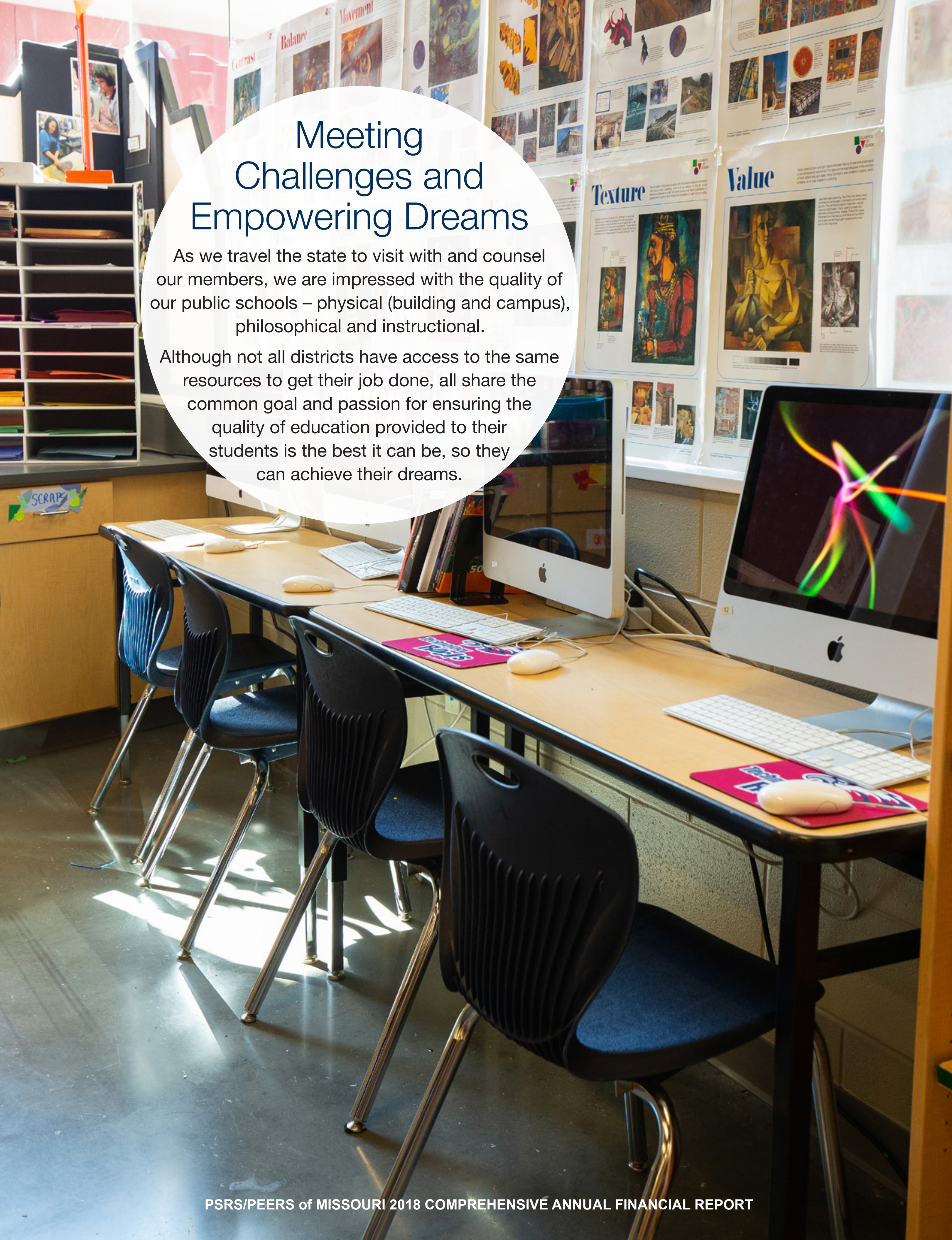



# Meeting Challenges and Empowering Dreams

As we travel the state to visit with and counsel our members, we are impressed with the quality of our public schools – physical (building and campus), philosophical and instructional.

Although not all districts have access to the same resources to get their job done, all share the common goal and passion for ensuring the quality of education provided to their students is the best it can be, so they can achieve their dreams.

# Investment Section

# Letter from Verus

Verus

September 28, 2018

To the Members of the Board:

Important events in the U.S. occurring during fiscal year 2018 included significant corporate tax reform, the beginnings of an unwind of quantitative easing and the initiation of meaningful changes to trade policy. Including severe market volatility in February and March, the S&P 500 returned 14.4% for the fiscal year.

International (Non- U.S.) markets, particularly in the second-half of the fiscal year, faced a strong U.S. Dollar, more moderate economic and earnings growth, and a fear of the uncertainty surrounding trade. Developed Non- U.S. markets (EAFE) and Emerging Markets returned 6.8% and 8.2%, respectively.

Short-term U.S. Treasury yields rose steadily over the twelve months, outpacing increases in longer term yields, resulting in a flat yield curve at fiscal year-end. The BBC U.S. Treasury Index returned -0.7% for the year as price declines more than offset income returns.

The combined PSRS/PEERS plans, known as the Missouri Education Pension Trust (MEPT), had a total return for the fiscal year of 8.9%, outperforming the Policy Benchmark return of 7.4%. Each of its three major components also outperformed corresponding benchmarks – Public Risk Assets (9.7% v. 8.9%), Safe Assets (-0.1% v. -0.2%), and, most notably, Private Risk Assets (14.6% v. 10.8%).

Verus was retained as the PSRS/PEERS's investment consultant on January 1, 2018. We have spent 2018 becoming familiar with PSRS/PEERS's people, processes and portfolio, focusing most recently on a review of the U.S. Equity portfolios, both Large and Small Capitalization.

Despite what seems like a topsy-turvy world, equity markets have experienced an unusual calm (low volatility), absent the February/March period. Along with the investment staff, we at Verus anticipate an eventual return to normalcy by continuing to maintain and enhance the portfolio's ability to withstand a less friendly investment environment.

The entire Verus organization appreciates our relationship with the PSRS/PEERS and looks forward to a mutually rewarding partnership.

Sincerely,

Barry W. Dennis
Managing Director

Verus — also known as Verus Advisory™

425 California Street, 17th Floor, San Francisco, California 94104 415-362-3484 verusinvestments.com

# Letter from the Chief Investment Officer

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

December 3, 2018

To the Members of the Systems:

Throughout this year's Financial Report, you will see the phrase: ***"Education for Today, Retirement 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 today and tomorrow.

With that in mind, I present the following report on the Systems' investments for the fiscal year ended June 30, 2018 on behalf of the PSRS and PEERS' Board of Trustees and the internal investment staff.

An improving U.S. economy led to above average returns for U.S. stocks and private equity in fiscal year 2018. The strength in these asset classes directly resulted in solid gains for PSRS/PEERS as the Systems' assets increased through investment earnings by almost $3.6 billion from the previous year with a total fund performance of 8.9% for both PSRS and PEERS.

## Key Points within this year's Financial Report

As you review the financial information in this report for the fiscal year ended June 30, 2018, it is important to be aware of the following points:

- PSRS and PEERS outperformed the assumed investment return of 7.6%,
- The Systems generated the investment return while taking less risk than the policy benchmark (as measured by standard deviation) and less risk than the majority of comparable public funds over all time periods,
- The PSRS/PEERS internal investment staff and external investment managers added value above the policy benchmark of over $530 million, net of all fees and expenses. This outperformance in 2018 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/PEERS investment expenses (including accrued performance-based fees and all internal investment staff expenses) for fiscal year 2018 were 1.16%, or $1.16 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 8.7% for PSRS and PEERS,
- The PSRS and PEERS investment returns for fiscal year 2018 and for the last three-year and five-year time periods exceeded 65% of the peer group as defined by the Wilshire TUCS universe of public pension plans with assets in excess of $1 billion,

**Location** 3210 W. Truman Blvd. / Jefferson City, MO 65109 **Mail** P.O. Box 268 / Jefferson City, MO 65102 **Phone** (573) 634-5290
**Toll Free** (800) 392-6848 **Email** psrspeers@psrspeers.org **Member Services FAX** (573) 634-7934 **Employer Services FAX** (573) 634-7911

- 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 $43.8 billion on June 30, 2018, 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 2018 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 2018, the combined asset allocation provided the Systems with substantial absolute returns, led by above average returns from U.S. stocks and reasonable, yet much lower, returns for global stocks. U.S. stocks returned 14.8% for the fiscal year ended June 30, 2018 (as measured by the Russell 3000 Index), non-U.S. developed stocks moved 6.8% higher (as measured by the MSCI EAFE Index), and emerging market stocks increased 8.2% (as measured by the MSCI Emerging Markets Index). In contrast, the yield on the 10-year Treasury Bond increased from 2.3% at the beginning of the fiscal year to 2.9% on June 30, 2018. This increase in yield contributed to a negative absolute return for the U.S. Treasury Bonds within the PSRS/PEERS' Safe Asset Portfolio.

The PSRS/PEERS non-traditional asset classes provided strong returns in fiscal year 2018. The Hedged Asset Program represented 11.9% of total fund assets at fiscal year-end and generated a 6.3% return. The objective of the Hedged Assets Program is to provide competitive returns, diversification and lower volatility (risk) than the Systems' stock portfolios. Diversification into private equity, private real estate and private credit proved beneficial for the year as the Private Equity Composite returned 19.4%, the Real Estate Composite increased 9.2%, and the Private Credit Composite increased 12.5%.

As noted above, significant absolute returns in most of the major asset classes contributed to the 8.9% return for PSRS and PEERS. Additionally, the investment returns were supported by solid implementation (security selection) and tactical asset allocation decisions. For example, the PSRS/PEERS' Non-U.S. Equity Portfolio outperformed its benchmark (MSCI All Country World Free ex U.S. Index) by 1.0% in fiscal year 2018, while the PSRS/PEERS' Private Equity Portfolio outperformed its benchmark (Russell 3000 Index) by 4.6%. From a portfolio construction and tactical standpoint, the internal investment staff maintained a modest 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 and stocks (both U.S. and non-U.S.). Additionally, within the Safe Assets Program, a cash position was increased relative to longer maturity Treasury bonds. The underweight to safe assets and credit bonds and the overweight to stocks and hedge assets for the fiscal year provided meaningful contribution to the overall PSRS/PEERS return.

## Fiscal Year 2019: The economy and fundamental PSRS/PEERS principles

As I write this annual letter on December 3, 2018, we are five months into fiscal year 2019 and the global economy remains solid with the U.S. labor market strengthening and unemployment declining. However, there are a number of issues which remain a concern to investors, including rising interest

# Letter from the Chief Investment Officer, continued

rates, the very late stages of the economic cycle in the U.S. and an increased risk of a prolonged trade war amidst growing geopolitical conflicts. Stocks reacted negatively to some of these concerns in October 2018 under the fear that the Federal Reserve could slow the economy by raising interest rates too much.

Investing in an uncertain environment, as we find ourselves in today, reinforces the Systems' application of the fundamental principles in the management of the PSRS/PEERS' investment portfolio:

- Focus on the long-term investment horizon which requires discipline and patience,
- Balance the long-term investment strategy of PSRS/PEERS with shorter term views as market dynamics change, and
- Manage risk by maintaining adequate liquidity and balancing the portfolio for the heightened possibility of market inflection points.

## Fiscal Year 2019: The assumed rate of return

As I wrote last year, the Systems utilized a 7.0% assumed rate of return for the decade of the 1970's. The assumption was increased to 8.0% in 1980 as bond yields increased. This historical assumption was reasonable and supported by market expectations over many years. However, in the current environment, virtually every asset class (including global stocks, despite the recent downturn) is fully valued and interest rates remain below historical norms. As such, we believe that the expected investment returns going forward could be lower than historical returns. To that end, the Board of Trustees, with input from both internal investment staff and external advisors, have worked to reduce the long-term assumed rate of return for the Systems. The Board moved from the 8.0% assumed rate of return in fiscal year 2016 to 7.75% in fiscal year 2017, 7.6% for fiscal year 2018 and 7.5% for fiscal year 2019. We believe that the directional move to a lower assumed rate of return is prudent and in concert with the Board's objective to provide for the long-term security and financial stability of the Systems.

## 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 within each category, under 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.

As mentioned previously in this letter, most asset classes appeared close to full valuation at the end of fiscal year 2018 and as we approach the half way point in fiscal year 2019. Consequently, the Systems currently have allocations that are close to the long-term targets for most of the asset classes in the portfolio.

The Safe Assets composite ensures that adequate liquidity is available to meet all PSRS and PEERS benefit payments and cash needs for an extended period of time, regardless of the economic environment. Short-term bonds (cash) have been added to the Safe Asset portfolio in the last year with the expectation for higher interest rates.

The Systems maintain a substantial allocation to Public Risk Assets. The point of emphasis in this category has been to increase active management within the U.S. equity portfolio as market volatility increases. The overall Public Risk composite is primarily balanced between U.S. equities, non-U.S. equities and lower volatility hedge funds. The Hedged Asset portfolio is designed to offer the diversification benefits traditionally associated with bonds but at higher levels of expected return. The Systems experienced this benefit in fiscal year 2018 as the Hedged Asset portfolio increased 6.3% while the Safe Assets portfolio earned mildly negative returns.

Finally, the Systems Private Risk Assets composite will continue to be a focus for the investment staff in fiscal year 2019 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 2018, the Systems had almost $8.0 billion invested in Private Risk Assets.

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 ensure that the ***retirement needs for tomorrow*** are met 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 1998-2018.*

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. The Systems conducted a general consultant search during the current year resulting in the selection of Verus. Willis Towers Watson was the previous general consultant from 2011 to December 2017. 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 7.6% with a real rate of return of at least 5.35% per annum over time**.[2] The Board of Trustees revised the long-term investment return objective to 7.6% effective for fiscal year 2018 investment performance and 7.5% effective for fiscal year 2019 investment performance. The investment objective was previously 8.0% effective from 1980 through fiscal year 2016 and 7.75% effective for fiscal year 2017.

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

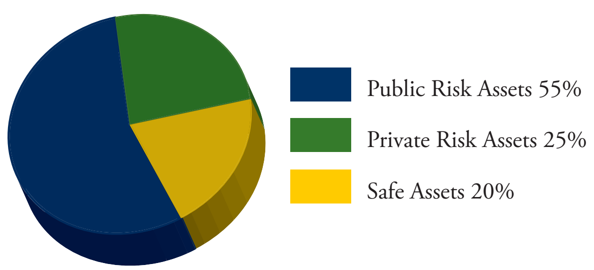
Selection of an appropriate asset allocation is one of the most important decisions made by a retirement plan. Within that asset allocation, it is important to not only consider the expected investment return, but also to understand the risks. The importance of risk consideration for institutional investors is critical to long-term success. To that end, the Systems employ an

*[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, 2018 was 2.25% per annum.*

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.

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 recently increased the Private Risk Assets target 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 2018. 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 2018 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 7.6% and a real rate of return net of expenses of at least 5.35% 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.

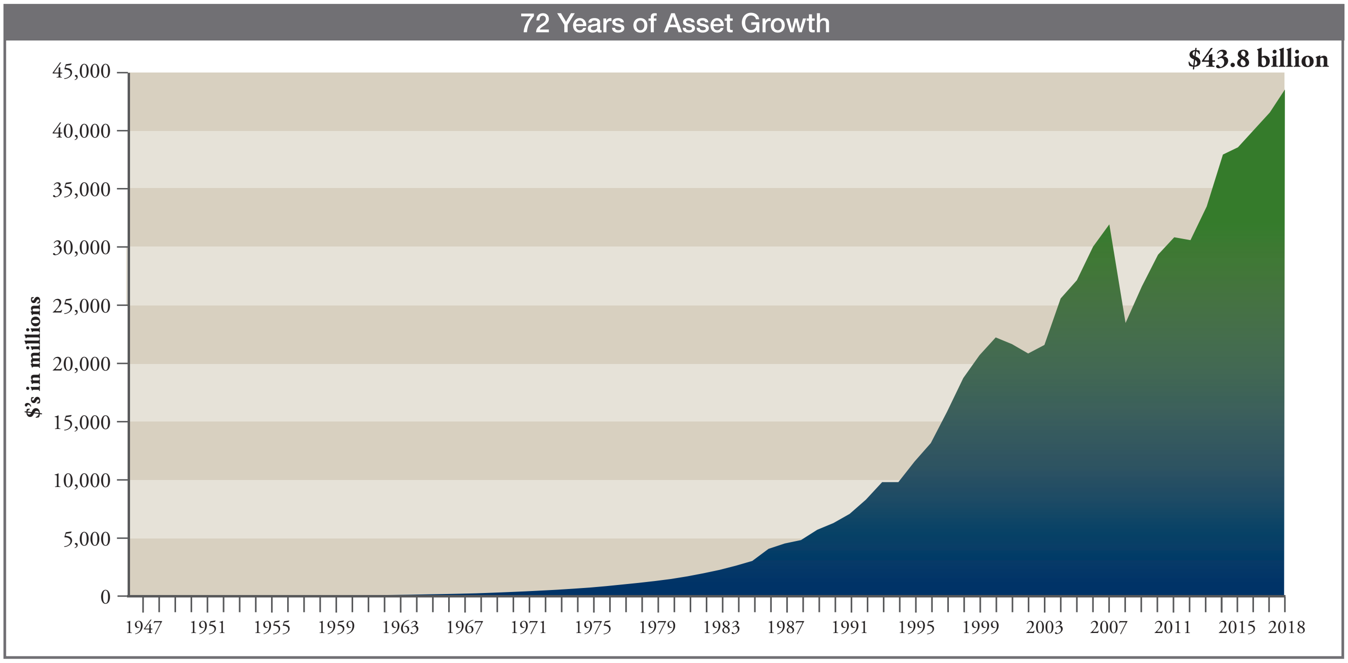
## Implementation Decisions

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 2021. 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 $43.8 billion as of June 30, 2018. 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 achieved strong absolute and relative returns in fiscal year 2018. The Systems' well-structured investment portfolio added approximately $3.6 billion in investment earnings to the growth of assets during the fiscal year 2018. The Systems earned an investment return of 8.9% for fiscal year 2018 (8.7% net of all investment expenses and fees) with an ending market value of invested assets at $43.8 billion. The total plan return, net of all investment expenses and fees, exceeded both the long-term investment goal (actuarial required rate of return) of 7.6% and the total plan policy benchmark return of 7.4%. PSRS and PEERS are long-term investors with a diversified portfolio that continues to produce strong long-term returns where the annualized investment return is 8.5% (8.4% net of all investment expenses and fees) over the last 30 years.

As illustrated in the table below, within the Systems' investment portfolio, U.S. equities delivered a return of 14.1%, non-U.S. equities returned 8.3%, private equity (investments in private companies) increased 19.4%, real estate produced 9.2% returns, and hedged assets returned 6.3%. Each of these asset classes strongly contributed to the total returns of the Systems while providing diversification from fixed income securities.

**Total Fund Performance**

| Assets | Total Return | Weighted Contribution* |
|---|---|---|
| U.S. Public Equity | 14.1% | 4.1% |
| Public Credit | 0.6% | 0.0% |
| Hedged Assets | 6.3% | 0.8% |
| Non-U.S. Public Equity | 8.3% | 1.4% |
| **Public Risk Assets** | **9.7%** | **6.1%** |
| U.S. Treasuries | -0.6% | -0.1% |
| U.S. TIPS | 1.6% | 0.1% |
| Cash & Cash Equivalents | 1.0% | 0.0% |
| **Safe Assets** | **-0.1%** | **0.0%** |
| Private Equity | 19.4% | 1.9% |
| Private Real Estate | 9.2% | 0.7% |
| Private Credit | 12.5% | 0.1% |
| **Private Risk Assets** | **14.6%** | **2.6%** |
| **TOTAL RETURN** | **8.9%** | **8.9%** |

**Percentages have been adjusted to reflect compounding effects and changes in asset weights.*

*[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** | **14.1%** | **10.7%** | **13.0%** | **10.4%** |
| Russell 3000 Index | 14.8% | 11.6% | 13.3% | 10.2% |
| **Public Credit** | **0.6%** | **2.9%** | **2.8%** | **n/a** |
| Bloomberg Barclays U.S. Intermediate Credit Index | -0.4% | 2.0% | 2.5% | n/a |
| **Hedged Assets** | **6.3%** | **4.8%** | **6.6%** | **6.1%** |
| Hedged Assets Benchmark | 5.3% | 5.3% | 6.2% | 5.7% |
| *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** | **8.3%** | **7.2%** | **8.3%** | **3.9%** |
| MSCI ACWI ex-USA net Index | 7.3% | 5.1% | 6.0% | 2.8% |
| **Total Public Risk Assets** | **9.7%** | **7.9%** | **9.4%** | **6.6%** |
| Public Risk Assets Benchmark | 8.9% | 7.5% | 8.6% | 5.4% |
| *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** | **-0.1%** | **1.0%** | **1.2%** | **2.9%** |
| Safe Assets Benchmark | -0.2% | 1.1% | 1.4% | 2.8% |
| *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** | **19.4%** | **15.9%** | **16.4%** | **11.7%** |
| Russell 3000 Index | 14.8% | 11.6% | 13.3% | 10.2% |
| **Private Real Estate** | **9.2%** | **9.6%** | **11.3%** | **4.2%** |
| NFI-ODCE Index | 7.5% | 8.2% | 9.7% | 4.6% |
| **Private Credit** | **12.5%** | **8.6%** | **8.0%** | **8.4%** |
| ICE BofAML U.S. High Yield Master II Index | 2.5% | 5.6% | 5.5% | 8.0% |
| **Total Private Risk Assets** | **14.6%** | **12.7%** | **13.6%** | **8.0%** |
| Private Risk Assets Benchmark | 10.8% | 9.8% | 11.3% | 8.8% |
| *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** | **8.9%** | **7.7%** | **8.8%** | **6.9%** |
| Total Fund Benchmark | 7.4% | 6.7% | 7.7% | 6.2% |
| *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 *** ** | 7.6% | 7.8% | 7.9% | 7.9% |
| **TUCS Universe Median** | 8.6% | 7.4% | 8.4% | 6.9% |

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

***Some programs have been established more recently and therefore 10-year returns are not available.*

****The Board of Trustees revised the long-term investment return objective from 7.75% to 7.6% effective for fiscal year 2018 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 7.6% per year and a real rate of return of at least 5.35% per year. As discussed in the Investment Objective section, the long-term objective was revised to 7.6% effective for fiscal year 2018 and 7.5% effective for fiscal year 2019. The fiscal year 2018 total plan return of 8.9% exceeded the long-term objective. 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 8.5% over the last 30 years. The reductions 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 reported time periods the total fund return exceeded the strategic benchmark and the strategic benchmark exceeded the policy benchmark demonstrating added value by Internal Staff through strategic asset allocation decisions and implementation decisions.

The fiscal year 2018 return was 8.9% which exceeded the policy benchmark by 150 basis points. The fiscal year investment return, net of ***all*** fees and expenses, was 8.7% which was also significantly above the policy benchmark. 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 110 basis points, on an annualized basis, resulting in over $1.8 billion in excess performance (net of all investment expenses and fees) to the Systems.

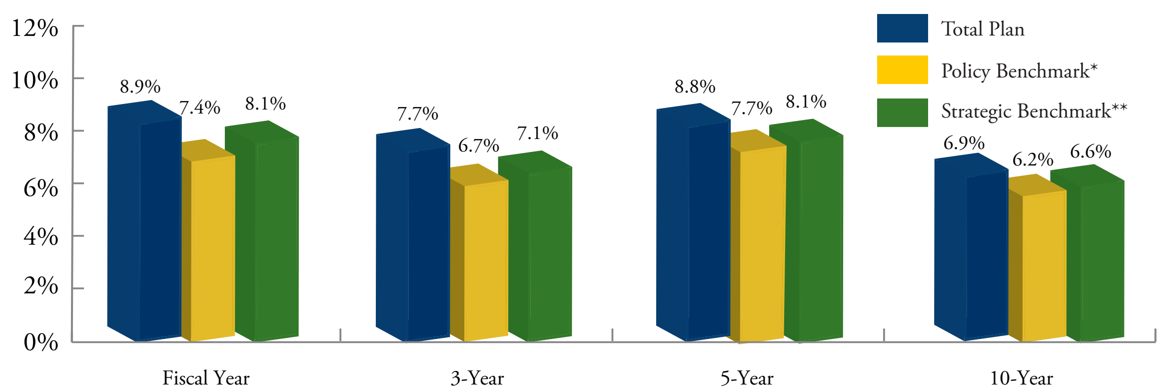
The Systems' utilize the Trust Universe Comparison Services (TUCS) to compare the total return and risk levels of the Systems relative to other public pension funds with assets in excess of $1 billion. As the chart on page 68 indicates, the total fund return for the one-year, three-year and five-year time periods exceeded the median return of other large public funds while the ten-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



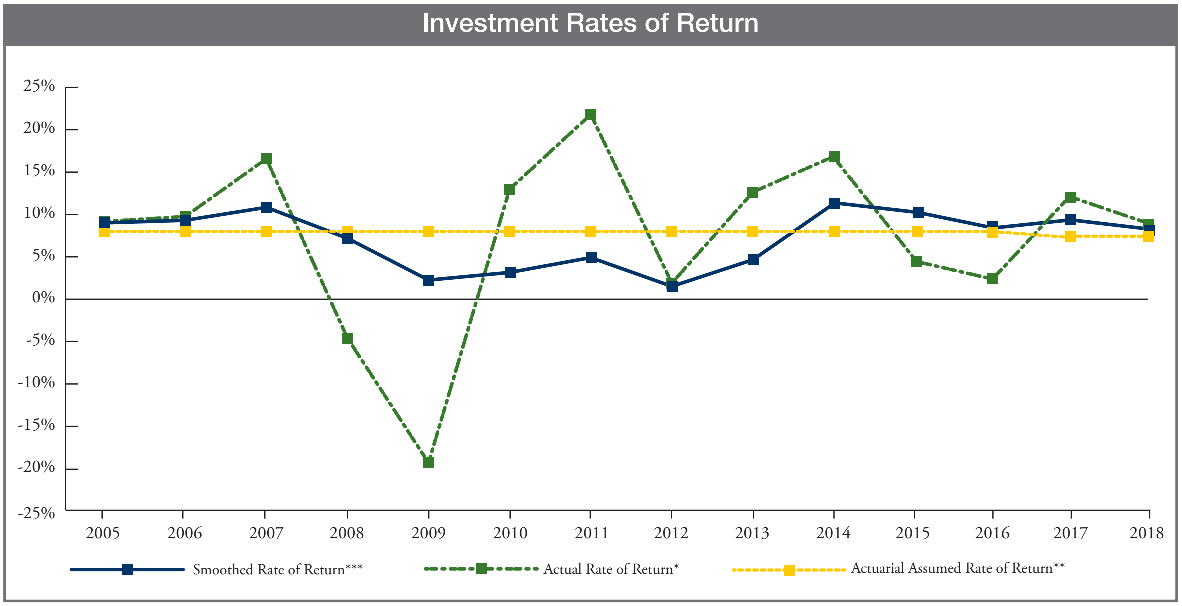

### Total Plan Statistical Performance

| Portfolio Characteristics | Fiscal Year | 3-Year | 5-Year | 10-Year |
|---|---|---|---|---|
| Annualized Total Plan Return | 8.9% | 7.7% | 8.8% | 6.9% |
| Annualized Policy Benchmark Return* | 7.4% | 6.7% | 7.7% | 6.2% |
| Annualized Strategic Benchmark Return** | 8.1% | 7.1% | 8.1% | 6.6% |
| Excess Return | 1.5% | 1.0% | 1.1% | 0.7% |
| Annualized Standard Deviation of Composite | 3.9% | 4.9% | 4.9% | 8.4% |
| Annualized Standard Deviation of Policy Benchmark* | 4.4% | 5.8% | 5.6% | 9.7% |
| Beta to Policy Benchmark* | 0.87 | 0.83 | 0.86 | 0.86 |
| Beta to MSCI ACWI net Index | 0.44 | 0.45 | 0.46 | 0.50 |

**As of June 30, 2018: 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, 2018: 41.7% Russell 3000 Index, 20.3% MSCI ACWI ex-USA net Index, 12.2% Bloomberg Barclays U.S. Treasury Index, 11.3% Bloomberg Barclays U.S. Intermediate Credit Index, 7.4% NFI-ODCE, 3.2% Merrill Lynch 3- Month U.S. Treasury Bill Index, 3.1% Bloomberg Barclays U.S. TIPS 1-10 Years Index, and 0.8% 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.




**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.*

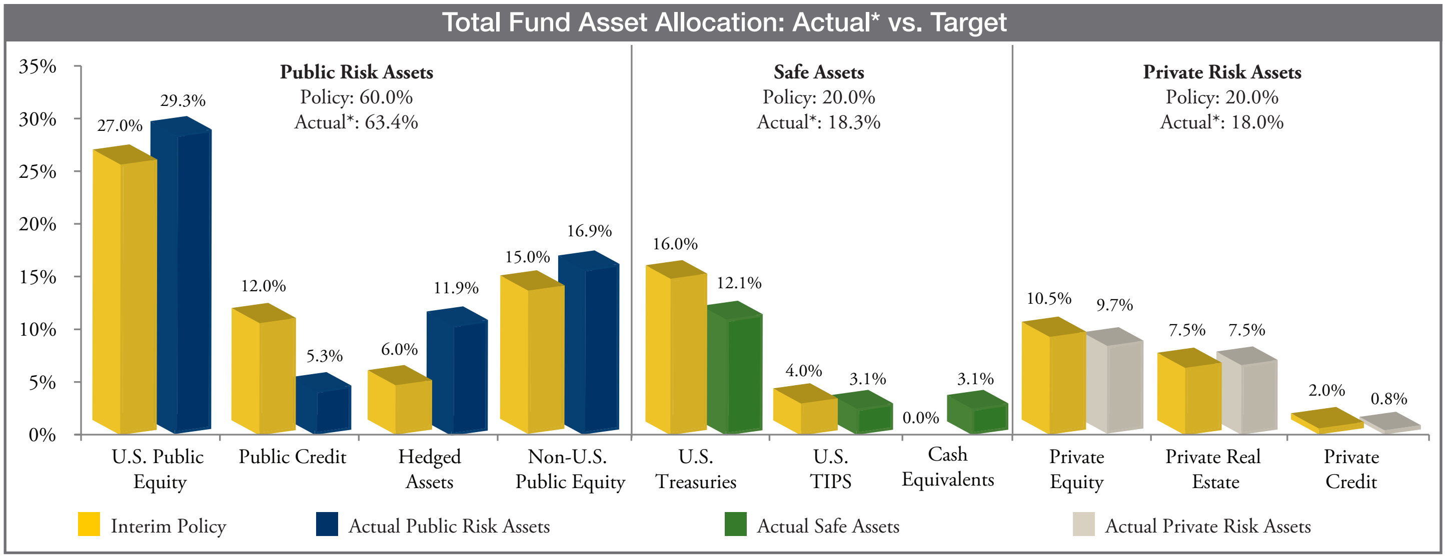
****Investment earnings in excess or deficient of the assumed rate of return are smoothed over a 5-year period for actuarial funding purposes. Twenty percent of the excess or deficiency is recognized annually for a 5-year period. This calculation results in the Smoothed Rate of Return.*

## 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 2018 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, 2018.

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 2018.




**Total Plan assets include 0.3% invested in an operating cash account that is not reflected in the chart above.*

# Public Risk Assets Summary

*As of June 30, 2018, Public Risk assets had a fair value of approximately $27.8 billion, representing 63.4% 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.

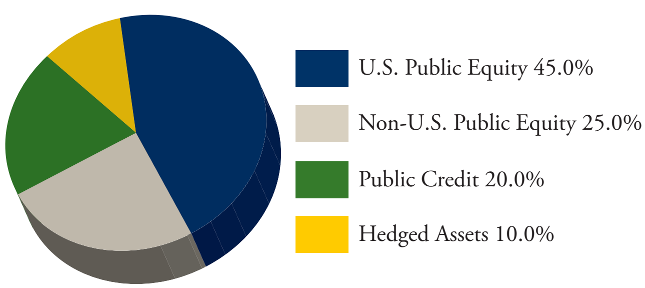
## Structure

As of June 30, 2018, 46.3% of the Systems' Public Risk assets were invested in the U.S. Public Equity program, 26.6% in the Non-U.S. Public Equity program, 8.4% in the Public Credit program and 18.7% in the Hedged Assets program. Each of these programs is discussed in more detail on the following pages.

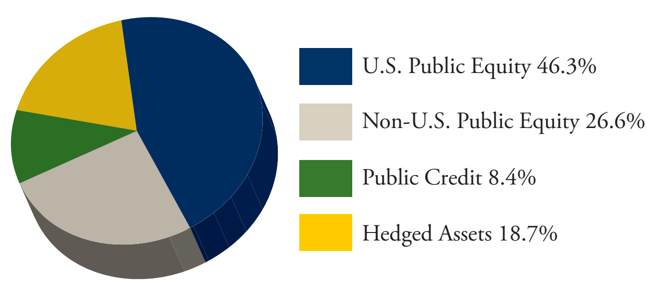
The internal staff continued to overweight the total plan to Public Risk assets during the year. The interim target allocation for Public Risk assets during fiscal year 2018 was 60.0% and the Systems' allocation at the end of the fiscal year was 63.4%, down from the prior year overweight of 65.9%. Internal staff strategically rebalanced from Public Risk assets during fiscal year 2018.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**

**Public Risk: Interim Target Allocation**




**Public Risk: Actual Allocation**



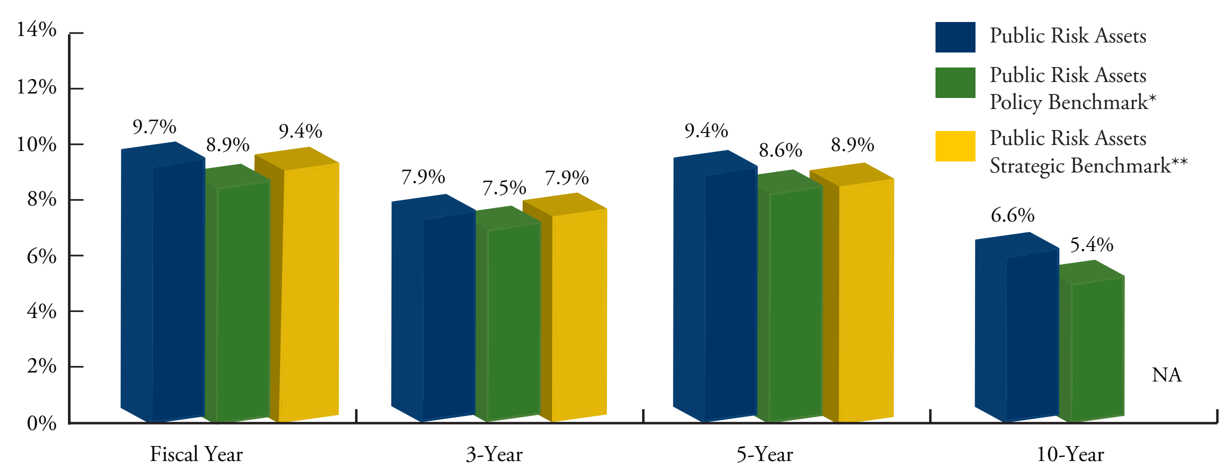

## Market Overview

Global economic growth remained robust throughout fiscal year 2018, including improved labor markets and strong corporate earnings resulting in positive equity market returns. The Russell 3000 Index (broad measure of the U.S. stock market) was up 14.8% for the year and the MSCI ACWI ex-USA net Index (broad measure of the international stock markets) increased 7.3%. Both the Russell 3000 Index and the MSCI ACWI ex-USA net Index hit record highs in January 2018 before pulling back slightly into the fiscal year-end. Bond markets were down marginally due to rising interest rates, resulting in a -0.4% return for the Public Credit benchmark (Bloomberg Barclays U.S. Intermediate Credit Index).

## Performance

The total return for the Systems' Public Risk portfolio was 9.7%, which outperformed the policy benchmark by 80 basis points. As shown in the table and graph below, the Systems' Public Risk composite returns significantly outperformed the benchmark in all reported 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 | 9.7% | 7.9% | 9.4% | 6.6% |
| Annualized Policy Benchmark Return* | 8.9% | 7.5% | 8.6% | 5.4% |
| Annualized Strategic Benchmark Return** | 9.4% | 7.9% | 8.9% | N/A |
| Excess Return | 0.8% | 0.4% | 0.8% | 1.2% |
| Annualized Standard Deviation of Composite | 6.1% | 7.6% | 7.4% | 12.9% |
| Annualized Standard Deviation of Policy Benchmark* | 6.2% | 8.0% | 7.7% | 13.5% |
| Beta to Policy Benchmark* | 0.98 | 0.95 | 0.96 | 0.95 |
| Beta to MSCI ACWI net Index | 0.70 | 0.70 | 0.71 | 0.78 |

**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. It was established more recently so a ten-year return is not available.*

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, 2018, the U.S. Public Equity assets had a fair value of approximately $12.8 billion, representing 29.3% 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

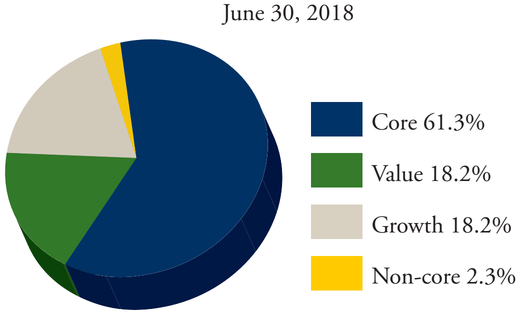
As of June 30, 2018, 24.6% of the U.S. Public Equity composite was passively managed. The remainder of the portfolio was actively managed and diversified across a broad array of capitalization ranges and investment styles, including the Small-Cap and the Alpha Overlay program. Both programs represent 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.

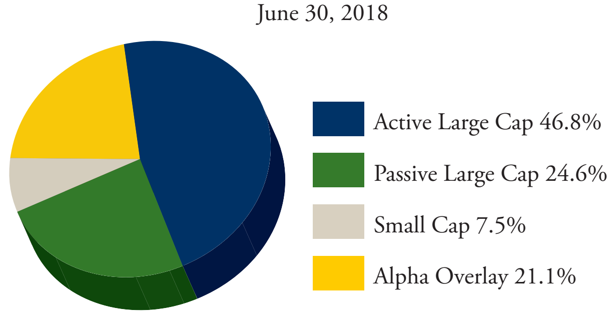
The pie charts below depict the U.S. Public Equity portfolio by presenting the current style structure of the portfolio as well as the allocation by composite and market sector.

### U.S. Public Equity Allocations: Style and Composite

**Style Allocation**
June 30, 2018




**Composite Allocation**
June 30, 2018



## Market Overview

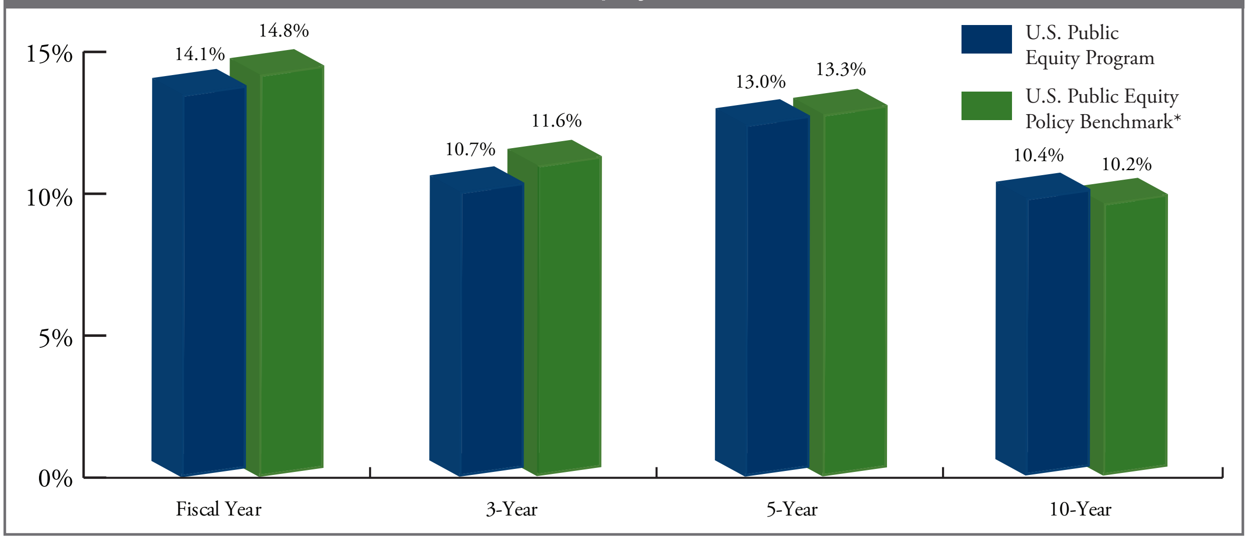
The U.S. equity markets continued to perform very well in fiscal year 2018 across all market capitalizations while growth styles performed especially well in comparison to value styles. The comprehensive measure of the U.S. stock market (Russell 3000 Index) increased 14.8% while small-cap stocks (Russell 2000 Index) increased 17.6% for the year. Large-cap growth stocks (Russell 1000 Growth Index) significantly outperformed large-cap value stocks (Russell 1000 Value Index) with a return of 22.5% compared to 6.8% while small-cap growth stocks (Russell 2000 Growth Index) significantly outperformed small cap value stocks (Russell 2000 Value Index) with a return of 21.9% compared to 13.1%.

## Performance

The total return for the U.S. Public Equity program was 14.1% compared to the benchmark return of 14.8% for the fiscal year ended June 30, 2018. Within the U.S. Public Equity program, the Large-Cap program returned 13.6%, Alpha Overlay returned 14.5% and the Small-Cap program returned 16.9% 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 | 14.1% | 10.7% | 13.0% | 10.4% |
| Annualized Policy Benchmark Return* | 14.8% | 11.6% | 13.3% | 10.2% |
| Excess Return | -0.7% | -0.9% | -0.3% | 0.2% |

**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, 2018 with comparisons shown to the portfolio's policy benchmark. In addition, the top ten U.S. stock holdings as of June 30, 2018 are shown in the table following the characteristics.

**U.S. Public Equity Characteristics**

| Characteristics | June 30, 2018 Systems' U.S. Public Equity Program | June 30, 2018 Russell 3000 Index |
|---|---|---|
| Number of Securities | 1,828 | 3,008 |
| Dividend Yield | 1.7% | 1.8% |
| Price-to-Earnings Ratio | 20.1 | 20.9 |
| Avg Market Capitalization | $ 144.3 bil | $ 179.9 bil |
| Price-to-Book Ratio | 3.5 | 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, 2018 | Fair Value | % of Total U.S. Public Equity |
|---|---|---|
| Amazon.com, Inc. | $ 141,792,217 | 1.1% |
| Facebook, Inc. | 94,407,652 | 0.7% |
| Alphabet, Inc. | 92,187,029 | 0.7% |
| Bank of America Corp. | 84,116,761 | 0.7% |
| Exxon Mobile Corp. | 75,747,919 | 0.6% |
| Microsoft Corp. | 75,284,100 | 0.6% |
| Johnson & Johnson | 72,582,676 | 0.6% |
| Netflix, Inc. | 71,866,548 | 0.6% |
| Coca-Cola Co. | 69,430,336 | 0.5% |
| JPMorgan Chase & Co. | 63,063,195 | 0.5% |
| **TOTAL** | **$ 840,478,433** | **6.6%** |

## Investment Advisors

As of June 30, 2018, the Systems had contracts with 14 external investment advisors who managed 21 portfolios that comprised 78.9% of the U.S. Public Equity portfolio. The remaining 21.1% of the portfolio was in the Alpha Overlay program described in the next section. The Systems repositioned the Small-Cap program during the year by adding a new Enhanced Russell 2000 mandate with NISA Investment Advisors.

**U.S. Public Equity Investment Advisors**

| Investment Advisor | Investment Style | Fair Value* As of June 30, 2018 | % of Total Plan Fair Value |
|---|---|---|---|
| Analytic Investors | Structured Large Cap Value | $ 286,620,399 | 0.6% |
| Analytic Investors | U.S. Low Volatility Equity | 1,306,571,345 | 3.0% |
| AQR Capital Management | Large Cap 140/40 Core | 820,603,985 | 1.9% |
| Aronson + Johnson + Ortiz | Active Large Cap 130/30 Value | 528,391,100 | 1.2% |
| Aronson + Johnson + Ortiz | Active Large Cap Value | 478,940,607 | 1.1% |
| Blackrock | Passive Russell 1000 Index | 2,981,246,119 | 6.8% |
| Blackrock | Passive Russell 1000 Growth Index | 40,626,109 | 0.1% |
| Columbia Management | Active Large Cap Growth | 270,540,948 | 0.6% |
| Lazard Asset Management | Active US Equity Concentrated | 379,769,072 | 0.9% |
| Martingale Asset Management | Active Large Cap 130/30 Growth | 520,956,203 | 1.2% |
| Westwood Management | Active Large Cap Value | 451,606,098 | 1.0% |
| Westwood Management | Master Limited Partnerships | 229,248,431 | 0.5% |
| Zevenbergen Capital | Active All Cap Growth | 730,451,353 | 1.7% |
| ***Large-Cap Subtotal*** | | **9,025,571,769** | **20.6%** |
| Allianz | Active Micro Cap Growth | 135,108,019 | 0.3% |
| Allianz | Active Ultra Micro Cap Growth | 45,495,532 | 0.1% |
| AQR Capital Management | Active Small Cap Value | 182,576,827 | 0.4% |
| Blackrock | Passive Russell 2000 Index | 138,544,193 | 0.3% |
| Chartwell Investment Partners | Active Small Cap Value | 103,320,471 | 0.3% |
| Columbus Circle | Active Small Cap Growth | 96,857,619 | 0.2% |
| NISA Investment Advisors | Enhanced Russell 2000 Index | 221,049,419 | 0.5% |
| RBC Global Asset Management | Active Small Cap Core | 180,769,540 | 0.4% |
| ***Small-Cap Subtotal*** | | **1,103,721,620** | **2.5%** |
| **Total** | | **$10,129,293,389** | **23.1%** |

**Includes manager cash.*

# Alpha Overlay Program Summary

*As of June 30, 2018, the Alpha Overlay allocation had a fair value of approximately $2.7 billion, representing 6.2% 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, 2018, 20.8% 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 73.6% of the portfolio was actively managed across a diversified range of multi-strategy and market neutral hedge fund mandates. The remaining 5.6% 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, 2018.

**Alpha Overlay Investment Advisors**

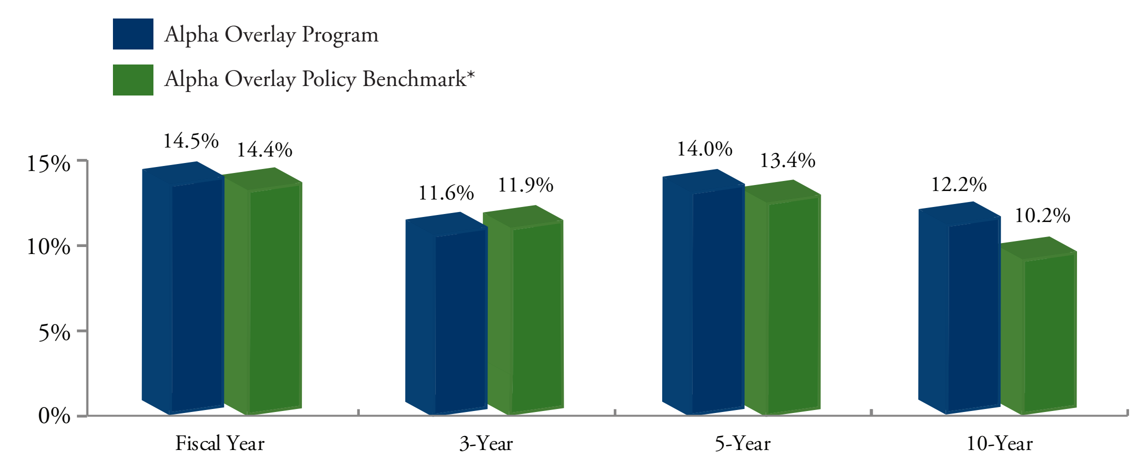
| Investment Advisor | Investment Style | Fair Value* As of June 30, 2018 | % of Total Plan Fair Value |
|---|---|---|---|
| Analytic Investors | Relative Value | $ 29,078,387 | 0.1% |
| AQR Absolute Return Fund | Relative Value | 176,092,208 | 0.4% |
| Bridgewater Pure Alpha II | Asset Allocation/Global Macro | 374,230,736 | 0.9% |
| Carlson Black Diamond | Relative Value | 250,123,959 | 0.6% |
| Davidson Kempner Institutional Partners | Event Driven | 267,125,406 | 0.6% |
| HBK Capital Management | Relative Value | 185,067,980 | 0.4% |
| NISA Investment Advisors | S&P 500 Exposure | 564,719,223 | 1.3% |
| Och-Ziff Domestic Partners | Multi-Strategy | 149,893,809 | 0.3% |
| Pershing Square | Activist Equity | 150,058,914 | 0.3% |
| Renaissance Institutional Equities Fund | Low Volatility Equity | 322,712,836 | 0.7% |
| Stark Investments Limited Partners | Equity Long/Short | 1,273,205 | 0.0% |
| UBS O'Connor Multi-Strategy Alpha | Relative Value | 92,385,969 | 0.2% |
| Zevenbergen Capital | Active All-Cap Growth | 152,977,921 | 0.4% |
| **Total** | | **$2,715,740,553** | **6.2%** |

** Includes manager cash.*

## Performance

The fiscal year 2018 return for the Alpha Overlay program was 14.5% exceeding the benchmark return of 14.4% by 10 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 | 14.5% | 11.6% | 14.0% | 12.2% |
| Annualized Policy Benchmark Return* | 14.4% | 11.9% | 13.4% | 10.2% |
| Excess Return | 0.1% | -0.3% | 0.6% | 2.0% |
| Annualized Standard Deviation of Composite | 7.8% | 8.9% | 8.9% | 14.3% |
| Annualized Standard Deviation of Policy Benchmark* | 8.6% | 10.2% | 9.8% | 14.7% |
| Beta to Benchmark* | 0.88 | 0.85 | 0.88 | 0.96 |

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

# Non-U.S. Public Equity Program Summary

*As of June 30, 2018, the Non-U.S. Public Equity assets had a fair value of approximately $7.4 billion, representing 16.9% of total plan assets.*

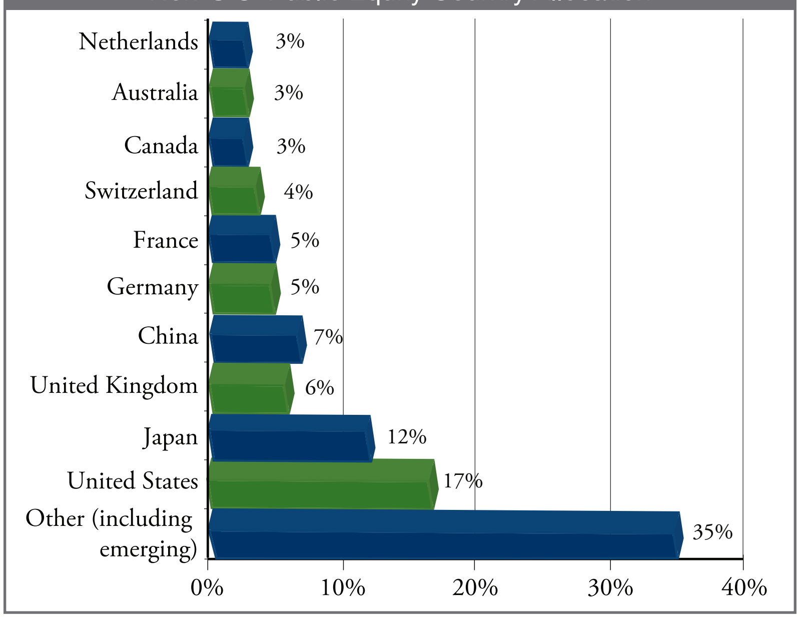
## Investment Program Description

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.

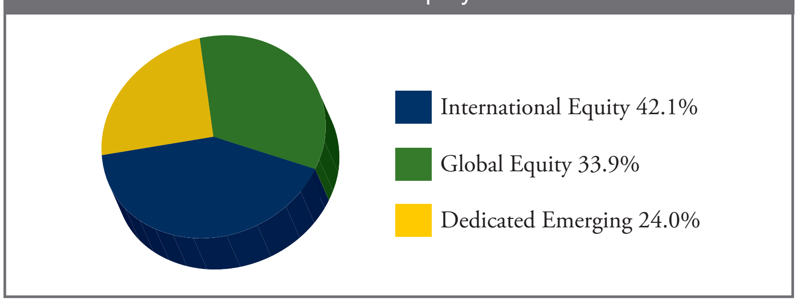
## Structure

As of June 30, 2018, 6.3% 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 Country Allocation




Non-U.S. Public Equity Allocation



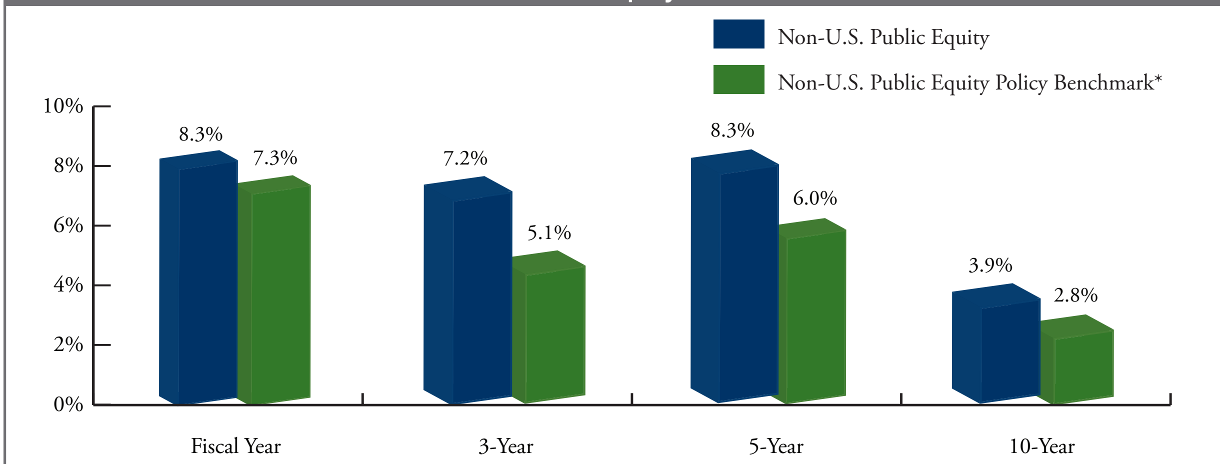
## Market Overview

Global economies experienced significant GDP growth along with increasing commodity prices in fiscal year 2018 resulting in strong global equity market returns. The broad measure for developed international markets (MSCI EAFE net Index) increased 6.8%, emerging markets (MSCI EM net Index) increased 8.2% and global stocks (MSCI World net Index) increased 11.1%.

## Performance

The total return for the Non-U.S. Public Equity program was 8.3% compared to the benchmark return of 7.3% for the fiscal year ended June 30, 2018. As shown in the table and graph below, the Systems' Non-U.S. Public Equity composite returns substantially outperformed the benchmark over 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 ten-year excess returns are indicative of this expectation.

**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 | 8.3% | 7.2% | 8.3% | 3.9% |
| Annualized Policy Benchmark Return* | 7.3% | 5.1% | 6.0% | 2.8% |
| Excess Return | 1.0% | 2.1% | 2.3% | 1.1% |

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

## Statistics

*The following table displays the top ten global stock holdings as of June 30, 2018.*

| Non-U.S. Public Equity - Top 10 Holdings | | |
|---|---|---|
| **Top 10 Largest Holdings* June 30, 2018** | **Fair Value** | **% of Total Non-U.S. Public Equity** |
| Nestle SA | $ 59,876,751 | 0.8% |
| Roche Holding AG | 57,437,621 | 0.8% |
| AIA Group Ltd. | 46,457,566 | 0.6% |
| SAP SE | 44,638,007 | 0.6% |
| Hoya Corp. | 42,275,778 | 0.6% |
| Samsung Electronics Ltd. | 41,512,766 | 0.6% |
| Bayer AG | 37,067,070 | 0.5% |
| Tata Consultancy Services Ltd. | 36,488,957 | 0.5% |
| Taiwan Semiconductor Manufacturing | 34,535,417 | 0.5% |
| Canadian National Railway Co. | 34,294,228 | 0.4% |
| **Total** | **$ 434,584,160** | **5.9%** |

** Includes only actively managed separate accounts.*

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

## Investment Advisors

As of June 30, 2018, the Systems had contracts with 12 external investment advisors who managed 15 portfolios within the Non-U.S. Public Equity portfolio. In fiscal year 2018, an Aronson + Johnson + Ortiz portfolio was terminated.

| Non-U.S. Public Equity Investment Advisors | | | |
|---|---|---|---|
| **Investment Advisor** | **Investment Style** | **Fair Value* As of June 30, 2018** | **% of Total Plan Fair Value** |
| Acadian Asset Management | Active Emerging Markets | $ 514,576,453 | 1.2% |
| AllianceBernstein Institutional Mgmt. | Active Intl Value | 474,097,290 | 1.1% |
| Analytic Investors | Active Global | 790,282,867 | 1.8% |
| AQR Capital Management | Active Intl Core | 784,879,536 | 1.8% |
| Arrowstreet Capital | Active Emerging Markets | 247,172,024 | 0.6% |
| Arrowstreet Capital | Active Global | 731,194,439 | 1.7% |
| Arrowstreet Capital | Global Long/Short | 1,000,148,533 | 2.3% |
| Blackrock | Passive Intl Core | 465,803,927 | 1.1% |
| Coronation Asset Management Limited | Active Emerging Markets | 304,849,659 | 0.7% |
| Invesco | Active Intl Low Volatility | 220,888,046 | 0.5% |
| MFS Investment Management | Active Intl Core | 940,664,429 | 2.1% |
| MFS Investment Management | Active Intl Concentrated Core | 239,402,632 | 0.5% |
| Neon Capital Management | Active Emerging Markets | 123,068,578 | 0.3% |
| NISA Investment Advisors | Currency Hedge | (41,989,047) | -0.1% |
| Rock Creek Group | Active Emerging Markets | 596,851,085 | 1.3% |
| Transition accounts | Transition accounts | 1,496 | 0.0% |
| **Total** | | **$ 7,391,891,947** | **16.9%** |

** Includes manager cash.*

# Public Credit Program Summary

*As of June 30, 2018, the Public Credit assets had a fair value of approximately $2.3 billion, representing 5.3% of total plan assets.*

## Investment Program Description

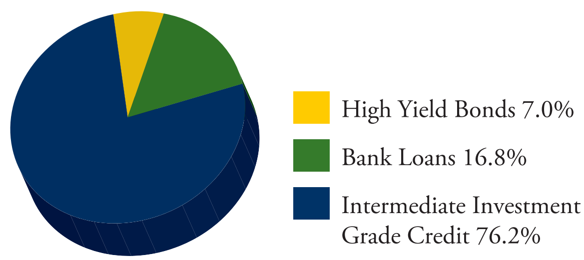
The Public Credit Program is designed to provide a source of income and capital appreciation for the Systems while creating substantial diversification to the total plan with a low correlation to other asset classes. Most securities in this program exhibit high liquidity. Specific investments can include 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, 2018, the Public Credit composite was actively managed and diversified across high quality corporate bonds, bank loans 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, 2018.

Public Credit Allocation



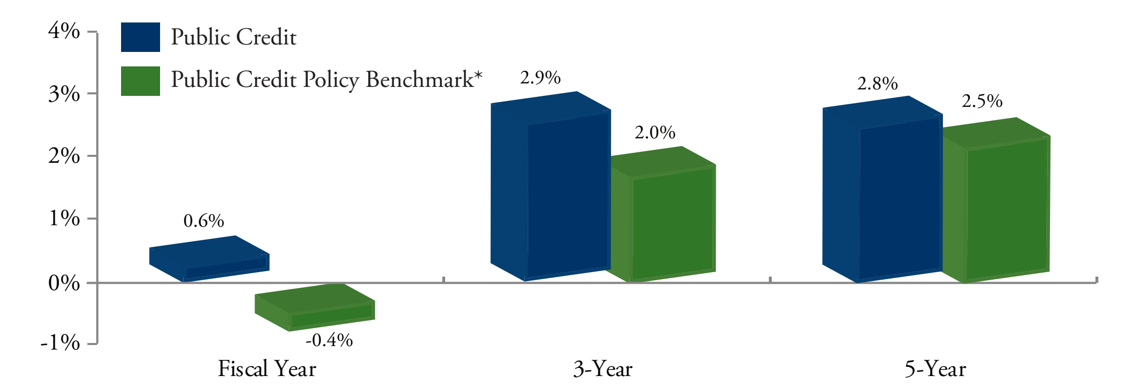

## Market Overview

High yield bonds significantly outperformed treasuries and investment grade credit during the year as the yield on the 10-year Treasury increased to 2.9% on June 30, 2018 from 2.3% on June 30, 2017. Both investment grade credit corporate bonds (Bloomberg Barclays U.S. Intermediate Credit Index) and a broader measure of the U.S. bond market (Bloomberg Barclays U.S. Aggregate Index) decreased by 0.4% for the year. High yield, or lower quality bonds (ICE BofAML U.S. High Yield Master II Index), increased 2.5% for the year and global bonds (Bloomberg Barclays Global Agg. Ex-US Index) increased 2.8%.

## Performance

The Public Credit program produced a modest absolute return for fiscal year 2018 and performed very well relative to the benchmark. The fiscal year return of 0.6% exceeded the benchmark return of -0.4% by 100 basis points. As indicated in the table and graph on page 83, the Public Credit portfolio has produced solid relative returns for all reported 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** |
| Annualized Public Credit Return | 0.6% | 2.9% | 2.8% |
| Annualized Policy Benchmark Return* | -0.4% | 2.0% | 2.5% |
| Excess Return | 1.0% | 0.9% | 0.3% |

**Note:** **The Public Credit Policy Benchmark is the Bloomberg Barclays U.S. Intermediate Credit Index.*
*The Public Credit Program was established in December 2008, so ten-year returns are not available.*

## Statistics

The following table displays the top ten Public Credit holdings as of June 30, 2018.

Public Credit - Top 10 Holdings

| Top 10 Largest Holdings* June 30, 2018 | Fair Value | % of Total Public Credit |
|---|---|---|
| United States Treasury Note, 2.63%, 06/15/2021 | $ 59,912,189 | 2.6% |
| AT&T, Inc., 0.00%, 11/27/2022 | 53,271,540 | 2.3% |
| Bank of America Corp., 2.37%, 07/21/2021 | 48,887,062 | 2.1% |
| Citigroup, Inc., 3.89%, 01/10/2028 | 48,267,191 | 2.1% |
| J.P. Morgan Chase & Co., 2.60%, 02/01/2021 | 47,227,989 | 2.0% |
| Morgan Stanley, 3.16%, 02/14/2020 | 45,136,350 | 1.9% |
| BAT Capital Corp, 3.22%, 08/15/2024 | 41,441,313 | 1.8% |
| Transcontinental Gas Pipe Line Co. LLC, 7.85%, 02/01/2026 | 40,055,829 | 1.7% |
| Shire Acquisitions Investments, 2.88%, 09/23/2023 | 39,330,144 | 1.7% |
| Alabama Power Co., 2.45%, 03/30/2022 | 38,556,453 | 1.6% |
| **Total** | **$ 462,086,060** | **19.8%** |

** Includes only actively managed separate accounts.*
*A complete list of portfolio holdings is available upon request.*

## Investment Advisors

As of June 30, 2018, the Systems had contracts with three external investment advisors who managed three portfolios in the Public Credit program.

Public Credit Investment Advisors

| Investment Advisor | Investment Style | Fair Value* As of June 30, 2018 | % of Total Plan Fair Value |
|---|---|---|---|
| NISA Investment Advisors | Corporate Credit | $ 1,782,946,205 | 4.1% |
| Oaktree Bank Loans | Senior Bank Loans | 391,984,232 | 0.9% |
| Pacific Investment Management Co. | High Yield | 163,959,873 | 0.3% |
| **Total** | | **$ 2,338,890,310** | **5.3%** |

**Includes manager cash.*

# Hedged Assets Program Summary

*As of June 30, 2018, the Hedged Assets portfolio had a fair value of approximately $5.2 billion, representing 11.9% of total plan assets.*

## Investment Program Description

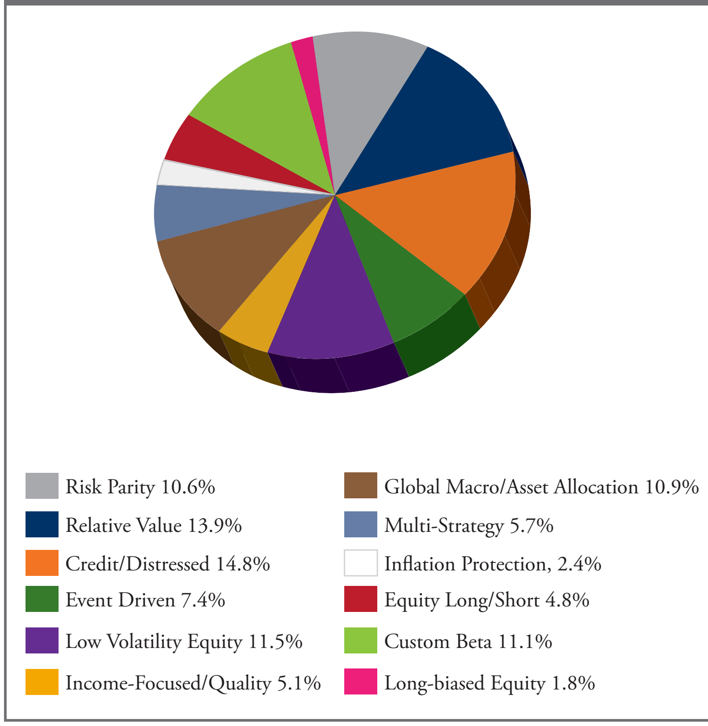
The Hedged Assets program's objective is to provide diversification to the total portfolio and reduce volatility within the Public Risk composite. The purpose of this program is to enhance the overall risk/return profile of the Public Risk composite through the inclusion of specialized investment strategies 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, 2018. 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**

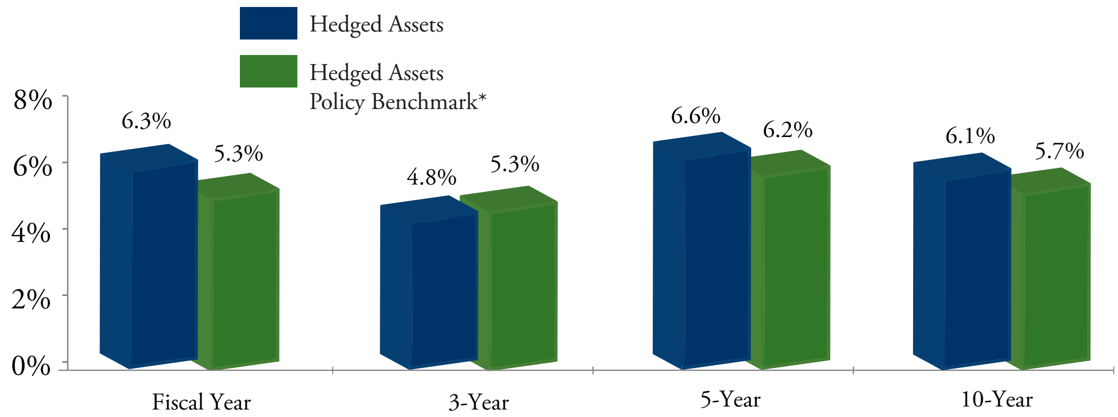



## Performance

The total annualized return on the Systems' Hedged Assets portfolio was 6.3%, compared to the benchmark return of 5.3% for the fiscal year ended June 30, 2018.

Over the past ten years, the Hedged Assets program has marginally outperformed its policy benchmark of 5.7%. The performance relative to the policy benchmark is particularly significant given the strong performance of equities over this time period. The Russell 3000 Index was up an annualized 10.2% over the past ten years and the MSCI ACWI net Index was up an annualized 5.8%. 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 on the following page, 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 | 6.3% | 4.8% | 6.6% | 6.1% |
| Annualized Policy Benchmark Return* | 5.3% | 5.3% | 6.2% | 5.7% |
| Annualized S&P 500 Return | 14.4% | 11.9% | 13.4% | 10.2% |
| Annualized MSCI ACWI net Index | 10.7% | 8.2% | 9.4% | 5.8% |
| Annualized Standard Deviation of Composite | 3.2% | 3.7% | 4.1% | 6.8% |
| Annualized Standard Deviation of Policy Benchmark* | 4.3% | 5.7% | 5.5% | 9.4% |
| Annualized Standard Deviation of S&P 500 | 8.6% | 10.2% | 9.8% | 14.7% |
| Annualized Standard Deviation of MSCI ACWI net Index | 8.6% | 10.7% | 10.2% | 16.4% |
| Beta to Policy Benchmark* | 0.65 | 0.53 | 0.64 | 0.64 |
| Beta to S&P 500 | 0.31 | 0.29 | 0.33 | 0.37 |
| Beta to MSCI ACWI net Index | 0.32 | 0.29 | 0.33 | 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, 2018, the Systems had contracts with 17 external investment advisors who managed 26 portfolios. During the fiscal year new investment mandates were added with AQR and Hillhouse while a Pershing Square mandate was rebalanced to the Alpha Overlay program.

| Hedged Assets Investment Advisors | | | |
|---|---|---|---|
| **Investment Advisor** | **Investment Style** | **Fair Value* As of June 30, 2018** | **% of Total Plan Fair Value** |
| AQR Absolute Return Fund | Relative Value | $ 233,424,555 | 0.5% |
| AQR Adaptive Multi-Strategy | Risk Parity | 261,618,500 | 0.6% |
| AQR Diversified Beta Fund | Risk Parity | 105,054,227 | 0.2% |
| AQR Real Asset Fund | Inflation Protection | 47,497,755 | 0.1% |
| Bridgewater All Weather | Risk Parity | 184,502,093 | 0.4% |
| Bridgewater Inflation Pool | Inflation Protection | 75,225,148 | 0.2% |
| Bridgewater Pure Alpha II | Asset Allocation/Global Macro | 561,346,125 | 1.3% |
| Bridgewater Pure Alpha Major Markets | Asset Allocation/Global Macro | 6,514,074 | 0.0% |
| Carlson Black Diamond | Relative Value | 166,749,307 | 0.4% |
| Davidson Kempner Institutional Partners | Event Driven | 267,125,406 | 0.6% |
| Davidson Kempner Distressed Opportunities Fund | Distressed Debt/Credit | 258,654,889 | 0.6% |
| GoldenTree Partners | Distressed Debt/Credit | 508,247,556 | 1.2% |
| HBK Capital Management | Relative Value | 185,067,980 | 0.4% |
| Hillhouse China Value Fund | Long-Biased Equity | 93,764,596 | 0.2% |
| Indus Asia Pacific Fund | Equity Long/Short | 117,440,826 | 0.3% |
| Maverick Fund USA | Equity Long/Short | 129,101,848 | 0.3% |
| NISA Investment Advisors | Custom Beta | 578,592,475 | 1.3% |
| Och-Ziff Domestic Partners | Multi-Strategy | 278,374,218 | 0.6% |
| Och-Ziff Europe | Multi-Strategy | 892,916 | 0.0% |
| Och-Ziff Asia | Multi-Strategy | 16,076,601 | 0.1% |
| Owl Creek Overseas Fund | Event Driven | 98,742,709 | 0.2% |
| Renaissance Institutional Equities Fund | Low Volatility Equity | 599,323,838 | 1.4% |
| Stark Investments Limited Partners | Equity Long/Short | 2,364,523 | 0.0% |
| UBS O'Connor Multi-Strategy Alpha | Relative Value | 138,578,972 | 0.3% |
| Westwood Management | Income Focused/Quality | 267,537,707 | 0.6% |
| York Capital Management | Event Driven | 16,019,578 | 0.1% |
| **Total** | | **$ 5,197,838,422** | **11.9%** |

**Includes manager cash.*

# Safe Assets Summary

*As of June 30, 2018, the Safe Assets had a fair value of approximately $8.0 billion, representing 18.3% of total plan assets.*

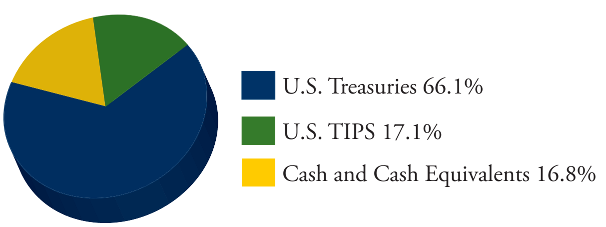
## Investment Program Description

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, 2018, NISA Investment Advisors was the only external investment manager within the Safe Assets program. The assets held within the program exhibit high liquidity and safety. The pie chart below depicts the Safe Assets Program by showing the sector and composite allocations as of June 30, 2018.

Safe Assets Allocation




The Systems' increased its allocation to Safe Assets from 17.0% as of June 30, 2017 to 18.3% as of June 30, 2018. The increased allocation includes additional funding to U.S. TIPS and the funding of a new Safe Assets cash account. The new cash account is an FDIC insured interest bearing account at J.P. Morgan with a competitive yield.

## Market Overview

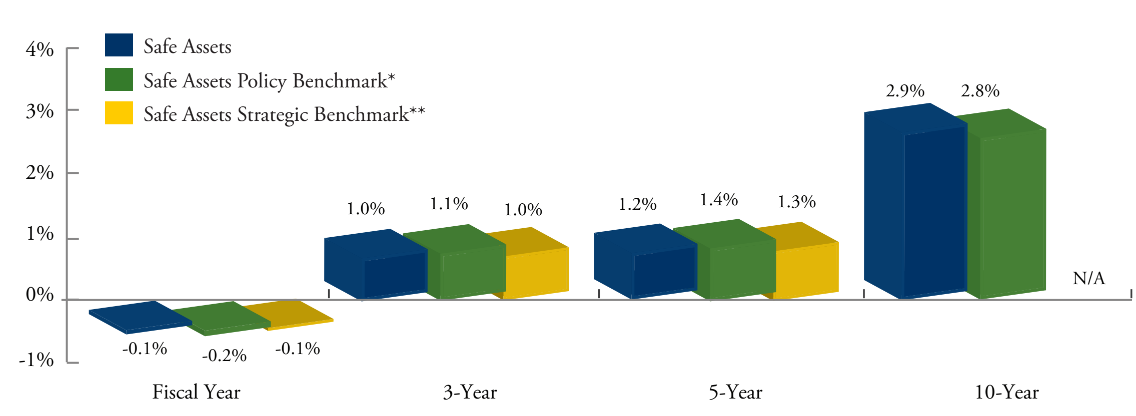
The yield on the 10-year Treasury increased to 2.9% on June 30, 2018 from 2.3% on June 30, 2017 as a result of continued U.S. economic growth and three Federal Reserve rate hikes during fiscal year 2018. The increase in interest rates throughout the year negatively impacted the price of Treasuries. The comprehensive measure of the U.S. Treasuries market (Bloomberg Barclays U.S. Treasuries Index) decreased 0.7% while the TIPS market (Bloomberg Barclays U.S. TIPS 1-10 Years) increased 1.5% for the year.

## Performance

The total return for Safe Assets portfolio was -0.1% for the fiscal year ended June 30, 2018. The portfolio outperformed the benchmark for the year by 10 basis points. For the three- and five-year time periods, the Systems' slightly underperformed the Safe Assets benchmark while the portfolio return slightly outperformed the benchmark for the ten-year time period.

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 | -0.1% | 1.0% | 1.2% | 2.9% |
| Annualized Policy Benchmark Return* | -0.2% | 1.1% | 1.4% | 2.8% |
| Annualized Strategic Benchmark Return** | -0.1% | 1.0% | 1.3% | NA |
| Excess Return | 0.1% | -0.1% | -0.2% | 0.1% |
| Annualized Standard Deviation of Composite | 2.2% | 2.4% | 2.5% | 3.2% |
| Annualized Standard Deviation of Policy Benchmark* | 2.5% | 2.7% | 2.7% | 3.4% |
| Beta to Policy Benchmark* | 0.87 | 0.91 | 0.90 | 0.95 |
| Beta to MSCI ACWI net Index | -0.09 | -0.04 | -0.04 | -0.01 |

**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. It was established more recently so a ten-year return is not available.*

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, 2018 with comparisons shown to the Bloomberg Barclays U.S. Treasury Index. Additionally, the top ten Safe Asset holdings as of June 30, 2018 are shown in the table below the characteristics.

**Safe Assets Characteristics**

| Characteristics | June 30, 2018 Systems' Safe Assets Program | June 30, 2018 Bloomberg Barclays U.S. Treasury Index |
|---|---|---|
| Number of Securities | 97 | 259 |
| Average Coupon | 1.8% | 2.2% |
| Yield to Maturity | 2.3% | 2.7% |
| Average Maturity (Years) | 6.1 | 7.7 |
| Duration (Years) | 5.1 | 6.1 |

**Safe Assets - Top 10 Holdings**

| Top 10 Largest Holdings* June 30, 2018 | Fair Value | % of Total Safe Assets |
|---|---|---|
| United States Treasury Note, 1.25%, 04/30/2019 | $ 397,524,771 | 4.9% |
| United States Treasury Note, 1.50%, 10/31/2019 | 303,320,383 | 3.8% |
| United States Treasury Note, 1.625%, 05/15/2026 | 285,999,482 | 3.5% |
| United States Treasury Note, 2.00%, 10/31/2022 | 214,334,125 | 2.7% |
| United States Treasury Note, 2.25%, 02/15/2027 | 201,797,362 | 2.5% |
| United States Treasury Note, 3.50%, 05/15/2020 | 198,397,573 | 2.5% |
| United States Treasury Bond, 2.50%, 02/15/2045 | 189,554,904 | 2.4% |
| United States Treasury Note, 1.375%, 08/31/2020 | 187,791,437 | 2.3% |
| United States Treasury Note, 2.25%, 01/31/2024 | 185,044,299 | 2.3% |
| United States Treasury Note, 2.125%, 09/30/2024 | 168,367,336 | 2.1% |
| **Total** | **$ 2,332,131,672** | **29.0%** |

** Includes only actively managed separate accounts.*

*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, 2018. The Systems repositioned the Safe Assets program during the fiscal year by adding an interest bearing cash account with our master custodian J.P. Morgan.

**Safe Assets Investment Advisor**

| Investment Advisor | Investment Style | Fair Value* As of June 30, 2018 | % of Total Plan Fair Value |
|---|---|---|---|
| NISA Investment Advisors | U.S. Treasuries | $ 5,314,288,918 | 12.1% |
| NISA Investment Advisors | U.S. TIPS | 1,375,382,420 | 3.1% |
| NISA Investment Advisors | Cash Equivalents | 984,869,520 | 2.3% |
| J.P. Morgan Cash Account | Interest Bearing Cash Account | 367,587,600 | 0.8% |
| **Total** | | **$ 8,042,128,458** | **18.3%** |

**Includes manager cash.*

# Private Risk Assets Summary

*As of June 30, 2018, the Private Risk assets had a fair value of approximately $7.9 billion, representing 18.0% of total plan assets.*

## Investment Program Description

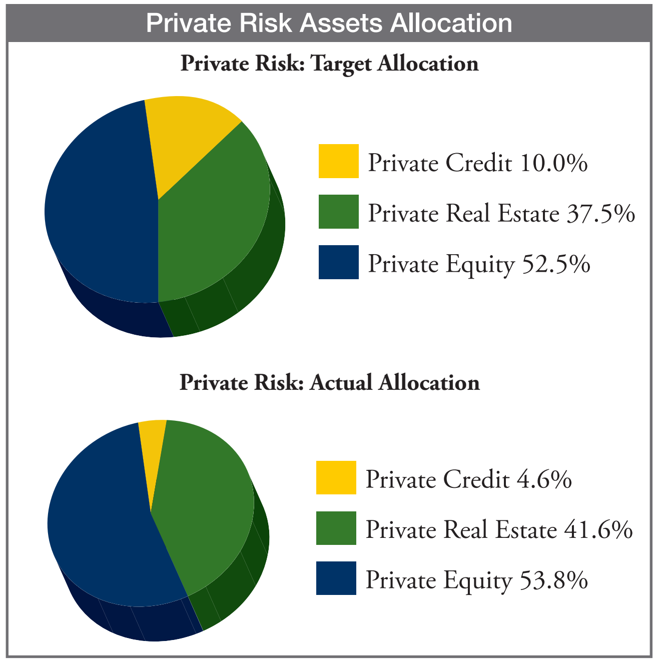
The allocation to Private Risk investments is viewed as a separate asset class for inclusion in the Systems' overall investment portfolios. The process of building the Systems' Private Risk program and fully funding the target allocation is expected to occur over a period of several years. Additional 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, 2018, 53.8% of Private Risk assets were invested in the Private Equity program, 41.6% in the Private Real Estate program, and 4.6% in the Private Credit program. Each of these programs is discussed in more detail on the following pages.

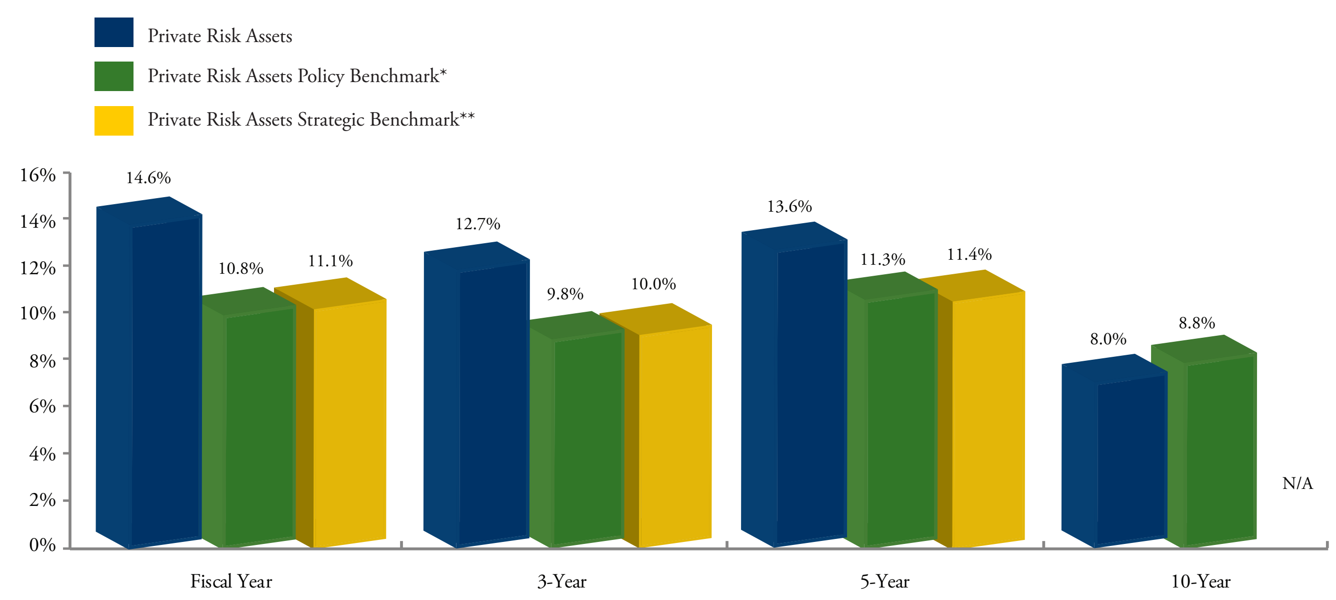


## Performance

The total return for the Private Risk portfolio was 14.6%, compared to the policy benchmark return of 10.8% for the fiscal year ended June 30, 2018. For the three- and five-year time periods, the Systems also significantly outperformed the benchmark. The ten-year return was marginally below the benchmark due to the immaturity of the programs and the impacts of the financial crisis of 2008 and 2009.

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 portfolios have produced excellent absolute returns over all time periods.

### Private Risk Assets Performance




### Private Risk Assets Statistical Performance

| Portfolio Characteristics | Fiscal Year | 3-Year | 5-Year | 10-Year |
|---|---|---|---|---|
| Annualized Private Risk Assets Return | 14.6% | 12.7% | 13.6% | 8.0% |
| Annualized Policy Benchmark Return* | 10.8% | 9.8% | 11.3% | 8.8% |
| Annualized Strategic Benchmark Return** | 11.1% | 10.0% | 11.4% | N/A |
| Excess Return | 3.8% | 2.9% | 2.3% | -0.8% |

** 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. It was established more recently so a 10-year return is not available.*

# Private Equity Program Summary

*As of June 30, 2018, the Private Equity assets had a fair value of approximately $4.2 billion, representing 9.7% 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

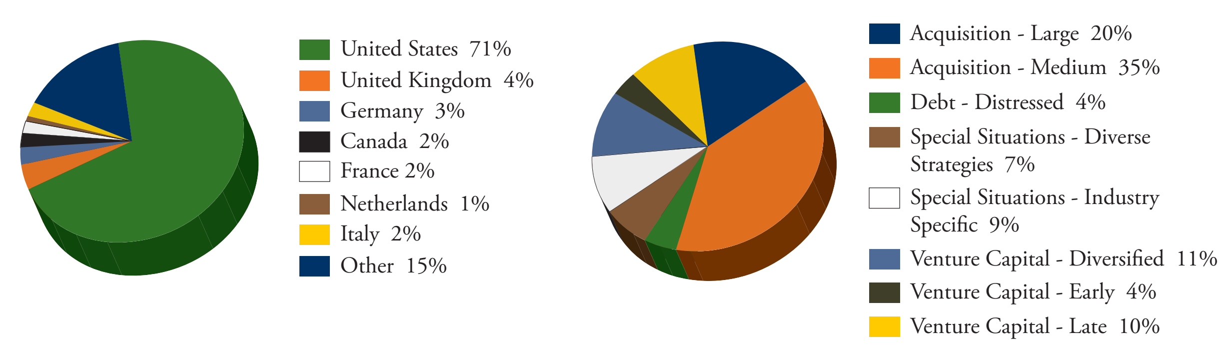
As of June 30, 2018, Private Equity assets committed* for investment were $9.1 billion. The fair value of funds that had been drawn down and actually invested as of June 30, 2018 was approximately $4.2 billion, representing 9.7% of total plan assets. The Systems private equity investment commitments that have not yet been funded were approximately $3.2 billion as of June 30, 2018.

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, 2018, the actual allocation for the Systems was just 9.7% 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 the assets that have been invested) of the Systems' private equity holdings as of June 30, 2018 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 Geographic Diversification**



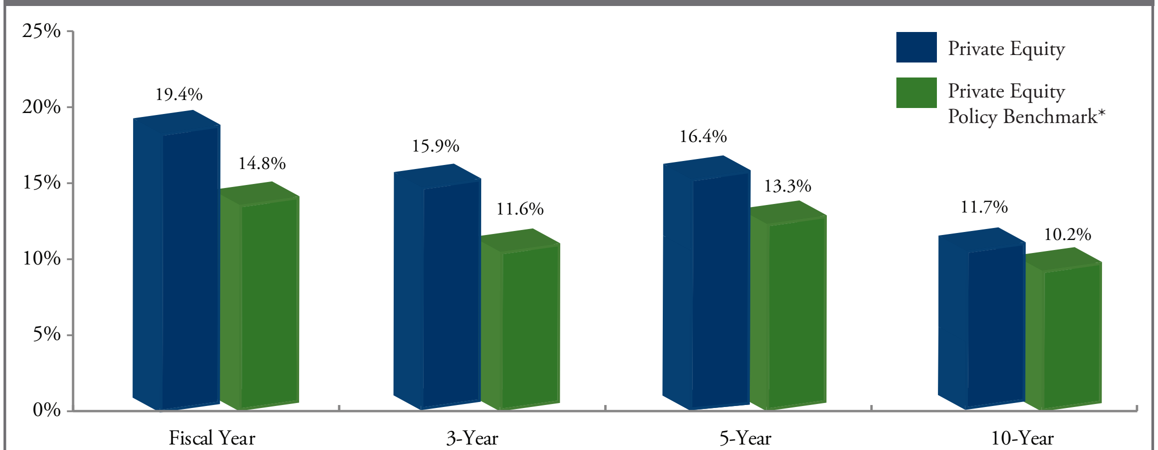

## Market Overview

Private equity markets had an excellent year, driven by several positive factors including solid economic data, strong corporate earnings and accommodative credit markets. Exit opportunities were particularly robust for private equity firms during the year as merger and acquisition activity reached record levels and IPO activity came in stronger than last year as well.

## Performance

The total return for the Private Equity program was 19.4%, compared to the benchmark return of 14.8% for the fiscal year ended June 30, 2018. 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 460 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 150 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 | 19.4% | 15.9% | 16.4% | 11.7% |
| Annualized Policy Benchmark Return* | 14.8% | 11.6% | 13.3% | 10.2% |
| Excess Return | 4.6% | 4.3% | 3.1% | 1.5% |

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

# Investment Advisors

As of June 30, 2018, the Systems were invested in 143 separate partnerships with 63 firms within the Private Equity asset class. In fiscal year 2018, the Systems committed to 31 new partnerships for $677 million. Additionally, the Systems received total distributions from the private equity partnerships of approximately $961 million in fiscal year 2018.

## Private Equity Investment Advisors

| Investment Advisor | Investment Style | Fair Value* As of June 30, 2018 | % of Total Plan Fair Value |
|---|---|---|---|
| Advent International GPE VII-B and VIII | Acquisition - Medium | $ 79,078,533 | 0.2% |
| Baring Asia VI | Acquisition - Medium | 21,707,876 | 0.1% |
| Battery Ventures XII and XII Side Fund | Venture Capital | 262,518 | 0.0% |
| BC European IX | Acquisition - Large | 30,835,409 | 0.1% |
| Blackstone Capital Partners V and VI | Acquisition - Large | 33,980,859 | 0.1% |
| Canaan Partners IX, X and XI | Venture Capital | 54,208,372 | 0.1% |
| Carlyle Europe Partners III | Acquisition - Medium | 3,656,136 | 0.0% |
| Carlyle Partners IV, V and VI | Acquisition - Large | 46,207,832 | 0.1% |
| Centerbridge Capital Partners I, II and III | Special Situations - Diverse Strategies | 49,939,163 | 0.1% |
| Centerbridge Capital Special Credit Partners II and III | Debt - Distressed | 32,906,911 | 0.1% |
| Charlesbank Equity Fund IX | Special Situations - Diverse Strategies | 2,205,159 | 0.0% |
| Chequers Capital XVII | Acquisition - Medium | 548,899 | 0.0% |
| Clayton, Dubilier & Rice Fund X | Acquisition - Medium | 2,813,993 | 0.0% |
| Clearlake Capital Partners V | Acquisition - Medium | 2,957,775 | 0.0% |
| Coller International Partners VII | Secondary Fund | 82,898,066 | 0.2% |
| CVC Capital Partners VI and VII | Acquisition - Large | 49,448,475 | 0.1% |
| CVC European Equity Partners IV and V | Acquisition - Large | 11,549,403 | 0.0% |
| CVC European Equity Tandem Fund | Acquisition - Large | 146,383 | 0.0% |
| DEFY Partners I | Venture Capital | 1,352,734 | 0.0% |
| Encap Energy IX, X, XI and VIII Co-Investors | Special Situations - Industry Specific | 78,688,053 | 0.2% |
| EnCap Flatrock Midstream III and IV | Special Situations - Industry Specific | 6,062,171 | 0.0% |
| Exponent Partners II | Acquisition - Medium | 2,869,143 | 0.0% |
| First Reserve Fund XI and XII | Special Situations - Industry Specific | 8,107,927 | 0.0% |
| General Catalyst Group IX | Venture Capital | 1,561,452 | 0.0% |
| Genstar Capital Partners V and VIII | Acquisition - Medium | 4,035,657 | 0.0% |
| Glendon Opportunities Fund | Debt - Distressed | 28,350,372 | 0.1% |
| GTCR Fund IX, X, XI and XII | Acquisition - Medium | 58,171,476 | 0.2% |
| Hellman & Friedman VI, Spock 1, VII and VIII | Acquisition - Large | 83,193,271 | 0.2% |
| Hillhouse Fund IV | Acquisition - Large | 3,879,007 | 0.0% |
| Huron Fund V | Acquisition - Medium | 1,800,625 | 0.0% |
| Insight Venture Partners IX and X | Special Situations - Diverse Strategies | 45,501,077 | 0.1% |
| Institutional Investment Partners XV and XVI | Venture Capital | 21,474,006 | 0.1% |
| Kelso Investment Associates VIII | Acquisition - Medium | 16,374,664 | 0.0% |
| KKR 2006 Fund | Acquisition - Large | 11,520,526 | 0.0% |
| KRG Fund IV | Acquisition - Medium | 2,398,286 | 0.0% |
| Lexington Capital Partners VI-B, VII and VIII | Secondary Fund | 200,541,575 | 0.5% |
| Lone Star Fund X | Debt - Distressed | 41,696,346 | 0.1% |
| Madison Dearborn VI and VII | Acquisition - Large | 47,366,739 | 0.1% |
| Marlin Equity V and Heritage II | Acquisition - Medium | 6,346,803 | 0.0% |
| Montagu III and IV | Acquisition - Medium | 23,075,975 | 0.1% |
| New Enterprise Associates 13, 14, 15 and 16 | Venture Capital | 151,420,268 | 0.3% |
| New Horizon VI: Advantech II and Redview II | Special Situations - Diverse Strategies | 168,517 | 0.0% |
| New Mountain Partners V | Acquisition - Medium | 8,585,350 | 0.0% |
| Nordic VII, CVI Alpha and VIII | Acquisition - Medium | 56,695,212 | 0.1% |
| Oak Investment Partners XIII | Venture Capital | 27,295,001 | 0.1% |
| OCM Principal Opportunities Fund IV, VII, VIIb, IX and Xb | Debt - Distressed | 24,586,184 | 0.1% |
| Odyssey Investment Partners IV and V | Acquisition - Medium | 26,372,976 | 0.1% |
| Onex Partners II, III, IV and ONCAP IV | Acquisition - Medium | 54,212,274 | 0.1% |
| Pamlico Capital IV | Acquisition - Medium | 5,664,620 | 0.0% |
| Pantheon Global Secondary Fund III and IV | Secondary Fund | 35,891,806 | 0.1% |
| Pathway Capital Management | Fund-of-Funds | 1,897,811,564 | 4.3% |
| Paul Capital Partners IX | Secondary Fund | 27,663,762 | 0.1% |
| Permira IV, V and VI | Acquisition - Medium | 57,983,887 | 0.1% |
| Providence Equity Partners VI | Special Situations - Industry Specific | 11,964,216 | 0.0% |
| Quad-C Partners IX and VIII | Acquisition - Medium | 55,292,504 | 0.1% |
| Quantum Energy Partners V, V-C, VI, VI-C , VII and VII-C | Special Situations - Industry Specific | 70,743,229 | 0.2% |
| The Resolute Fund II and III | Acquisition - Medium | 51,485,620 | 0.1% |
| Sentinel Junior Capital I | Debt - Mezzanine | 158,746 | 0.0% |
| Silver Lake Partners III | Special Situations - Industry Specific | 17,475,790 | 0.0% |
| Spectrum Equity Investors VI, VII and VII | Special Situations - Diverse Strategies | 32,714,742 | 0.1% |
| TA XI and XII | Special Situations - Diverse Strategies | 36,669,899 | 0.1% |
| TCV IX, VI, VII and VIII | Venture Capital | 115,955,045 | 0.3% |
| Thoma Bravo Discover Fund | Acquisition - Medium | 11,514,511 | 0.0% |
| Thoma Bravo Fund XII | Acquisition - Large | 28,078,150 | 0.1% |
| Thoma Bravo Special Opps Fund II | Acquisition - Medium | 40,834,465 | 0.1% |
| Thoma Cressey Fund VIII | Acquisition - Medium | 526,429 | 0.0% |
| TPG Partners V and VI | Acquisition - Large | 17,435,256 | 0.0% |
| Trident Capital Fund VII | Acquisition - Medium | 14,838,105 | 0.0% |
| Vista Equity Partners V, VI and Foundation III | Acquisition - Medium | 117,994,523 | 0.3% |
| Wayzata Opportunities Fund I, II and III | Debt - Distressed | 12,552,705 | 0.0% |
| Wind Point Partners VI and VII | Acquisition - Medium | 13,312,368 | 0.0% |
| Stock distribution account | Public Stocks | 7,939,705 | 0.0% |
| **Total** | | **$ 4,231,557,076** | **9.7%** |

**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, 2018, the net asset values utilized were cash flow adjusted through June 30, 2018.*

# Private Credit Program Summary

*As of June 30, 2018, the Private Credit assets had a fair value of approximately $364 million, representing 0.8% 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, 2018, Private Credit assets committed* for investment were $1.5 billion. The fair value of funds that have been drawn down and actually invested as of June 30, 2018 was approximately $364 million, representing 0.8% of total assets. The Systems' private credit investment commitments that have not yet been funded were approximately $622 million as of June 30, 2018.

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.

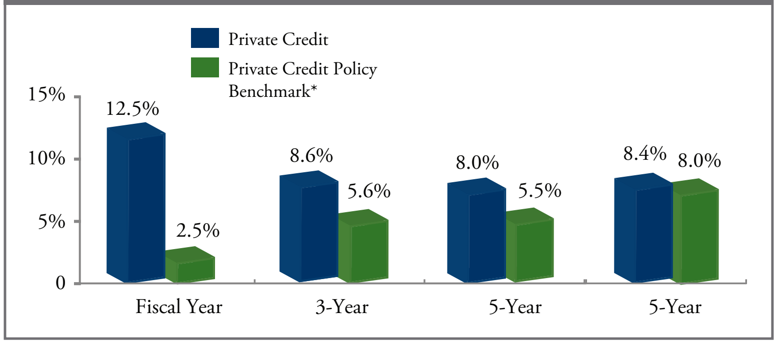
## Market Overview

Private Credit markets provided attractive returns in fiscal year 2018 as a result of low default rates, accommodating debt market conditions and healthy business and industry operating conditions. High yield markets returned 2.5% for the year as measured by the ICE BofAML U.S. High Yield Master II Index.

## Performance

The total return for the Private Credit program was 12.5%, compared to the benchmark return of 2.5% for the fiscal year ended June 30, 2018. 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 time periods.

**Private Credit Performance**




**Private Credit Statistical Performance**

| Portfolio Characteristics | Fiscal Year | 3-Year | 5-Year | 10-Year |
|---|---|---|---|---|
| Annualized Private Credit Return | 12.5% | 8.6% | 8.0% | 8.4% |
| Annualized Policy Benchmark Return* | 2.5% | 5.6% | 5.5% | 8.0% |
| Excess Return | 10.0% | 3.0% | 2.5% | 0.4% |

**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, 2018, the Systems were invested in 19 separate partnerships with 15 firms within the Private Credit asset class. Six new commitments were made to the Private Credit asset class during fiscal year 2018 for $415 million. The Systems received total distributions from the private credit partnerships of approximately $117 million in fiscal year 2018.

**Private Credit Investment Advisors**

| Investment Advisor | Investment Style | Fair Value* As of June 30, 2018 | % of Total Plan Fair Value |
|---|---|---|---|
| Bayview Opportunity Domestic V | Debt - Distressed | $ 12,862,246 | 0.0% |
| Benefit Street Partners Debt Fund IV | Debt - Lending | 35,089,799 | 0.1% |
| Caltius IV | Debt - Mezzanine | 1,264,976 | 0.0% |
| Centerbridge Special Capital Partners | Debt - Distressed | 1,815,006 | 0.0% |
| EIG Energy Fund XVI | Debt - Energy | 75,825,021 | 0.2% |
| Encap Fund VII | Special Situations - Industry Specific | 2,118,809 | 0.0% |
| Encap Fund VIII | Special Situations - Industry Specific | 13,834,746 | 0.0% |
| GSO Capital Solutions Fund III | Debt - Distressed | 1,925,969 | 0.0% |
| H.I.G Capital Bayside IV | Debt - Distressed | 10,628,138 | 0.0% |
| H.I.G Capital Whitehorse | Debt - Distressed | 49,163,339 | 0.1% |
| HPS Specialty Loan Fund 2016 | Debt - Mezzanine | 27,830,874 | 0.1% |
| Indigo Capital V | Debt - Mezzanine | 1,478,679 | 0.0% |
| Lone Star Real Estate Fund II | Debt - Distressed | 3,057,531 | 0.0% |
| OCM Opportunities Fund VIII | Debt - Distressed | 3,359,285 | 0.0% |
| OCM Opportunities Fund VIII b | Debt - Distressed | 16,671,829 | 0.0% |
| Pathway Capital Management | Fund-of Funds | 62,140,529 | 0.2% |
| TA Subordinated Debt Fund III | Debt - Mezzanine | 10,439,228 | 0.0% |
| TA Subordinated Debt Fund IV | Debt - Mezzanine | 19,094,413 | 0.1% |
| TSSP Adjacent Opportunities Partners | Debt - Multi Strategy | 15,451,201 | 0.0% |
| **Total** | | **$ 364,051,618** | **0.8%** |

**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, 2018, the net asset values utilized were cash flow adjusted through June 30, 2018.*

# Private Real Estate Program Summary

*As of June 30, 2018, the Private Real Estate assets had a fair value of approximately $3.3 billion, representing 7.5% 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

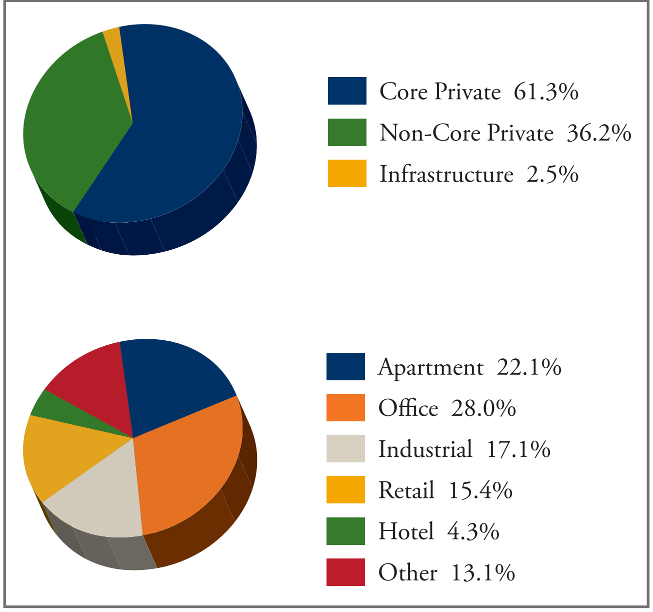
As of June 30, 2018, the Systems' private real estate assets committed* for investment were $4.7 billion. The fair value of funds that had been drawn down and actually invested as of June 30, 2018 was approximately $3.3 billion, representing 7.5% of total assets. The Systems' private real estate investment commitments that had not yet been funded were approximately $1.1 billion as of June 30, 2018.

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. Market 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.

Private Real Estate Diversification




** 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.*

## Market Overview

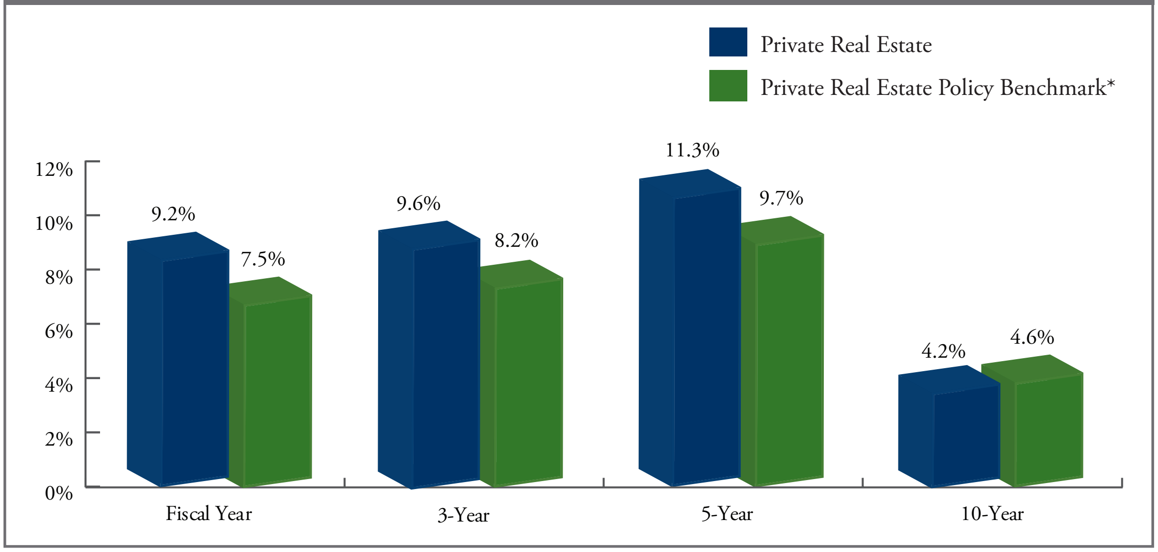
Overall it was a strong year for the real estate market. However, there are signs of growth moderating as occupancy rates have recently plateaued at historically high levels for all property types. Investment activity was stable throughout the year with all property types experiencing positive rent growth. The private real estate benchmark, the NCREIF Fund Index – Open Diversified Core Equity (NFI-ODCE), increased 7.5% for fiscal year 2018.

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 9.2%, compared to the benchmark return of 7.5% for the fiscal year ended June 30, 2018. The Systems' Private Real Estate program has produced excellent absolute and relative returns for all time periods as noted below, with the exception of the 10-year time period. The underperformance for the 10-year time period was primarily due to the significant downward pressure on real estate valuations during the credit crisis of 2008 and 2009.

### Private Real Estate Performance




### Private Real Estate Statistical Performance

| **Portfolio Characteristics** | **Fiscal Year** | **3-Year** | **5-Year** | **10-Year** |
|---|---|---|---|---|
| Annualized Private Real Estate Return | 9.2% | 9.6% | 11.3% | 4.2% |
| Annualized Policy Benchmark Return* | 7.5% | 8.2% | 9.7% | 4.6% |
| Excess Return | 1.7% | 1.4% | 1.6% | -0.4% |

*"*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, 2018, the Systems were invested in 58 separate partnerships with 29 firms within the Private Real Estate asset class. In fiscal year 2018, the Systems committed to eight new partnerships totaling $610 million. Additionally, the Systems received total distributions from the real estate partnerships of approximately $472 million in fiscal year 2018.

| Private Real Estate Investment Advisors | | | |
|---|---|---|---|
| **Investment Advisor** | **Investment Style** | **Fair Value* As of June 30, 2018** | **% of Total Plan Fair Value** |
| AEW Core Property Fund | Core - Private | $ 99,274,234 | 0.2% |
| Alinda Infrastructure Fund I | Infrastructure | 204,030 | 0.0% |
| Alterna Core Capital Assets Fund II | Infrastructure | 49,258,401 | 0.1% |
| Asana Partners Fund I, L.P. | Non-Core - Private | 51,895,780 | 0.1% |
| Blackstone R.E. Partners V, VI, VII, VIII | Non-Core - Private | 157,774,444 | 0.4% |
| Blackstone Real Estate Partners Asia I and II | Non-Core - Private | 62,154,544 | 0.1% |
| Brockton Capital II | Non-Core - Private | 19,526,373 | 0.1% |
| Carlyle Europe Real Estate Partners III | Non-Core - Private | 4,983,584 | 0.0% |
| Carlyle Property Investors | Core - Private | 143,181,672 | 0.3% |
| Carlyle Realty V, VI and VII | Non-Core - Private | 109,318,613 | 0.3% |
| CBRE US Value 6 and 7 | Non-Core - Private | 48,915,800 | 0.1% |
| CIM Fund III and VIII | Non-Core - Private | 92,676,456 | 0.2% |
| CIM Urban REIT | Non-Core - Private | 19,988,794 | 0.1% |
| Colony Investors VIII | Non-Core - Private | 1,805,600 | 0.0% |
| CPI Capital Partners Europe | Non-Core - Private | 849,637 | 0.0% |
| Dune Real Estate Fund I | Non-Core - Private | 1,331,392 | 0.0% |
| Exeter Industrial Value Fund IV | Non-Core - Private | 20,261,092 | 0.1% |
| Forum Asian Realty Income II | Non-Core - Private | 46,721 | 0.0% |
| Heitman Value Partners II and III | Non-Core - Private | 33,081,515 | 0.1% |
| JPMorgan Special Situation Property Fund | Non-Core - Private | 165,418,259 | 0.4% |
| JPMorgan Strategic Property Fund | Core - Private | 349,182,821 | 0.8% |
| KKR Real Estate Partners America I and II | Non-Core - Private | 39,349,042 | 0.1% |
| LaSalle Asia Opportunity Fund II and III | Non-Core - Private | 1,510,061 | 0.0% |
| LaSalle Japan Logistics Fund II | Non-Core - Private | 117,070 | 0.0% |
| LaSalle Property Fund | Core - Private | 218,320,908 | 0.5% |
| Lone Star V and VI | Non-Core - Private | 12,178,628 | 0.0% |
| Lone Star Real Estate Fund | Non-Core - Private | 2,309,542 | 0.0% |
| Lone Star V Co-Investment Fund | Non-Core - Private | 12,686 | 0.0% |
| Macquarie Infrastructure Partners | Infrastructure | 31,315,835 | 0.1% |
| Morgan Stanley Prime Property Fund | Core - Private | 409,364,013 | 0.9% |
| North Haven Real Estate Fund V International | Non-Core - Private | 1,336,847 | 0.0% |
| Noble Hospitality Fund I and III | Non-Core - Private | 50,023,486 | 0.1% |
| Principal Enhanced Property Fund | Core - Private | 49,090,630 | 0.1% |
| Prologis Targeted U.S. Logistics Holdings | Core - Private | 201,663,169 | 0.5% |
| Prudential PRISA Fund | Core - Private | 185,428,294 | 0.4% |
| Prudential PRISA III | Non-Core - Private | 87,768,165 | 0.2% |
| Standard Life European Real Estate Fund I, II and III | Non-Core - Private | 96,393,561 | 0.2% |
| Starwood Hospitality Fund | Non-Core - Private | 3,008,939 | 0.0% |
| UBS Trumbull Property Fund | Core - Private | 353,208,734 | 0.8% |
| Westbrook R.E. Fund VII, VIII, IX and X | Non-Core - Private | 101,411,444 | 0.2% |
| **Total** | | **$ 3,274,940,816** | **7.5%** |

**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, 2018, the net asset values utilized were cash flow adjusted through June 30, 2018.*

| U.S. Public Equity Broker Commissions Report | | | | |
|---|---|---|---|---|
| **Brokerage Firm** | **Shares Traded** | **Dollars Traded** | **Commissions Paid** | **Cost Per Share** |
| Barclays Capital, Inc. | 16,610,943 | $ 832,575,063 | $ 790,741 | $ 0.05 |
| SG Cowen & Co | 15,110,659 | 749,332,600 | 463,482 | 0.03 |
| Merrill Lynch | 27,451,409 | 1,267,610,824 | 320,692 | 0.01 |
| JP Morgan Chase | 22,990,487 | 963,727,030 | 272,920 | 0.01 |
| Instinet, LLC | 37,328,087 | 1,660,418,760 | 246,037 | 0.01 |
| UBS Securities, LLC | 7,503,684 | 398,935,254 | 191,514 | 0.03 |
| Weeden & Co | 29,920,641 | 1,509,645,317 | 176,349 | 0.01 |
| Investment Technology Group | 16,460,728 | 756,063,855 | 135,475 | 0.01 |
| Cap Institutional Services | 4,370,259 | 236,279,819 | 127,203 | 0.03 |
| Bank of New York | 18,263,797 | 726,837,696 | 101,582 | 0.01 |
| Other (<$100,000) | 120,715,344 | 4,968,354,727 | 1,307,841 | 0.01 |
| **Total** | **316,726,038** | **$14,069,780,945** | **$ 4,133,836** | **$ 0.01** |

| Non-U.S. Public Equity Broker Commissions Report | | | | |
|---|---|---|---|---|
| **Brokerage Firm** | **Shares Traded** | **Dollars Traded** | **Commissions Paid** | **Cost (Basis Points)** |
| Instinet, LLC | 159,109,611 | $ 807,983,979 | $ 272,420 | 3.4 |
| Merrill Lynch | 100,995,311 | 598,393,595 | 209,508 | 3.5 |
| Morgan Stanley & Co, Inc. | 81,566,613 | 454,886,322 | 176,492 | 3.9 |
| Goldman Sachs and Co | 83,104,334 | 465,964,464 | 166,291 | 3.6 |
| Credit Suisse Securities, LLC | 150,674,590 | 272,706,207 | 121,074 | 4.4 |
| JP Morgan Chase | 36,091,998 | 235,933,091 | 102,664 | 4.4 |
| Investment Technology Group | 41,473,072 | 270,403,731 | 95,292 | 3.5 |
| Deutsche Bank | 31,654,265 | 297,713,886 | 93,796 | 3.2 |
| Citigroup Global Markets, Inc. | 33,882,344 | 124,737,733 | 86,806 | 7.0 |
| UBS Securities, LLC | 21,813,336 | 132,489,918 | 60,548 | 4.6 |
| Other (<$50,000) | 195,382,881 | 958,219,523 | 494,132 | 5.2 |
| **Total** | **935,748,355** | **$ 4,619,432,449** | **$ 1,879,023** | **4.1** |

| Investment Summary as of June 30, 2018 | | | |
|---|---|---|---|
| | | Percent of Total Fair Value | |
| **Asset Type** | **Fair Value** | **FY 2018** | **FY 2017** |
| *Public Risk Assets* | | | |
| U.S. Public Equity | $ 12,845,033,942 | 29.3% | 29.7% |
| Non-U.S. Public Equity | 7,391,891,947 | 16.9% | 17.2% |
| Public Credit | 2,338,890,310 | 5.3% | 6.9% |
| Hedged Assets | 5,197,838,422 | 11.9% | 12.1% |
| ***Total Public Risk Assets*** | ***27,773,654,621*** | ***63.4%*** | ***65.9%*** |
| *Safe Assets* | | | |
| U.S. Treasuries | 5,314,288,918 | 12.1% | 12.9% |
| U.S. TIPS | 1,375,382,420 | 3.1% | 2.1% |
| Cash & Cash Equivalents | 1,352,457,120 | 3.1% | 2.1% |
| ***Total Safe Assets*** | ***8,042,128,458*** | ***18.3%*** | ***17.1%*** |
| *Private Risk Assets* | | | |
| Private Real Estate | 3,274,940,816 | 7.5% | 7.6% |
| Private Equity | 4,231,557,076 | 9.7% | 8.4% |
| Private Credit | 364,051,618 | 0.8% | 0.7% |
| ***Total Private Risk Assets*** | ***7,870,549,510*** | ***18.0%*** | ***16.7%*** |
| ***Securities Lending Collateral*** | ***15,534*** | ***0.0%*** | ***0.0%*** |
| ***Cash & Equivalents**** | ***112,965,463*** | ***0.3%*** | ***0.3%*** |
| **Total Investments**** | **$ 43,799,313,586** | **100.0%** | **100.0%** |
| ***Reconciliation with Financial Statements*** | | | |
| Total from above | $ 43,799,313,586 | | |
| Accrued payable for investments purchased | 2,948,021,102 | | |
| Accrued income payable | 1,189,322 | | |
| Accrued receivable for investments sold | (2,332,007,193) | | |
| Accrued income receivable | (86,376,817) | | |
| Securities lending collateral | (15,534) | | |
| Short-term investments designated for benefits | (597,228,326) | | |
| ***Statements of Fiduciary Net Position*** | **$ 43,732,896,140** | | |

**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, 2018.*

| Investment Expenses for the Fiscal Year Ended June 30, 2018 | |
|---|---|
| **Investment Managers** | |
| **Investment Management Fees** | |
| NISA Investment Advisors - Core | $ 3,903,713 |
| NISA Investment Advisors - TIPS | 582,719 |
| **Safe Assets Fees** | 4,486,432 |
| NISA Investment Advisors - Corporate | 1,411,714 |
| Oaktree Bank Loans | 1,925,326 |
| Pacific Investment Management Company | 693,143 |
| **Public Credit Fees** | 4,030,183 |
| Analytic Investors, LLC | 2,169,198 |
| AQR Capital Management | 2,974,058 |
| Aronson & Johnson & Ortiz | 2,027,611 |
| BlackRock Investment Management | 178,213 |
| Columbia Management | 1,187,603 |
| Lazard Asset Management | 1,513,672 |
| Martingale Asset Management | 1,711,199 |
| Westwood Management | 3,152,350 |
| Zevenbergen Capital | 1,566,302 |
| **U.S. Public Equity Fees** | 16,480,206 |
| Acadian Asset Management | 1,379,063 |
| Alliance Bernstein Institutional Management | 1,588,981 |
| Analytic Investors, LLC | 1,469,072 |
| AQR Capital Management | 2,432,448 |
| Arrowstreet Capital | 9,241,058 |
| BlackRock Investment Management | 366,258 |
| Coronation Asset Management (Proprietary) Limited | 2,496,310 |
| Invesco Advisers, Inc | 633,658 |
| MFS Institutional Advisors | 4,062,064 |
| Neon Capital Management | 3,250,611 |
| NISA Investment Advisors | 119,597 |
| The Rock Creek Group | 3,406,373 |
| **Non-U.S. Public Equity Fees** | 30,445,493 |
| Allianz | 1,804,092 |
| AQR Capital Management | 758,758 |
| BlackRock Investment Management | 54,798 |
| Chartwell Investment Partners | 677,536 |
| Columbus Circle | 519,992 |
| NISA Investment Advisors | 109,706 |
| RBC Global Asset Management | 1,088,104 |
| **S-Cap Fees** | 5,012,986 |
| **Alpha Overlay Fees** | 40,622,991 |
| **Hedged Assets Fees** | 96,289,661 |
| **Private Real Estate Fees** | 53,546,129 |
| **Private Credit Fees** | 16,467,400 |
| **Private Equity Fees** | 228,167,794 |
| **Commission Recapture Income** | (148,317) |
| **Investment Management Expense** | 495,400,958 |
| **Custodial Services** | |
| JP Morgan Chase, NA | 1,577,462 |
| **Custodial Fees** | 1,577,462 |
| **Investment Consultants** | |
| Albourne America, LLC | 750,000 |
| Institutional Shareholder Services, Inc. | 74,500 |
| Pathway Consulting | 3,708,815 |
| Towers Watson | 243,100 |
| Townsend | 350,000 |
| Verus Advisory Inc | 225,000 |
| **Investment Consultant Fees** | 5,351,415 |
| **Legal Expenses** | 1,298,405 |
| **Staff Investment Expenses** | 4,077,004 |
| **Total Investment Expenses** | $ 507,705,244 |