Collaboration

Nothing worth achieving is achieved in isolation. Teamwork with a retirement professional, teacher, mentor or fellow student can be key to achieving one's goals. School designs may incorporate bright, open areas to encourage teamwork and student interaction.

Investment Section

Letter from Verus

Verus

October 4, 2019

To the Members of the Board,

Financial markets in fiscal 2019 paid strict attention to global trade issues, the U.K.'s potential exit from the European Union, the stalling of earnings growth relative to the prior year and continued unrest in the Middle East. The one-year S&P 500 return of 10.4% tends to mask the volatility that occurred in the fall of 2018 when the index fell 9.0%. Smaller capitalization stocks in the U.S. returned -3.3% despite the strong performance from larger companies.

International Equity Markets continued to trail the U.S. as the Developed Non-U.S. Markets returned only 1.3% and Emerging Markets 1.2%, with continued U.S. Dollar strength particularly versus the Euro and the Pound Sterling. Despite negative interest rates in many of the largest countries, economic activity remains low (growth of approximately 1% in the fiscal year) and below that of the U.S. (3.2%).

In the U.S. Fixed Income Market, 10-year yields fell from 2.9% to 2.0%, propelling the U.S. Treasury Index to a 7.2% return. Also, at 6/30/19, the U.S. T-Bill Index had a yield of 2.3%, signaling an inverted yield curve, often a harbinger of slowing economic activity.

The combined PSRS/PEERS plans, known collectively as the Missouri Education Pension Trust (MEPT), had a total (net of all fees) return of 6.9%, slightly trailing its Policy Index Return (7.3%), but ahead of its Peer Median Return of 6.8%. MEPT's peers are other U.S. Public Funds with assets of great than $1 billion. Much like its peers, MEPT underperformed in U.S. Equity markets. This was somewhat offset by strong returns in Private Equity and Non-U.S. Equity.

PSRS/PEERS and Verus are embarking on a comprehensive Asset/Liability Study to help the Board determine its preferred risk allocations going forward. While it is premature to suggest any changes to the current Policy Target Portfolio, we anticipate a market environment that will produce returns that are below long-term averages, placing a premium on continuing to produce value-added above what the broad markets provide.

We at Verus appreciate our relationship with PSRS/PEERS and look forward to assisting the Board in the important Investment Policy decisions in fiscal 2020.

Sincerely,

Barry W. Dennis

Barry W. Dennis
Managing Director

Verus — also known as Verus Advisory™

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Letter from the Chief Investment Officer

PSRS/PEERS
PUBLIC SCHOOL & EDUCATION EMPLOYEE
RETIREMENT SYSTEMS OF MISSOURI

December 2, 2019

To the Members of the Systems:

Throughout this year's Financial Report, you will see the phrase: "***Providing Opportunities for Tomorrow"***. The investment staff, under the direction of the Board of Trustees, is solely focused on providing consistent long-term investment returns that can support retirement benefits and provide financial security to the members of PSRS and PEERS as they prepare for tomorrow.

With that in mind, I present the following report on the Systems' investments for the fiscal year ended June 30, 2019 on behalf of the PSRS and PEERS' Board of Trustees and the internal investment staff.

Fiscal year 2019 (July 1, 2018 through June 30, 2019) was marked by global trade issues and a Federal Reserve that increased interest rates in December, only to change the posture to one of easing (lowering rates) shortly thereafter. This fluctuation in both trade and monetary policy led to tremendous volatility in both the bond and stock markets. U.S. stocks were down 8.2% in the first six months of the fiscal year, only to rally 18.7% in the last half of the year. Bond yields remained relatively stable early in the fiscal year before declining significantly in the last half as the yield on the 10-year Treasury bond moved from 2.7% on December 31, 2018 to 2.0% on June 30, 2019. In total, PSRS and PEERS benefited from the overall investment environment as the Systems' assets increased through investment earnings by over $2.9 billion from the previous year with a total fund performance of 7.0% (or 6.9% net of all fees and expenses).

Key Points within this year's Financial Report

As you review the financial information in this report for the fiscal year ended June 30, 2019, it is important to be aware of the following points:

- The Systems generated the 7.0% investment return while taking less risk than the policy benchmark (as measured by standard deviation) and less risk than most comparable public funds over all time periods,
- Several of the Systems' primary asset categories (Non-U.S. Public Equity, Private Real Estate and Private Equity) generated returns in excess of established policy benchmarks for the year,
- The PSRS/PEERS investment expenses (including accrued performance-based fees and all internal investment staff expenses) for fiscal year 2019 were 1.13%, or $1.13 for every $100 managed. The investment returns reported throughout this publication are mostly net of these fees. The investment return net of all fees and expenses was 6.9% for PSRS and PEERS,
- Total Systems' assets have increased through investment earnings by approximately $13 billion over the last five years,

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- The PSRS/PEERS internal investment staff and external investment managers added value above the policy benchmark of over $1.3 billion, net of all fees and expenses, over the last five years. The outperformance was due to portfolio construction and tactical asset allocation decisions by internal investment staff (overweighting and underweighting asset classes around targets) as well as active management on the part of external managers,
- The PSRS and PEERS investment returns for the last five-year time period exceeded 70% of the peer group as defined by the Wilshire TUCS universe of public pension plans with assets in excess of $1 billion,
- Investment performance throughout this report is calculated using a time-weighted rate of return based on market values, and
- The total invested assets of both PSRS and PEERS were approximately $45.3 billion on June 30, 2019, making the combined entity larger than all other public retirement plans in the state combined, and the 44th largest defined benefit plan in the United States.

Fiscal Year 2019 Year in Review

The internal investment staff, under the direction of the PSRS/PEERS' Board of Trustees, has adopted a disciplined and diversified investment portfolio that includes allocations to multiple asset classes. Over time, every specific asset class within the PSRS/PEERS' investment portfolio performs a valuable function.

In fiscal year 2019, the combined asset allocation provided the Systems with solid absolute returns, led by above average returns from bonds (both Treasury and corporate) and reasonable returns from U.S. stocks. The yield on the 10-year Treasury bond declined from 2.9% at the beginning of the fiscal year to 2.0% on June 30, 2019. This sharp drop in yield contributed to a positive absolute return for all bonds. U.S. Treasury bonds (as measured by the Bloomberg Barclays Treasury Index) increased 7.2% for the fiscal year while corporate bonds (as measured by the Bloomberg Barclays Intermediate Credit Index) increased 8.2%. U.S. stocks returned 9.0% for the fiscal year ended June 30, 2019 (as measured by the Russell 3000 Index). In contrast, non-U.S. stocks produced positive (but much lower) returns for the fiscal year. Non-U.S. developed stocks moved 1.1% higher (as measured by the MSCI EAFE Index), and emerging market stocks increased 1.2% (as measured by the MSCI Emerging Markets Index). The PSRS/PEERS non-traditional asset classes provided strong returns in fiscal year 2019. Specifically, the Private Equity program represented 11.4% of total fund assets at fiscal year-end and generated a 15.4% return. Diversification into private real estate, private credit and hedged assets provided meaningful benefits from a risk and return perspective in fiscal year 2019. The Real Estate composite increased 6.5%, the Private Credit composite increased 5.7% and the Hedged Asset composite returned 3.9%.

As noted above, meaningful absolute returns in most of the major asset classes contributed to the 7.0% return for PSRS and PEERS. The investment returns were supported by solid implementation (security selection) decisions while tactical asset allocation moves detracted from performance. For example, the PSRS/PEERS' Non-U.S. Equity portfolio outperformed its benchmark (MSCI All Country World ex U.S. net Index) by 3.3% in fiscal year 2019, while the PSRS/PEERS' Private Equity portfolio outperformed its benchmark (Russell 3000 Index) by 6.4%. From a portfolio construction and tactical standpoint, the internal investment staff maintained an underweight to bonds (both credit and Treasury) throughout the year (due to historically low interest rates and tight credit spreads) and an overweight to hedged assets. This underweight to bonds diminished total fund performance as both

Letter from the Chief Investment Officer, continued

Treasury bonds and credit bonds significantly outperformed hedged assets for the year. As you may recall, this is a reversal of fiscal year 2018 when the Hedged Asset portfolio increased 6.3% while the Safe Assets portfolio (primarily Treasury bonds) earned mildly negative returns.

Fiscal Year 2020: The economy and fundamental PSRS/PEERS principles

As I write this annual letter on December 2, 2019, we are five months into fiscal year 2020 and there are numerous data points that are cause for concern for an investor. We are in the very late stages of an economic cycle (the longest expansion in history), there is angst around the trade war, political turmoil in the U.S., geopolitical challenges abroad and growing concerns of a recession. Additionally, a significant portion of the PSRS/PEERS portfolio is invested in bonds that continue to offer yields at historic low levels.

Despite all the potential negatives, there are continued signs of economic strength around the world, particularly if the U.S. and China reach any sort of meaningful agreement. Therefore, as an institutional investor in an uncertain environment, PSRS/PEERS continue to maintain a highly diversified asset allocation with a long-term focus. The asset allocation is balanced with a significant distribution to return-seeking assets such as stocks and private equity but also a healthy allocation to more defensive investments such as Treasury securities, cash and hedged assets. As the U.S. stock market continues to reach new highs, we believe it is prudent to maintain a structured portfolio that has an opportunity to participate if the markets continue to move higher, but also has substantial downside protection in the event of a market correction.

Fiscal Year 2019: Portfolio structure

The PSRS/PEERS investment portfolio remains grounded in three primary categories: Safe Assets, Public Risk Assets and Private Risk Assets. The Board has adopted an Investment Policy that provides the PSRS/PEERS' internal investment staff and external advisors with the flexibility to deviate from the broad categories, and make changes in each category, within appropriate bands. At times the investment staff has deviated significantly from the target allocation as valuations in specific asset classes were attractive relative to historical pricing. However, as we move into fiscal year 2020, the Systems are relatively close to the long-term target asset allocation. Specifically, staff anticipates very few changes to the Safe Asset and Public Risk categories in fiscal year 2020. The Safe Assets composite is critical (despite very low yields) as the economic cycle gets extended because it ensures that adequate liquidity is available to meet all PSRS and PEERS benefit payments and cash needs for an extended period. Alternatively, a strong allocation to the Public Risk category is necessary to provide PSRS/PEERS exposure to potential market growth.

The Systems Private Risk Assets composite will remain a focus for the investment staff in fiscal year 2020 with the belief that private equity and private credit can produce returns in excess of the expected public market returns over long periods of time. Furthermore, the PSRS and PEERS allocation to private real estate is expected to provide consistent income that offers a premium over traditional fixed income investments. The nature of private investing requires a process of portfolio construction that takes years to develop. This is particularly true for a plan with the substantial assets of PSRS/PEERS.

Over the years, the Systems have continued to build on this successful investment platform that serves as an alternative to traditional public markets. At the close of fiscal year 2019, the Systems had over $9.2 billion invested in Private Risk Assets representing 20.3% of total PSRS/PEERS' assets.

The internal investment staff initiated a private equity co-investment program in 2014 to allow the Systems to make direct investments in private companies alongside private equity managers where PSRS/PEERS has an existing relationship. The investments are compelling because they are executed with no direct investment fees and no performance-based fees. As of June 30, 2019, the Systems had committed $647 million to 56 private co-investment portfolio companies. The portfolio has generated an annualized since inception return of 17.5% through June 30, 2019. As importantly, the program generated total fee savings of approximately $70 million over that time period relative to traditional private equity investments. The internal investment staff will continue the program of private equity co-investing in fiscal year 2020. Additionally, at the October 28, 2019 Board meeting, the Board of Trustees approved a similar direct investment program in the private credit space. That program will be initiated prior to the end of calendar year 2019.

Under the support and guidance of the Board of Trustees, I am confident that the investment program at PSRS/PEERS will continue to provide the Systems with an excellent opportunity to achieve solid investment returns over future economic and capital market environments. Most importantly, I believe the portfolio is well-positioned to ***provide retirement opportunities for tomorrow*** for all PSRS/PEERS' members.

Respectfully,

Craig A. Husting, CFA
Chief Investment Officer

Investment Policy Summary

The Board of Trustees of the Public School Retirement System of Missouri and Public Education Employee Retirement System of Missouri (PSRS and PEERS, also referred to as the Systems) is charged with the responsibility for investing the assets of the Systems in a manner consistent with the fiduciary standards set forth in the 'prudent person' rule. To that end, the Board has adopted the following principles to guide all investment-related decisions:

1. Act in the exclusive interest of the members of the Systems,
2. Maximize total return within prudent risk parameters, and
3. Preserve the long-term purchasing power of the Systems.

The investment portfolios of PSRS and PEERS represent all contributions to the plans, from members and their employers, as well as all net earnings on these assets. These funds are held in support of both current and future liabilities. In total, approximately 60% of every dollar used to pay retirees is generated from investment earnings[1].

The Board of Trustees of PSRS and PEERS approved the commingling of assets for purposes of investment as allowed by state statute in January 2013. In order to implement this change, PSRS and PEERS adopted the Missouri Education Pension Trust Agreement (MEPT), which is managed by the PSRS and PEERS Board of Trustees and Investment Staff. Effective July 1, 2013, the invested assets of the Systems were pooled and invested in MEPT. All assets held by MEPT are for the exclusive benefit of PSRS and PEERS. Each of the Systems has equity in MEPT based on funds contributed and earnings allocated. Earnings of MEPT are allocated based on the average daily balances of each of the respective Systems. Individual investments in MEPT are not specifically identified to the respective Systems. Due to the fact all invested assets are invested in MEPT, the rate of return for each of the Systems is approximately the same. Therefore, the following discussions focus on MEPT in total and not the individual Systems.

Roles and Responsibilities

Board of Trustees

It is the responsibility of the Board of Trustees (Board) to establish and maintain policies and objectives for all aspects of the Systems' investment program including the determination of long-term policies for risk tolerance and asset allocation.

In keeping with its obligation to serve as the governing fiduciary, any changes to the investment policy or investment implementation manuals require the Board's approval.

As one of the largest public pension funds in the United States, the Systems' operational requirements are complex. In order to properly administer the Systems and carry out investment strategies, the Board relies heavily on both internal staff and external service providers. Due to the number of parties involved, their roles as fiduciaries are clearly identified to ensure distinct lines of responsibility and proper controls exist, while providing increased operational efficiency and elimination of duplication of effort.

Executive Director

The Executive Director (Director) is appointed by, and serves at the pleasure of the Board. The Director is responsible for planning, organizing and administering all operations of the Systems under the broad policy guidance and direction of the Board. The Director, with the assistance of the investment staff, monitors the performance of the investment portfolio; ensures that funds are invested in accordance with Board policies; and, ensures that proper internal controls are developed to safeguard the assets of the Systems. In fulfilling these responsibilities, the Director relies heavily on the Chief Investment Officer and external asset consultants.

Chief Investment Officer

The Chief Investment Officer (CIO) serves at the pleasure of the Director yet has a direct, but limited, link to the Board on investment-related issues. The CIO's sole access to the Board is for submission of investment reports, information, or communications required by the investment policy and any other information or opinions specifically requested by the Board with regard to the investment program. The CIO is the individual primarily responsible for providing direction for the investment program. It is the CIO's responsibility to work with the Director, the general consultant, specialty consultants, and other external service providers, with the assistance of the internal staff, in advising the Board on policies related to the investment program. The CIO has responsibilities related to hiring and terminating service providers.

[1] *Based on a twenty-year average for fiscal years 1999-2019.*

Critical functions of the CIO include recommendations for implementation decisions related to the investment plan and for the strategic allocation of the portfolio within broad ranges approved by the Board.

External Asset Consultants

The Systems employ Verus Advisory, Inc. (Verus) as a general consultant and Albourne America, LLC (Albourne), Pathway Capital Management (Pathway) and The Townsend Group (Townsend) as specialty consultants. Verus is an independent resource available to collaborate with the Board and staff on the investment process. This typically includes regular meetings with the Board to provide an independent perspective on the Systems' goals, structure, performance and external service providers. Additionally, Verus may be involved with the strategic allocation shifts for the portfolio.

The specialty consultants work on specific programs within the overall investment program. Albourne is utilized for the Private Credit, Private Equity, Hedged Assets and Alpha Overlay programs. Pathway is a consultant for the Private Equity and Private Credit programs and Townsend consults on the Real Estate program.

External Investment Managers

The Systems employ external investment managers that include external money managers which may be structured as public or private entities in the form of a partnership, limited liability company, trust, separately managed account, commingled account, or some other form of operational structure in which assets may be held by an external custodian selected and monitored by the external manager.

Managers are given explicit written directions detailing their particular assignments or they follow the investment program outlined in their offering documents or Limited Partnership Agreements, and will construct and manage investment portfolios that are consistent with the investment philosophy and disciplines for which they were hired. Discretion is delegated to the managers to carry out investment actions as directed by the Systems.

Master Custodian

JP Morgan Chase Bank, NA (JP Morgan) serves as the master custodian for the Systems. The master custodian holds most cash and securities for the Systems, except in cases where investment in a partnership, commingled account, or unique asset class makes it impossible to do so. The Systems thoroughly evaluate the structure of all investments and their custody arrangements. JP Morgan is responsible for providing the official book of record for investment performance reporting and accounting, and serves as an additional layer of risk control in safekeeping the Systems' assets.

Investment Objective

Based on the long-term investment returns available from a well-diversified, prudently invested portfolio, the Board has adopted an objective to achieve a **total nominal investment return of 7.5% with a real rate of return of at least 5.25% per annum over time**.[2] The Board of Trustees revised the long-term investment return objective to 7.5% effective for fiscal year 2019 investment performance. The investment objective was previously 8.0% effective from 1980 through fiscal year 2016, 7.75% effective for fiscal year 2017, and 7.60% effective for fiscal year 2018.

In order to achieve the investment objective, the Systems have developed a portfolio that is prudently invested across a broad array of assets that reflects the long-term nature of the Systems' pension obligations. The principles of diversification, risk control and competitive rates of return provide the framework for selecting an asset allocation that is expected, over longer periods of time and in the aggregate, to give the Systems the most competitive long-term return within a prudent level of risk.

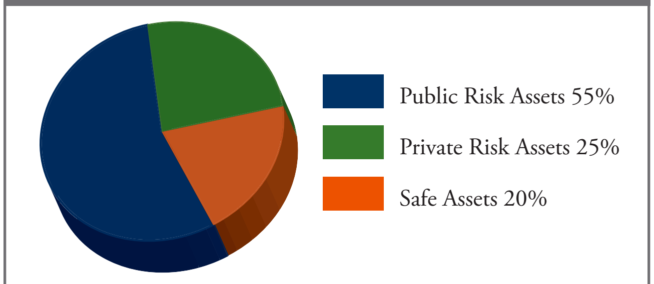
Understanding Risk

Selection of an appropriate asset allocation is one of the most important decisions made by a retirement plan. Within that asset allocation, it is important to not only consider the expected investment return, but also to understand the risks. The importance of risk consideration for institutional investors is critical to long-term success. To that end, the Systems employ an effective and intuitive risk-based approach to setting and reporting the asset allocation decision. The Systems developed a risk-based asset allocation to clearly define the prudent risks taken within its investment portfolios. The Systems consider a variety of risks including, but not limited to, liquidity risk, volatility, tail risk (the possibility that an investment will move much more than expected) and the ability to meet the Systems' assumed rate of return when structuring the portfolio.

[2] *The real rate of return is the rate by which the long-term total return exceeds the long-term inflation rate. The Board of Trustees shall employ an actuarial consultant for purposes of determining the inflation rate to be used in calculating the pension obligations. The assumed inflation rate as of June 30, 2019 was 2.25% per annum.*

This analysis results in an asset allocation to Public Risk Assets, Safe Assets and Private Risk Assets. Within each risk allocation, the Systems' investment portfolio includes long-term commitments to specific asset programs. The target risk-based asset allocation is illustrated in the pie chart below. The Board of Trustees increased the Private Risk Assets target in 2016 by 5% and proportionately decreased the Public Risk Assets target. These changes are discussed further in the following Asset Allocation section.

Target Risk-Based Asset Allocation



Asset Allocation

The asset allocation decision is generally regarded as the most important decision in the investment management process since it is crucial to achieving the long-term objectives established by the Board. In that light, it is the Board's responsibility to determine the appropriate policy asset allocation based upon several criteria with input and guidance from internal staff and Verus. These criteria are as follows:

1. The expected rate of return for each asset classification;
2. The expected risk of each asset classification (expressed as the standard deviation of the rate of return);
3. The correlation of returns between asset types;
4. The investment objectives and risk constraints of the Systems (including, but not limited to, liquidity needs and the expected time horizon);
5. The funded ratio and cash flow requirements for PSRS and PEERS; and
6. The impact of the Systems' return volatility on the contribution rate.

The Board of Trustees amended the long-term target asset allocation at the June 2016 Board of Trustees meeting. The allocation to each investment program considers both the risk tolerance of the Systems and the long-term return objective. The new long-term target asset allocation is expected to maintain similar levels of total portfolio risk while allowing for more efficient investment returns. However, given the nature of investing in Private Risk assets, it is expected to take several years to implement. Implementation will be achieved over a number of years through a disciplined investment approach. The policy benchmarks will change over time as the Systems make meaningful progress to the new long-term targets. The changes to the asset allocation are as follows: Public Risk Assets decreased 5% and Private Risk Assets increased 5%. Within Public Risk Assets, Public Credit decreased from 12% to 7%. Within Private Risk Assets, Private Equity increased from 10.5% to 12%, Real Estate increased from 7.5% to 9% and Private Credit increased from 2% to 4%.

The following chart details the long-term target and interim target asset allocations for fiscal year 2019. The interim policy allocations have been established to reflect the continued funding of Private Risk Assets and progress towards the Systems' long-term asset allocation objective. For performance measurement purposes, the interim policy will serve as the basis for establishing the Total Fund policy benchmark until the on-going process of funding Private Risk investments is meaningfully complete.

Target Asset Allocation and Policy Ranges				
	Fiscal Year 2019 Interim		As Amended in 2016	
Investment Type	**Long-Term Target**	**Policy Ranges**	**Long-Term Target**	**Policy Ranges**
Public Risk Asset Programs				
U.S. Public Equity	27.00%	16% - 48%	27.00%	16% - 48%
Public Credit	12.00%	0% - 20%	7.00%	0% - 20%
Hedged Assets	6.00%	0% - 25%	6.00%	0% - 25%
Non-U.S. Public Equity	15.00%	8% - 28%	15.00%	8% - 28%
Total Public Risk Assets	**60.00%**	**35% - 75%**	**55.00%**	**35% - 75%**
Safe Assets Programs				
U.S. Treasuries	16.00%	0% - 40%	16.00%	0% - 40%
U.S. TIPS	4.00%	0% - 40%	4.00%	0% - 40%
Cash & Cash Equivalents	0.00%	0% - 10%	0.00%	0% - 10%
Total Safe Assets	**20.00%**	**10% - 40%**	**20.00%**	**10% - 40%**
Private Risk Asset Programs				
Private Equity	10.50%	4% - 14%	12.00%	4% - 15%
Private Real Estate	7.50%	4% - 10%	9.00%	4% - 12%
Private Credit	2.00%	0% - 7%	4.00%	0% - 8%
Total Private Risk Assets	**20.00%**	**5% - 25%**	**25.00%**	**10% - 30%**
Total Fund	**100.0%**		**100.0%**	

The Board recognizes the cyclical nature of the investment markets and it has allowed the internal staff to capitalize upon opportunities by changing the allocation of each asset class or sub-asset class within broad strategic bands or policy ranges (as indicated in the previous table). The flexibility given to the internal staff in establishing the strategic mix provides opportunities for the Systems to take advantage of changing market conditions. To ensure appropriate controls, the Director, CIO and Verus must unanimously agree upon all material strategic changes prior to implementation.

Performance Objectives and Monitoring Process

Generating a total nominal rate of return net of expenses of at least 7.5% and a real rate of return net of expenses of at least 5.25% per annum is an important consideration in the asset allocation decision and the primary performance objective for the Systems over long periods of time. The need for a long-term focus is necessary to preclude the temptation to overreact to events in the financial markets that have no relevance to long-term asset/liability management of the Systems. The resulting dilemma is the conflicting requirement to evaluate investment policy implementation over shorter time periods while maintaining a long-term focus on meeting the return objectives. In order to determine if the Systems' short-term and long-term objectives are being achieved, the Board evaluates performance relative to policy and strategic benchmarks. The policy benchmarks allow the Systems to be judged by performance relative to a defined set of broad market indices (i.e., the Systems' long-term asset allocation objective). The strategic benchmarks allow the Board to consider the additional value generated from the latitude given to the internal staff to alter the asset class or sub-asset class allocations.

Policy Decisions

The value added through policy decisions is measured by the difference between the policy benchmark return and the actuarial required rate of return objective (defined as Real Return Objective + Inflation). A policy benchmark return greater than the actuarial required rate of return reflects value added. A policy benchmark return less than the actuarial required rate of return reflects losses or shortfalls in performance in funding the liabilities of the Systems. These policy decisions are measured over long periods of time.

Strategy Decisions

Strategy decisions are asset class or sub-asset class asset allocation choices made by the internal staff to deviate from the policy benchmark weights, with approval from Verus and the Director that the proposed material deviation is in compliance with the Board's investment policy. The value added through these decisions to overweight and/or underweight these sub-asset classes is measured by the difference between the strategic benchmark return and the policy benchmark return. This difference captures the value added by internal staff through asset class or sub-asset class strategic decisions relative to the Board's broad policy allocation decisions. A strategic benchmark return greater than the policy benchmark return reflects value added through the allocation decisions. A strategic benchmark return less than the policy benchmark return reflects losses to the fund's performance based upon strategy decisions.

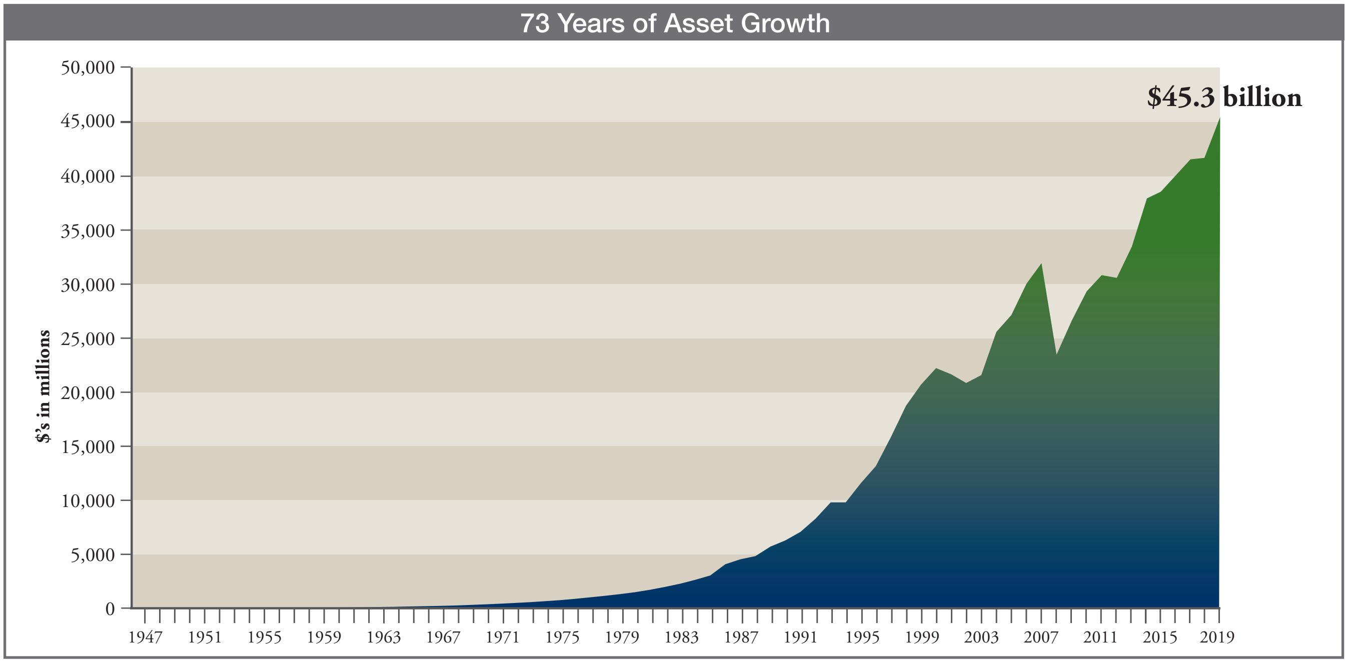
Implementation Decisions

Implementation decisions are manager selection choices made by the internal staff with the approval of a consultant(s) and the Director. The value added through these manager selection decisions is measured by the difference between the actual portfolio return and the strategic benchmark return. An actual portfolio return greater than the strategic benchmark return reflects value added through these manager selection decisions. An actual portfolio return less than the strategic benchmark return reflects losses to the fund's performance based upon implementation decisions.

Risk Controls

The Board recognizes that even though the Systems' investments are subject to short-term volatility, it is critical that a long-term investment focus be maintained. Given the importance of the broad asset allocation decision to the Systems' long-term investment success, internal staff is required to conduct an asset allocation/liability study at least every five years to examine the appropriate long-term investment strategies for the Systems. The most recent asset/liability study was conducted in fiscal year 2016 and the next study is scheduled for 2020. In addition, the CIO must annually evaluate the asset allocation mix and any strategic allocation of the portfolio and provide a report to the Board on the results of that evaluation. This ongoing review of the asset allocation process helps to ensure the asset allocation is being monitored and modified as needed to meet the financial obligations of the Systems.

Total Fund Review



The Systems' total invested assets were $45.3 billion as of June 30, 2019. There has been a long-term growth in assets since the inception of PSRS in 1946 and PEERS in 1965, as shown in the graph above.

Investment Performance[3]

The Systems earned an investment return of 7.0% for fiscal year 2019 (6.9% net of all investment expenses and fees) with an ending market value of invested assets at $45.3 billion. The Systems' well-structured investment portfolio added approximately $2.9 billion in investment earnings to the growth of assets during the year.

As illustrated in the table below, all asset classes produced positive returns for the year. Private Risk Assets produced the strongest returns for the year as Private Equity performed especially well returning 15.4%. Public Risk Assets and Safe Assets also did well overall for the year driven by positive returns from both equity markets and fixed income markets with U.S. Public Equities returning 7.4% and U.S. Treasuries returning 7.3%. Each of these asset classes strongly contributed to the Systems' investment return of 7.0% for the year.

Total Fund Performance

Investment Program	Total Return	Weighted Contribution
U.S. Public Equity	7.4%	2.1%
Public Credit	8.1%	0.4%
Hedged Assets	3.9%	0.5%
Non-U.S. Public Equity	4.6%	0.7%
Public Risk Assets	**6.0%**	**3.7%**
U.S. Treasuries	7.3%	0.9%
U.S. TIPS	4.7%	0.1%
Cash & Cash Equivalents	2.9%	0.1%
Safe Assets	**6.1%**	**1.1%**
Private Equity	15.4%	1.7%
Private Real Estate	6.5%	0.5%
Private Credit	5.7%	0.0%
Private Risk Assets	**11.3%**	**2.2%**
TOTAL RETURN	**7.0%**	**7.0%**

[3] *Investment returns were prepared using a time-weighted rate of return based on market values.*

Investment Performance Relative to Benchmarks*

	Fiscal Year	3-Year	5-Year	10-Year
Public Risk Assets Program				
U.S. Public Equity	**7.4%**	**13.3%**	**9.5%**	**14.7%**
Russell 3000 Index	9.0%	14.0%	10.2%	14.7%
Public Credit	**8.1%**	**3.9%**	**3.4%**	**5.2%**
Bloomberg Barclays U.S. Intermediate Credit Index	8.2%	3.0%	3.1%	4.8%
Hedged Assets	**3.9%**	**6.6%**	**4.3%**	**8.0%**
Hedged Assets Benchmark	7.0%	7.5%	4.8%	7.9%
Benchmark consists of:				
50.0% Bloomberg Barclays U.S. Intermediate Credit Index				
25.0% MSCI ACWI ex-USA net Index				
25.0% Russell 3000 Index				
Non-U.S. Public Equity	**4.6%**	**10.9%**	**5.1%**	**8.7%**
MSCI ACWI ex-USA net Index	1.3%	9.4%	2.2%	6.8%
Total Public Risk Assets	**6.0%**	**10.5%**	**6.8%**	**10.7%**
Public Risk Assets Policy Benchmark	7.0%	10.1%	6.3%	10.2%
Benchmark consists of:				
47.5% Russell 3000 Index				
27.5% MSCI ACWI ex-USA net Index				
25.0% Bloomberg Barclays U.S. Intermediate Credit Index				
Safe Assets Program				
Total Safe Assets	**6.1%**	**1.4%**	**2.0%**	**2.8%**
Safe Assets Policy Benchmark	6.7%	1.6%	2.3%	3.0%
Benchmark consists of:				
80.0% Bloomberg Barclays U.S. Treasury Index				
20.0% Bloomberg Barclays U.S. TIPS 1-10 Years Index				
Private Risk Assets Program				
Private Equity	**15.4%**	**18.3%**	**14.5%**	**16.0%**
Russell 3000 Index	9.0%	14.0%	10.2%	14.7%
Private Real Estate	**6.5%**	**8.2%**	**9.8%**	**10.0%**
NFI-ODCE Index	5.5%	6.6%	8.6%	8.2%
Private Credit	**5.7%**	**13.7%**	**5.6%**	**11.5%**
ICE BofAML U.S. High Yield Master II Index	7.6%	7.5%	4.7%	9.2%
Total Private Risk Assets	**11.3%**	**13.6%**	**12.0%**	**13.2%**
Private Risk Assets Policy Benchmark	8.0%	10.8%	9.3%	11.9%
Benchmark consists of:				
52.5% Russell 3000 Index				
37.5% NFI-ODCE Index				
10.0% ICE BofAML U.S. High Yield Master II Index				
TOTAL FUND				
Total Fund	**7.0%**	**9.4%**	**6.9%**	**9.9%**
Total Fund Policy Benchmark	7.3%	8.6%	6.2%	9.1%
Benchmark consists of:				
39.0% Russell 3000 Index				
16.5% MSCI ACWI ex-USA net Index				
16.0% Bloomberg Barclays U.S. Treasury Index				
15.0% Bloomberg Barclays U.S. Intermediate Credit Index				
7.5% NFI-ODCE Index				
4.0% Bloomberg Barclays U.S. TIPS 1-10 Years Index				
2.0% ICE BofAML U.S. High Yield Master II Index				
Actuarial Required Rate of Return **	7.5%	7.6%	7.8%	7.9%
TUCS Universe Median	6.8%	9.4%	6.5%	9.8%

**Investment returns were prepared using a time-weighted rate of return based on market values.*

***The Board of Trustees revised the long-term investment return objective from 7.6% to 7.5% effective for fiscal year 2019 investment performance. The extended time periods reflect the blended returns of the historical actuarial required rates of return.*

Investment Performance Relative to Benchmarks

The Board has established a long-term objective (actuarial required rate of return) to achieve a total investment return of at least 7.5% per year and a real rate of return of at least 5.25% per year. As discussed in the Investment Objective section, the long-term objective was revised to 7.5% effective for fiscal year 2019. The fiscal year 2019 total plan return of 7.0% fell short of the long-term objective. However, over long periods of time, PSRS and PEERS continue to produce investment returns that meet or exceed the Systems' objective. The annualized investment return for the Systems is 8.3% (8.1% net of all investment expenses and fees) over the last 30 years. The reduction in the long-term objective are based on capital market expectations and the belief that expected investment returns going forward will be lower than historical returns.

As previously discussed, in order to determine if the Systems' short-term and long-term objectives are being achieved, the Board utilizes three benchmarks by which the Systems' progress may be judged: (1) performance relative to a **policy benchmark** (defined set of broad market indices that reflects the Systems' long-term asset allocation, or market beta), (2) performance relative to a **strategic benchmark** which indicates value added by the internal staff, and, to a lesser extent, (3) performance relative to other public pension systems and their investment managers as a reference point of oversight.

The internal staff presents to the Board a detailed attribution of the total fund performance at the end of each fiscal year. Value is added over and above expected market returns if the strategic benchmark exceeds the policy benchmark (i.e., the internal staff made positive strategic decisions) and/or if the actual total fund return exceeds the strategic benchmark. The Statistical Performance section on the following page shows that for all extended time periods the total fund return exceeded the strategic benchmark and the strategic benchmark has either met or exceeded the policy benchmark demonstrating added value by Internal Staff through strategic asset allocation decisions and implementation decisions.

The fiscal year 2019 return of 7.0% underperformed the policy benchmark return of 7.3% by 30 basis points. However, the total fund return has exceeded the policy benchmark in seven of the last ten fiscal years, an indication that internal staff and active investment management have added value to the Systems. Over the past five years, the total fund return has exceeded the policy benchmark by 73 basis points, on an annualized basis, resulting in over $1.3 billion in excess performance (net of all investment expenses and fees) to the Systems.

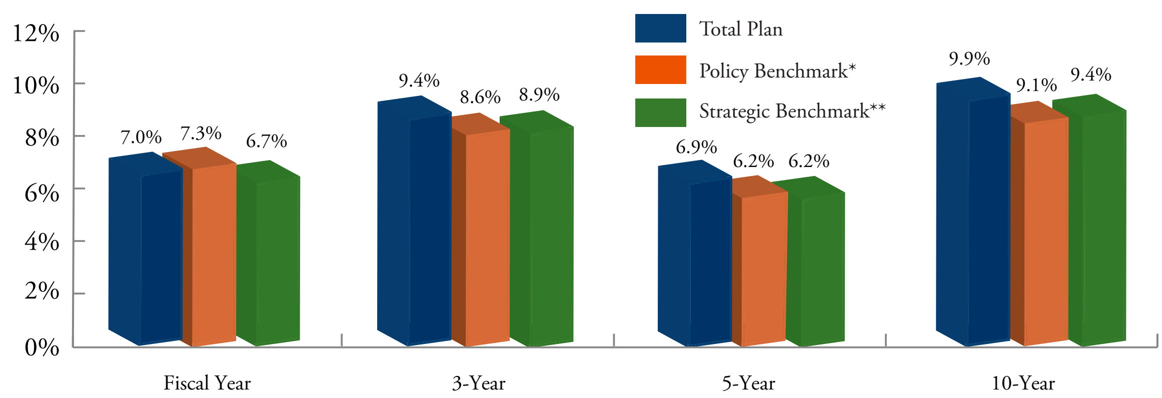
The Systems' utilize the Trust Universe Comparison Services (TUCS) to compare the total return and risk levels of the Systems relative to other public pension funds with assets in excess of $1 billion. As the chart on page 68 indicates, the total fund return for the one-year, five-year and ten-year time periods exceeded the median return of other large public funds while the three-year return was equal to the public fund median return. The systems have taken substantially less risk than comparable funds during all time periods yet have consistently provided higher investment returns.

Statistical Performance

One of the primary investment objectives of the Systems is to achieve returns similar to the market but at lower risk or volatility levels. To that end, internal staff monitors a number of quantitative risk statistics related to the total investment portfolio as well as individual composites. The following table indicates that the Systems have taken less risk than the policy benchmark (as measured by standard deviation) over all time periods while achieving higher returns, thereby indicating strong risk-adjusted performance.

Beta measures the volatility, or systematic risk, of a security or portfolio in comparison to the market as a whole. If a portfolio has a beta of 1.0, it indicates that the portfolio moves in unison with the market. The Systems' portfolios have a beta of less than 1.0 relative to the policy benchmark, indicating less market volatility. The Systems' beta relative to the all country world stock index (MSCI ACWI net Index) is approximately 0.50. This signifies that the Systems' portfolio moves up or down approximately half as much as the world stock index.

Total Plan Performance



Total Plan Statistical Performance

Portfolio Characteristics	Fiscal Year	3-Year	5-Year	10-Year
Annualized Total Plan Return	7.0%	9.4%	6.9%	9.9%
Annualized Policy Benchmark Return*	7.3%	8.6%	6.2%	9.1%
Annualized Strategic Benchmark Return**	6.7%	8.9%	6.2%	9.4%
Excess Return	-0.3%	0.8%	0.7%	0.8%
Annualized Standard Deviation of Composite	8.1%	5.3%	5.5%	6.6%
Annualized Standard Deviation of Policy Benchmark*	10.2%	6.5%	6.6%	7.4%
Beta to Policy Benchmark*	0.79	0.81	0.82	0.88
Beta to MSCI ACWI net Index	0.47	0.46	0.45	0.48

**As of June 30, 2019: 39.0% Russell 3000 Index, 16.5% MSCI ACWI ex-USA net Index, 16% Bloomberg Barclays U.S. Treasury Index, 15% Bloomberg Barclays U.S. Intermediate Credit Index, 7.5% NFI-ODCE, 4% Bloomberg Barclays U.S. TIPS 1-10 Years Index, and 2% ICE BofAML U.S. High Yield Master II Index.*

***As of June 30, 2019: 41.9% Russell 3000 Index, 18.9% MSCI ACWI ex-USA net Index, 12.6% Bloomberg Barclays U.S. Treasury Index, 10.4% Bloomberg Barclays U.S. Intermediate Credit Index, 8.2% NFI-ODCE, 3.7% Merrill Lynch 3- Month U.S. Treasury Bill Index, 3.3% Bloomberg Barclays U.S. TIPS 1-10 Years Index, and 1.0% ICE BofAML U.S. High Yield Master II Index. The Total Plan Strategic Benchmark changes monthly based on the actual asset allocation at the end of the previous month.*

The following chart shows the relationship between market value returns, the actuarially assumed rate of return and the utilization of an actuarial asset valuation method of smoothed assets. To reduce volatility in employer and employee contribution rates, a common actuarial practice of "asset smoothing" is utilized. The application of this practice results in full recognition of returns at the actuarial assumed rate and recognizes any annual excess or deficiency relative to the assumed rate over a period of five years.

Investment Rates of Return

**The Actual Rate of Return (market return) consists of all investment gains and losses (net of investment expenses) on the fair market value of assets each year.*

***The Actuarial Assumed Rate of Return is the assumed rate of return on the actuarial value of assets and is used in establishing contribution rates and pension obligations, including the net pension liability.*

****Investment earnings in excess or deficient of the assumed rate of return are smoothed over a 5-year period for actuarial funding purposes. Twenty percent of the excess or deficiency is recognized annually for a 5-year period. This calculation results in the Smoothed Rate of Return.*

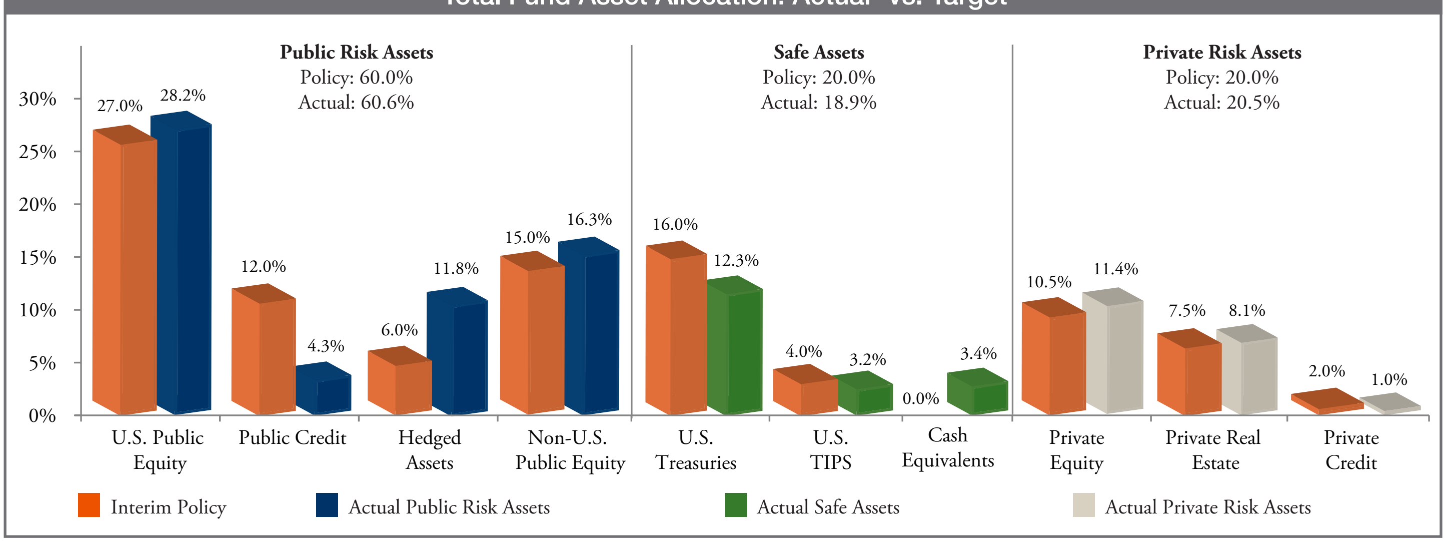
Asset Allocation: Actual Versus Target

The interim policy allocations have been established to reflect meaningful progress towards the new long-term targets and for policy benchmark weights, as discussed in the Investment Policy Summary: Asset Allocation section. Until meaningful progress is made, the interim target will reflect the prior long-term policy allocations.

For fiscal year 2019 the interim policy allocation was 60% Public Risk Assets, 20% Safe Assets and 20% Private Risk Assets. Within each broad policy target, the Board has established sub-asset class targets. For example, as the chart below indicates, the target allocation to U.S. Public Equity was 27% as of June 30, 2019.

As illustrated in the chart, internal staff utilized the flexibility built into the investment policy to strategically overweight or underweight certain asset classes throughout the year. Strategic decisions within the Public Risk Assets program included an overweight to U.S. equities and Non-U.S. equities which provided meaningful returns to the Systems in fiscal year 2019.

Total Fund Asset Allocation: Actual* vs. Target



**Total Plan assets include 0.2% invested in an operating cash account that is not reflected in the chart above.*

Public Risk Assets Summary

As of June 30, 2019, Public Risk assets had a fair value of approximately $27.5 billion, representing 60.6% of total plan assets.

Investment Program Description

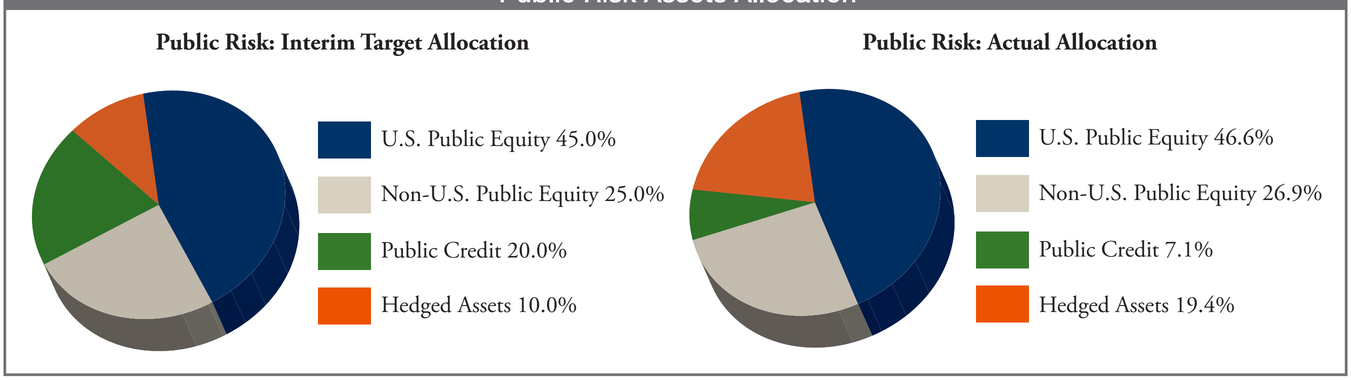
The Board of Trustees has adopted an asset allocation policy that includes a significant allocation to Public Risk Assets. The four programs within the Public Risk Asset composite are U.S. Public Equity, Public Credit, Hedged Assets and Non-U.S. Public Equity. Each program within the Public Risk allocation is a separate multi-manager composite that is treated generally as a single portfolio. Each program serves a specific and distinct role within the overall Public Risk composite and also within the overall total plan allocation. Over time, the Public Risk composite and its sub-components serve as an effective and efficient vehicle to supply the underlying beta exposure to a portfolio of global risk assets required by the Systems' asset allocation policy, while providing the opportunity to achieve excess returns above that of a passive benchmark through the prudent combination of passive investment vehicles and a wide range of active investment strategies.

Structure

As of June 30, 2019, 46.6% of the Systems' Public Risk assets were invested in the U.S. Public Equity program, 26.9% in the Non-U.S. Public Equity program, 7.1% in the Public Credit program and 19.4% in the Hedged Assets program. Each of these programs is discussed in more detail on the following pages.

The internal staff decreased the total plan's overweight to Public Risk assets during the year. The interim target allocation for Public Risk assets during fiscal year 2019 was 60.0% and the Systems' allocation at the end of the fiscal year was 60.6%, down from the prior year overweight of 63.4%. Internal staff strategically rebalanced from Public Risk assets during fiscal year 2019. Within the Public Risk assets composite, internal staff continued to overweight U.S. Public Equity, Non-U.S. Public Equity, and Hedged Assets while increasing an underweight to Public Credit throughout the fiscal year.

Public Risk Assets Allocation



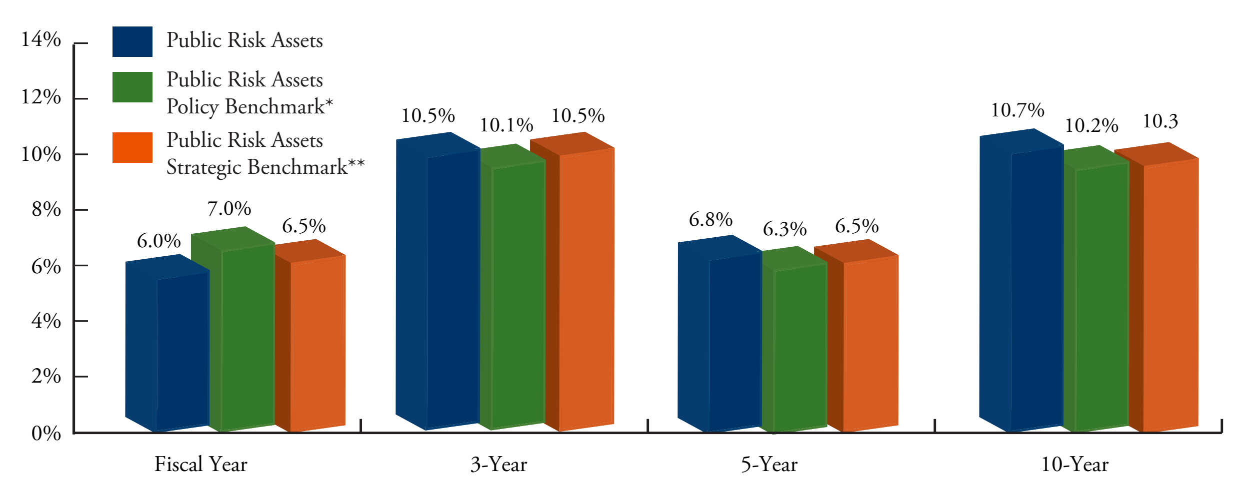
Market Overview

Financial markets performed well overall for fiscal year 2019 however there was significant volatility from economic and geopolitical uncertainty throughout the year. The Russell 3000 Index (broad measure of the U.S. stock market) was up 9.0% for the year and the MSCI ACWI ex-USA Index (broad measure of the international stock markets) increased 1.3%. Bond markets performed very well from declining interest rates resulting in an 8.2% return for the Public Credit benchmark (Bloomberg Barclays U.S. Intermediate Credit Index).

Performance

The total return for the Systems' Public Risk portfolio was 6.0% which underperformed the policy benchmark by 100 basis points. However, as shown in the table and graph below, the Systems' Public Risk composite returns have outperformed the benchmark over the extended time periods. The positive performance of the portfolio relative to the policy benchmark indicates substantial value added by the internal staff through both strategic asset allocation decisions and manager selection decisions.

Public Risk Assets Performance



Public Risk Assets Statistical Performance

Portfolio Characteristics	Fiscal Year	3-Year	5-Year	10-Year
Annualized Return	6.0%	10.5%	6.8%	10.7%
Annualized Policy Benchmark Return*	7.0%	10.1%	6.3%	10.2%
Annualized Strategic Benchmark Return**	6.5%	10.5%	6.5%	10.3%
Excess Return	-1.0%	0.4%	0.5%	0.5%
Annualized Standard Deviation of Composite	13.3%	8.6%	8.7%	10.0%
Annualized Standard Deviation of Policy Benchmark*	13.7%	8.8%	9.0%	10.2%
Beta to Policy Benchmark*	0.98	0.97	0.96	0.98
Beta to MSCI ACWI net Index	0.77	0.75	0.73	0.73

**The Public Risk Assets Policy Benchmark is composed as follows: 47.5% Russell 3000 Index, 27.5% MSCI ACWI ex-USA net Index, 25.0% Bloomberg Barclays U.S. Intermediate Credit Index.*

*** The Public Risk Assets Strategic Benchmark changes monthly based on the actual asset allocation at the end of the previous month.*

The table indicates that the Systems have taken less risk relative to the policy benchmark (as measured by standard deviation) while achieving higher returns over the longer-term time periods, thereby indicating strong risk-adjusted performance. Additionally, the Systems' portfolios have a beta of less than 1.0 relative to the policy benchmark, indicating less market risk.

U.S. Public Equity Program Summary

As of June 30, 2019, the U.S. Public Equity assets had a fair value of approximately $12.8 billion, representing 28.2% of total plan assets.

Investment Program Description

U.S. Public Equity is comprised of the Large-Cap, Small-Cap and Alpha Overlay programs which seek to provide long-term capital appreciation and dividend income in excess of inflation through the investment in domestic equity securities. Returns above a purely passive investment benchmark are targeted through the use of a wide variety of active investment strategies that may employ exposure to both equity securities and other types of investments. The primary ***beta*** exposure is achieved through investments in passive investment vehicles (including derivatives), traditional long-only active domestic equity management, and active long/short approaches. ***Alpha*** (or, excess returns above a passive alternative) is expected to be achieved through traditional long-only active domestic equity management, active long/short approaches and alpha overlay strategies (described in greater detail at the end of this section).

Structure

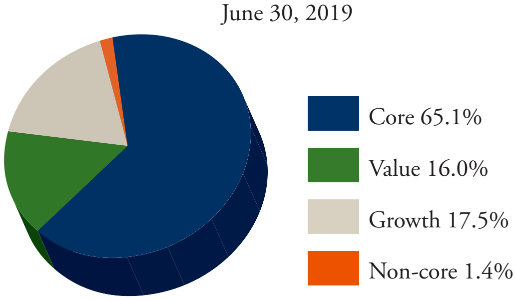
As of June 30, 2019, 23.3% of the U.S. Public Equity composite was passively managed. The remainder of the portfolio was actively managed and diversified across a broad array of capitalization ranges and investment styles, including the Small-Cap and the Alpha Overlay program. Both programs represent multi-manager pools of assets managed within the overall U.S. Public Equity structure. The Small-Cap program encompasses small capitalization assets. The Alpha Overlay composite focuses on the separation of returns into alpha and beta, and encompasses alternative equity mandates including hedge fund portfolios.

Exposure to the various segments of the domestic equity market (i.e., growth-oriented, value-oriented, and core) and to the approved investment strategy types are achieved through the identification, selection and on-going management of SEC-registered investment advisors qualified to serve as fiduciaries to the Systems.

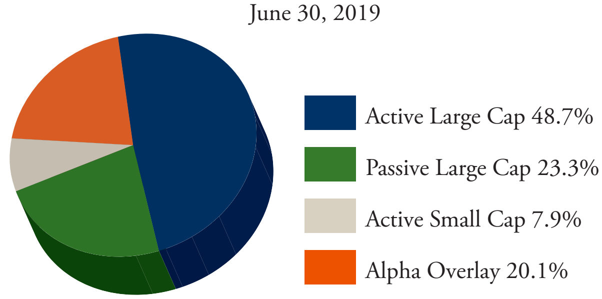
The pie charts below depict the U.S. Public Equity portfolio by presenting the current style structure of the portfolio as well as the allocation by composite and market sector.

U.S. Public Equity Allocations: Style and Composite

Style Allocation
June 30, 2019



Composite Allocation
June 30, 2019



Market Overview

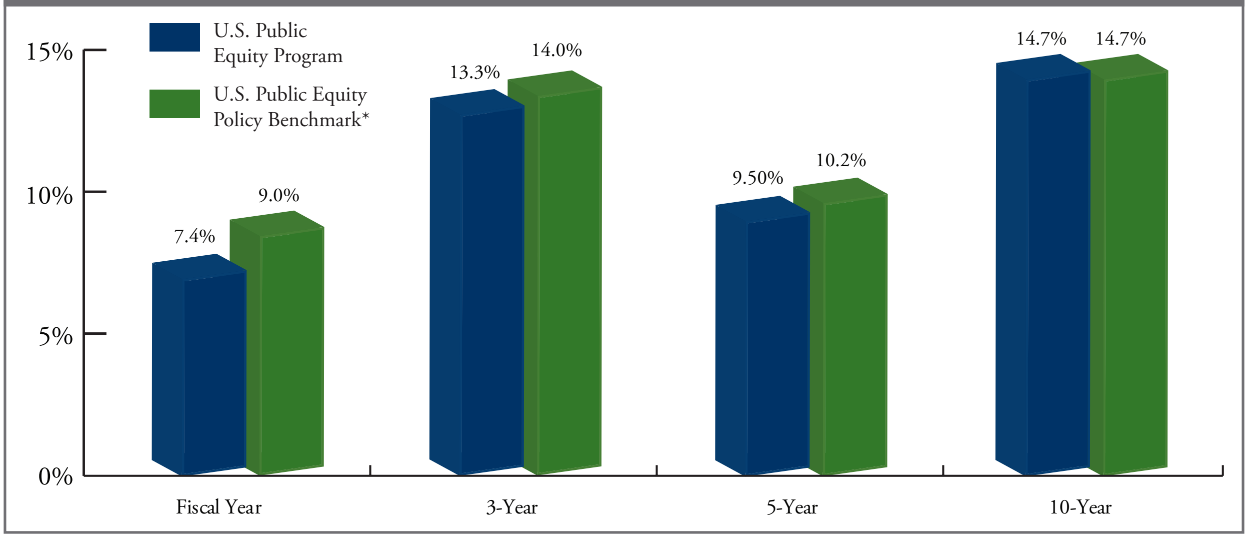
The U.S. equity markets performed well overall for fiscal year 2019 despite significant volatility throughout the year. For the year, large cap stocks performed especially well in comparison to small cap stocks while growth styles outperformed value styles. The comprehensive measure of the U.S. stock market (Russell 3000 Index) increased 9.0% while large-cap stocks (Russell 1000) increased 10.0% and small-cap stocks (Russell 2000 Index) decreased 3.3% for the year. Large-cap growth stocks (Russell 1000 Growth Index) outperformed large-cap value stocks (Russell 1000 Value Index) with a return of 11.6% compared to 8.5% while small-cap growth stocks (Russell 2000 Growth Index) outperformed small cap value stocks (Russell 2000 Value Index) with a return of -0.5% compared to -6.2%.

Performance

The total return for the U.S. Public Equity program was 7.4% compared to the benchmark return of 9.0% for the fiscal year ended June 30, 2019. Within the U.S. Public Equity program, the Large-Cap program returned 8.3%, Alpha Overlay returned 9.5% and the Small-Cap program returned -4.0% for the year.

As indicated in the table and graph, the U.S. Public Equity portfolio has produced strong absolute returns for all reported time periods. Over longer periods of time, the Systems' U.S. Public Equity portfolio is designed to deliver approximately 50-100 basis points of excess return through a combination of active and passive investment strategies.

U.S. Public Equity Performance



U.S. Public Equity Statistical Performance

Portfolio Characteristics	Fiscal Year	3-Year	5-Year	10-Year
U.S. Public Equity Return	7.4%	13.3%	9.5%	14.7%
Annualized Policy Benchmark Return*	9.0%	14.0%	10.2%	14.7%
Excess Return	-1.6%	-0.7%	-0.7%	0.0%

**The U.S. Public Equity Policy Benchmark is the Russell 3000 Index.*

Statistics

The following table displays the statistical characteristics of the Systems' U.S. Public Equity program as of June 30, 2019 with comparisons shown to the portfolio's policy benchmark. In addition, the top ten U.S. Public Equity holdings as of June 30, 2019 are shown in the table following the characteristics.

U.S. Public Equity Characteristics

Characteristics	June 30, 2019 Systems' U.S. Public Equity Program*	June 30, 2019 Russell 3000 Index
Number of Securities	2,173	2,954
Dividend Yield	1.3%	1.8%
Price-to-Earnings Ratio	17.0	19.9
Avg. Market Capitalization	$ 140.4 bil	$ 207.3 bil
Price-to-Book Ratio	3.0	3.2

** Includes only actively managed separate accounts.*

A complete list of portfolio holdings is available upon request.

U.S. Public Equity - Top 10 Holdings

Top 10 Largest Holdings* June 30, 2019		Fair Value	% of Total U.S. Public Equity
Amazon.com Inc.	$	139,403,360	1.1%
Microsoft Corp.		124,236,781	1.0%
Alphabet Inc.		105,537,152	0.8%
Facebook Inc.		92,611,436	0.7%
Apple Inc.		91,518,010	0.7%
Johnson & Johnson		73,897,372	0.6%
Medtronic PLC.		72,670,373	0.6%
Coca-Cola Co.		71,314,631	0.6%
Cisco Systems Inc.		63,439,021	0.5%
Exact Sciences Corp.		57,323,647	0.4%
TOTAL	**$**	**891,951,783**	**7.0%**

Investment Advisors

As of June 30, 2019, the Systems had contracts with 18 external investment advisors who managed 27 portfolios that comprised 79.9% of the U.S. Public Equity portfolio. The remaining 20.1% of the portfolio was in the Alpha Overlay program described in the next section. The Systems repositioned the Large-Cap program during the year by terminating two mandates and adding new mandates with Coatue Long Only Partners, Davis Advisors, Grantham, Mayo, Van Otterloo & Co., Rock Springs Capital, Russell Investments, and Select Equity Group. The Systems repositioned the Small-Cap program during the year by terminating two mandates and adding new mandates with Martingale Asset Management, NISA Investment Advisors, Russell Investments, and Systematic Financial Management.

U.S. Public Equity Investment Advisors

Investment Advisor	Investment Style	Fair Value As of June 30, 2019	% of Total Plan Fair Value
Analytic Investors	Structured Large Cap Value	$ 149,315,832	0.3%
Analytic Investors	U.S. Low Volatility Equity	1,214,504,011	2.7%
AQR Capital Management	Large Cap 140/40 Core	713,063,412	1.6%
Aronson + Johnson + Ortiz	Active Large Cap 130/30 Value	432,166,479	1.0%
Aronson + Johnson + Ortiz	Active Large Cap Value	144,726,082	0.3%
Blackrock	Passive Russell 1000 Index	2,984,188,946	6.6%
Coatue Long Only Partners	Active Industry Specific	206,214,738	0.4%
Davis Selected Advisers	Active Industry Specific	214,630,907	0.5%
Grantham, Mayo, Van Otterloo & Co.	Active US Equity Concentrated	514,759,355	1.1%
Lazard Asset Management	Active US Equity Concentrated	320,285,670	0.7%
Martingale Asset Management	Active Large Cap 130/30 Growth	545,501,395	1.2%
Rock Springs Capital	Active Industry Specific	83,641,629	0.2%
Russell Investments	Active Large Cap Core	351,486,394	0.8%
Select Equity Group	Active US Equity Concentrated	119,955,586	0.3%
Westwood Management	Active Large Cap Value	453,955,794	1.0%
Westwood Management	Master Limited Partnerships	143,564,717	0.3%
Zevenbergen Capital	Active All Cap Growth	632,365,830	1.4%
Large-Cap Subtotal		**9,224,326,777**	**20.4%**
Allianz	Active Micro Cap Growth	123,630,979	0.3%
Allianz	Active Ultra Micro Cap Growth	39,799,623	0.1%
AQR Capital Management	Active Small Cap Core	120,215,848	0.3%
Blackrock	Passive Russell 2000 Index	113,996,160	0.2%
Chartwell Investment Partners	Active Small Cap Value	100,232,409	0.2%
Martingale Asset Management	U.S. Low Volatility Equity	141,512,854	0.3%
NISA Investment Advisors	Active Small Cap Growth	72,799,521	0.2%
NISA Investment Advisors	Enhanced Russell 2000 Index	62,965,360	0.1%
Russell Investments	Passive Small Cap Growth	84,578,494	0.2%
Systematic Financial Management	Active Small Cap Value	145,260,611	0.3%
Small-Cap Subtotal		**1,004,991,859**	**2.2%**
Total		**$ 10,229,318,636**	**22.6%**

Alpha Overlay Program Summary

As of June 30, 2019, the Alpha Overlay allocation had a fair value of approximately $2.6 billion, representing 5.6% of total plan assets.

Investment Program Description

The Alpha Overlay portfolio resides within the U.S. Large-Cap Equity program. The Alpha Overlay portfolio has been constructed to assist in meeting the long-term goals established for the overall U.S. Large-Cap Equity allocation. Specifically, Alpha Overlay provides broad exposure to large-cap U.S. stocks using S&P 500 total return swaps, while the returns of a select portfolio of hedge fund strategies provides the opportunity to earn excess returns above the passive S&P 500 Index. By combining the market exposure obtained through the S&P 500 total return swaps with the diversified exposures to investment strategies focused on alpha generation, the combined portfolio is constructed and managed to produce a return stream with volatility and beta characteristics similar to the passive S&P 500 Index, while generating excess returns (or alpha) of approximately 200-250 basis points over longer periods of time.

Structure

As of June 30, 2019, 20.0% of the Alpha Overlay composite assets were passively managed by NISA Investment Advisors using S&P 500 total return swaps to attain equitization. An additional 73.3% of the portfolio was actively managed across a diversified range of multi-strategy and market neutral hedge fund mandates. The remaining 6.7% of the portfolio was actively managed by Zevenbergen Capital in a long-only mandate. The chart below displays the specific investment advisor exposure within the composite as of June 30, 2019.

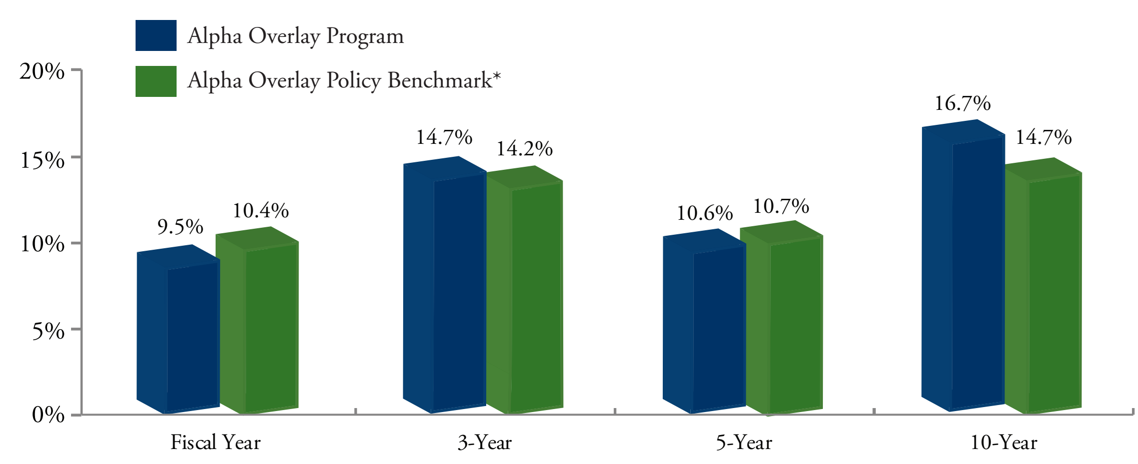
Alpha Overlay Investment Advisors

Investment Advisor	Investment Style	Fair Value As of June 30, 2019	% of Total Plan Fair Value
Analytic Investors	Relative Value	$ 28,406,574	0.1%
AQR Absolute Return Fund	Relative Value	147,121,273	0.3%
Bridgewater Pure Alpha II	Asset Allocation/Global Macro	357,248,995	0.8%
Carlson Black Diamond	Relative Value	150,362,990	0.3%
Davidson Kempner Institutional Partners	Event Driven	278,533,023	0.6%
HBK Capital Management	Relative Value	217,624,113	0.5%
NISA Investment Advisors	S&P 500 Exposure	515,894,368	1.1%
Och-Ziff Domestic Partners	Multi-Strategy	164,972,344	0.3%
Pershing Square	Activist Equity	74,846,504	0.2%
Renaissance Institutional Equities Fund	Low Volatility Equity	365,317,328	0.8%
Stark Investments Limited Partners	Equity Long/Short	1,169,561	0.0%
UBS O'Connor Multi-Strategy Alpha	Relative Value	99,285,450	0.2%
Zevenbergen Capital	Active All-Cap Growth	171,820,613	0.4%
Total		**$ 2,572,603,136**	**5.6%**

Performance

The fiscal year 2019 return for the Alpha Overlay program was 9.5% underperforming the benchmark return of 10.4% by 90 basis points. As shown in the table and graph below, the Alpha Overlay composite has produced significant long-term absolute and relative returns while maintaining a risk profile (standard deviation and beta) lower than the benchmark.

Alpha Overlay Performance



Alpha Overlay Statistical Performance

Portfolio Characteristics	**Fiscal Year**	**3-Year**	**5-Year**	**10-Year**
Annualized Alpha Overlay Return	9.5%	14.7%	10.6%	16.7%
Annualized Policy Benchmark Return*	10.4%	14.2%	10.7%	14.7%
Excess Return	-0.9%	0.5%	-0.1%	2.0%
Annualized Standard Deviation of Composite	15.5%	10.1%	10.2%	12.0%
Annualized Standard Deviation of Policy Benchmark*	19.0%	12.2%	12.0%	12.7%
Beta to Benchmark*	0.81	0.82	0.83	0.92

**The Alpha Overlay Policy Benchmark is the S&P 500 Index.*

Non-U.S. Public Equity Program Summary

As of June 30, 2019, the Non-U.S. Public Equity assets had a fair value of approximately $7.4 billion, representing 16.3% of total plan assets.

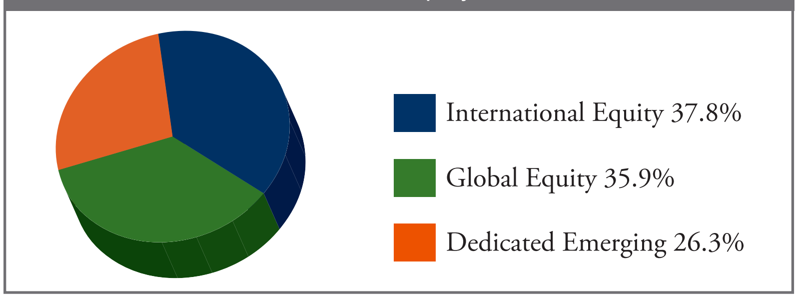
Investment Program Description

The Non-U.S. Public Equity program provides long-term capital appreciation and dividend income in excess of inflation through exposure to public equity securities on a global basis. Specific investment strategies approved for the Non-U.S. Public Equity program include passive investment vehicles, traditional long-only active equity management and active long/short approaches. Exposure to the various segments of the global equity market (i.e., U.S., developed non-U.S., emerging, growth-oriented, value-oriented, and core) and to the approved investment strategy types are achieved through the identification, selection and on-going management of SEC-registered investment advisors qualified to serve as fiduciaries to the Systems. The Non-U.S. Public Equity portfolios provide an element of diversification relative to the domestic equity portfolios. Currency is an aspect of international investing that can impact the performance and volatility of the asset class over the short-term. However, over the long-term, the effect from currency is expected to be neutral.

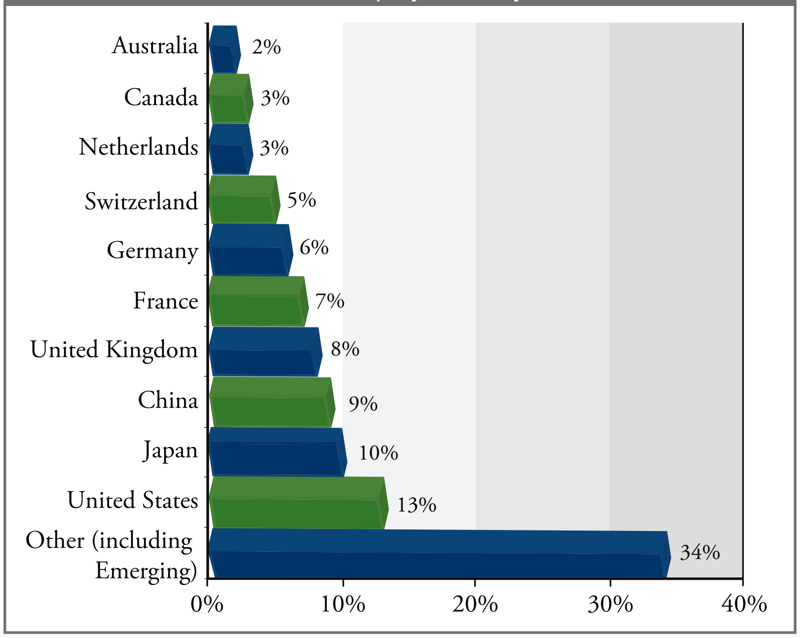
Structure

As of June 30, 2019, 6.0% of the Non-U.S. Public Equity composite was passively managed. The remainder of the portfolio was actively managed and diversified across capitalization ranges, styles and a number of developed and emerging market countries. The bar graph displays the specific country exposure within the composite while the pie chart indicates broader exposure by investment mandate.

Non-U.S. Public Equity Allocation



Non-U.S. Public Equity Country Allocation



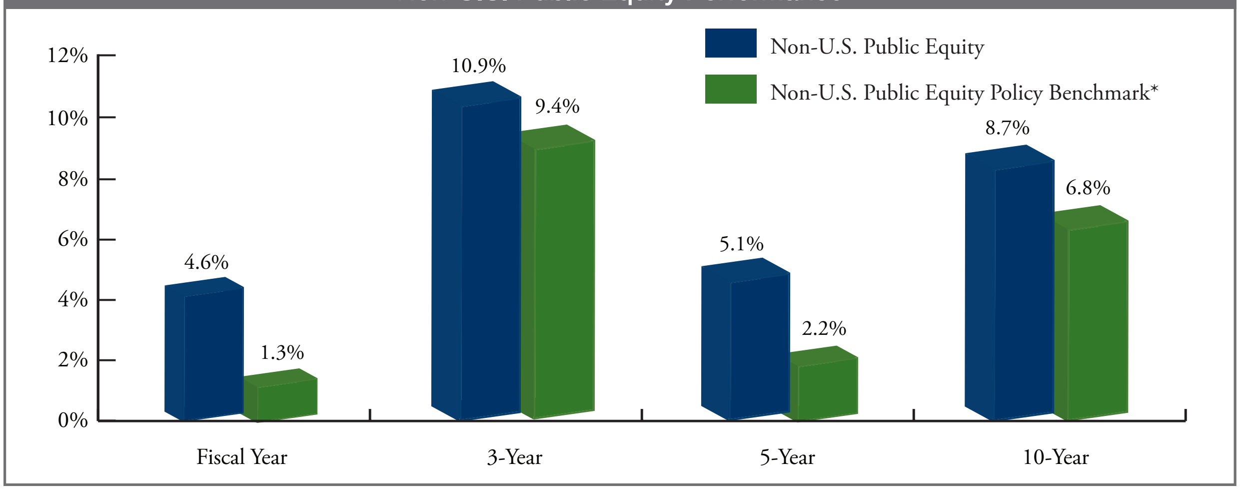
Market Overview

Stock markets throughout the world experienced significant volatility in fiscal year 2019 including a sharp sell-off in the 4th quarter of calendar year 2018 followed by a strong rebound in the 1st quarter of calendar year 2019. For example, the MSCI World net Index dropped by 13.4% in the 4th quarter of calendar year 2018 followed by an increase of 12.5% for the 1st quarter of calendar year 2019. Overall for the fiscal year ended June 30, 2019 equity markets were positive. Global stocks (MSCI World net Index) increased 6.3% outperforming international markets (MSCI EAFE net Index) increasing 1.1% and emerging markets (MSCI EM net Index) increasing 1.2%.

Performance

The total return for the Non-U.S. Public Equity program was 4.6% compared to the benchmark return of 1.3% for the fiscal year ended June 30, 2019. As shown in the table and graph below, the Systems' Non-U.S. Public Equity composite returns substantially outperformed the benchmark in all time periods. Over long periods of time, the Systems' Non-U.S. Public Equity program is designed to deliver approximately 100-150 basis points of excess returns through a combination of active and passive investment strategies. The long-term excess returns have exceeded these expectations.

Non-U.S. Public Equity Performance



Non-U.S. Public Equity Statistical Performance

Portfolio Characteristics	**Fiscal Year**	**3-Year**	**5-Year**	**10-Year**
Annualized Non-U.S. Public Equity Return	4.6%	10.9%	5.1%	8.7%
Annualized Policy Benchmark Return*	1.3%	9.4%	2.2%	6.8%
Excess Return	3.3%	1.5%	2.9%	1.9%

**The Non-U.S. Public Equity Benchmark is the MSCI ACWI ex-USA net Index.*

Statistics

The following table displays the top ten Non-U.S. Public Equity holdings as of June 30, 2019.

Non-U.S. Public Equity - Top 10 Holdings		
Top 10 Largest Holdings* June 30, 2019	**Fair Value**	**% of Total Non-U.S. Public Equity**
Roche Holding AG	$ 97,174,832	1.3%
Nestle SA	69,682,166	0.9%
SAP SE	61,959,068	0.8%
AIA Group Ltd.	55,817,035	0.8%
Hoya Corp.	53,343,792	0.7%
LVMH SE	45,301,725	0.6%
Schneider Electric SE	41,857,869	0.6%
Tata Consultancy Services Ltd.	40,813,700	0.6%
Canadian National Railway Co.	37,766,317	0.5%
Novo Nordisk A/S	37,331,353	0.5%
Total	**$ 541,047,857**	**7.3%**

** Includes only actively managed separate accounts.*

A complete list of portfolio holdings is available upon request.

Investment Advisors

As of June 30, 2019, the Systems had contracts with 12 external investment advisors who managed 17 portfolios within the Non-U.S. Public Equity portfolio. In fiscal year 2019 an international small cap mandate with Acadian and an emerging markets mandate with Blackrock were added to the portfolio.

Non-U.S. Public Equity Investment Advisors			
Investment Advisor	**Investment Style**	**Fair Value As of June 30, 2019**	**% of Total Plan Fair Value**
Acadian Asset Management	Active Emerging Markets	$ 545,275,874	1.2%
Acadian Asset Management	Active Intl Small Cap	97,649,385	0.2%
AllianceBernstein Institutional Mgmt.	Active Intl Value	343,994,688	0.7%
Analytic Investors	Active Global	800,355,586	1.8%
AQR Capital Management	Active Intl Core	539,894,192	1.2%
Arrowstreet Capital	Active Emerging Markets	248,222,868	0.5%
Arrowstreet Capital	Active Global	782,291,378	1.7%
Arrowstreet Capital	Global Long/Short	1,070,921,770	2.4%
Blackrock	Passive Intl Core	344,662,673	0.8%
Blackrock	Passive Emerging Markets	99,738,421	0.2%
Coronation Asset Management Limited	Active Emerging Markets	333,969,120	0.7%
Invesco	Active Intl Low Volatility	214,365,912	0.5%
MFS Investment Management	Active Intl Core	991,080,507	2.2%
MFS Investment Management	Active Intl Concentrated Core	265,075,956	0.6%
Neon Capital Management	Active Emerging Markets	124,875,736	0.3%
NISA Investment Advisors	Currency Hedge	(7,618,286)	0.0%
Rock Creek Group	Active Emerging Markets	590,839,270	1.3%
Total		**$ 7,385,595,050**	**16.3%**

Public Credit Program Summary

As of June 30, 2019, the Public Credit assets had a fair value of approximately $2.0 billion, representing 4.3% of total plan assets.

Investment Program Description

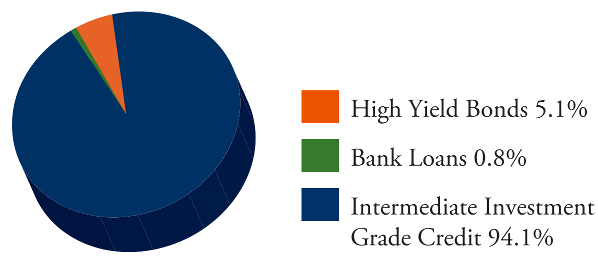
The Public Credit program is designed to provide a source of income and capital appreciation for the Systems while creating substantial diversification to the total plan with a low correlation to other asset classes. Most securities in this program exhibit high liquidity. Specific investments can include investment grade corporate securities, below investment grade debt instruments, distressed debt securities, convertible bonds, bank loans, agencies, mortgage-backed securities, asset-backed securities, and interest rate sensitive securities (including those issued or guaranteed by the United States government or its agencies). Investments in this program may include debt of both U.S. and non-U.S. issuers.

The performance objective for the Public Credit program is to exceed the returns of the investment grade credit markets through the use of a wide variety of active management approaches while incurring a level of risk that is generally consistent with the policy benchmark.

Structure

As of June 30, 2019, the Public Credit composite was actively managed and diversified across high quality corporate bonds and high yield bonds. The Systems' internal staff has built a diversified Public Credit portfolio with a base of high-quality corporate bonds. The following pie chart presents the strategy allocation of the Systems' Public Credit assets as of June 30, 2019.

Public Credit Allocation



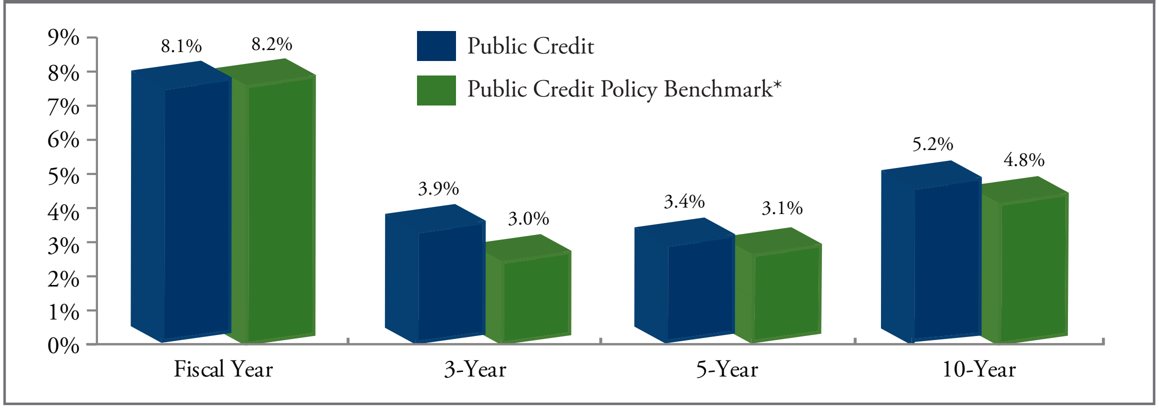
Market Overview

Credit markets performed very well during the year as a result of a decline in yields across the major fixed income segments. During the year, investment grade credit and high yield bonds outperformed Treasuries as the yield on the 10-year Treasury decreased to 2.0% on June 30, 2019 from 2.9% on June 30, 2018. Investment grade credit corporate bonds (Bloomberg Barclays U.S. Intermediate Credit Index) increased by 8.2% and a broader measure of the U.S. bond market (Bloomberg Barclays U.S. Aggregate Index) increased by 7.9% for the year. High yield, or lower quality bonds (ICE BofAML U.S. High Yield Master II Index) increased 7.6% for the year and global bonds (Bloomberg Barclays Global Agg. Ex-US Index) increased 4.1%.

Performance

The Public Credit program produced strong absolute returns for fiscal year 2019. The fiscal year return of 8.1% was below the benchmark return of 8.2% by 10 basis points as a result of the program's lower duration floating rate structure. As indicated in the table and graph, the Public Credit portfolio has produced moderate relative returns for the extended time periods. Over long periods of time, the Systems' Public Credit program is designed to deliver approximately 50-100 basis points of excess return through a combination of active and passive strategies.

Public Credit Performance



Public Credit Statistical Performance

Portfolio Characteristics	Fiscal Year	3-Year	5-Year	10-Year
Annualized Public Credit Return	8.1%	3.9%	3.4%	5.2%
Annualized Policy Benchmark Return*	8.2%	3.0%	3.1%	4.8%
Excess Return	-0.1%	0.9%	0.3%	0.4%

**The Public Credit Policy Benchmark is the Bloomberg Barclays U.S. Intermediate Credit Index.*

Statistics

The following table displays the top ten Public Credit holdings as of June 30, 2019.

Public Credit - Top 10 Holdings

Top 10 Largest Holdings* June 30, 2019	Fair Value	% of Total Public Credit
United States Treasury Note, 2.375%, 05/15/2029	$ 52,992,752	2.7%
Transcontinental Gas Pipe Line Co. LLC, 7.85%, 02/01/2026	42,199,517	2.2%
Alabama Power Co., 2.45%, 03/30/2022	39,823,271	2.0%
Coca-Cola FEMSA, 3.875%, 11/26/2023	36,356,999	1.9%
Contineneta Resources Inc., 4.5%, 04/15/2023	32,360,944	1.7%
Morgan Stanley, Floating, 01/20/2022	30,316,800	1.5%
Cintas Corp No. 2, 3.25%, 06/01/2022	29,821,954	1.5%
Anheuser-Busch Inbev, 3.70%, 02/01/2024	28,260,104	1.4%
American Express Co., 3.40%, 02/27/2023	27,945,764	1.4%
Glaxosmithkline Capital Inc., 3.375%, 05/15/2023	27,516,192	1.4%
Total	**$ 347,594,297**	**17.7%**

**A complete list of portfolio holdings is available upon request.*

Investment Advisors

As of June 30, 2019, the Systems had contracts with three external investment advisors who managed three portfolios in the Public Credit program. The Systems repositioned the Public Credit program during the year by winding down the Oaktree Bank Loans portfolio.

Public Credit Investment Advisors

Investment Advisor	Investment Style	Fair Value As of June 30, 2019	% of Total Plan Fair Value
NISA Investment Advisors	Corporate Credit	$ 1,846,950,970	4.1%
Oaktree Bank Loans	Senior Bank Loans	16,345,480	0.0%
Pacific Investment Management Co.	High Yield	100,825,891	0.2%
Total		**$ 1,964,122,341**	**4.3%**

Hedged Assets Program Summary

As of June 30, 2019, the Hedged Assets portfolio had a fair value of approximately $5.3 billion, representing 11.8% of total plan assets.

Investment Program Description

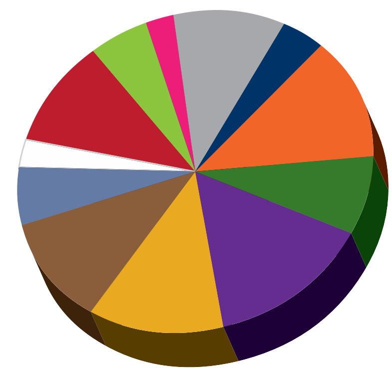
The Hedged Assets program's objective is to provide diversification to the total portfolio and reduce volatility within the Public Risk composite. The purpose of this program is to enhance the overall risk/return profile of the Public Risk composite through the inclusion of specialized investment strategies that typically generate returns in a different fashion (i.e., absent a high correlation to equities or bonds). These strategies may utilize leverage as allowed within their governing documents. The returns from these strategies have historically had a low-to-moderate correlation with the traditional equity markets, thus providing diversification benefits in addition to portfolio return enhancement. These strategies seek to control risks and maintain a focus on absolute returns. The inherent nature of these vehicles to serve as a "hedge" provides for the expectation that the program will lag the equity market during times when equities are performing above the long-term averages. However, when equities are performing below the long-term averages, the program would be expected to outperform the equity market. In addition, managers within this asset class have historically possessed significantly lower volatility relative to traditional equity managers.

Structure

The Systems have retained Albourne America, LLC (Albourne) as its hedged asset consultant. Albourne is an independent global advisory firm with a significant focus on hedge funds. The Systems utilize direct investments into hedge funds as opposed to incorporating fund-of-funds. The Systems' internal staff believes the benefits of direct investments, including lower fees, customized portfolio exposures, direct access to manager knowledge, and higher levels of transparency outweighed the benefit of quicker implementation offered by fund-of-funds.

The following chart indicates the strategy diversification of the Hedged Assets program as of June 30, 2019. The Systems manage the Hedged Assets portfolio to a blended benchmark of 25% Russell 3000 Index, 25% MSCI ACWI ex-USA net Index, and 50% Bloomberg Barclays U.S. Intermediate Credit Index.

Hedged Assets Diversification

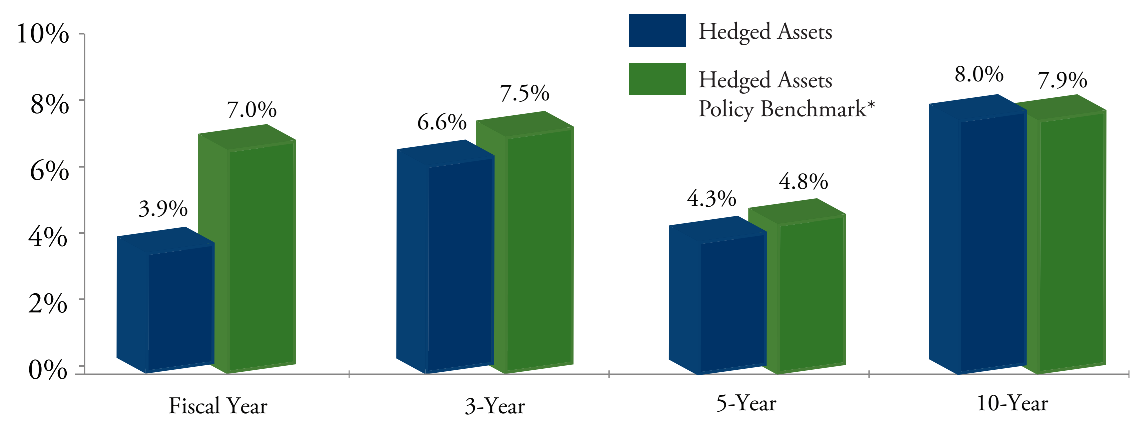


Performance

The total annualized return on the Systems' Hedged Assets portfolio was 3.9%, compared to the benchmark return of 7.0% for the fiscal year ended June 30, 2019.

Over the past ten years, the Hedged Assets program has slightly outperformed its policy benchmark of 7.9%. The performance relative to the policy benchmark is particularly significant given the strong performance of equities over this time period. The Russell 3000 and S&P 500 Indexes were both up an annualized 14.7% over the past ten years and the MSCI ACWI net Index was up an annualized 10.2%. As discussed previously, the hedging characteristics of the Hedged Assets program provide for the expectation that its performance will lag equity markets and/or its policy benchmark during periods of higher-than-normal equity returns. The Hedged Assets program is expected to outperform in more normal and down markets. As the table indicates, the longer-term performance was accomplished by assuming less than one-half of the volatility of the all country world stock index and achieving a beta of approximately 0.40 to the index, signifying that the Systems' portfolio moves up or down less than half as much as the world stock index.

Hedged Assets Performance



Hedged Assets Statistical Performance

Portfolio Characteristics	Fiscal Year	3-Year	5-Year	10-Year
Annualized Hedged Assets Return	3.9%	6.6%	4.3%	8.0%
Annualized Policy Benchmark Return*	7.0%	7.5%	4.8%	7.9%
Annualized S&P 500 Return	10.4%	14.2%	10.7%	14.7%
Annualized MSCI ACWI net Index	5.7%	11.6%	6.2%	10.2%
Annualized Standard Deviation of Composite	4.8%	3.5%	4.0%	5.6%
Annualized Standard Deviation of Policy Benchmark*	9.2%	6.0%	6.3%	7.3%
Annualized Standard Deviation of S&P 500	19.0%	12.2%	12.0%	12.7%
Annualized Standard Deviation of MSCI ACWI net Index	17.3%	11.3%	11.8%	13.5%
Beta to Policy Benchmark*	0.48	0.49	0.54	0.68
Beta to S&P 500	0.22	0.23	0.26	0.36
Beta to MSCI ACWI net Index	0.26	0.27	0.28	0.36

**The Hedged Assets Policy Benchmark is composed as follows: 50% Bloomberg Barclays U.S. Intermediate Credit Index, 25% MSCI ACWI ex-USA net Index, 25% Russell 3000 Index.*

Investment Advisors

As of June 30, 2019, the Systems had contracts with 17 external investment advisors who managed 25 portfolios. During the fiscal year one investment mandate was terminated.

Hedged Assets Investment Advisors			
Investment Advisor	**Investment Style**	**Fair Value As of June 30, 2019**	**% of Total Plan Fair Value**
AQR Absolute Return Fund	Relative Value	$ 195,021,222	0.4%
AQR Adaptive Multi-Strategy	Risk Parity	282,368,933	0.6%
AQR Diversified Beta Fund	Risk Parity	74,457,379	0.2%
AQR Real Asset Fund	Inflation Protection	47,420,987	0.1%
Bridgewater All Weather	Risk Parity	196,539,930	0.4%
Bridgewater Inflation Pool	Inflation Protection	78,051,917	0.2%
Bridgewater Pure Alpha II	Asset Allocation/Global Macro	608,288,808	1.4%
Bridgewater Pure Alpha Major Markets	Asset Allocation/Global Macro	6,112,638	0.0%
Carlson Black Diamond	Relative Value	100,241,993	0.2%
Davidson Kempner Institutional Partners	Event Driven	278,533,023	0.6%
Davidson Kempner Distressed Opportunities Fund	Distressed Debt/Credit	259,839,819	0.6%
GoldenTree Partners	Distressed Debt/Credit	524,212,383	1.2%
HBK Capital Management	Relative Value	217,624,113	0.5%
Hillhouse China Value Fund	Long-Biased Equity	146,242,705	0.3%
Indus Asia Pacific Fund	Equity Long/Short	97,038,646	0.2%
Maverick Fund USA	Equity Long/Short	135,344,923	0.3%
NISA Investment Advisors	Custom Beta	550,213,444	1.2%
Och-Ziff Domestic Partners	Multi-Strategy	306,377,210	0.7%
Och-Ziff Europe	Multi-Strategy	794,267	0.0%
Owl Creek Overseas Fund	Event Driven	109,371,371	0.3%
Renaissance Institutional Equities Fund	Low Volatility Equity	678,446,466	1.5%
Stark Investments Limited Partners	Equity Long/Short	2,172,043	0.0%
UBS O'Connor Multi-Strategy Alpha	Relative Value	148,928,186	0.3%
Westwood Management	Income Focused/Quality	283,795,836	0.6%
York Capital Management	Event Driven	15,938,231	0.0%
Total		**$ 5,343,376,473**	**11.8%**

Safe Assets Summary

As of June 30, 2019, the Safe Assets had a fair value of approximately $8.6 billion, representing 18.9% of total plan assets.

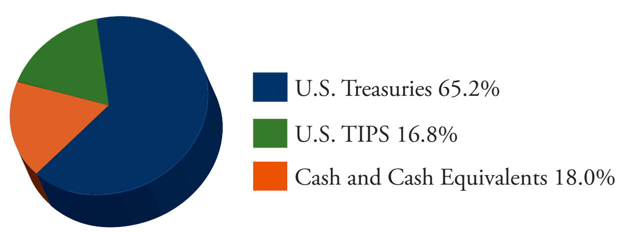
Investment Program Description

The Safe Assets program is intended to act as a source of safety and income for the Systems. The program is designed to create substantial diversification to the total portfolio and reduce volatility through low correlation to other asset classes. Specifically, the Safe Assets portfolio should provide asset protection at the total fund level in periods of economic stress.

Structure

As of June 30, 2019, NISA Investment Advisors was the only external investment manager within the Safe Assets program. Additionally, the Safe Assets program includes an FDIC insured interest-bearing account with a competitive yield at J.P. Morgan. The assets held within the program exhibit high liquidity and safety. The pie chart below depicts the Safe Assets program by showing the composite allocations as of June 30, 2019.

Safe Assets Allocation



The Systems' slightly increased its allocation to Safe Assets from 18.3% as of June 30, 2018 to 18.9% as of June 30, 2019.

Market Overview

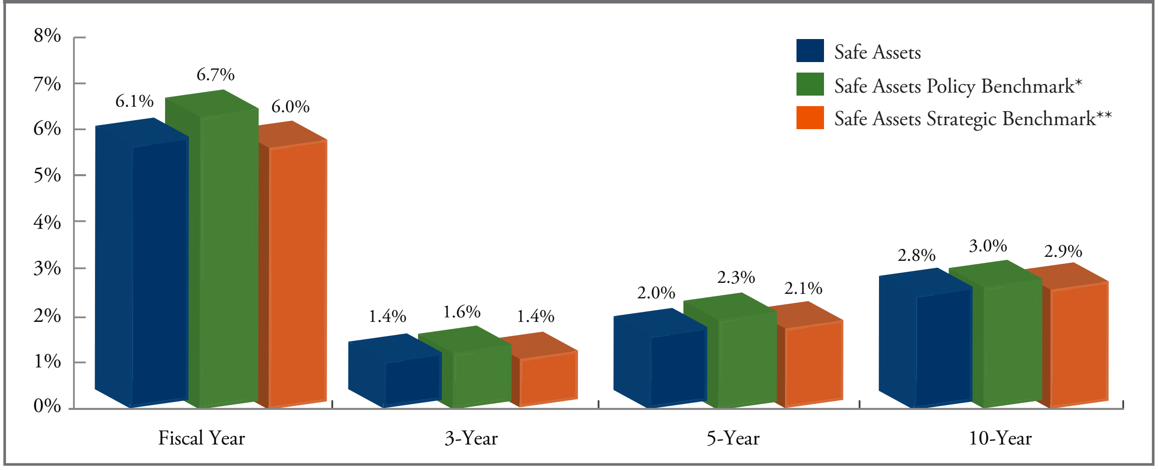
The Treasury markets produced very strong returns for year as the yield on the 10-year Treasury decreased to 2.0% on June 30, 2019 from 2.9% on June 30, 2018. Treasury yields ended the year lower across the curve as investors sought lower risk assets and the Federal Reserve signaled a willingness to be accommodative with future rate cuts. The decrease in interest rates throughout the year positively impacted the price of Treasuries. The comprehensive measure of the U.S. Treasuries market (Bloomberg Barclays U.S. Treasuries Index) increased 7.2% while the TIPS market (Bloomberg Barclays U.S. TIPS 1-10 Year) increased 4.7% for the year.

Performance

The total return for Safe Assets portfolio was 6.1% producing a strong absolute return for the fiscal year ended June 30, 2019. The portfolio underperformed the Safe Assets benchmark for the year by 60 basis points as a result of the lower duration allocations to cash and cash equivalents within the portfolio.

The absolute return of the Safe Assets portfolio is relatively modest over longer time periods. However, the Safe Assets portfolio continues to provide asset protection at the total fund level in periods of economic stress and ultimate liquidity to the Systems. An allocation to Safe Assets allows the Systems to accept market risk in other portions of the total fund portfolio.

Safe Assets Performance



Safe Assets Statistical Performance

Portfolio Characteristics	Fiscal Year	3-Year	5-Year	10-Year
Annualized Safe Assets Return	6.1%	1.4%	2.0%	2.8%
Annualized Policy Benchmark Return*	6.7%	1.6%	2.3%	3.0%
Annualized Strategic Benchmark Return**	6.0%	1.4%	2.1%	2.9%
Excess Return	-0.6%	-0.2%	-0.3%	-0.2%
Annualized Standard Deviation of Composite	2.9%	2.7%	2.7%	2.8%
Annualized Standard Deviation of Policy Benchmark*	3.5%	3.0%	3.0%	3.0%
Beta to Policy Benchmark*	0.84	0.89	0.90	0.92
Beta to MSCI ACWI net Index	-0.04	-0.03	-0.05	-0.06

**The Safe Assets Policy Benchmark is composed as follows: 80.0% Bloomberg Barclays U.S. Treasury Index and 20.0% Bloomberg Barclays U.S. TIPS 1-10 Yrs. Index.*

***The Safe Assets Strategic Benchmark changes monthly based on the actual asset allocation at the end of the previous month.*

The Systems have specifically taken less risk compared to the policy benchmark due to the inclusion of the cash and cash equivalents portfolios. Additionally, the Safe Assets program has a beta slightly less than 1.0 relative to the policy benchmark over all time periods, indicating less market volatility. Most importantly, the Safe Asset portfolio exhibits a beta of approximately zero relative to the all country world stock index (MSCI ACWI net Index) over longer time periods, indicating no correlation to risk assets. These statistics support one of the primary objectives of Safe Assets: diversification from other risk assets in the total fund.

Statistics

The following table displays the statistical characteristics of the Systems' Safe Assets program as of June 30, 2019 with comparisons shown to the Bloomberg Barclays U.S. Treasury Index. Additionally, the top ten Safe Asset holdings as of June 30, 2019 are shown in the table below the characteristics.

Safe Assets Characteristics

Characteristics	June 30, 2019 Systems' Safe Assets Program	June 30, 2019 Bloomberg Barclays U.S. Treasury Index
Number of Securities	110	257
Average Coupon	2.1%	2.4%
Yield to Maturity	1.7%	1.9%
Average Maturity (Years)	5.9	7.6
Duration (Years)	5.1	6.3

Safe Assets - Top 10 Holdings

Top 10 Largest Holdings* June 30, 2019	Fair Value	% of Total Safe Assets
United States Treasury Note, 2.50%, 05/31/2020	$ 415,258,248	4.9%
United States Treasury Note, 2.50%, 01/31/2021	311,121,395	3.6%
United States Treasury Note, 1.625%, 05/15/2026	209,215,645	2.5%
United States Treasury Note, 2.00%, 02/15/2025	208,577,837	2.4%
United States Treasury Note, 2.875%, 08/15/2028	195,208,280	2.3%
United States Treasury Note, 1.375%, 08/31/2020	191,386,812	2.2%
United States Treasury Note, 2.375%, 04/30/2020	190,732,213	2.2%
United States Treasury Note, 1.50%, 02/28/2023	178,865,717	2.1%
United States Treasury Note, 1.75%, 05/31/2022	177,642,167	2.1%
United States Treasury Note, 1.25%, 10/31/2021	165,754,389	1.9%
Total	**$ 2,243,762,703**	**26.2%**

**A complete list of portfolio holdings is available upon request.*

Investment Advisors

NISA Investment Advisors was the only external investment advisor within the Safe Assets program who managed three portfolios as of June 30, 2019. The Safe Assets program also includes an interest-bearing cash account with the Systems' master custodian J.P. Morgan.

Safe Assets Investment Advisors

Investment Advisor	Investment Style	Fair Value As of June 30, 2019	% of Total Plan Fair Value
NISA Investment Advisors	U.S. Treasuries	$ 5,575,626,023	12.3%
NISA Investment Advisors	U.S. TIPS	1,439,284,196	3.2%
NISA Investment Advisors	Cash Equivalents	1,277,979,364	2.8%
J.P. Morgan	Interest Bearing Cash Account	258,129,688	0.6%
Total		**$ 8,551,019,271**	**18.9%**

Private Risk Assets Summary

As of June 30, 2019, the Private Risk assets had a fair value of approximately $9.2 billion, representing 20.3% of total plan assets.

Investment Program Description

The allocation to Private Risk investments is viewed as a separate asset class for inclusion in the Systems' overall investment portfolios. The process of building the Systems' Private Risk program and fully funding the target allocation is expected to occur over a period of several years. Additional new investments will be necessary beyond the funding period in order to maintain the long-term target allocation. The three programs within the Private Risk Assets composite are Private Equity, Private Real Estate and Private Credit. Each program within the Private Risk allocation is a separate multi-manager composite that is treated generally as a single portfolio. Each program serves a specific and distinct role within the overall Private Risk composite and also within the overall Total Plan allocation. Over time, the Private Risk composite serves as a long-term vehicle to supply the underlying beta exposure to a portfolio of private assets.

Investments in Private Risk Assets differ substantially from the Systems' public markets asset classes (Public Risk Assets and Safe Assets) in part because they are typically very long-term in nature, not publicly traded, relatively illiquid and offer the potential for substantially higher returns (along with a commensurate level of risk). The illiquid nature of Private Risk Assets can result from the form of the asset or security itself, or it can be a function of the investment structure being utilized (e.g., a limited partnership).

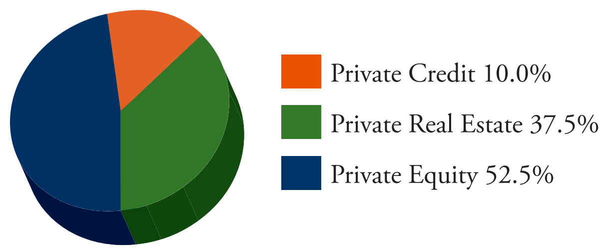
Due to the fact that Private Risk Assets are not publicly traded, pricing and performance measurements prior to the realization of gains are less reliable than in the traditional publicly traded asset classes. The Systems continually monitor the valuation policies and procedures utilized for such investments.

Structure

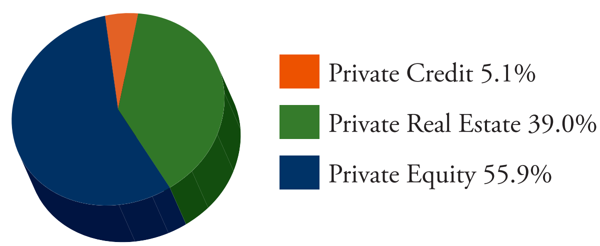
As of June 30, 2019, 55.9% of Private Risk Assets were invested in the Private Equity program, 39.0% in the Private Real Estate program, and 5.1% in the Private Credit program. Each of these programs is discussed in more detail on the following pages.

Private Risk Assets Allocation

Private Risk: Interim Target Allocation



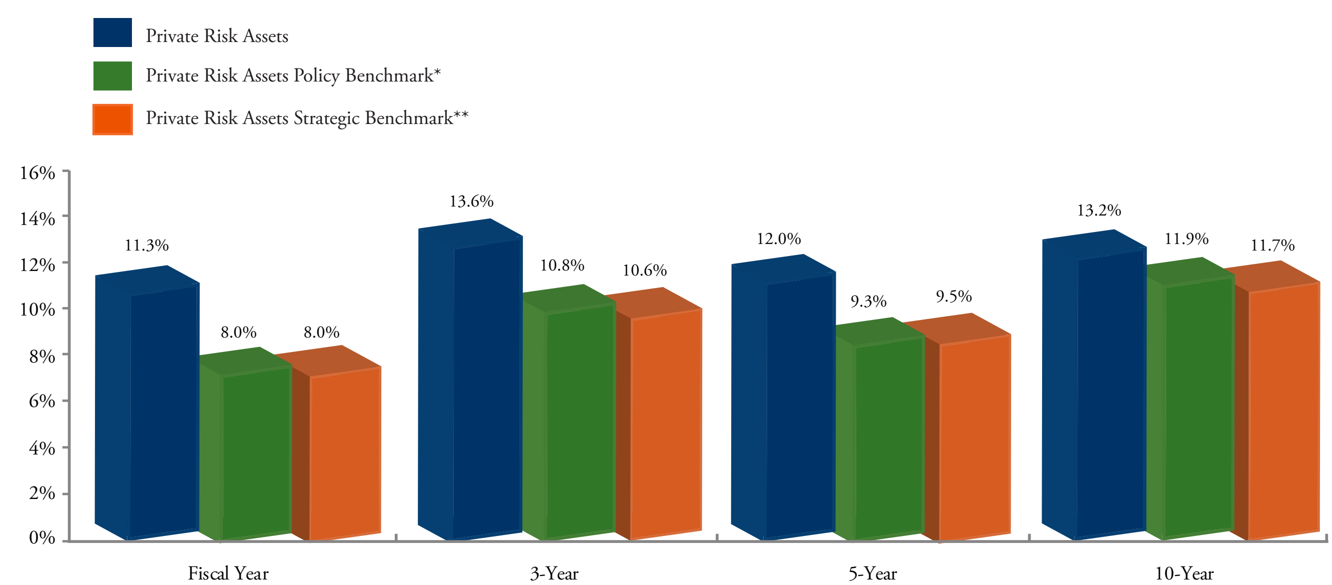
Private Risk: Actual Allocation



Performance

The total return for the Private Risk portfolio was 11.3%, compared to the policy benchmark return of 8.0% for the fiscal year ended June 30, 2019. The pricing and performance methodology utilized for private assets can provide for significant performance variances over short time periods. For instance, the Systems utilize a liquid benchmark (Russell 3000 Index) to measure an illiquid (private equity) asset class. Thus, there will be significant performance differences over short time periods in volatile markets. Due to the long term nature of Private Risk assets, the performance can be more appropriately judged over a longer timeframe. As the table below indicates, the Private Risk portfolio has produced excellent absolute and relative returns over all time periods. The ten-year return exceeded the benchmark by 130 basis points. These excess returns are net of fees and expenses.

Private Risk Assets Performance



Private Risk Assets Statistical Performance

Portfolio Characteristics	Fiscal Year	3-Year	5-Year	10-Year
Annualized Private Risk Assets Return	11.3%	13.6%	12.0%	13.2%
Annualized Policy Benchmark Return*	8.0%	10.8%	9.3%	11.9%
Annualized Strategic Benchmark Return**	8.0%	10.6%	9.5%	11.7%
Excess Return	3.3%	2.8%	2.7%	1.3%

** The Private Risk Assets Policy Benchmark is composed as follows: 52.5% Russell 3000 Index, 37.5% NFI-ODCE Index and 10.0% ICE BofAML U.S. High Yield Master II Index.*

*** The Private Risk Assets Strategic Benchmark changes monthly based on the actual asset allocation at the end of the previous month.*

Private Equity Program Summary

As of June 30, 2019, the Private Equity assets had a fair value of approximately $5.2 billion, representing 11.4% of total plan assets.

Investment Program Description

The Private Equity asset class is comprised of investment opportunities not typically included within the public equity and fixed income markets. Private Equity investments provide financing for start-up companies, private middle market companies, firms in financial distress and public and non-public firms seeking buyout financing. Private Equity investments can be classified into three basic sub-asset class categories:

- Venture Capital,
- Buyouts, and
- Debt-Related.

Investments in the sub-asset classes can be made in the U.S. or foreign countries. In total, the allocation to Non-U.S. Private Equity investments will not exceed 40.0% of the overall Private Equity target allocation. The risks associated with Private Equity will be viewed both in isolation and within the context of the entire fund.

In January 2014, the Board of Trustees approved the development and implementation of a Private Equity Co-Investment Program. The Co-Investment Program is expected to further advance the goals and objectives of the overall Private Equity Program by obtaining additional exposure to underlying portfolio company investments through direct equity investments made on a side-by-side basis with private equity funds where the Systems have an existing relationship. Co-investments serve to increase exposure to the private equity asset class with little or no additional fees and/or performance carry paid to the underlying private equity partnerships. The objective of the Co-Investment Program is to leverage existing, high-quality relationships with private equity managers in order to increase commitments to the asset class in a format that does not materially increase overall risk, while simultaneously helping to lower fees and performance carry.

Structure

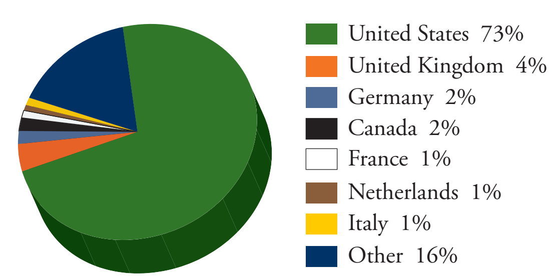
As of June 30, 2019, Private Equity assets committed* for investment were $11.6 billion. The fair value of funds that had been drawn down and actually invested as of June 30, 2019 was approximately $5.2 billion, representing 11.4% of total plan assets. The Systems private equity investment commitments that have not yet been funded were approximately $4.7 billion as of June 30, 2019.

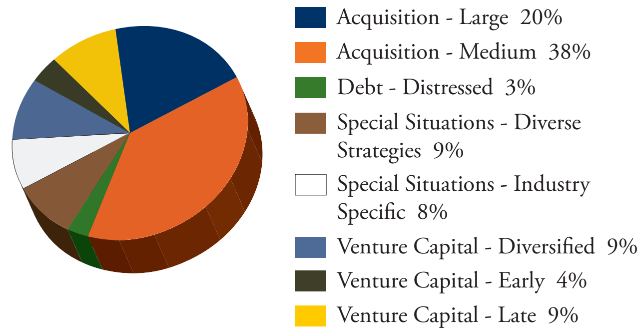
The objective for the Systems' allocation to Private Equity is to achieve returns that are higher than those attainable in the public equity markets with the added benefit of diversification. The long-term target allocation to Private Equity is 12.0%. However, as of June 30, 2019, the actual allocation for the Systems was 11.4% because the long-term and illiquid nature of the private equity asset class dictates that capital must be invested at a measured pace. In addition, private equity investments have made record distributions in recent years. Pathway Capital Management has been retained by the Systems to provide private equity investment management services through three structures; a discretionary fund-of-funds relationship, an advisory relationship and a co-investment program. Additionally, the Systems have invested in private equity secondary funds and also utilize Albourne America, LLC to provide private equity advisory services.

The following pie charts show the diversification (utilizing the market value of invested assets) of the Systems' Private Equity holdings as of June 30, 2019 from both strategy and country perspectives.

** Committed capital reflects the total amount of capital that the Systems are legally obligated to supply to the partnerships and funds as the capital is needed to invest in underlying holdings. Fair value reflects capital that has actually been drawn and invested by the partnerships and funds.*

Private Equity Strategy and Diversification





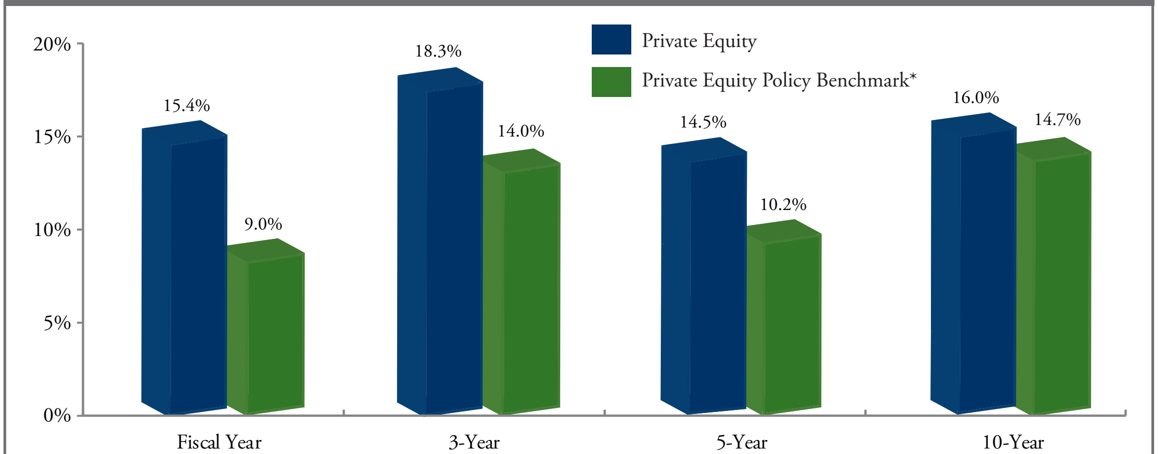
Market Overview

The Private Equity program had another excellent year producing the strongest absolute returns across all the Systems' asset classes. Despite the volatility in the public equity markets and heightened global macroeconomic uncertainty, private equity firms continued to have success. The private equity markets were driven by steady GDP growth, accommodative capital markets, and historic deal multiples and capital fundraising activity.

Performance

The total return for the Private Equity program was 15.4%, compared to the benchmark return of 9.0% for the fiscal year ended June 30, 2019. While short-term returns are not overly insightful for the Private Equity program in comparison to its benchmark, the one-year return exceeded the benchmark by 640 basis points. The private equity benchmark utilizes a liquid public equity index (Russell 3000 Index) to measure an illiquid (private equity) asset class. As such, there could be significant performance differences over short time periods in volatile markets. Due to the long term nature of the asset class, the performance of a private equity portfolio can be more appropriately judged over a longer timeframe. As the table below indicates, the Private Equity portfolio has produced excellent absolute and relative returns over all time periods. The ten-year return exceeded the benchmark by 130 basis points. These excess returns are net of fees and expenses.

Private Equity Performance



Private Equity Statistical Performance

Portfolio Characteristics	Fiscal Year	3-Year	5-Year	10-Year
Annualized Private Equity Return	15.4%	18.3%	14.5%	16.0%
Annualized Policy Benchmark Return*	9.0%	14.0%	10.2%	14.7%
Excess Return	6.4%	4.3%	4.3%	1.3%

**The Private Equity Policy Benchmark is the Russell 3000 Index.*

Investment Advisors

As of June 30, 2019, the Systems were invested in 162 separate partnerships with 69 firms within the Private Equity asset class. In fiscal year 2019 the Systems committed to 26 new partnerships for $2.5 billion. Additionally, the Systems received total distributions from the private equity partnerships of approximately $897 million in fiscal year 2019.

Private Equity Investment Advisors

Investment Advisor	Investment Strategy	Fair Value* As of June 30, 2019	% of Total Plan Fair Value
Advent International GPE VII-B and VIII	Acquisition - Medium	$ 85,722,292	0.2%
Baring Asia VI	Acquisition - Medium	35,704,828	0.1%
Battery Ventures XII and XII Side Fund	Venture Capital	4,412,253	0.0%
BC European IX	Acquisition - Large	27,120,292	0.1%
Blackstone Capital Partners V and VI	Acquisition - Large	26,883,535	0.1%
Canaan Partners IX, X and XI	Venture Capital	74,893,747	0.2%
Carlyle Europe Partners III	Acquisition - Medium	3,015,184	0.0%
Carlyle Partners IV, V and VI	Acquisition - Large	41,806,063	0.1%
Centerbridge Capital Partners I, II and III	Special Situations - Diverse Strategies	46,843,170	0.1%
Centerbridge Capital Special Credit Partners II and III	Debt - Distressed	31,680,229	0.1%
Charlesbank Equity Fund IX	Special Situations - Diverse Strategies	2,285,285	0.0%
Charlesbank Fund IX Overage Allocation Program	Special Situations - Diverse Strategies	2,860,274	0.0%
Chequers Capital XVII	Acquisition - Medium	2,161,889	0.0%
Clayton, Dubilier & Rice Fund X	Acquisition - Medium	15,006,149	0.0%
Clearlake Capital Partners V	Acquisition - Medium	7,926,008	0.0%
Coller International Partners VII	Secondary Fund	123,142,501	0.3%
CVC Capital Partners VI and VII	Acquisition - Large	64,733,162	0.1%
CVC European Equity Partners IV and V	Acquisition - Large	5,555,657	0.0%
CVC European Equity Tandem Fund	Acquisition - Large	13,745	0.0%
DEFY Partners I	Venture Capital	3,680,646	0.0%
Encap Energy IX, X, XI and VIII Co-Investors	Special Situations - Industry Specific	79,635,961	0.2%
EnCap Flatrock Midstream III and IV	Special Situations - Industry Specific	15,492,286	0.0%
Energy Spectrum Partners VIII	Acquisition - Medium	2,724,009	0.0%
EQT VIII	Acquisition - Medium	8,395,368	0.0%
Exponent Partners II	Acquisition - Medium	514,570	0.0%
First Reserve Fund XI and XII	Special Situations - Industry Specific	6,919,220	0.0%
General Catalyst Group IX	Venture Capital	14,808,794	0.0%
Genstar Capital Partners V and VIII	Acquisition - Medium	16,964,923	0.0%
Glendon Opportunities Fund	Debt - Distressed	31,686,430	0.1%
GTCR Fund IX, X, XI and XII	Acquisition - Medium	56,786,010	0.1%
Hellman & Friedman VI, Spock 1, VII and VIII	Acquisition - Large	103,971,577	0.2%
H.I.G. Growth Buyouts & Equity Fund III	Acquisition - Large	961,880	0.0%
Hillhouse Fund IV	Acquisition - Large	3,498,832	0.0%
Huron Fund V	Acquisition - Medium	4,629,903	0.0%
Insight Venture Partners IX and X	Special Situations - Diverse Strategies	76,749,144	0.2%
Institutional Investment Partners XV and XVI	Venture Capital	46,964,466	0.1%
Kelso Investment Associates VIII	Acquisition - Medium	7,181,853	0.0%
KKR 2006 Fund	Acquisition - Large	10,949,654	0.0%
KRG Fund IV	Acquisition - Medium	543,097	0.0%
Lexington Capital Partners VI-B, VII and VIII	Secondary Fund	225,325,999	0.5%
Lone Star Fund X	Debt - Distressed	71,314,604	0.2%
Madison Dearborn VI,VII, VII Auxiliary SPV	Acquisition - Large	83,717,331	0.2%
Marlin Equity V and Heritage II	Acquisition - Medium	8,474,763	0.0%
Mayfair Equity Partners II and Sidecar	Acquisition - Medium	2,721,206	0.0%
Montagu III and IV	Acquisition - Medium	7,942,320	0.0%
New Enterprise Associates 13, 14, 15 and 16	Venture Capital	154,477,562	0.4%
New Horizon VI: Advantech II and Redview II	Special Situations - Diverse Strategies	3,031,505	0.0%
New Mountain Partners V	Acquisition - Medium	13,169,804	0.0%
Nordic VII, CVI Alpha, IX Beta and VIII	Acquisition - Medium	54,595,319	0.1%
Oak Investment Partners XIII	Venture Capital	32,329,122	0.1%
OCM Principal Opportunities Fund IV, VII, VIIb, IX and Xb	Debt - Distressed	23,666,408	0.1%
Odyssey Investment Partners IV and V	Acquisition - Medium	43,826,491	0.1%
Onex Partners II, III, IV, V and ONCAP IV	Acquisition - Medium	58,006,562	0.1%
Pamlico Capital IV	Acquisition - Medium	16,663,958	0.0%
Pantheon Global Secondary Fund III and IV	Secondary Fund	32,287,960	0.1%
Pathway Capital Management	Fund-of-Funds	2,348,271,445	5.2%
Paul Capital Partners IX	Secondary Fund	23,752,797	0.1%
Permira IV, V and VI	Acquisition - Medium	88,887,761	0.2%
Providence Equity Partners VI	Special Situations - Industry Specific	8,957,435	0.0%
Quad-C Partners IX and VIII	Acquisition - Medium	40,122,412	0.1%
Quantum Energy Partners V, V-C, VI, VI-C , VII and VII-C	Special Situations - Industry Specific	73,251,238	0.2%
Riverside Micro-Cap Fund V	Acquisition - Medium	1,688,156	0.0%
The Resolute Fund II,III and IV	Acquisition - Medium	58,196,156	0.1%
Sentinel Junior Capital I	Debt - Mezzanine	369,441	0.0%
Silver Lake Partners III, SPV-2	Special Situations - Industry Specific	9,572,714	0.0%
Siris Partners IV	Acquisition - Medium	7,061,562	0.0%
Spectrum Equity Investors VI, VII and VIII	Special Situations - Diverse Strategies	54,582,056	0.1%
TA XI and XII	Special Situations - Diverse Strategies	61,880,104	0.2%
TCV IX, VI, VII, VIII and X	Venture Capital	122,873,363	0.3%
Thoma Bravo Discover Fund, II	Acquisition - Medium	20,412,422	0.1%
Thoma Bravo Fund XII and XIII	Acquisition - Large	57,023,991	0.1%
Thoma Bravo Special Opps Fund II	Acquisition - Medium	46,537,932	0.1%
Thoma Cressey Fund VIII	Acquisition - Medium	130,208	0.0%
TPG Partners V and VI	Acquisition - Large	9,310,899	0.0%
Trident Capital Fund VII	Acquisition - Medium	34,918,217	0.1%
Vista Equity Partners V, VI, VII and Foundation III	Acquisition - Medium	143,790,640	0.3%
Wayzata Opportunities Fund I, II and III	Debt - Distressed	9,025,720	0.0%
Wind Point Partners VI, CV1 andVII	Acquisition - Medium	12,250,588	0.0%
Stock distribution account	Public Stocks	628,408	0.0%
Total		**$ 5,159,871,465**	**11.4%**

**Fair values are reported by the Systems' Private Equity advisors. Fair values reflect the most current net asset values. In instances where the most current net asset values were not as of June 30, 2019, the net asset values utilized were cash flow adjusted through June 30, 2019.*

Private Credit Program Summary

As of June 30, 2019, the Private Credit assets had a fair value of approximately $465 million, representing 1.0% of total plan assets.

Investment Program Description

Investments in Private Credit are similar to Private Equity investments in that they are typically very long-term in nature, not publicly traded, relatively illiquid, and offer the potential for substantially higher returns (along with a commensurate level of risk). The Private Credit portfolio also differs from the Private Equity portfolio, and is a separate and distinct composite within Private Risk Assets. The Private Credit asset class is comprised primarily of debt-related investments that provide a current yield along with equity participation (usually warrants) referred to as an 'equity kicker.' Primary strategies are distressed debt, bankruptcy restructurings, mezzanine debt, bank loans and other credit-driven or debt-related investment strategies. Investments can be made in the U.S. or foreign countries. In total, the allocation to Non-U.S. Private Credit investments will not exceed 40% of the overall Private Credit target allocation. The risks associated with Private Credit will be viewed both in isolation and within the context of the entire fund.

Structure

As of June 30, 2019, Private Credit assets committed* for investment were $1.7 billion. The fair value of funds that have been drawn down and actually invested as of June 30, 2019 was approximately $465 million, representing 1.0% of total assets. The Systems' private credit investment commitments that have not yet been funded were approximately $709 million as of June 30, 2019.

The objective for the Systems' allocation to Private Credit is to achieve returns that are higher than those attainable in the public markets with the added benefit of diversification. The long-term and illiquid nature of the private credit asset class dictates that capital must be invested at a measured pace. Pathway Capital Management has been retained by the Systems to provide private credit investment management services through two structures; a discretionary fund-of-funds relationship and an advisory relationship. Albourne America, LLC has also been retained to provide private credit advisory services.

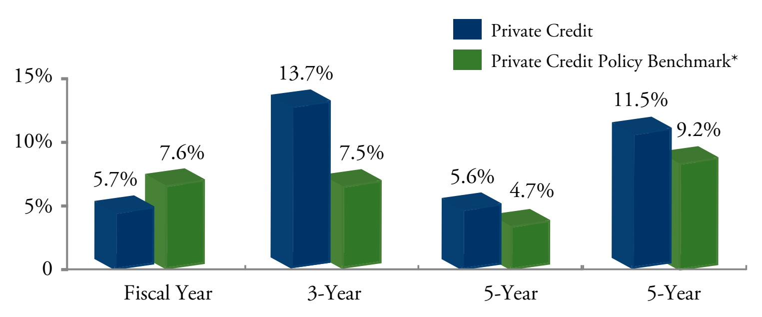
Market Overview

The private credit markets generated strong returns in fiscal year 2019 as a result of accommodating debt market conditions, strong corporate earnings and low levels of distress. The high yield market as measured by the private credit benchmark, ICE BofAML U.S. High Yield Master II Index, returned 7.6% for the year compared to a 2.5% for fiscal year 2018.

Performance

The total return for the Private Credit program was 5.7% compared to the benchmark return of 7.6% for the fiscal year ended June 30, 2019. Short-term returns can be volatile for the Private Credit program in comparison to a public benchmark, as discussed previously; private assets are more appropriately evaluated over longer time frames. As the table below indicates, the Private Credit portfolio has produced very strong absolute and relative returns over all extended time periods. The ten-year return exceeded the benchmark by 230 basis points. These excess returns are net of fees and expenses.

Private Credit Performance



Private Credit Statistical Performance

Portfolio Characteristics	Fiscal Year	3-Year	5-Year	10-Year
Annualized Private Credit Return	5.7%	13.7%	5.6%	11.5%
Annualized Policy Benchmark Return*	7.6%	7.5%	4.7%	9.2%
Excess Return	-1.9%	6.2%	0.9%	2.3%

**The Private Credit Policy Benchmark is the ICE BofAML U.S. High Yield Master II Index.*

** Committed capital reflects the total amount of capital that the Systems are legally obligated to supply to the partnerships and funds as the capital is needed to invest in underlying holdings. Fair value reflects capital that has actually been drawn and invested by the partnerships and funds.*

Investment Advisors

As of June 30, 2019, the Systems were invested in 24 separate partnerships with 17 firms within the Private Credit asset class. Four new commitments were made to the Private Credit asset class during fiscal year 2019 for $234 million. The Systems received total distributions from the private credit partnerships of approximately $86 million in fiscal year 2019.

Private Credit Investment Advisors

Investment Advisor	Investment Strategy	Fair Value* As of June 30, 2019	% of Total Plan Fair Value
Bayview Opportunity Domestic V	Debt - Distressed	$ 34,187,523	0.1%
Benefit Street Partners Debt Fund IV	Debt - Lending	45,450,766	0.1%
Caltius IV	Debt - Mezzanine	1,238,738	0.0%
Centerbridge Special Capital Partners	Debt - Distressed	1,861,452	0.0%
EIG Energy Fund XVI	Debt - Energy	70,865,330	0.2%
Encap Fund VII	Special Situations - Industry Specific	2,343,515	0.0%
Encap Fund VIII	Special Situations - Industry Specific	12,116,291	0.0%
GSO Capital Solutions Fund III	Debt - Distressed	6,827,188	0.0%
GSO Energy Select Opportunities Fund II	Debt - Distressed	4,036,016	0.0%
H.I.G Capital Bayside IV	Debt - Distressed	13,985,922	0.0%
H.I.G Capital Bayside V	Debt - Distressed	436,611	0.0%
H.I.G Capital Whitehorse	Debt - Distressed	40,998,409	0.1%
HPS Specialty Loan Fund 2016	Debt - Mezzanine	63,688,170	0.2%
Indigo Capital V	Debt - Mezzanine	506,049	0.0%
Lone Star Real Estate Fund II	Debt - Distressed	2,061,004	0.0%
Oberland Capital Healthcare Fund II	Debt - Distressed	8,113,595	0.0%
OCM Opportunities Fund VIII	Debt - Distressed	1,524,651	0.0%
OCM Opportunities Fund VIII b	Debt - Distressed	11,338,716	0.0%
Pathway Capital Management	Funds-of-Funds	48,418,671	0.1%
Summit Partners Credit Fund III	Debt - Lending	15,336,257	0.0%
TA Subordinated Debt Fund III	Debt - Mezzanine	9,897,120	0.0%
TA Subordinated Debt Fund IV	Debt - Mezzanine	35,482,879	0.1%
TSSP Adjacent Opportunities Partners	Debt - Multi Strategy	31,375,703	0.1%
TSSP Opportunities Partners IV	Debt - Multi Strategy	3,227,807	0.0%
Total		**$ 465,318,383**	**1.0%**

**Fair values are reported by the Systems' Private Credit advisors. Fair values reflect the most current net asset values. In instances where the most current net asset values were not as of June 30, 2019, the net asset values utilized were cash flow adjusted through June 30, 2019.*

Private Real Estate Program Summary

As of June 30, 2019, the Private Real Estate assets had a fair value of approximately $3.6 billion, representing 7.9% of total plan assets.

Investment Program Description

The Real Estate allocation is intended to provide exposure to a diversified portfolio of institutional quality private real estate investments that will provide meaningful, consistent returns and act as a hedge against inflation and as a diversifier to the overall investment portfolio. The specific objectives of the real estate allocation will be to optimize yield and return, preserve capital and enhance portfolio value across market cycles. The risks associated with Private Real Estate will be viewed both in isolation and within the context of the entire fund.

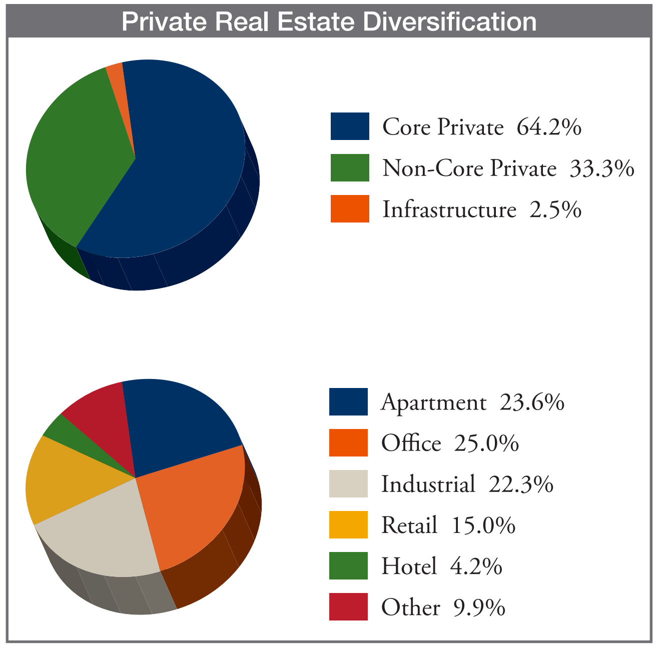
Structure

As of June 30, 2019, the Systems' Private Real Estate assets committed* for investment were $5.7 billion. The fair value of funds that had been drawn down and actually invested as of June 30, 2019 was approximately $3.6 billion, representing 7.9% of total assets. The Systems' private real estate investment commitments that had not yet been funded were approximately $1.8 billion as of June 30, 2019.

Within the overall Real Estate allocation, the Systems have established a 55% target allocation to non-core real estate (inclusive of infrastructure) and a 45% allocation to core private real estate. Non-core investments represent those properties and/or investment strategies that require specialized acquisition and management expertise or skill to mitigate the business and leasing risk that may be associated with individual investments. Non-core investments have greater associated risk compared to core investments. Core investments include existing, substantially leased income-producing properties located mainly in metropolitan areas that exhibit reasonable economic diversification and growth.

** Committed capital reflects the total amount of capital that the Systems are legally obligated to supply to the partnerships and funds as the capital is needed to invest in underlying holdings. Fair value reflects capital that has actually been drawn and invested by the partnerships and funds.*

The following pie charts indicate the current allocation to real estate investment strategies utilizing the market value of the Systems' invested real estate assets and the diversification within the real estate composite by property type.



Market Overview

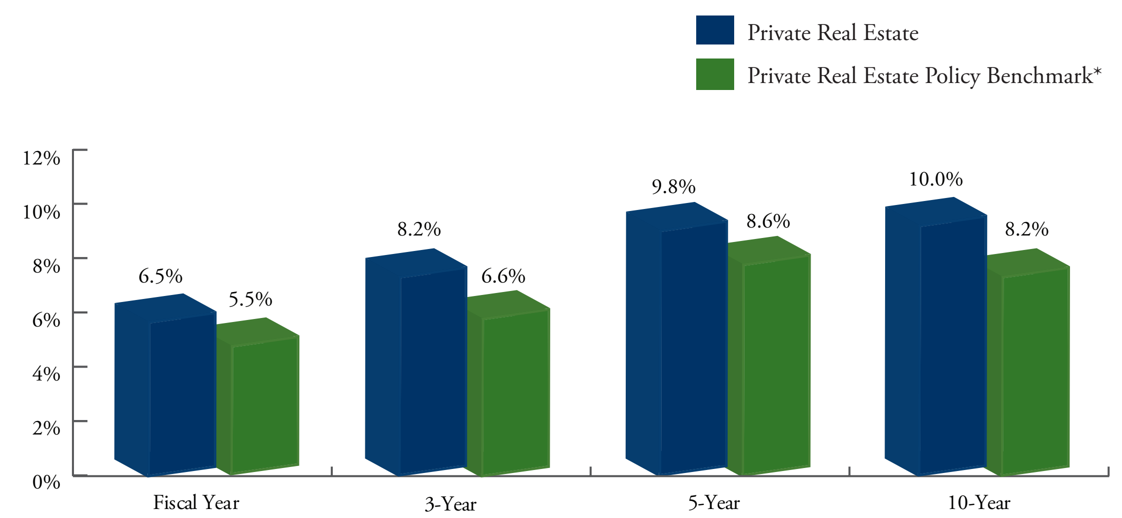
The Private Real Estate benchmark, the NCREIF Fund Index – Open Diversified Core Equity (NFI-ODCE), returned 5.5% for fiscal year 2019 compared to a 7.5% return for fiscal year 2018. The total return of 5.5% consisted of 4.1% income and 2.2% appreciation, gross of fees. The positive appreciation for the year indicates properties are still increasing in value but at a more moderated pace than recent years.

The Systems maintain a sizable allocation to high-quality, stabilized real estate assets (core) due to the secure income return. Additionally, the Systems have an allocation to non-core assets to enhance return to the overall real estate portfolio. The Systems will continue to focus real estate efforts going forward on investments that complement the existing portfolio.

Performance

The total return for the Private Real Estate program was 6.5% compared to the benchmark return of 5.5% for the fiscal year ended June 30, 2019. The Systems' Private Real Estate program has produced very strong absolute and relative returns for all time periods as noted below. The ten-year return exceeded the benchmark by 180 basis points. These excess returns are net of fees and expenses.

Private Real Estate Performance



Private Real Estate Statistical Performance

Portfolio Characteristics	Fiscal Year	3-Year	5-Year	10-Year
Annualized Private Real Estate Return	6.5%	8.2%	9.8%	10.0%
Annualized Policy Benchmark Return*	5.5%	6.6%	8.6%	8.2%
Excess Return	1.0%	1.6%	1.2%	1.8%

**Effective January 1, 2016 the Real Estate Policy Benchmark is the NCREIF Open End Diversified Core Equity Index (NFI-ODCE). The NCREIF Property Index is used for prior periods.*

Investment Advisors

As of June 30, 2019, the Systems were invested in 66 separate partnerships with 32 firms within the Private Real Estate asset class. In fiscal year 2019 the Systems committed to nine new partnerships totaling $852 million. Additionally, the Systems received total distributions from the real estate partnerships of approximately $438 million during the year.

Private Real Estate Investment Advisors

Investment Advisor	Investment Strategy	Fair Value* As of June 30, 2019	% of Total Plan Fair Value
AEW Core Property Fund	Core - Private	$ 101,377,411	0.2%
Alinda Infrastructure Fund I	Infrastructure	104,736	0.0%
Almanac Realty Securities VIII	Non-Core - Private	3,488,556	0.0%
Alterna Core Capital Assets Fund II	Infrastructure	52,994,420	0.1%
Angelo Gordon Realty Value Fund X	Non-Core - Private	6,375,000	0.0%
Asana Partners Fund I	Non-Core - Private	77,907,568	0.2%
Blackstone R.E. Partners V, VI, VII and VIII	Non-Core - Private	159,142,477	0.4%
Blackstone Real Estate Partners Asia I and II	Non-Core - Private	78,549,792	0.2%
Brockton Capital II	Non-Core - Private	16,238,821	0.1%
Carlyle Europe Real Estate Partners III	Non-Core - Private	3,636,188	0.0%
Carlyle Property Investors	Core - Private	147,559,004	0.3%
Carlyle Realty V, VI, VII and VIII	Non-Core - Private	102,243,320	0.2%
CBRE US Value 6 and 7	Non-Core - Private	13,713,607	0.0%
CIM Fund III and VIII	Non-Core - Private	107,585,552	0.2%
CIM Urban REIT	Non-Core - Private	19,538,437	0.1%
Colony Investors VIII	Non-Core - Private	1,636,509	0.0%
CPI Capital Partners Europe	Non-Core - Private	666,453	0.0%
Dune Real Estate Fund I	Non-Core - Private	1,066,005	0.0%
Exeter Industrial Value Fund IV	Non-Core - Private	46,951,860	0.1%
Global Energy & Power Infrastructure Fund III F	Infrastructure	2,762,309	0.0%
Heitman Value Partners II, III and IV	Non-Core - Private	37,707,593	0.1%
JPMorgan Special Situation Property Fund	Non-Core - Private	171,059,865	0.4%
JPMorgan Strategic Property Fund	Core - Private	339,357,078	0.8%
KKR Real Estate Partners America I and II	Non-Core - Private	45,229,884	0.1%
LaSalle Asia Opportunity Fund II and III	Non-Core - Private	1,152,447	0.0%
LaSalle Japan Logistics Fund II	Non-Core - Private	115,636	0.0%
LaSalle Property Fund	Core - Private	274,722,699	0.6%
Lone Star V and VI	Non-Core - Private	11,042,790	0.0%
Lone Star Real Estate Fund	Non-Core - Private	1,516,646	0.0%
Lone Star V Co-Investment Fund	Non-Core - Private	9,531	0.0%
Macquarie Infrastructure Partners I and IV	Infrastructure	35,130,285	0.1%
MetLife Core Property Fund	Core - Private	138,924,275	0.3%
Morgan Stanley Prime Property Fund	Core - Private	422,069,593	0.9%
North Haven Real Estate Fund V International	Non-Core - Private	1,165,045	0.0%
Noble Hospitality Fund I, III, IV-Income and IV-Value Added	Non-Core - Private	51,298,802	0.1%
Principal Enhanced Property Fund	Core - Private	150,644,483	0.3%
Prologis Targeted U.S. Logistics Holdings	Core - Private	223,665,355	0.5%
Prudential PRISA Fund	Core - Private	191,626,964	0.4%
Prudential PRISA III	Non-Core - Private	85,675,986	0.2%
Standard Life European Real Estate Fund I, II and III	Non-Core - Private	45,738,474	0.1%
Starwood Hospitality Fund	Non-Core - Private	3,489,233	0.0%
UBS Trumbull Property Fund	Core - Private	319,890,526	0.7%
Westbrook R.E. Fund VII, VIII, IX and X	Non-Core - Private	104,723,758	0.2%
Total		**$ 3,599,494,973**	**7.9%**

**Fair values are reported by the Systems' Private Real Estate advisors. Fair values reflect the most current net asset values. In instances where the most current net asset values were not as of June 30, 2019, the net asset values utilized were cash flow adjusted through June 30, 2019.*

U.S. Public Equity Broker Commissions Report

Brokerage Firm	Shares Traded	Dollars Traded	Commissions Paid	Cost Per Share
Morgan Stanley & Co Incorporated	26,475,076	$ 1,161,467,864	$ 647,018	$ 0.02
SG Cowen & Co.	14,283,348	602,145,540	472,062	0.03
Barclays Capital, Inc.	7,653,134	405,104,247	374,574	0.05
Merrill Lynch	26,052,449	906,970,664	365,427	0.01
Goldman Sachs & Co.	22,822,954	881,918,176	337,536	0.01
Instinet, LLC	24,053,006	1,097,414,366	210,648	0.01
Investment Technology Group	22,561,379	1,117,505,157	196,574	0.01
Jefferies & Co.	13,987,936	713,346,979	168,216	0.01
Weeden & Co.	26,370,524	1,404,431,507	135,610	0.01
JP Morgan Chase	20,022,573	808,562,731	133,207	0.01
Other (<$100,000)	112,291,673	4,561,131,801	1,190,980	0.01
Total	**316,574,052**	**$13,659,999,032**	**$ 4,231,852**	**$ 0.01**

Non-U.S. Public Equity Broker Commissions Report

Brokerage Firm	Shares Traded	Dollars Traded	Commissions Paid	Cost (Basis Points)
Instinet, LLC	116,938,276	$ 762,124,959	$ 243,321	3.2
Goldman Sachs & Co.	120,427,619	703,856,534	192,391	2.7
Merrill Lynch	119,535,194	666,387,021	177,528	2.7
JP Morgan Chase	332,490,560	539,065,398	147,241	2.7
Credit Suisse Securities, LLC	1,126,314,216	425,446,600	128,284	3.0
Morgan Stanley & Co.	79,063,292	507,393,083	122,593	2.4
UBS Securities, LLC	99,236,676	380,899,023	110,490	2.9
Investment Technology Group	54,342,398	400,309,217	97,449	2.4
Citigroup Global Markets, Inc.	40,001,344	358,055,320	97,108	2.7
HSBC Bank	228,135,604	184,870,057	62,873	3.4
Sanford C. Bernstein & Co.	28,099,583	287,845,265	62,246	2.2
Other (<$60,000)	313,414,062	1,866,517,741	567,198	3.0
Total	**2,657,998,824**	**$ 7,082,770,218**	**$ 2,008,722**	**2.8**

Investment Summary as of June 30, 2019			
		Percent of Total Fair Value	
Asset Type	**Fair Value**	**FY 2019**	**FY 2018**
Public Risk Assets			
U.S. Public Equity	$ 12,801,921,772	28.2%	29.3%
Non-U.S. Public Equity	7,385,595,050	16.3%	16.9%
Public Credit	1,964,122,341	4.3%	5.3%
Hedged Assets	5,343,376,473	11.8%	11.9%
Total Public Risk Assets	***27,495,015,636***	***60.6%***	***63.4%***
Safe Assets			
U.S. Treasuries	5,575,626,023	12.3%	12.1%
U.S. TIPS	1,439,284,196	3.2%	3.1%
Cash & Cash Equivalents	1,536,109,052	3.4%	3.1%
Total Safe Assets	***8,551,019,271***	***18.9%***	***18.3%***
Private Risk Assets			
Private Real Estate	3,599,494,973	7.9%	7.5%
Private Equity	5,159,871,465	11.4%	9.7%
Private Credit	465,318,383	1.0%	0.8%
Total Private Risk Assets	***9,224,684,821***	***20.3%***	***18.0%***
Securities Lending Collateral	***12,993***	***0.0%***	***0.0%***
Cash & Equivalents*	***66,271,168***	***0.2%***	***0.3%***
Total Investments**	**$ 45,337,003,889**	**100.0%**	**100.0%**
Reconciliation with Financial Statements			
Total from above	$ 45,337,003,889		
Accrued payable for investments purchased	2,686,685,281		
Accrued income payable	2,061,301		
Accrued receivable for investments sold	(2,060,201,722)		
Accrued income receivable	(99,963,263)		
Securities lending collateral	(12,993)		
Short-term investments designated for benefits	(61,958,960)		
Statements of Fiduciary Net Position	**$ 45,803,613,533**		

**Managers may hold cash or cash equivalents as part of an active management strategy. Cash or cash equivalents held as part of an active management strategy are not separately listed.*

*** Total Investments includes accrued income and securities lending collateral as of June, 30, 2019.*

Investment Expenses for the Fiscal Year Ended June 30, 2019

Investment Managers	
Investment Management Fees	
NISA Investment Advisors - Core	$ 4,023,994
NISA Investment Advisors - TIPS	864,247
Safe Assets Fees	**4,888,241**
NISA Investment Advisors - Corporate	1,114,120
Oaktree Bank Loans	1,438,061
Pacific Investment Management Company	614,733
Public Credit Fees	**3,166,914**
Analytic Investors, LLC	1,794,608
AQR Capital Management	1,721,714
Aronson & Johnson & Ortiz	1,089,409
BlackRock Investment Management	172,868
Coatue Long Only Partners	842,089
Columbia Management	460,254
Davis Selected Advisers	353,590
Grantham, Mayo, Van Otterloo & Co.	141,324
Lazard Asset Management	1,364,303
Martingale Asset Management	1,619,923
NISA Investment Advisors	14,583
Rock Springs Capital	1,875,182
Russell Investments	68,832
Select Equity Group	156,466
Westwood Management	1,382,930
Zevenbergen Capital	1,513,306
U.S. Public Equity Fees	**14,571,381**
Alliance Bernstein Institutional Management	1,320,888
Analytic Investors, LLC	1,433,972
AQR Capital Management	2,000,434
Arrowstreet Capital	9,019,047
BlackRock Investment Management	135,228
Coronation Asset Management (Proprietary) Limited	2,234,164
Invesco Advisers, Inc	609,382
MFS Institutional Advisors	4,057,039
Neon Capital Management	1,529,329
NISA Investment Advisors	120,663
The Rock Creek Group	3,172,268
Non-U.S. Public Equity Fees	**28,001,089**
Allianz	1,308,194
AQR Capital Management	415,956
BlackRock Investment Management	37,349
Chartwell Investment Partners	690,665
Columbus Circle	364,083
Martingale Asset Management	453,547
NISA Investment Advisors	104,324
RBC Global Asset Management	316,075
Russell Investments	17,021
Systematic Financial Management	220,742
S-Cap Fees	**3,927,956**
Alpha Overlay Fees	**42,639,012**
Hedged Assets Fees	**84,831,465**
Private Real Estate Fees	**58,196,068**
Private Credit Fees	**11,293,396**
Private Equity Fees	**247,272,056**
Commission Recapture Income	**(194,594)**
Investment Management Expense	**498,592,984**
Custodial Services	
JP Morgan Chase, NA	1,371,458
Custodial Fees	**1,371,458**
Investment Consultants	
Albourne America, LLC	750,000
Institutional Shareholder Services, Inc.	74,500
Pathway Consulting	3,337,192
Townsend	350,000
Verus Advisory Inc	450,000
Investment Consultant Fees	**4,961,692**
Legal Expenses	**1,363,374**
Staff Investment Expenses	**4,552,097**
Total Investment Expenses	**$ 510,841,605**