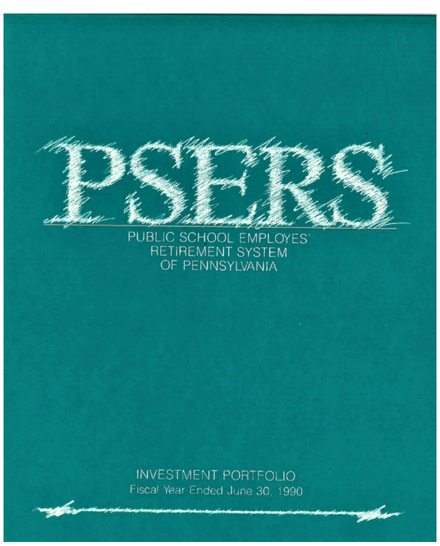
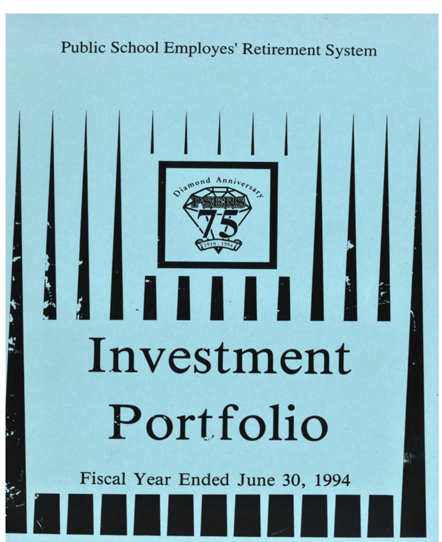
INVESTMENT SECTION

1990 Investment Portfolio Cover



1994 Investment Portfolio Cover



1995 Investment Portfolio Cover

Past Staff Photo

Current Staff-Investment Office

COMMONWEALTH OF PENNSYLVANIA
PUBLIC SCHOOL EMPLOYEES' RETIREMENT SYSTEM

James H. Grossman Jr., CPA, CFA
Chief Investment Officer

November 7, 2019

Dear PSERS Board of Trustees:

It is a privilege to present to you the Investment Section of the Comprehensive Annual Financial Report for the fiscal year ended June 30, 2019.

Authority and Fiduciary Standard

The Board has the responsibility to invest funds of the System in accordance with guidelines and limitations set forth in the Code and other applicable state law. As fiduciaries, the members of the Board and Professional Staff must act solely in the interests of the members of the System and for the exclusive benefit of the System's members. In performance of their duties, the members of the Board and Staff who have been delegated investment authority shall be held to the Prudent Investor Standard.

The Prudent Investor Standard, as articulated in the Code, means "the exercise of that degree of judgment, skill, and care under the circumstances then prevailing which persons of prudence, discretion, and intelligence who are familiar with such matters exercise in the management of their own affairs not in regard to speculation, but in regard to the permanent disposition of the fund, considering the probable income to be derived therefrom as well as the probable safety of their capital."

The Prudent Investor Standard requires a trustee to act prudently and with caution, discretion, loyalty, and care but does not restrict the assets in which the Board can invest. Under the Prudent Investor Standard, which recognizes modern portfolio theory, the Board's investment and management decisions with respect to individual assets shall be considered in the context of the portfolio as a whole and as part of an overall investment strategy, and not in isolation. No specific investment or course of action, taken alone, shall be considered inherently prudent or imprudent. This Standard recognizes the trade-off between risk and return.

Policies and Objectives

The Board is responsible for the formulation of investment policies for the System. Professional Staff is responsible for the implementation of those investment policies. The overall investment objectives of the System are as follows:

Return Objectives – the System has a return objective of meeting or exceeding the targeted actuarial rate of return of 7.25% over the long-term (i.e. 25 to 30 years). In addition, the Board has the following broad objectives:

1. The assets of the System shall be invested to maximize the returns for the level of risk taken, and
2. The System shall strive to achieve a net of fee return that exceeds the Policy Index (the Policy Index is a custom benchmark, based on the Board-established asset allocation structure that seeks to generate a return that meets the actuarial rate of return assumption).

Risk Objectives

1. The assets of the System shall be diversified to minimize the risk of losses at the portfolio level and within any one asset class, investment type, industry or sector distribution, maturity date, or geographic location. Failure to do so could impair the System's ability to achieve its funding and long-term investment goals and objectives; and,
2. The System's assets shall be invested so that the probability of investment losses (as measured by the Policy Index) in excess of 15% in any one year is no greater than 2.5% (or two standard deviations below the expected return).

To achieve these objectives, the Board meets during the second half of the calendar year to review the overall asset allocation plan and investment policies for the System. Implementation of investment policy decisions necessitates asset management. Implementation is accomplished through the use of external investment management firms who act as agents for the System as well as through the use of internal investment managers. The Board also retains various investment consultants to assist with the formulation and implementation of investment policies.

Operations

The Board, via its Investment Committee, provides oversight of investment activities. The Investment Committee generally conducts six meetings per year and may meet more frequently as needed. Investment Office professionals, as well as external investment advisors, Investment Accounting professionals, and Internal Audit professionals, assist the Board in achieving investment objectives and monitoring compliance with investment policies. For the fiscal year ended June 30, 2019, Aon Hewitt Investment Consulting, Inc. (Aon Hewitt) served as the general investment consultant to assist the Board and Professional Staff in formalizing investment objectives, establishing an asset allocation plan, conducting investment advisor searches, reviewing performance, and commenting on compliance with investment policies. In addition, the Board retained Aksia, LLC as an absolute return consultant and Hamilton Lane Advisors, L.L.C. as an alternative and real estate investment consultant. Alternative investments generally consist of investments in private debt, private equity, and venture capital limited partnerships. Investment Office professionals implement investment decisions within the guidelines established in the Investment Policy Statement, Objectives and Guidelines regarding asset allocation, manager selection, security selection, and other objectives directed by the Board.

The Board employs both external investment management firms and internal investment managers to manage the investment portfolio of the System. At fiscal year-end, 63 external public market investment management firms were managing $15.7 billion in assets of the System, $23.1 billion in assets were managed by the System's internal investment managers, and the remaining $18.9 billion in assets were managed by numerous alternative investment and real estate investment managers. The performance of each external investment management firm and each internal manager is monitored quarterly against a pre-established benchmark as well as the performance of the manager's peer group.

Asset Allocation

The Board reviews the long-term asset allocation targets of the System annually. The Board consults with its actuary, consultants, Investment Office professionals, and other sources of information it deems appropriate in formulating the asset allocation plan. The level of risk assumed by the System is largely determined by the Board's strategic asset allocation plan. The Board, in determining its long-term asset allocation, takes the following factors into consideration:

- The System's investment time horizon;
- The demographics of the plan participants and beneficiaries;
- The cash flow requirements of the System;
- The actuarial assumptions approved by the Board;
- The funded status of the System;
- The Board's willingness and ability to take risk, and
- The employers' (Commonwealth and school districts) financial strength.

In approving the asset allocation for the System that is recommended by Investment Office professionals and PSERS' general investment consultant, the Board considers capital market expectations for expected return, volatility, and asset class correlations as prepared by its general investment consultant. The current long-term, top-down asset allocation targets of the Board, based on targeted exposures, are discussed in the following paragraphs. Targeted exposures include positions obtained through derivative exposure with minimal capital requirements.

The current target allocation as of June 30, 2019, included an equity target allocation of 30.0% consisting of publicly traded stocks (15.0%) and private markets (15.0%). Specific publicly traded stock targets have been established for U.S. equity (4.8%) and non-U.S. equity (10.2%). Within the U.S. equity target, the portfolios are diversified between large and small capitalization investment mandates. The non-U.S. equity exposure includes both developed and emerging markets portfolios as well as large and small capitalization investment mandates. The non-U.S. developed markets equity exposure is 75% currency-hedged back to the U.S. Dollar. The primary vehicle used to invest funds in private markets is the limited partnership. The partnerships are established by individual management groups that have been selected by the System for the purpose of investing in and managing private equity, venture capital, and debt positions on behalf of PSERS and other limited partners.

The fixed income target allocation of 42.0% consisted of investment grade exposure (10.0%), credit-related exposure (11.0%), inflation-protected exposure (15.0%) and cash (6.0%). Investment grade exposure consisted of U.S. core fixed income (4.0%) and U.S. Long-term Treasuries (6.0%). Credit-related exposure consisted of private credit (10.0%) and emerging markets fixed income (1.0%). Inflation protected exposure consisted of U.S. and non-U.S. inflation-linked bonds. Within these categories, all sectors of the fixed income market are represented. The cash allocation consisted of short-duration, high quality government and investment grade securities. The Board, Investment Office professionals, and Aon Hewitt deemed it prudent to have an allocation to cash given the known and potential cash flow requirements of the System.

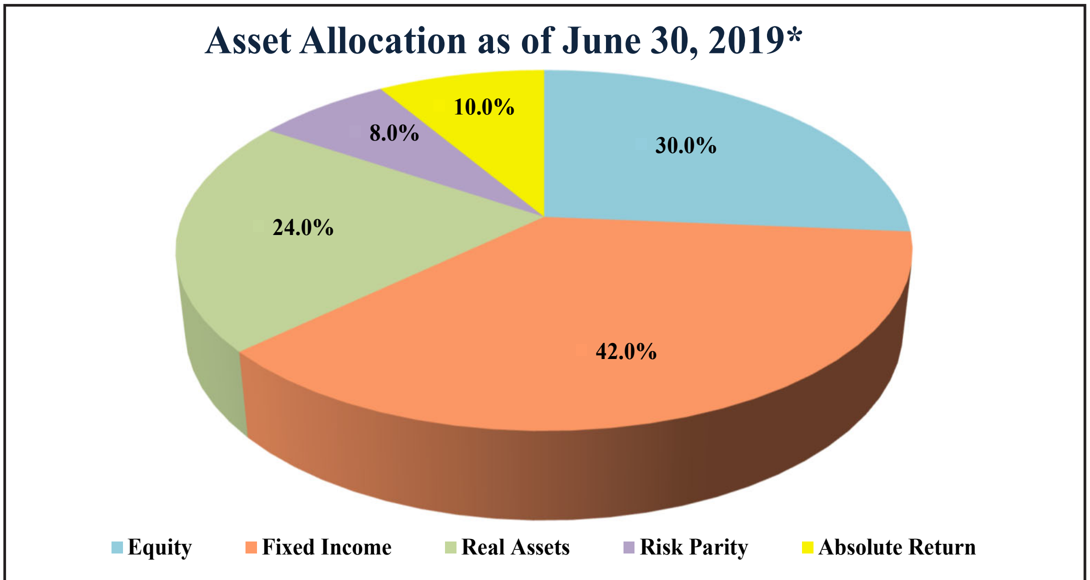
The real asset exposure of 24.0% consisted of real estate (10.0%), master limited partnerships (4.0%), infrastructure (2.0%) and commodities (8.0%, including 3% to gold). The real estate allocation consisted of limited partnerships and publicly-traded real estate securities. The types of partnerships the System invests in include core, value-added, and opportunistic real estate limited partnerships. The commodities allocation consisted primarily of commodity futures, commodity swaps, and commodity-related publicly traded stocks. Commodities are included in the allocation for inflation protection and to diversify the System's total portfolio risk. The master limited partnership (MLP) allocation consisted of publicly traded partnerships that own and operate assets such as pipelines, processing facilities, and storage facilities for natural gas, crude oil, and refined products that are a vital part of the U.S. energy infrastructure. MLPs are included in the allocation due to their attractive current yields, reasonable growth potential, and ability to diversify the System's total portfolio risk. The Infrastructure allocation targets stable, defensive investments primarily within the energy, power, water, and transportation sectors. Infrastructure plays a strategic role within the System by providing steady returns and cash yields, defensive growth, inflation protection, capital preservation, and diversification benefits. The infrastructure allocation consists primarily of publicly-traded companies.

The absolute return target allocation of 10.0% consisted primarily of investment managers retained by the System to generate positive returns over time that are independent of how the equity, fixed income, and commodity markets perform. Strategies implemented to achieve this target include, but are not limited to, global macro, event-driven, and relative value strategies such as insurance-linked securities and long/short credit. The absolute return program is included in the allocation to generate returns equal to or greater than 3-month LIBOR plus 3.5% with low volatility and low correlation to the public financial markets to diversify the System's total portfolio risk.

The risk parity allocation of 8.0% consisted primarily of global equities, global nominal bonds, global inflation-linked securities, and commodities in an allocation that balances risk across these asset classes with structurally offsetting biases to the primary drivers of asset class returns - growth and inflation. Risk parity provides diversification and liquidity to the System.

Leverage was utilized at the asset allocation level to provide additional exposure to diversifying asset classes. The System utilized 14.0% leverage through use of derivative instruments that allow the System to gain incremental asset class exposure with minimal margin requirements. Leverage is utilized in the fixed income, real asset, and risk parity allocations.

The System also participates in a securities lending program administered by Deutsche Bank AG. This program is designed to provide incremental income to the System by lending publicly-traded securities in the System's portfolio held by the System's custodial bank, The Bank of New York Mellon, to securities dealers in exchange for cash collateral, which can be reinvested to generate income. This program generated $14.3 million in net income during the year.

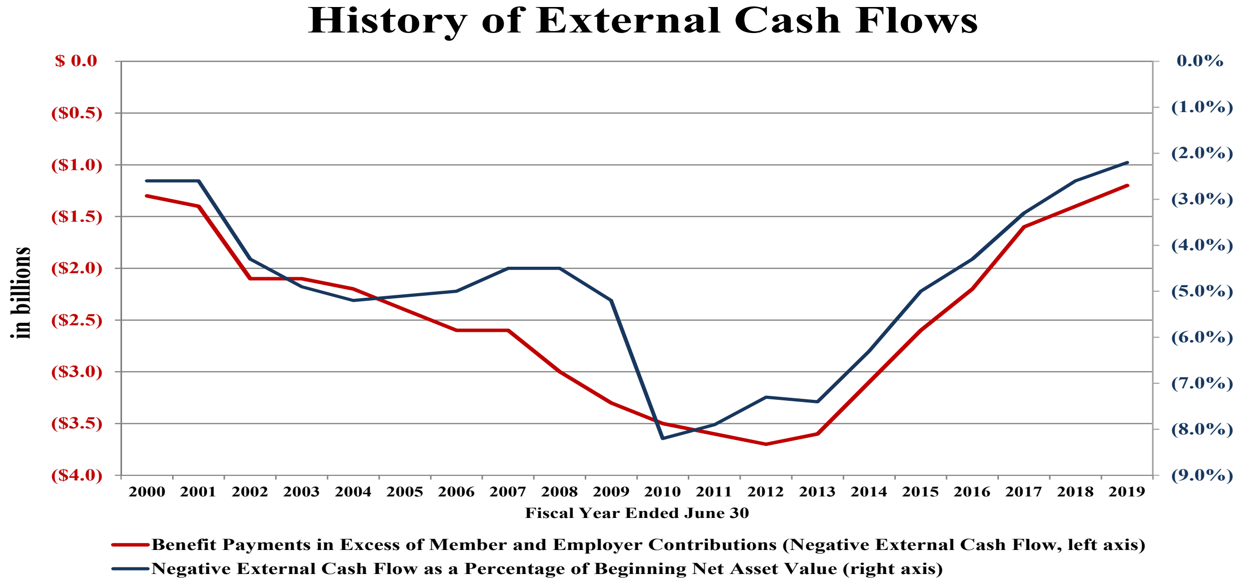


*Financing represents a negative 14% allocation and is not reflected in the pie chart.

Liquidity and Asset Allocation

The System's risk profile is, in part, driven by its liquidity needs. Over the past twenty fiscal years, the System has paid out $50.8 billion more in benefits than it has received in member and employer contributions (i.e., the System has experienced negative cash flow). The average negative cash flow was approximately $2.5 billion per year during this period. This annual funding deficiency has amounted to 2.1% or more of beginning net assets each year and represents the amount of investment return needed each year to make up the shortfall (i.e., if the System earned 3.0% in a given year with a 3.0% cash flow shortfall, then the net assets of the System will be unchanged). The large negative annual cash flow has improved significantly since fiscal year 2012 due to the implementation of Act 120 in 2010 (see chart below). Act 120 provided for increased employer contributions to the actuarial required contribution levels. The large annual cash flow shortfall, while much improved, will continue over the next few years and necessitates a larger liquidity position and lower risk profile than a retirement system that has smaller liquidity requirements.

Given the significant net cash outflows, the Board has prudently reduced the risk profile of the System since the financial crisis in 2008. It has done so by decreasing its return dependence on the equity markets and increasing its risk exposures to asset classes that are less correlated to equity markets such as inflation-linked bonds, commodities, and absolute return. The goal of such an allocation is to generate the desired return profile with less volatility.



While such an allocation will not provide for a large upside in returns, it is expected to minimize downside risks to the System's assets in the event of a large equity market drawdown as experienced during the financial crisis in 2008.

The Economy During The Past Fiscal Year

The U.S. Economy

The U.S. economy showed improvement this past fiscal year, driven by continued easy monetary conditions and a pivot from the Federal Reserve on interest rate expectations during the year. Monetary conditions in the U.S. at first tightened as the Federal Reserve increased interest rates two times in the first half of the fiscal year; however, the Fed pivoted in the second half of the year from a tightening bias to a neutral or easing bias which improved optimism about the U.S. economy, encouraged more risk taking and inflated asset prices. The Federal Funds target rate increased by 0.5% and had a range of 2.25% to 2.50%. While short term interest rates increased, they continue to be historically low and provided a low cost of borrowing so that broad economic conditions can continue to improve. The U.S. real Gross Domestic Product (GDP) increased year-over-year an average of 2.3% per quarter during the past fiscal year with a range of 1.1% to 3.1%. The official unemployment rate (otherwise known as the U3 unemployment rate) fell during the fiscal year from 4.0% as of June 2018 to 3.7% as of June 2019, approaching what the Fed would consider full employment.

The more encompassing U6 unemployment rate, which measures not only people without work seeking full-time employment (U3 unemployment rate) but also counts "marginally attached workers and those working part-time for economic reasons" fell to levels last seen in 2001 at 7.2% as of fiscal year end, down from 7.8% at the end of the last fiscal year. However, the U.S. Labor Participation Rate (LPR), which measures the total labor force as a percentage of the working age population, remains depressed relative to historical levels. The LPR remained unchanged from June 2018 at 62.9%. The LPR was as high as 67.3% in March 2000. If the LPR were at 2000 levels today, the official unemployment rate would probably be significantly higher.

The U.S. economy showed a significant decrease in momentum during the fiscal year as measured by the manufacturing Institute of Supply Management (ISM) Purchasing Managers Index (PMI), an indicator of activity in the sector. During the fiscal year, the ISM PMI decreased by 8.3 points to 51.7 at June 30, 2019, but was still in expansionary territory (a contraction/expansion is indicated whenever the index is below 50/above 50). Concurrently, U.S. consumer confidence, as measured by the Conference Board's Consumer Confidence Index decreased from 127.1 at June 2018 to 124.3 at June 2019.

Inflation in the United States, after years of being below the Fed's target inflation rate of 2.0%, has shown steady year-over-year increases this past fiscal year as low interest rates, tight labor markets, and fiscal expansion in the form of tax cuts have started to have an impact. The past fiscal year saw inflation relatively stable, with the U.S. Core Consumer Price Index (CPI) modestly decreasing to 2.1% year-over-year as of June 2019 from 2.3% one year ago.

Select Non-U.S. Economies

Significant headwinds affecting many non-U.S. economies include political uncertainty in Europe, specifically the rise of populism as evidenced by the formation of a populist coalition government in Italy and Great Britain's planned exit from the European Union (Brexit), and protectionist policies as evidenced by President Donald Trump's administration's imposition of billions of dollars of tariffs on goods imported into the U.S. from China. These uncertainties manifested themselves over the past couple of years and are worthy of watching during the next few years, specifically Brexit in the U.K. and the trade policies of the U.S.

The Euro Area economy continued to struggle, with modestly positive growth. As of the second quarter 2019, the Euro Area was growing at a 1.1% annual pace, meaningfully down from the 2.2% pace one year earlier. The unemployment rate continued to normalize and improved to 7.6% as of June 2018 from 8.3% a year earlier. Eurozone inflation trends weakened during the past fiscal year, falling from 2.0% on an annualized basis in June 2018 to 1.3% in June 2019, well below the European Central Bank (ECB) target of 2.0%. The Euro Area economy fell into contraction territory as evidenced by the Markit Eurozone Manufacturing PMI print of 47.6 in June 2019 from 54.9 last June (a contraction/expansion is indicated whenever the index is below 50/above 50). Aggressive actions by the ECB have generated improvements in employment but have failed to sustain economic growth and inflation. The ECB continued its policy of very accommodative overnight interest rates (negative 0.4%) but had slightly tightened monetary conditions by ending quantitative easing in December

2018 but moving to ease monetary conditions by introducing another round of Targeted Long-Term Refinancing Operations (TLTROs) in 2019.

Japan's economy slowed during the past fiscal year. As of the second quarter 2019, Japan's real GDP increased by a year-over-year rate of 1.2% versus a 1.5% year-over-year rate as of June 2018. Japan's demographics are poor as the population ages which generally means that robust growth will be difficult to sustain over the long term. However, since the size of the working age population is decreasing, unemployment has been very low and was 2.3% in June 2019, down from 2.5% last fiscal year. The inflation rate in Japan was positive 0.7% over the past year, unchanged from the end of last year. Japanese policy makers continue to aggressively attempt to stimulate their economy through a combination of low interest rates (the Bank of Japan policy rate is negative 0.1%), the purchase of higher risk assets by the Bank of Japan, coordinated diversification into higher risk assets by large public investors, and fiscal spending policies to encourage liquidity to move into riskier assets. Economic conditions deteriorated and the Japanese manufacturing sector followed Europe into contraction territory as evidenced by the Jibun Bank Japan Manufacturing PMI falling 3.7 points from 53.0 at June 2018 to 49.3 at June 2019 (a contraction/expansion is indicated whenever the index is below 50/above 50). Japanese fiscal and monetary authorities have had a difficult time finding the appropriate economic and structural reforms to put in place to enable a sustained period of economic prosperity.

China had robust growth compared to the other developed regions of the world. China's real GDP increased by 6.2% over the past year, moderately slower than the 6.7% pace for the year ended June 2018. Inflation in China accelerated over the past year to 2.7% compared to 1.9% last year. Economic conditions weakened as evidenced by the China Manufacturing PMI decreasing 2.1 from 51.5 at June 2018 to 49.4 at June 2019 (a contraction/expansion is indicated whenever the index is below 50/above 50). As noted in previous years, China continued its struggle to rebalance its economy from an investment-oriented economy to a consumer-oriented economy, while maintaining political stability. In addition, the trade war with the United States also put pressure on the Chinese economy with no signs of abating anytime soon.

Investment Results

Aon Hewitt calculates the total investment return of the System as well as the performance of each external investment management firm and each internal investment manager retained by the Board to invest the System's assets. Performance is calculated using a time-weighted return methodology.

For the one-year period ended June 30, 2019, the System generated a total net of fee return of 6.68%. This return fell short of the actuarial required return of 7.25% by 57 basis points and the total fund Policy Index return of 7.68% by 100 basis points. Annualized total net of fee returns for the three-, five-, and ten-year periods ended June 30, 2018 were 8.71%, 6.04% and 9.02%, respectively. The three-, five- and ten-year returns ended June 30, 2019 exceeded (underperformed) the total fund Policy Index returns by 62, (2), and 59 basis points, respectively.

Significant positive contributors to performance this past fiscal year included:
- Private Equity was up 11.2%;
- Gold was up 9.8% due to investors looking for safe haven investments as the result of increasing geopolitical risks;
- U.S. Long Treasuries were up 8.9%, driven by a decrease in interest rates during the fiscal year;
- Risk Parity was up 8.2% during the fiscal year driven by strong returns in fixed income and U.S. equities; and,
- U.S. Equities were up 7.8%. Returns in U.S. equities were driven by expectations of lower interest rates starting in the second half of the fiscal year.

Significant detractors from performance this past fiscal year included:
- Diversified commodities which were down over 7.0%; due primarily to weakness in oil prices which fell roughly 9% during the fiscal year;
- Master Limited Partnerships which were up 1.6%;
- Absolute return which was up 2.4%; and
- Non-U.S. equities which were up 2.8% as growth outside the U.S. was slowing this past year.

The fiscal year was really the tale of two halves. In the first half of the year, there were signs that growth was slowing globally, causing equity and oil prices to plunge and the U.S. yield curve to flatten. The Fed was hiking rates and communicating that more tightening would be needed in the future. However, the Fed pivoted about mid-way through the fiscal year and indicated that it was ending its monetary tightening campaign and signaled that it may be cutting rates which caused both equities and bonds to rally in the second half of the fiscal year. Central banks globally are now very accommodative as both the European Central Bank and the Bank of Japan are keeping short-term interest rates in negative territory and the Federal Reserve Bank in the U.S. is about to embark on an easing cycle later in 2019.

Diversification is Undeniably Effective

Diversification into asset classes such as diversified commodities, absolute return, and non-U.S. equities were a drag on overall performance this past fiscal year. As noted by Ben Hunt in his newsletter Epsilon Theory, “Diversification isn’t a pretty bird. Diversification doesn’t make my heart skip a beat like a flock of goldfinches in July. Diversification, by design, is going to have winners and losers simultaneously. Diversification, by design, is never going to look pretty doing its job, because if your portfolio is all working in unison, swooping through the market in a beautiful glint of gold…well, you may be making money, but you sure aren’t diversified. Diversification is undeniably effective….” Many investment professionals discuss diversification using terms such as standard deviation, correlation, and co-variance. However, at its most basic level, diversification is insurance against bad future outcomes. The System diversifies simply because it doesn’t know how actual events in the future will transpire relative to what is priced into the market. Diversification is a very humble approach to investing. If an investor knew with certainty which asset class would perform best the next month, quarter, or year, the investor would simply invest in that one asset class. However, without such perfect foresight, the downside risk of such a strategy could be devastating. As Peter Bernstein, the late American financial historian, economist, and educator once wrote, “Diversification is the only rational deployment of our ignorance.”

Accomplishments

The Investment Office received approval to increase its professional complement by ten during the past fiscal year. We are in the process of filling those positions with very capable investment professionals which will allow us to continue our efforts to bring additional assets in-house as well as provide depth to the investment team. The complement increase will allow the Investment Office to support the large amount of assets managed in-house at a significantly lower cost than if those assets were managed externally. Over the past three years, the Investment Office increased the amount of assets managed internally from 34% to 39%, or by $5.6 billion. The estimated savings from managing those assets in-house is over $50 million per year.

Summary

This past fiscal year was volatile and challenging with a net of fee return of 6.68%. However, pension plans like PSERS are built to generate long-term returns, so one good (or bad) year is not going to make (or break) the Fund. The System focuses on long-term returns. For the past 10 years, the Fund’s annualized net of fee return was 9.02%, comfortably above the actuarial assumed rate of return of 7.25%. Looking forward, even with cash rates of around 2.25%, the System still needs to take prudent risks to achieve its long-term goal of 7.25%. The System has built a diversified allocation to allow it to collect risk premiums over the long-term. In the short-term, no one knows what will happen and the System should expect to go through years where returns are below 7.25%, perhaps significantly below. The System continues to believe the best way to achieve its long-term objectives is to maintain a very diversified portfolio which includes all asset classes available to the Fund, such as public and private equities, fixed income, real assets, risk parity and absolute return. In any given year, the System expects some assets to perform well, such as U.S. Long Treasuries, risk parity, and gold did this past fiscal year, and some to not do as well, such as diversified commodities this past fiscal year. However, over the long run, the System expects each of its asset classes to generate a positive return commensurate with the risks taken. The future is uncertain, but we believe the Fund is well positioned to accomplish its objectives.

James H. Grossman Jr., CPA, CFA
Chief Investment Officer

Annualized Total Returns (%) Net of Fees

Periods Ended June 30, 2019

	1 Year	3 Years	5 Years	10 Years
PSERS Total Portfolio	6.68	8.71	6.04	9.02
Total Fund Policy Index	7.68	8.09	6.06	8.43
Median Public Defined Benefit Plan (DBP) Fund Universe (Aon Hewitt Database)	5.98	8.53	5.61	8.77
PSERS U.S. Equity Portfolios	7.84	13.63	10.16	14.95
U.S. Equity Policy Index (1)	8.96	14.04	10.24	14.60
PSERS Non-U.S. Equity Portfolios	2.84	11.72	6.94	9.58
Non-U.S. Equity Policy Index (2)	2.15	10.67	5.47	8.34
PSERS Fixed Income Portfolios (10)	7.89	6.55	5.59	8.12
Fixed Income Policy Index (3)	8.38	4.52	3.70	5.75
PSERS Commodity Portfolios (10)	0.19	0.63	-3.85	0.08
Commodity Policy Index (4)	0.17	-0.63	-5.22	-1.84
PSERS Absolute Return Portfolios	2.42	5.38	3.35	6.08
Absolute Return Policy Index (5)	6.16	5.34	4.76	6.22
PSERS Risk Parity Portfolios (11)	8.16	7.37	4.18	N/A
Risk Parity Policy Index (6)	9.41	7.10	5.08	9.89
PSERS Master Limited Partnership (MLP) Portfolios	1.55	1.99	-4.98	12.42
Standard & Poor's MLP Index	3.23	1.54	-6.65	8.88
PSERS Real Estate (7) (10)	7.59	9.83	10.44	9.16
Blended Real Estate Index (8)	5.99	8.49	10.14	8.73
PSERS Alternative Investments (7)	11.21	13.93	9.44	12.14
Burgiss Median, Vintage Year Weighted Index (9)	9.67	13.26	10.88	13.37

1. MSCI USA Investable Market Index effective April 1, 2009; previously was the Dow Jones Wilshire 5000 Index.
2. MSCI ACWI ex USA IMI with DM 75% Hedged to USD (Net) Index effective April 1, 2016. From October 1, 2014 to March 31, 2016, the index was the MSCI ACWI ex USA IMI with DM 100% Hedged to USD (Net) Index. From July 1, 2008 to September 30, 2014, the index was the MSCI All Country World (ACW) ex. USA Investable Market Index. Before July 1, 2008, the MSCI ACW ex. U.S. Index was used. The benchmark was 30% hedged to the U.S. dollar from July 1, 2006 to March 31, 2009.
3. Returns presented are a blend of the Barclays Capital U.S. Aggregate Index (17.5%), Barclays Capital Global Aggregate GDP Weighted Dev x U.S. (Unhedged) Index (3.5%), Barclays Capital Emerging Mkt 10% Country Cap Index (7.0%), Barclays Capital U.S. Treasury Long Index (8.8%), Barclays Capital U.S. High Yield Index (21.1%), and Barclays Capital U.S. TIPS Index (42.1%) effective April 1, 2016. Prior to July 1, 2013, the blend was Barclays Capital U.S. Universal Index (24.7%), JP Morgan GBI EM Global Diversified Index (9.4%), Barclays Capital U.S. High Yield Index (28.2%), Barclays Capital Multiverse Index (14.1%), and Blended Policy (Net Levered TIPS) (23.6%).
4. Returns presented are a blend of the Bloomberg Commodity Gold Index (37.5%) and the Bloomberg Commodity Index (62.5%). On July 1, 2014, the indices names were changed from DJ/UBS to Bloomberg. The returns have been adjusted for leverage.
5. Three month LIBOR +3.50% effective July 1, 2014. Previously, it was based on the assumed actuarial rate of return for the Fund which was 8.0% from July 1, 2009 through June 30, 2011. The assumed rate changed to 7.5% on July 1, 2011 and was used as the Absolute Return Policy Index through June 30, 2014.
6. Effective July 1, 2014 returns presented are a blend of MSCI ACW Index ($Net) (50%); Barclays Capital U.S. Treasury Index (75%); Barclays Capital World Inflation Linked Bond Index Hedged (55%); Bloomberg Commodity Index (Total Return) (15%); Bloomberg Gold Subindex (5%); and 3-Month LIBOR (-100%). The weights to these indices have varied in previous quarters. The returns have been adjusted for volatility.
7. Returns reported on a one-quarter lag, except for publicly traded real estate security investments.
8. Effective April 1, 2015, comprised of a blended benchmark consisting of the National Council of Real Estate Investment Fiduciaries (NCREIF) – Open End Diversified Core Equity (ODCE) Index and Burgiss Private iQ (for Value-Added Real Estate and Opportunistic Real Estate) reported on a one-quarter lag. For periods between April 1, 2010 and March 31, 2015, the benchmark was comprised of a blended benchmark of NCREIF-ODCE (core) and various private real estate benchmarks for Value-Added and Opportunistic (including NCREIF-Closed-End Value-Added (CEVA), NCREIF/Townsend and NCREIF-NPI) reported on a one-quarter lag. For all prior periods, the benchmark was comprised of a blended benchmark strategically split between public/private using various public REIT indices (FTSE EPRA/NAREIT Global Real Estate, Wilshire Real Estate Securities and Wilshire REIT) and NCREIF-NPI (for all non-core) reported on a one-quarter lag.
9. Burgiss Median, Vintage Year Weighted Index effective January 1, 2011. Previously, the Thompson ONE, Vintage Year Weighted Index was used. Returns reported on a one-quarter lag.
10. Returns are presented on an unleveraged basis for comparability purposes to the Policy Index.
11. Returns are presented on a volatility-adjusted basis for comparability purposes to the Policy Index.

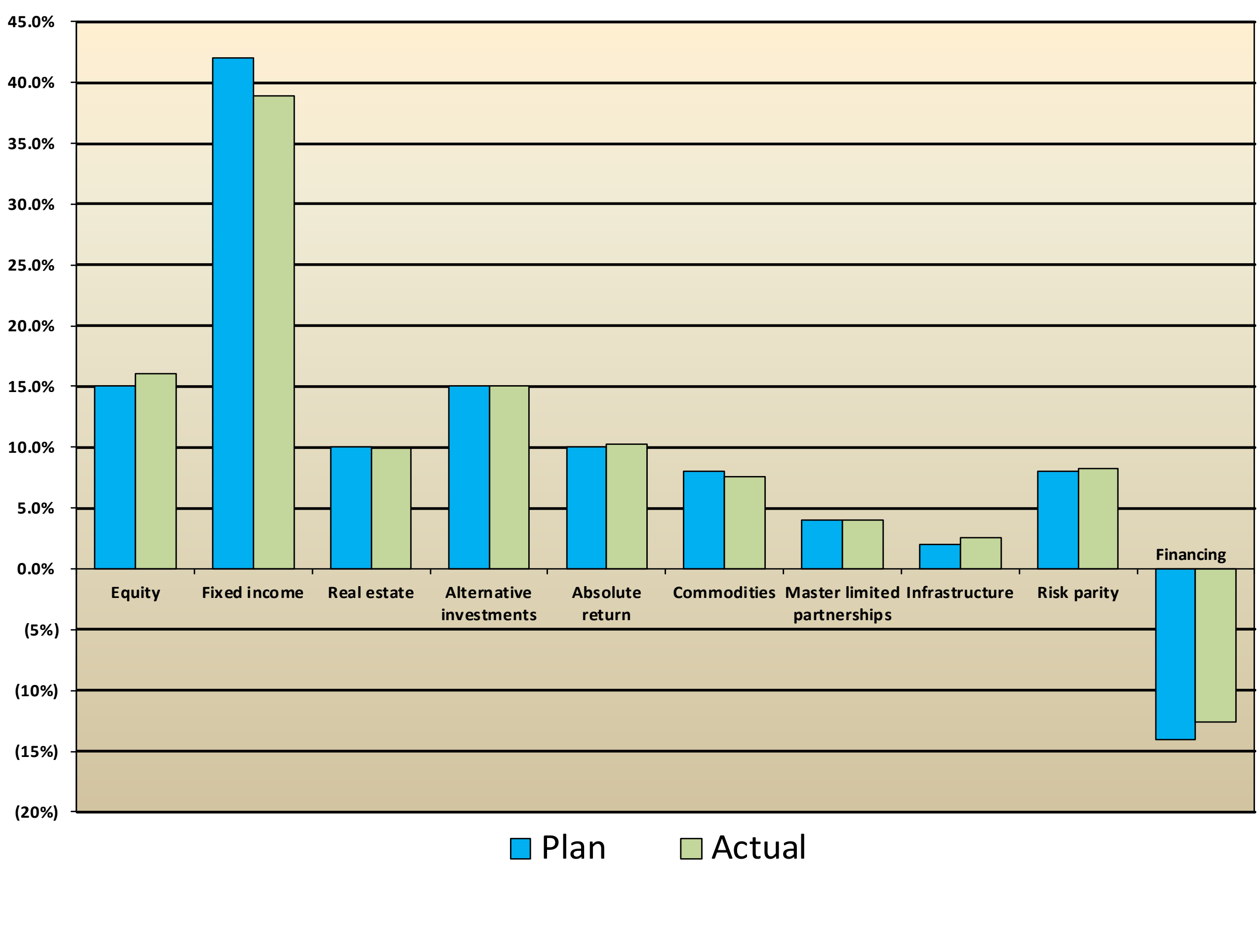
Portfolio Summary Statistics
Asset Allocation
As of June 30, 2019
(Dollar Amounts in Thousands)

Pension investments		Fair Value	% Fair Value
Common and preferred stock (Equity):			
Large and mid cap stocks	$	4,366,408	7.6
Small cap stocks		671,002	1.2
Emerging markets stocks		1,314,222	2.3
Total Non-U.S. equity		**6,351,632**	**11.1**
Large cap stocks		2,225,270	3.9
Mid, small, and microcap stocks		661,932	1.1
Total U.S. equity		**2,887,202**	**5.0**
Total Common and preferred stock - Asset Allocation Basis		**9,238,834**	**16.1**
Fixed income:			
Investment grade fixed income		9,385,941	16.4
High yield fixed income		5,309,792	9.3
Total U.S. Fixed income		**14,695,733**	**25.7**
Non-U.S. developed markets fixed income		4,457,610	7.8
Emerging markets fixed income		374,580	0.6
Total Non-U.S. Fixed income		**4,832,190**	**8.4**
Cash and cash equivalents		**2,725,345**	**4.8**
Total Fixed income - Asset Allocation Basis		**22,253,268**	**38.9**
Real estate		**5,688,780**	**9.9**
Alternative investments:			
Private equity		6,379,347	11.1
Special situations		1,176,820	2.0
Venture capital		1,061,134	1.9
Total Alternative investments - Asset Allocation Basis		**8,617,301**	**15.0**
Absolute return		**5,909,056**	**10.3**
Commodities		**4,328,516**	**7.6**
Master limited partnerships		**2,269,241**	**4.0**
Infrastructure		**1,529,825**	**2.6**
Risk parity		**4,722,638**	**8.2**
Financing		**(7,215,891)**	**(12.6)**
Total Pension investments - Asset Allocation Basis		**57,341,568**	**100.0**
Net Asset Allocation Adjustment*		(3,189)	
Pension investments per Statement of Fiduciary Net Position		**57,338,379**	
Postemployment Healthcare investments	**$**	**379,702**	**100.0**
Defined Contribution plan investments	**$**	**10,476**	**100.0**

* Includes reclassifications of certain investments between asset classes and investment receivables/payables to adjust the Statement of Fiduciary Net Position classification to the basis used to measure Asset Allocation. See the table and graph which follow.

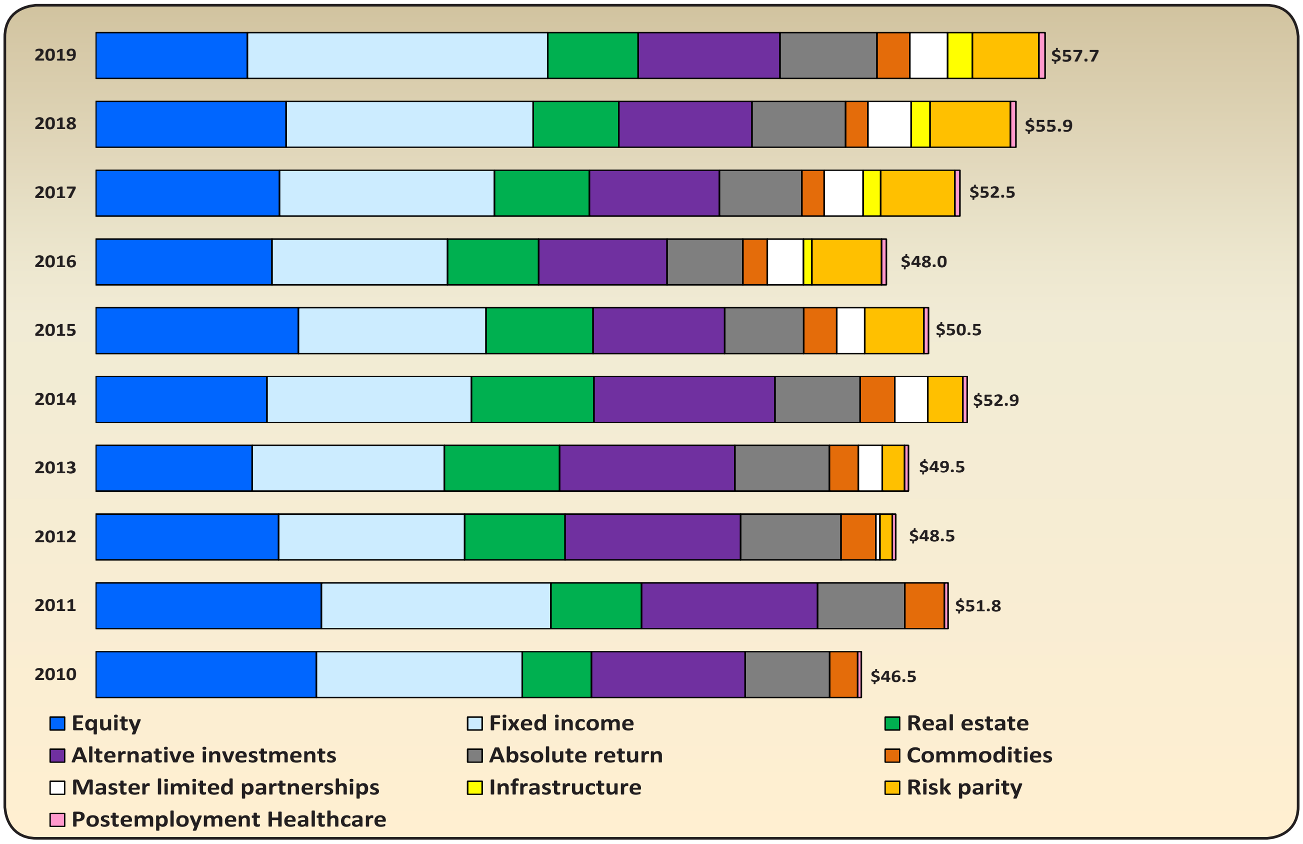
Comparison of Actual Portfolio Distribution to Asset Allocation Plan As of June 30, 2019

Asset Category	Plan	Actual
Common and preferred stock (Equity)	15.0%	16.1%
Fixed income	42.0	38.9
Real estate	10.0	9.9
Alternative investments	15.0	15.0
Absolute return	10.0	10.3
Commodities	8.0	7.6
Master limited partnerships	4.0	4.0
Infrastructure	2.0	2.6
Risk parity	8.0	8.2
Financing	(14.0)	(12.6)
Total	**100.0%**	**100.0%**



Portfolio Capital Distribution 10 Year Trend

(Fair Value - Dollar Amounts in Billions)



The following lists of portfolio detail statistics present the ten largest holdings by descending order of fair value for the largest public market asset classes. Information on the complete holdings of the System can be downloaded from the PSERS website at www.psers.pa.gov.

Common and Preferred Stock - Non-U.S. Equity

10 Largest Holdings in Descending Order by Fair Value

As of June 30, 2019

(Dollar Amounts and Shares in Thousands)

Description	No. of Shares	Fair Value
The Children's Investment Fund LP	459,880	$ 479,395
BlackRock Emerging Markets Alpha Advantage Fund Ltd.- Class D	319	464,544
Effissimo Capital Management Feeder Fund 2	740	198,043
Steadview Capital Partners LP	164,266	165,199
Cederberg Greater China Equity Fund	1,494	154,631
BlackRock Emerging Markets Alpha Advantage Fund Ltd.- Class P	105	153,605
Enbridge Inc.	3,101	111,877
iShares MSCI ETF	1,604	82,494
Nestle SA	511	52,970
Rio Tinto PLC	642	39,862
Total of 10 Largest Holdings		**$ 1,902,620**

Common and Preferred Stock - U.S. Equity

10 Largest Holdings in Descending Order by Fair Value
As of June 30, 2019
(Dollar Amounts and Shares in Thousands)

Description	No. of Shares	Fair Value
SPDR Trust Unit Series 1	1,831	$ 536,485
Enterprise Products Partners, LP	11,798	340,606
Energy Transfer Equity, LP	23,928	336,901
Williams Partners, LP	6,595	184,924
Plains All American Pipeline, LP	7,210	175,562
MPLX, LP	3,112	100,184
Targa Resources Corp.	2,436	95,649
Cheniere Energy, Inc.	1,393	95,364
iShares TR S&P Small Cap 600	1,901	85,373
Magellan Midstream Partners, LP	1,216	77,813
Total of 10 Largest Holdings		**$ 2,028,861**

Fixed Income

10 Largest Holdings in Descending Order by Fair Value
As of June 30, 2019
(Dollar Amounts and Shares in Thousands)

Description	No. of Shares	Fair Value
BlackRock US Extended Core Global Alpha Bond Fund Ltd.	448	$ 1,011,972
Bain Capital Credit Managed Account, LP	N/A	397,116
TAO Partners Parallel Fund, LP	N/A	346,596
Brigade Structured Credit Offshore Fund Ltd.	200	289,260
Bain Capital Distressed and Special Situations 2016, LP	N/A	276,790
Cerberus PSERS Levered Loan Opportunities Fund, LP	N/A	267,837
PIMCO Multi-Sector Strategy Fund Ltd.	197	259,460
LBC-PSERS Credit Fund, LP	N/A	256,820
iShares TIPS Bond ETF	2,052	237,039
Avenue Europe Special Situations Fund III	N/A	234,862
Total of 10 Largest Holdings		**$ 3,577,752**

Absolute Return
10 Largest Holdings in Descending Order by Fair Value
As of June 30, 2019
(Dollar Amounts and Shares in Thousands)

Description	No. of Shares	Fair Value
Bridgewater Pure Alpha Fund II, Ltd.	240	$ 1,007,292
Capula Global Relative Value Fund, Ltd.	3,000	479,173
Garda Fixed Income Relative Value Opportunity Fund Ltd.	291	440,767
Aeolus Property Catastrophe Keystone PF Fund, LP	426	409,153
Brigade Leveraged Capital Structures Offshore Ltd.	170	328,704
PIMCO Commodity Alpha Fund, Ltd.	256	322,204
Capula Tail Risk Fund Ltd.	3,977	307,348
PIMCO Global Credit Opportunity Offshore Fund Ltd.	280	305,268
OWS Credit Opportunity Offshore Fund III, Ltd.	200	294,698
Oceanwood Opportunities Fund	259	268,684
Total of 10 Largest Holdings		**$ 4,163,291**

Postemployment Healthcare Investments
10 Largest Holdings in Descending Order by Fair Value
As of June 30, 2019
(Dollar Amounts in Thousands)

Description	Maturity Date	Interest Rate (%)	Par Value	Fair Value
Wilmington US Government MM	N/A	Various	$ 161,259	$ 161,259
PSERS Short-Term Investment Fund	Various	Various	104,223	104,223
Capital One Multi-Asset	06/15/22	1.33%	6,166	6,172
Verizon Owner Trust	05/20/21	1.68%	4,279	4,285
World Omni Auto	01/17/22	1.84%	4,094	4,094
Ally Auto	11/16/20	1.73%	3,051	3,054
Ford Credit Auto	06/15/21	1.60%	2,875	2,876
Exeter Automobile	01/18/22	2.90%	2,352	2,353
GM Financial	05/20/20	2.59%	2,304	2,305
Honda Auto	11/18/22	1.33%	2,270	2,271
Total of 10 Largest Holdings				**$ 292,892**

Comparison of Investment Activity Income
Fiscal Years Ended June 30, 2019 and 2018
(Dollar Amounts in Thousands)

Investment Activity	**2019**	2018
Net appreciation in fair value of investments	**$ 2,830,333**	$ 3,710,567
Short-term	**130,046**	88,600
Fixed income	**256,597**	193,759
Common and preferred stock	**322,865**	321,547
Collective trust funds	**6,373**	5,166
Real estate	**226,303**	367,526
Alternative investments	**298,004**	485,718
Total investment activity income	**$ 4,070,521**	$ 5,172,883

Brokers' fees on equity investment transactions for the fiscal year ended June 30, 2019 were $4.2 million. The System has commission recapture contracts with several brokers. These contracts generally stipulate that the brokers rebate a percentage of commissions earned on investment transactions directly to the System. During the fiscal year ended June 30, 2019, the System earned $20,000 from a commissions recapture program. A list of the brokers receiving fees in excess of $100,000 during the fiscal year follows:

Summary Schedule of Brokers' Fees
(Cumulative Fiscal Year Amounts Exceeding $100,000)
Fiscal Year Ended June 30, 2019

Broker Name	**Fees Paid**	**Broker Name**	**Fees Paid**
Instinet LLC	$ 418,168	Macquarie Bank Ltd	$ 141,809
Citigroup Inc.	358,582	Goldman Sachs & Company	128,263
B. Riley & Company	278,485	UBS Securities	122,405
Fimat USA	270,220	Bank of America Merrill Lynch	121,798
Wells Fargo Securities	267,939	Jefferies & Company Inc.	104,496
Liquidnet Inc.	174,800	Credit Suisse First Boston	100,044
Morgan Stanley & Company	163,008		

Professional Consultants
External Investment Advisors
As of June 30, 2019

Absolute Return Managers

- Aeolus Capital Management, Ltd.
- Apollo Aviation Group
- AKAZ Investment Partners, LP
- Bridgewater Associates, LP
- Brigade Capital Management
- Capula Investment Management, LLP
- Carlyle Aviation Management Limited
- Caspian Capital, LP
- Garda Capital Partners, LP
- HS Group Ltd.
- Independence Reinsurance Partners GP, LLC
- Nephila Capital, Ltd.
- Oceanwood Capital Management, Ltd.
- One William Street Capital Management, LP
- Pacific Investment Management Company, LLC
- Perry Capital, LLC
- Two Sigma Advisors, LP
- Venor Capital Management, LP

Publicly-Traded Real Estate Securities Advisors

- Security Capital Research & Management, Inc.

Non-U.S. Equity Managers

- Acadian Asset Management, LLC
- Baillie Gifford Overseas, Ltd.
- Cederberg Capital
- Effissimo Capital Management Pte. Ltd.
- Marathon Asset Management Limited
- Oberweis Asset Management, Inc.
- QS Batterymarch Financial Management, Inc.
- Steadview Capital Partners, LP
- The Children's Investment Fund, LP
- Wasatch Advisors, Inc.

Commodity Managers

- Denham Capital Management, LP
- Gresham Investment Management, LLC
- NGP Energy Captial Management
- Wellington Management Company, LLP

U.S. Core Plus Fixed Income Managers

- BlackRock Financial Management
- Pugh Capital Management, Inc.
- SEI Investment Management Corporation

High Yield/Private Credit Managers

- Apollo Global Management, LLC
- Avenue Capital Group
- Bain Capital Credit, LP
- Brigade Capital Management
- The Carlyle Group
- Cerberus Business Finance, LLC
- Clearlake Capital Group, LP
- Hayfin Capital Management LLP
- Intermediate Capital Group PLC
- Latitude Management Real Estate Investors
- LBC Credit Management, LP
- Mariner Investment Group, LLC
- Oaktree Capital Management, LP
- Pacific Investment Management Company, LLC
- Park Square Capital, LLC
- Summit Partners
- TCI Fund Management Limited
- TPG Sixth Street Partners
- Varde Partners, Inc.

Non-U.S Developed Markets Fixed Income Manager

- AllianceBernstein, LP

Emerging Markets Debt Manager

- Franklin Templeton Investments

Multi-Sector Fixed Income Manager

- Pacific Investment Management Company, LLC

Non-U.S. Inflation-Linked Securities Manager

- Bridgewater Associates, LP

LIBOR-Plus Short-Term Investment Pool Managers

- Capula Investment Management, LLP
- Penn Mutual Asset Management, LLC
- Radcliffe Capital Management

Master Limited Partnership Managers

- Atlantic Trust Private Wealth Management
- Harvest Fund Advisors, LLC
- Salient Capital Advisors, LLC

Currency Hedging Manager

- Pareto Investment Management, Ltd.

Professional Consultants (Continued)

Infrastructure

- Blackstone Group, The
- GCM Grosvenor
- Mariner Investment Group, LLC
- Strategic Partners

Risk Parity Managers

- BlackRock Financial Management
- Bridgewater Associates, LP
- D.E. Shaw Investment Management, LLC

Real Estate Advisors

- Bell Partners, Inc.
- Charter Oak Advisors, Inc.
- GF Management, Inc.
- L&B Realty Advisors
- Property Management, Inc.

Real Estate Fund Managers

- Almanac Realty Investors, LLC
- Angelo, Gordon & Co., LP
- Ares Management, LLC
- Avenue Capital Group
- Bell Partners, Inc.
- BlackRock Real Estate
- Blackstone Group, The
- Brookfield Asset Management, Inc.
- Cabot Properties, Inc.
- Carlyle Group, The
- C-III Capital Partners, LLC
- DRA Advisors, LLC
- Equus Capital Partners, LTD
- Exeter Property Group
- Fortress Investment Group
- LAI Real Estate Investors, LLC
- LaSalle Mortgage Real Estate Investors
- LEM Capital Partners, LP
- O'Connor Capital Partners
- Paramount Group, Inc.
- PGIM Real Estate
- RCG Longview Management, LLC
- Silverpeak Real Estate Partners
- Stockbridge Capital Partners
- Strategic Partners
- UBS Realty Investors, LLC

Farmland Advisor

- Prudential Agricultural Group

Venture Capital Fund Managers

- Adams Capital Management, Inc.
- Aisling Capital, LLC
- Cross-Atlantic Capital Partners
- Insight Venture Management, LLC
- KBL Healthcare
- Landmark Partners
- LLR Partners
- Mid-Atlantic Venture Funds
- Psilos Group Investors
- Quaker Bio-Ventures, Inc.
- Sante Ventures
- SCP Private Equity Partners
- StarVest Associates
- Sterling Partners
- Strategic Partners
- Summit Partners
- TDH, Inc.
- Tenaya Capital

Private Equity Fund Managers

- Actis LLP
- APAX Partners, LLP
- Bain Capital Partners, LLC
- Baring Private Equity Asia Limited
- Blue Point Capital Partners LLC
- Bridgepoint Capital Ltd
- Capital Group
- L Catterton Management Company LLC
- Cinven
- Coller Investment Management LTD
- Crestview Advisors LLC
- CVC Capital Partners Group
- Denham Capital
- EagleTree Capital
- The Energy & Minerals Group
- Equistone Partners Europe Limited
- Evergreen Pacific Partners GP LLC
- First Reserve Corporation
- GoldPoint Partners LLC
- HgCapital
- Huntsman Gay Global Capital LLC
- Incline Management Corp.
- IPC Advisors
- K4 Capital Advisors
- Landmark Partners
- Milestone Partners
- Morgan Stanley
- New Mountain Investments
- NGP Energy Capital Management
- Odyssey Investment Partners LLC
- Orchid Asia
- PAI Europe
- Palladium Equity Partners
- Partners Group Mgmt VI LTD
- Permira

Professional Consultants (Continued)

- Platinum Equity Capital Partners
- Portfolio Advisors, LLC
- StepStone Group
- Sterling Partners
- Strategic Partners
- Trilantic Capital Management, LLC
- Webster Capital Management, LLC

Special Situations Fund Managers

- Apollo Global Management, LLC
- Arrowhead Mezzanine
- Avenue Capital Group
- Black Diamond Capital Management, LLC
- Cerberus Capital Management, LP
- Clearlake Capital Group, LP
- Gold Hill Venture Lending 03, LLC
- GoldPoint Partners, LLC
- Oaktree Capital Management LP
- Searchlight Capital Partners, LP
- Tulco Management, LLC
- Venor Capital Management, LP
- Versa Capital Management, LLC
- Windjammer Capital Investors

Custodian Bank

- The Bank of New York Mellon Corporation

Securities Lending Agent

- Deutsche Bank AG

Investment Accounting Application Service Provider

- STP Investment Services, LLC

Proxy Voting Agent

- Glass, Lewis & Co., LLC

Investment Evaluator and General Investment Consultant

- Aon Investment Consulting

Private Markets Investment Consultant

- Hamilton Lane Advisors, LLC

Real Estate Investment Consultant

- Hamilton Lane Advisors, LLC

Absolute Return & Risk Parity Consultant

- Aksia, LLC

Risk Management System Provider

- BlackRock Solutions

Current Staff-Bureau of Benefits Administration(BOA)

BOA-Member Account Division

BOA-Benefits & Exceptions Division