Investment Section

Chief Investment Officer's Report

MOSERS
MISSOURI STATE EMPLOYEES' RETIREMENT SYSTEM

PO Box 209, Jefferson City, MO 65102-0209
(573) 632-6100 • (800) 827-1063 | (573) 632-6103 (fax)
mosers@mosers.org (email)
Visit us at 907 Wildwood Drive or www.mosers.org

October 16, 2020

Dear Members,

I am pleased to present the *Investment Section* of the *MOSERS Comprehensive Annual Financial Report* for the fiscal year ended June 30, 2020.

To say the year was a wild ride in the world of investments may be an understatement. Fueled by strong returns in the equity and bond markets, MOSERS' year-to-date portfolio return in late February was up around 8.0%. Then, the COVID-19 pandemic began to take its toll on the markets, with global equities losing 36.0% of their value by mid-March. MOSERS' portfolio was not immune to this: our year-to-date return fell to a low of (9.0)%. Then, from late March through June, our portfolio rallied, eventually ending the year with a return of 5.2% (net of fees and expenses).

Although the losses experienced from late February to mid-March were significant, they were mitigated by the diversifying assets present in the portfolio. Specifically, our meaningful allocation to "safer" assets, such as long duration U.S. Treasuries and U.S. Treasury Inflation Protection Securities (TIPS), shielded our portfolio from greater losses. In addition, the loss in value on "riskier" assets, such as equities and high-yielding instruments, allowed us to invest at opportune prices, boosting the portfolio in the market's second-quarter rally.

The combination of the above led the portfolio to post a one-year return that ranked in the top 1% of all public pension funds with assets greater than $1 billion, according to the Investor Force universe rankings (71 funds in the universe). Other highlights for the year include the following:

- Our one-year return exceeded the policy return (i.e. the return expectation set by the Board) by 3.2%, benefiting the fund by over $250 million.
- The one-year total risk, as measured by standard deviation, for the total fund was less than total fund policy (9.5% vs 11.2%).
- Management fees paid to external managers in fiscal year 2020 were $35.6 million. The amount represented a savings of $5.1 million compared to fiscal year 2019 and was the lowest amount of management fees paid by the fund since fiscal year 2004.

As mentioned in last year's CIO letter, the Board adopted new asset allocations for MOSERS' portfolio in 2018. Compared to recent allocations, this one emphasizes growth investments, such as equities, but is still balanced by significant allocations to safer, diversifying assets such as U.S. Treasuries and U.S. TIPS. In fiscal year 2019, staff began transitioning to this new portfolio and, by the end of fiscal year 2020, had completed 58% of that transition. We expect to complete this transition before the end of the fiscal year 2021.

As a lifetime Missourian, I am honored to play a part in the secured retirement benefits of the fine members of this System. I thank Executive Director Ronda Stegmann and the Board of Trustees for allowing me the opportunity to serve.

Sincerely,

D. Shannon Davidson
Chief Investment Officer

Investment Policy Summary

The investment policy summary serves as a reference point for management of System assets and outlines MOSERS' investment philosophy and practices. Investments within this report are presented on the basis of fair value using a variety of sources such as appraisals, valuations of underlying companies and assets for limited partnerships and commingled funds, and through fair values obtained from the investment custodian.

The purpose of MOSERS' investment program is to ensure that MOSERS' members and beneficiaries receive their benefits at a reasonable and predictable cost to the employers. Plan assets may be invested, reinvested, and managed by MOSERS' investment staff or third-party investment managers, subject to the terms, conditions, and limitations provided by law and contracts, where applicable.

The MOSERS Board of Trustees (the Board), charged with the responsibility for investing the assets of the System in a manner consistent with fiduciary standards set forth in the prudent person rule, has adopted the following objectives and philosophies to guide all investment related decisions.

Investment Objective

- Develop a Real Return Objective (RRO) intended to keep contribution rates at a reasonable level over long periods of time, absent changes in actuarial assumptions.
- Establish an asset allocation policy that is expected to meet the RRO, while minimizing the impact of the portfolio investments' volatility on the contribution rate.
- Maximize long-term investment returns by exposing plan assets to a prudent level of risk in order to support the goal of having sufficient funds available to meet projected benefit payment obligations.
- Monitor costs associated with the efficient implementation of the asset allocation policy through the use of internal and external resources.

Investment Philosophy

- A key risk to the portfolio is asset shortfall where assets are insufficient to meet promised benefit obligations. As a result, the Board will strive to minimize the potential for long-term impact from disproportionate drawdowns.
- MOSERS is willing to take measured risks for which it expects to be compensated, and will seek to avoid risks, which may not be appropriately rewarded.
- The Board will employ a disciplined, objective, and quantitatively-driven asset/liability analysis process with the goal of determining the optimal asset allocation policy to meet the investment objectives.
- In order to meet the RRO, it is necessary for the portfolio to maintain a significant allocation to growth (i.e., equity) assets. As a result, equity risk is expected to be the key contributor to the overall risk of the portfolio's investments (Total Fund). In recognition of this, the Board's asset allocation policy will seek to mitigate the risk from large equity market declines.
- Strategic asset allocation is a significant factor influencing long-term investment performance and asset volatility. The asset allocation targets, determined by the Board, will be adhered to through clearly defined rebalancing guidelines.
- The Board will seek to cause the total fund to be broadly diversified and risk-balanced in view of the fact that not all strategies will add value at all times, which should mitigate the impact of negative market environments over its long-term investment horizon.
- Risk management and performance benchmarking are integral to the investment program. The Board will establish and regularly monitor appropriate absolute and relative return risk as well as other key risks that affect the total fund.
- The Board will employ industry-accepted benchmarks for all major asset classes, using published market indices where feasible.
- Costs meaningfully impact investment returns and will be a consideration in all investment program decisions. Investment performance shall be reported net of fees to incorporate the full impact of fees and costs.

Roles and Responsibilities

Board of Trustees
The Board of Trustees (the Board) bears the ultimate fiduciary responsibility for the investment of System assets. Members of the Board must adhere to state law and prudent standards of diligence with respect to their duties as investment fiduciaries. Accordingly, they are required to discharge their duties in the interest of plan participants. They must also "act with the same care, skill, prudence, and diligence under prevailing circumstances that a prudent person, acting in a similar capacity and familiar with those matters, would use in the conduct of a similar enterprise with similar aims."[1] Specifically related to investments, the Board is responsible for prudent oversight, governance, and management of the System's assets.

Executive Director
The executive director is appointed by, and serves at the pleasure of, the Board. Pursuant to its authority to delegate functions to employees of the System under Section 104.1069, RSMo., the Board of Trustees has delegated to the executive director the responsibility to manage the staff that oversees and executes MOSERS' investment program. The executive director selects, evaluates, and terminates the chief investment officer and is responsible for monitoring the investment program compliance, as established by policies set forth by the Board.

Chief Investment Officer (CIO) and Internal Staff
The CIO serves at the pleasure of the executive director and has primary responsibility for the overall direction of the investment program. The CIO works with the Board investment consultant and executive director in advising the Board on policies related to the investment program. The CIO has primary responsibility to make hiring and termination decisions related to money managers with the approval of the staff investment consultant. The CIO is also charged with the responsibility of making strategic allocation decisions within parameters established by Board policy. Other responsibilities of the CIO include monitoring the investment of System assets, oversight of external money managers and the internally managed portfolios, and keeping the Board apprised of situations that merit their attention. The internal investment staff is accountable to the CIO.

External Consultants
The Board investment consultant serves at the pleasure of the Board. The Board investment consultant's primary duty is to provide the Board with independent and objective investment advice and assist the Board in making decisions and overseeing the investment program. Specifically, the Board investment consultant assists the Board in developing investment policy, recommends asset allocation policy as requested by the Board, and assists the Board in oversight of the investment program.

Staff investment consultants serve at the pleasure of the CIO. The primary responsibilities of the staff investment consultants are to provide independent and objective investment advice to the staff. Among other duties, as applicable, each staff investment consultant agrees in writing to the CIO's proposed hiring or termination of external investment management firms and third-party plan administrators.

Chief Auditor
The chief auditor reports administratively to the executive director and functionally to the Board. The chief auditor is independent of the System's investment operations and, among other duties, is responsible for providing objective audit and review services for investment operations. It is the chief auditor's objective to promote adequate and effective internal controls at a reasonable cost.

Master Custodian
Bank of New York Mellon serves as the master custodian of the System's assets except in cases where investments are held in partnerships, commingled accounts, or unique asset classes where it is impossible for them to do so. The master custodian is responsible for maintaining the official book of records, providing performance reports, and serving as an additional layer of risk control in the safekeeping of System assets.

---

[1] *Section 105.688, RSMo - Investment Fiduciaries, Duties.*

Asset Allocation

Determining the System's asset allocation is one of the most important decisions in the investment management process. The Board, with advice from the Board investment consultant and the CIO, adopted a new portfolio allocation in July 2018 that is designed to provide the highest probability of meeting or exceeding the System's investment objectives at a controlled level of risk and with liquidity that is acceptable to the Board. The Board has adopted a plan to transition from the old portfolio allocation to the new portfolio allocation over a period of time in order to lessen the impact of market volatility. In determining the optimum mix of assets, the Board considers five factors:

- The expected risk of each asset class.
- The expected rate of return for each asset class.
- The correlation between the rates of return of the asset classes.
- The investment objectives and risk constraints of the fund.
- The impact of the portfolio's volatility on the contribution rate.

While the Board maintains a set policy allocation mix, they have taken steps to provide flexibility by granting authority to the CIO to make strategic allocation decisions to capitalize on attractively valued opportunities within prudent risk constraints. This flexibility has allowed the System to take advantage of changing market conditions. The table below illustrates the policy asset allocation and ranges formally adopted by the Board for the old and new portfolio.

Asset Allocation

Old Portfolio - Asset Classes	Risk Allocation Policy	Risk Allocation Ranges[1]	Benchmark[2]	Benchmark Weight
Opportunistic global equity	36%	25% - 47%	MSCI ACWI[3] + .75%	38%
Nominal bonds	24%	17% - 31%	Bloomberg Barclays Long Treasury	44%
Commodities	19%	13% - 25%	Bloomberg Commodity Index (BCOM)[4]	20%
Inflation-protected bonds	8%	5% - 10%	Bloomberg Barclays 1-10 TIPS	39%
Alternative beta	13%	9% - 17%	AQR DELTA[5]	31%

New Portfolio - Asset Classes	Asset Allocation Policy	Asset Allocation Ranges[1]	Benchmark[2]
Total growth	**45%**	**35% - 55%**	**Blended**
Global public equities	30%	15% - 45%	MSCI ASCWI
Global private equities	15%	5% - 20%	Burgiss All Equity Universe (weighted by vintage year)
Total income	**35%**	**30% - 40%**	**Blended**
Long treasuries	25%	20% - 30%	Bloomberg Barclays Long Treasury
Core bonds	10%	5% - 15%	Bloomberg Barclays Aggregate Bond
Total inflation hedge	**40%**	**35% - 45%**	**Blended**
Commodities	5%	0% - 10%	Bloomberg Commodity Index (BCOM)
TIPS	25%	20% - 30%	Bloomberg Barclays 1 - 10 yr TIPS
Private real assets	5%	0% - 10%	NCREIF ODCE
Public real assets	5%	0% - 10%	NAREIT Index
Total alternative beta	**20%**	**15% - 25%**	**Blended**
Hedge funds	5%	0% - 10%	HFRI Fund Weighted Composite Index
Alternative beta	10%	5% - 15%	HRFX Macro/CTA
Private credit	5%	0% - 10%	S&P/LSTA U.S. Leveraged Loan Index + 2%

[1] *The Board has granted the CIO the authority to operate within the risk allocation and policy asset allocation ranges.*

[2] *Benchmarks are net of MOSERS' actual leveraging costs on borrowed assets.*

[3] *Morgan Stanley Capital International All Country World Index (net dividends). Legacy real estate benchmarked to the Dow Jones U.S. REIT Index.*

[4] *Bloomberg Commodity Index*

[5] *A diversified risk-balanced portfolio of liquid hedge fund risk premia managed by AQR Capital net of management fees.*

Rebalancing

It is the responsibility of staff to ensure that the asset allocation adheres to the System's rebalancing policy. MOSERS utilizes a combination of cash market and derivative transactions to maintain the total portfolio's allocation at the broad policy level. Month-end reviews are conducted to bring the portfolio back within allowable ranges of the broad policy targets.

Risk Controls

MOSERS' investment program faces numerous risks; however, the primary risk to MOSERS is that the assets will not support the liabilities over long periods of time. In order to control this risk and numerous other risks that face the System, the Board has taken the following steps, on an ongoing basis, to help protect the System:

- Actuarial valuations are performed each year to ensure the System is on track to meet the funding objectives of the plan. In addition, every five years an external audit of the actuary is conducted to ensure that the assumptions being made and calculation methods being utilized are resulting in properly computed liabilities.
- Asset/liability studies are conducted at least once every five years. The purpose of these studies is to ensure that the current portfolio design is structured to meet the System's liabilities. During these studies, investment expectations are also reexamined in more detail.
- An investment policy statement is in place to ensure that Board policies are clearly identified. Within these documents, desired outcomes are identified, responsibilities for individuals are identified in relation to particular areas of the portfolio's management, and details are provided for measuring outcomes. Reporting requirements are clearly identified to ensure appropriate checks and balances are in place. In addition, annual performance audits are conducted to ensure the performance measurement tools and methodologies being utilized are proper.

Performance Objectives and Monitoring Process

Generating returns net of expenses equaling the RRO (4.75% in fiscal year 2020) plus inflation remains the primary performance objective for the total portfolio.

The reason for the long-term focus on this objective is to preclude the temptation to overreact to events in the marketplace that have no relevance in the management of the relationship between the System's assets and liabilities. The resulting dilemma is the conflicting need to evaluate investment policy implementation decisions over shorter time frames while maintaining the longer-term focus necessary to manage and measure the fund's performance relative to the RRO. To address this problem, the Board evaluates performance relative to policy and strategy benchmarks. This helps to evaluate the Board's broad policy decisions and the staff and external consultant's implementation decisions. Policy benchmarks measure broad investment opportunities of each sub-asset class in which MOSERS has chosen to invest. The strategy benchmarks represent decisions made by the CIO to strategically deviate from the policy asset allocation for each sub-asset class. The return of the strategy benchmarks are determined based upon the actual weight of the asset class multiplied by the appropriate benchmark.

The policy and strategy benchmarks are used in the following manner to evaluate Board and staff decisions:

- **Board Decisions:** The value added through Board policy decisions is measured by the difference between the total fund policy benchmark return and the RRO. This difference captures the value added by the Board through their policy asset allocation decisions relative to the return necessary to fund the System's liabilities. A policy benchmark return greater than the RRO reflects the achievement of the RRO goals. A policy benchmark return less than the RRO reflects losses or shortfalls in performance in funding the liabilities. These policy decisions are measured over long periods of time.

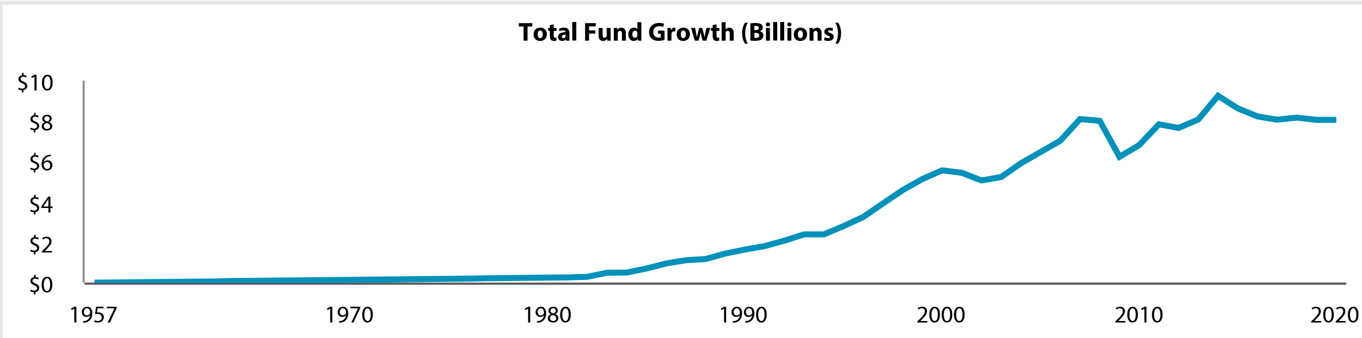
- **CIO and External Consultants' Decisions:** There are two components to decisions made by the CIO and external consultants, which are monitored by the Board on an ongoing basis. They are: 1) strategic allocation decisions, and 2) implementation decisions.

Strategy decisions are made by the CIO to deviate from the policy benchmark weight. The difference between the strategy benchmark return and the policy benchmark return captures the value added by the CIO through strategic decisions to overweight or underweight assets relative to the Board's policy allocation decisions. A strategy benchmark return greater than the policy benchmark return reflects value added through the strategic decisions. A strategy benchmark return less than the policy benchmark return reflects losses to the fund's performance based upon strategy decisions. Strategy decisions should be measured over all periods of time with majority weight placed on outcomes that have occurred over a market cycle. Implementation decisions are money manager selection choices made by the CIO with the approval of the appropriate external consultant that the decision was made in accordance with the Board's adopted policy. The value added through these decisions is measured by the difference between the actual portfolio return and the strategy benchmark return. This difference captures the value added through these external manager selection decisions. An actual portfolio return greater than the strategy benchmark return reflects value added through these external manager selection decisions. An actual portfolio return less than the strategy benchmark return reflects losses to the fund's performance based upon implementation decisions. Implementation decisions should be measured over all periods of time with a majority weight placed on outcomes that have occurred over a market cycle.

The Board reviews performance information on a quarterly basis to help ensure adequate monitoring of the fund's overall performance objectives.

Total Fund Review

As of June 30, 2020, the MOSERS investment portfolio had a fair value of $8.1 billion. The graph below illustrates the growth of MOSERS' portfolio since the System's inception.



Investment Performance

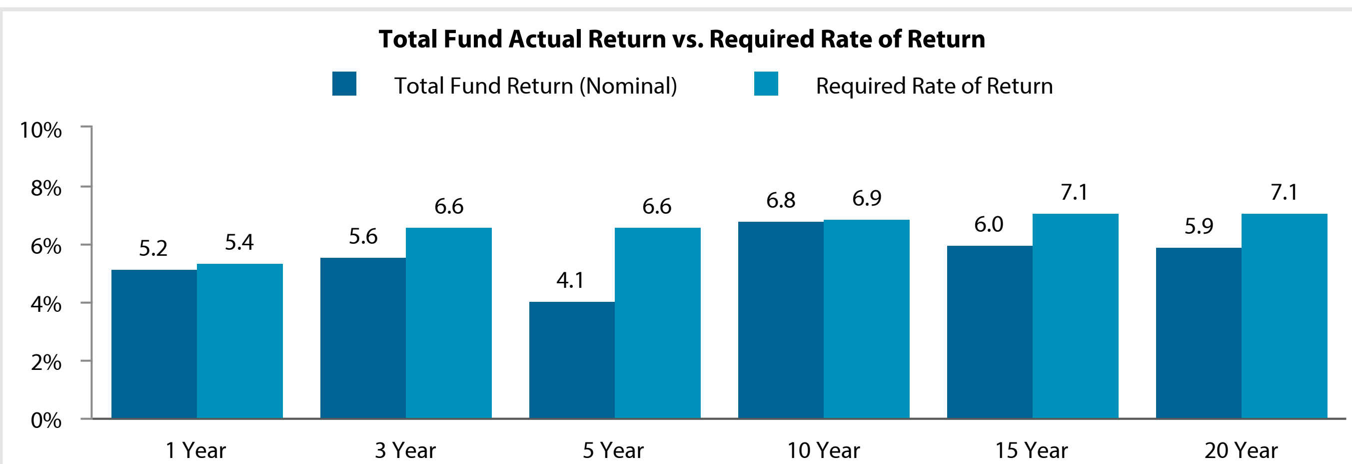
MOSERS' investments generated a time-weighted return of 5.2%, net of fees, for fiscal year 2020. The total fund return exceeded the 1-year policy benchmark of 2.0%. This additional 3.2% investment return produced $251 million over what would have been earned if the fund had been invested passively in the policy benchmark.

Investment Performance vs. Required Rate of Return

The total fund investment return is compared to a required rate of return. The required rate of return is established by the Board to determine how well the fund is performing over the long term in order to meet future plan obligations after accounting for inflation. The required rate of return for fiscal year 2020 is equal to the RRO of 4.75% plus inflation. The best known measure of inflation is the Consumer Price Index (CPI). [1]

Given the volatility of the investment markets, the portfolio should not be expected to meet the required rate of return every year. A review of long periods of time is best to evaluate whether or not the total return has kept pace with the System's funding objectives.

As indicated in the following bar chart, MOSERS' investment returns trailed the required rate of return by 1.2% over the 20-year period ended June 30, 2020. [2]



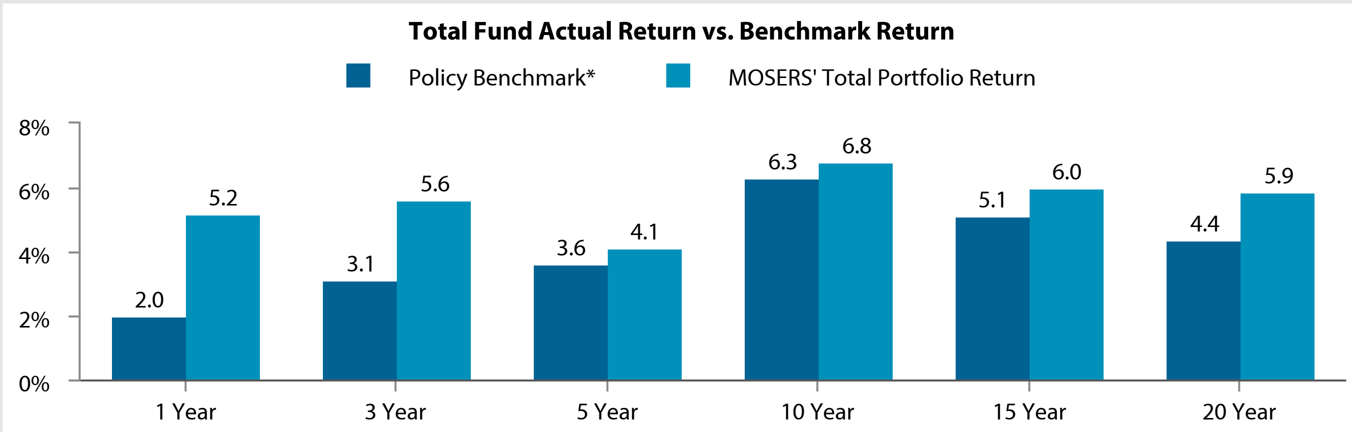
---

[1] *CPI Source: United States Department of Labor, Bureau of Labor Statistics (not seasonally adjusted).*

[2] *Performance returns are calculated using a time-weighted rate of return on fair values.*

Investment Performance vs. Benchmark Comparisons

In addition to measuring performance relative to the required rate of return, the Board also compares fund returns to the policy benchmark. Returns for the total fund versus policy benchmarks are displayed in the following bar chart.



* *As of June 30, 2020, the total fund policy benchmark was comprised of the following components: 44% old portfolio policy benchmark, 56% new portfolio policy benchmark*

- *As of June 30, 2020, the old portfolio policy benchmark was comprised of the following components: 38% total opportunistic global equities policy, 44% total nominal bonds policy, 20% total commodities policy, 39% total inflation-protected bonds policy and 31% total alternative beta policy. This program did not begin until September 2012.*
- *As of June 30, 2020, the new portfolio policy benchmark was comprised of the following components: 45% total growth policy, 35% total income policy, 40% total inflation hedge policy and 20% total alternative betas policy. This program did not begin until January 2019.*
- *All policy return components are adjusted for financing cost associated with programs.*

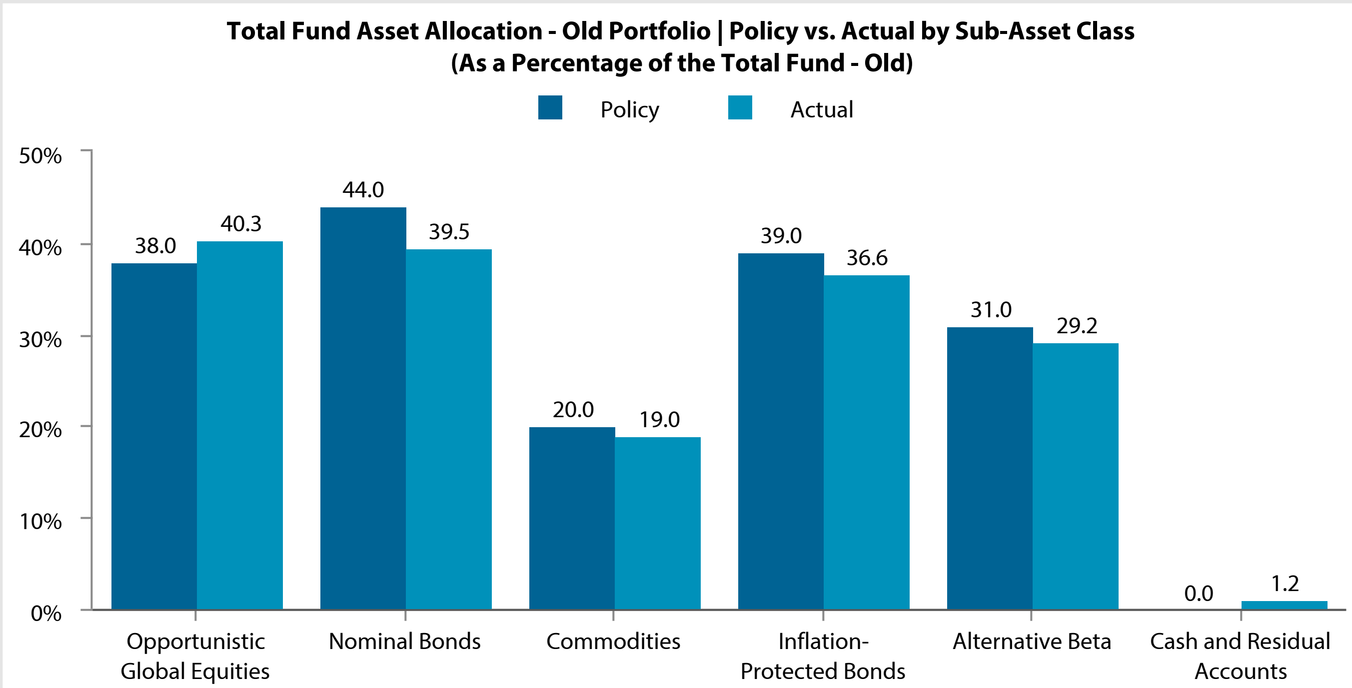
The policy benchmark provides an indication of the returns that could have been achieved (excluding transaction costs) by a portfolio invested in the designated benchmarks for each asset class at the percentage weights allocated to each asset class in MOSERS' policy asset allocation. Comparison of the total return to the policy benchmark reflects the total value added or detracted by the CIO through strategic and manager implementation decisions. Value is added when the total fund return exceeds the policy benchmark return. The total fund 1-, 3-, 5-, 10-, 15-, and 20-year actual performance over performed its policy benchmark by 3.2%, 2.5%, 0.5%, 0.5%, 0.9%, and 1.5%, respectively.

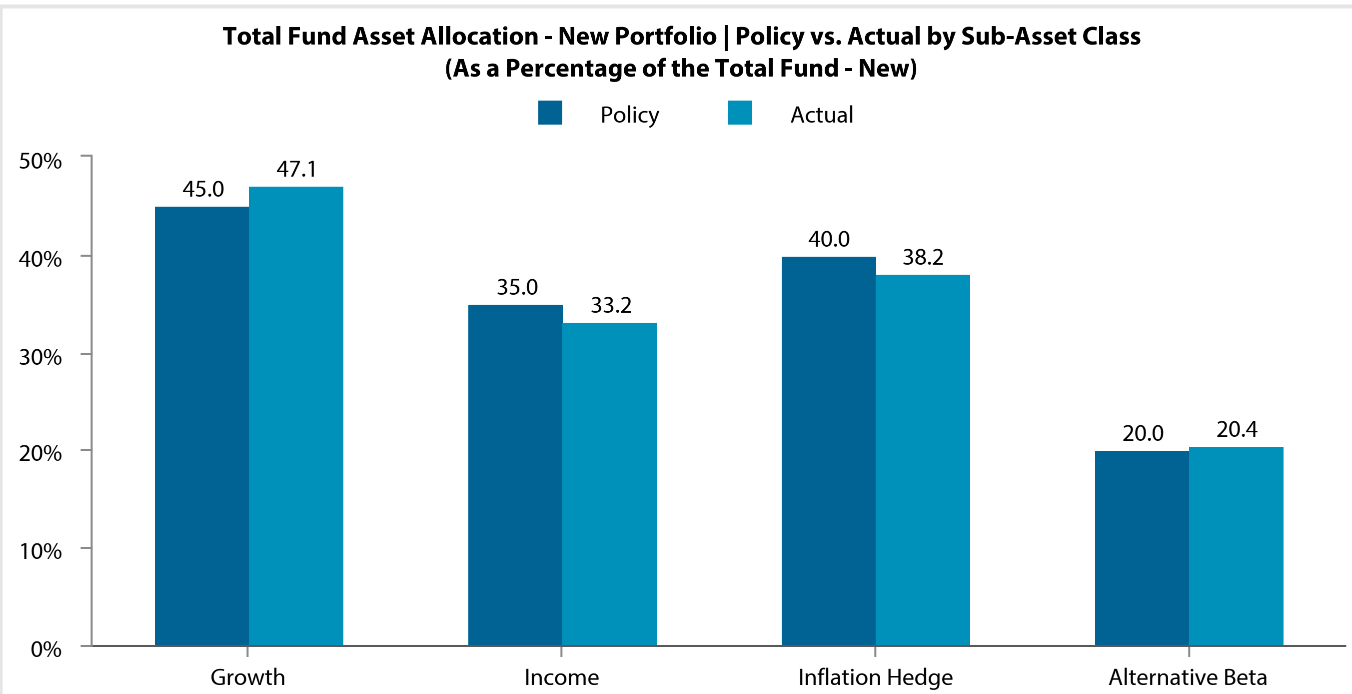
Total Fund Policy Allocation Overview

As of June 30, 2020, the Board's old portfolio policy allocation mix was 38% opportunistic global equities, 44% nominal bonds, 20% commodities, 39% inflation-protected bonds, and 31% alternative beta. As of June 30, 2020, the policy for each sub-asset class, along with the actual strategic allocation to each type of investment, is shown in the bar graph on the following page.

As of June 30, 2020, the Board's new portfolio policy allocation mix was 45% growth assets, 35% income assets, 40% inflation assets, and 20% alternative betas/absolute return assets. The policy target, as of June 30, 2020, for each sub-asset class, along with the actual strategic allocation to each type of investment, is shown in the bar graph on the following page.

The Board has granted authority to the CIO to make strategic decisions. A strategic decision should be thought of as any decision that might cause MOSERS' actual portfolio to differ from the policy asset allocation. This has allowed MOSERS to capitalize on investment opportunities at the margin by overweighting asset classes that are viewed as "cheap" relative to their historical norm and under-weighting asset classes that are "expensive" relative to their historical norm.


Total Fund Asset Allocation - Old Portfolio | Policy vs. Actual by Sub-Asset Class
(As a Percentage of the Total Fund - Old)
Policy
Actual
50%
40%
30%
20%
10%
0%
38.0
40.3
44.0
39.5
20.0
19.0
39.0
36.6
31.0
29.2
0.0
1.2
Opportunistic Global Equities
Nominal Bonds
Commodities
Inflation-Protected Bonds
Alternative Beta
Cash and Residual Accounts


Total Fund Asset Allocation - New Portfolio | Policy vs. Actual by Sub-Asset Class
(As a Percentage of the Total Fund - New)
Policy
Actual
50%
40%
30%
20%
10%
0%
45.0
47.1
35.0
33.2
40.0
38.2
20.0
20.4
Growth
Income
Inflation Hedge
Alternative Beta

Schedule of Brokerage Activity

	Commissions Paid	Volume of Trades*	Shares Traded
B Riley and Co., LLC	$ 8,615	$ 7,276,321	287,525
Baird, Robert W & Co., Inc.	29	155,062	2,850
Barclays Capital, Inc.	24,806	209,914,072	4,958,196
Berstein Sanford C & Co.	805	6,196,966	160,992
BTIG, LLC	56,779	46,328,818	3,188,508
Cantor Fitzgerald & Co.	119	49,377	3,965
Cap Institutional Services, Inc.	61	17,992	2,031
Citigroup Global Markets	2,386	534,933	79,535
CJS Securities, Inc.	273	81,890	6,825
Cowen and Co.	137	621,656	27,401
Credit Suisse	71,603	54,895,007	2,221
Davidson & Co., Inc.	2,122	809,368	53,045
Dougherty & Co., Inc.	1,062	251,992	34,285
Electronic Brokerage Systems	38	369,117	7,609
Goldman Sachs & Co.	116	185,698	4,711
Imperial Capital, LLC	16	2,324	806
Jefferies & Co., Inc.	10,554	87,231,030	2,010,330
JMP Securities	45	15,751	1,131
Jones Trading Institutional Services	93	14,294	4,641
Keefe Bruyette + Woods, Inc.	315	99,680	8,286
Keybanc Capital Markets, Inc.	244	91,382	6,098
Knight Equity Markets, LP	65,991	53,464,517	5,618,603
Ladenburg Thalman & Co.	213	59,172	7,103
Mizuho Securities USA, Inc.	35	168,995	7,023
MKM Partners, LLC	581	161,198	15,700
Morgan Stanley & Co.	429,222	563,248,651	3,296,939
National Financial Services Corporation	481	99,520	17,607
Northland Securities, Inc.	3,489	848,447	117,208
Pershing, LLC	449	27,193	22,445
Piper Sandler Co.	15,479	16,098,911	1,476,051
Raymond James & Associates, Inc.	158	42,945	5,178
RBC Capital Markets, LLC	1,061	5,798,949	207,192
Roth Capital Partners, LLC	600	182,914	18,310
Sidoti and Co., LLC	99	21,543	4,640
Sterne Agee & Leach, Inc.	173	49,430	4,320
Stifel Nicolaus	78	40,881	1,959
UBS Securities, LLC	812	356,153	27,080
Virtu Americas, LLC	25	108,035	5,000
Wedbush Morgan Securities, Inc.	1,344	361,111	43,821
Wells Fargo Securities, LLC	6,587	22,523,099	1,112,240
William Blair & Co.	997	432,477	32,733
Total	$ 708,092	$ 1,079,236,871	22,892,143

* *Volume does not include futures notional value*

Schedule of Investment Portfolios by Asset Class

As of June 30, 2020

	Portfolio Value	Percentage of Investments	Market Exposure	Percentage of Investments at Market Exposure
Old Portfolio - 42% of Total Fund				
Global opportunistic equities	$ 1,105,132,410	33.2%	$ 1,357,937,984	40.8%
Nominal bonds	530,832,018	15.9	1,332,375,801	40.0
Commodities	239,151,989	7.2	642,073,473	19.3
Inflation-protected bonds	472,593,549	14.2	1,232,492,649	37.0
Alternative beta	982,998,813	29.5	982,998,813	29.5
Total old portfolio	3,330,708,779	100.0	5,547,878,720	166.6
New Portfolio - 58% of Total Fund				
Growth	1,776,929,966	38.0	2,206,991,169	47.1
Income	1,013,895,278	21.6	1,556,334,433	33.2
Inflation hedge	937,235,640	20.0	1,791,595,694	38.2
Alternative beta	957,204,230	20.4	955,707,726	20.4
Total new portfolio	4,685,265,114	100.0	6,510,629,022	138.9
Residual accounts from old portfolio	23,273,196	0.3	23,273,196	0.3
Cash reserve	17,301,560	0.2	17,301,560	0.2
MOSERS Total Fund	$ 8,056,548,649	100.0%	$ 12,099,082,498	150.2%

Reconciliation to Statement of Fiduciary Net Position	
Total portfolio value	$ 8,056,548,649
Obligations under repurchase agreements	3,434,907,955
Receivable - investment income	(210,681,256)
Receivable - investment sales	(159,689,135)
Investment activities payable	87,716,970
Management and incentive fee payable	11,729,264
Payable for investments purchased	242,658,443
Investments per *Statement of Fiduciary Net Position*	$ 11,463,190,890

Total Fund – Top Ten Publicly Traded Separate

Ten Largest Holdings as of June 30, 2020*	Fair Value	Percent of the Total Fund
U.S. Treasury Bond - 3.375% 2048	$ 154,414,891	1.92%
U.S. Treasury Bond CPI Inflation - 0.125% 2023	130,209,213	1.62
U.S. Treasury Bond CPI Inflation - 0.125% 2022	124,880,543	1.55
U.S. Treasury Bond CPI Inflation - 0.125% 2024	118,596,242	1.47
U.S. Treasury Bond CPI Inflation - 0.375% 2023	111,320,433	1.38
U.S. Treasury Bond - 2.750% 2047	107,399,438	1.33
U.S. Treasury Bond CPI Inflation - 0.125% 2022	105,168,281	1.31
U.S. Treasury Bond - 2.875% 2043	101,601,938	1.26
U.S. Treasury Bond CPI Inflation - 0.250% 2025	101,522,737	1.26
U.S. Treasury Bond CPI Inflation - 0.625% 2024	100,631,796	1.25

** For a complete list of holdings, contact MOSERS.*

Schedule of Investment Results

1-, 3-, 5-, 10-, 15- and 20-Year Periods

Total Fund – As of June 30, 2020, the total fund policy benchmark was comprised of the following components: 42% old portfolio policy, 58% new portfolio policy.

As of June 30, 2020, the old portfolio policy benchmark was comprised of the following components: 38% total opportunistic global equities policy, 44% total nominal bonds policy, 20% total commodities policy, 39% total inflation-protected bonds policy, and 31% total alternative beta policy. All policy return components are adjusted for financing cost associated with the beta-balanced program. This program did not begin until September 2012.

As of June 30, 2020, the new portfolio policy benchmark was comprised of the following components: 45% total growth policy, 35% total income policy, 40% total inflation hedge policy and 20% total alternative betas policy. This program did not begin until January 2019.

Old portfolio

- *Opportunistic global equities* – As of June 30, 2020, the opportunistic global equities policy was MSCI ACWI Net + .75%. Legacy real estate and timber assets are benchmarked to the Dow Jones U.S. Select REIT Index.
- *Nominal bonds* – As of June 30, 2020, the total nominal bonds policy was Barclays Long Treasury.
- *Commodities* – As of June 30, 2020, the total commodities policy was BCOM.
- *Inflation-protected bonds* – As of June 30, 2020, the total inflation-protected bonds policy was Barclays U.S. TIPS 1-10 Year.
- *Alternative beta* – As of June 30, 2020, the total alternative beta policy was AQR Delta.

New portfolio

- *Growth* – As of June 30, 2020, the total growth policy was 33% MSCI ACWI Net and 67% Burgiss all equity universe weighted by vintage year.
- *Income* – As of June 30, 2020, the total income policy was 29% Bloomberg Barclays aggregate bond and 71% Bloomberg Barclays long treasury.
- *Inflation hedge* – As of June 30, 2020, the total inflation hedge policy was 12.5% BCOM, 62.5% Bloomberg Barclays 1-10 year TIPS, 12.5% NCREIF ODCE and 12.5% FTSE NAREIT ALL REITS.
- *Alternative beta* – As of June 30, 2020, the total alternative beta policy was 25% HFRI Fund Weighted Composite Index, 50% HFRX Macro/ CTA and 25% S&P/ LSTA U.S. Leverage Loan Index + 2%.

Schedule of Investment Results (continued)

	1 Year	3 Year	5 Year	10 Year	15 Year	20 Year
Total fund*	5.2 %	5.6 %	4.1 %	6.8 %	6.0 %	5.9 %
Total fund policy benchmark	2.0 %	3.1 %	3.6 %	6.3 %	5.1 %	4.4 %
Old portfolio	5.6 %	5.8 %	4.2 %	N/A	N/A	N/A
Old portfolio policy benchmark	(1.2)%	1.9 %	2.9 %	N/A	N/A	N/A
Opportunistic global equities	(5.2)%	2.4 %	3.6 %	8.8 %	7.2 %	N/A
Opportunistic global equities policy benchmark	1.1 %	5.9 %	7.2 %	10.6 %	7.5 %	N/A
Nominal bonds	24.0 %	10.4 %	8.1 %	N/A	N/A	N/A
Nominal bonds policy benchmark	23.3 %	10.4 %	8.1 %	N/A	N/A	N/A
Commodities	(14.6)%	(4.6)%	(11.3)%	(6.8)%	(6.3)%	(2.0)%
Commodities policy benchmark	(18.5)%	(4.9)%	(10.4)%	(7.4)%	(7.7)%	(3.4)%
Inflation-protected bonds	3.9 %	2.1 %	1.6 %	2.4 %	3.3 %	5.5 %
Inflation-protected bonds policy benchmark	3.5 %	2.3 %	1.8 %	2.6 %	3.4 %	5.5 %
Alternative beta	(1.9)%	0.5 %	1.8 %	N/A	N/A	N/A
Alternative beta policy benchmark	(28.0)%	(16.5)%	(8.4)%	N/A	N/A	N/A
New portfolio	4.7 %	N/A	N/A	N/A	N/A	N/A
New portfolio policy benchmark	7.9 %	N/A	N/A	N/A	N/A	N/A
Growth	(2.5)%	N/A	N/A	N/A	N/A	N/A
Growth policy benchmark	2.1 %	N/A	N/A	N/A	N/A	N/A
Income	19.1 %	N/A	N/A	N/A	N/A	N/A
Income policy benchmark	19.4 %	N/A	N/A	N/A	N/A	N/A
Inflation hedge	(1.5)%	N/A	N/A	N/A	N/A	N/A
Inflation hedge policy benchmark	(0.6)%	N/A	N/A	N/A	N/A	N/A
Alternative beta	(2.8)%	N/A	N/A	N/A	N/A	N/A
Alternative beta policy benchmark	0.8 %	N/A	N/A	N/A	N/A	N/A

** Results are based on time-weighted rates of return on fair values adjusted for cash flows.*

Schedule of Investment Manager Fees

For the Year Ended June 30, 2020

	Portfolio Fair Value June 30, 2020	Total Fees	Manager Fees	Fund Pass Through Expenses *	Incentive Fees Earned in FY20
Equity					
Blakeney Onyx, LP	$ 30,697	$ 33,763	$ 3,015	$ 30,748	$ 0
Harvest Fund Advisors, LLC	0	157,131	157,131	0	0
Silchester International Investors	497,134,682	3,234,537	3,234,537	0	0
SSGA Emerging Markets	0	41,851	41,851	0	0
Total equity	497,165,379	3,467,282	3,436,534	30,748	0
Fixed income					
Stone Harbor Investment Partners	0	112,410	112,410	0	0
Total fixed income	0	112,410	112,410	0	0
Multi-asset					
Blackrock	766,295,576	62,629	62,629	0	0
NISA Investment Advisors	2,886,558,866	5,811,958	5,811,958	0	0
Total multi-asset	3,652,854,442	5,874,587	5,874,587	0	0
Alternatives					
Actis Emerging Markets III	1,812,000	129,000	0	129,000	0
Actis Emerging Markets IV	22,205,000	640,732	531,000	113,000	(3,268)
AQR DELTA Sapphire Fund, LP	212,472,572	2,995,299	2,589,003	406,296	0
Axiom Asia Private Capital Fund II, LP	25,906,013	350,695	230,291	32,389	88,015
Axiom Asia Private Capital Fund III, LP	73,849,251	718,209	394,875	43,280	280,054
Axxon Brazil Private Equity Fund II B, LP	12,570,010	263,635	215,899	47,736	0
Bayview Opportunity Domestic IIIb, LP	948,159	129,774	43,093	72,416	14,265
Blackstone Real Estate Partners IV	731,314	488,842	0	16,490	472,352
Blackstone Real Estate Partners V	2,548,944	(283,710)	0	7,023	(290,733)
Blackstone Real Estate Partners VI	3,765,303	210,445	0	29,851	180,594
Blackstone Real Estate Partners VII	30,027,363	4,144	383,803	25,232	(404,891)
Blackstone Topaz Fund, LP	266,701,926	2,662,553	2,230,612	206,508	225,433
Blackstone Topaz Private Credit	92,549,470	141,259	128,895	12,364	0
Bridgewater Associates - All Weather @ 12%, LLC	0	719,207	618,440	100,767	0
Bridgewater Associates - Diamond Ridge Fund, LLC	93,898,984	4,033,955	3,908,147	125,808	0
CarVal Investors CVI Global Value Fund A, LP - private debt	1,000,000	12,880	0	12,880	0
CarVal Investors CVI Global Value Fund A, LP - real estate	1,000,000	12,880	0	12,880	0
Catalyst Fund Limited Partnership III	14,527,531	709,799	642,688	67,111	0
Catalyst Fund Limited Partnership IV	5,750,752	319,710	248,480	71,230	0
Catalyst Fund Limited Partnership V	20,566,946	2,355,240	1,973,532	381,708	0
Cornwall Domestic, LP	5,660,980	69,350	0	69,350	0
DRI Capital - LSRC	12,035,286	365,215	0	229,237	135,978
EIG Energy Fund XIV, LP	2,551,077	83,823	0	83,823	0
EIG Energy Fund XV, LP	12,065,145	386,345	302,688	83,657	0
EIG Energy Fund XVI, LP	24,700,606	(882,797)	302,306	42,415	(1,227,518)

Schedule of Investment Manager Fees continued on page 88

Schedule of Investment Manager Fees (continued)

For the Year Ended June 30, 2020

	Portfolio Fair Value June 30, 2020	Total Fees	Manager Fees	Fund Pass Through Expenses*	Incentive Fees Earned in FY20
Elliott International Limited	$ 193,563,000	$ 9,481,515	$ 3,652,269	$ 1,796,805	$ 4,032,441
Exodus Point	68,380,981	742,167	0	0	742,167
Farallon Capital Institutional Partners, LP	1,006,396	(56,182)	0	0	(56,182)
Gaoling Fund, LP	0	26,948	103,686	0	(76,738)
Gateway Energy & Resource Holdings, LLC	5,503,566	345,289	0	345,289	0
Glenview Capital Opportunity Fund, LP	3,109,667	504,588	264,006	240,582	0
Glenview Sidecar	0	103,089	0	103,089	0
Global Forest Partners GTI7 Institutional Investors Company Ltd.	449,547	3,240	1,712	1,528	0
HBK Merger Strategies Offshore Fund, Ltd.	138,968,100	3,377,461	1,018,949	333,509	2,025,003
JLL Partners Fund V, LP	3,041,179	(191,792)	0	6,254	(198,046)
JLL Partners Fund VI, LP	11,528,185	(1,656,859)	209,064	13,571	(1,879,494)
Kennedy Capital	40,411,690	190,736	190,736	0	0
King Street Capital, LP	1,821,350	36,488	31,660	0	4,828
King Street Capital, Ltd.	42,011	636	636	0	0
Linden Capital Partners II, LP	18,852,086	1,131,026	404,072	12,359	714,595
Mast Credit Opportunities I, LP	1	45,783	45,783	0	0
Merit Energy Partners F-II, LP	3,004,064	37,633	37,633	0	0
MHR Institutional Partners IIA, LP	34,138,556	(78,396)	0	20,006	(98,402)
MHR Institutional Partners III, LP	17,860,651	307,486	284,187	23,299	0
MHR Institutional Partners IV, LP	31,195,995	933,854	857,822	76,032	0
Millennium Technology Value Partners II	13,061,022	(261,488)	354,939	60,079	(676,506)
OCM Opportunities Fund VIIb, LP	180,182	(6,732)	4,568	11,499	(22,799)
OCM Opportunities Fund VIIIb, LP	6,495,571	203,991	173,066	30,925	0
OCM Power Opportunities Fund III, LP	5,153,004	(301,733)	130,614	37,020	(469,367)
OCM/GFI Power Opportunities Fund II, LP	1	(47)	0	(92)	45
Perry Partners, LP	8,031	120	120	0	0
Pharo Macro Fund, Ltd.	61,302,853	1,352,672	1,231,527	54,751	66,394
Silver Creek Special Opportunities Fund I, LP	5,273,416	29,712	0	29,712	0
Silver Creek Special Opportunities Fund II, LP	8,216,430	34,123	0	34,123	0
Silver Lake Partners II, LP	25,998	(25,308)	0	2,293	(27,601)
Standard Investment Research Hedged Equity Fund	91,419,763	2,832,422	1,778,497	171,839	882,086
StepStone Capital Buyout Fund II, LP	635,030	80,454	20,222	60,232	0
StepStone Opportunities Fund II, LP	62,493	39,528	0	42,024	(2,496)
Voleon Investors Fund, LP	15,444,777	207,936	161,716	46,220	0
Voleon Institutional Strategies Fund, LP	50,355,760	601,558	502,626	98,932	0
Total alternatives	1,770,355,988	36,708,402	26,203,862	6,074,331	4,430,209
Total fees	$ 5,920,375,809	$ 46,162,681	$ 35,627,393	$ 6,105,079	$ 4,430,209

* *Fund pass through expenses are administrative expenses charged to the fund and paid by the limited partners (including MOSERS), in addition to the management fee. These expenses may include, but are not limited to, accounting, audit, legal, and custody expenses directly related to the administration of the underlying fund investments.*

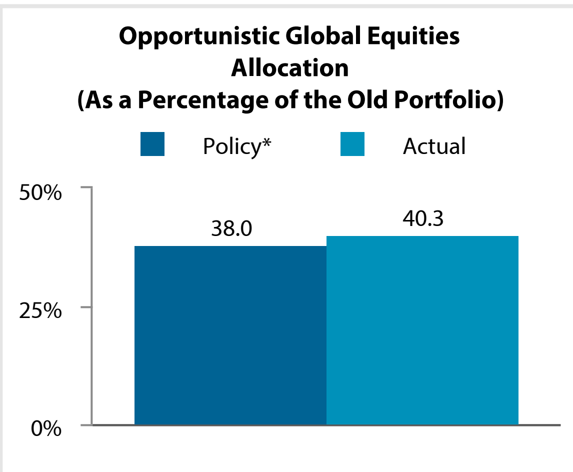
Asset Class Summary - Old Portfolio

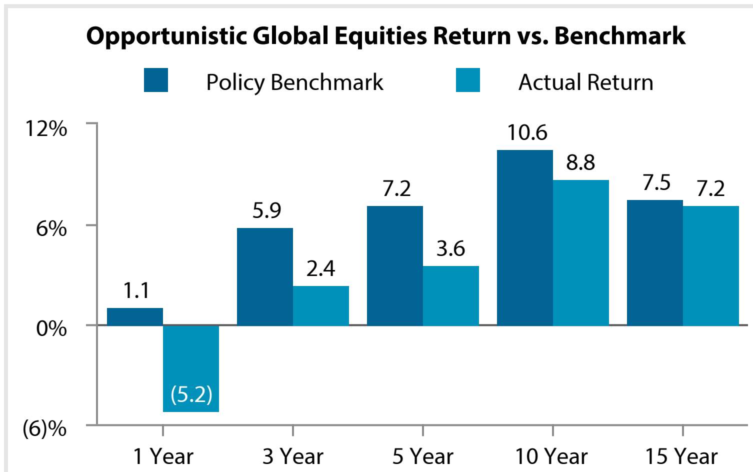
The portfolio consists of five broad asset buckets: opportunistic global equities, nominal bonds, commodities, inflation-protected bonds, and alternative betas. Only nominal bonds and inflation-protected bonds had positive performance during the fiscal year. The remaining three, all had negative performance.

Opportunistic Global Equities

It is expected that investments in this asset class will perform well during periods of rising economic growth and/or falling inflation. Investments in this asset class include U.S. and non-U.S. equity investments with varying characteristics related to market capitalization and investment style. Because of the non-U.S. nature of some of these investments, foreign currency exposure will be part of this portfolio.

The market exposure of the equity portfolio on June 30, 2020, was $1,357,937,984, representing 40.3% of total fair value. The graph below (left) illustrates the actual exposure compared to policy. For the fiscal year, the equity allocation returned (5.2%) versus 1.1% for the global equity policy benchmark. The underperformance was driven by manager underperformance within domestic and international equities, a portfolio overweight to value and energy sectors, and the opportunistic equity portfolio lagging its benchmark. The graph below (right) illustrates actual performance as compared to the policy benchmark.



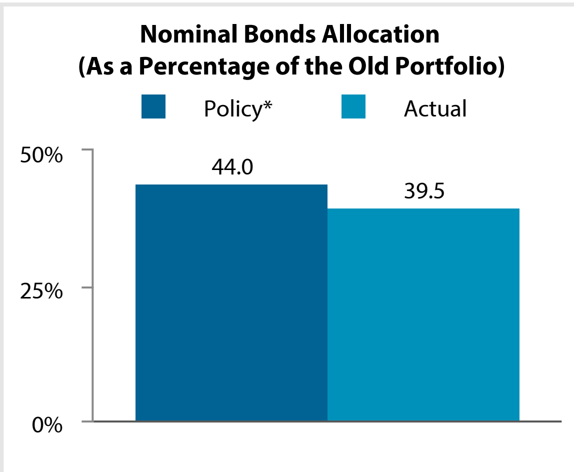


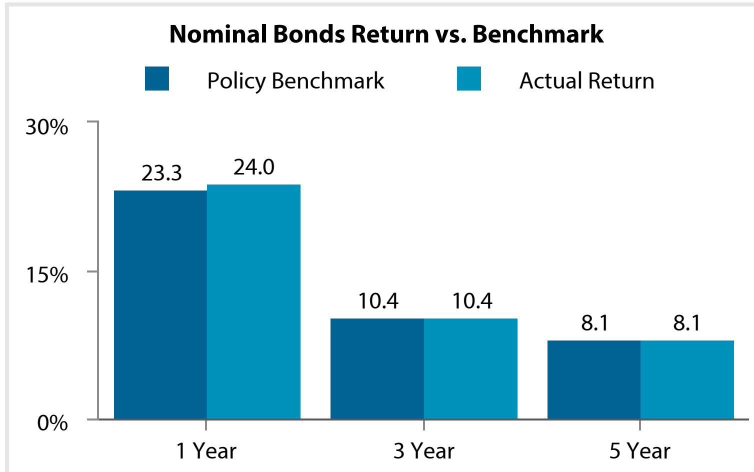
* *As of June 30, 2020, the opportunistic global equities policy was MSCI ACWI Net + .75%.*

Nominal Bonds

It is expected that investments in this asset class will perform well in periods of falling economic growth and falling inflation. Investments in this asset class include U.S. bonds that have been issued, collateralized or guaranteed by the U.S. Government, its agencies, or its instrumentalities. Because this asset class is invested in all U.S. bonds, there is currently not any foreign currency exposure as part of this portfolio.

As of June 30, 2020, the market exposure of the nominal bond portfolio was $1,332,375,801, representing 39.5% of total fair value of the old portfolio. The bar chart below (left) illustrates the actual exposure compared to policy. For the fiscal year, the nominal bond allocation returned 24.0% versus 23.3% for the nominal bond policy benchmark. A strategic decision preferring to own TIPS in lieu of nominal treasuries detracted from performance and implementation decisions were slightly additive to performance. The bar chart below (right) illustrates actual performance as compared to the policy benchmark.



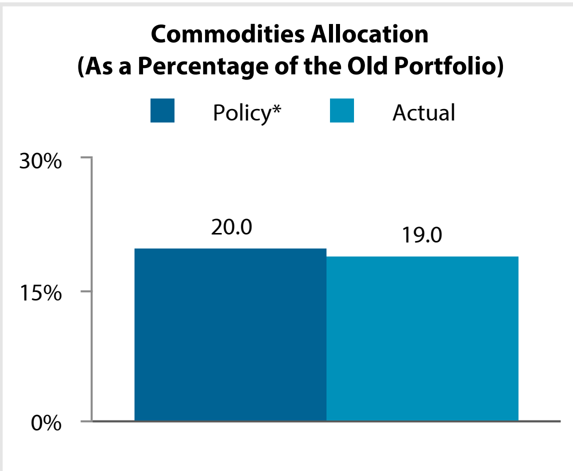


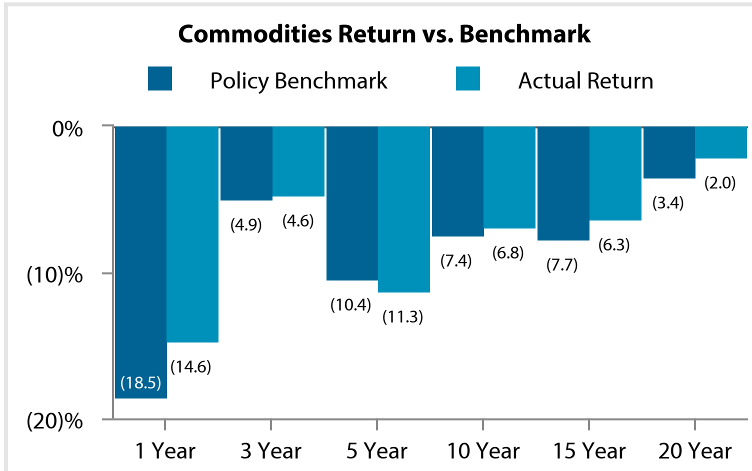
* *As of June 30, 2020, the total nominal bonds policy benchmark was Bloomberg Barclays Long Treasury.*

Commodities

It is expected that investments in this asset class will perform well during periods of economic growth and rising inflation. Investments in the asset class may include investments in raw materials, materials required in the manufacturing of finished products, the owners of raw goods, and the producers of raw materials. Because this asset class is invested in all U.S. dollar denominated commodities there is no currency exposure as part of this portfolio.

As of June 30, 2020, the market exposure of the commodities portfolio was $642,073,473, representing 19.0% of the total fair value of the old portfolio. The bar chart below (left) illustrates the actual exposure compared to policy. The commodity allocation returned (14.6%) versus (18.5%) for the commodity policy benchmark. The primary driver of the outperformance was implementing the exposure through a modified futures roll strategy compared to the benchmark. The actual performance as compared to the policy benchmark is illustrated in the bar chart below (right).



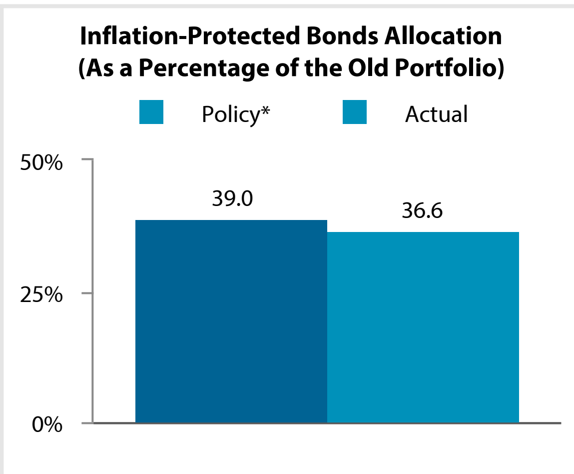


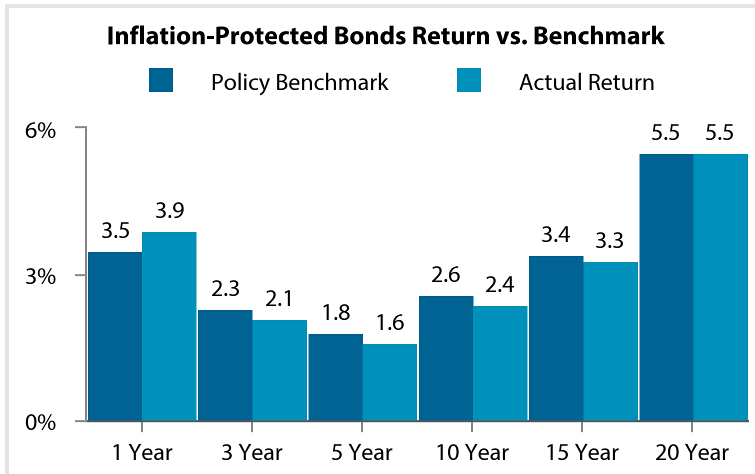
* *As of June 30, 2020, the commodities policy benchmark was Bloomberg Commodity Index.*

Inflation-Protected Bonds

It is expected that investments in this asset class will perform well during periods of falling economic growth and rising inflation. Investments in this asset class include U.S. bonds that have been issued, collateralized, or guaranteed by the U.S. Government, its agencies, or its instrumentalities. All such securities must derive a significant portion of their value from changes in the respective issuer's domestic inflation. Because this asset class is invested in all U.S. bonds, there is no foreign currency exposure as part of this portfolio.

As of June 30, 2020, the market exposure of the inflation-protected bond portfolio was $1,232,492,649, representing 36.6% of total fair value of the portfolio. The bar chart below (left) illustrates the actual exposure compared to policy. For the fiscal year, the inflation-protected bond allocation returned 3.9% versus 3.5% for the inflation-protected bond policy benchmark. There was no internal or external active management strategy utilized during the year; thus providing a return that closely matched the benchmark. The bar chart below (right) illustrates actual performance as compared to the policy benchmark.



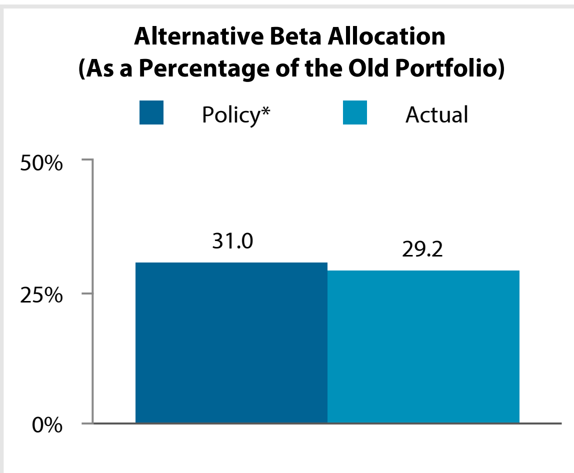


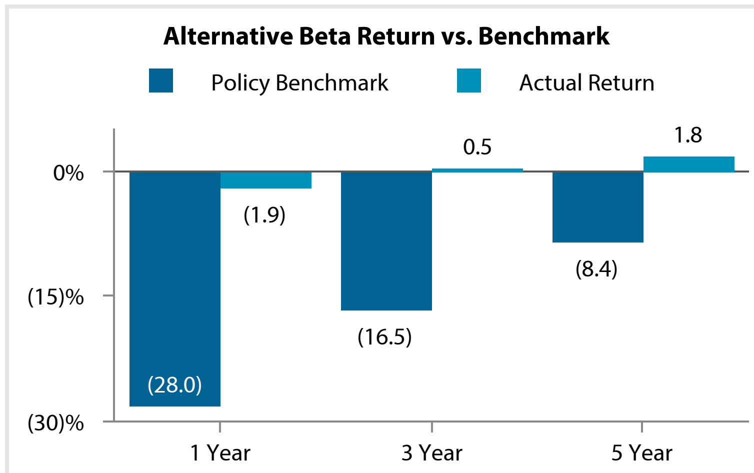
* *As of June 30, 2020, the inflation-protected bonds policy benchmark was Bloomberg Barclays U.S. TIPS 1-10 YR.*

Alternative Beta

This asset class represents a collection of strategies, commonly referred to as hedge fund or alternative betas, because they access risk premiums that provide a reasonable return for the risk taken and are diversifying to the other market risks in the portfolio. Alternative betas are expected to produce positive returns with the distinction that they can be obtained passively at fees lower than active hedge fund managers. In addition to, and as a result of the multitude of strategies being deployed, it is expected that this asset class will provide meaningful diversification to the portfolio. While the sensitivities to economics will be dependent on positioning at the time, it expected that these betas will have their best returns in rising growth environments and their worst returns in falling growth environments. Because of the non-U.S. nature of some of these investments, foreign currency exposure will be part of this portfolio.

As of June 30, 2020, the market exposure of the alternative beta portfolio was $982,998,813, representing 29.2% of total fair value of the old portfolio. The bar chart below (left) illustrates the actual exposure compared to policy. The alternative beta allocation returned (1.9%) for the fiscal year versus (28.0%) for the alternative beta policy benchmark. The outperformance was attributable to the active hedge fund managers who collectively represented approximately 45% of the allocation and returned 1.9% for the year. There was also outperformance due to the passive alternative beta strategies that returned 4.5% and 9.4% for the fiscal year. The bar chart below (right) illustrates actual performance as compared to the policy benchmark.





* *As of June 30, 2020, the alternative beta policy benchmark was AQR Delta.*

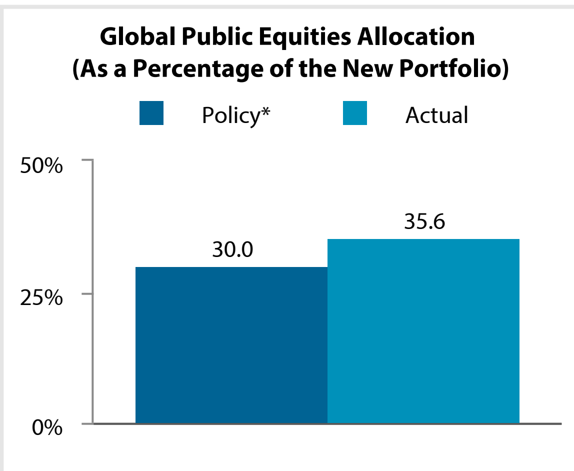
Asset Class Summary - New Portfolio

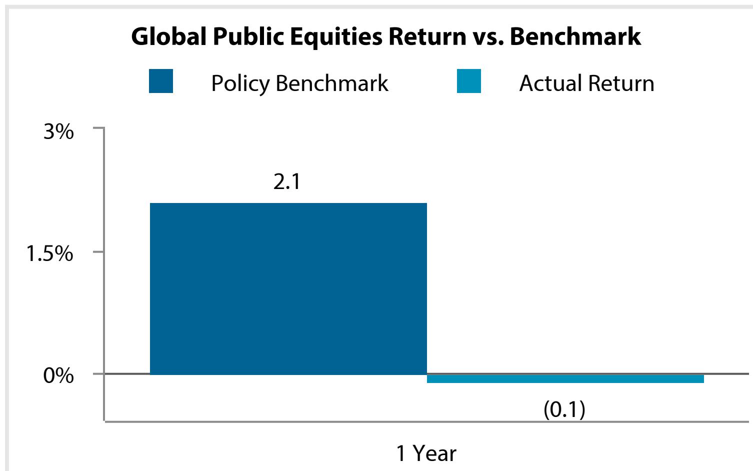
The new portfolio was initially funded at the end of January 2019. The portfolio consists of four broad asset buckets: growth, income, inflation hedge, and alternative betas/absolute return. Each of these asset buckets are made up of a number of different asset classes. Only one asset bucket had positive performance during the fiscal year. The growth bucket returned negative 2.5%, while the income bucket was up 19.1%. The inflation hedge bucket was down 1.5% and the alternative betas/absolute return bucket returned negative 2.8%.

Growth Bucket

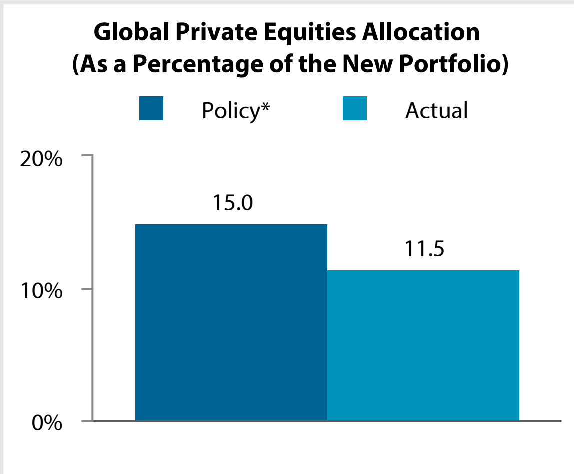
This bucket is designed to provide capital appreciation and provide access to a form of equity-risk premium and liquidity risk premium. In addition, it is expected that investments in this category would perform well in periods of rising economic growth. Investments in this asset class include U.S. and non-U.S. equity investments with varying characteristics related to market capitalization and investment style. Because of the non-U.S. nature of some of these investments, foreign currency exposure will be part of this bucket.

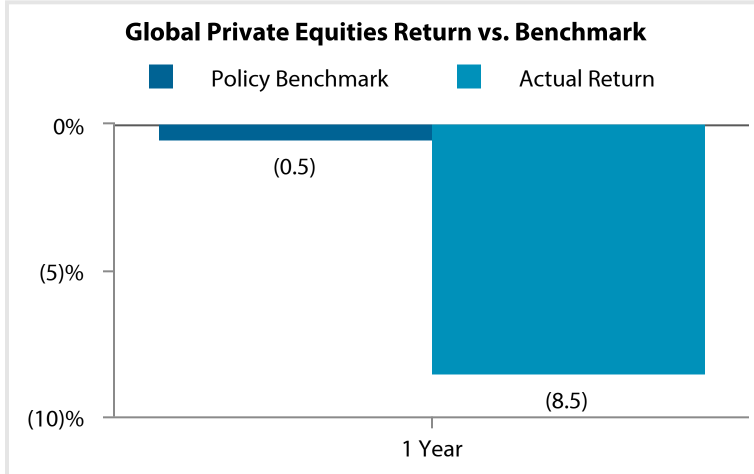
The growth bucket is made up of global public equities and global private equities. As of the fiscal year end, global public equities and global private equities were 76% and 24% of the growth bucket, respectively. For the fiscal year, public equities returned (0.1)% versus 2.1% for the policy benchmark. Private equities, for the fiscal year, returned (8.5%) compared to its policy benchmark return of (0.5%). This underperformance was the result of manager implementation that underperformed the benchmark.





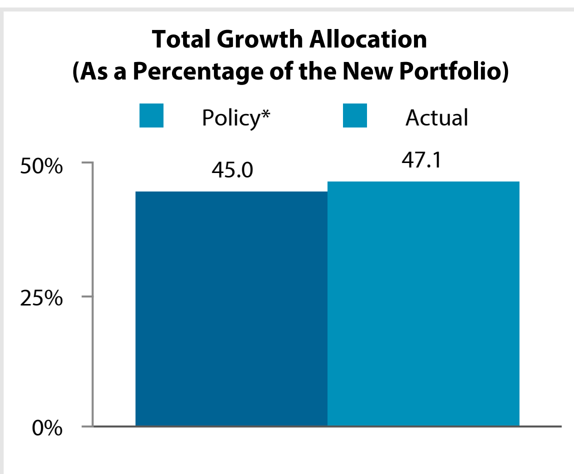
* *As of June 30, 2020, the public equities policy benchmark was MSCI ACWI Net.*

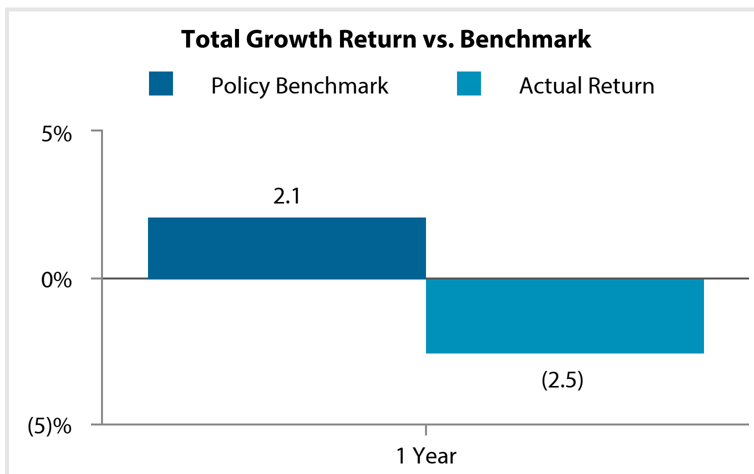




* *As of June 30, 2020, the private equities policy benchmark was the Burgiss All Equity Universe (weighted by vintage year).*

The market exposure of the growth bucket on June 30, 2020, was $2,206,991,169, representing 47.1% of total fair value of the new portfolio. The bar chart below (left) illustrates the actual exposure compared to policy. For the fiscal year, the growth allocation returned (2.5%) versus 2.1% for the policy benchmark. The underperformance was driven by global private equities underperforming the policy benchmark by 8.0%. The bar chart below (right) illustrates actual performance as compared to the policy benchmark.



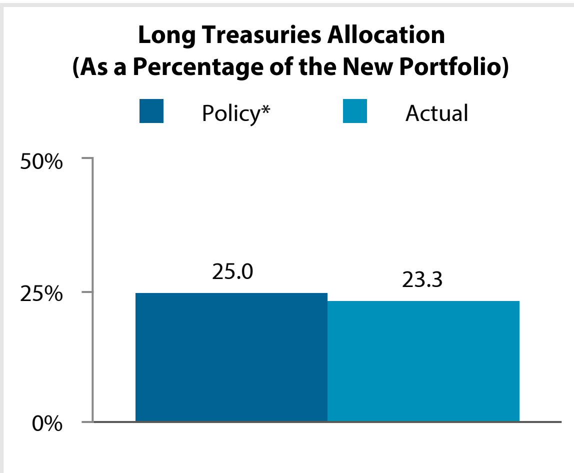


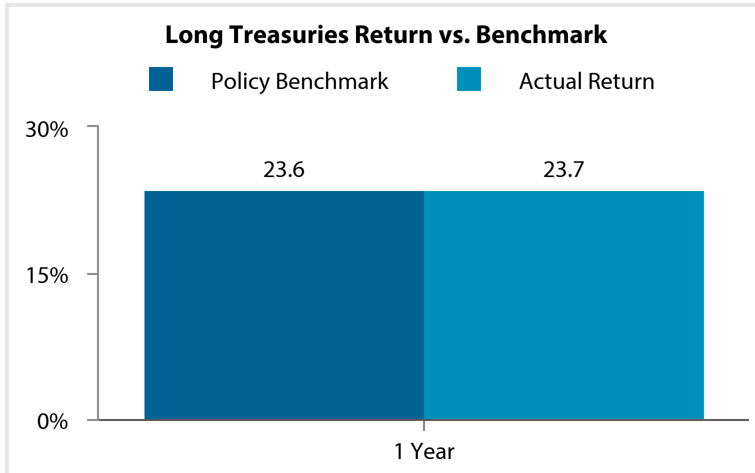
* *As of June 30, 2020, the total growth policy benchmark was comprised of 66.7% global public equities policy benchmark and 33.3% global private equities policy benchmark.*

Income Bucket

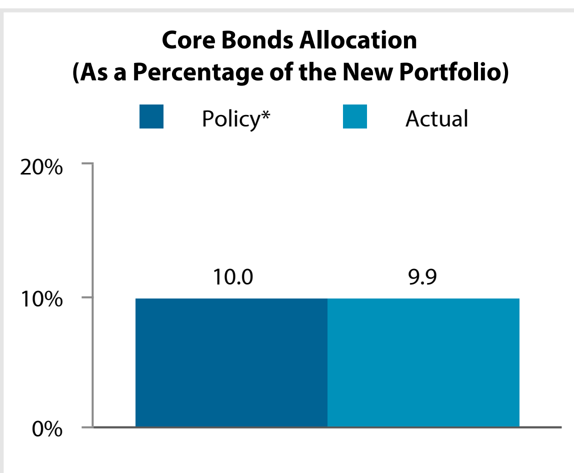
This bucket is designed to provide a source of current income and to reduce overall fund volatility. It is expected that investments in this asset class will perform well in periods of stable or falling economic growth and falling inflation. Investments in this asset class include U.S. bonds that have been issued, collateralized, or guaranteed by the U.S. Government, its agencies, or its instrumentalities, debt issued by corporations, and securitized debt. Because this asset class is invested in all U.S. bonds, there is currently not any foreign currency exposure as part of this bucket.

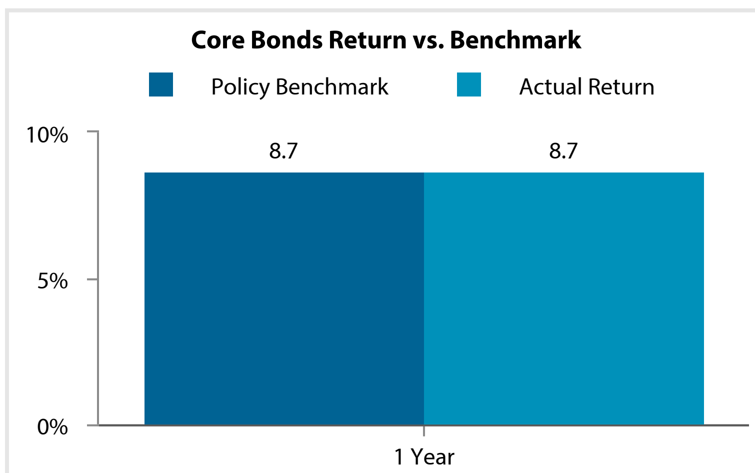
The income bucket is made up of long treasuries and core bonds. As of the fiscal year end, long treasuries and core bonds were 70% and 30% of the income bucket, respectively. For the fiscal year, long treasuries returned 23.7% versus 23.6% for the policy benchmark. The exposure to long treasuries is gained passively with minimal tracking error. Core bonds, for the fiscal year, returned 8.7% compared to its policy benchmark return of 8.7%. There is minimal tracking error as the result of passively implementing the exposure with an exchange traded fund and passive index fund.





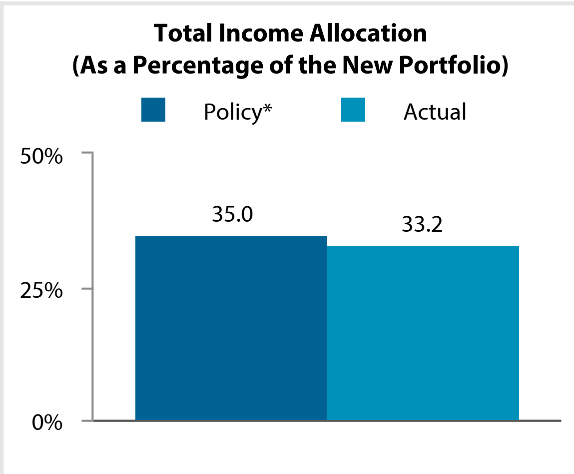
* *As of June 30, 2020, the long treasuries policy benchmark was Bloomberg Barclays Long Treasury Index.*

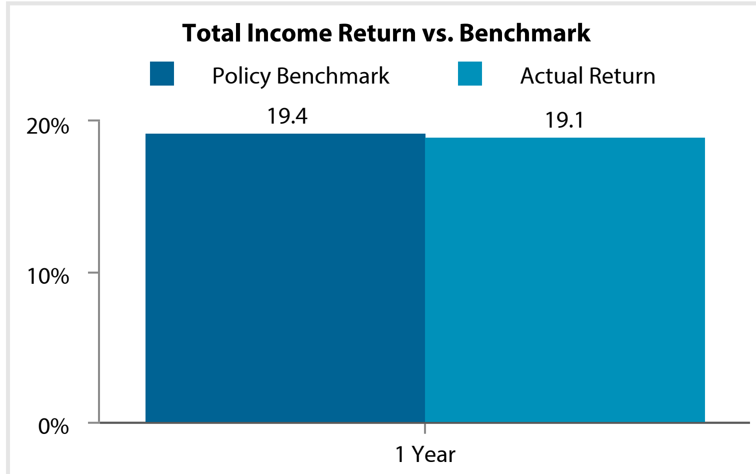




* *As of June 30, 2020, the core bonds strategy benchmark was Bloomberg Barclays Aggregate Bond Index.*

As of June 30, 2020, the market exposure of the income bucket was $1,556,334,433, representing 33.2% of total fair value of the new portfolio. The bar chart below (left) illustrates the actual exposure compared to policy. For the fiscal year, the income allocation returned 19.1% versus 19.4% for the income bucket policy benchmark. There are no strategic positions in the income bucket so it tracks the benchmark closely. The bar chart below (right) illustrates actual performance as compared to the policy benchmark.



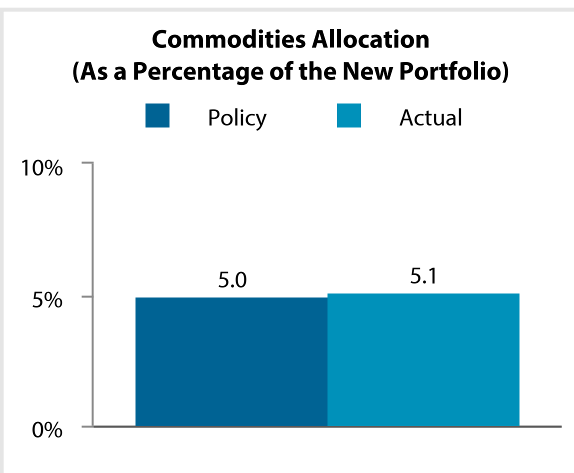


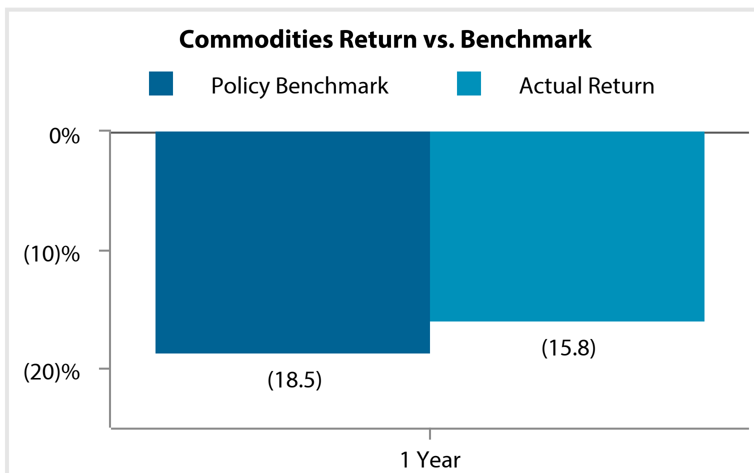
* *As of June 30, 2020, the total income policy benchmark was comprised of 71.4% long treasuries policy benchmark and 28.6% core bonds policy benchmark.*

Inflation Hedge Bucket

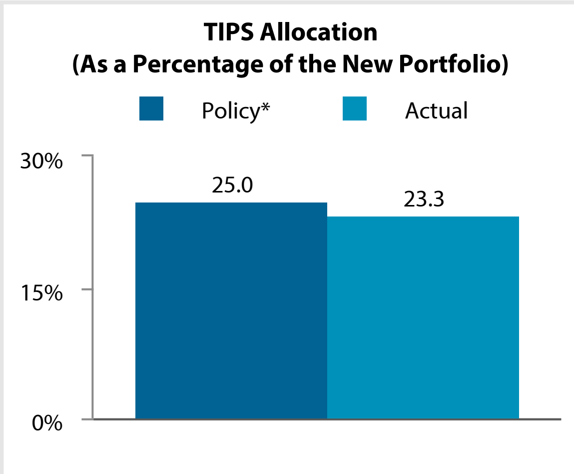
It is expected that investments in this asset class will perform well during periods of rising inflation. Investments in this asset class include U.S. Government treasury inflation protected securities (TIPS), commodities, private real estate, and public real estate. TIPS are designed to provide a source of current income and protect against actual inflation. It is expected that investments in this asset class will perform well during periods of falling economic growth and rising inflation. Commodities are designed to provide protection from an unexpected rise in inflation. In addition, it is expected that investments in this category would perform well in periods of rising economic growth. Public and private real assets are designed to provide capital appreciation and income; as well as, exposure to equity and liquidity risk premium. It is expected that investments in this category would perform well in periods of rising economic growth and rising inflation. Because this asset class is invested primarily in U.S. denominated assets, there is not expected to be meaningful foreign currency exposure as part of this bucket.

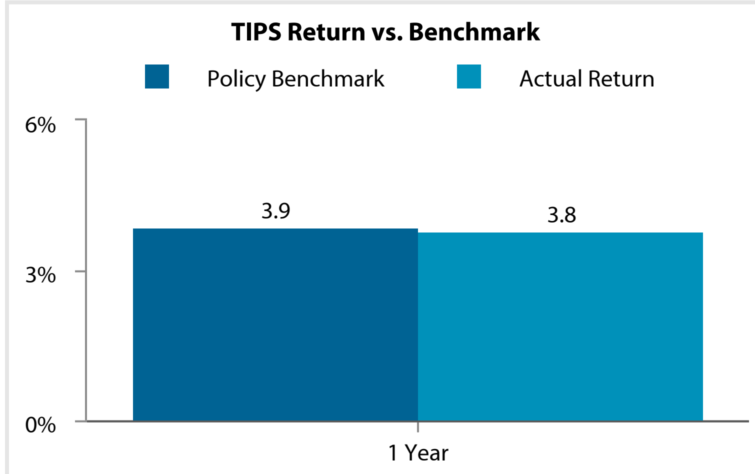
As of the fiscal year end, TIPS were 61% and public real assets were 14% of the inflation hedge bucket. Commodities and private real assets each made up 13% of the inflation hedge bucket. For the fiscal year , TIPS returned 3.8% versus 3.9% for the policy benchmark. There was no internal or external active management strategy utilized during the fiscal year; thus, providing a return that closely matched the benchmark. Commodities, for the fiscal year, returned (15.8%) compared to its policy benchmark return of (18.5%). The primary driver of the outperformance was implementing the exposure through a modified futures roll strategy compared to the benchmark. Public real assets returned (8.5%), for the fiscal year, compared to its policy benchmark return of (8.4%). There was no internal or external active management strategy utilized during the fiscal year; thus, providing a return that closely matched the benchmark. For the fiscal year, private real assets returned (10.8%) versus 1.3% for its policy benchmark. This underperformance was due to the portfolio holding publicly traded real estate investment trusts as a short-term placeholder for core real estate funds as well as external managers underperforming during the period.



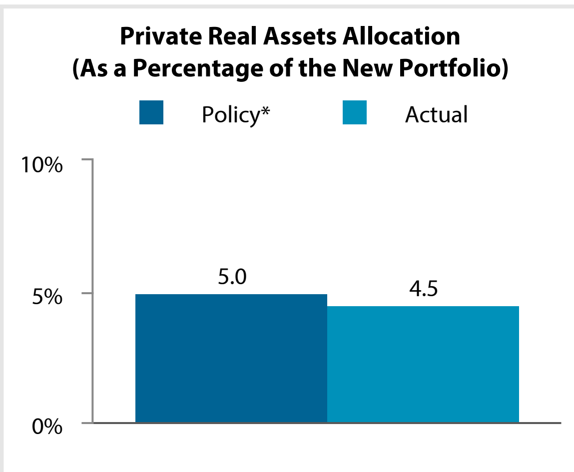


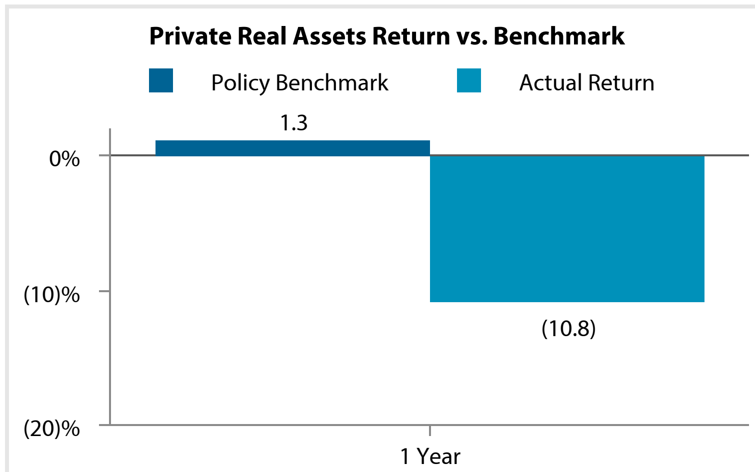
* *As of June 30, 2020, the commodities policy benchmark was the Bloomberg Commodity Index (BCOM).*



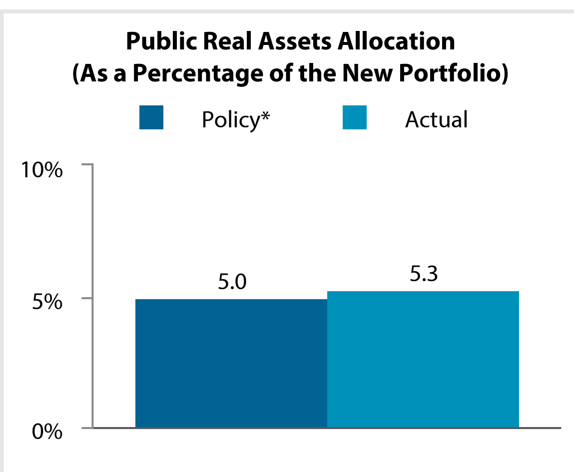


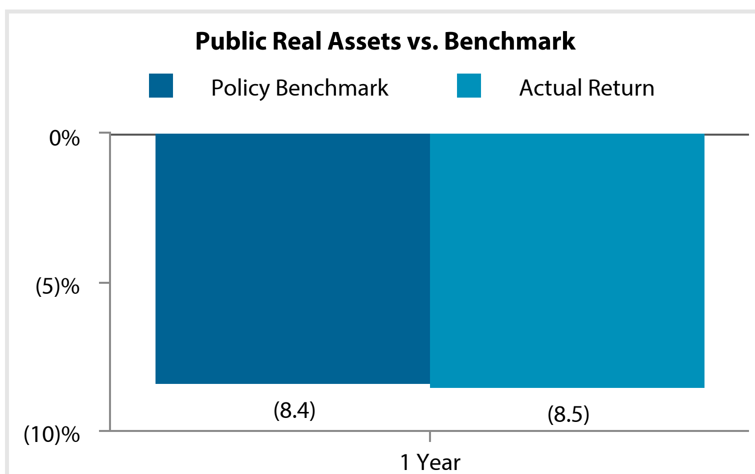
* *As of June 30, 2020, the TIPS policy benchmark was the Bloomberg Barclays 1 - 10 year TIPS Index.*





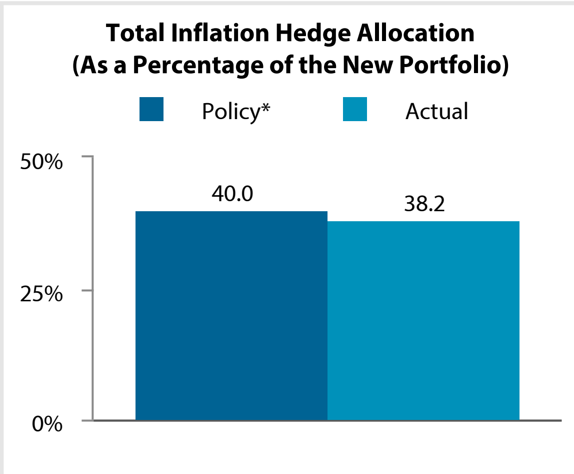
* *As of June 30, 2020, the private real assets policy benchmark was the NCREIF Fund Index - Open End Diversified Core Equity (ODCE).*

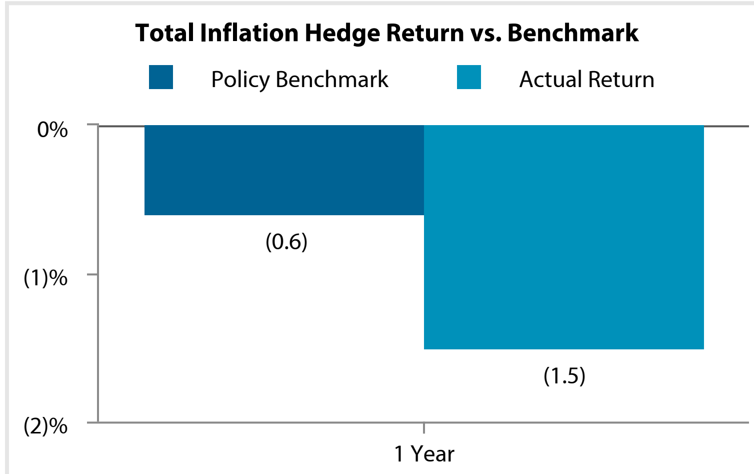




* *As of June 30, 2020, the public real assets policy benchmark was the FTSE NAREIT ALL REITS Index.*

As of June 30, 2020, the market exposure of the inflation hedge bucket was $1,791,595,694 representing 38.2% of total fair value of the new portfolio. The bar chart below (left) illustrates the actual exposure compared to policy. For the fiscal year, the inflation hedge allocation returned (1.5%) versus (0.6%) for the policy benchmark. The bar chart below (right) illustrates actual performance as compared to the policy benchmark.





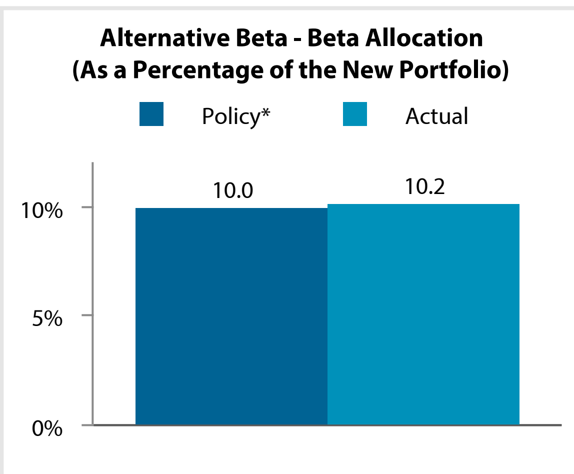
* *As of June 30, 2020, the total inflation hedge policy benchmark was comprised of 12.5% commodities policy benchmark, 62.5% TIPS policy benchmark, 12.5% private real assets policy benchmark, and 12.5% public real assets policy benchmark.*

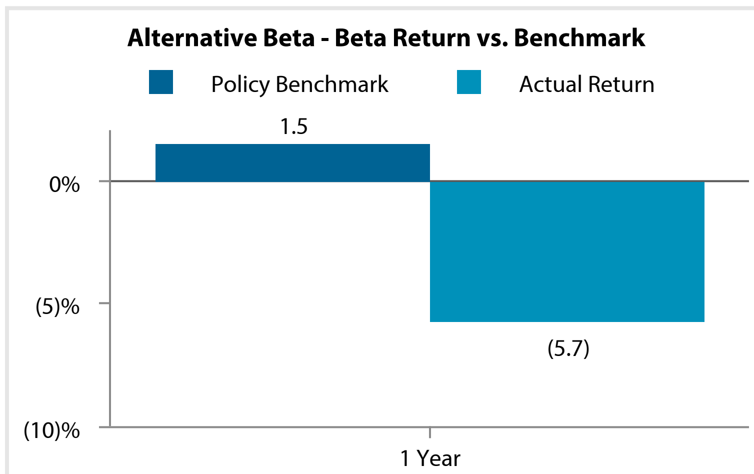
Alternative Betas/Absolute Return Bucket

This asset class represents hedge funds, alternative betas, and private credit. Alternative betas and hedge funds are designed to provide a source of stable returns and low correlations with traditional asset strategies. In addition, it is expected that investments in this category would perform well across multiple economic environments. Private credit is designed to provide a source of current income and provide access to a form of credit risk premium. It is expected that investments in this category would perform well in periods of rising economic growth.

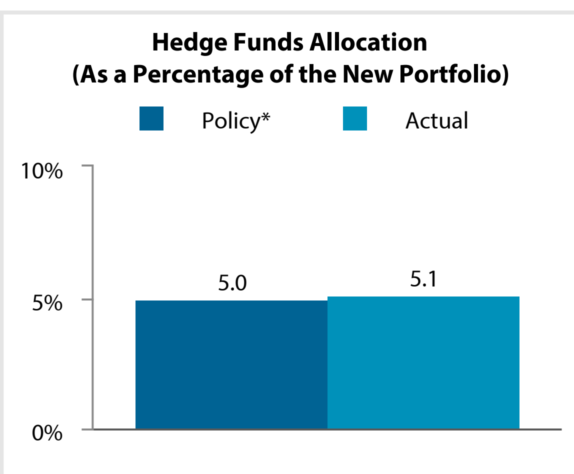
As a result of the multitude of strategies being deployed, it is expected that this asset class will provide meaningful diversification to the portfolio. While the sensitivities to economics will be dependent on positioning at the time, it expected that these betas will have their best returns in rising growth environments and their worst returns in falling growth environments. Because of the non-U.S. nature of some of these investments, foreign currency exposure will be part of this bucket.

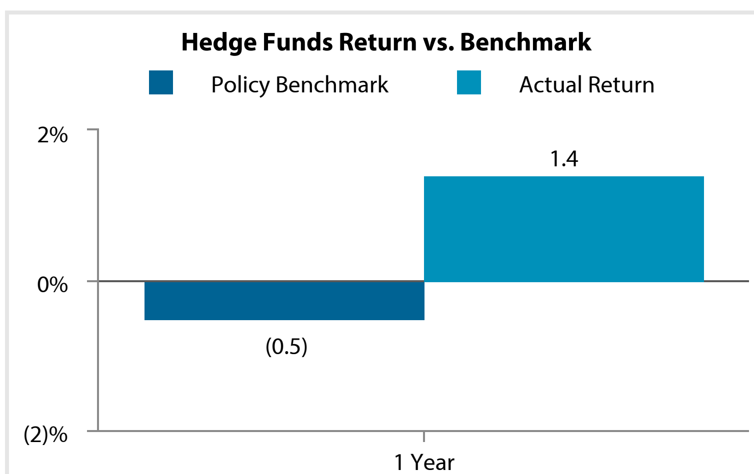
As of the fiscal year end, alternative betas were 50% of the bucket with hedge funds and private credit each making up 25% of the bucket. For the fiscal year, alternative betas returned (5.7%) versus 1.5% for the policy benchmark. The underperformance was primarily related to manager implementation. Hedge funds, for the fiscal year, returned 1.4% compared to its policy benchmark return of (0.5%). The primary driver of the outperformance was manager selection within hedge fund managers. For the fiscal year, private credit returned (0.4%) versus 0.0% for its policy benchmark. This underperformance was largely due to the external managers within this portfolio underperforming the benchmark.



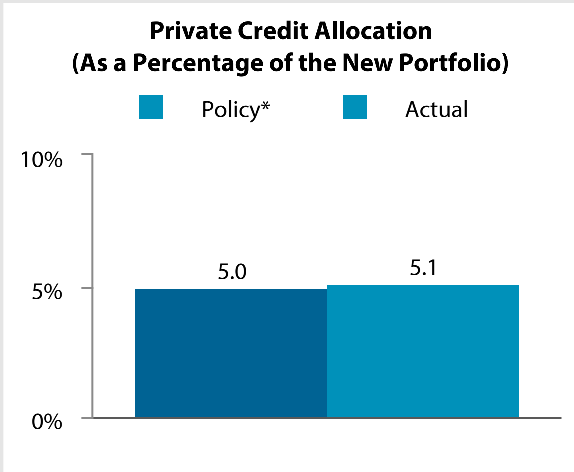


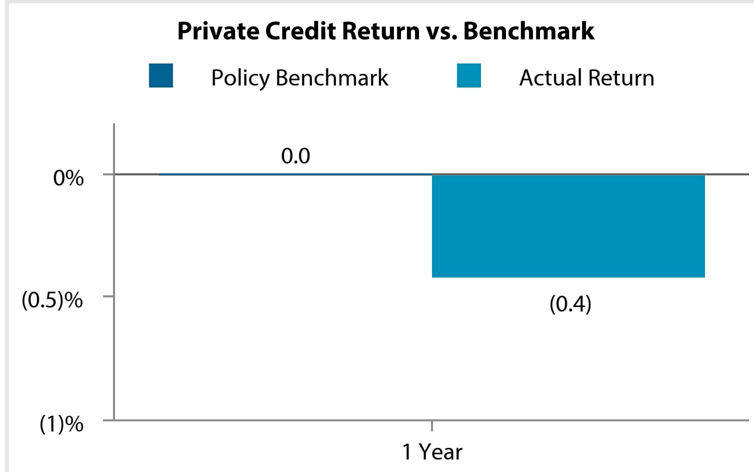
* *As of June 30, 2020, the alt beta - beta policy benchmark was the HFRX Macro/CTA Index.*





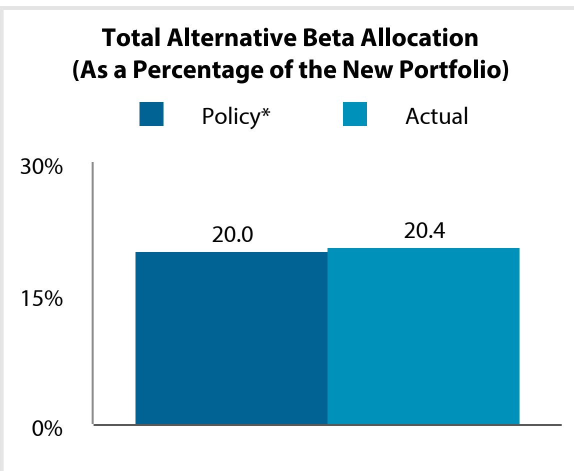
* *As of June 30, 2020, the hedge funds policy benchmark was the HFRI Fund Weighted Composite Index.*

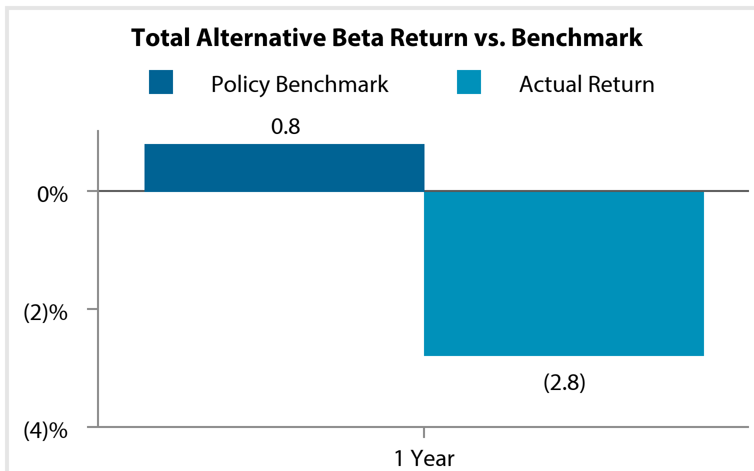




* *As of June 30, 2020, the private credit policy benchmark was the S&P/LSTA US Leveraged Loan Index + 2%.*

As of June 30, 2020, the market exposure of the alternative beta portfolio was $955,707,726, representing 20.4% of total fair value of the new portfolio. The bar chart below (left) illustrates the actual exposure compared to policy. The alternative betas/absolute return allocation returned (2.8%) for the fiscal year versus 0.8% for the policy benchmark. The bar chart below (right) illustrates actual performance as compared to the policy benchmark.





* *As of June 30, 2020, the alternative beta policy benchmark was comprised of 25.0% direct hedge funds policy benchmark, 50.0% alternative beta - beta policy benchmark, and 25.0% private credit policy benchmark.*