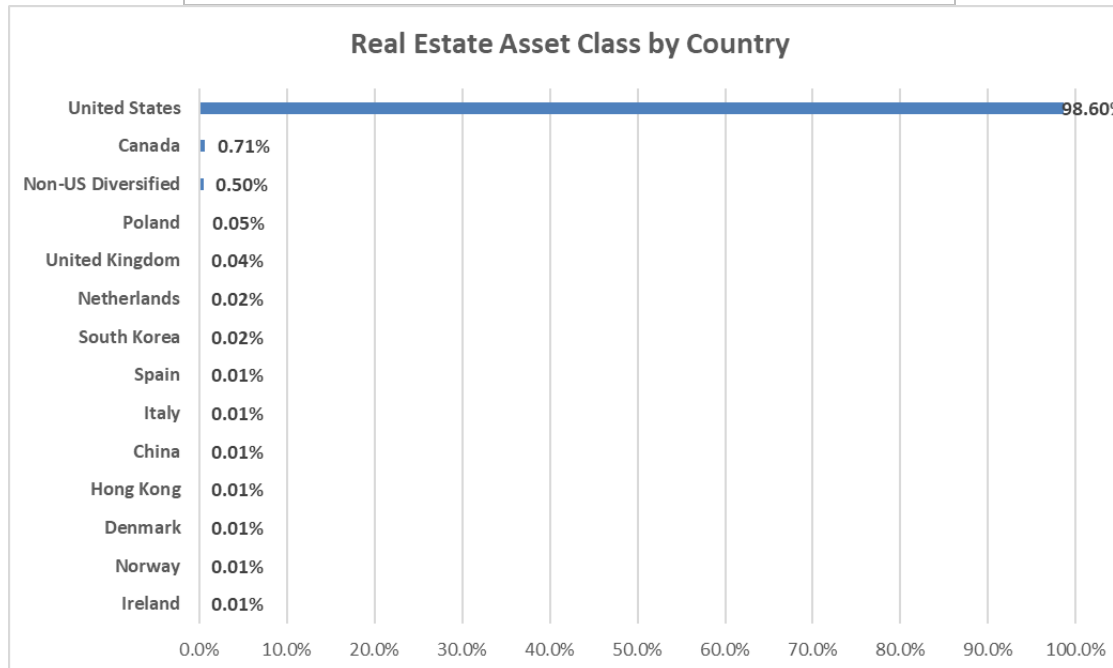
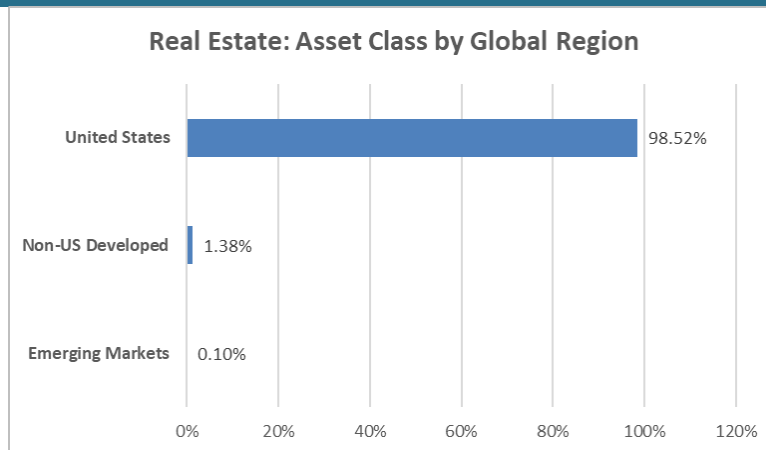


Note: Data reflects most recent GP-reported holdings as of 6/30/22
September 30, 2022

Real Estate Characteristics

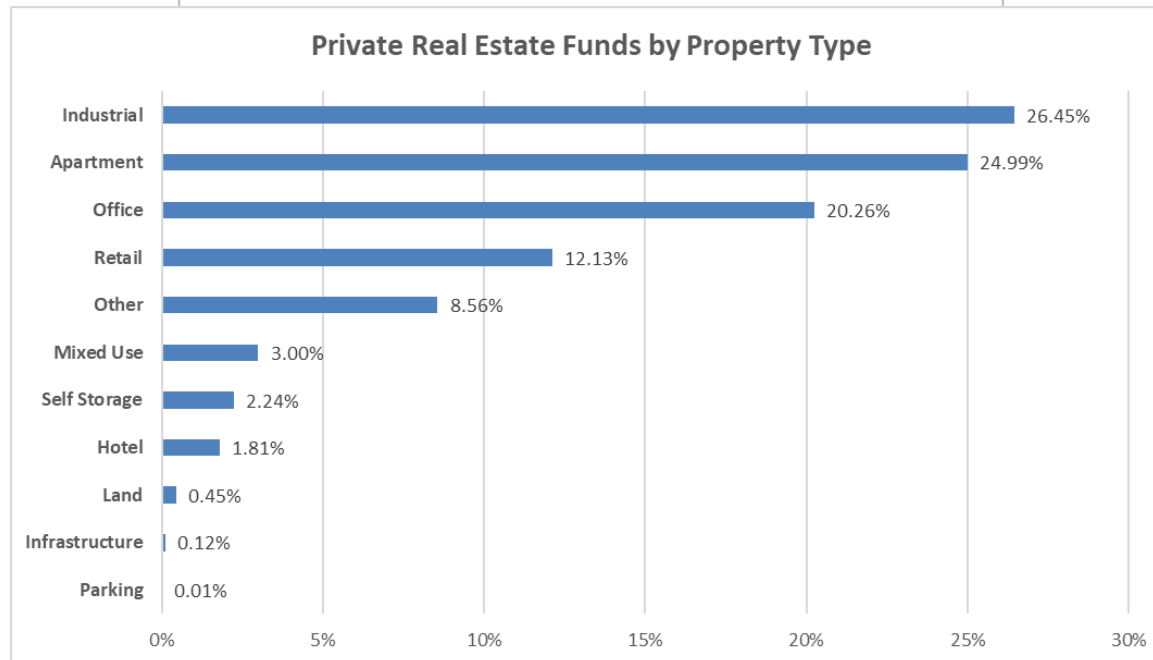
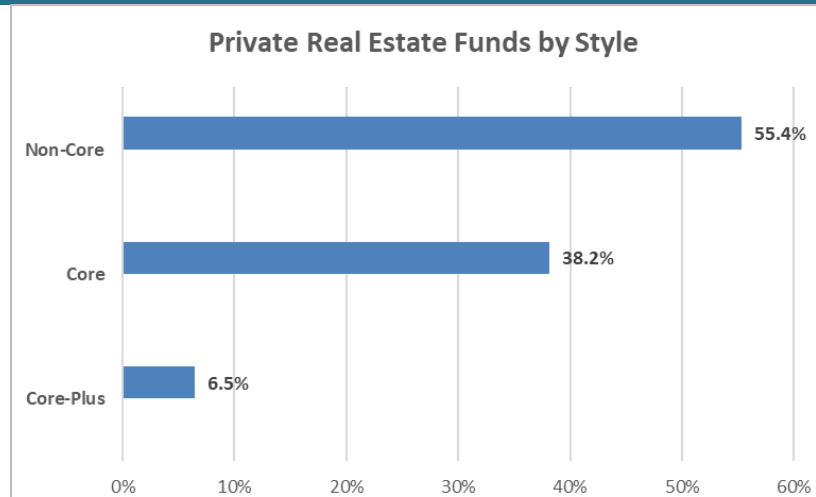


Real Estate Characteristics



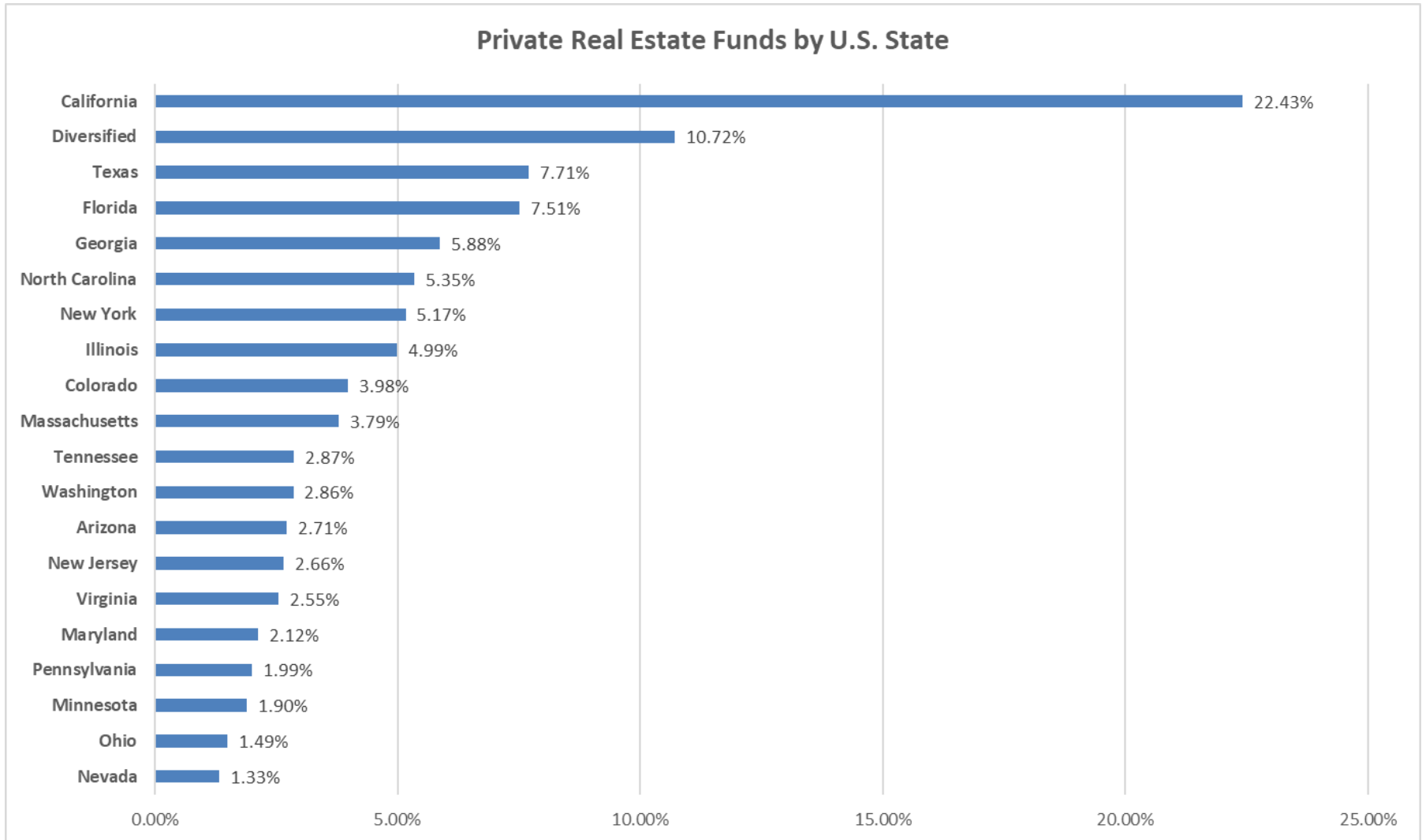
Note: Data reflects most recent GP-reported holdings as of 6/30/22
September 30, 2022

Real Estate Characteristics



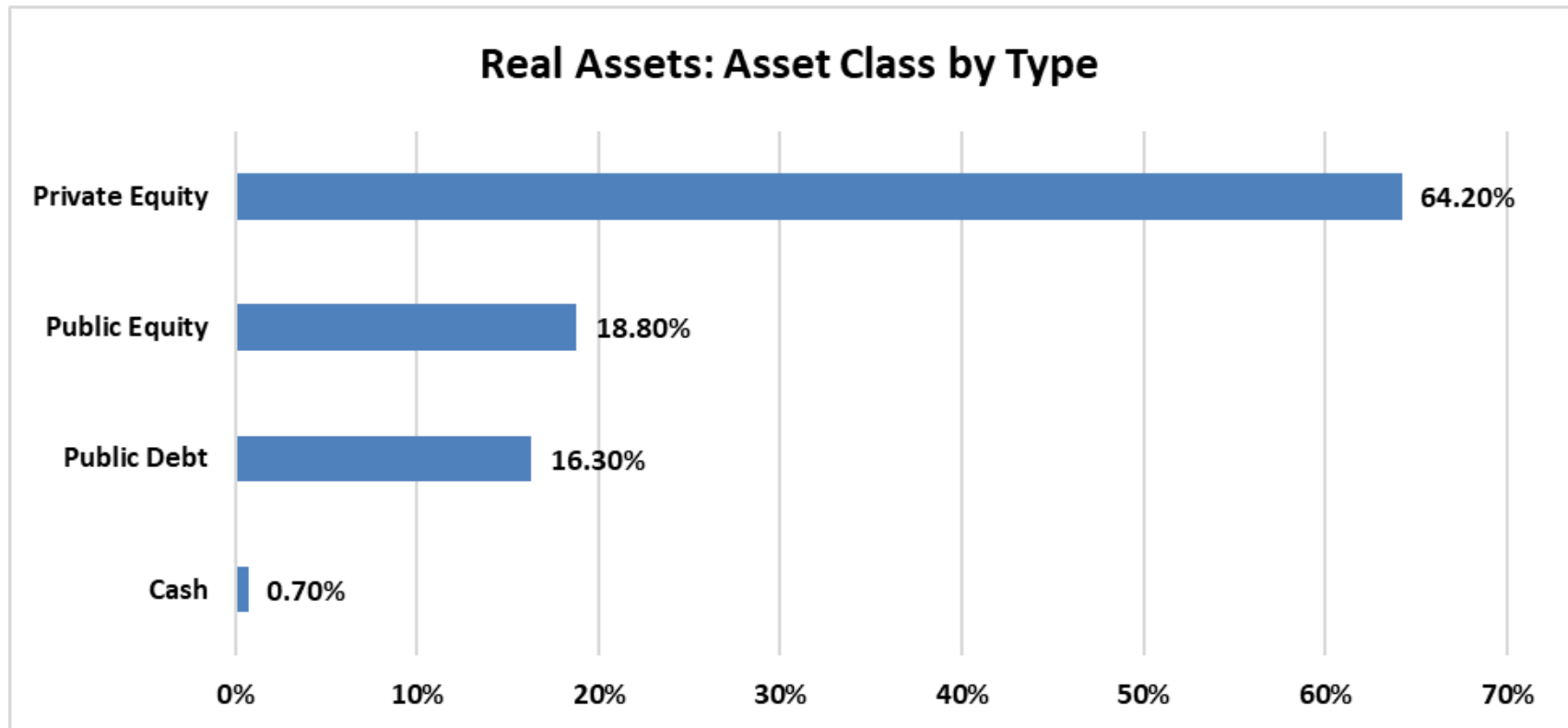
Note: Data reflects most recent GP-reported holdings as of 6/30/22
September 30, 2022

Real Estate Characteristics

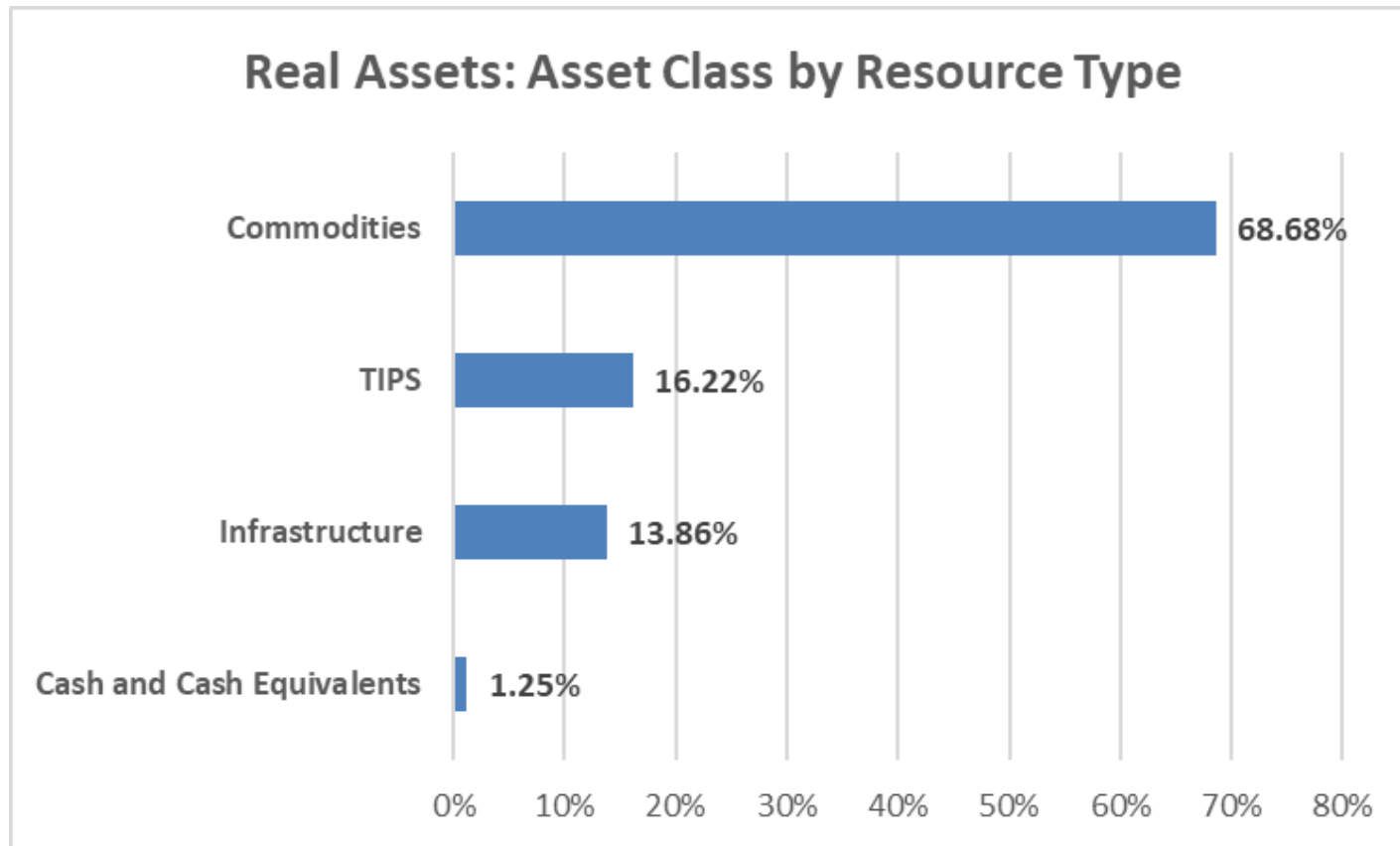


Note: Data reflects most recent GP-reported holdings as of 6/30/22
September 30, 2022

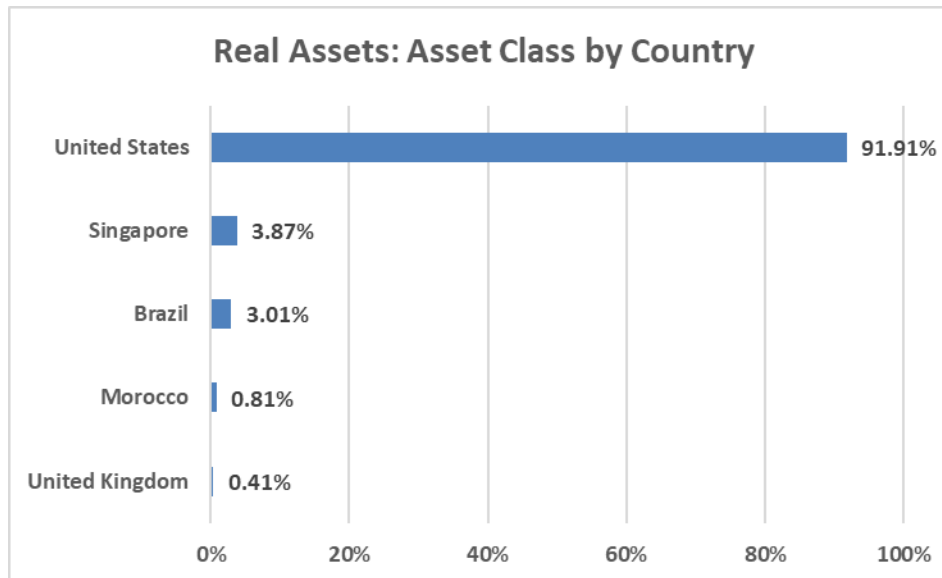
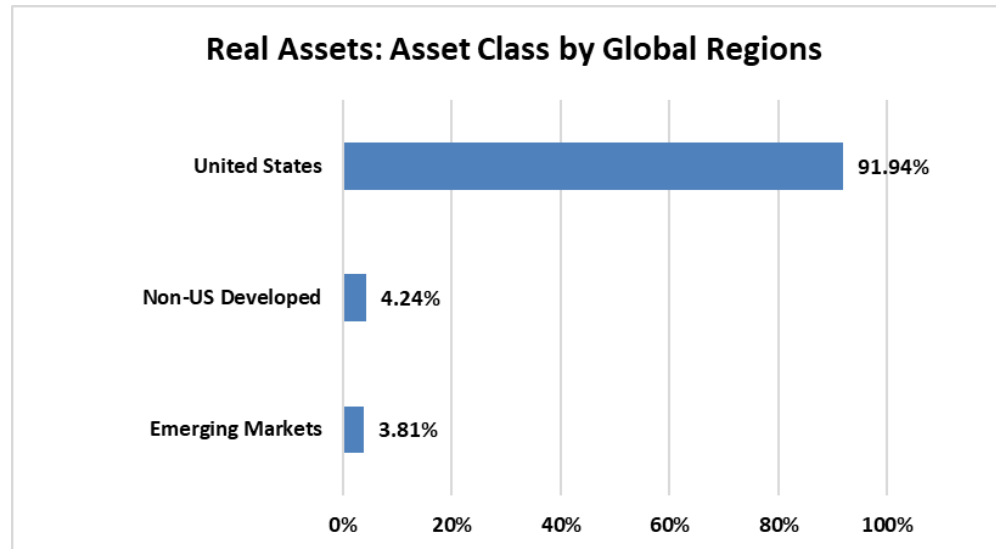
Real Assets Characteristics



Real Assets Characteristics

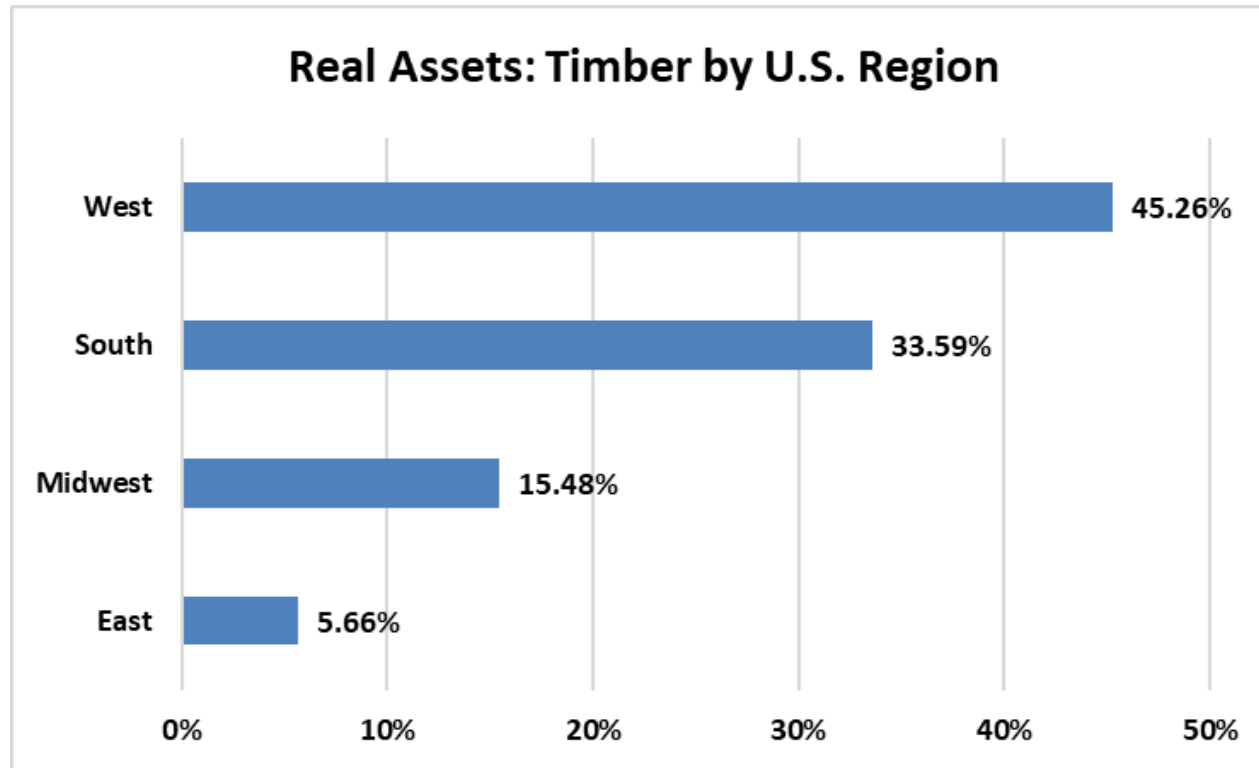


Real Assets Characteristics



Note: Data reflects most recent GP-reported holdings as of 6/30/22
September 30, 2022

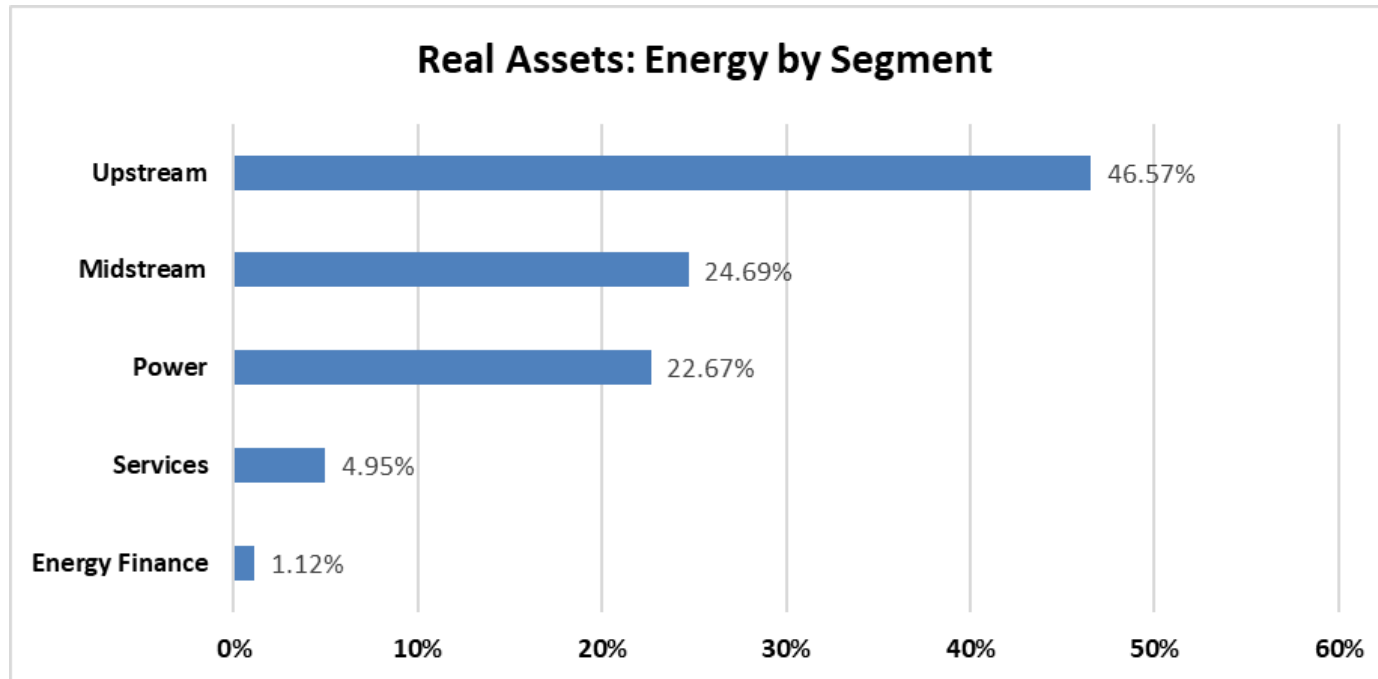
Real Assets Characteristics



Note: Data reflects most recent GP-reported holdings as of 6/30/22

September 30, 2022

Real Assets Characteristics

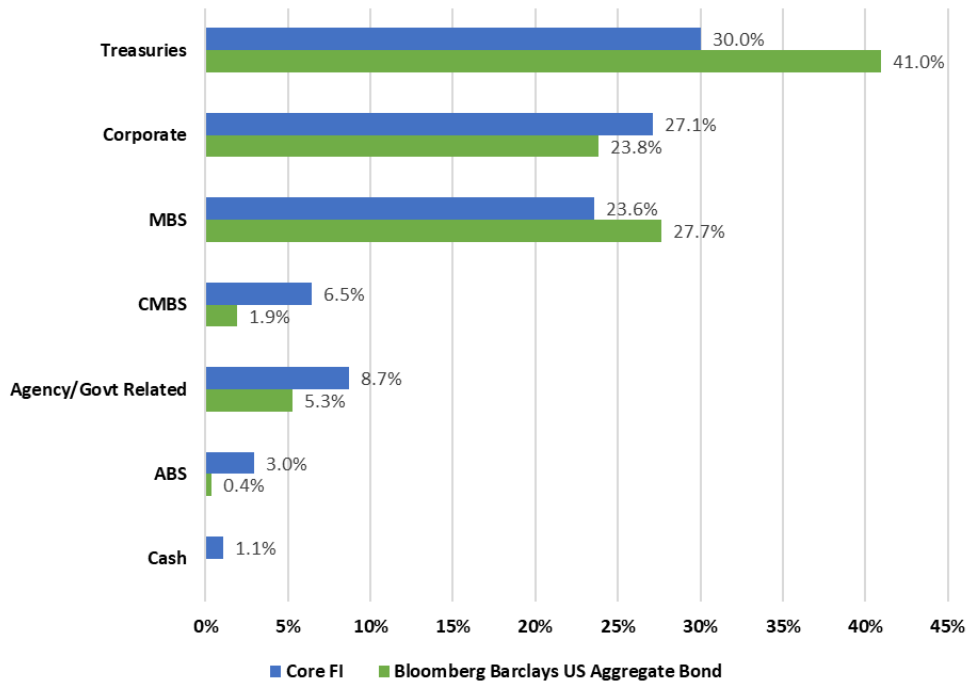


Upstream	Exploration and production
Services	Businesses that provide ancillary services and equipment required to explore for, produce and transport oil and gas
Power	Generation plants that create power
Midstream	Pipelines, terminals and storage of oil and gas and involves the transportation of oil and gas
Energy Finance	Investments in a portfolio of liquid or yield-oriented securities

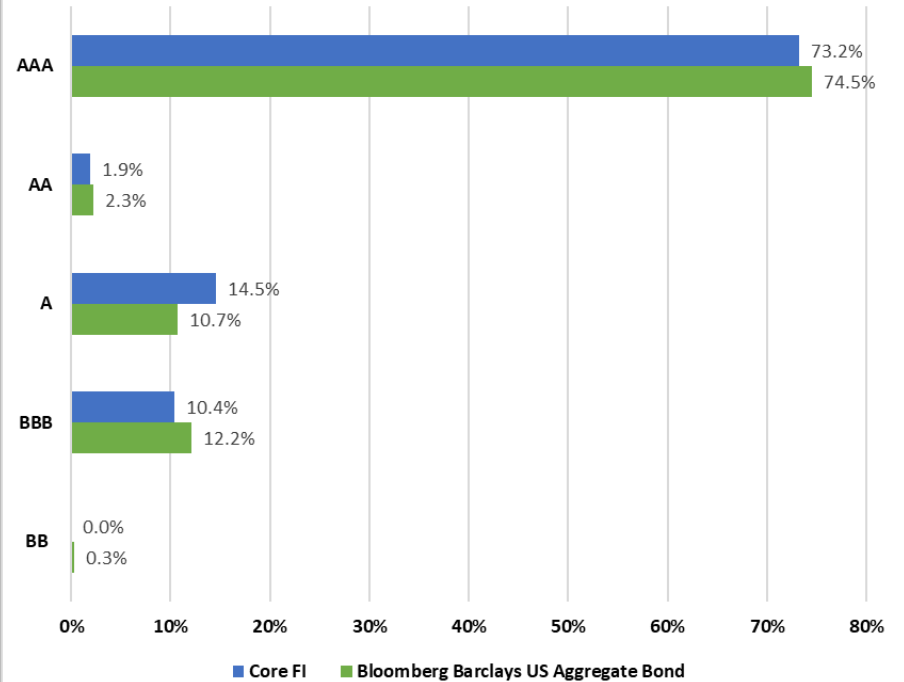
Note: Data reflects most recent GP-reported holdings as of 6/30/22
September 30, 2022

Core Fixed Income Characteristics

**Core Fixed Income
Sector Weights**

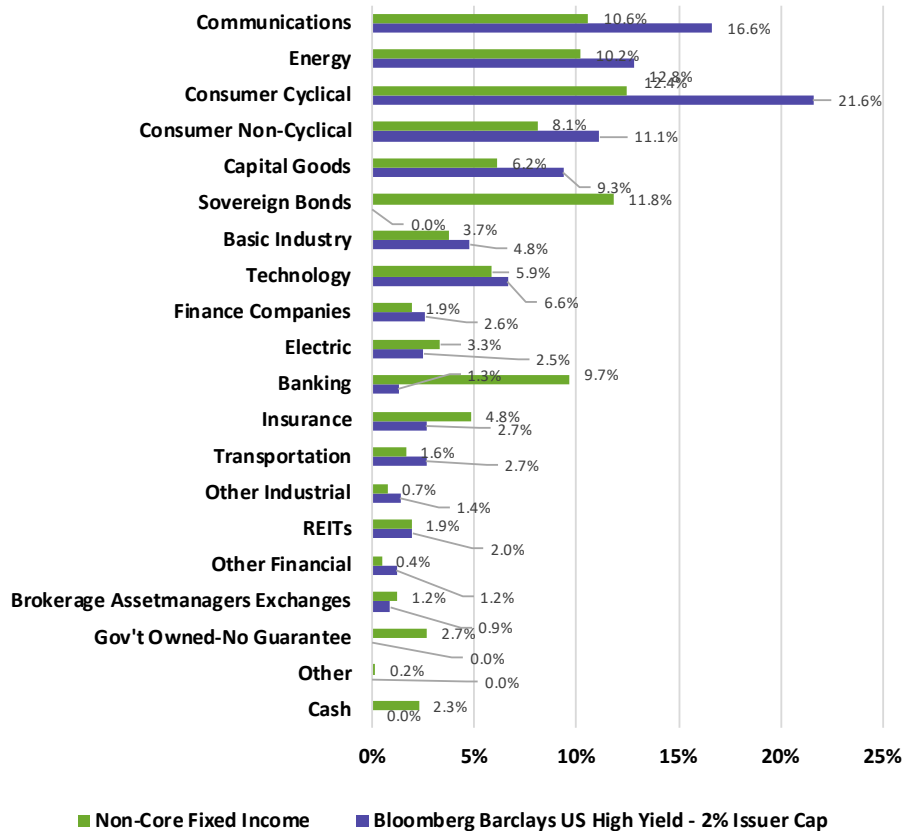


**Core Fixed Income
Credit Quality**

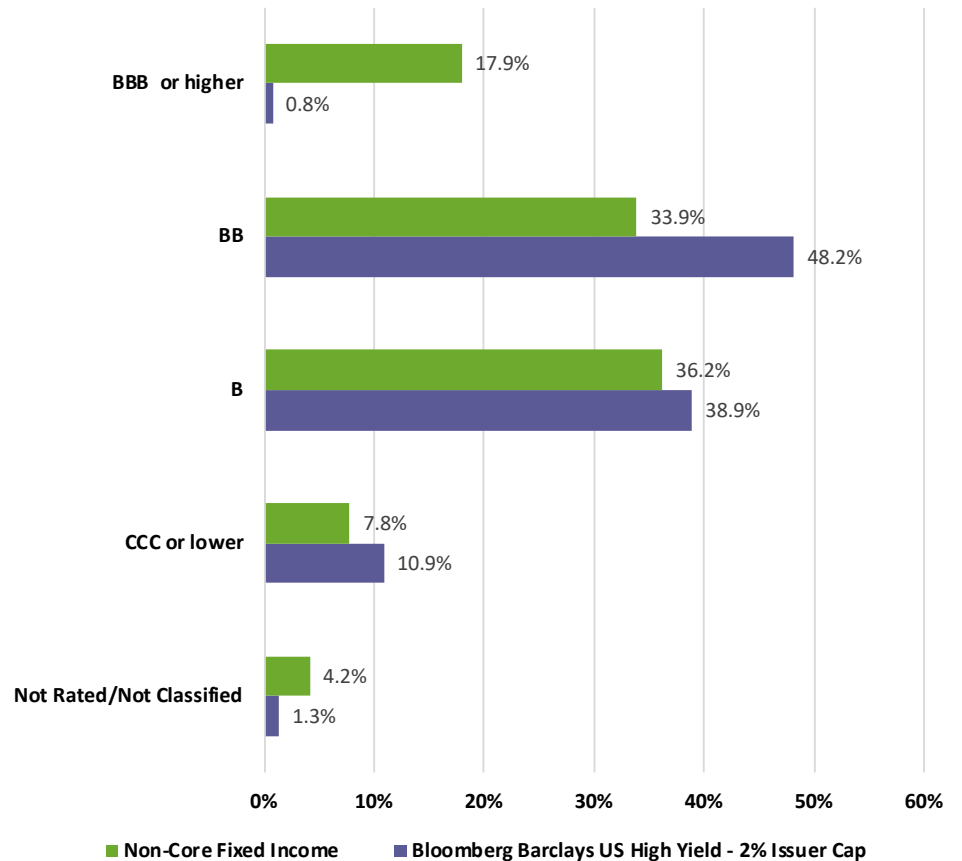


Non-Core Fixed Income Characteristics

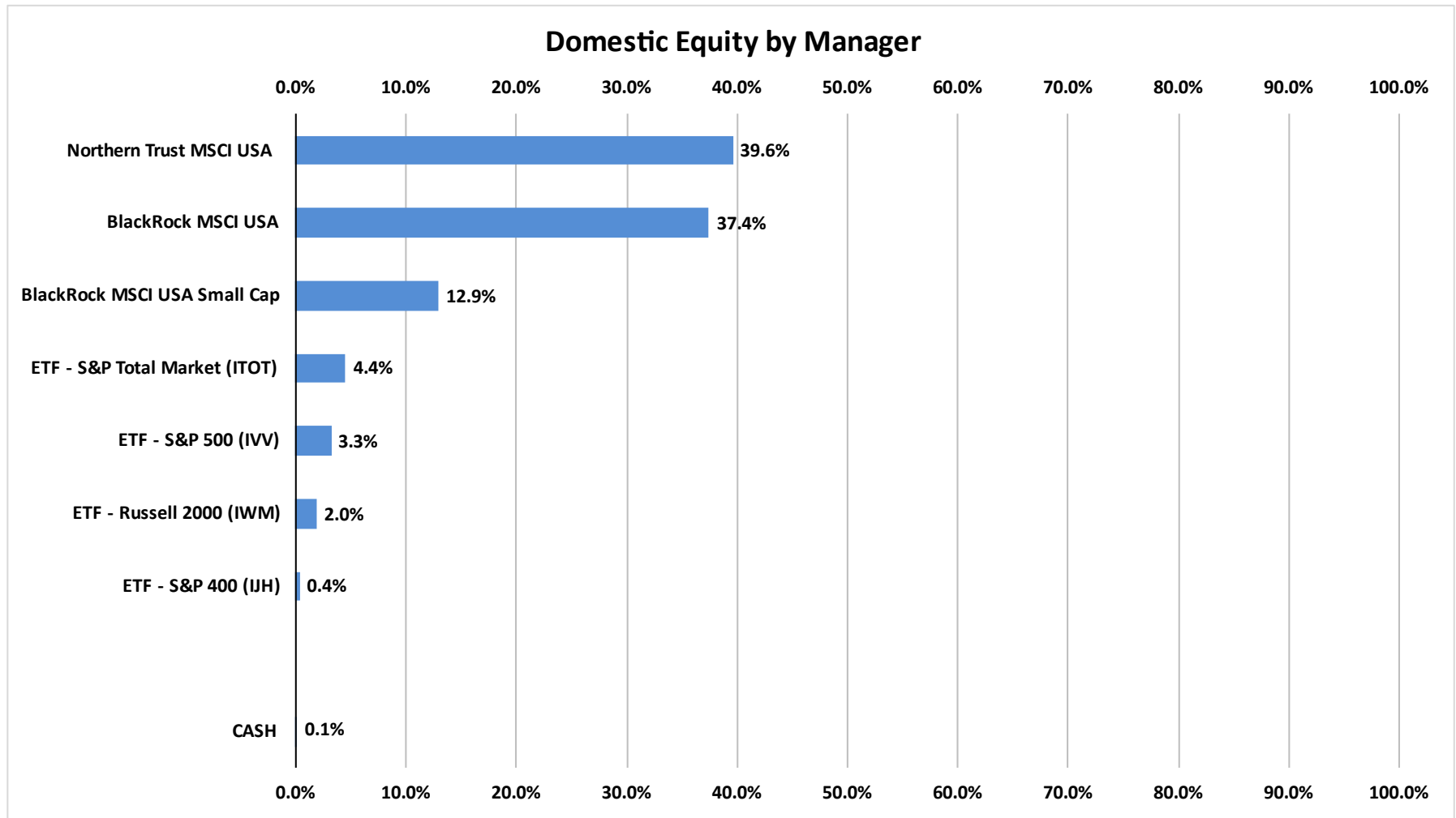
Non-Core Fixed Income Sector Weights



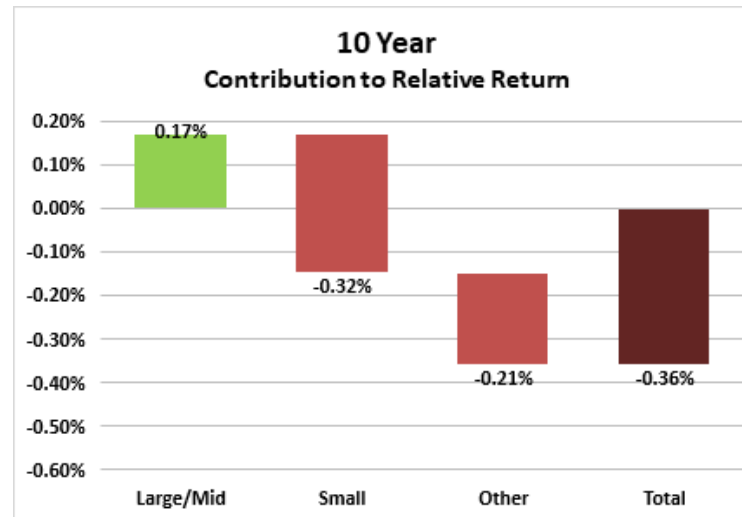
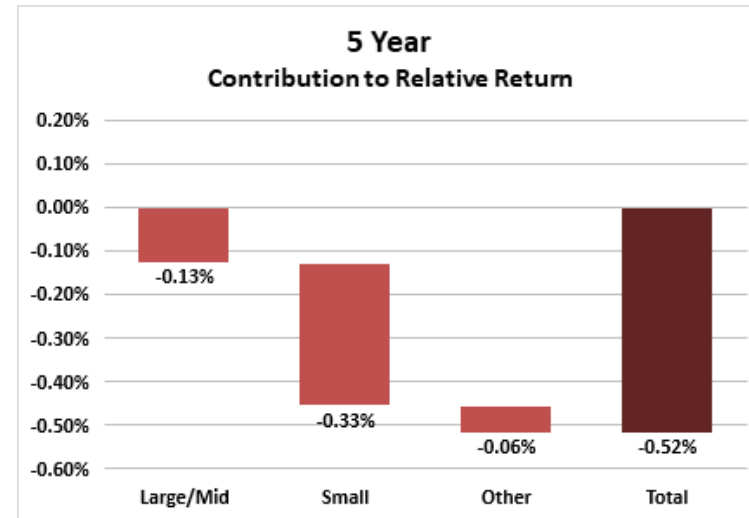
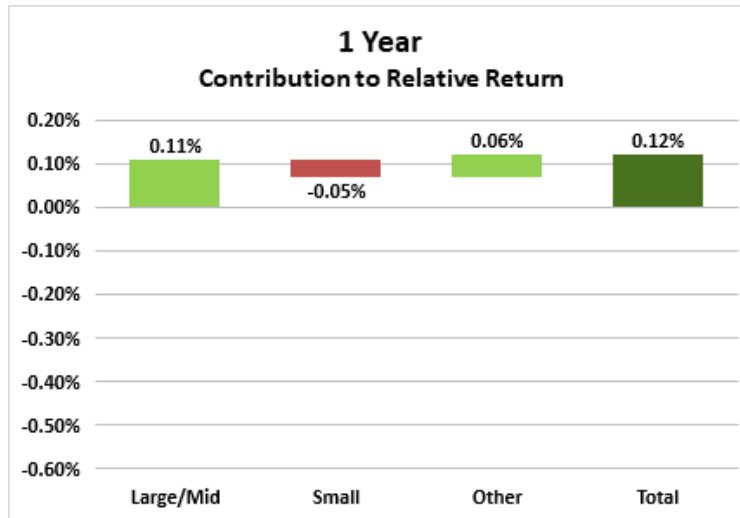
Non-Core Fixed Income Credit Quality



Domestic Equity Policy



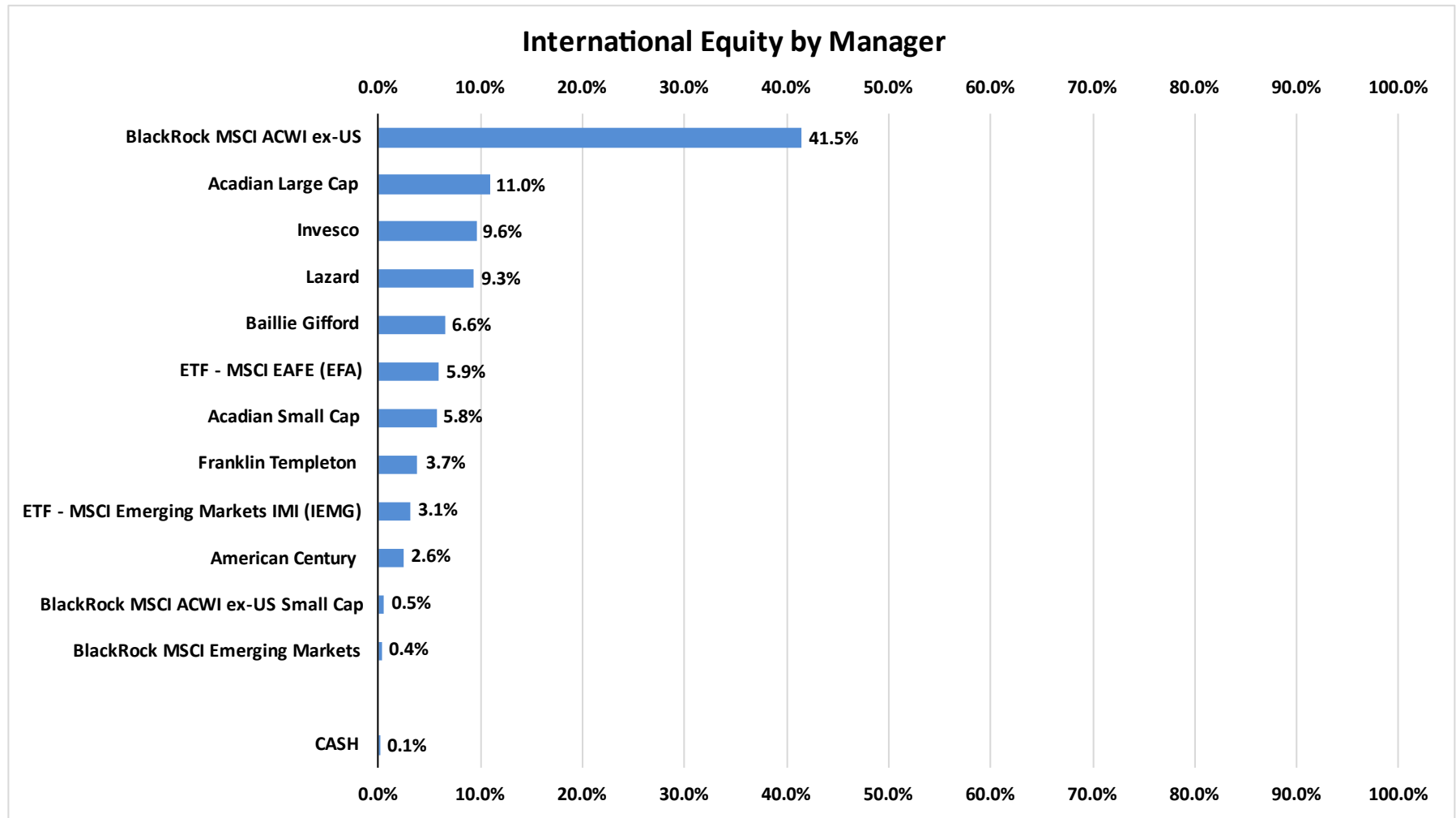
Domestic Equity Net Performance



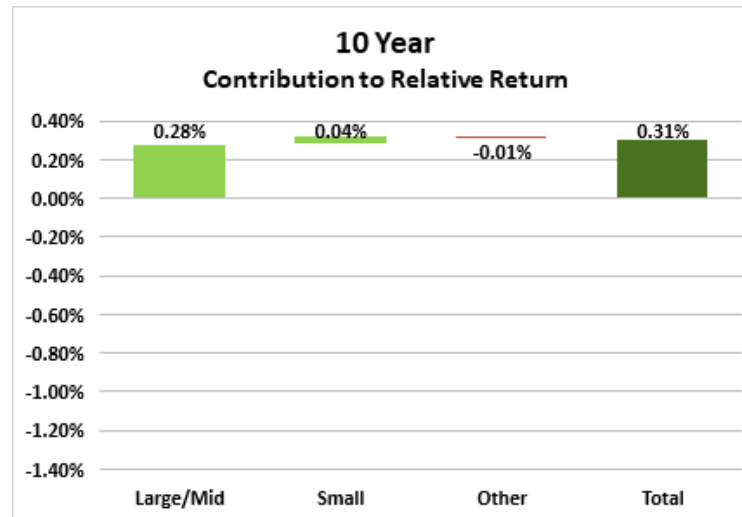
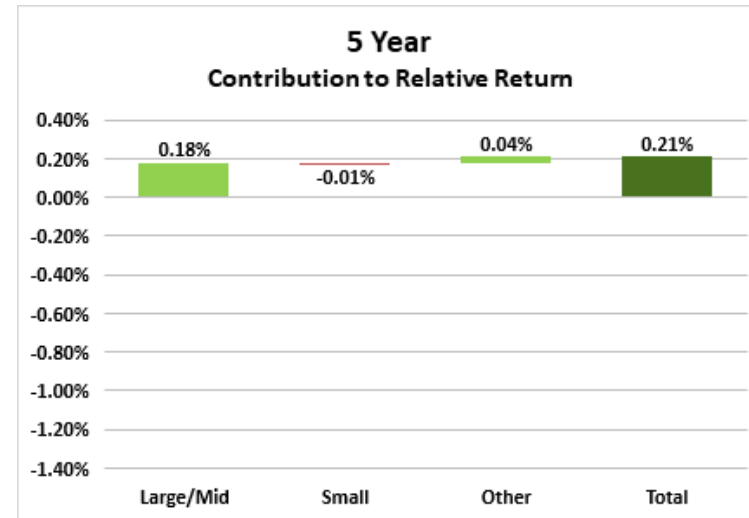
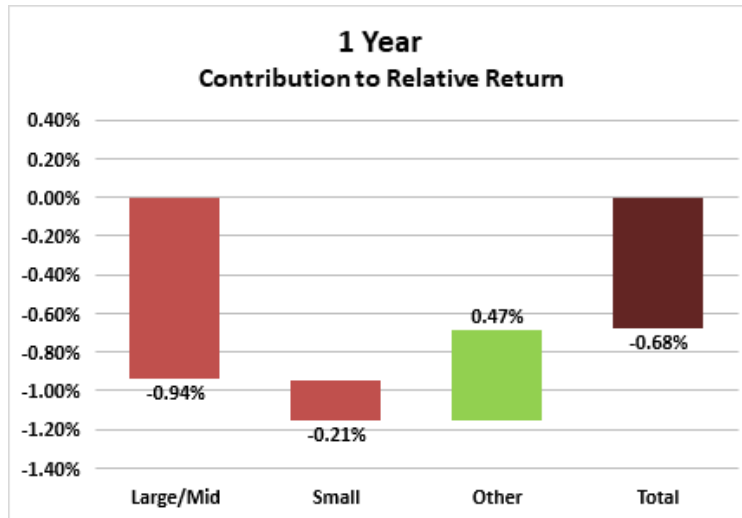
Benchmark: Domestic Equity – PAC Custom Blend

September 30, 2022

International Equity Policy



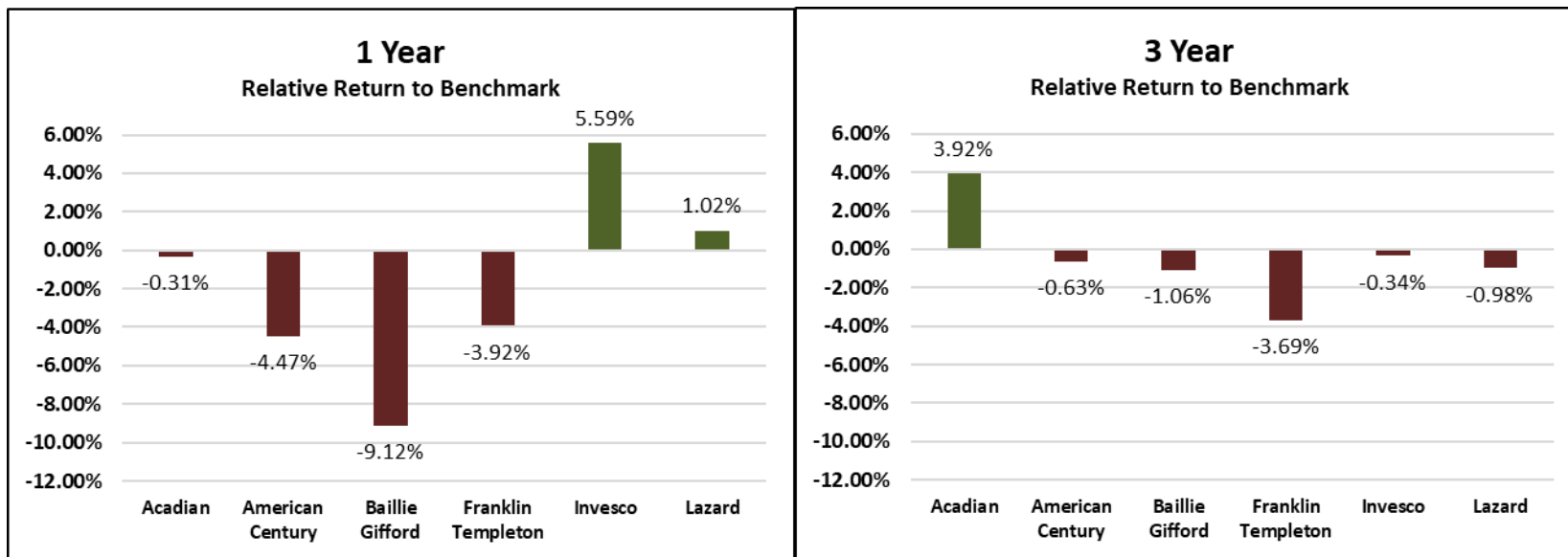
International Equity Net Performance



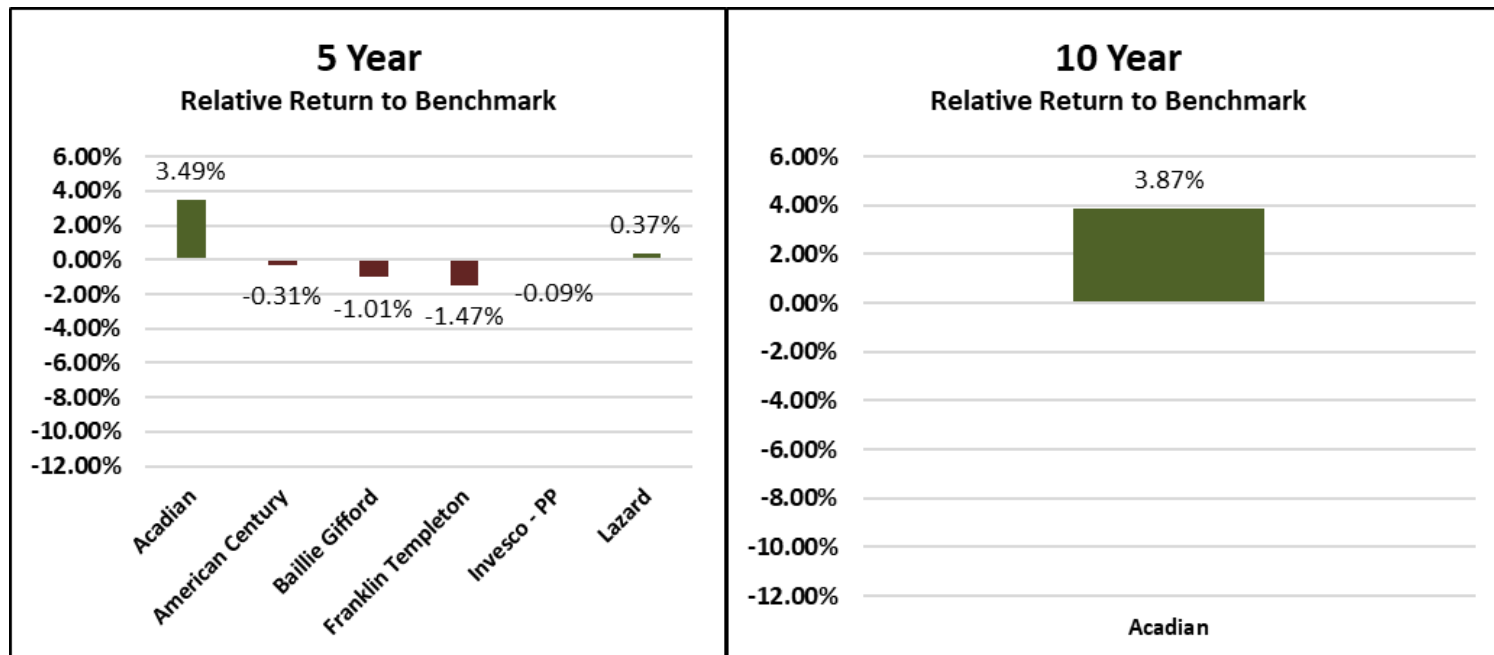
Benchmark: International Equity – PAC Custom Blend

September 30, 2022

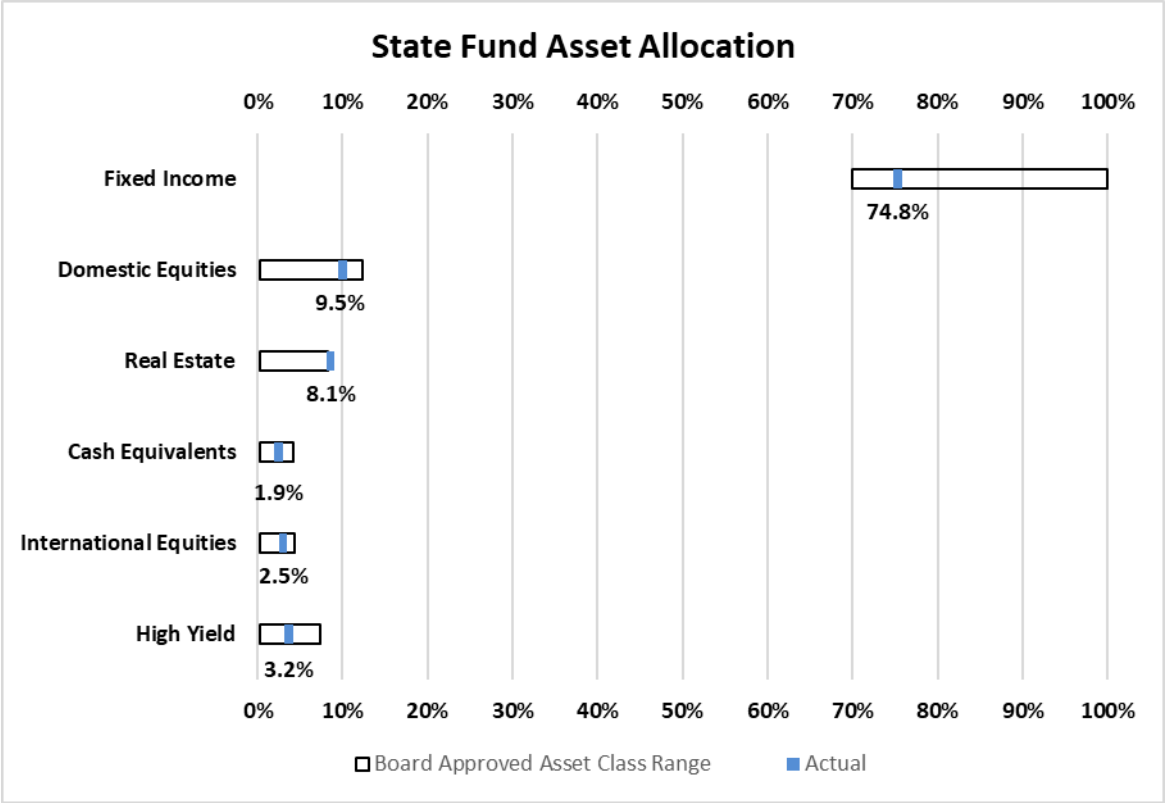
International Equity – Active Managers Net Performance



International Equity – Active Managers Net Performance

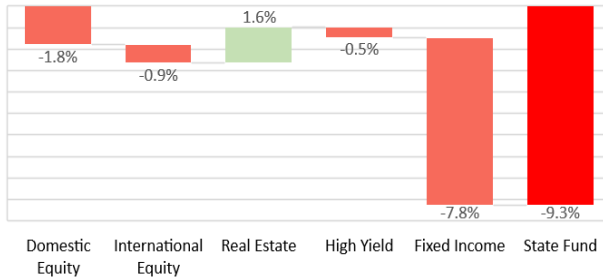


State Fund Policy

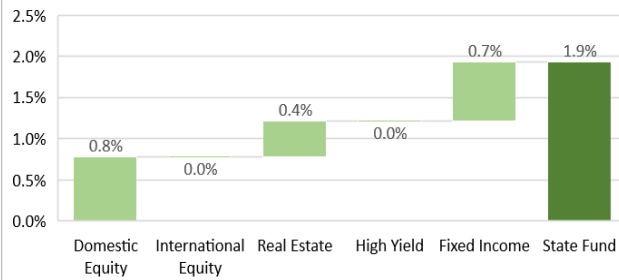


State Fund Performance

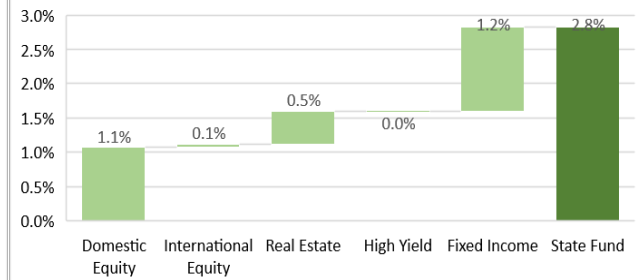
1 Year
Contribution to Total Return



5 Year
Contribution to Total Return

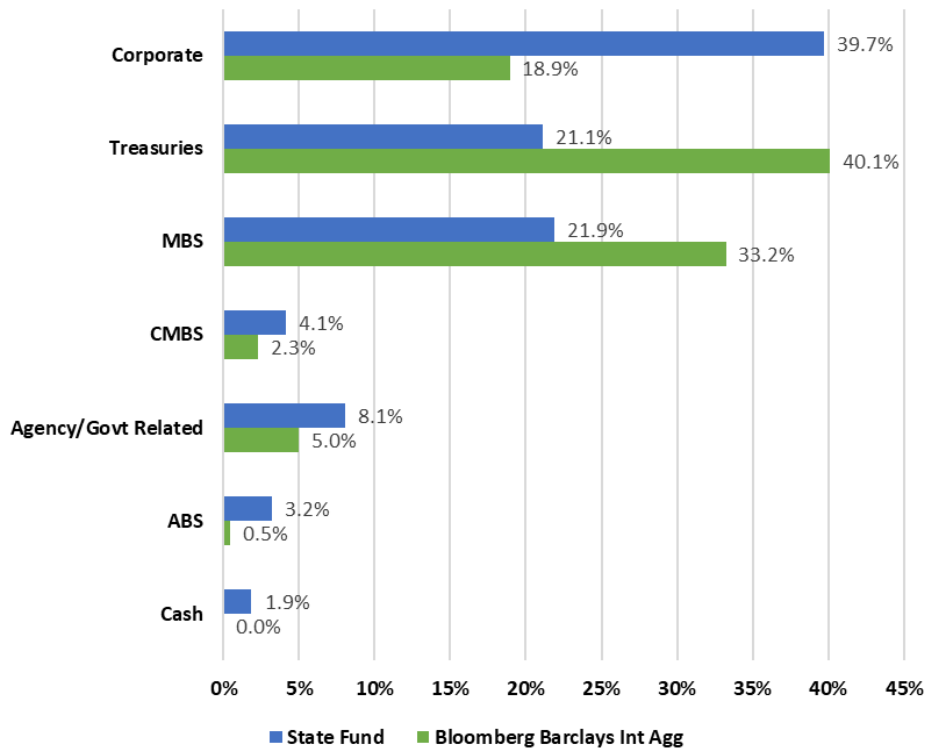


10 Year
Contribution to Total Return

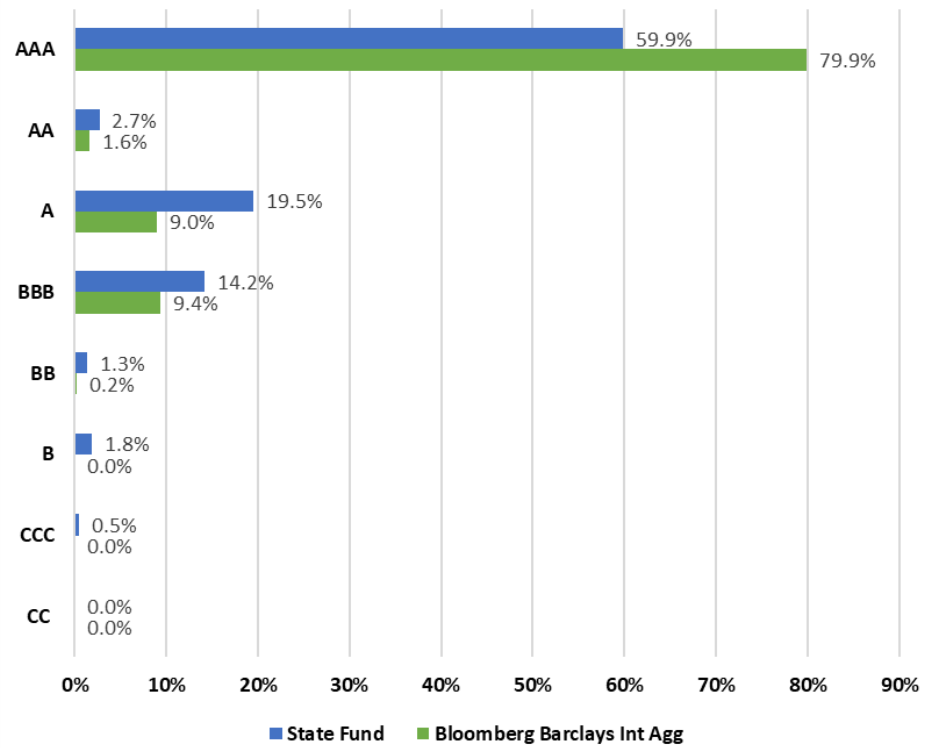


State Fund Investment Pool Characteristics

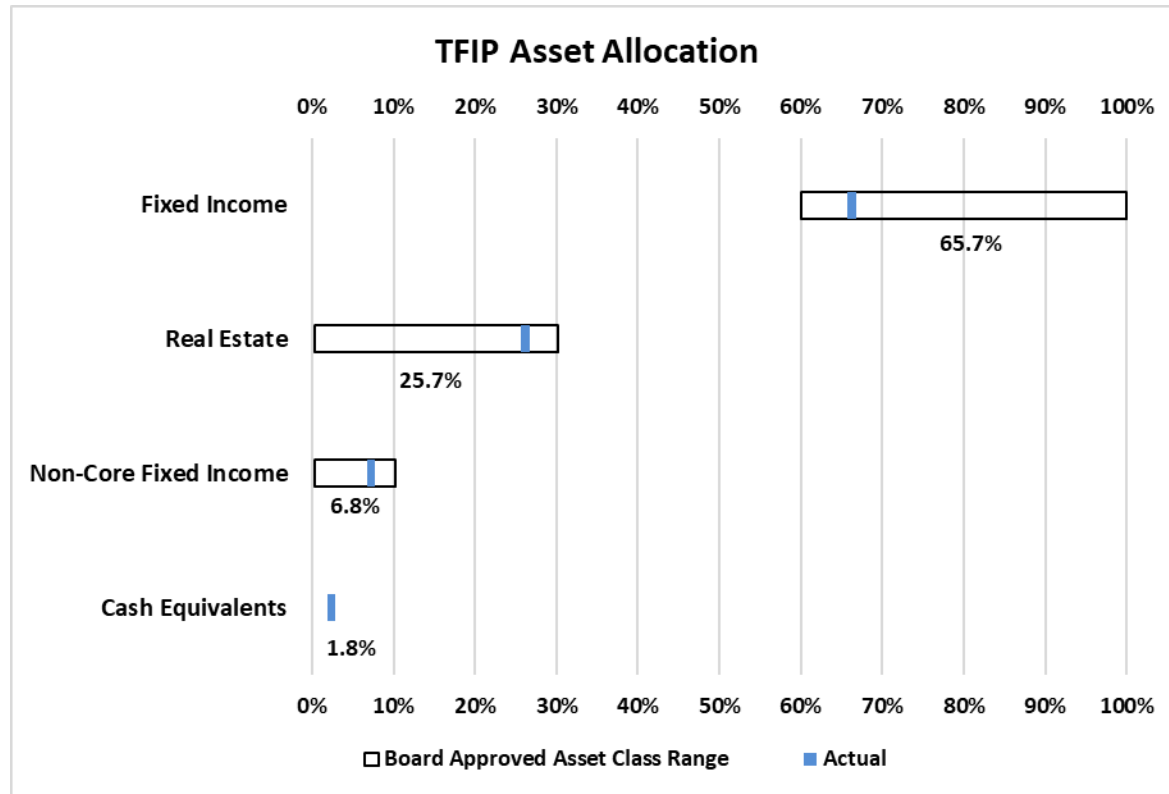
State Fund Bond Portfolio Sector Weights



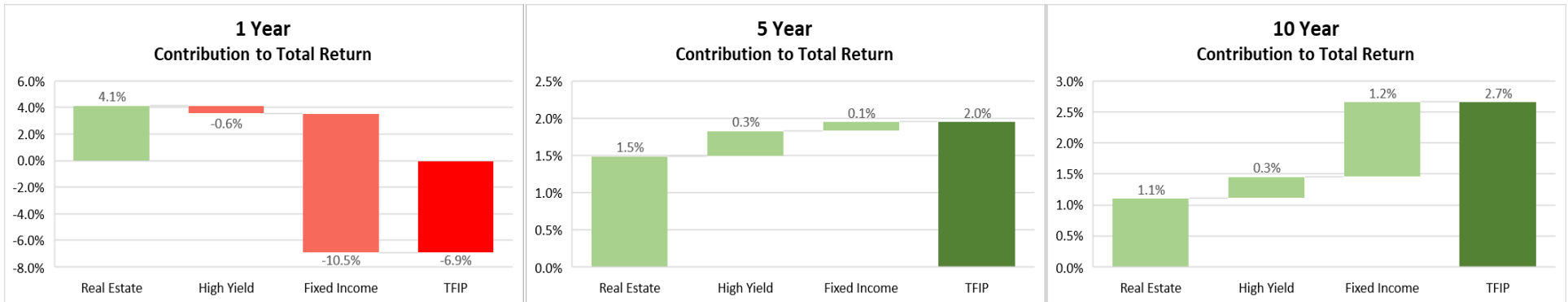
State Fund Bond Portfolio Credit Quality



Trust Funds Investment Pool Policy

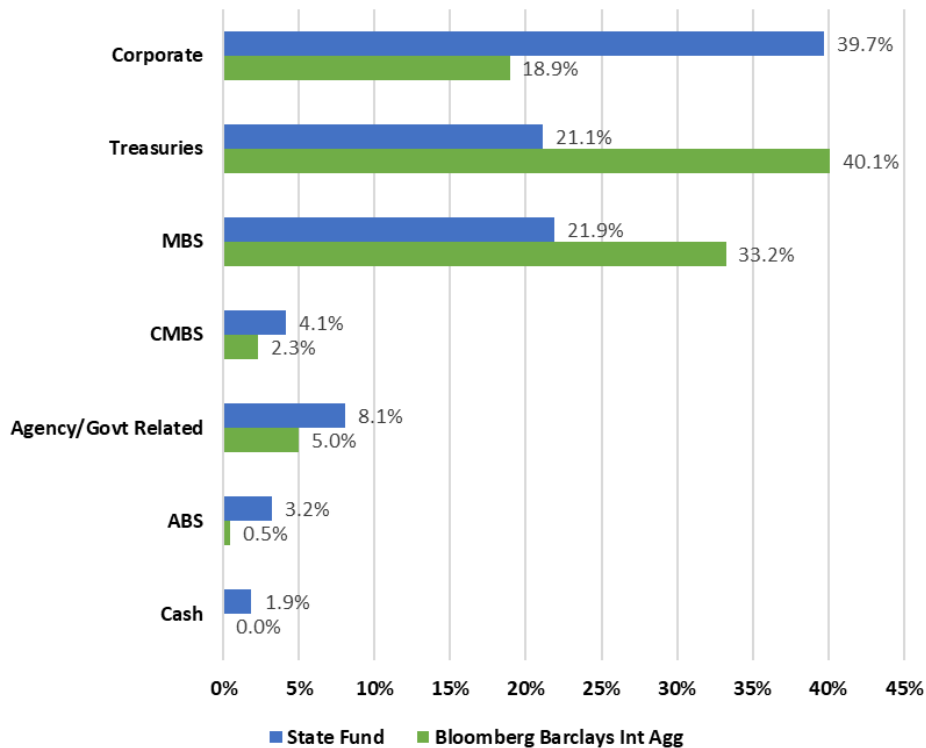


Trust Funds Investment Pool Performance

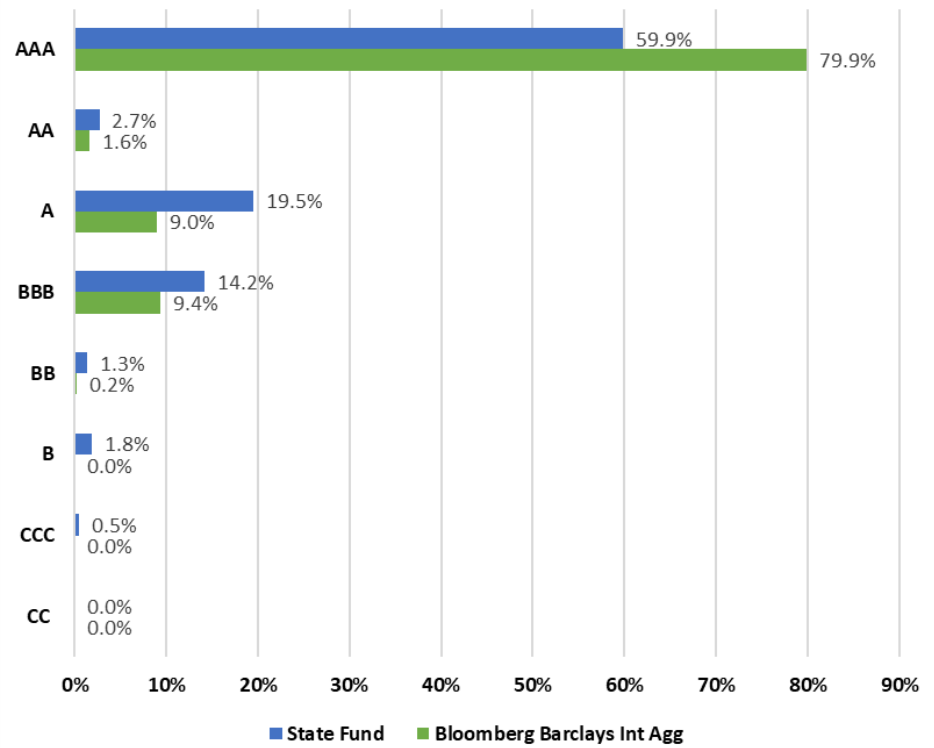


State Fund Investment Pool Characteristics

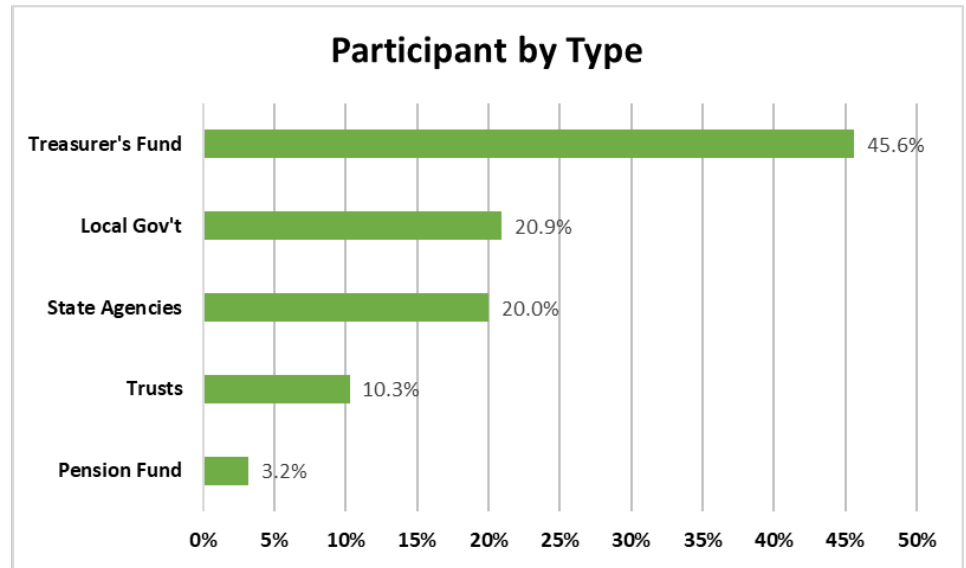
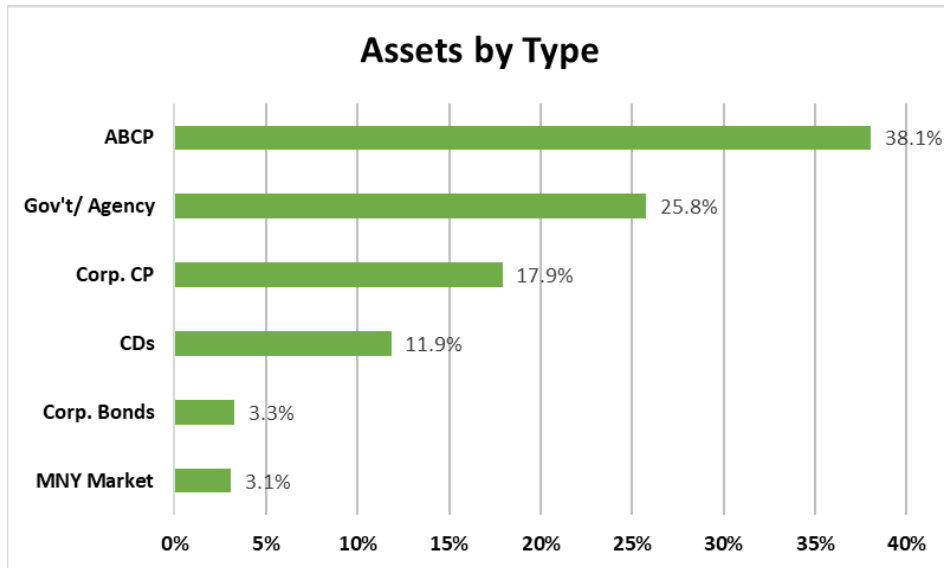
State Fund Bond Portfolio Sector Weights



State Fund Bond Portfolio Credit Quality



Short Term Investment Pool Characteristics



2023 Board of Investments Meetings

JANUARY						
S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

FEBRUARY						
S	M	T	W	T	F	S
			1	2	3	4
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12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28				

MARCH						
S	M	T	W	T	F	S
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12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

APRIL						
S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

MAY						
S	M	T	W	T	F	S
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7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

JUNE						
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11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

JULY						
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2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

AUGUST						
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13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

SEPTEMBER						
S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

OCTOBER						
S	M	T	W	T	F	S
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8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

NOVEMBER						
S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

DECEMBER						
S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

[Board Materials Due](#)
[Board Packet Mailing](#)
[Board Meeting Dates](#)

BOI WORK AND EDUCATION PLAN

2022

2023

February 16-17

Education:

Outreach Efforts for the Board - In-State Loan and INTERCAP Programs
Short Term Investment Pool

Reports:

Ethics Policy
Disaster Recovery and Emergency Preparedness
Quarterly Reports
In-State Loan Reports
INTERCAP Reports

Committee Meetings:

Audit: Financial Audit Report

April 20

Education:

Domestic Equity Asset Class Review
RVK Annual Capital Market Assumptions

Reports:

Benchmarks Used by the Board

May 25-26

Education:

MT Buildings (Board as Landlord/Tenant Holdings)
Investment Policy Statement Review
Real Estate Asset Class Review

Reports:

Budget Status FYTD
Quarterly Reports
In-State Loan Reports
INTERCAP Reports

Committee Meetings:

Audit: Accounting Staff Review
HR: Staffing Level Review
HR: Exempt Staff Compensation Review

August 3-4

Education:

Core Fixed Income Asset Class Review
Budget Proposal for FY24-25

Reports:

Proxy Voting
Budget Status Prior FY
Quarterly Reports
In-State Loan Reports
INTERCAP Reports

Committee Meetings:

Audit: SOC I, Type 2 Report

October 26-27

Education:

Separate Accounts Investment Review
First Reading - Asset Allocation Range Recommendation

Reports:

CEM, Inc Cost Reporting Analysis

Committee Meetings:

HR: Exempt Staff Performance Review

December 6-7

Education:

2023 Legislative Session
Policy 217 - Reauthorization of Investment Vendors
Adoption - Asset Allocation Range Approval

Reports:

Quarterly Reports
In-State Loan Reports
INTERCAP Reports

Committee Meetings:

Audit: Annual Report and Financial Statements

February 22-23

Education:

Cash Management of State Monies
Custodial Banking Relationship and Continuity

Reports:

Ethics Policy
Disaster Recovery and Emergency Preparedness
Quarterly Reports
In-State Loan Reports
INTERCAP Reports

Committee Meetings:

Audit: Financial Compliance Audit Report

April 12

Education:

International Equities Asset Class Review
RVK Annual Capital Market Assumptions

Reports:

Benchmarks Used by the Board

May 24-25

Education:

State Government Customer Relationships
Investment Policy Statement Review
Real Assets Asset Class Review

Reports:

Budget Status FYTD
Quarterly Reports
In-State Loan Reports
INTERCAP Reports

Committee Meetings:

Audit: Accounting Staff Review
HR: Staffing Level Review
HR: Exempt Staff Performance and Compensation Review

August 23-24

Education:

Trust Funds Investment Review
Non-Core Fixed Income Asset Class Review

Reports:

Budget Status Prior FY
Quarterly Reports
In-State Loan Reports
INTERCAP Reports

Committee Meetings:

Audit: SOC I, Type 2 Report

October 11

Education:

Private Investments Asset Class Review
First Reading - Asset Allocation Range Recommendation

Reports:

Securities Lending

Committee Meetings:

HR: Exempt Staff Performance Review

December 13-14

Education:

MPERA and TRS Relationship
Policy 217 - Reauthorization of Investment Vendors
Adoption - Asset Allocation Range Approval

Reports:

Quarterly Reports
In-State Loan Reports
INTERCAP Reports

Committee Meetings:

Audit: Annual Report and Financial Statements

MONTANA BOARD OF INVESTMENTS ACRONYM INDEX

ACH.....	Automated Clearing House
ADV.....	Uniform Application for Investment Adviser Registration and Report by Exempt Reporting Advisor
AUM.....	Assets Under Management
ADR.....	American Depository Receipts
AOF.....	All Other Funds
ARC.....	Actuarially Required Contribution
BOI.....	Board of Investments
CAPP.....	Consolidated Asset Pension Pool
CFA.....	Chartered Financial Analyst
EM.....	Emerging Market
FOIA.....	Freedom of Information Act
FWP.....	Fish Wildlife and Parks
FX.....	Foreign Exchange
IPS.....	Investment Policy Statement
IRP.....	Intermediary Relending Program
LDI.....	Liability-Driven Investing
MBOH.....	Montana Board of Housing
MBOI.....	Montana Board of Investments
MDEP.....	Montana Domestic Equity Pool
MLP.....	Master Limited Partnership
MFFA.....	Montana Facility Finance Authority
MPEP.....	Montana Private Equity Pool
MPT.....	Modern Portfolio Theory
MSTA.....	Montana Science and Technology Alliance
MTIP.....	Montana International Pool

MTRP Montana Real Estate Pool

MTSBA Montana School Boards Association

MVO Mean-Variance Optimization

NAV Net Asset Value

PERS Public Employees' Retirement System

PFL Partnership Focus List

QZAB Qualified Zone Academy Bonds

QSCB Qualified School Construction Bonds

RFBP Retirement Funds Bond Pool

RFP Request for Proposal

SABHRS Statewide Accounting Budgeting and Human Resource System

SLQT Securities Lending Quality Trust

SOC1 Service Organization Controls 1 (Audit)

SSBCI State Small Business Credit Initiative

STIP Short Term Investment Pool

TFBP Trust Funds Bond Pool

TFIP Trust Funds Investment Pool

TIF Tax Increment Financing

TIFD Tax Increment Financing District

TRS Teachers' Retirement System

TUCS Trust Universe Comparison Service

UIP Unified Investment Program

VIX Volatility Index

ASSET CLASS ACRONYMS

DEPAC	Domestic Equity Pension Asset Class
IEPAC	International Equity Pension Asset Class
PEPAC	Private Equity Pension Asset Class
NRPAC	National Resources Pension Asset Class
REPAC	Real Estate Pension Asset Class
TIPAC	TIPS Pension Asset Class
BFPAC.....	Broad Fixed Income Pension Asset Class
USPAC	UST/AGY Pension Asset Class
IGPAC	Investment Grade Corp Pension Asset Class
MBPAC.....	MBS Pension Asset Class
HYPAC	High Yield Pension Asset Class
DSPAC	Diversified Strategies Pension Asset Class
CPAC.....	Cash Pension Asset Class

BOI TERMINOLOGY

ACTIVE MANAGEMENT (typically with respect to stocks)

Investment method which involves hiring a manager to research securities and actively make investment decisions to buy and sell securities in an effort to outperform an assigned index, rather than purchasing a portfolio of securities that would simply replicate the index holdings (*'passive'* investing).

ACTUARIAL ASSUMED RATE (pension concept)

The investment return rate used by actuaries that enables them to project the investment growth of retirement system assets into the future (typically perpetual).

ACTUARIAL FUNDING STATUS (pension concept)

A measurement made by actuaries to measure a pension system's financial soundness (ratio of actuarial liabilities to the actuarial value of the assets available to pay the liabilities).

ALPHA (investment term)

Return on an investment portfolio in excess of the market return or benchmark return; generally used in the context of *'active'* management (as passive management, by definition, does not seek excess returns, or *'alpha'*).

ALTERNATIVE INVESTMENTS

A wide range of investments, other than traditional assets such as publicly traded stocks and bonds. The most common nontraditional or alternative investments are private equity, real estate, commodities, and hedge funds.

ARBITRAGE (bond program)

A structural or systematic difference between investment types which may allow profiting from the *'difference,'* i.e., arbitrage. The most common context for the use of *'arbitrage'* at the BOI is the federal law that prevents *'arbitrage,'* i.e., the profiting of investing tax-exempt securities (e.g., INTERCAP) into taxable yields investments (such as U.S. Treasuries).

ASSET ALLOCATION AND ASSET ALLOCATION RANGE (general investment principle)

The Board's invested assets are divided or allocated into various asset classes such as stocks and bonds, each with its own characteristics, with the objective of attaining an optimal mix of risk and return. The total expected return of a portfolio is primarily determined by the mix or allocation to its underlying assets classes. Given the importance of *'asset allocation,'* the BOI Board sets the asset allocation *'range'* for each broad investment type or asset class.

ASSET-BACKED SECURITY

Bonds or notes backed by loan paper or accounts receivable originated by banks, credit card companies, or other providers of credit. Not mortgages.

AVERAGE LIFE (fixed income, particularly bonds)

The average time period the debt is expected to be outstanding. This is typically the maturity date for a traditional bond structure; however, it will be shorter for bonds having a sinking fund or amortizing payment structure.

BANKER'S ACCEPTANCE

A short-term credit investment which is created by a non-financial firm and whose payment is guaranteed by a bank. Often used in importing and exporting, and as a discount money market fund investment.

BARCLAY'S AGGREGATE INDEX (fixed income)

A composite of outstanding bond issues, including corporate, structured, and government bonds whose overall investment features such as return and investment type are tracked over many years. This is the most common benchmark used for comparing the performance of a portfolio that invests in U.S. investment grade fixed income securities. Formerly known as the Lehman Aggregate bond index.

BASIS POINTS (investment jargon)

A basis point is 1/100th of a percentage. Ten basis points is one tenth of a percent, typically written as 10 bps.

BENCHMARK (standard investment concept)

The concept of employing a particular independent or market investment return as a measurement to judge an investment portfolio's return; typically chosen investment benchmarks have the following attributes: they are investible, quantifiable, chosen in advance, easily understandable, and have a long history; common examples are the S & P 500 Index and the Barclay's Aggregate Index.

BETA (investment jargon)

A measure of the risk (or volatility) of a security or a portfolio in comparison to the market as a whole. If the stock or portfolio moves identically to that market, its beta value is 1; if its price volatility (or movement) is greater than that market's price volatility, it is said to have beta greater than 1.

CAP, AS IN LARGE 'CAP' (generally for stocks, e.g., public equities)

'Cap' is short for capitalization, as a reference to the market value of a publicly-traded company. The current stock price times the total shares outstanding of the company equals its market capitalization or market 'cap'; often used contextually such as 'large-cap,' 'mid-cap,' and 'small-cap' for different sized public companies.

CERTIFICATE OF DEPOSIT (CD):

A short-or medium-term, interest-bearing deposit obligation offered by banks and savings and loans. These may include "Yankee CDs" which are CDs issued by foreign banks or their U.S. affiliates in the U.S. which are denominated in U.S. dollars

CLAWBACK (private equity)

A clause in the agreement between the general partner and the limited partners of a private equity fund. The clawback gives limited partners the right to reclaim a portion of distributions to a general partner for profitable investments based on significant losses from later investments in a portfolio which ultimately resulted in the general partner receiving more distributions than it was legally entitled to.

COMMERCIAL PAPER

An unsecured obligation issued by a corporation or bank to finance its short-term credit needs, such as accounts receivable and inventory. Maturities typically range from two (2) to two hundred seventy (270) days. Commercial paper is available in a wide range of denominations, can be either discounted or interest-bearing, and usually a limited or nonexistent secondary market. Commercial paper is usually issued by companies with high credit ratings, meaning that the investment is almost always relatively low risk.

CORE (context varies for equity, fixed income, real estate)

In equity and fixed income, 'core' refers to investments that are generally always found in the portfolio and normally expect to hold for a very long time e.g. 'core' holdings of the largest U.S. companies, or U.S. treasuries; in real estate, 'core' generally refers to the best quality of real estate holdings such as prime commercial property in major metropolitan cities that have low leverage and low levels of vacancy.

CORPORATE NOTE

A type of unsecured debt issued by a corporation that may be longer-term than Commercial Paper, but shorter-term than a typical Corporate Bond.

CORRELATION (common statistical concept)

A measure of how two or more investment values or two asset classes move relative to each other during the same time period. A central concept in portfolio construction is to seek investments whose values do not move *together* at the same time, i.e., are uncorrelated. A correlation of 1 means that two or more investments 'move' precisely together.

CREDIT ENHANCEMENT (bond program)

At BOI, the term generally refers to credit support or a bond or loan guarantee. For example, the Board's INTERCAP bonds are 'enhanced' by the BOI's performance guarantee bringing down the yearly interest rate.

CUSTOM BENCHMARK (or sometimes custom index)

A way to measure investment performance using a tailor-made measurement versus a generic industry-standard benchmark. At the BOI, total pension performance is measured against the Board's 'custom index' or 'custom benchmark' which is a weighted blend of all the underlying asset class benchmarks used to measure the asset class returns.

DERIVATIVES (investment jargon)

Investment securities whose performance itself depends (or is 'derived') from another underlying investment return. Examples include stock options, puts/calls, and forward currency contracts whose returns are based on the underlying stock or currency.

DEVELOPED MARKETS (equity)

Countries having a long period of stable industrialization; or are the most economically developed.

DISCOUNT (fixed income, generally)

Used most often with respect to bonds, the price paid that is less than face (or 'par') value. A \$1 million face-value of a bond purchased for less than a million is bought at a 'discount.' Described as the difference between a bond's current market price and its face or redemption value.

DIVERSIFICATION (standard investment concept)

The concept of spreading risk by putting assets in several investment categories, each having different attributes with respect to type, expected return, risk, and correlation, to best protect against the risk of loss.

DURATION (bonds)

Almost exclusively used when discussing fixed income bonds, a measurement of how sensitive a bond's change in price is to a change in general market interest rates, expressed in years (specifically calculated as a weighted average term to maturity of the bond's cash flows). The greater the duration of a bond, the greater the volatility of price for changes in market interest rates.

EFFICIENCY (usually when discussing various stock markets)

Used to describe markets where it is very difficult to achieve return in excess of that of the overall market from individual stock selection. When information is widely available on a company and its securities are traded regularly the market is considered 'efficient.'

EMERGING MARKETS (most often for public equities)

Certain international securities markets that are typically small, new, have low turnover, and are located in countries where below-average income prevails and is developing in response to the spread of capitalism.

ENHANCED (pertaining to stocks)

Generally linked with 'index' as in enhanced index, an indexed investment management style that has been modified to include the portfolio manager's idea of how to outperform the index by omitting some stocks in the index and overweighting others in a limited manner designed to enhance returns but at minimal risk.

EXCESS RETURNS (standard investment concept)

Returns are 'excess' if they are more than the market or more than the benchmark they are measured against.

EXEMPT STAFF VS. CLASSIFIED STAFF (specific to Montana state government)

"Exempt" refers to the Board's eleven employees who, under state law, do not fall under the state's standard employment rules (the 'classified' staff).

FIDUCIARY (from the Latin verb, *fidere*, to trust)

The concept of trust and watchfulness; a fiduciary is charged with the responsibility of investing the money wisely for the beneficiary's benefit. Board members are the ultimate 'fiduciaries' for the Board's assets and are obligated to be a good agent.

FTE (state government jargon)

An acronym in state government: "full time equivalent" as in full time employee. The concept is a slot or position, not the actual individuals. The BOI is currently authorized for 32 FTE's.

FUND OF FUNDS (private equity)

A concept used in alternative investments referring to using an investment manager to invest in **other** managers or funds, as opposed to making direct investments in funds.

GAAP/GASB (accounting terminology)

GAAP...Generally Accepted Accounting Principles; Montana state law uses GAAP accounting principles unless specifically allowed otherwise. GASB...Government Accounting Standards Board, the board that sets GAAP standards for U.S. governments (FASB...Financial Accounting Standards Board, the entity for commercial and business accounting standards).

GENERAL OBLIGATION (municipal finance term)

Used to describe the promise that a government makes to bond holders, backed by taxing and further borrowing power, it is generally considered the highest level of commitment to bondholders. At the local government level, general obligation bonds typically require a vote of the residents.

GENERAL PARTNER VS. LIMITED PARTNER (private equity)

In private equity, the general partner is responsible for the operations of the partnership and makes the actual underlying investment decisions; the limited partner is the investor, and therefore has limited liability for investment decisions; the BOI is the 'limited' partner in its private equity fund investments (and real estate funds as well).

GROWTH (as to style public equities)

An investment style that more heavily invests in companies whose earnings are expected to grow at an above average rate to the market. A growth stock usually does not pay a dividend, as the company would prefer to reinvest retained earnings in capital projects to grow the company (vs. 'value,' which considers buying established companies they feel are trading at bargain prices to the fundamental analysis of the company's financial statements and internal competitive factors).

INDENTURE (bond and loan programs)

The central document describing the contract between investors and the borrower or user of the proceeds. The Board's INTERCAP program is structured around a bond indenture.

HEDGE FUND (as defined by Investopedia)

An aggressively managed portfolio of investments that uses advanced investment strategies such as *leverage*, long, short and *derivative* positions in both domestic and international markets with the goal of generating high returns (either in an absolute sense or over a specified market *benchmark*).

HURDLE RATE (private equity)

a minimum return per annum that must be generated for limited partners of a private equity fund before the general partner can begin receiving a percentage of profits from investments.

INDEX (investment concept)

Typically, a single measure of a broadly-based group of investments that can be used to judge or be compared to the return performance of an individual investment or manager.

INDEXING (investment concept)

Typically refers to investing in a portfolio to match a broad range of investments that are set within a pre-determined grouping, such as the S&P 500, so as to match its performance; such investing is generally labeled 'passive' or indexed investing; or buying shares in an Index Fund.

IN-STATE LOAN PROGRAM (Montana-specific)

Programs that are funded by the state's coal severance tax monies.

INTERNAL SERVICE VS. ENTERPRISE FUND (state accounting concept)

Within Montana state government: a program whose funding is dependent on **mandatory participation** by another state government program is labeled an 'internal' service fund; a program whose funding is dependent on voluntary participation is labeled an enterprise fund. At BOI, the investment program is an internal service fund because participation is not voluntary; the Board's bond and loan programs, because their use is voluntary, are accounted for as an enterprise.

INVESTMENT GRADE (bonds)

Bond ratings from Moody's, Standard and Poor's, and Fitch high enough to be considered secure enough for most investors (bonds rated AAA – BBB). Below investment-grade bonds (below BBB) are generally considered to have a more speculative outlook and carry more risk of default.

IRR (private equity)

A measure of investment performance, short for 'internal rate of return,' expressed as a percentage (the 'internal rate of return' number, or discount rate) that mathematically will equalize the total future cash flows of an investment to the initial cash outflow of the investment, the concept accounts for the time value of money.

LEVERAGE (investment concept)

As an investment concept, a way to increase a return on an investment through a combination of one's own money and by borrowing additional money to enhance such an investment; high 'leverage' is also associated with high risk.

LINK DEPOSIT

The Link Deposit program can provide a financial institution a long-term fixed rate funding source "linked" to a specific loan. The State of Montana provides the financial institution funding in the form of a deposit through the Montana Board of Investments using coal tax funds.

MASTER LIMITED PARTNERSHIP

An investment structure that combines the tax benefits of a limited partnership with the liquidity of a common stock. While an MLP has a partnership structure, it issues shares that trade on an exchange like common stock. MLPs are often broadly associated with energy companies operating in midstream services.

MEAN VARIANCE OPTIMIZATION MODEL ('Modern Portfolio Theory')

A theory that it is possible to construct a portfolio to maximize the return for the least amount of risk or volatility. This theory is based on various asset types and their level of expected return, risk (volatility) and their correlation with each other or how the asset values move with each other. The central idea of the model is to blend investments so that in total, they provide both the best expected return and optimal amount of diversification to minimize deep performance swings (volatility); a central tenant is that long term historical returns are indicative of future returns.

MEZZANINE FINANCE (private equity)

Subordinated debt with an equity 'kicker' or ability to share in the equity value of the company. It is typically lower quality because it is generally subordinated to debt provided by senior lenders such as banks, thus is considered higher risk.

MULTIPLE (as in "multiple" of invested capital, private equity)

The ratio of total cash returned over the life of the investment plus the investment's residual value over the total cash expended in making the investment. A multiple of 2 means, regardless of the total investment time period, that total cash returned was twice the cash invested.

130/30 STRATEGY (public equities)

Also called 'partial long short,' this strategy involves the establishment of a short position in select stocks while taking the proceeds of those shorts and buying additional long positions in stocks. The net effect is an overall market position that is 100% long, but the active decisions on individual stock selections are amplified by this ability to short. If the stock selections are successful, the strategy enables the portfolio to profit more than if a stock had simply not been owned, as with traditional long-only portfolios.

OPPORTUNISTIC (real estate)

In real estate, a euphemism for the most risky real estate investments, typically distressed, raw land, newly developed buildings or other high risk investments in the real estate sector, (versus, 'core,' which are the best quality fully leased commercial properties).

OVERWEIGHT OR UNDERWEIGHT (investment concept)

Generally, the level of holdings of a certain type of investment that is above or below either a benchmark's weight (portion of total investment), or the percentage held of a particular asset class compared to the Board's asset allocation policy weight. Also used to describe an external investment manager's decision to have more (or less) of a particular investment than the percentage or weighting found in the benchmark.

P/E RATIO (equity)

The price of a publicly traded stock divided by its estimated or actual earnings is the price/earnings or P/E ratio. This can also be calculated for a stock index or portfolio of stocks. Over the last 100 years, the S&P 500 has had an overall P/E ratio of about 15, or a total index price of about 15 times the annual earnings of its underlying companies.

PACING STUDY (private equity)

An analysis of the likely timing and amount of the drawdown of committed but yet uninvested monies and the estimated distributions or returns from the funds held in an alternative investment portfolio, generally used to judge the future size of the portfolio and its potential liquidity needs, i.e., cash funding demands.

PAR (fixed income)

The initial principal amount designated by the issuer of the bond, or face value of a bond.

PASSIVE

For investments, generally not materially participating in an investment decision, meaning an investment portfolio whose returns follows that of a broad market index, such as an investable stock index, i.e. the S & P 500.

PASSIVE MANAGEMENT OR PASSIVE INVESTMENT (most often in public equities, but not exclusively)

An investment style where a fund's portfolio mirrors a market index, such as the S&P 500, with limited selection decisions by the manager, resulting in market returns. Passive management is the opposite of active management in which a fund's manager attempts to beat the market with various investment strategies and buy/sell decisions of a portfolio of securities to enhance returns.

PASSIVE WEIGHT (generally equities)

The percentage of a stock held in a particular index portfolio, or percentage of an overall asset class that is held in passive portfolios.

POLICY PORTFOLIO

A fixed-target asset allocation, as opposed to asset allocation ranges, which theoretically allows gauging whether deviations from the target portfolio had a positive or negative impact on overall performance.

PORTABLE ALPHA (public equities)

An investment strategy which involves the active selection of securities while neutralizing overall beta or market risk. This often involves the use of derivative investments such as futures to replicate the market return, either taking a short or long position, while then selecting securities which are expected to add return in an absolute sense or in addition to the market return. As an example, this strategy can be found with certain hedge funds where a market exposure is shorted while individual securities such as specific stocks are purchased that are expected to outperform the general market. The concept of portable applies when the ability to generate positive alpha can be overlaid or ported onto a portfolio. This is not a strategy employed by any of MBOI's existing managers.

PREMIUM (fixed income)

Most often the amount paid over the stated face amount (often called 'par') of a bond, but also used in other contexts, typically paying more (the premium) than a market price (as in a take-over bid for a company).

PRIVATE ANNUAL WAGE

The private annual wage is determined annually by the Montana Department of Labor & Industry using the average annual employment divided by the total wages.

PROXY (publicly traded companies)

An agent legally authorized to act on behalf of another party. Shareholders not attending a company's annual meeting may choose to vote their shares by proxy by allowing someone else to cast votes on their behalf, but the word 'proxy' is used more frequently colloquially as a 'close approximation.'

PRUDENT EXPERT, PRUDENT PERSON (a central fiduciary concept)

These legal terms have long histories of court-determined standards of care, deriving originally under English common law. The BOI is empowered to operate under the 'prudent expert rule,' which states that the Board shall manage a portfolio:

- a) *with the care, skill, prudence, and diligence, under the circumstances then prevailing, that a prudent man acting in a like capacity and familiar with such matters would use in the conduct of an enterprise of a like character and with like aims;*
- b) *diversify the holdings of each fund within the unified investment program to minimize the risk of loss and to maximize the rate of return unless, under the circumstances, it is clearly prudent not to do so; and*
- c) *discharge the duties solely in the interest of and for the benefit of the funds forming the unified investment program.*

At an 'expert' level; there is more room for accepting risk under the prudent expert rule than the prudent person rule.

REBALANCING (general investment term)

The process of realigning the weightings of the portfolio of assets. Rebalancing involves periodically buying or selling assets in the portfolio to maintain the original desired level of asset allocation and/or to stay within predetermined asset category range; it is part of a disciplined investment approach within modern portfolio theory.

REPURCHASE AGREEMENT

A contract in which the seller of securities, such as Treasury Bills, agrees to buy them back at a specified time and price. May also be called "Repo" or "Buyback." Typically used as a short-term form of collateralized borrowing by a bank or securities dealer.

RESOLUTION (government term)

Generally, a formal and written action by a governmental (or corporate) body that has long term significance and requiring a vote of the governing body. BOI uses 'resolutions' generally only for its most significant and long term actions and/or policies.

REVERSE REPURCHASE AGREEMENT

A purchase of securities with an agreement to resell them at a higher price at a specific future date. The investor essentially borrows money and allows its securities to be held as collateral. Reverse Repurchase Agreements occur most often in government securities or other securities that are highly valued and thus considered a good form of collateral.

SECURITIES LENDING (general investment)

Investments that are temporally borrowed by other investors for a fee; the BOI allows most of its publicly traded investments to be loaned for additional marginal income.

STANDARD DEVIATION (common statistical concept)

A specific statistic that measures the dispersion of returns from the mean over a specific time period to determine the "historical volatility" of returns for a stock, or portfolio, or asset class; more specifically a single unit (i.e., one standard deviation) of dispersion that accounts for approximately 66% of all data around a mean using a 'normal' (or 'uniform' or 'bell-shaped' curve; as opposed to a skewed or asymmetrical) distribution. The standard deviation is used as a gauge for the amount of expected future volatility.

SABHRS (accounting jargon)

Montana state government's State Accounting, Budgeting and Human Resource System; the State's central information management system. BOI investment and other financial data must tie and be reported on this system, which is the official book of record and includes the state's financial statements.

STYLE DRIFT (often in reference to public equity managers, but applicable to other managers, too)

As the name implies, a divergence from an investor's professed investment bias or style or objective.

TRANCHE

A division or portion of a pool or whole; specifically: an issue of bonds derived from a pooling of like obligations (such as securitized mortgage debt) that is differentiated from other issues especially by maturity or rate of return.

TRACKING ERROR (statistical concept in investments)

A measurement of the standard deviation of a portfolio's return versus the return of the benchmark it was attempting to outperform. The concept is often used when discussing investment managers. For example, some styles are expected to have high 'tracking errors,' (e.g., deep 'value' investors who buy companies that may be dogs for years), versus passive managers, whose stock volatility is expected to be very close to their benchmark. Tracking error can either be intentional or unintentional; it can also be regarded as an accepted deviation or contrary to the management agreement. High *unexpected* tracking error is generally a serious concern to be examined and understood.

UNDERWRITER (bond program)

In investments, the agent who buys investments to be resold to the public; at BOI, the investment firms that buy the Board's bonds to be resold to the public.

UNIFIED INVESTMENT PROGRAM (Montana Constitution)

The Program in the State's constitution requiring a central investment program which the legislature has assigned to the BOI.

VALUE (as to style when discussing public equities)

An investment style that focuses on buying established companies that investors believe are undervalued and trading at bargain prices to the fundamental analysis of the company's financial statements and internal competitive factors.

VENTURE CAPITAL (private equity)

A higher-risk/high-return type of investing in startup firms and small businesses with perceived long-term growth potential. Sometimes these are already existing business ventures with limited operating history that need additional management expertise and access to capital. (For start-ups, 'seed capital,' or 'angel investor' are terms differentiating this even higher risk type of investment.)

VOLATILITY (investment jargon)

A statistical measure of the dispersion of returns for a given security or market index. Volatility is typically measured by using the standard deviation of returns from the security or market index. Commonly, the higher the volatility, the riskier the security.

YIELD (general investment, but most often within fixed income)

The amount returned to the investor above the original investment generally expressed as a percentage. Yield can be thought of as the expected return from the combination of interest and price accrual or amortization to maturity (in the case of a bond trading at a discount or premium to par).

YIELD CURVE (fixed income)

A line that plots the prevailing interest rates at a given time for bonds ranging in maturity from as short as three months out to 30 years. When plotted across these various maturities (typically 2, 5, 7, 10 and 30 years), the resultant line is shaped like a curve with generally low interest rates (the yield) for shorter maturities and gradually higher interest rates for longer maturities, because generally investors demand higher interest rates for longer term investments. The yield curve for U.S. Treasury debt is the most common when referring to the prevailing level of interest rates.