

# PSERS BUDGET REPORT - FY 2021-2022



## SECTION 3 - INVESTMENT INFORMATION

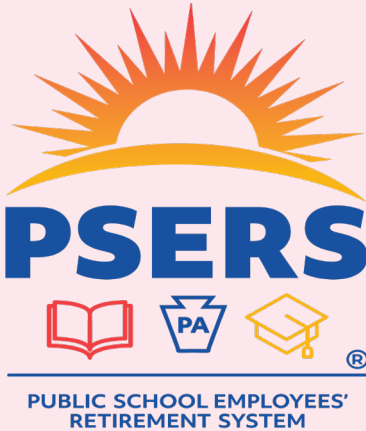
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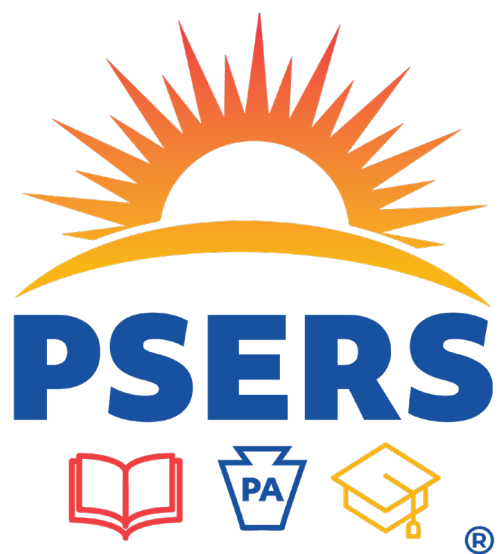
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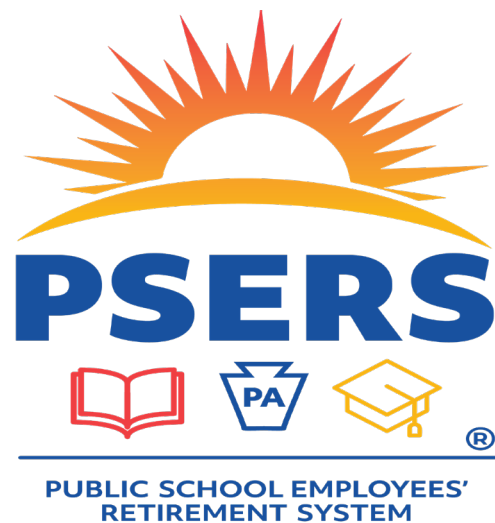


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# Investment Guidelines, Philosophy, Risk Management, and Capital Market Assumptions

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## Section 3 - Investment Information

### Investment Objectives, Philosophy, Risk Management, and Capital Market

#### Assumptions

#### Investment Objectives

The Board has established investment objectives for the Fund as follows:

To generate returns to support the System's actuarial soundness so it may provide its members with benefits as required by law.

To earn a long-term total return, net of fees and investment expenses, that equals or exceeds the Actuarial Assumed Rate approved by the Board.

To earn a long-term total return, net of fees and investment expenses, that equals or exceeds the Policy Index approved by the Board.

To prudently manage investment risks that are related to the achievement of investment goals.

#### Investment Philosophy

The PSERS Board of Trustees believes PSERS' assets should be managed in accordance with PSERS' unique liability stream, funding sources, cash flows, and portfolio size, focusing on the prudent accumulation of wealth over the long term to meet the retirement benefit obligations established by the plan sponsor to its members. PSERS' assets should be managed based on the following beliefs:

##### 1. Uncertainty

The future is difficult to forecast with any accuracy or certainty, particularly changes in the economic and market environment.

##### 2. Asset Allocation

The strategic asset allocation mix, more than implementation or any other factor or decision, largely determines the portfolio's overall risk and return.

##### 3. Diversification

Diversification is the best approach to addressing future uncertainty and therefore meeting PSERS' long-term investment objectives.

Diversification should be across multiple dimensions: By and within asset classes.

- By geography.
- By strategy (e.g., in Public Equity: growth and value, concentrated and diversified, quantitative and fundamental).
- By vintage year for Private Investments (investment pacing in and out of investments helps mitigate the impact of market volatility).

Over any given period, any number of asset classes, geographies, strategies, and vintages will underperform others; that is to be expected and accepted.

##### 4. Risk

For an underfunded plan or for a plan with negative cash flow (benefits paid exceed contributions received), the path of compounding of investment returns – from month to month, quarter to quarter, and year to year -- matters more than for a plan that is fully funded or has positive cash flow; for the former type of plan, peak-to-trough declines transform unrealized losses into permanent ones.

Drawdown risk should be mitigated, especially as the environment in which drawdowns occur is likely. Also the environment where the Plan Sponsor's willingness and ability to make contributions to the plan may be less than in normal times.

Liquidity should be managed to reasonably ensure that the fund can meet its obligations during periods of market dislocations.

##### 5. Leverage

Leverage at the total fund level can be an effective tool to enhance diversification, since asset classes, over the long-term, have similar risk-adjusted returns, different correlations to each other, and different responses to changes in the economic and market environment.

Leverage can be a vital tool to increase or decrease total fund risk in a diversified manner.

### Investment Philosophy(continued)

#### 6. Rebalancing

Disciplined rebalancing enhances long term returns as it is an inherently contrarian process.

Rebalancing restores strategic asset allocation as the primary driver of return and risk.

#### 7. Portfolio Size

Managing a large pool of assets provides investors unique access to investment opportunities not available to smaller institutional investors or individual investors.

PSERS should use its size to its advantage to enhance its net-of-fees return and diversification opportunities.

#### 8. Private Investments

Allocations to Private Equity, Private Credit, Private Real Estate, Private Infrastructure, and other illiquid asset classes may be justified by the illiquidity risk premium available to investors.

Allocations to these asset classes may also be justified by the diversification benefit they provide, through exposure to sectors, businesses, and mode of corporate governance not obtainable through public markets.

#### 9. Active Management

Passive investing, rather than active management, is the default choice to be used for any asset class that is highly efficient or where skilled active managers are less likely to be identified.

Certain asset classes continue to exhibit information inefficiency, where skilled active management and well-resourced investors such as PSERS can potentially persistently outperform peers and the benchmark for that asset class.

There will be short-term periods when a skilled active manager may underperform peers and the benchmark; that is to be expected and accepted; therefore a long-term perspective will be employed.

#### 10. Internal Management

PSERS has developed skilled internal investment managers; as such internal investment management

is preferred over external investment management in cases where internal management most likely can match or exceed the long term, net of fees, risk-adjusted returns provided by External Managers, provided the internal investment and operational resources are available to do so.

#### 11. Investment Fees

Investment management fees for external management are one of the few aspects of investment management that are certain and over which the investor has control.

Investment management and performance fees should be managed to (i) maximize long term, net of fees, risk-adjusted returns, (ii) split the value added fairly between the Investment Manager and PSERS, and (iii) align the interests of Investment Manager with PSERS.

### Risk Management

Risk management is essential to the entire investment process. The goal of investment risk management is to find the appropriate balance between expected returns and the risks taken to generate those returns. An entirely risk-free investment portfolio that has a high probability of meeting all investment goals does not exist. Therefore, PSERS does not attempt to eliminate all risk but instead seeks to limit the possibility of permanent loss. Risk itself is neither good nor bad, but it is necessary that the System expose itself to some appropriate level of risk if it is to generate the long-term investment returns required to maintain stable and cost-effective contribution rates.

The future is difficult to forecast with any accuracy or certainty, particularly changes in the economic and market environment but PSERS can understand the future as a range of probabilities, some desirable and some not, and can position its current investments to guard against undesirable outcomes and to make desirable outcomes more likely. In positioning for future developments, PSERS cannot know with complete certainty how markets or particular investment strategies will perform. The strategic asset allocation mix,

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### Investment Risk Management (continued)

more than implementation or any other factor or decision, largely determines the portfolio's overall risk and return.

Given its long-term investment horizon, PSERS accepts prudent investment risk in exchange for acceptable levels of additional incremental return. PSERS' Board sets long-term asset allocation and risk parameters. The Investment Office implements investment policies within these approved guidelines. The Investment Office works closely with PSERS' Board to establish, monitor, and report its various risk metrics and has the required authority to efficiently and effectively implement associated actions.

The Policies of the Board can be found on the Investment page on PSERS website.

### Capital Market Assumptions

Capital Market Assumptions (CMAs) are estimates of expected returns and risks for a given set of asset classes, and expectations of the relationship (correlations) between these asset classes over long periods of time. They are issued periodically by investment consultants, asset managers, and investment banks. Inflation, real short-term interest rates, and economic data frequently provide the foundation used by CMAs for expected returns across global asset classes. These are the primary building blocks for developing equity and fixed income returns expectations, which in turn are used in setting expectations for alternative asset class returns. PSERS collects and evaluates this information when considering its long-term actuarial rates of return assumptions and in setting its Asset Allocation Policy.

Compared to 2019, 2020 survey results under the 20-year forecast indicate a decrease in return assumptions across most asset classes. CMAs are forecasting slower growth and lower asset returns over the coming decade than has been experienced in past decades. Select asset classes are detailed in Table 8.1 on the next page.

### Fixed Income

Nominal government bond returns are a function of long-term expectations for inflation and government yields. Corporate bond returns are a function of expected inflation, government yields, and expectations for credit spreads, defaults and downgrades. Most of the decrease in bond return assumptions from 2016 – 2020 can be explained by falling yields and tightening credit spreads. In response to the COVID-19 pandemic, the Federal Reserve lowered the target range for the federal funds rate to 0% to 0.25% in 2020 and projected to keep rates near 0% until at least 2023.

### Equities

Equity return assumptions are driven by market valuations, earnings growth expectations and assumed dividend payouts: Non-US Equity return expectations have declined relative to 2019, driven by slowing growth, political uncertainty and trade wars.

Equity market returns over the past few years have been driven by rising valuations. Due to the COVID-19 pandemic, participants' concern over slowing growth has driven future expected returns lower.

### Real Estate

Global real estate return assumption in 2020 decreased relative to expected returns from 2019. Lower initial yields and slowing growth impacted the real return assumption in 2020.

### Hedge Funds

Hedge Fund assumptions reflect changes in the underlying equity, fixed income and cash capital market assumptions. Decrease in the hedge fund assumption from 2019 to 2020 reflect the declining expectations for fixed income and cash.

An alternative approach to asset allocation that

## Section 3 - Investment Information

### Capital Market Assumptions

is sometimes suggested to pension plans is to establish a stereotypical 60% equity/40% fixed income policy that remains static over time. Tables 8.1 and 8.2 illustrate one reason why such an approach would not be prudent. Because PSERS can select from a broad array of asset allocation alternatives, we can analyze alternative allocation strategies using asset classes with varying expected returns and expected risk in order to formulate an optimal asset allocation policy most likely to achieve the investment return and investment risk goals established by the Board. In recent years, lower risk projections have

afforded PSERS valuable flexibility in identifying different combinations of asset allocations that can achieve our current long-term goal of 7.25% at acceptable levels of risk even as return assumptions have fallen. Furthermore, PSERS applies leverage opportunistically in implementing its asset allocation policy, providing an additional mechanism to increase expected volatility in order to target higher expected return when warranted. A stereotypical 60%/40% strategy would have precluded such flexibility and exposed the system to artificial and harmful limits on our ability to manage the Fund.

The table below summarizes the average expected capital market geometric return assumptions of 20-30 surveyed independent investment advisors in 2016 - 2020.

<b>PSERS Capital Market Assumptions (CMA's)</b>					
<b>Average Expected Geometric Returns (2016 - 2020)</b>					
<b>Asset Class</b>	<b>2016 Survey</b>	<b>2017 Survey</b>	<b>2018 Survey</b>	<b>2019 Survey</b>	<b>2020 Survey</b>
U.S. Equity - Large Cap	7.9%	7.8%	7.4%	7.1%	7.1%
U.S. Equity - Small/Mid Cap	8.2%	8.4%	8.2%	7.5%	7.6%
Non-U.S. Equity - Developed	8.0%	7.6%	7.7%	7.7%	7.5%
Non-U.S. Equity - Emerging	9.1%	8.7%	8.8%	8.7%	8.4%
U.S. Corporate Bonds - Core	4.6%	4.4%	4.5%	4.3%	3.6%
U.S. Corporate Bonds - Long Duration	4.9%	4.8%	4.4%	4.4%	3.6%
U.S. Corporate Bonds - High Yield	6.8%	6.2%	5.8%	5.8%	5.6%
Non-U.S. Debt - Developed	3.7%	3.5%	3.2%	3.4%	2.3%
Non-U.S. Debt - Emerging	6.4%	6.2%	6.1%	6.1%	5.9%
U.S. Treasuries (Cash Equivalent)	3.2%	3.2%	3.1%	3.0%	2.3%
TIPS (Inflation-Protected)	3.9%	4.0%	4.0%	3.5%	2.7%
Real Estate	6.8%	6.7%	6.7%	6.8%	6.6%
Hedge Funds	6.2%	6.0%	6.2%	6.2%	5.7%
Commodities	4.8%	5.0%	4.9%	4.7%	4.0%
Infrastructure	7.1%	7.1%	7.1%	7.2%	7.3%
Private Equity	10.3%	10.1%	9.5%	10.1%	9.9%
Private Debt	-	-	-	7.8%	7.9%
Inflation	2.3%	2.4%	2.5%	2.3%	2.2%

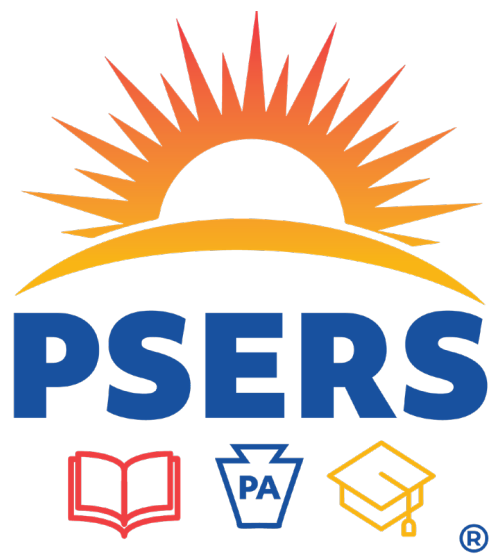
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### Capital Market Assumptions (continued)

The CMA surveys also included forecasts for 20 year average expected risk (Table 8.2). The numbers below reflect the expected standard deviation in % around the expected return.

<b>Table 8.2</b>					
<b>PSERS Capital Market Assumptions (CMA's)</b>					
<b>Average Expected Risk (2016 - 2020)</b>					
<b><u>Asset Class</u></b>	<b><u>2016</u></b>	<b><u>2017</u></b>	<b><u>2018</u></b>	<b><u>2019</u></b>	<b><u>2020</u></b>
	<b><u>Survey</u></b>	<b><u>Survey</u></b>	<b><u>Survey</u></b>	<b><u>Survey</u></b>	<b><u>Survey</u></b>
US Equity – Large Cap	16.9%	16.6%	16.4%	16.2%	16.2%
US Equity – Small/Mid Cap	21.0%	20.2%	20.2%	20.2%	20.2%
Non-US Equity – Developed	19.5%	18.9%	18.7%	18.2%	18.1%
Non-US Equity – Emerging	26.4%	25.4%	24.9%	24.7%	24.2%
US Corporate Bonds – Core	6.0%	5.5%	5.7%	5.5%	5.5%
US Corporate Bonds – Long Duration	10.5%	10.4%	10.8%	10.5%	10.2%
US Corporate Bonds – High Yield	11.0%	10.6%	10.2%	10.1%	9.8%
Non-US Debt – Developed	7.6%	7.4%	6.9%	7.6%	7.0%
Non-US Debt – Emerging	11.6%	11.8%	11.4%	11.3%	11.0%
US Treasuries (Cash Equivalent)	2.8%	3.0%	2.7%	2.3%	1.8%
TIPS (Inflation-Protected)	6.5%	6.3%	6.3%	6.1%	6.1%
Real Estate	14.7%	14.5%	13.9%	15.0%	16.8%
Hedge Funds	8.4%	8.0%	7.9%	8.4%	8.0%
Commodities	18.5%	17.9%	17.6%	17.7%	17.6%
Infrastructure	13.8%	14.6%	14.7%	14.4%	14.6%
Private Equity	23.1%	22.0%	22.2%	22.0%	22.0%
Private Debt	-	-	-	11.6%	12.1%
Inflation	1.8%	1.7%	1.8%	1.7%	1.7%



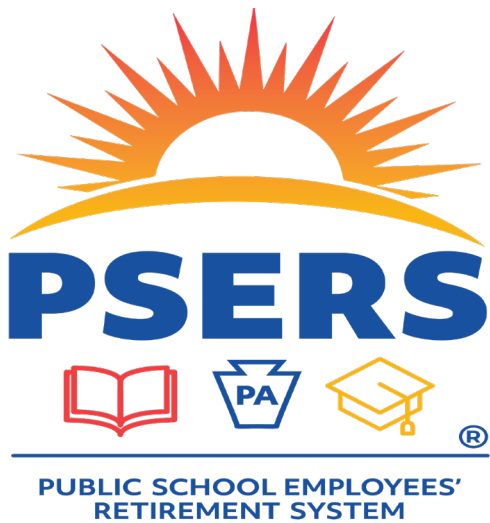


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# Asset Exposure and Investment Program Summary

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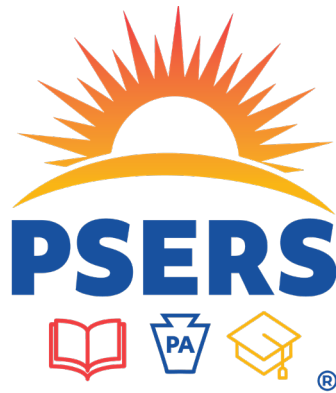
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### Asset Exposure (as of June 30, 2020)

While the Board can choose to modify its asset allocation at any time it determines that changes are warranted (for example, due to changing liquidity circumstances or opportunities in the marketplace), the Board maintains a disciplined and thorough process to establish a new asset allocation policy annually. This process begins following the Board's review and acceptance of the actuary's annual report, as described in Tab 5. PSERS' investment professionals and general investment consultant collaborate to analyze potential asset allocations (using actuarial as well as capital market return assumptions) in order to identify those potential asset allocations that meet the long-term return and risk objectives of the Fund. The Board is then presented with alternative

asset allocations with detailed analysis of probable long-term return and risk characteristics from which it will select a new Asset Allocation Policy for further implementation by staff.

The Board reviews the long-term asset allocation targets of the System at least annually. In establishing the asset allocation plan, the Board will consult with its actuary, consultants, investment staff, and other sources of information it deems appropriate in formulating this allocation. The purpose of the asset allocation is to meet the long-term financial needs and investment objectives of the System.



## Section 3 - Investment Information

### Asset Exposure (continued)

Table 9.1 represents PSERS asset exposure and target allocation plan that became effective October 1, 2019, and was in effect on June 30, 2020.

<b>Asset Class</b>	<b>Market Value (in millions)</b>	<b>Percentage of Gross Asset Exposure</b>	<b>Percentage of Net Asset Exposure</b>	<b>Target Allocation %</b>	<b>Target Allocation Range</b>
Public Equity	\$ 9,104.0	14.2%	16.0%	14.0%	
Private Equity	7,969.9	12.4%	14.0%	16.0%	
<b>Total Equity</b>	<b>\$ 17,073.9</b>	<b>26.6%</b>	<b>30.0%</b>	<b>30.0%</b>	<b>± 5</b>
Public Fixed Income*	18,178.1	28.3%	32.0%	26.0%	
Private Credit	5,109.3	8.0%	9.0%	10.0%	
<b>Total Fixed Income</b>	<b>\$ 23,287.4</b>	<b>36.3%</b>	<b>41.0%</b>	<b>42.0%</b>	<b>± 5</b>
Public Commodities*	4,552.8	7.1%	8.0%	8.0%	
Public Infrastructure*	2,523.5	3.9%	4.5%	5.0%	
Public Real Estate*	787.6	1.2%	1.4%	0.5%	
<b>Total Public Real Asset</b>	<b>\$ 7,863.9</b>	<b>12.3%</b>	<b>13.9%</b>	<b>13.5%</b>	<b>± 3</b>
Private Commodities	140.0	0.2%	0.3%	0.0%	
Private Infrastructure	356.1	0.5%	0.6%	1.0%	
Private Real Estate	4,946.3	7.7%	8.7%	9.5%	
<b>Total Private Real Asset</b>	<b>\$ 5,442.4</b>	<b>8.4%</b>	<b>9.6%</b>	<b>10.5%</b>	<b>± 3</b>
<b>Risk Parity*</b>	<b>4,469.3</b>	<b>7.0%</b>	<b>7.9%</b>	<b>8.0%</b>	<b>± 2</b>
<b>Absolute Return</b>	<b>6,033.6</b>	<b>9.4%</b>	<b>10.5%</b>	<b>10.0%</b>	<b>± 3</b>
<b>Gross Asset Exposure</b>	<b>64,170.5</b>	<b>100.0%</b>	<b>112.9%</b>	<b>114.0%</b>	
<b>Financing*</b>	<b>(7,318.1)</b>		<b>-12.9%</b>	<b>-14.0%</b>	<b>+24/-6</b>
<b>Net Asset Exposure</b>	<b>\$ 56,852.4</b>		<b>100.0%</b>	<b>100.0%</b>	

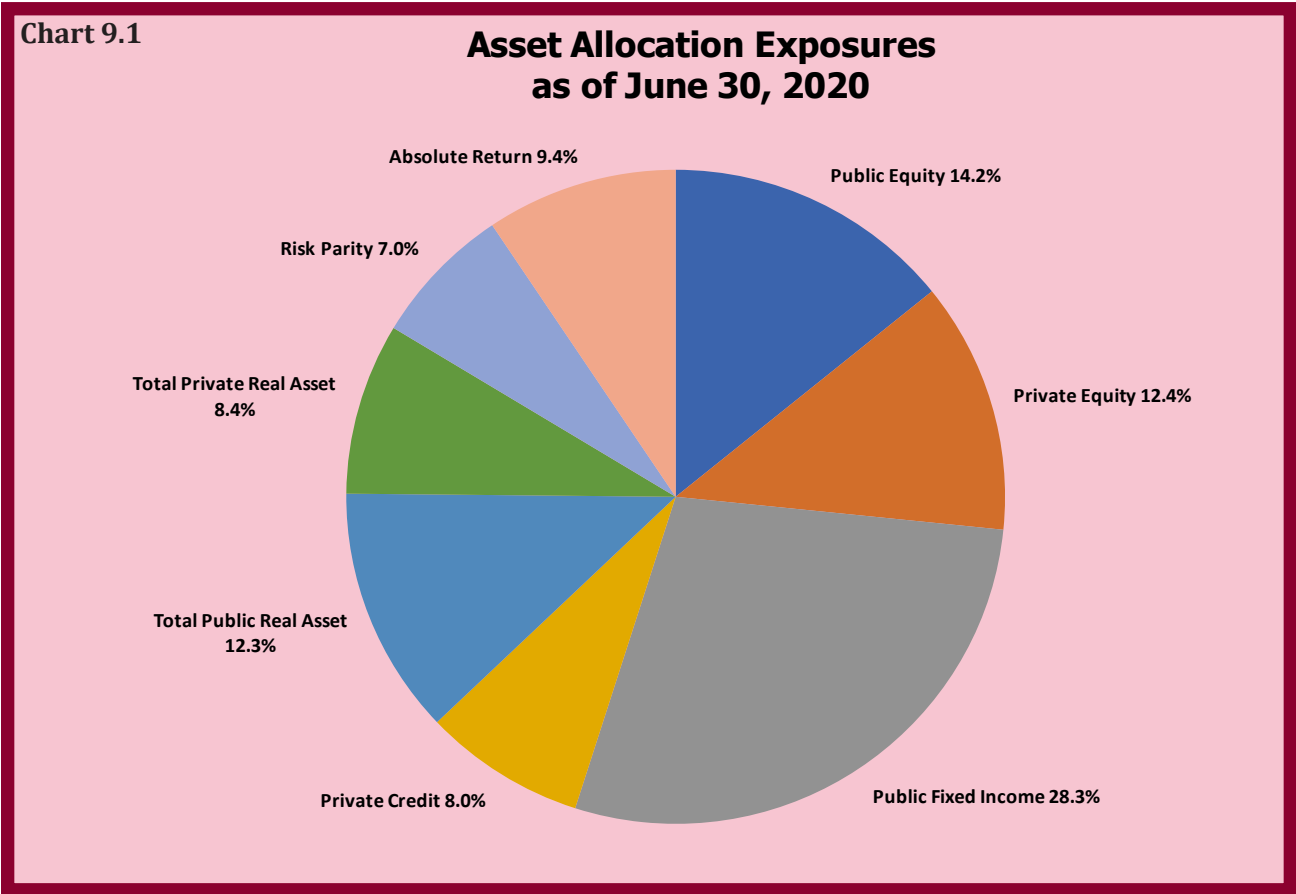
\*PSERS uses financing to achieve increased economic exposure to diversifying asset classes to manage the overall portfolio risk while maintaining an allocation designed to achieve the long-term return goals of the System. Increased economic exposure is generally achieved through the use of either derivative positions or higher volatility funds. As of June 30, 2020, PSERS had total increased economic exposure of \$7.3 billion related to the following asset classes: Fixed Income (\$3.7 billion); Risk Parity (\$0.5 billion); Infrastructure (\$0.6 billion); Real Estate (\$0.3 billion) and Commodities (\$2.9 billion). An allocation of 6% to Cash is included in the Target Allocation.

Note: PSERS' asset allocation was updated December 3, 2020 and is available for review at <http://www.psers.pa.gov>

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## Asset Exposure (continued)

Chart 9.1 illustrates PSERS' asset allocation exposure as of June 30, 2020:

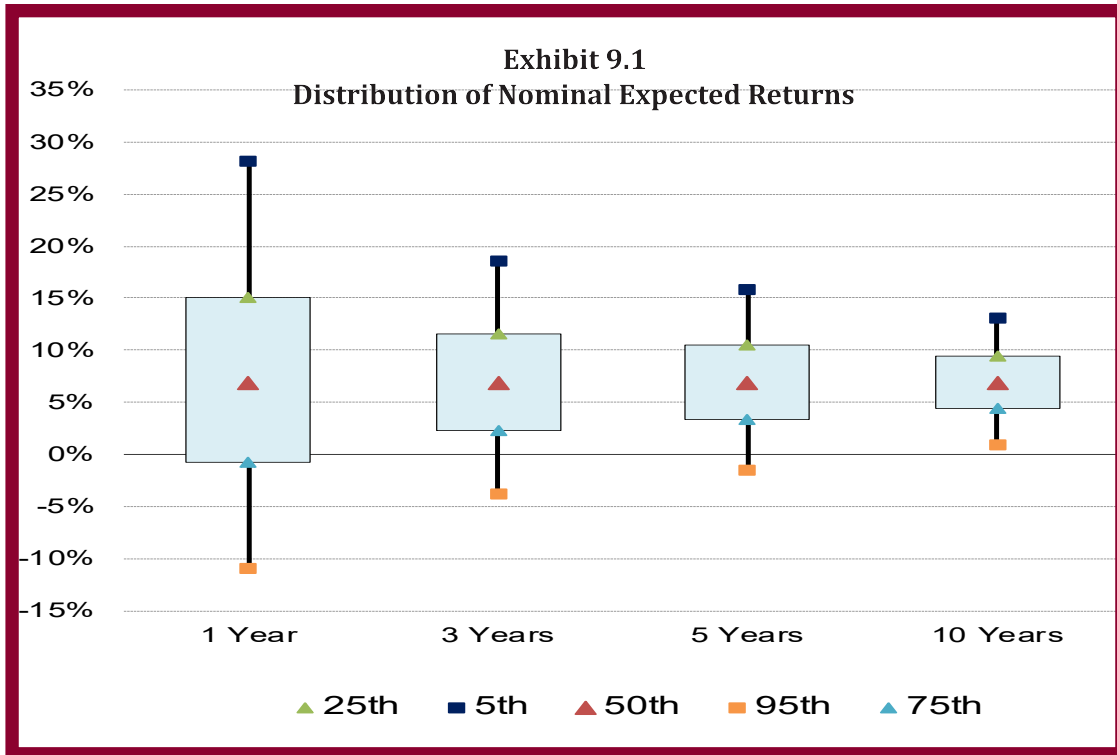


Note: Financing represents a negative 12.9% allocation and is not reflected in Chart 9.1.

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### Asset Exposure (continued)

The purpose of the asset allocation is to meet the long-term investment objectives of the System. PSERS considers the expected range of returns for 1, 3, 5, and 10 year periods of various alternative asset allocations (as seen in Exhibit 9.1) to select the optimal asset allocation annually. While the range of returns can be high for any single year, volatility will decrease and converge around a median return over time. This is demonstrated in Exhibit 9.1 below, which depicts expected future returns for PSERS' current asset allocation:



<b>Range of Returns</b>				
Percentiles	1 Year	3 Years	5 Years	10 Years
5%	28.1%	18.6%	15.9%	13.1%
25%	15.1%	11.5%	10.4%	9.4%
50%	6.8%	6.8%	6.8%	6.8%
75%	-0.8%	2.3%	3.3%	4.3%
95%	-10.9%	-3.8%	-1.5%	0.9%

Source: Aon Hewitt's 30-year capital market assumptions as of June 30, 2020.

### Public Market Investments

#### Public Equity Investments

PSERS seeks to diversify assets by obtaining broad exposure to publicly traded equity markets. Public Equity plays a strategic role within the Fund, by providing a return premium over inflation, thereby preserving and enhancing the real value of the Fund, and by performing well when economic growth is stronger than expected or inflation is lower than expected. To maintain diversification within the asset class, the Fund pursues a global investment strategy across regions, sectors, market capitalization segments, and investment styles.

Public Equity assets may be invested in instruments that provide equity returns. Instruments used may be exchange-traded or non-exchange-traded and may be physical securities or derivatives.

#### Private Equity Investments

PSERS seeks to diversify its assets by providing exposure to private investments as part of the overall investable universe and to take advantage of the ability to accept less liquidity in exchange for higher potential returns, stronger investor rights and protections, and better alignment of interests. Private Equity also provides access to investment opportunities not available in Public Equity markets. The Private Equity asset class targets risk-adjusted returns in excess of the benchmark, net of fees, over a full market cycle. The Private Equity portfolio will achieve diversification by investing in funds and co-investments that are complementary in nature regarding fund size, sector, strategic, geographic and industry focus, and vintage year.

Private Equity assets may be committed to, but not limited to, funds, co-investments, secondaries, separate accounts, joint ventures, partnerships, limited liability companies, and operating companies (collectively "Private Equity Investments") investing in Private Equity strategies. Private Equity Investments may result in exposure to any type of private (sometimes public) security throughout the capital structure. PSERS will only consider investment structures

that provide limited liability to PSERS which limits PSERS' losses to the amount invested.

#### Public Fixed Income Investments

PSERS seeks to diversify assets by obtaining broad exposure to publicly traded fixed income markets. Public Fixed Income plays a strategic role within the Fund in a variety of ways. Nominal bonds serve as a hedge against lower inflation and weak economic growth, produce current income in the form of periodic interest payments, and provide liquidity to meet the Fund's obligations. Inflation protected bonds serve as a hedge against higher inflation and weaker economic growth and provide liquidity. Credit-related securities such as emerging market debt and public high yield bonds generate higher current income relative to investment grade debt and tend to do well when economic growth is stronger than expected. To maintain diversification within the asset class, the Fund pursues a global investment strategy across regions, sectors, maturity segments, credit quality, and investment styles.

Public Fixed Income assets may be invested in instruments that provide fixed income returns. Instruments used may be exchange-traded or non-exchange-traded and may be physical securities or derivatives.

#### Private Credit Investments

PSERS seeks to diversify its assets by providing exposure to private investments as part of the overall investable universe and to take advantage of the ability to accept less liquidity in exchange for higher potential returns, stronger investor rights and protections, and better alignment of interests. Private Credit typically provides enhanced yields over publicly-traded fixed income markets and serves as a diversifier to the overall portfolio due to the variety of underlying collateral types not easily accessed in traditional asset classes. The Private Credit asset class targets risk-adjusted returns in excess of the benchmark, net of fees, over a full market cycle. The Private Credit asset class will achieve diversification by investing in funds, both

## Section 3 - Investment Information

### Private Credit Investments (continued)

closed-end and evergreen, and co-investments that are complementary in nature regarding fund size, sector, strategic focus, geographic and industry focus and vintage year.

Private Credit assets may be committed to, but not limited to, funds, co-investments, secondaries and separate accounts (collectively “Private Credit Investments”) investing in Private Credit strategies. Private Credit Investments may result in exposure to diverse securities throughout the capital structure. Private Credit assets also allow for structures which may not conform precisely to the previous list but whose intent is to capture private credit exposure and returns. PSERS will only consider investment structures that provide limited liability to PSERS which limits PSERS’ losses to the amount committed.

### Public Commodities Investments

PSERS seeks to diversify assets by obtaining broad exposure to publicly traded commodities markets. Commodity investments consist of energy, precious metals, industrial metals, and agricultural. The prices of commodities are determined primarily by near-term events in global supply and demand conditions and are positively related with both the level of inflation and changes in the rate of inflation. Public Commodities play a strategic role within the Fund, by providing a hedge against unanticipated inflation and diversification benefits. To maintain diversification within the asset class, the Fund pursues an investment strategy across all key commodities and across investment styles.

Public Commodities assets may be invested in instruments that provide publicly traded commodities returns. Instruments used may be exchange-traded or nonexchange-traded and may be physical securities or derivatives, and leverage may be employed. In the case of Gold, the instruments may include physical gold (bullion).

### Public Infrastructure Investments

PSERS seeks to diversify assets by obtaining broad exposure to publicly traded

infrastructure markets. Public Infrastructure investments target stable, defensive investments with steady cash flows primarily within the energy, power, water, and transportation sectors. Public Infrastructure plays a strategic role within the Fund, by providing steady returns and cash yields, defensive growth, inflation protection, capital preservation, liquidity and diversification benefits. To maintain diversification within the asset class, the Fund pursues a global investment strategy across geographic regions, sectors, market capitalization segments, and investment styles.

Public Infrastructure assets may be invested in instruments that provide publicly-traded infrastructure returns. Instruments used may be exchange-traded or nonexchange-traded and may be physical securities or derivatives, and leverage may be employed.

### Public Real Estate Investments

PSERS seeks to diversify assets by obtaining broad exposure to publicly-traded real estate markets. Public Real Estate provides a strategic role within the Fund, by providing steady returns and cash yields, inflation protection, defensive growth, capital preservation, liquidity and diversification benefits. To maintain diversification within the asset class, the Fund pursues a global investment strategy across geographic regions, property sectors, market capitalization segments, and investment styles.

Public Real Estate assets may be invested in instruments that provide publicly-traded real estate returns. These include, but are not limited to, US and Non-US publicly-traded real estate investment trusts (REITs). Instruments used may be exchange-traded or non-exchange-traded and may be physical securities or derivatives.

### Private Commodities Investments

Through investment in Private Commodities, PSERS seeks to increase the diversification of PSERS’ commodities assets. Exposure to Private Commodities as part of the overall investable universe can offer the option to access investment



### Private Commodities Investments (continued)

opportunities not available in Public Commodities and accept less liquidity in exchange for historically higher private equity-like returns within the overall Commodities allocation. Private Commodity manager selection can be enhanced by PSERS experience with private equity managers who have shown success in commodities-related investment sleeves. The Private Commodities asset class will achieve risk moderation by investing in vehicles and co-investments that are complementary in nature regarding fund size, sector, strategic focus, and vintage year.

Private Commodity assets may be committed to, but not limited to, funds, co-investments, secondaries, separate accounts, joint ventures, partnerships, limited liability companies, and operating companies (collectively “Private Commodity Investments”) investing in Private Commodity strategies. Private Commodity Investments may result in exposure to any type of private (sometimes public) security throughout the capital structure. PSERS will only consider investment structures that provide limited liability to PSERS which limits PSERS’ losses to the amount invested.

### Private Infrastructure Investments

PSERS seeks to diversify its assets by providing exposure to private investments as part of the overall investable universe. Additionally, when compared to other investable opportunities, private investments are intended to provide exposure to higher potential returns, stronger investor rights and protections, and better alignment of interests. While providing a current income return and a potential hedge against inflation, Private Infrastructure also provides access to investment opportunities not available in Public Infrastructure markets. The Private Infrastructure asset class targets risk-adjusted returns in excess of the benchmark, net of fees, over a full market cycle. The Private Infrastructure asset class will achieve diversification by investing in funds, both closed-end and evergreen and co-investments that are complementary in nature regarding fund size, sector, strategic focus, regional footprint and vintage year.

Private Infrastructure assets can be committed to, but not limited to, funds, co-investments, separate accounts, joint ventures, partnerships, limited liability companies, and operating companies (collectively “Private Infrastructure Investments”) investing in private infrastructure strategies. Private Infrastructure Investments may result in exposure to any type of security throughout the capital structure. Notwithstanding investments in Separate Accounts, PSERS will only consider investment structures that provide limited liability to PSERS which limits PSERS’ losses to the amount committed.

### Private Real Estate Investments

PSERS seeks to diversify its assets by providing exposure to private investments as part of the overall investable universe and to take advantage of the ability to accept less liquidity in exchange for higher potential returns, stronger investor rights and protections, and better alignment of interests. Private Real Estate typically provides current income, appreciation, and a potential hedge against inflation, and serves as a diversifier to the overall portfolio. Private Real Estate also provides access to investment opportunities not available in the publicly traded real estate markets. The Private Real Estate asset class targets risk-adjusted returns in excess of the benchmark, net of fees, over a full market cycle. The Private Real Estate asset class will achieve diversification by investing in funds, both closed-end and evergreen, and co-investments that are complementary in nature regarding fund size, property type, strategic focus, regional footprint and vintage year.

Private Real Estate investments can be committed to, but not limited to, funds, co-investments, separate accounts, joint ventures, partnerships, limited liability companies, private REITS and real estate operating companies (collectively “Private Real Estate Investments”) investing in private real estate strategies. Private Real Estate Investments may be considered throughout the entire capital structure. Notwithstanding investments in Separate Accounts, PSERS will only consider investment structures that provide limited liability

## Section 3 - Investment Information

### Private Real Estate Investments (continued)

to PSERS which limits PSERS' losses to the amount committed.

### Risk Parity Investments

PSERS seeks to diversify assets by obtaining exposure to Risk Parity. Risk Parity plays a strategic role within the Fund by providing exposure to a broad array of asset classes in a risk-balanced manner. Given the different volatilities of the underlying asset classes, portfolio leverage is employed in order to obtain both the desired level of risk balance and the desired target level of risk (standard deviation). Inclusion of this asset class is expected to reduce the Fund's overall risk exposure over long term horizons, because it is designed to be more resistant to market downturns than traditional investment strategies, and it enhances the Fund's diversification due to its risk-balanced portfolio construction. Risk Parity portfolios are designed to perform consistently well, whether the period is characterized by rising economic growth, falling economic growth, rising inflation, or falling inflation. It does less well in periods of broadly rising interest rates and/or broadly rising risk premiums.

Risk Parity assets may be invested in a variety of asset classes, including but not limited to, global equity, global fixed income, global inflation protected fixed income, credit, and commodities. Instruments used may be exchange-traded or over-the-counter and may be physical securities or derivatives.

The Board of Trustees voted to end the Risk Parity program in August 2020, and it was fully liquidated in December 2020.

### Absolute Return Investments

Through investment in Absolute Return strategies, PSERS seeks to reduce the risk and/or enhance the returns of PSERS' overall investment program through investment in a diversified basket of portfolios. The Absolute Return asset class targets managers which provide idiosyncratic returns and portfolios that exhibit low correlation to equities, fixed income, commodities, and other sources of low cost beta over a full market cycle. The Absolute Return asset class targets risk-adjusted returns in excess of the benchmark, net of fees, over a full market cycle. The Absolute Return asset class will achieve diversification by investing in funds, both closed-end and evergreen, and co-investments that are complementary in nature regarding fund size, sector, and strategic focus.

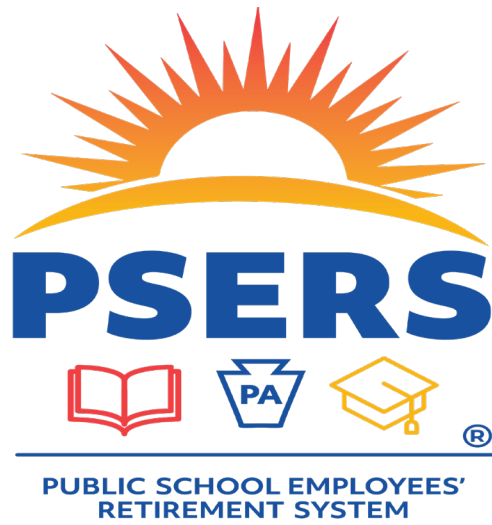
All strategies are eligible for inclusion in the Absolute Return asset class including event driven, relative value, tactical trading, and long/short equity. Investments are diversified by strategy in order to reduce the impact from any one strategy. Absolute Return assets can be committed to, but not limited to, funds, co-investments, separate accounts, joint ventures, partnerships, and limited liability companies (collectively "Absolute Return Investments") investing in Absolute Return strategies. Absolute Return Investments may result in exposure to diverse securities throughout the capital structure. This Policy also allows for structures which may not conform precisely to the previous list but whose intent is to capture absolute return exposure and returns. PSERS will only consider investment structures that provide limited liability to PSERS which limits PSERS' losses to the amount committed.

**PSERS' Asset Class Policies can be found on our website at <https://www.psers.pa.gov/About/Investment/Pages/Guide.aspx>**

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# Performance

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## Section 3 - Investment Information

### Performance

PSERS' general investment consultant 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, 2020, the System generated a total net of fee return of 1.11%. This

return was below the Total Fund Policy Index return of 2.74% by 163 basis points. Annualized total net of fee returns for the three-, five-, and ten-year periods ended June 30, 2020 were 5.62%, 5.64%, and 7.70%, respectively. The ten-year return ended June 30, 2020 exceeded the Total Fund Policy Index returns by 20 basis points, while the three- and five-year returns trailed by 64 and 44 basis points, respectively.

**Table 10.1 provides the System's total time-weighted investment returns for each major asset class and the total portfolio, including, where applicable and available, respective benchmark indexes used by asset class and median performance by asset class:**

Table 10.1	Annualized Total Returns (%)					
	Net of Fees					
	Ended June 30, 2020					
	1 Year	3 Years	5 Years	10 Years	15 Years	20 Years
<b>PSERS Total Fund</b>	<b>1.11</b>	<b>5.62</b>	<b>5.64</b>	<b>7.70</b>	<b>6.11</b>	<b>5.58</b>
Total Fund Policy Index	2.74	6.26	6.08	7.50	5.94	5.06
Median Public Defined Benefit Plan (DBP) Fund Universe (Aon Hewitt Database)	1.91	5.40	5.78	8.10	6.27	5.80
60% Global Equity / 40% Barclays U.S. Aggregate Bond Index	6.02	6.41	6.01	7.36	6.06	5.14
<b>PSERS U.S. Equity Portfolios</b>	<b>3.23</b>	<b>8.27</b>	<b>9.47</b>	<b>13.37</b>	<b>8.35</b>	<b>6.58</b>
U.S. Equity Policy Index (1)	3.25	8.94	9.38	13.35	8.57	6.02
<b>PSERS Non-U.S. Equity Portfolios</b>	<b>1.77</b>	<b>4.94</b>	<b>5.45</b>	<b>8.92</b>	<b>7.88</b>	<b>6.22</b>
Non-U.S. Equity Policy Index (2)	-2.53	2.60	3.67	6.89	5.99	4.66
<b>PSERS Fixed Income Portfolios (10)</b>	<b>7.10</b>	<b>7.16</b>	<b>6.65</b>	<b>6.93</b>	<b>6.78</b>	<b>7.19</b>
Fixed Income Policy Index (3)	8.70	6.38	5.70	5.15	5.64	6.12
<b>PSERS Commodity Portfolios (10)</b>	<b>2.13</b>	<b>6.17</b>	<b>2.65</b>	<b>0.76</b>	<b>N/A</b>	<b>N/A</b>
Commodity Policy Index (4)	-2.68	0.67	-1.84	-2.37	N/A	N/A
<b>PSERS Absolute Return Portfolios</b>	<b>-0.49</b>	<b>2.23</b>	<b>2.38</b>	<b>3.92</b>	<b>N/A</b>	<b>N/A</b>
Absolute Return Policy Index (5)	1.74	4.39	4.34	5.59	N/A	N/A
<b>PSERS Risk Parity Portfolios (11)</b>	<b>0.14</b>	<b>4.96</b>	<b>4.39</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>
Risk Parity Policy Index (6)	10.51	8.66	7.37	N/A	N/A	N/A
<b>PSERS Master Limited Partnership (MLP) Portfolios</b>	<b>-35.43</b>	<b>-13.04</b>	<b>-11.06</b>	<b>3.54</b>	<b>N/A</b>	<b>N/A</b>
Standard & Poor's MLP Index	-30.96	-11.20	-10.14	0.91	N/A	N/A
<b>PSERS Real Estate (7) (10)</b>	<b>2.43</b>	<b>7.78</b>	<b>8.12</b>	<b>10.68</b>	<b>6.02</b>	<b>8.16</b>
Blended Real Estate Index (8)	-0.73	6.17	7.10	9.93	7.98	8.52
<b>PSERS Private Equity (7)</b>	<b>-4.18</b>	<b>7.40</b>	<b>7.97</b>	<b>9.44</b>	<b>10.30</b>	<b>8.21</b>
Burgiss Median Return, Vintage Year Weighted (9)	1.79	9.79	9.76	11.46	8.94	6.47

*Other Footnotes to the Total Portfolio are available on page 94 of PSERS Comprehensive Annual Financial Report.*

### Performance (continued)

The past fiscal year was a positive year for the System with a net of fee return of 1.11%; however, the return trailed the Policy Index by 1.63% for the fiscal year. The following asset classes were additive to absolute returns this past fiscal year:

- Gold, as represented by the Bloomberg Gold Subindex Total Return, was up 25.7%. Many investors flocked to gold, as a safe-haven asset, from the riskier assets.
- U.S. Long Treasuries, as represented by the Bloomberg Barclays U.S. Long Treasury Index, were up 25.4%. Returns in long-term treasuries were driven by falling interest rates.
- U.S. Large Cap Equities, as represented by the S&P 500 Index, were up 7.5%. U.S. large cap technology stocks drove returns as these stocks benefitted from increased demand for technology amidst social distancing measures in response to the COVID-19 pandemic.

Significant detractors from absolute performance this past fiscal year included:

- Commodities, as represented by the Bloomberg Commodity Index Total Return, were down -17.4%. Negative absolute returns were largely driven by the energy sector and falling crude oil prices.
- Public Infrastructure, as represented by FTSE Developed Core Infrastructure 50/50 Index (Net), was down -9.0%.
- Non-U.S. Equities, as represented by the MSCI All Country World ex USA Index (net), returned -4.8%. Non-U.S. stocks underperformed their U.S. counterparts due to slowing global growth and geopolitical uncertainty.

As noted, two of the best performing asset classes this past fiscal year were Gold and U.S. Long Treasuries, which were both up over 25%, while one of the worst performers was Commodities, returning -17.4% for FY 2020. This illustrates the importance of diversification. 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 outcomes. The System diversifies simply because it does not 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. PSERS employs diversification across a wide variety of public and private markets. Exposure to U.S. long treasuries, gold, TIPS, and private real estate aided the System's overall performance during the past fiscal year. Diversification into asset classes such as commodities and public infrastructure resulted in a drag on overall performance.

In analyzing performance, PSERS' Board, general investment consultant and staff pay attention to the Sharpe ratio, which tells an investor what portion of a portfolio's performance is associated with risk taking. The Sharpe ratio measures a portfolio's added value relative to its total risk; the higher a portfolio's Sharpe ratio, the better its risk-adjusted return. PSERS' Sharpe ratio, as calculated by the general investment consultant, was 0.70 for the 5-year period ending June 30, 2020, a top 8th percentile score among public pension plans with assets above \$1 billion.

During the past fiscal year, the equity markets experienced volatility due to the spread of COVID-19 and slowing global growth, with the VIX reaching a peak in March 2020. Despite the headwinds, U.S. stocks proved to be resilient as the top performing region within the global equity market. U.S. stocks were supported by fiscal and monetary policies, as well as more favorable economic data coming out of the U.S. relative to the international markets. In the U.S., Congress passed a \$2.3 trillion economic relief package for workers, families, and small businesses, which pumped liquidity in the capital markets. Non-U.S. stocks lagged their U.S. counterparts due to COVID-19 cases increasing more rapidly and geopolitical uncertainty. In Europe, Brexit uncertainties continued as negotiations between the United Kingdom and European Union stalled.

## Section 3 - Investment Information

### Performance (continued)

In response to the COVID-19 pandemic and slowing global growth, major central banks implemented looser monetary policies. In the U.S., the Federal Reserve lowered the target range for the federal funds rate to 0% to 0.25% in 2020 and projected to keep rates near 0% until at least 2023. Over the fiscal year, the U.S. nominal yield curve shifted downwards as yields fell across all maturities. The 10-year U.S. Treasury yield ended the fiscal year at 0.66%, 134 basis points lower than the beginning of the fiscal year. The sharp decline in interest rates resulted in a strong positive return for long government bonds. Gold also benefitted from falling interest rates and market volatility as investors flocked to the safe-haven asset. Gold tends to perform well as a defensive hedge in weak

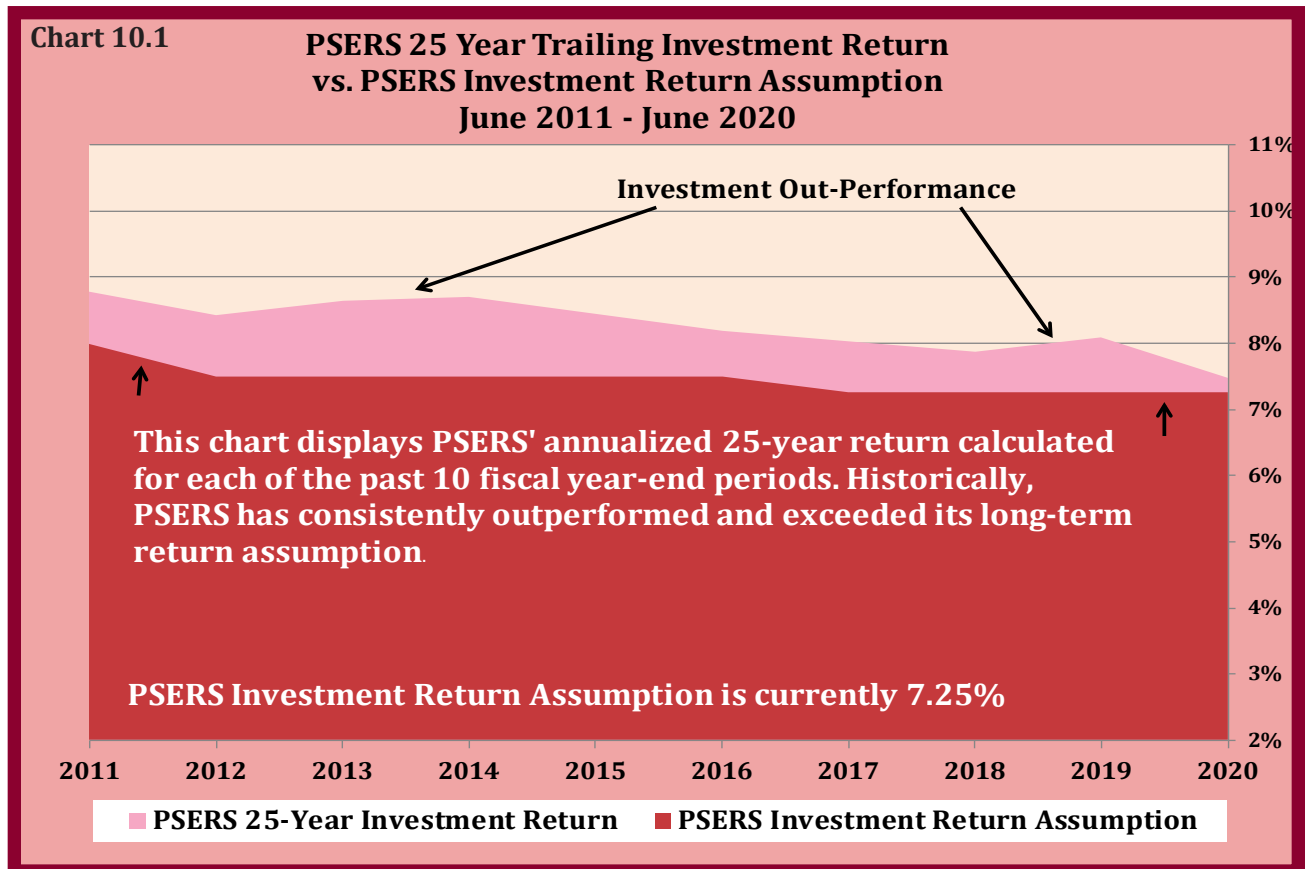
market conditions, which are currently marred by low real interest rates, record highs in government debt, unprecedented levels of central bank intervention in capital markets, and geopolitical risk.

Commodities produced negative returns over the 12 months ended June 30, 2020, largely driven by the energy sector and falling crude oil prices. Oil prices declined sharply after OPEC negotiations collapsed as Saudi Arabia engaged in a pricing war with Russia. Oil prices fell into negative territory for the first time in April 2020 as investors faced storage facility shortages and a decreasing demand, leaving them with no choice but to pay in order to not receive physical barrels. An increase in global

### Long Term Investment Performance Consistently Outperforms

The assets of the System are invested to maximize the returns for the level of risk taken. Chart 10.1 shows PSERS' 25-Year Trailing Investment Return for each of the past 10 fiscal years and Chart 10.2 depicts PSERS' Fiscal Year Investment Return versus PSERS' Investment Return Assumption for the past 10 fiscal years.

As shown in Chart 10.1, the 25-year trailing investment return has exceeded the investment return assumption over the last ten years including the Great Recession.



## Section 3 - Investment Information

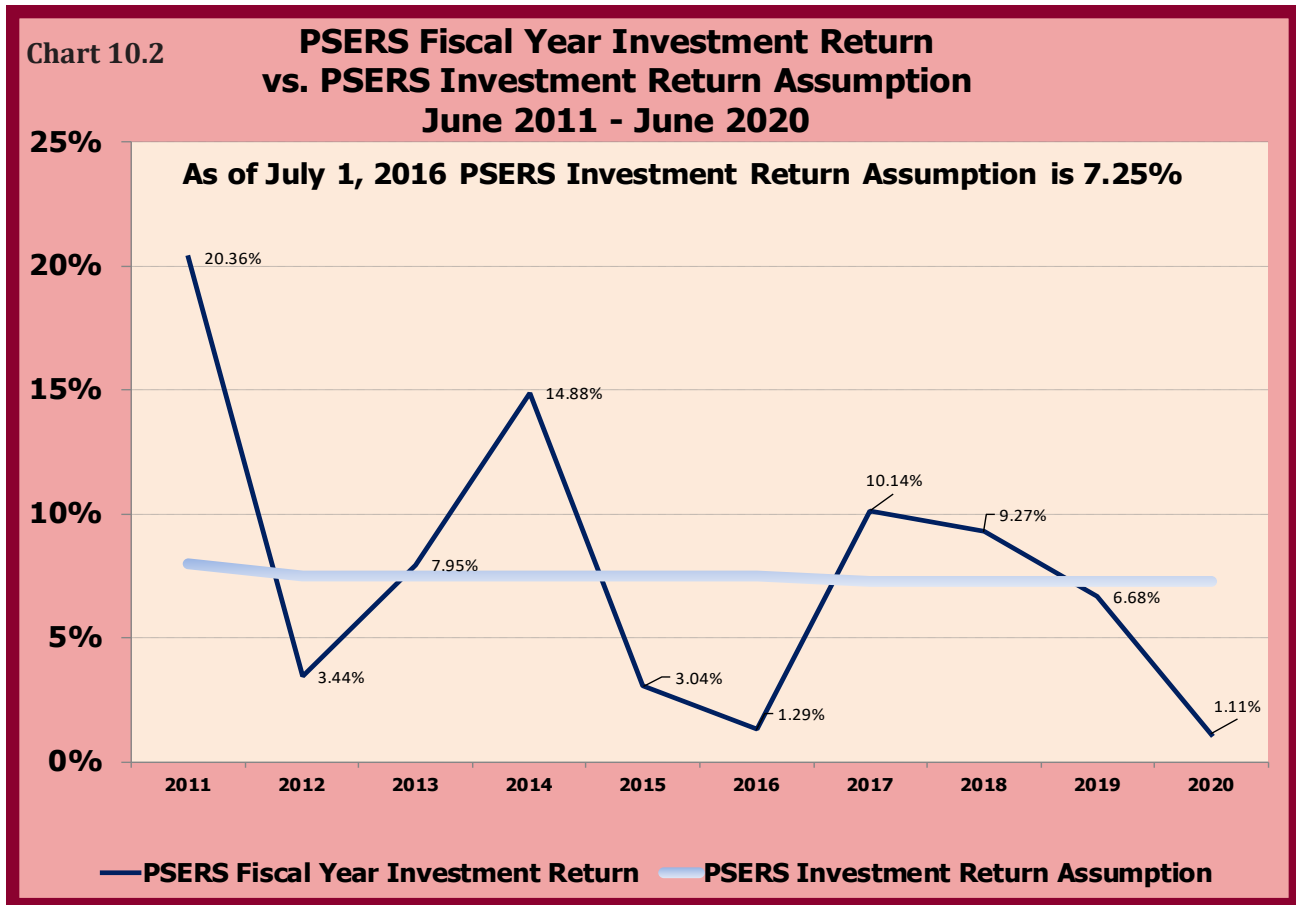
### Performance (continued)

travel and supply cuts created major tailwinds for oil later in the fiscal year, which propelled oil prices into positive territory. The price of WTI crude oil decreased by ~32% over the past 12 months to US\$39/bbl.

While it has been a challenging return environment as evidenced by the System's one-year annualized return, PSERS' ten-year annualized net of fee return was 7.70%, exceeding the actuarial assumed rate of return of 7.25%. With interest rates at historically low levels, the System needs to take prudent risks to achieve its long-term goal of a 7.25% return. An important concept to remember from the last sentence is "long-term." The System has built a diversified allocation to allow it to collect risk premia over the long-term.

In the short term, no one knows what will happen, and the System can experience periods of time of sub-7.25% annual returns. 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 it, such as equities, fixed income, real assets, and absolute return. In any given year, the System expects some assets to perform well, such as Gold and U.S. Long Treasuries did this past fiscal year, and some assets to not perform as well, such as Commodities this past fiscal year. However, over the long term, the System expects each of its asset classes to generate a positive return commensurate with the risks taken. The future is uncertain, but PSERS believes it is well positioned to accomplish its objectives.

As depicted in chart 10.2, PSERS' one-year investment return was below the investment return assumption for fiscal year 2020. Five of the past ten fiscal years, it performed above the assumption.



## Section 3 - Investment Information

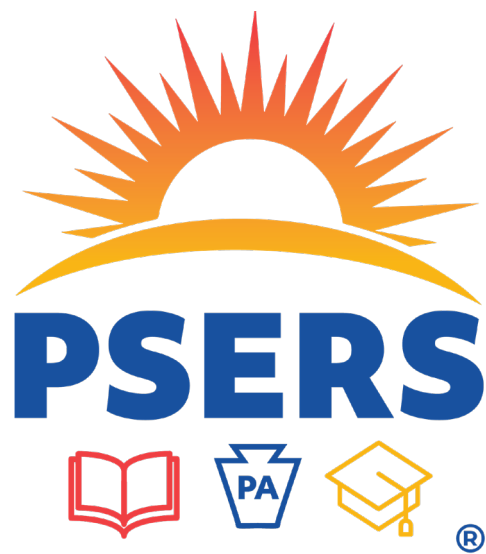
### Performance (continued)

Table 10.2 demonstrates that over the past 20 fiscal years, on average, every dollar PSERS has spent in investment fees and expenses has resulted in investment earnings of \$1.78 above the Policy Benchmark's dollar returns.

<b>Table 10.2 PSERS' Investment Earnings over Policy Benchmark Fiscal Years Ended June 30</b>				
<i><u>Fiscal Year</u></i>	<i><u>Total Investment Expenses *</u></i>	<i><u>PSERS' Net Return over Policy Benchmark (AFTER Payment of all Expenses)</u></i>	<i><u>PSERS' Investment Earnings over Policy Benchmark Net of Total Investment Expenses *</u></i>	<i><u>\$'s of Gross Alpha for every \$1 of Investment Expenses</u></i>
2020	\$515	-1.63%	(\$838)	(\$0.63)
2019	450	-1.00%	(631)	(0.40)
2018	468	1.06%	528	2.13
2017	474	1.78%	814	2.72
2016	416	-1.84%	(883)	(1.12)
2015	455	0.39%	190	1.42
2014	482	0.50%	221	1.46
2013	558	1.27%	586	2.05
2012	481	1.09%	515	2.07
2011	515	1.02%	414	1.80
2010	522	2.20%	890	2.71
2009	478	-5.22%	(3,133)	(5.55)
2008	399	-0.98%	(618)	(0.55)
2007	314	4.36%	2,360	8.52
2006	211	3.26%	1,635	8.75
2005	193	2.36%	1,090	6.65
2004	191	3.51%	1,388	8.27
2003	179	-0.43%	(142)	(0.21)
2002	163	0.57%	319	2.96
2001	<u>144</u>	2.13%	<u>1,200</u>	9.33
<b>Total</b>	<b><u>\$7,608</u></b>		<b><u>\$5,907</u></b>	<b><u>\$1.78</u></b>

\*Dollar amounts in millions.



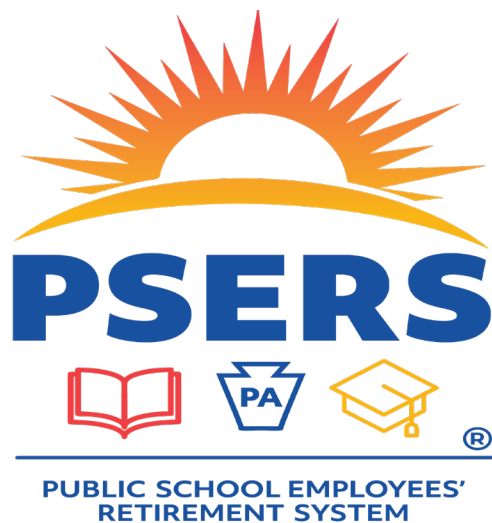


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# Managing Investment Fees, Expenses, and Carried Interest

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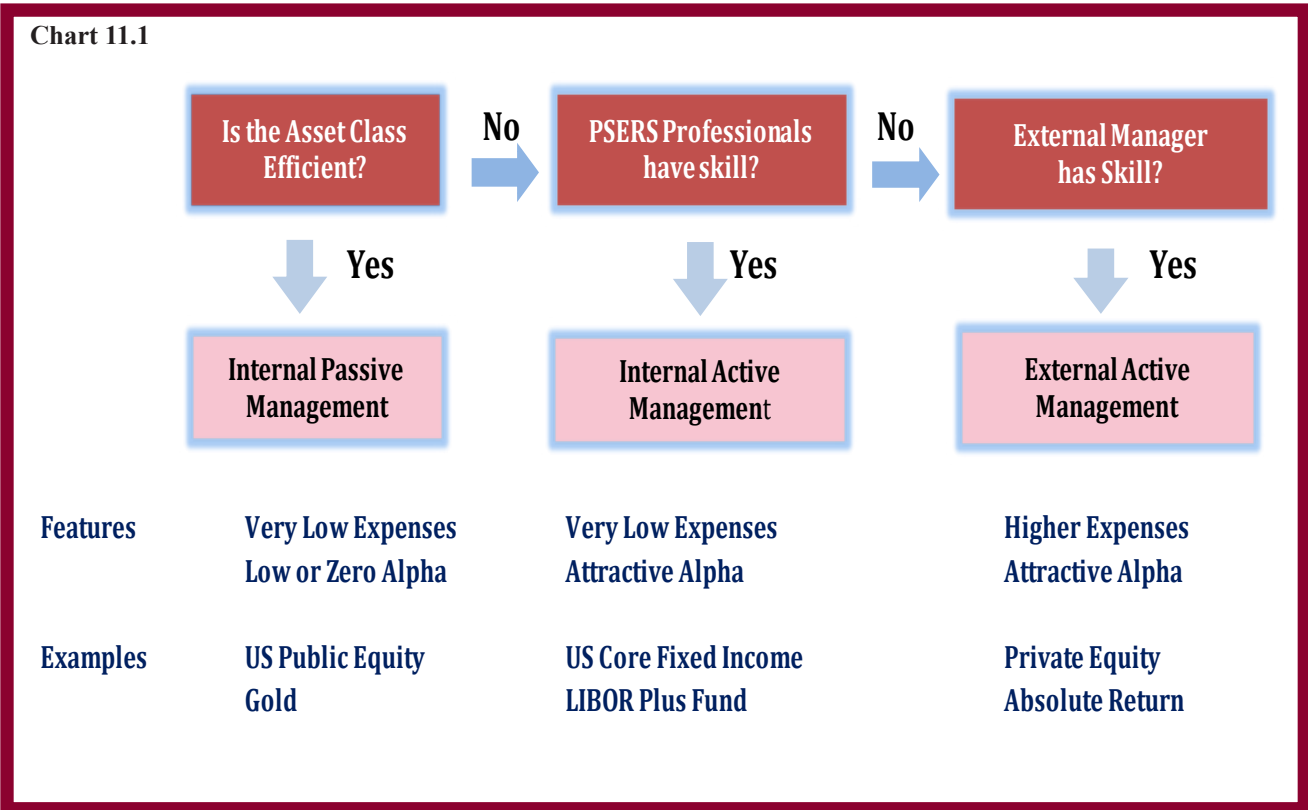


## Section 3 - Investment Information

### Managing Investment Fees, Expenses, and Carried Interest

PSERS' investment professionals annually formulate an Asset Allocation Policy (as more fully described in Tab 9) with input from the general investment consultant, and work on an ongoing basis to implement the Policy through identification of attractive investment strategies and well-qualified investment managers. The Board reviews and approves the long-term asset

allocation targets of the System annually. A fundamental part of this implementation process is making key decisions with regard to use of active or passive strategies implemented by internal professionals or external investment managers, as depicted in Chart 11.1.



Management of investment fees and expenses is integrated into the process of making these key decisions, so analysis of these costs must also occur within this context. If one assumes that, under PSERS' Asset Allocation Policy, all of PSERS' investments could be made in a passive manner resulting in negligible fees and expenses while earning investment returns equal to the Policy Benchmark, then one can also assume that all of PSERS' actual investment fees and expenses are incurred with the goal of earning investment returns that exceed the Policy Benchmark (of course, as the prudent investor realizes, not all investments can be made in passive strategies,

not all passive strategies have low fees, and not all passive strategies deliver the market returns targeted). These assumptions allow PSERS to analyze how much excess investment return above the Policy Benchmark the System has been able to generate over time for the level of fees and expenses actually paid.

PSERS' ability to select a prudent combination of both internal and external managers, and both active and passive strategies, has generated and continues to generate significant excess risk-adjusted, net of fee returns relative to the Policy Benchmarks.

## Section 3 - Investment Information

### Managing Investment Fees, Expenses, and Carried Interest (continued)

Chart 11.2 below demonstrates that over the past 20 fiscal years, PSERS has earned \$6.0 billion in additional investment returns above the Board-approved Policy Index, net of fees.

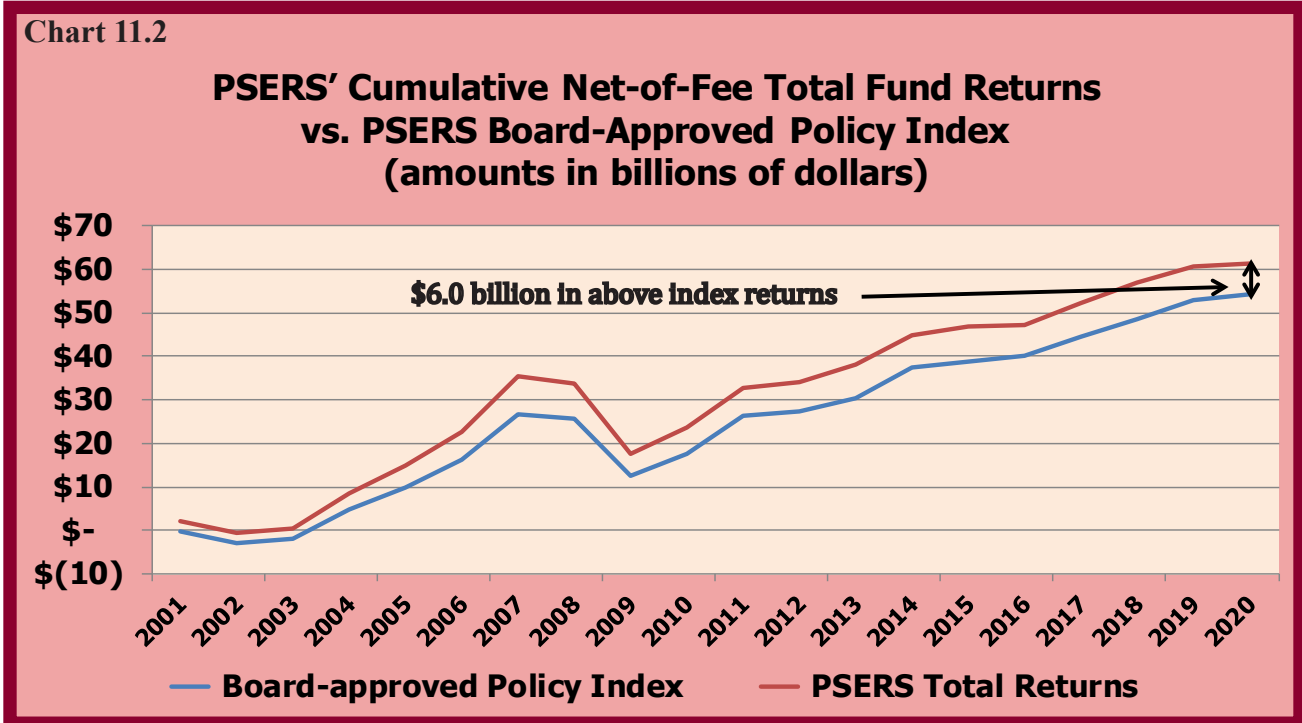
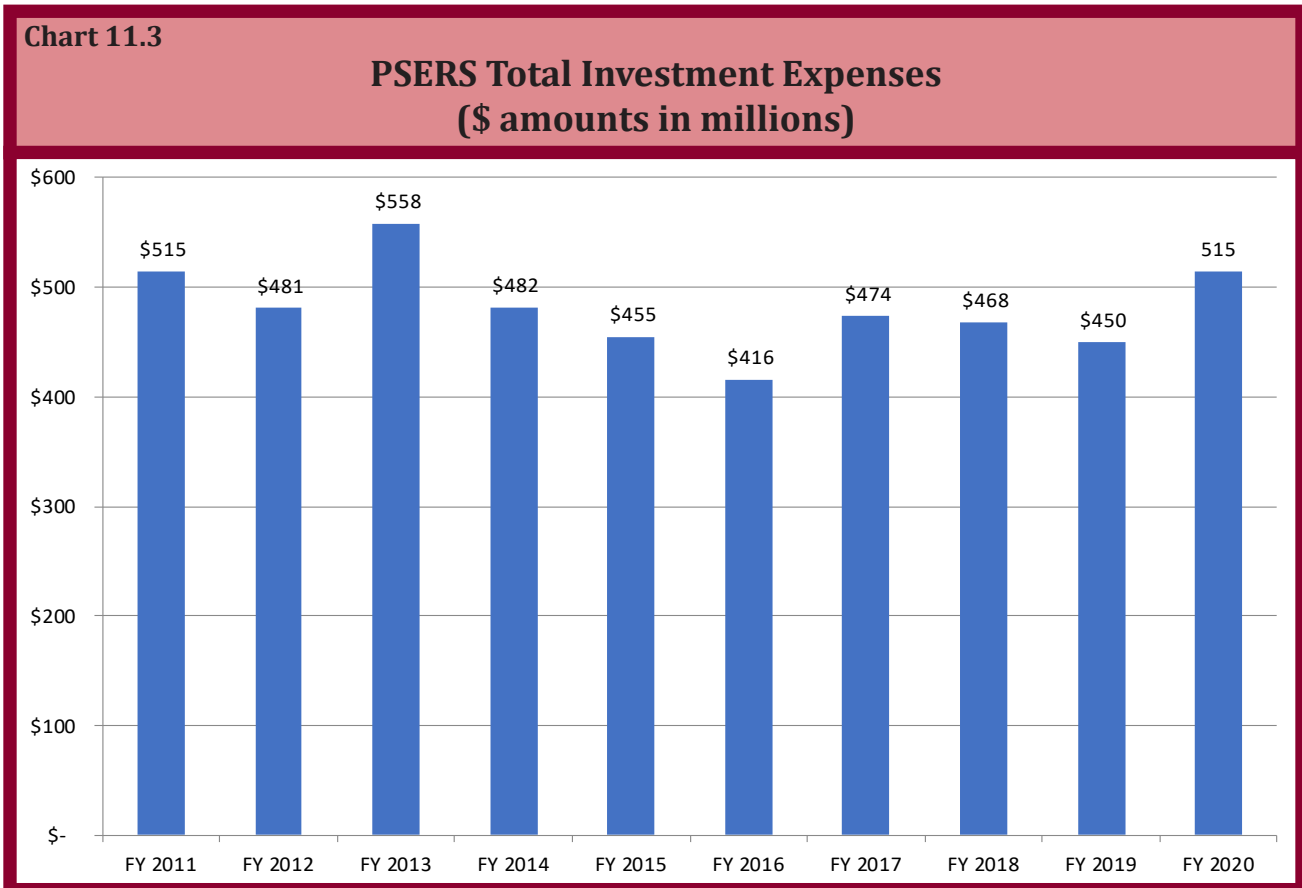


Chart 11.3 shows PSERS Total Investment Expenses over the past ten fiscal years.



## Section 3 - Investment Information

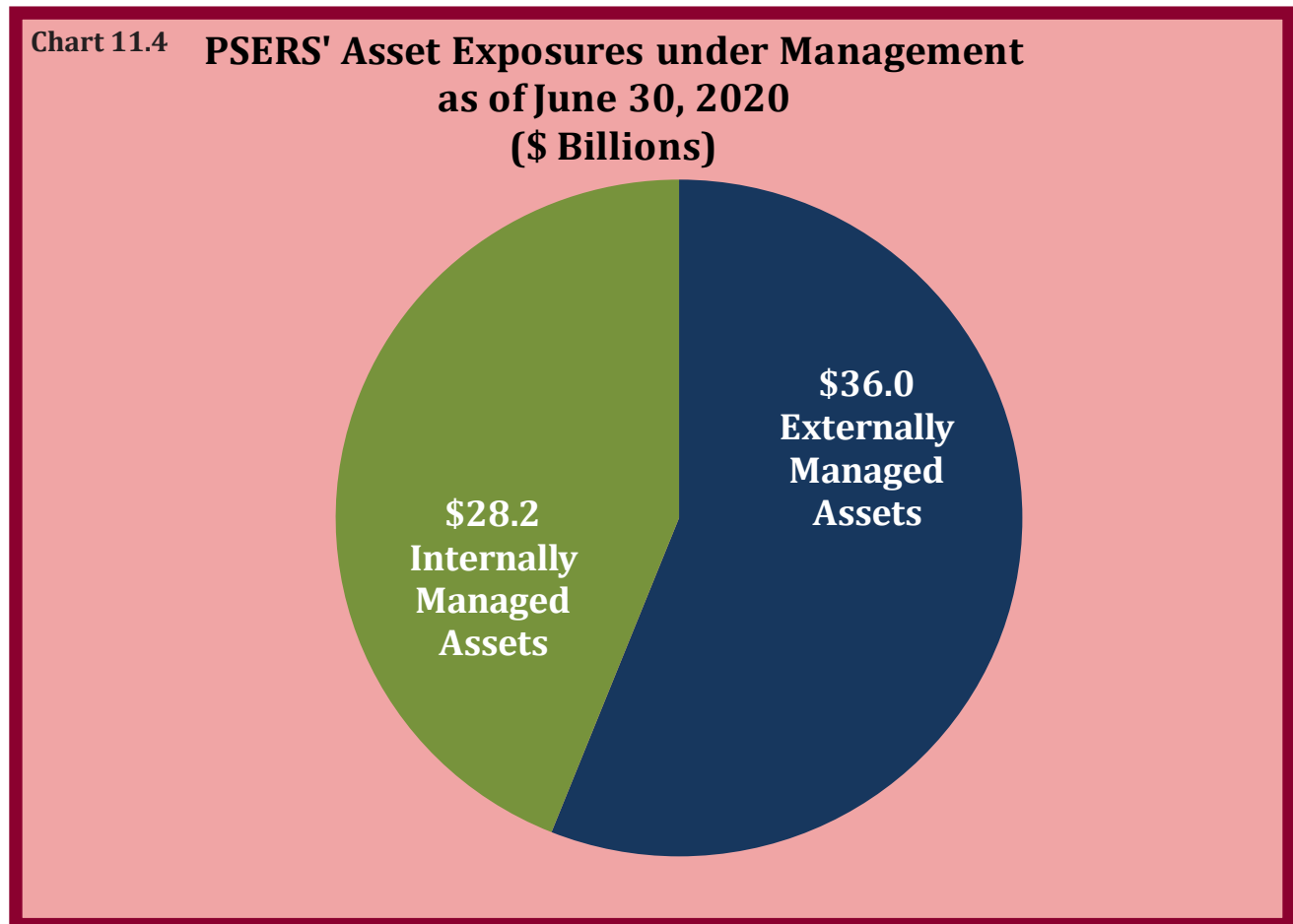
### Key Decision: Internal vs. External Investment Management

PSERS generally prefers to assign investment management responsibilities to internal professionals rather than to external investment management companies when certain conditions are present (see Chart 11.1). For example, it must be clear that internal professionals can achieve risk-adjusted returns that are at least equal to what might be earned by external investment managers in equivalent strategies, and PSERS' investment professionals must simultaneously have the operational capacity to take on the additional work. When assets are assigned to PSERS' professionals, the total costs (e.g., salary and benefits, computers and office supplies) are much lower than using even the largest "very low fee" index mutual fund

companies charge, giving PSERS a significant advantage.

When PSERS does select external investment managers, the decision is based in part on the fees the System has negotiated and in part on the likelihood the manager will meet or exceed the performance expected. Fee negotiations begin with the expectation that the contract with the investment manager will have a "Most Favored Nations" clause guaranteeing that PSERS' fees will be at least as low as other clients with a similar investment amount, and the System then negotiates fees lower from that point wherever possible.

Chart 11.4 displays the distribution of PSERS managed assets as of June 30, 2020.



**Note:** Financing represents a negative \$7.3 billion allocation exposure and is not reflected in Chart 11.4.

## Section 3 - Investment Information

### Key Decision: Internal vs. External Investment Management (continued)

PSERS' investment staff managed 21 portfolios internally, with a total estimated net asset value of over \$28 billion on June 30, 2020, resulting in significant fee savings. For the entire fiscal year, PSERS incurred costs of approximately \$23 million to manage these portfolios internally, as well as oversee all of the external managers, manage the asset allocation, oversee risk, and perform other tasks in managing the overall investment program.

As shown in Table 11.1 below, managing these assets externally would have cost PSERS over \$50 million in additional fees: (\$ amounts in thousands).

**Table 11.1**

<u>Account</u>	<u>Asset Class</u>	<u>Market Value as of 6/30/20*</u>	<u>Estimated Annual Fee %</u>	<u>Estimated Cost to Manage Externally</u>
PSERS - S&P 500 Index	U.S. Equities	\$ 2,087,712	0.01%	\$ 209
PSERS - S&P 400 Index	U.S. Equities	345,712	0.03%	104
PSERS - S&P 600 Index	U.S. Equities	346,657	0.04%	139
Misc. PSERS Equity Accounts	U.S. Equities	565	0.00%	0
	<b>U.S. Equities Total</b>	<b>2,780,646</b>		<b>451</b>
PSERS ACWI ex. U.S. Index	Non U.S. Equities	2,909,881	0.08%	2,328
	<b>Non-U.S. Equities Total</b>	<b>2,909,881</b>		<b>2,328</b>
Private Equity Co-Investments	Private Equity	682,497	1.00%	6,825
PA Investment Fund - Private Equity	Private Equity	55,223	1.00%	552
	<b>Private Equity Total</b>	<b>737,720</b>		<b>7,377</b>
Private Credit Internal	Fixed Income	128,399	1.00%	1,284
PSERS Active Aggregate	Fixed Income	1,459,558	0.21%	3,065
PSERS TIPS Portfolio	Fixed Income	4,204,660	0.13%	5,466
PSERS Long Treasuries	Fixed Income	3,267,203	0.18%	5,881
	<b>Fixed Income Total</b>	<b>9,059,820</b>		<b>15,696</b>
PSERS Infrastructure Index	Infrastructure	1,277,366	0.35%	4,471
Infrastructure Internal	Infrastructure	37,678	1.00%	377
	<b>Infrastructure Total</b>	<b>1,315,044</b>		<b>4,848</b>
PSERS Commodity Beta	Commodities	1,007,678	0.15%	1,512
PSERS Gold Fund	Commodities	2,884,942	0.15%	4,327
Private Commodities Internal	Commodities	17,513	1.00%	175
	<b>Commodities Total</b>	<b>3,910,133</b>		<b>6,014</b>
PSERS Midstream Energy Index	MLP	548,591	0.35%	1,920
	<b>MLP Total</b>	<b>548,591</b>		<b>1,920</b>
PSERS REIT Index	Real Estate	611,303	0.08%	489
Real Estate Co-Investments	Real Estate	85,932	0.49%	417
	<b>Real Estate Total</b>	<b>697,235</b>		<b>906</b>
PSERS Risk Parity	Risk Parity	2,449,286	0.30%	7,348
	<b>Risk Parity Total</b>	<b>2,449,286</b>		<b>7,348</b>
PSERS Cash Management	Cash Management	3,789,063	0.10%	3,789
	<b>Cash Management Total</b>	<b>3,789,063</b>		<b>3,789</b>
	<b>Grand Total</b>	<b>\$ 28,197,419</b>		<b>\$ 50,677</b>

\*Market values include cash and derivatives exposure

## Section 3 - Investment Information

### Key Decision: Active vs. Passive Investment Management

Passive investment strategies form the basis that the Fund uses to attain market exposure in many public market asset classes. The advantage of passive strategies, such as indexing, is that they are generally very inexpensive to implement. If solely using passive strategies, however, performance will be limited to general market performance with little or no potential for excess earnings.

PSERS evaluates and selects active managers on a case by case basis with strong emphasis on understanding the manager's sustainable investment edge. If PSERS' investment professionals and consultants have conviction that the manager's process will generate attractive and potentially uncorrelated risk-adjusted net of fee returns in excess of the most competitive passive benchmarks, the active manager will be considered. Active strategies are also used by PSERS in asset classes where passive strategies are not available, such as Private Equity.

In selecting active managers, PSERS strives to hire managers that meet the following criteria:

- have a unique insight or process;
- have the ability to add long-term excess returns above passive alternatives, net of fees;
- have adequate capacity to execute the strategy;
- add diversification to PSERS' existing investment structure;
- do not exhibit style drift; and
- exhibit a high level of ethical behavior.

The advantage of active strategies is that they endeavor to generate net of fee returns in excess of the passive alternatives, if available, and/or provide diversification benefits which help manage total portfolio risk. The disadvantages of active strategies include being more expensive to implement than passive strategies and the risk that they may underperform passive strategies.

PSERS regularly measures the performance of active strategies relative to alternative passive strategies. In cases where PSERS is not receiving investment earnings from its active strategies in excess of alternative passive strategies, when all investment fees are taken into account, capital is redeployed either to other active strategies or to passive strategies. If PSERS determines that the active managers are not meeting expectations as a group, the Fund would endeavor to exit active strategies altogether and move to a purely passive implementation.

## Section 3 - Investment Information

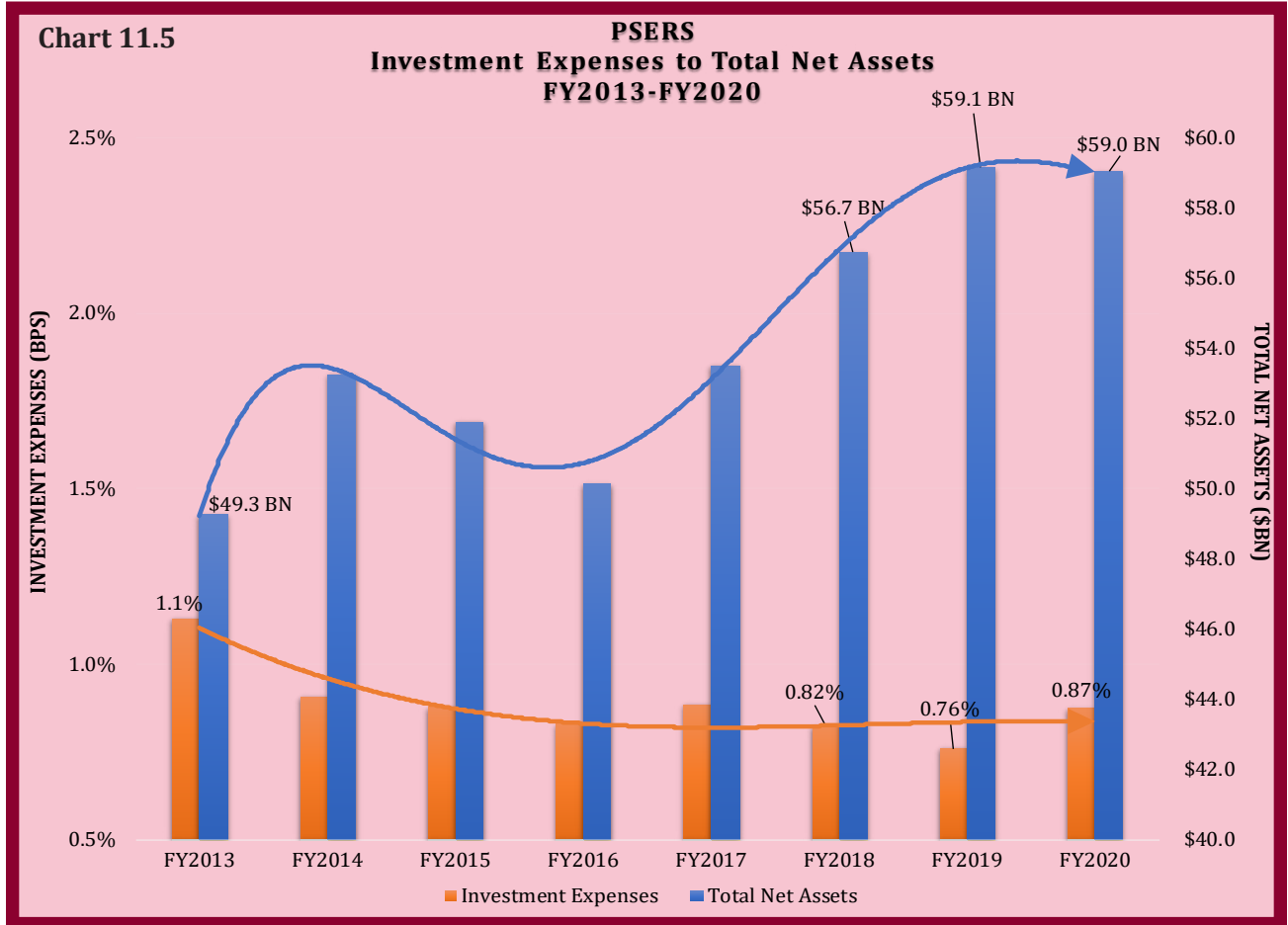
**Table 11.2 summarizes total investment expenses for the fiscal year ended June 30, 2020.** “Total External Management” includes all fees paid to external investment managers as either a base fee or a share of profits earned (performance fee). “Total Internal Management” includes all staff salaries related to PSERS’ Investment Office as well as costs needed to support their work (e.g., vendor services, hardware and software, office supplies). “Total Other Expenses” include fees paid to the custodian bank, consultants, and legal services providers.

<b>Table 11.2 Summary of Investment Advisory Fees</b>					
<b>Fiscal Year Ended June 30, 2020</b>					
<b>(Dollar Amounts in Thousands)</b>					
	<b>Base Fees</b>	<b>Performance Fees</b>	<b>Total Fees</b>	<b>Basis Points</b>	
<b>External Management</b>					
U.S. Equity	\$ 1,600	\$ 277	\$ 1,877	51	
Non U.S. Equity	19,777	51,127	70,904	183	
Fixed Income	92,585	1,471	94,056	88	
Real Estate	49,808	-	49,808	100	
Alternative Investments	99,640	-	99,640	133	
Absolute Return	87,784	52,219	140,003	230	
Commodities	7,019	-	7,019	128	
Master Limited Partnerships	4,016	-	4,016	37	
Infrastructure	3,921	-	3,921	120	
Risk Parity	15,277	690	15,967	71	
Defined Contribution	30	-	30	38	
<b>Total External Management</b>	<b>\$ 381,457</b>	<b>\$ 105,784</b>	<b>\$ 487,241</b>	<b>129</b>	
<b>Total Internal Management</b>			<b>22,891</b>	<b>9</b>	
<b>Total Investment Management</b>			<b>\$ 510,132</b>	<b>79</b>	
Custodian Fees			\$ 2,481		
Consultant & Legal Fees			2,649		
<b>Total Other Expenses</b>			<b>\$ 5,130</b>		
<b>Total Investment Expenses</b>			<b>\$ 515,262</b>	<b>80</b>	



## Section 3 - Investment Information

Increasing the number and size of portfolios managed internally has been a core initiative in reducing PSERS' Total Investment Expenses in recent years. **As Chart 11.5 illustrates, Total External Management fees have decreased from \$558 million in Fiscal Year 2013 to \$515 million in Fiscal Year 2020, while Total Net Assets have increased from \$49.3 billion to \$59.0 billion.** It is worth noting that these decreases have occurred while Total Internal Management and Total Other Expenses have remained flat.



## Section 3 - Investment Information

External management fees are treated as a reduction of the investment revenue of the Fund rather than as a budgeted administrative expense.

**Table 11.3**

### Investment Fees by Manager Fiscal Year ended June 30, 2020 (Dollar amounts in Thousands)

<u>Manager</u>	<u>Base Fees</u>	<u>Performance Fees</u>	<u>Total</u>
<b><u>U.S. Equity</u></b>			
Radcliffe Capital Management LP	\$ 1,600	\$ 277	\$ 1,877
<b>Total - U.S. Equity</b>	<b>\$ 1,600</b>	<b>\$ 277</b>	<b>\$ 1,877</b>
<b><u>Non - U.S. Equity</u></b>			
Acadian Asset Management, LLC	\$ 1,062	\$ -	\$ 1,062
Baillie Gifford Overseas Ltd.	2,182	9,247	11,428
BlackRock Financial Management, Inc.	521	-	521
BlackRock Institutional Trust Company, N.A.	1,324	(1,274)	50
Cederberg Greater China EQ FD	-	12,536	12,536
ECM Feeder Fund 2 LP	(494)	-	(494)
Insight Investment International Limited	561	-	561
Marathon Asset Management Limited	2,669	-	2,669
Oberweis Asset Management, Inc.	1,721	-	1,721
QS Batterymarch Financial Management, Inc.	652	-	652
Steadview Capital Partners LP	2,331	(503)	1,828
The Children's Investment Fund LP	3,212	7,395	10,607
Wasatch Advisors, Inc.	4,037	23,727	27,763
<b>Total - Non - U.S. Equity</b>	<b>\$ 19,777</b>	<b>\$ 51,127</b>	<b>\$ 70,904</b>
<b><u>Fixed Income</u></b>			
Apollo European Principal Finance Fund II (Dollar A), L.P.	\$ 321	\$ -	\$ 321
Apollo European Principal Finance Fund III (Dollar A), LP	2,764	-	2,764
Avenue Energy Opportunities Fund, L.P.	1,715	-	1,715
Avenue Energy Opportunities Fund II, L.P.	850	-	850
Avenue Europe Special Situations Fund III (U.S.), L.P.	1,800	-	1,800
Bain Capital Credit Managed Account (PSERS), L.P.	1,756	-	1,756
Bain Capital Distressed and Special Situations 2013 (A), L.P.	1,440	-	1,440
Bain Capital Distressed and Special Situations 2016 (A), L.P.	2,716	-	2,716
Bain Capital Distressed and Special Situations 2019 (A), L.P.	174	-	174
Bain Capital Middle Market Credit 2010, L.P.	152	-	152
Bain Capital Middle Market Credit 2014, LP	893	-	893
BlackRock Financial Management, Inc.	2,025	-	2,025
Bridgewater Associates, LP	23,852	-	23,852
Brigade Capital Management, LLC	4,424	-	4,424
Capula Investment Management, LP	525	717	1,242

( ) Represents reversal of amount accrued in prior fiscal year.

## Section 3 - Investment Information

**Table 11.3**

### Investment Fees by Manager Fiscal Year ended June 30, 2020 (Dollar amounts in Thousands)

<u>Manager</u>	<u>Base Fees</u>	<u>Performance Fees</u>	<u>Total</u>
<b>Fixed Income (continued)</b>			
Carlyle Energy Mezzanine Opportunities Fund II, L.P.	\$ 1,426	\$ -	\$ 1,426
Carlyle Energy Mezzanine Opportunities Fund-Q, L.P.	888	-	888
Cerberus Levered Loan Opportunities Fund II, L.P.	557	-	557
Cerberus PSERS Levered Loan Opportunities Fund, L.P.	8,019	-	8,019
Clearlake Opportunities Partners (P) II, L.P.	837	-	837
Galton Onshore Mortgage Recovery Fund III, L.P.	23	-	23
Galton Onshore Mortgage Recovery Fund IV, L.P.	963	-	963
Hayfin SOF II USD Co-Invest, L.P.	93	-	93
Hayfin SOF II USD, L.P.	2,195	-	2,195
HayFin Special Opportunities Credit Fund (Parallel), L.P.	470	-	470
ICG Europe Fund V, L.P.	621	-	621
ICG Europe Fund VI, L.P.	1,035	-	1,035
ICG Europe Fund VII Feeder SCSp	2,270	-	2,270
Insight Investment International Limited	83	-	83
International Infrastructure Finance Company Fund, L.P.	898	-	898
Latitude Management Real Estate Capital IV, Inc.	819	-	819
LBC Credit Partners III, L.P.	975	-	975
LBC-P Credit Fund, L.P.	6,075	-	6,075
Mariner Investment Group, LLC	1,273	42	1,314
Pacific Investment Management Company (PIMCO)	530	-	530
Park Square - PSERS Credit Opportunities Fund, L.P.	2,223	-	2,223
Penn Mutual Asset Management, LLC	157	45	202
PIMCO BRAVO Fund III Onshore Feeder, LP	1,726	-	1,726
Pugh Capital Management, Inc.	47	-	47
PSERS TAO Partners Parallel Fund, L.P.	3,710	-	3,710
Radcliffe Capital Management, L.P.	693	667	1,359
Sankaty Credit Opportunities IV, L.P.	382	-	382
SEI Investments Company	752	-	752
SSG Capital Partners V Sidecar, L.P.	29	-	29
SSG Capital Partners V, L.P.	1,097	-	1,097
Templeton Investment Counsel, LLC	1,899	-	1,899
TOP NPL (A), L.P.	16	-	16
TPG Opportunities Partners II (A), L.P.	70	-	70
TPG Opportunities Partners III (A), L.P.	804	-	804
TSSP Opportunities Partners IV (A), L.P.	2,252	-	2,252
Varde Scratch and Dent Feeder I-A, L.P., The	729	-	729
Varde Scratch and Dent Feeder, L.P., The	544	-	544
<b>Total - Fixed Income</b>	<b>\$ 92,585</b>	<b>\$ 1,471</b>	<b>\$ 94,056</b>

## Section 3 - Investment Information

**Table 11.3**

### Investment Fees by Manager Fiscal Year ended June 30, 2020 (Dollar amounts in Thousands)

<u>Manager</u>	<u>Base Fees</u>	<u>Profit Share</u>	<u>Total</u>
<b><u>Real Estate-Direct Ownership</u></b>			
Bell Partners Inc.	\$ 969	\$ -	\$ 969
Charter Oak Advisors, Inc.	680	-	680
GF Management, Inc.	131	-	131
L & B Realty Advisors, L.L.P.	149	-	149
<b>Subtotal - Real Estate-Direct Ownership</b>	<b>\$ 1,930</b>	<b>\$ -</b>	<b>\$ 1,930</b>
<b><u>Real Estate-Partnerships/Funds</u></b>			
AG Core Plus Realty Fund III, L.P.	\$ 193	\$ -	\$ 193
AG Core Plus Realty Fund IV, L.P.	1,258	-	1,258
AG Europe Realty Fund II, L.P.	1,044	-	1,044
AG Realty Value Fund X, L.P.	1,006	-	1,006
Almanac Realty Securities V, L.P.	16	-	16
Almanac Realty Securities VI, L.P.	164	-	164
Almanac Realty Securities VII, L.P.	563	-	563
Almanac Realty Securities VIII, L.P.	1,878	-	1,878
Ares European Real Estate Fund IV, L.P.	868	-	868
Ares U.S. Real Estate Fund VIII, L.P.	643	-	643
Ares U.S. Real Estate Fund IX, L.P.	887	-	887
ARS VII (Sidecar V), L.P.	78	-	78
ARS VIII (SC V), L.P.	33	-	33
Avenue Real Estate Fund (Parallel) L.P.	661	-	661
Bell Institutional Fund V, L.P.	857	-	857
Bell Institutional Fund VI, L.P.	848	-	848
Bell Institutional Fund VII, L.P.	846	-	846
Blackstone Real Estate Debt Strategies II, L.P.	40	-	40
Blackstone Real Estate Debt Strategies III, L.P.	1,066	-	1,066
Blackstone Real Estate Partners Europe III, L.P.	597	-	597
Blackstone Real Estate Partners Europe IV, L.P.	482	-	482
Blackstone Real Estate Partners VII, L.P.	1,371	-	1,371
Blackstone Real Estate Partners VIII, L.P.	2,891	-	2,891
Brookfield Strategic Real Estate Partners, L.P.	846	-	846
Brookfield Strategic Real Estate Partners II, L.P.	2,306	-	2,306
Brookfield Strategic Real Estate Partners III-A, L.P.	2,599	-	2,599
Cabot Industrial Core Fund, L.P.	1,365	-	1,365
Cabot Industrial Core Fund II, L.P.	307	-	307
Cabot Industrial Value Fund V, L.P.	1,500	-	1,500
Carlyle Realty Partners IV, L.P.	15	-	15
Carlyle Realty Partners V, L.P.	144	-	144
Carlyle Realty Partners VI, L.P.	110	-	110

## Section 3 - Investment Information

**Table 11.3**

### Investment Fees by Manager Fiscal Year ended June 30, 2020 (Dollar amounts in Thousands)

<u>Manager</u>	<u>Base Fees</u>	<u>Profit Share</u>	<u>Total</u>
<b><u>Real Estate-Partnerships/Funds (continued)</u></b>			
Carlyle Realty Partners VII, L.P.	\$ 459	\$ -	\$ 459
Carlyle Realty Partners VIII, L.P.	1,703	-	1,703
DRA Growth and Income Fund IX, LLC	2,024	-	2,024
DRA Growth and Income Fund VII, L.P.	507	-	507
DRA Growth and Income Fund VIII, LLC	1,396	-	1,396
DRA Fund IX Industrial Co-Investment LLC	104	-	104
DRA Growth and Income Fund VIII Co-Investment I, LLC	145	-	145
DRA Growth and Income Master Fund X, LLC	205	-	205
Exeter Core Industrial Club Fund II, L.P.	743	-	743
Exeter Industrial Core Fund III, L.P.	37	-	37
Exeter Industrial Value Fund II, L.P.	0	-	0
Exeter Industrial Value Fund III, L.P.	206	-	206
Exeter Industrial Value Fund IV, L.P.	1,060	-	1,060
Insight Investment International Limited	46	-	46
Latitude Management Real Estate Capital III, Inc.	876	-	876
LEM Multifamily Fund V, L.P.	1,000	-	1,000
LEM Multifamily Senior Equity Fund IV, L.P.	838	-	838
LEM RE High Yield Debt & Preferred Equity Fund III, L.P.	33	-	33
Pramerica Real Estate Capital VI, L.P.	688	-	688
RCG Longview Debt Fund V, L.P.	75	-	75
RCG Longview Debt Fund VI, L.P.	1,127	-	1,127
RCG Longview Equity Fund, L.P.	47	-	47
Security Capital Preferred Growth (Public)	1,252	-	1,252
Senior Housing Partnership Fund IV, L.P.	274	-	274
Senior Housing Partnership Fund V, L.P.	715	-	715
Stockbridge Real Estate Fund II, LP	130	-	130
Stockbridge Real Estate Fund III, LP	299	-	299
Stockbridge Real Estate Fund, L.P.	3,257	-	3,257
Strategic Partners Fund IV RE, L.P.	27	-	27
UBS (US) Trumbull Property Fund, L.P.	303	-	303
<b>Subtotal - Real Estate-Partnerships/Funds</b>	<b>\$ 47,058</b>	<b>\$ -</b>	<b>\$ 47,058</b>
<b>Real Estate-Farmland</b>			
Prudential Agricultural Group	820	-	820
<b>Subtotal - Real Estate-Farmland</b>	<b>\$ 820</b>	<b>\$ -</b>	<b>\$ 820</b>
<b>Total Real Estate</b>	<b>\$ 49,808</b>	<b>\$ -</b>	<b>\$ 49,808</b>

## Section 3 - Investment Information

**Table 11.3**

### Investment Fees by Manager Fiscal Year ended June 30, 2020 (Dollar amounts in Thousands)

<u>Manager</u>	<u>Base Fees</u>	<u>Profit Share</u>	<u>Total</u>
<b>Private Equity</b>			
Actis Global 4, L.P.	\$ 1,330	\$ -	\$ 1,330
Apax Digital, L.P.	1,758	-	1,758
Bain Capital Asia Fund II, L.P.	640	-	640
Bain Capital Asia Fund III-A, L.P.	2,600	-	2,600
Bain Capital Asia Fund IV-B, L.P.	1,375	-	1,375
Bain Capital Fund XI-A, L.P.	449	-	449
Bain Capital Fund XII-A, L.P.	1,875	-	1,875
Baring Asia Private Equity Fund IV, L.P.	619	-	619
Baring Asia Private Equity Fund V, L.P.	3,050	-	3,050
Baring Asia Private Equity Fund VI, L.P.	1,212	-	1,212
Blue Point Capital Partners II (B), L.P.	76	-	76
Blue Point Capital Partners III (B), L.P.	519	-	519
Blue Point Capital Partners IV, L.P.	885	-	885
Bridgepoint Development Capital III, L.P.	1,477	-	1,477
Bridgepoint Europe IV, L.P.	580	-	580
Bridgepoint Europe V, L.P.	1,369	-	1,369
Bridgepoint Europe VI, L.P.	1,520	-	1,520
Capital International Private Equity Fund VI, L.P.	550	-	550
Catterton Growth Partners II, L.P.	1,075	-	1,075
Catterton Growth Partners III, L.P.	1,187	-	1,187
Catterton Growth Partners, L.P.	462	-	462
Catterton Partners VI, L.P.	477	-	477
Catterton Partners VII, L.P.	1,409	-	1,409
Catterton VIII, L.P.	1,227	-	1,227
Cinven Fund (Fifth), L.P.	586	-	586
Cinven Fund (Sixth), L.P.	1,156	-	1,156
Coller International Partners VI, L.P.	791	-	791
Coller International Partners VII, L.P.	1,250	-	1,250
Crestview Partners II, L.P.	872	-	872
Crestview Partners III, L.P.	1,290	-	1,290
Crestview Partners, L.P.	250	-	250
DCPF VI Oil and Gas Co-Investment Fund, L.P.	75	-	75
Denham Commodity Partners Fund VI, L.P.	723	-	723
Energy & Minerals Group Fund III, L.P.	1,058	-	1,058
Equistone Partners Europe Fund V E, L.P.	932	-	932
Equistone Partners Europe Fund VI E, SCSp	1,473	-	1,473
First Reserve Fund XII, L.P.	32	-	32
GoldPoint Partners Co-Investment V, L.P.	343	-	343
Hahn & Company III L.P.	169	-	169
Hahn & Company III-S L.P.	86	-	86

## Section 3 - Investment Information

**Table 11.3**

### Investment Fees by Manager Fiscal Year ended June 30, 2020 (Dollar amounts in Thousands)

<b>Manager</b>	<b>Base Fees</b>	<b>Profit Share</b>	<b>Total</b>
<b>Private Equity (continued)</b>			
HgCapital 7 A, L.P.	\$ 985	\$ -	\$ 985
HgCapital 8 D, L.P.	2,057	-	2,057
HGGC Fund II, L.P.	1,141	-	1,141
HGGC Fund III, L.P.	1,032	-	1,032
Incline Elevate Fund, L.P.	745	-	745
Incline Equity Partners IV, L.P.	1,109	-	1,109
K4 Private Investors, L.P.	1,952	-	1,952
Landmark Equity Partners XIII, L.P.	91	-	91
Landmark Equity Partners XIV, L.P.	298	-	298
Milestone Partners III, L.P.	182	-	182
Milestone Partners IV, L.P.	315	-	315
New Mountain Partners IV, L.P.	442	-	442
New Mountain Partners V, L.P.	2,043	-	2,043
New York Life Capital Partners IV-A, L.P.	38	-	38
NGP Natural Resources X, L.P.	593	-	593
NGP Natural Resources XI, L.P.	1,207	-	1,207
North Haven PE Asia Fund IV, L.P. (Morgan Stanley)	1,135	-	1,135
Odyssey Investment Partners Fund V, L.P.	1,999	-	1,999
Orchid Asia V, L.P.	158	-	158
Orchid Asia VI, L.P.	1,001	-	1,001
Orchid Asia VII, L.P.	1,507	-	1,507
PAI Europe V, L.P.	100	-	100
PAI Europe VI, L.P.	1,160	-	1,160
PAI Europe VII, L.P.	1,099	-	1,099
Palladium Equity Partners IV, L.P.	503	-	503
Partners Group Secondary 2008, L.P.	372	-	372
Partners Group Secondary 2011 (USD), L.P. Inc.	962	-	962
Partners Group Secondary 2015 (USD) A, L.P.	1,250	-	1,250
Platinum Equity Capital Partners V, L.P.	247	-	247
Platinum Equity Small Cap Fund, L.P.	765	-	765
Portfolio Advisors Secondary Fund III, L.P.	1,349	-	1,349
Strategic Partners Fund IV, L.P.	65	-	65
Strategic Partners Fund V, L.P.	253	-	253
Strategic Partners Fund VI, L.P.	530	-	530
Strategic Partners Fund VII, L.P.	1,250	-	1,250
Trilantic Capital Partners IV L.P.	19	-	19
Trilantic Capital Partners V (North America), L.P.	564	-	564
Trilantic Capital Partners VI (North America), L.P.	2,261	-	2,261
Webster Capital IV, L.P.	348	-	348
<b>Subtotal - Private Equity</b>	<b>\$ 71,932</b>	<b>\$ -</b>	<b>\$ 71,932</b>

## Section 3 - Investment Information

**Table 11.3**

### Investment Fees by Manager Fiscal Year ended June 30, 2020 (Dollar amounts in Thousands)

<u>Manager</u>	<u>Base Fees</u>	<u>Profit Share</u>	<u>Total</u>
<b><u>Private Debt</u></b>			
Apollo Investment Fund IX, L.P.	\$ 2,265	\$ -	\$ 2,265
Apollo Investment Fund VIII, L.P.	761	-	761
Cerberus Institutional Partners V, L.P.	624	-	624
Cerberus Institutional Partners VI, L.P.	2,086	-	2,086
Clearlake Capital Partners IV, L.P.	687	-	687
Clearlake Capital Partners V, L.P.	380	-	380
Gold Hill Venture Lending 03-A, L.P.	35	-	35
Searchlight Capital II, L.P.	921	-	921
Searchlight Capital III, L.P.	1,000	-	1,000
Venor Special Situations Fund II, L.P.	691	-	691
Versa Capital Fund II, L.P.	1,446	-	1,446
Versa Capital Fund III, L.P.	884	-	884
<b>Subtotal - Private Debt</b>	<b>\$ 11,779</b>	<b>\$ -</b>	<b>\$ 11,779</b>
<b><u>Venture Capital</u></b>			
Aisling Capital IV, L.P.	\$ 302	\$ -	\$ 302
Insight Investment International Limited	51	-	51
Insight Partners XI, L.P.	693	-	693
Insight Venture Partners X, L.P.	1,371	-	1,371
LLR Equity Partners III, L.P.	605	-	605
LLR Equity Partners IV, L.P.	2,091	-	2,091
LLR Equity Partners V, L.P.	3,475	-	3,475
Psilos Group Partners III-C, L.P.	15	-	15
Sante Health Ventures III	1,191	-	1,191
SCP Private Equity Partners II, L.P.	141	-	141
Starvest Partners II (Parallel), L.P.	230	-	230
Strategic Partners Fund IV VC, L.P.	125	-	125
Summit Partners Growth Equity Fund VIII-A, L.P.	1,111	-	1,111
Summit Partners Growth Equity Fund X-A, L.P.	429	-	429
Summit Partners Venture Capital Fund III-A, L.P.	200	-	200
Summit Partners Venture Capital Fund IV-A, L.P.	800	-	800
Tenaya Capital VI, L.P.	713	-	713
Tenaya Capital VII, L.P.	2,000	-	2,000
Tenaya Capital V-P, L.P.	387	-	387
<b>Subtotal - Venture Capital</b>	<b>\$ 15,929</b>	<b>\$ -</b>	<b>\$ 15,929</b>
<b>Total Alternative Investments</b>	<b>\$ 99,640</b>	<b>\$ -</b>	<b>\$ 99,640</b>



## Section 3 - Investment Information

**Table 11.3**

### Investment Fees by Manager Fiscal Year ended June 30, 2020 (Dollar amounts in Thousands)

<u>Manager</u>	<u>Base Fees</u>	<u>Performance Fees</u>	<u>Total</u>
<b><u>Absolute Return</u></b>			
Aeolus Capital Management Ltd.	\$ 7,624	\$ 4,705	\$ 12,328
AKAZ Offshore Fund LTD	2,609	20,951	23,560
Bridgewater Associates, Inc.	23,963	-	23,963
Brigade Capital Management	3,139	(129)	3,011
Capula Investment Management, LLP	12,052	11,518	23,570
Caspian Capital, LP	2,566	762	3,328
Falko Regional Aircraft Opportunities Fund II L.P.	1,032	-	1,032
Garda Capital Partners, LP	7,138	18,862	26,000
HS Group Sponsor Fund II Ltd.	889	-	889
Independence Reinsurance Partners GP, LLC	2,818	1,061	3,879
Nephila Capital Ltd.	2,509	-	2,509
Nimbus Weather Fund	1,986	-	1,986
Oceanwood Opportunities Fund	1,262	1,158	2,420
OWS Credit Opportunity Offshore Fund III, Ltd.	4,573	(7,011)	(2,438)
Pacific Investment Management Company (PIMCO)	7,492	-	7,492
Perry Partners, L.P.	123	-	123
Sciens Aviation Special Opportunities Investment Fund II, L.P.	35	-	35
Sciens Aviation Special Opportunities Investment Fund III, L.P.	1,578	-	1,578
Sciens Aviation Special Opportunities Investment Fund IV, L.P.	1,425	-	1,425
Sciens Aviation Special Opportunities Investment Fund V, L.P.	249	1	249
Two Sigma Risk Premia Enhanced Fund	1,058	343	1,401
Venor Capital Offshore	1,664	-	1,664
<b>Total - Absolute Return</b>	<b>\$ 87,784</b>	<b>\$ 52,219</b>	<b>\$ 140,003</b>
<b><u>Commodities</u></b>			
Denham Mining Fund, L.P.	\$ 888	\$ -	\$ 888
Gresham Investment Management, LLC	2,998	-	2,998
NGP Natural Resources XII, L.P.	1,040	-	1,040
Wellington Management Company, LLP	2,094	-	2,094
<b>Total - Commodities</b>	<b>\$ 7,019</b>	<b>\$ -</b>	<b>\$ 7,019</b>
<b><u>Master Limited Partnerships</u></b>			
Harvest Fund Advisors, LLC	\$ 1,882	\$ -	\$ 1,882
Salient Capital Advisors, LLC	1,548	-	1,548
Stein Roe Investment Counsel D/B/A Atlantic Trust	586	-	586
<b>Total - Master Limited Partnerships</b>	<b>\$ 4,016</b>	<b>\$ -</b>	<b>\$ 4,016</b>

( ) Represents reversal of amount accrued in prior fiscal year.

## Section 3 - Investment Information

Table 11.3

### Investment Fees by Manager Fiscal Year ended June 30, 2021 (Dollar amounts in Thousands)

<u>Manager</u>	<u>Base Fees</u>	<u>Performance Fees</u>	<u>Total</u>
<b><u>Diversified Infrastructure</u></b>			
Blackstone Infrastructure Partners L.P.	\$ 1,700	\$ -	\$ 1,700
Insight Investment International Limited	109	-	109
International Infrastructure Finance Company II, LP	703	-	703
GCM Grosvenor Customized Infrastructure Strategies II, LP	1,062	-	1,062
Strategic Partners Real Assets II, L.P.	348	-	348
<b>Total - Infrastructure</b>	<b>\$ 3,921</b>	<b>\$ -</b>	<b>\$ 3,921</b>
<b><u>Risk Parity</u></b>			
BlackRock Institutional Trust Company, N.A.	\$ 2,004	\$ -	\$ 2,004
Bridgewater Associates, LP	8,354	690	9,044
D.E. Shaw Investment Management, L.L.C.	4,919	-	4,919
<b>Total - Risk Parity</b>	<b>\$ 15,277</b>	<b>\$ 690</b>	<b>\$ 15,967</b>
<b><u>Defined Contribution</u></b>			
T. Rowe Price Target Date Funds	30	-	30
<b>Total - Defined Contribution</b>	<b>\$ 30</b>	<b>\$ -</b>	<b>\$ 30</b>
<b>Total External Management</b>	<b>\$ 383,799</b>	<b>\$ 103,442</b>	<b>\$ 487,241</b>
<b>Total Internal Management</b>			<b>\$ 22,891 *</b>
<b>Total Investment Management</b>			<b>\$ 510,132</b>

\*Internal Management expenses include salaries and fringe benefits of \$13,220 and operating expenses of \$9,671.

## Section 3 - Investment Information

### Investment Fees and Expenses

#### Initiatives

PSERS continues to pursue several avenues intended to maintain a reasonable cost structure. These initiatives include:

- For external managers making traditional investments, reduce base fees and create better alignment of interests by moving to a lower base fee coupled with a profit share.
- For external managers making traditional and absolute return investments, enter into arrangements for netting of profit shares for managers with multiple PSERS mandates.
- For external managers making non-traditional investments, continue to grow co-investments (which have lower fees and profit shares).
- For external managers making non-traditional investments, move away from paying on committed capital and towards paying on invested capital whenever possible.
- For external managers, re-underwriting all fee arrangements to ensure that the fee arrangements are fair and equitable.

- Research firms specializing in investment management fee negotiations, considering their credentials, references, past performance in reducing investment management fees for clients, and probable cost effectiveness for PSERS, for possible retention.

#### Carried Interest Reported by Manager

PSERS, as part of its historic commitment to transparency, has evolved its reporting on private markets fees and costs. This past year, PSERS disclosed for the first time profit share (carried interest), net management fees, and other fund expenses by fund in one report for the calendar year ended 2019. PSERS uses a best effort approach to gather the necessary data by canvassing our active funds for carried interest, management fee offsets and other fund expenses detailed out by fund. This information was presented to PSERS Board in December 2020 and the full report is available on our website at [www.psers.pa.gov](http://www.psers.pa.gov)

## Section 3 - Investment Information

**Table 11.4**

**Carried Interest Reported by Manager  
Calendar Year ended December 31, 2019  
(Dollar amounts in Thousands)**

<u>Manager</u>	<u>Net Management</u>	<u>Net Carried Interest</u>	<u>Partnership Expenses</u>	<u>Total</u>
<b><u>Private Equity</u></b>				
Actis Emerging Markets 3, L.P.	\$ -	\$ -	\$ 255	\$ 255
Actis Global 4, L.P.	1,281	-	259	1,540
Adams Capital Management, L.P.	-	-	6	6
Aisling Capital II, L.P.	-	-	29	29
Aisling Capital III, L.P.	(32)	10,289	42	10,300
Aisling Capital IV, L.P.	776	7,182	268	8,226
Allegheny New Mountain Partners, L.P.	-	(131)	-	(131)
Apax Digital L.P.	1,632	669	587	2,888
Apax Europe VII-A, L.P.	-	5,585	16	5,601
Apollo Investment Fund IX, L.P.	2,472	-	1,102	3,574
Apollo Investment Fund VIII, L.P.	776	10,677	513	11,966
Avenue Special Situations Fund VI, L.P.	-	-	20	20
Bain Capital Asia Fund II, L.P.	657	2,212	363	3,232
Bain Capital Asia Fund III, L.P.	2,600	776	1,836	5,212
Bain Capital Asia Fund IV, L.P.	625	-	206	831
Bain Capital Fund XI, L.P.	458	9,341	67	9,867
Bain Capital Fund XII, L.P.	1,875	-	1,201	3,076
Baring Asia Private Equity Fund III, L.P.	-	2,019	494	2,513
Baring Asia Private Equity Fund IV, L.P.	341	(169)	364	537
Baring Asia Private Equity Fund V, L.P.	3,170	(5,773)	2,871	268
Baring Asia Private Equity Fund VI, L.P.	952	4,080	936	5,968
BDC III, L.P.	926	1,293	260	2,478
Blue Point Capital Partners I, L.P.	-	-	9	9
Blue Point Capital Partners II, L.P.	49	2,153	21	2,223
Blue Point Capital Partners III, L.P.	385	377	155	917
Blue Point Capital Partners IV, L.P.	976	-	239	1,215
Bridgepoint Capital II (Secondary)	-	-	-	-
Bridgepoint Europe I	-	-	-	-
Bridgepoint Europe II, L.P.	-	625	11	635
Bridgepoint Europe III, L.P.	-	-	114	114
Bridgepoint Europe IV, L.P.	(5,719)	2,636	(555)	(3,638)
Bridgepoint Europe V, L.P.	1,052	5,543	827	7,422
Bridgepoint Europe VI, L.P.	1,264	825	506	2,595
Capital International Private Equity Fund V, L.P.	108	-	140	248
Capital International Private Equity Fund VI, L.P.	509	-	512	1,021

## Section 3 - Investment Information

**Table 11.4**

**Carried Interest Reported by Manager  
Calendar Year ended December 31, 2019  
(Dollar amounts in Thousands)**

<u>Manager</u>	<u>Net Management</u>	<u>Net Carried Interest</u>	<u>Partnership Expenses</u>	<u>Total</u>
<b>Private Equity (continued)</b>				
Catterton Growth Partners II, L.P.	\$ 1,077	\$ -	\$ 126	\$ 1,203
Catterton Growth Partners, L.P.	508	(2,350)	103	(1,739)
Catterton Partners V, L.P.	-	-	8	8
Catterton Partners VI, L.P.	706	(1,443)	67	(669)
Catterton Partners VII, L.P.	1,528	3,989	127	5,644
Cerberus Institutional Partners V, L.P.	656	4,857	484	5,997
Cerberus Institutional Partners VI, L.P.	2,375	-	1,564	3,939
Cerberus Institutional Partners, L.P. - Series 3	(32)	74	8	50
Cerberus Institutional Partners, L.P. (Series 4)	(342)	2,429	424	2,510
Cinven Fifth Fund, L.P.	566	7,492	2,404	10,463
Cinven Fourth Fund	-	-	-	-
Cinven Sixth Fund	1,005	2,886	466	4,356
Clearlake Capital Partners IV, L.P.	584	4,454	103	5,140
Clearlake Capital Partners V, L.P.	525	7,212	428	8,164
Clearlake Capital Partners VI, L.P.	-	-	-	-
Co-Investment 2000 Fund, L.P.	-	-	207	207
Co-Investment Fund II, L.P.	-	-	233	233
Coller International Partners VI, L.P.	820	2,032	47	2,899
Coller International Partners VII, L.P.	1,342	364	137	1,843
Crestview Capital Partners	250	4,550	243	5,042
Crestview Partners II, L.P.	902	3,805	465	5,172
Crestview Partners III, L.P.	906	5,677	378	6,961
Cross Atlantic Technology Fund II, L.P.	-	-	4	4
Cross Atlantic Technology Fund, L.P.	-	-	19	19
CVC Capital Partners Asia Pacific III, L.P.	-	731	603	1,334
CVC European Equity Partners V, L.P.	19	25,336	25	25,380
DCPF VI Oil and Gas Coinvestment Fund LP	114	1,871	17	2,002
Denham Commodity Partners Fund VI, L.P.	736	(29)	120	827
Denham Mining Fund, L.P.	1,818	(0)	305	2,122
Equistone Partners Europe Fund V, L.P.	820	-	91	912
Equistone Partners Europe Fund VI, L.P.	1,313	-	380	1,693
Evergreen Pacific Partners II, L.P.	-	18	43	62
Evergreen Pacific Partners, L.P.	-	-	100	100
First Reserve Fund XII, L.P.	206	-	91	298
Gleacher Mezzanine Fund II, L.P.	-	21	23	44
Gold Hill Venture Lending 03, L.P.	35	11	15	61

## Section 3 - Investment Information

**Table 11.4**

**Carried Interest Reported by Manager  
Calendar Year ended December 31, 2019  
(Dollar amounts in Thousands)**

<u>Manager</u>	<u>Net Management</u>	<u>Net Carried Interest</u>	<u>Partnership Expenses</u>	<u>Total</u>
<b>Private Equity (continued)</b>				
GoldPoint Partners Co-Investment V, L.P.	\$ 369	\$ 1,221	\$ 24	\$ 1,614
GSC Recovery II, L.P.	-	-	-	-
GSC Recovery III (Parallel Fund), L.P.	-	-	-	-
Hahn & Company III, L.P.	3,265	-	935	4,200
Hahn & Company III-S, L.P.	172	-	315	488
HgCapital 7, L.P.	811	-	93	905
HgCapital 8, L.P.	1,643	-	430	2,073
HGGC Fund II, L.P.	1,154	4,273	103	5,530
HGGC Fund III, L.P.	314	7,481	637	8,431
Incline Elevate Fund, L.P.	919	-	585	1,504
Incline Equity Partners III, L.P.	-	14,672	30	14,702
Incline Equity Partners IV, L.P.	1,126	2,152	72	3,350
Incline Equity Partners V, L.P.	-	-	-	-
Insight Partners XI, L.P.	190	-	339	529
Insight Venture Partners X, L.P.	391	896	103	1,390
Irving Place Capital III SPV, L.P.	-	-	90	90
Irving Place Capital MB-PSERS II, L.P.	-	(3,649)	37	(3,612)
K4 Private Investors, L.P.	1,928	-	168	2,095
KBL Partnership, L.P.	-	-	8	8
L Catterton Growth Partners III, L.P.	1,130	5,995	485	7,610
L Catterton VIII, L.P.	1,596	3,053	705	5,353
Landmark Equity Partners XIII, L.P.	206	-	19	226
Landmark Equity Partners XIV, L.P.	341	170	54	565
Lindsay Goldberg V, L.P.	-	-	-	-
LLR Equity Partners II, L.P.	-	87	43	130
LLR Equity Partners III, L.P.	379	9,691	140	10,210
LLR Equity Partners IV, L.P.	2,159	17,766	192	20,118
LLR Equity Partners V, L.P.	3,500	4,201	1,379	9,080
Milestone Partners FS 2, L.P.	8	-	350	358
Milestone Partners III, L.P.	239	-	41	281
Milestone Partners IV, L.P.	334	(507)	266	92
NEPA Venture Fund II	-	-	3	3
New Mountain Partners III, L.P.	-	9,116	-	9,116
New Mountain Partners IV, L.P.	423	16,165	40	16,628
New Mountain Partners V, L.P.	2,372	4,789	1,754	8,915
New York Life Capital Partners I, L.P.	-	-	29	29

## Section 3 - Investment Information

**Table 11.4**

**Carried Interest Reported by Manager  
Calendar Year ended December 31, 2019  
(Dollar amounts in Thousands)**

<u>Manager</u>	<u>Net Management</u>	<u>Net Carried Interest</u>	<u>Partnership Expenses</u>	<u>Total</u>
<b>Private Equity (continued)</b>				
New York Life Capital Partners II, L.P.	\$ -	\$ 14	\$ 34	\$ 48
New York Life Capital Partners III-A, L.P.	-	(1,084)	55	(1,029)
New York Life Capital Partners IV-A, L.P.	77	456	96	629
NGP Natural Resources X, L.P.	750	-	64	814
NGP Natural Resources XI, L.P.	1,340	(6,019)	54	(4,624)
NGP Natural Resources XII, L.P.	3,002	-	112	3,114
North Haven Private Equity Asia IV, L.P.	1,143	4,316	584	6,043
NYLIM Mezzanine Partners II (Parallel Fund) LP	-	-	-	-
OCM Opportunities Fund VII, L.P.	-	-	21	21
OCM Opportunities Fund VII-B, L.P.	5	2	25	32
Odyssey Investment Partners Fund V, L.P.	969	-	422	1,391
Orchid Asia Fund VI, L.P.	1,189	1,064	42	2,294
Orchid Asia V, L.P.	150	128	4	282
Orchid Asia VII, L.P.	1,498	452	574	2,523
PAI Europe IV	-	35	(15)	20
PAI Europe V	180	(861)	238	(442)
PAI Europe VI	979	4,037	826	5,842
PAI Europe VII	1,431	-	1,808	3,239
Palladium Equity Partners IV, L.P.	628	(41)	427	1,014
Partners Group Secondary 2008 S.C.A., SICAR	997	144	56	1,197
Partners Group Secondary 2011 (USD), L.P. Inc.	1,012	(120)	468	1,360
Partners Group Secondary 2015 (USD) A, L.P.	1,250	511	284	2,045
Permira IV, L.P.	-	1,008	21	1,029
Perseus-Soros BioPharmaceutical Fund, L.P.	-	-	-	-
Platinum Equity Capital Partners II, L.P.	-	2,905	194	3,099
Platinum Equity Capital Partners III, L.P.	-	(2,205)	216	(1,989)
Platinum Equity Capital Partners IV, L.P.	-	5,512	1,135	6,648
Platinum Equity Capital Partners V, L.P.	1,023	-	292	1,315
Platinum Equity Capital Partners, L.P.	-	-	88	88
Platinum Equity Small Cap Fund, L.P.	3,778	-	924	4,702
PNC Equity Partners II, L.P.	-	80	38	118
Portfolio Advisors Secondary Fund III, L.P.	1,147	2,699	266	4,112
Psilos Group Partners III, L.P.	-	-	-	-
Quaker BioVentures II, L.P.	279	-	29	308
Quaker Bio-Ventures, L.P.	-	-	16	16
Sante Health Ventures III, L.P.	-	-	210	210

## Section 3 - Investment Information

**Table 11.4**

**Carried Interest Reported by Manager  
Calendar Year ended December 31, 2019  
(Dollar amounts in Thousands)**

<u>Manager</u>	<u>Net Management</u>	<u>Net Carried Interest</u>	<u>Partnership Expenses</u>	<u>Total</u>
<b>Private Equity (continued)</b>				
SCP Private Equity Partners I, L.P.	\$ -	\$ -	\$ -	\$ -
SCP Private Equity Partners II, L.P.	-	-	-	-
Searchlight Capital Partners II, L.P.	1,318	1,469	468	3,254
Searchlight Capital Partners III, L.P.	-	-	-	-
StarVest	0	-	20	20
StarVest Partners II (Parallel), L.P.	268	-	62	330
StepStone International Investors III L.P.	248	-	131	379
Sterling Capital Partners, L.P.	-	-	32	32
Sterling Venture Partners I, L.P.	-	-	9	9
Strategic Partners Fund II, L.P.	-	-	-	-
Strategic Partners Fund III VC, L.P.	-	-	91	91
Strategic Partners Fund III-B, L.P.	-	-	202	202
Strategic Partners Fund IV VC, L.P.	123	969	28	1,120
Strategic Partners Fund IV, L.P.	95	560	21	676
Strategic Partners Fund V, L.P.	283	1,846	128	2,257
Strategic Partners Fund VI, L.P.	593	271	178	1,042
Strategic Partners Fund VII, L.P.	1,250	3,999	588	5,838
Summit Partners Growth Equity Fund IX, L.P.	-	5,315	138	5,453
Summit Partners Growth Equity Fund VIII, L.P.	1,211	11,204	79	12,493
Summit Partners Growth Equity Fund X, L.P.	-	-	268	268
Summit Partners Venture Capital Fund III, L.P.	247	2,100	17	2,363
Summit Partners Venture Capital Fund IV, L.P.	784	3,138	107	4,029
TDH III, L.P.	-	-	-	-
Tenaya Capital IV-P, L.P.	-	(3,730)	69	(3,660)
Tenaya Capital VI, L.P.	764	(1,436)	55	(617)
Tenaya Capital VII, L.P.	2,000	5,251	106	7,357
Tenaya Capital V-P, L.P.	431	461	71	963
The Energy & Minerals Group Fund III, L.P.	1,190	-	25	1,214
Trilantic Capital Partners IV L.P.	52	(408)	46	(311)
Trilantic Capital Partners V (North America), L.P.	594	3,482	134	4,210
Trilantic Capital Partners VI (North America), L.P.	2,249	-	266	2,514
Tulco LLC	-	-	-	-
U.S. Equity Partners II, L.P.	-	-	(32)	(32)
Venor Special Situations Fund II, L.P.	718	-	315	1,033
Versa Capital Fund I, L.P.	-	-	172	172
Versa Capital Fund II, L.P.	1,544	-	548	2,092



## Section 3 - Investment Information

**Table 11.4**

**Carried Interest Reported by Manager  
Calendar Year ended December 31, 2019  
(Dollar amounts in Thousands)**

<u>Manager</u>	<u>Net Management</u>	<u>Net Carried Interest</u>	<u>Partnership Expenses</u>	<u>Total</u>
<b><u>Private Equity (continued)</u></b>				
Versa Capital Fund III, L.P.	\$ 287	\$ -	\$ 1,150	\$ 1,436
Webster Capital IV, L.P.	348	(251)	125	223
Windjammer Senior Equity Fund III, L.P.	-	-	-	-
Windjammer Senior Equity Fund IV, L.P.	-	-	-	-
<b>Total - Private Equity</b>	<b>\$ 99,962</b>	<b>\$ 279,037</b>	<b>\$ 48,228</b>	<b>\$ 427,228</b>
<b><u>Private Credit</u></b>				
Apollo European Principal Finance Fund II (Dollar A), L.P.	516	81	(7)	590
Apollo European Principal Finance Fund III (Dollar A), LP	2,142	5,273	1,392	8,807
Avenue Energy Opportunities Fund II, L.P.	840	-	406	1,246
Avenue Energy Opportunities Fund, L.P.	1,800	-	441	2,241
Avenue Europe Special Situations Fund III (U.S.), L.P.	1,864	-	770	2,634
Bain Capital Credit Managed Account (PSERS), L.P.	1,807	-	430	2,237
Bain Capital Credit Managed Account (PSERS), L.P. (SCF)	-	-	-	-
Bain Capital Credit Managed Account (PSERS), L.P. (SSA)	431	731	430	1,592
Bain Capital Distressed and Special Situations 2013 (A) AIV, L.P.	1,248	-	254	1,501
Bain Capital Distressed and Special Situations 2013 (A), L.P.	526	-	101	628
Bain Capital Distressed and Special Situations 2016 (A), L.P.	2,687	15	2,431	5,133
Bain Capital Distressed and Special Situations 2019, L.P.	76	-	1,833	1,909
Bain Capital Middle Market Credit 2010, L.P.	198	758	78	1,034
Bain Capital Middle Market Credit 2014, LP	1,031	7,496	171	8,697
Brigade Distressed Value Offshore Fund	1,688	-	678	2,366
Brigade Structured Credit Offshore Fund	2,860	176	246	3,282
Carlyle Energy Mezzanine Opportunities Fund II, L.P.	2,306	-	667	2,973
Carlyle Energy Mezzanine Opportunities Fund-Q, L.P.	1,244	-	559	1,803
Cerberus Levered Loan Opportunities Fund I, L.P.	-	-	-	-
Cerberus Levered Loan Opportunities Fund II, L.P.	-	-	-	-
Cerberus PSERS Levered Loan Opportunities Fund, L.P.	7,706	5,342	1,470	14,517
Clearlake Opportunities Partners II, L.P.	201	84	517	802
Galton Onshore Mortgage Recovery Fund III, L.P.	74	-	246	320
Galton Onshore Mortgage Recovery Fund IV, L.P.	973	-	710	1,683
Galton Residential Mortgage-Backed Securities	1,240	1,222	-	2,462
Hayfin SOF II USD Co-Invest, L.P.	88	-	74	162
Hayfin SOF II USD, L.P.	2,065	-	665	2,730
HayFin Special Opportunities Credit Fund (Parallel), L.P.	582	101	94	777
ICG Europe Fund V, L.P.	649	582	391	1,623

## Section 3 - Investment Information

**Table 11.4**

**Carried Interest Reported by Manager  
Calendar Year ended December 31, 2019  
(Dollar amounts in Thousands)**

<u>Manager</u>	<u>Net Management</u>	<u>Net Carried Interest</u>	<u>Partnership Expenses</u>	<u>Total</u>
<b><u>Private Credit (continued)</u></b>				
ICG Europe Fund VI, L.P.	\$ 1,184	\$ 3,142	\$ 219	\$ 4,546
ICG Europe Fund VII Feeder SCSp	1,786	2,920	133	4,839
International Infrastructure Finance Company Fund II, L.P.	585	1,806	368	2,760
International Infrastructure Finance Company Fund, L.P.	998	1,251	326	2,574
Latitude Management Real Estate Capital IV, Inc.	803	-	116	919
LBC Credit Partners II, LP	-	-	-	-
LBC Credit Partners III, L.P.	1,277	-	244	1,521
LBC-P Credit Fund, L.P.	5,360	3,182	642	9,183
Oaktree Loan Fund 2X, LP	-	-	92	92
Pacific Investment Management Company, LLC	(0)	194	44	238
Park Square - PSERS Credit Opportunities Fund, L.P. (COPS)	2,349	-	714	3,063
Park Square - PSERS Credit Opportunities Fund, L.P. (ELP)	255	915	1,415	2,585
PIMCO BRAVO Fund III Onshore Feeder, LP	1,550	4,632	871	7,052
PSERS TAO Partners Parallel Fund, L.P. - (TAO 2.0)	1,669	3,459	974	6,102
PSERS TAO Partners Parallel Fund, L.P. - (TAO 3.0)	1,578	3,277	992	5,847
PSERS TAO Partners Parallel Fund, L.P. - (TAO Contingent)	-	-	-	-
Sankaty Credit Opportunities IV, L.P.	570	1,215	135	1,920
SSG Capital Partners V Sidecar, L.P.	1,403	-	267	1,671
SSG Capital Partners V, L.P.	-	-	66	66
Summit Partners Credit Fund II, L.P.	-	851	584	1,435
TCI Real Estate Partners Fund III, L.P.	-	1,420	99	1,518
TOP NPL (A), L.P.	26	519	189	734
TPG Opportunities Partners II (A), L.P.	105	261	162	527
TPG Opportunities Partners III (A), L.P.	885	2,842	351	4,078
TSSP Opportunities Partners IV, L.P.	2,244	15	480	2,738
Varde Scratch and Dent Feeder I-A, L.P., The	774	226	331	1,331
Varde Scratch and Dent Feeder, L.P., The	630	10	209	849
<b>Total - Private Credit</b>	<b>\$ 62,871</b>	<b>\$ 53,996</b>	<b>\$ 25,071</b>	<b>\$ 141,939</b>
<b><u>Private Real Estate</u></b>				
812 Market Street	\$ 30	\$ -	\$ -	\$ 30
AG Core Plus Realty Fund III, L.P.	202	375	63	640
AG Europe Realty Fund II, L.P.	1,011	2,660	868	4,539
AG Europe Realty Fund III, L.P.	-	-	-	-
AG Realty Fund X, L.P.	886	-	762	1,648
Almanac Realty Securities V, L.P.	28	386	6	420

## Section 3 - Investment Information

**Table 11.4**

**Carried Interest Reported by Manager  
Calendar Year ended December 31, 2019  
(Dollar amounts in Thousands)**

<u>Manager</u>	<u>Net Management</u>	<u>Net Carried Interest</u>	<u>Partnership Expenses</u>	<u>Total</u>
<b>Private Real Estate (continued)</b>				
Almanac Realty Securities VI, L.P.	\$ 101	\$ (604)	\$ 11	\$ (492)
Almanac Realty Securities VII, L.P.	407	938	33	1,378
Almanac Realty Securities VIII, L.P.	930	-	65	995
Angelo Gordon Core Plus Realty Fund IV, L.P.	1,184	582	413	2,179
Apollo Real Estate Finance Corporation	-	-	37	37
Ares European Real Estate Fund III, L.P.	-	-	67	67
Ares European Real Estate Fund IV, L.P.	401	737	265	1,403
Ares U.S. Real Estate Fund IX, L.P.	353	-	140	493
Ares U.S. Real Estate Fund VII, L.P.	-	-	294	294
Ares U.S. Real Estate Fund VIII, L.P.	366	693	38	1,097
Atlanta Marriott	131	-	-	131
Avenue Real Estate Fund (Parallel) L.P.	744	-	256	999
Bell Institutional Fund IV, LLC	-	4	76	80
Bell Institutional Fund V, L.P.	888	1,792	733	3,414
Bell Institutional Fund VI, L.P.	764	-	1,013	1,777
Bell Institutional Fund VII, L.P.	322	-	39	361
Big Valley Ranch	248	-	-	248
BlackRock Asia Property Fund III L.P.	-	-	(16)	(16)
BlackRock Europe Property Fund III L.P.	-	-	889	889
Blackstone Real Estate Debt Strategies II, L.P.	30	1	3	33
Blackstone Real Estate Debt Strategies III, L.P.	606	414	7	1,027
Blackstone Real Estate Partners Europe III, L.P.	282	31	61	374
Blackstone Real Estate Partners Europe IV, L.P. (USD)	287	517	25	829
Blackstone Real Estate Partners V, L.P.	-	612	3	615
Blackstone Real Estate Partners VI, L.P.	-	1,201	(13)	1,187
Blackstone Real Estate Partners VII, L.P.	875	4,025	80	4,981
Blackstone Real Estate Partners VIII, L.P.	1,006	3,024	428	4,458
BPG/PSEERS Co-Investment Fund	-	6	3	9
Brookfield Strategic Real Estate Partners II, L.P.	2,359	5,836	158	8,354
Brookfield Strategic Real Estate Partners III, L.P.	5,235	-	710	5,945
Brookfield Strategic Real Estate Partners, L.P.	950	28,260	339	29,549
Cabot Industrial Core Fund, L.P.	678	10	99	787
Cabot Industrial Value Fund IV, L.P.	-	0	7	7
Cabot Industrial Value Fund V, L.P.	750	348	105	1,204
Cabot Industrial Value Fund VI, L.P.	-	-	-	-
Cabot U.K. Core-Plus Industrial Fund SCSp	-	-	-	-

## Section 3 - Investment Information

**Table 11.4**

**Carried Interest Reported by Manager  
Calendar Year ended December 31, 2019  
(Dollar amounts in Thousands)**

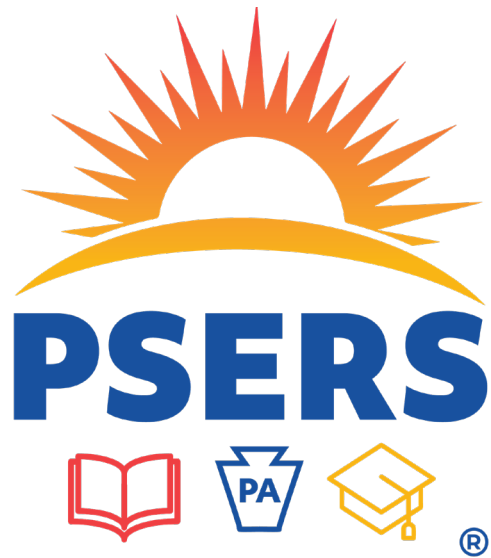
<u>Manager</u>	<u>Net Management</u>	<u>Net Carried Interest</u>	<u>Partnership Expenses</u>	<u>Total</u>
<b>Private Real Estate (continued)</b>				
Carlyle Realty Partners III, L.P.	\$ -	\$ 4,258	\$ 109	\$ 4,367
Carlyle Realty Partners IV, L.P.	15	-	127	141
Carlyle Realty Partners V, L.P.	138	17,205	77	17,419
Carlyle Realty Partners VI, L.P.	155	72	228	456
Carlyle Realty Partners VII, L.P.	547	1,889	132	2,568
Carlyle Realty Partners VIII, L.P.	829	-	128	956
Centerline High Yield CMBS III - Loan/Stock	27	-	-	27
DRA Growth and Income Fund IX, LLC	1,898	-	161	2,059
DRA Growth and Income Fund VI, L.P.	-	1,191	37	1,228
DRA Growth and Income Fund VII, LLC	620	9,780	233	10,634
DRA Growth and Income Fund VIII, LLC	1,500	225	137	1,862
DRA Growth and Income Fund X, L.P.	20	-	106	126
Exeter Core Industrial Club Fund II, L.P.	638	545	124	1,307
Exeter Core Industrial Fund III, L.P.	-	-	-	-
Exeter Industrial Value Fund II, L.P.	1	6	44	51
Exeter Industrial Value Fund III, L.P.	230	3,199	84	3,512
Exeter Industrial Value Fund IV, L.P.	1,150	2,090	150	3,391
Exeter Industrial Value Fund V, L.P.	-	-	-	-
Five North 5th Street	52	-	-	52
Fortress Investment Fund IV, L.P.	-	-	72	72
Fortress Investment Fund V, L.P.	-	-	251	251
Fortress Investment Fund, L.P.	-	-	15	15
Golden Hills Ranch	151	-	-	151
Keystone Portfolio	719	-	1,192	1,912
LAI Strategic Realty Investors, L.P.	-	-	15	15
Latitude Management Real Estate Capital III, L.P.	876	(25)	95	946
Legg Mason Real Estate Capital II	-	-	-	-
LEM Multifamily Senior Equity Fund IV, L.P.	563	3,753	145	4,460
LEM Multifamily Senior Equity Fund V, L.P.	1,000	-	1,862	2,862
LEM RE HY Debt & Pfd Equity Fund III, L.P.	65	415	51	530
LEM Real Estate Mezzanine Fund II, L.P.	-	-	92	92
Lorida Groves	352	-	-	352
Maricopa Citrus	42	-	-	42
Paramount Group Real Estate Fund VII, L.P.	6	-	47	53
Peabody Global Real Estate Partners	-	-	-	-
Pramerica Real Estate Capital VI, L.P.	477	383	-	860

## Section 3 - Investment Information

**Table 11.4**

**Carried Interest Reported by Manager  
Calendar Year ended December 31, 2019  
(Dollar amounts in Thousands)**

<u>Manager</u>	<u>Net</u> <u>Management</u>	<u>Net Carried</u> <u>Interest</u>	<u>Partnership</u> <u>Expenses</u>	<u>Total</u>
<b><u>Private Real Estate (continued)</u></b>				
Prudential Senior Housing Partners IV, L.P.	\$ 517	\$ 17	\$ 61	\$ 595
Prudential Senior Housing V, L.P.	656	490	217	1,362
PSERS YES Holdings, L.P.	-	-	90	90
RCG Longview Debt Fund V, L.P.	55	-	180	235
RCG Longview Debt Fund VI, L.P.	277	154	324	755
RCG Longview Equity Fund, L.P.	14	-	33	47
Rivercenter Mall	57	-	-	57
Security Capital Preferred Growth (Public)	1,205	-	211	1,415
Silverpeak Legacy/PSERS, L.P.	-	2,456	164	2,621
Stockbridge Real Estate Fund II, L.P.	189	-	66	256
Stockbridge Real Estate Fund III, L.P.	298	-	72	370
Stockbridge Real Estate Fund, L.P.	3,028	14,866	426	18,321
Strategic Partners Fund IV RE, L.P.	-	-	-	-
Strategic Partners III RE, L.P.	-	-	-	-
The Galleria at Ft Lauderdale	571	-	-	571
Townsend Grove	198	-	-	198
UBS Trumbull Property Income Fund	330	-	21	351
<b>Total - Private Real Estate</b>	<b>\$ 41,518</b>	<b>\$ 114,816</b>	<b>\$ 15,647</b>	<b>\$ 171,980</b>
<b>Grand Total</b>	<b>\$ 204,351</b>	<b>\$ 447,849</b>	<b>\$ 88,947</b>	<b>\$ 741,147</b>

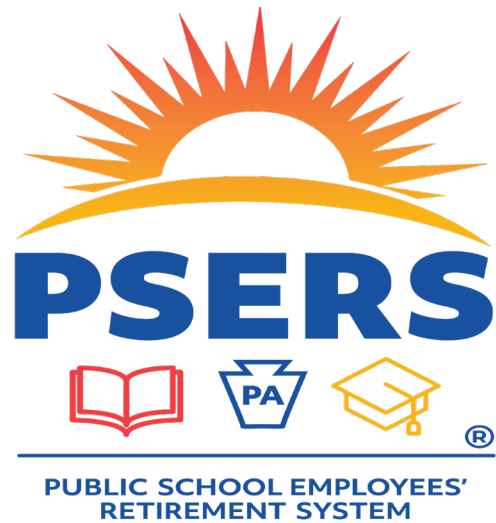


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# Commitment to Pennsylvania-Based Investments

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## Section 3 - Investment Information

### Commitment to Pennsylvania Financial Services Firms (as of June 30, 2020)

The members of the Board and Professional Staff are fiduciaries and must act in the interests of the members of the System and for the exclusive benefit of the System's members. In creating the investment program, the Board hires both external and internal investment managers. The Board has determined that it is in the best interest of the System to manage assets internally when (1) the System's investment professionals have the proven ability and capacity to manage portfolios internally at least as well as the external investment managers, and (2) the cost of investing those assets is no greater than the cost that would have been incurred to have those assets externally managed. The Board will also consider the diversification benefits that may be achieved by allocating assets to external portfolio managers even when conditions (1) and (2) are met.

The Board evaluates external managers based on a variety of factors, including: (1) a unique

insight or process; (2) the ability to add long-term excess returns above passive alternatives, net of fees; (3) adequate capacity to execute the strategy; (4) adding diversification to our existing investment structure; (5) not exhibiting style drift, and; (6) exhibiting a high level of ethical behavior. In selecting external managers, PSERS will show preference to Pennsylvania-based potential managers that demonstrate similar strengths to alternative managers without a Pennsylvania nexus.

PSERS has shown a strong commitment to Pennsylvania's financial services industry by having assets managed by firms based in Pennsylvania or by firms with offices in Pennsylvania. In FY 2020, investment management fees paid to external firms managing PSERS' assets from offices located in Pennsylvania amounted to \$27.9 million, or 5.7% of the total external investment manager fees.

**Table 12.1 lists the asset exposures managed internally by PSERS, as of June 30, 2020.**

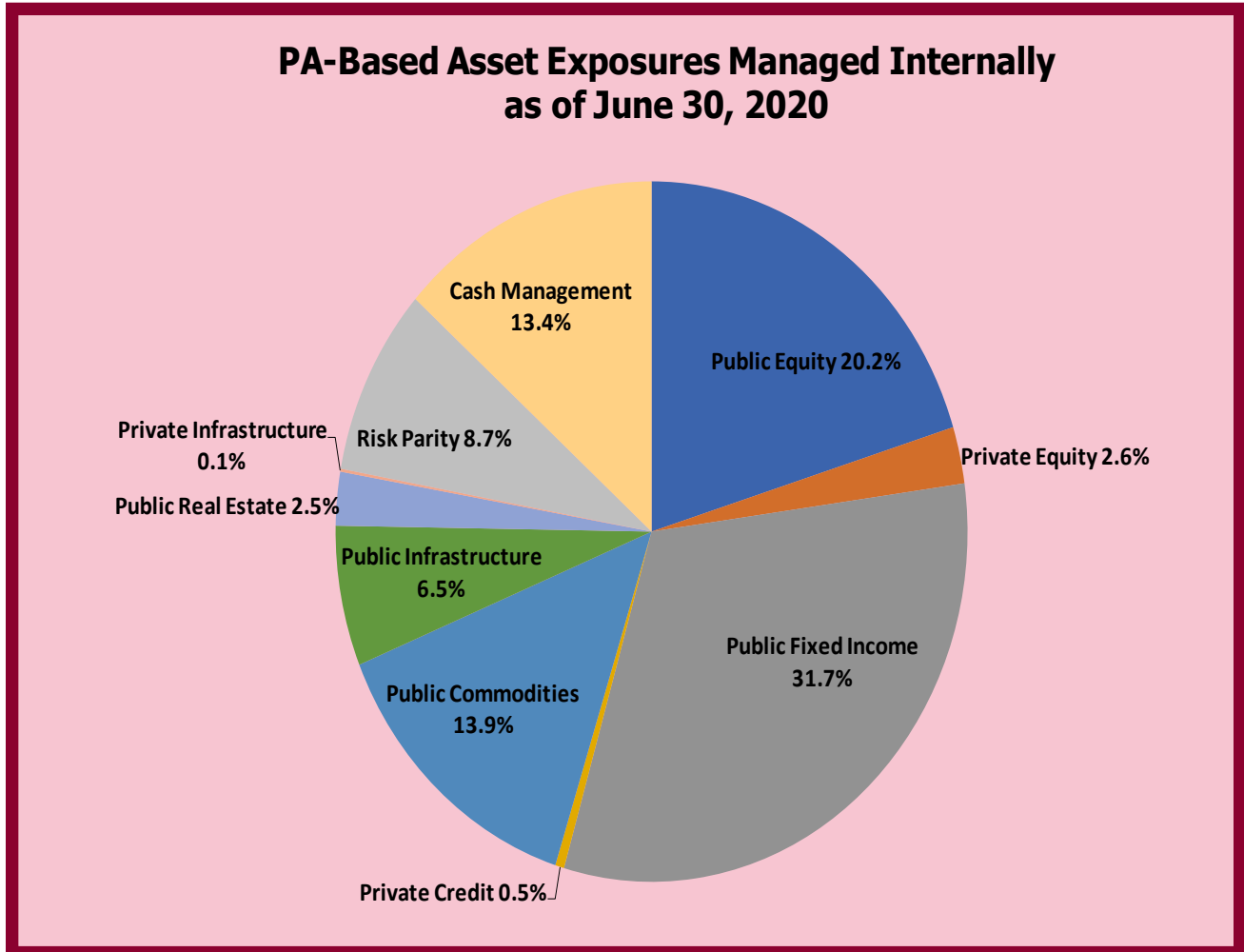
<b>Table 12.1</b>			
<b>Pennsylvania-Based Asset Exposures Managed Internally (as of June 30, 2020)</b>			
<b><u>Asset Class</u></b>	<b><u>Market Value (in millions)</u></b>		<b><u>% of Total</u></b>
Public Equity	\$	5,690.5	20.1%
Private Equity		737.7	2.6%
Public Fixed Income		8,931.4	31.7%
Private Credit		128.4	0.5%
Public Commodities		3,910.1	13.9%
Public Infrastructure		1,826.0	6.5%
Public Real Estate		697.2	2.5%
Private Infrastructure		37.7	0.1%
Risk Parity		2,449.3	8.7%
Cash Management		3,789.1	13.4%
<b>Totals</b>	<b>\$</b>	<b>28,197.4</b>	<b>100%</b>



## Section 3 - Investment Information

### Commitment to Pennsylvania Financial Services Firms (continued)

Chart 12.1 displays the distribution of exposures managed internally as of June 30, 2020.



## Section 3 - Investment Information

Table 12.2 is a list of assets managed by external managers with headquarters or offices located in Pennsylvania, as of June 30, 2020.

<b>Table 12.2</b>	
<b>Pennsylvania-Based External Managers</b>	
<b>Public Equity:</b>	<b>Private Equity:</b>
Radcliffe Capital Management, L.P.	Adams Capital Management, L.P.
	Co-Investment 2000 Fund, L.P.
	Co-Investment Fund II, L.P.
<b>Public Fixed Income:</b>	
Penn Mutual Management, LLC	Cross Atlantic Technology Fund II
Radcliffe Capital Management, L.P.	Cross Atlantic Technology Fund, L.P.
SEI Investments Company	Incline Equity Partners III, L.P.
	Incline Equity Partners IV, L.P.
	Incline Equity Partners V, L.P.
<b>Private Credit:</b>	
International Infrastructure Finance Company Fund, L.P.	LLR Equity Partners II, L.P.
LBC Credit Partners III, LP	LLR Equity Partners III, L.P.
LBC Credit Partners-P Credit Fund, LP	LLR Equity Partners IV, L.P.
	LLR Equity Partners V, L.P.
<b>Private Real Estate:</b>	
BPG/PSERS Co-Investment Fund	Milestone Partners FS 2, L.P.
Charter Oak Advisors, Inc.	Milestone Partners III, L.P.
Exeter Core Industrial Club Fund II, L.P.	Milestone Partners IV, L.P.
Exeter Industrial Core Fund III, L.P.	NEPA Venture Fund II
Exeter Industrial Value Fund II, L.P.	PNC Equity Partners II, L.P.
Exeter Industrial Value Fund III, L.P.	SCP Private Equity Partners II, L.P.
Exeter Industrial Value Fund IV, L.P.	Versa Capital Fund I, L.P.
Exeter Industrial Value Fund V, L.P.	Versa Capital Fund II, L.P.
GF Management	Versa Capital Fund III, L.P.
LEM Multifamily Fund V, L.P.	
LEM Multifamily Senior Equity Fund IV, L.P.	
LEM RE HY Debt & Preferred Equity Fund III, L.P.	
Property Management, Inc.	
<b>Private Infrastructure:</b>	
International Infrastructure Finance Company Fund II, L.P.	

### Investments in Pennsylvania-Based Companies (as of June 30, 2020)

Where investment characteristics including yield, risk, and liquidity are equivalent, the Board's policy favors investments that have a positive impact on the economy of Pennsylvania. The Board, in managing the investment portfolio, will also be cognizant of concentration risk to any one region, including Pennsylvania. The Fund will continue to seek investments in Pennsylvania-based companies when the investment characteristics are equivalent to other favorable investments, subject to diversification considerations.

#### U.S. Equities

PSERS invests in the stock of Pennsylvania-based companies through the various U.S. Equity portfolios managed by internal portfolio managers. PSERS has always had investments in large national firms located in Pennsylvania.

#### Fixed Income Securities

PSERS invests in the debt of Pennsylvania-based companies through the various Fixed Income portfolios managed by external and internal portfolio managers. PSERS has always had investments in large national firms located in Pennsylvania.

#### Private Infrastructure

PSERS' Private Infrastructure Program has committed \$900 million to 4 partnerships. From the program inception to June 30, 2020, PSERS has committed capital to 1 partnership headquartered in Pennsylvania.

#### Private Real Estate

PSERS has investments in limited partnerships that have invested in Pennsylvania real estate properties. PSERS Real Estate program has committed \$16.7 billion to 140 partnerships. From the program inception to June 30, 2020, PSERS has committed capital to 23 partnerships headquartered in Pennsylvania.

#### Private Equity

PSERS' Private Equity program has committed \$32.0 billion to 282 partnerships. From the program inception to June 30, 2020, PSERS has committed capital to 30 partnerships headquartered in Pennsylvania.

#### Private Equity and Private Real Estate Pennsylvania In-House Co-Investment Program

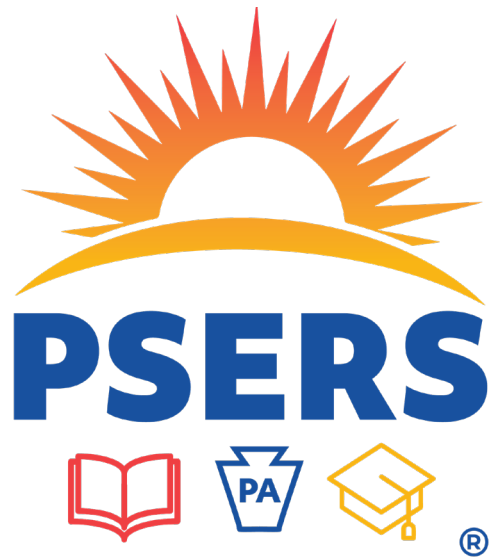
In April 2015, PSERS' Board approved a \$250 million commitment for PSERS to co-investment in portfolio companies based in Pennsylvania. The portfolio companies are sourced from funds where PSERS or its consultant is an investor. As of June 30, 2020, PSERS has invested \$60.4 million. The market value of the investments total \$56.5 million. The number of employees, payroll, and market value are included within their respective asset class in Table 12.3.

## Section 3 - Investment Information

Table 12.3 displays Pennsylvania-based investments and other statistics at June 30, 2020 (\$'s in millions):

<b>Table 12.3</b>					
<b>Statistics of Pennsylvania-Based Investments</b>					
<b><u>Asset Class</u></b>	<b><i>Total PA Market Value (PSERS' Portion)</i></b>	<b><i>Total PA Market Value (Total Invested)</i></b>	<b><i># of People Employed</i></b>	<b><i>Payroll</i></b>	
US Equities	\$ 83.5	\$ 83.5	\$ *	\$ *	\$ *
Fixed Income	136.8	136.8	*	*	*
Private Real Estate	100.0	1,362.2	96.0	3.8	3.8
Private Markets:					
Venture Capital	347.1	2,710.1	1,806.0	53.0	53.0
Private Equity	1,095.1	18,173.6	34,962.0	413.5	413.5
Private Debt	457.3	17,420.4	16,173.0	90.9	90.9
<b>Total</b>	<b>\$ 2,219.7</b>	<b>\$ 39,886.6</b>	<b>\$ 53,037.0</b>	<b>\$ 561.2</b>	<b>\$ 561.2</b>

\* Statistics for publicly traded companies not included due to the difficulty in obtaining the information.



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