

# SECTION 3 - INVESTMENT INFORMATION

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### Investment Policy

The Public School Employees' Retirement Board of Trustees (the Board) is responsible for, among other things, the formulation of an Investment Policy for the Public School Employees' Retirement System (the System). As articulated in the Public School Employees' Retirement Code 24 Pa. C.S. §8521(a), the Board and PSERS' staff delegated with investment authority must act in a manner consistent with the Prudent Investor Standard, which requires "the exercise of that degree of judgment, skill and care under the circumstances then prevailing which persons of prudence, discretion and intelligence who are familiar with such matters exercise in the management of their own affairs not in regard to speculation, but in regard to the permanent disposition of the fund, considering the probable income to be derived therefrom as well as the probable safety of their capital." The Prudent Investor Standard recognizes modern portfolio theory and guides investment and management decisions respecting individual assets so that the trade-offs between risk and return for each asset are considered in the context of an overall investment strategy.

The System's Investment Policy Statement, Objectives, and Guidelines (the Policy), which is available at [www.psers.state.pa.us](http://www.psers.state.pa.us), reflects the many implications of the Prudent Investor Standard. The Board reviews the Policy regularly, and makes changes as necessary. The Policy establishes clear criteria for the management of the assets by or on behalf of the Board. For example:

- The Board, PSERS' staff, investment consultants, and investment managers are assigned appropriate responsibilities and made to understand clearly the objectives and policies of the Board and the System;
- Allocation plans are prepared to guide the investment of the System's assets;
- Guidelines are established for each investment category so that asset quality, diversification, and return can be monitored;
- Investment managers are given guidance and limitations on the investment of the System's assets; and,
- The Board has created a meaningful basis for evaluating the investment performance of individual investment managers, as well as for evaluating overall success in meeting its objectives.

### General Return and Risk Objectives

The System seeks to provide benefits to its members through a carefully planned and well-executed investment program, and the Policy identifies the following general return and risk objectives and constraints for its investments:

#### Return Objectives

- The assets of the System shall be invested to maximize the returns for the level of risk taken; and
- The System shall strive to achieve a return that exceeds the Policy Index.

#### Risk Objectives

- The assets of the System shall be diversified to minimize the risk of losses within any one asset class, investment type, industry or sector distribution, maturity date, or geographic location; and
- The System's assets shall be invested so that the probability of investment losses (as measured by the Policy Index) in excess of 15% in any one year is no greater than 2.5% (or two standard deviations below the expected return).

#### Constraints

- The System shall maintain adequate liquidity to meet required benefit payments to the System's beneficiaries;
- The System's assets shall be invested in a manner that is consistent with the System's long-term investment horizon; and,
- As a tax-exempt investor, the System's assets may be invested without distinction between returns generated from income and returns generated from capital gains.

## Investment Risk Management

PSERS recognizes that risk management is an essential component of a prudent investment program. The implementation of a well-defined risk management framework improves the likelihood that the System is compensated adequately for the risks taken, and helps to avoid unexpected and unintended risks. Therefore, PSERS pursues a disciplined and advanced risk management approach. Through investment policies and guidelines, PSERS defines the amount of investment risk to be taken by the System, and how it is to be measured and monitored.

PSERS has created a practical framework that enables the System to implement risk-focused investment strategies, and transparently monitor active portfolio risks and returns relative to budgets and/or specific objectives. PSERS has identified over 100 specific investment risks for modeling and analysis, and categorizes those risks into the following broad classes:

- Market
- Fund and Portfolio
- Operational
- Liquidity, Leverage and Finance
- Legal
- Organizational

PSERS' team manages these broad classes of risk consistent with its long-term investment objectives.

Investment risk reflects the possibility that the future value of investments will deviate from targeted return objectives. This deviation often occurs as a result of changes in perception of market conditions, whether those changes are caused by factors specific to individual investments, classes of investments or factors affecting all investments simultaneously.

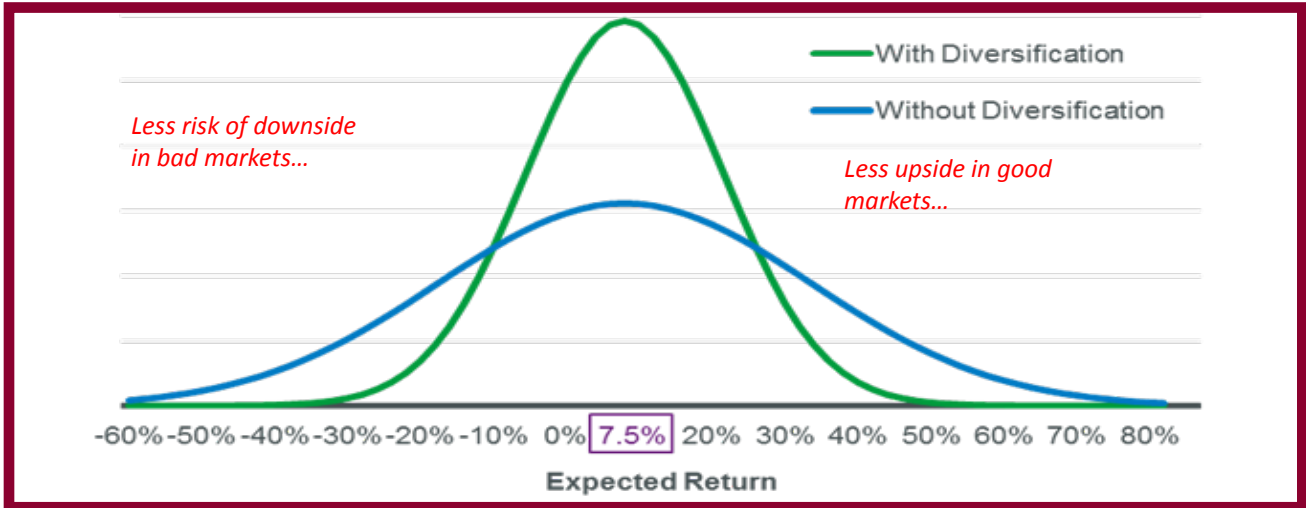
The goal of investment risk management is to find the appropriate balance between expected returns and the risks taken to generate those returns. An entirely risk-free investment portfolio that has a high probability of meeting all investment goals does not exist. Therefore, PSERS does not attempt to 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 investment returns required to maintain stable and cost-effective contribution rates. In positioning for future developments, PSERS cannot know with complete certainty how markets or particular investment strategies will perform, but 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.

Given its long-term investment horizon, PSERS accepts prudent investment risk in exchange for acceptable levels of additional incremental return. PSERS diversifies across investment categories, each having different characteristics across all market environments.

The benefit of a diversified portfolio is that it reduces the probability of outsized outcomes relative to return objectives. Diversification is the only “free lunch” in finance; excess volatility is damaging to PSERS' portfolio, while diversification is beneficial.

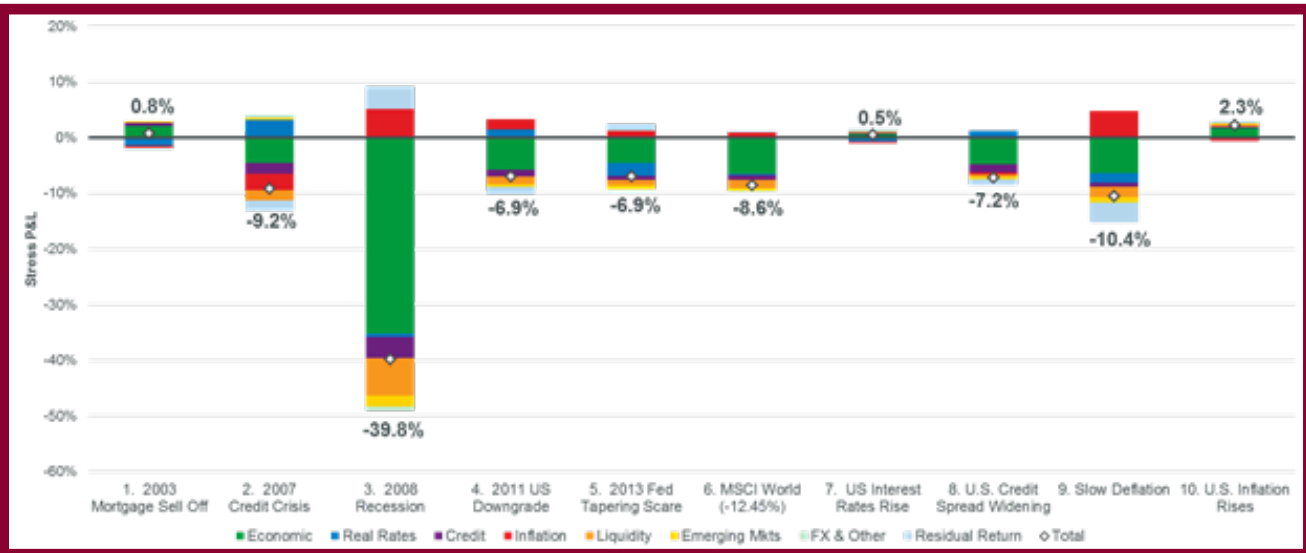
# Investment Risk Management (Continued)

The below graph illustrates two distributions with the same expected return. The distribution shown in blue assumes a portfolio risk of 25.6%, which reflects 100% correlations between risk factors, while the green distribution reflects PSERS' portfolio which benefits from diversification. In the event of a negative two standard deviation move, the undiversified portfolio would experience losses more than double what the diversified portfolio would experience. In a normal distribution, the chance of a two standard deviation decline is approximately 2.3%.



One way that PSERS assesses the amount of diversification in the portfolio is through stress testing. This is a process that quantifies anticipated portfolio losses under various calamitous market events. There are two types of stress tests: historical (meaningful actual past market events) and hypothetical (scenarios designed to reflect potentially calamitous market events).

The graph below depicts several historical and hypothetical stress scenarios and the impact of each as related to a series of common economic factors. Strategically, the exposures to each risk factor are driven by PSERS' asset allocation decisions, which could be tactically adjusted to the extent that a market event is likely, using stress scenarios to assist in these tactical decisions.



# 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.

The table below summarizes the average expected capital market geometric return assumptions of 20 to 30 surveyed independent investment advisors in 2013, 2014, and 2015:

Asset Class	2013 Survey	2014 Survey	2015 Survey
U.S. Equity - Large Cap	7.6%	7.4%	7.1%
U.S. Equity - Small Cap	8.1%	7.7%	7.3%
Non-U.S. Equity - Developed	8.0%	7.8%	7.5%
Non-U.S. Equity - Emerging	9.1%	8.9%	8.7%
U.S. Fixed Income - Core	3.4%	4.0%	3.7%
U.S. Fixed Income - Long Duration Corp.	4.2%	4.9%	4.0%
U.S. Fixed Income - High Yield	5.9%	6.0%	6.0%
Non-U.S. Fixed Income - Developed	3.0%	3.5%	2.7%
Non-U.S. Fixed Income - Emerging	5.4%	5.9%	6.0%
Treasuries (Cash Equivalents)	2.2%	2.7%	2.4%
TIPS (Inflation-Protected)	2.6%	3.5%	3.1%
Real Estate	6.8%	6.5%	6.3%
Hedge Funds	6.4%	6.3%	5.8%
Commodities	5.1%	4.9%	4.4%
Infrastructure	7.1%	7.8%	7.1%
Private Equity	10.1%	9.8%	9.5%
Inflation	2.5%	2.4%	2.2%

## Fixed Income

Nominal government bond returns are a function of long-term expectations for inflation and government yields:

- Government bond 5 year yields have declined between 0.3% and 1.6% across major markets over the past 2 years with the U.S. yields declining 0.9%.
- 15-year yields across the global markets have declined between 0.4% and 1.1% over the past 2 years.

Corporate bond returns are a function of expected inflation, government yields and expectations for credit spreads, defaults and downgrades. The majority of declines in corporate bond return assumptions can be explained by the decline in government bond yields and inflation as defaults, downgrades and spreads have been relatively stable.

Overall, global economies are characterized today by high debts and near-zero interest rates, with levels of inflation running below target nearly everywhere. CMAs are forecasting slow growth and low asset returns over the coming decade. Select asset classes are detailed as follows:

- 5 year corporate bond yields across the various major markets have declined between 0.4% and 1.3% over the past 2 years.
- 15-year yields across markets have declined between 0.1% and 1.4% over the past 2 years.

## Capital Market Assumptions

(continued)

### Equities

Equity return assumptions are driven by market valuations, earnings growth expectations and assumed dividend payouts. Global equity assumptions have declined across all markets between 0.3% and 0.7% over the past 2 years.

### Hedge Funds

Recent structural changes within the hedge fund industry include a) improved information availability, b) lower leverage utilized, c) changing objectives, and d) dramatic increases in market players. This has resulted in lower expected alpha opportunities for hedge funds generally.

**The CMA surveys also included forecasts for average expected risk:**

Asset Class	2013 Survey	2014 Survey	2015 Survey
U.S. Equity - Large Cap	18.1%	17.5%	17.1%
U.S. Equity - Small Cap	22.5%	21.1%	21.0%
Non-U.S. Equity - Developed	20.5%	19.8%	19.6%
Non-U.S. Equity - Emerging	27.5%	26.4%	26.6%
U.S. Fixed Income - Core	5.3%	5.4%	5.6%
U.S. Fixed Income - Long Duration Corp.	11.8%	11.3%	10.8%
U.S. Fixed Income - High Yield	12.3%	11.5%	11.2%
Non-U.S. Fixed Income - Developed	8.2%	7.6%	7.4%
Non-U.S. Fixed Income - Emerging	12.4%	10.9%	11.7%
Treasuries (Cash Equivalents)	1.8%	2.3%	2.8%
TIPS (Inflation-Protected)	5.9%	6.3%	6.3%
Real Estate	12.4%	13.1%	13.6%
Hedge Funds	9.4%	9.0%	8.3%
Commodities	18.5%	18.0%	18.0%
Infrastructure	15.2%	13.5%	13.1%
Private Equity	26.2%	24.8%	23.6%
Inflation	2.0%	2.1%	1.8%

Equity market returns over the past two years have been driven by rising valuations rather than profits. A growing number of market participants worry that equities look expensive and there is an expectation for these market valuations to decline toward historically low levels. Future return assumptions have been declining, reflecting these concerns over expensive valuations.

### Real Estate

Like equities, real estate assumptions have declined due to perceived high current valuations and therefore an expectation for lower returns in the future as these valuations correct: Expected returns across the global real estate markets have declined between 0.5% and 1.0% over the past 2 years.

An alternative approach to asset allocation that is sometimes suggested to pension plans is to establish a stereotypical 60% equity/40% fixed income policy that remains static over time. The two preceding tables illustrate one reason why such an approach would not be prudent. Because PSERS is able to select from a broad array of asset allocation alternatives, the System 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 its long-term goal of 7.5% 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 its ability to manage the Fund.

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### Investment Performance

#### Net of Fees

(for the period ended June 30, 2015)      Annualized Total Returns(%)

Asset Class	One Year	Three Year	Five Year	Ten Year
<b><i>PSERS U.S. Equities</i></b>	<b>6.53</b>	<b>17.61</b>	<b>17.47</b>	<b>7.82</b>
U.S. Equity Policy Index (1)	7.36	17.72	17.46	8.17
<b><i>PSERS Non-U.S. Equities</i></b>	<b>9.31</b>	<b>14.38</b>	<b>11.14</b>	<b>8.46</b>
Non-U.S. Equity Policy Index (2)	7.79	14.14	10.54	7.32
<b><i>PSERS Private Markets (3)</i></b>	<b>2.63</b>	<b>8.97</b>	<b>10.92</b>	<b>11.49</b>
Burgiss Median Return, Vintage Year Weighted (4)	4.29	4.84	5.37	4.87
<b><i>PSERS Real Estate (3)</i></b>	<b>13.92</b>	<b>12.92</b>	<b>13.31</b>	<b>4.99</b>
Blended Real Estate Index (5)	14.32	11.71	12.51	8.16
<b><i>PSERS Fixed Income</i></b>	<b>1.93</b>	<b>4.74</b>	<b>7.05</b>	<b>6.77</b>
Fixed Income Policy Index (6)	-1.19	1.61	4.61	5.61
<b><i>PSERS Absolute Return</i></b>	<b>4.30</b>	<b>4.87</b>	<b>6.04</b>	<b>N/A</b>
Absolute Return Policy Index (7)	3.76	6.24	6.84	N/A
<b><i>PSERS Risk Parity</i></b>	<b>-0.86</b>	<b>4.99</b>	<b>N/A</b>	<b>N/A</b>
Risk Parity Policy Index (8)	-0.81	3.98	N/A	N/A
<b><i>PSERS Master Limited Partnerships</i></b>	<b>-10.14</b>	<b>18.76</b>	<b>20.62</b>	<b>N/A</b>
S&P MLP Index	-16.48	10.54	13.32	N/A
<b><i>PSERS Commodities</i></b>	<b>-18.65</b>	<b>-6.21</b>	<b>-1.18</b>	<b>N/A</b>
Commodity Policy Index (9)	-19.59	-7.15	-2.89	N/A
<b><i>PSERS Cash</i></b>	<b>0.19</b>	<b>0.22</b>	<b>0.25</b>	<b>N/A</b>
BofA Merrill Lynch U.S. Treasury Bill 0 - 3 Month Index (10)	0.02	0.04	0.06	N/A
<b><i>PSERS Total Fund (11)</i></b>	<b>3.04</b>	<b>8.52</b>	<b>9.73</b>	<b>6.31</b>
Policy Index	2.02	6.24	7.27	4.86

1. MSCI USA Investable Market Index effective April 1, 2009; previously was the Dow Jones Wilshire 5000 Index.
2. MSCI ACWI ex USA IMI with DM 100% Hedged to USD (Net) Index effective October 1, 2014. From July 1, 2008 to September 30, 2014, the index was the MSCI All Country World (ACW) ex. USA Investable Market Index. Before July 1, 2008, the MSCI ACW ex. U.S. Index was used. The benchmark was 30% hedged to the U.S. dollar from July 1, 2006 to March 31, 2009.
3. Returns reported on a one-quarter lag, except for publicly traded real estate security investments.
4. Burgiss Median, Vintage Year Weighted Index effective January 1, 2011. Previously, the Thompson ONE, Vintage Year Weighted Index was used. Returns reported on a one-quarter lag.
5. Effective April 1, 2015, comprised of 100% Blended Benchmark (Burgiss Value Added, Burgiss Opportunistic, and NCREIF ODCE for Core) reported on a one-quarter lag. From October 1, 2013 to March 31, 2015, comprised of 100% Blended Benchmark (NCREIF-CEVA for Value Added and Opportunistic; NCREIF-ODCE for Core), reported on a one-quarter lag. Between July 1, 2010 and September 30, 2013 the NTFI Index was used. Between April 1, 2010 and June 30, 2010, the NCREIF Index was used. Previously, returns presented were a blend of the FTSE EPRA/NAREIT Global Real Estate Index and the NCREIF Index.
6. Returns presented are a blend of the Barclays Capital U.S. Aggregate Index (17.2%), Barclays Capital Global Aggregate GDP Weighted Dev x U.S. (Unhedged) Index (3.5%), Barclays Capital Emerging Mkt 10% Country Cap Index (6.9%), Barclays Capital U.S. Treasury Long Index (10.3%), Barclays Capital U.S. High Yield Index (20.7%), and Barclays Capital U.S. TIPS Index (41.4%) effective July 1, 2013. Prior to July 1, 2013, the blend was Barclays Capital U.S. Universal Index (24.7%), JP Morgan GBI EM Global Diversified Index (9.4%), Barclays Capital U.S. High Yield Index (28.2%), Barclays Capital Multiverse Index (14.1%), and Blended Policy (Net Levered TIPS) (23.6%).
7. Three month LIBOR +3.50% effective July 1, 2014. Previously, was based on the assumed actuarial rate of return for the Fund which was 8.0% from July 1, 2009 through June 30, 2011. The assumed rate changed to 7.5% on July 1, 2011 and was used as the Absolute Return Policy Index through June 30, 2014.
8. Effective July 1, 2014 returns presented are a blend of MSCI ACW Index (\$Net) (50%); Barclays Capital U.S. Treasury Index (75%); Barclays Capital World Inflation Linked Bond Index Hedged (55%); Bloomberg Commodity Index (Total Return) (15%); Bloomberg Gold Subindex (5%); and 3-Month LIBOR (-100%). The weights to these indices have varied in previous quarters. The returns have been adjusted for volatility.
9. Returns presented are a blend of the Bloomberg Commodity Gold Index (33.3%) and the Bloomberg Commodity Index (66.7%). On July 1, 2014, the indices names were changed from DJ/UBS to Bloomberg. The returns have been adjusted for leverage.
10. On September 25, 2009, the index name was changed from Merrill Lynch to BofA Merrill Lynch.
11. Over the past 25 years ended June 30, 2015, the Fund earned an annualized rate of return of 8.45 percent which remained above the Fund's assumed actuarial rate of return during that time period.



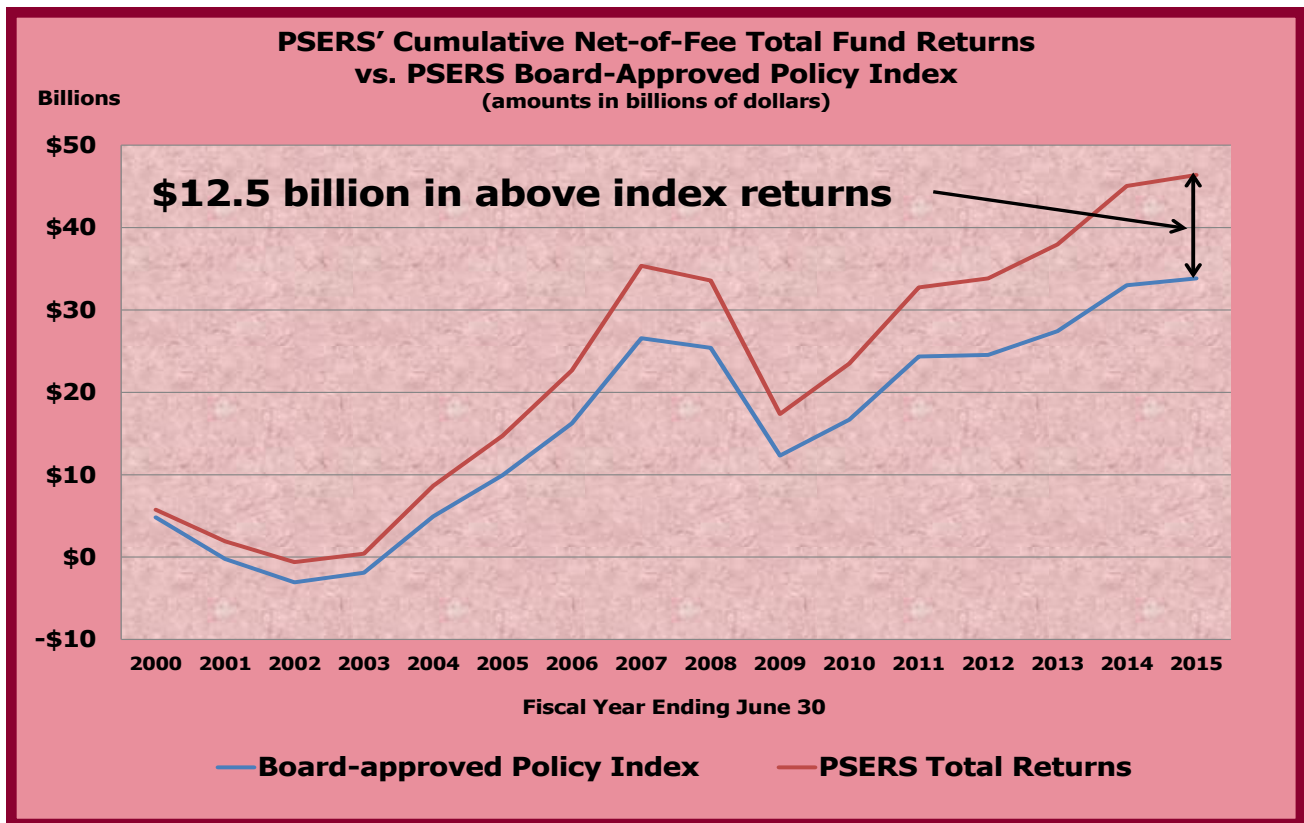
## Managing Investment Fees and Expenses

PSERS' Board annually establishes an Asset Allocation Policy (as more fully described in Tab 12) with input from staff and the general investment consultant, and works on an ongoing basis to implement the Policy through identification of attractive investment strategies and well-qualified investment managers. A fundamental part of this implementation process is making key decisions as to whether assets should be managed by internal staff or by external investment management companies, and whether to adopt active or passive investment strategies. PSERS has demonstrated that a prudent combination of both internal and external investment managers using both active and passive strategies can be successful over the long-term.

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.

**The chart below demonstrates that over the past 16 fiscal years, PSERS has earned \$12.5 billion in additional investment returns above the Board-approved Policy Index, net of fees.**



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

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

PSERS generally prefers to assign investment management responsibilities to internal staff rather than to external investment management companies when certain conditions are present. For example, it must be clear that staff can achieve risk-adjusted returns that are at least equal to what might be earned by external investment managers in equivalent strategies, and PSERS' staff must simultaneously have the operational capacity to take on the additional work. When assets are assigned to PSERS' staff, the total costs (e.g., staff salary and benefits, computers and

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office supplies) are much lower than using even the largest “very low fee” index mutual fund companies charge, giving PSERS a significant advantage.

PSERS current investment staffing levels are too low to increase internal asset management when opportunities present themselves. PSERS continues to work with the Administration to look for ways to reduce investment fees in the future by increasing internal investment staff to bring additional asset classes in-house to be managed by PSERS’ investment staff. PSERS continues to believe it is in the best interests of both the Fund and the Commonwealth to make such an investment and, therefore, has included additional positions in its FY2016/17 budget request.

PSERS’ Investment staff managed 20 portfolios internally, with a total estimated net asset value of over \$17 billion on December 31, 2015, resulting in significant fee savings. PSERS incurred costs of just over \$9 million to manage these portfolios internally, as well as, oversee all of the external managers, manage the asset allocation, oversee risk, etc. **As shown below, managing these assets externally would have cost PSERS over \$25 million in additional fees:**

<i>Account</i>	<i>Asset Class</i>	<i>Market Value as of 12/31/15* (000s)</i>	<i>Estimated Annual Fee %</i>	<i>Estimated Cost to Manage Externally (000s)</i>
PSERS - S&P 500 Index	U.S. Equities	\$ 2,715,307	0.01%	\$ 272
PSERS - S&P 400 Index	U.S. Equities	448,640	0.03%	135
PSERS - S&P 600 Index	U.S. Equities	430,947	0.04%	172
Misc. PSERS Equity Accounts	U.S. Equities	1,436	0.00%	-
	<b>U.S. Equities Total</b>	<b>3,596,330</b>		<b>579</b>
PSERS ACWI ex. U.S. Index	Non U.S. Equities	3,182,716	0.08%	2,546
	<b>Non U.S. Equities Total</b>	<b>3,182,716</b>		<b>2,546</b>
Private Markets Co-Investments	Private Markets	265,568	1.00%	2,656
PA Investment Fund - Private Equity.	Private Markets	4,250	1.00%	43
	<b>Private Markets Total</b>	<b>269,818</b>		<b>2,698</b>
Private Debt Internal	Fixed Income	23,119	1.00%	231
PSERS Active Aggregate	Fixed Income	1,161,753	0.21%	2,440
PSERS TIPS Portfolio	Fixed Income	888,836	0.13%	1,155
PSERS Long Treasuries	Fixed Income	1,117,352	0.18%	2,011
	<b>Fixed Income Total</b>	<b>3,191,060</b>		<b>5,837</b>
PSERS Infrastructure Index	Infrastructure	460,220	0.47%	2,163
	<b>Infrastructure Total</b>	<b>460,220</b>		<b>2,163</b>
PSERS Commodity Beta	Commodities	1,689,878	0.15%	2,535
PSERS Gold Fund	Commodities	1,442,959	0.15%	2,164
	<b>Commodities Total</b>	<b>3,132,837</b>		<b>4,699</b>
PSERS S&P MLP Index	MLP	400,208	0.50%	2,001
	<b>MLP Total</b>	<b>400,208</b>		<b>2,001</b>
PSERS REIT Index	Real Estate	392,038	0.08%	314
Real Estate Co-Investments	Real Estate	96,394	1.00%	964
	<b>Real Estate Total</b>	<b>488,432</b>		<b>1,278</b>
PSERS Risk Parity	Risk Parity	1,258,746	0.30%	3,776
	<b>Risk Parity Total</b>	<b>1,258,746</b>		<b>3,776</b>
PSERS Cash Management	Cash Management	1,256,619	0.01%	126
	<b>Cash Management Total</b>	<b>1,256,619</b>		<b>126</b>
	<b>Grand Total</b>	<b>\$ 17,236,984</b>		<b>\$ 25,704</b>

*\*Market values include cash and derivatives exposure.*

Another benefit of managing a significant amount of assets internally is that PSERS can have its own trading desk. The PSERS Internal Equity Trading Desk (Trading Desk) has the ability to trade domestic and international equities, currencies, options, and futures. The objectives of the internal Trading Desk include:

- to obtain best execution;
- to pay the lowest possible commissions consistent with obtaining best execution; and
- to provide market information/data to portfolio managers.

In addition to trade execution, the Trading Desk provides PSERS with access to information on the financial markets and analysis of trading ideas and strategies developed by PSERS' internal management. Various systems, including Bloomberg, and access to analysis from the broker community provide resources used in evaluating and implementing internal trading ideas and strategies. Trade Cost Analysis (TCA) is able to be performed on a pre-trade basis in order to gauge the expected costs of any transaction. Program trading applications enable the Trading Desk to manage the large number of trading transactions which occur during asset allocation changes, index rebalances, or other transitional trading events. These applications provide a means to execute large trading baskets while monitoring the profit or loss of the trade execution in real-time.

During the fiscal year ended June 30, 2015, the Trading Desk executed approximately 150 million U.S. shares, 84,000 U.S. futures contracts, 270 million international shares, and 36,000 international futures contracts. Combined notional value of all shares, futures, and currencies traded was approximately \$145.6 billion.

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 similar investments, and the System then negotiates fees lower from that point wherever possible.

### 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 the investment staff 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.

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## Summary of Investment Advisory Fees Fiscal Year Ended June 30, 2015 (Dollar Amounts in Thousands)

A summary of investment management fees by asset class, total internal management expenses, custodian fees, and consultant and legal fees is shown below:

	<u>Base Fees</u>	<u>Performance Fees</u>	<u>Total Fees</u>	<u>Basis Points</u>
<b>External Management</b>				
U.S. Equity	\$ 2,097	\$ 555	\$ 2,652	45
Non - U.S. Equity	18,058	5,752	23,810	26
Fixed Income	76,505	7,784	84,289	91
Real Estate	68,955	-	68,955	97
Alternative Investments	102,190	-	102,190	92
Absolute Return	83,278	33,958	117,236	222
Commodities	7,963	272	8,235	68
Master Limited Partnerships	8,502	3,407	11,909	59
Risk Parity	<u>12,913</u>	<u>-</u>	<u>12,913</u>	51
<b>Total External Management</b>	<b>\$ 380,461</b>	<b>\$ 51,728</b>	<b>\$ 432,189</b>	<b>90</b>
<b>Total Internal Management</b>			<b><u>9,189</u></b>	<b>8</b>
<b>Total Investment Management</b>			<b>441,378</b>	<b>73</b>
Custodian Fees			2,383	
Consultant and Legal Fees			<u>11,446</u>	
<b>Total Investment Expenses</b>			<b>\$ <u>455,207</u></b>	<b>75</b>

NOTE: See the Investment Fees by Manager Schedule at Tab 16 for total fee expense charges for each external investment manager

## Section 3 - Investment Information

### Asset Allocation (as of December 31, 2015)

While the Board can choose to modify its asset allocation at any time it determines that changes are warranted, 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' staff 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 following represents PSERS' asset allocation plan that became effective October 1, 2015, and was in effect on December 31, 2015:**

<u>Asset Class</u>	<u>Market Value (in millions)</u>	<u>Percentage of Total</u>	<u>Target Allocation %</u>	<u>Target Allocation Range</u>
Global Public Market Equity:				
U.S. Equity	\$ 3,316.6	7.1 %	8.0 %	
Non-U.S. Equity	<u>6,382.2</u>	<u>13.7</u>	<u>12.5</u>	
Total Global Public Market Equity	\$ 9,698.8	20.8 %	20.5 %	
Private Markets	<u>7,582.2</u>	<u>16.3</u>	<u>17.0</u>	
<b>Total Equity</b>	<b>\$ 17,281.0</b>	<b>37.1 %</b>	<b>37.5 %</b>	± 10%
Fixed Income**	<b>\$ 13,068.5*</b>	<b>28.1 %</b>	<b>24.5 %</b>	± 10%
Master Limited Partnerships	1,938.7	4.2 %	4.0 %	
Commodities**	793.7	1.7	3.0	
Infrastructure**	(23.3)	(0.1)	1.0	
Real Estate**	<u>5,187.1</u>	<u>11.1</u>	<u>11.0</u>	
<b>Total Real Asset Exposure</b>	<b>\$ 7,896.2</b>	<b>16.9 %</b>	<b>19.0 %</b>	± 10%
Risk Parity**	<b>\$ 3,526.1</b>	<b>7.6 %</b>	<b>9.0 %</b>	± 5%
Absolute Return	<b>\$ 4,813.2</b>	<b>10.3 %</b>	<b>10.0 %</b>	± 4%
<b>Totals</b>	<b><u>\$ 46,585.0</u></b>	<b><u>100.0 %</u></b>	<b><u>100.0 %</u></b>	

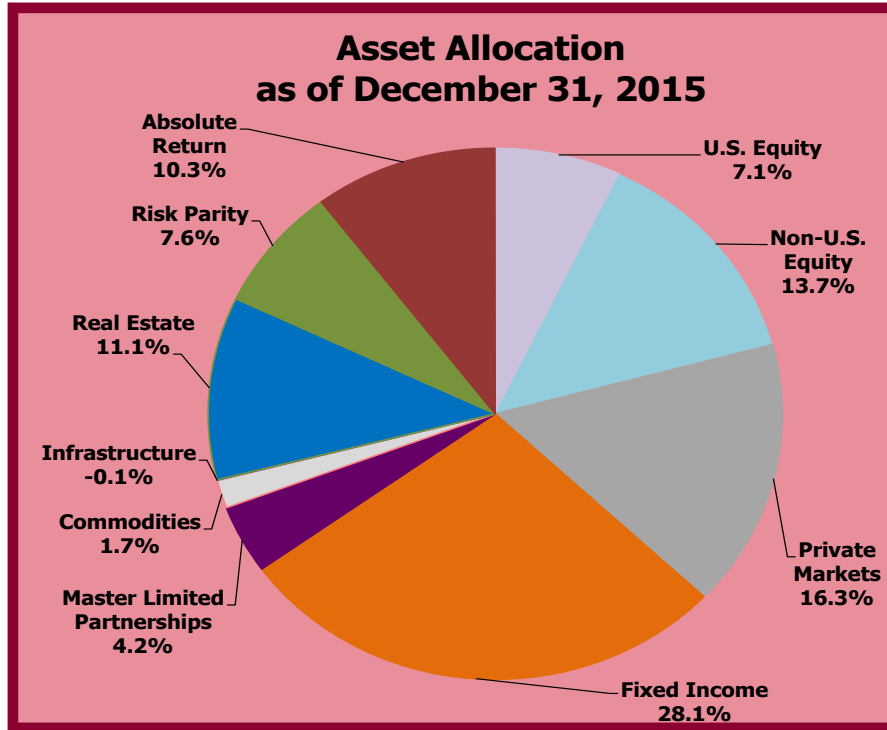
\* Cash is included in the Fixed Income asset class. Cash represents the total short-term investment fund (STIF) managed by PSERS in the PSERS Proprietary Fund. Cash is unitized and the managers in the various asset classes are allocated units of STIF. For purposes of this schedule, units of STIF are not included in the various asset classes. For example, a U.S. Equity manager may manage \$200 million, but if that manager has \$10 million in STIF, \$190 million would be included in U.S. Equity and \$10 million would be included in Cash.

\*\*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 December 31, 2015, PSERS had increased economic exposure of \$7.0 billion related to the following asset classes: Fixed Income (\$3.6 billion); Risk Parity (\$0.6 billion); Infrastructure (\$0.3 billion); Real Estate (\$0.2 billion) and Commodities (\$2.3 billion). The target allocation to financing was netted against the following target allocations: Fixed Income (7%), Risk Parity (1%), Real Estate (1%), and Commodities (5%).

## Section 3 - Investment Information

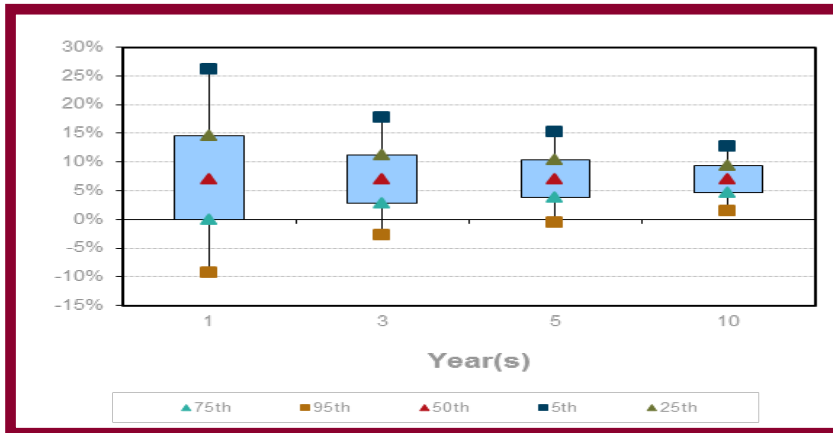
### Asset Allocation (as of December 31, 2015) (continued)

The following chart illustrates PSERS' asset allocation as of December 31, 2015:



The purpose of the asset allocation is to meet the long-term financial needs and 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 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 the table below, which depicts expected future returns for PSERS' current asset allocation:



Range of Returns				
Percentile	1 Year	3 Years	5 Years	10 Years
5th	26.2%	17.7%	15.2%	12.7%
25th	14.5%	11.3%	10.3%	9.3%
50th	7.0%	7.0%	7.0%	7.0%
75th	0.0%	2.9%	3.8%	4.7%
95th	-9.3%	-2.7%	-0.6%	1.5%

Based on Aon Hewitt's 30 year 2nd quarter 2015 capital market assumptions.

**Asset Allocation  
(as of December 31, 2015)  
(continued)**

**Number of Investment Managers and Portfolios**

**Public Market Asset Classes (ex. Real Estate)**

PSERS' public market asset classes, excluding Real Estate, used 64 external investment managers who were responsible for 82 portfolios, and 10 internal portfolio managers who were responsible for 14 portfolios. There were 4 external public market investment managers with portfolios in multiple asset classes. A further breakdown of the external and internal portfolio managers is shown in the table below.

**Private Markets and Real Estate**

PSERS' private markets and real estate (public and private markets) asset classes used 105 active external general partners to invest in 245 limited partnership interests of various private market real estate, private debt, private equity, and venture capital funds. Additionally, PSERS' internal staff manages a portfolio of privately-placed co-investment and secondary investments consisting of both private equity and real estate. PSERS has 2 internal real estate investment managers who are responsible for 1 public market real estate portfolio. Finally, PSERS had 4 external real estate asset managers who oversee the direct management of 4 separate real estate accounts.

**Public Market Asset Classes  
(excluding Public Market Real Estate)**

	Portfolio Managers	Portfolios/Accounts
<b><i>U.S. Equity Investments:</i></b>		
Internal	2	3
<b><i>Non-U.S. Equity Investments:</i></b>		
External	9	10
Internal	1	1
<b><i>Fixed Income Investments:</i></b>		
External	29	44
Internal*	3	5
<b><i>Commodities:</i></b>		
External	3	2
Internal	1	2
<b><i>Master Limited Partnerships:</i></b>		
External	3	3
Internal	1	1
<b><i>Risk Parity:</i></b>		
External	4	5
Internal	1	1
<b><i>Absolute Return:</i></b>		
External	15	17
<b><i>Cash:</i></b>		
Internal*	1	1
<b><i>Securities Lending:</i></b>		
External	1	1
<b><i>Total</i></b>	<b>74</b>	<b>96</b>
<b><i>Total External</i></b>	<b>64</b>	<b>82</b>
<b><i>Total Internal</i></b>	<b>10</b>	<b>14</b>

\*PSERS managed \$282.9 million for the System's healthcare account.



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## Section 3 - Investment Information

### Commitment to Pennsylvania-Based Investment Managers (as of December 31, 2015)

The members of the Board and 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 investment managers 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 staff has 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 2015, investment management fees paid to external firms managing PSERS' assets from offices located in Pennsylvania amounted to \$ 29.7 million, or 6.9% of the total external investment manager fees.

**The following is a list of assets either managed internally by PSERS or by external managers with headquarters or offices located in Pennsylvania, as of December 31, 2015:**

<i>Pennsylvania-Based Manager</i>	<i>Market Value (in millions)</i>	<i>Percentage of the Fund</i>
<b>Internal Management</b>		
US. Equity:		
S&P 500 Index	\$ 2,436.3	5.2%
S&P 400 Index	448.4	1.0%
S&P 600 Index	430.9	0.9%
Non-U.S. Equity:		
ACW ex-U.S. Index	3,181.9	6.8%
Fixed Income:		
PSERS TIPS	876.2	1.9%
PSERS Active Aggregate	1,131.3	2.5%
PSERS U.S. Long Treasuries	46.9	0.1%
Cash & Cash Equivalents:		
STIF	3,369.4	7.2%
Master Limited Partnerships:		
PSERS S&P MLP Index	400.2	0.9%
Commodities:		
PSERS Gold Fund	(7.0) a	0.0%
PSERS Commodity Beta	172.1	0.4%
Infrastructure:		
PSERS Infrastructure Index	(22.6) a	(0.1)%
Risk Parity:		
PSERS Risk Parity	547.5	1.2%
Private Markets:		
Internal Program	278.6	0.6%
Real Estate:		
Internal Program	96.4	0.2%
PSERS REIT Index	(8.0) a	0.0%
<b>Total Internal Management</b>	<b>\$ 13,378.5</b>	<b>28.7%</b>

a - The Market Value represents the net payable on swap contracts.

## Section 3 - Investment Information

### Commitment to Pennsylvania-Based Investment Managers (as of December 31, 2015) (continued)

<i>Pennsylvania-Based Manager</i>	<i>Market Value (in millions) (1)</i>	<i>Percentage of the Fund (1)</i>
<b>External Management</b>		
Fixed Income:		
LBC Credit Partners II, LP	\$ 28.8	0.1%
LBC Credit Partners III, LP	156.8	0.3%
Mariner - International Infrastructure Finance Company Fund L.P.	104.1	0.2%
Radcliffe Capital Management	562.2	1.2%
SEI Investments Company	99.0	0.2%
<b>Subtotal Fixed Income:</b>	<b>\$ 950.9</b>	<b>2.0%</b>
Master Limited Partnership:		
Harvest Fund Advisors, LLC	612.0	1.3%
Real Estate:		
BPG Co-Investment Fund		
Charter Oak Advisors, Inc.		
Exeter Industrial Value Fund II, L.P.		
Exeter Industrial Value Fund III, L.P.		
GF Management, Inc.		
LEM Real Estate Mezzanine Fund II, L.P.		
LEM RE High Yield Debt & Preferred Equity Fund III, LP		
<b>Subtotal Real Estate:</b>	<b>\$ 404.8</b>	<b>0.9%</b>
Private Equity and Debt:		
Incline Equity Fund III, L.P.		
PNC Equity Partners II, L.P.		
PNC Equity Partners, L.P.		
Milestone Partners II, L.P.		
Milestone Partners III, L.P.		
Milestone Partners IV, L.P.		
Versa Capital Fund I, L.P.		
Versa Capital Fund II, L.P.		
Versa Capital Fund III, L.P.		
<b>Subtotal Private Equity and Debt:</b>	<b>\$ 373.4</b>	<b>0.8%</b>

(1) Market values and percentage of the fund for individual Real Estate and Private Market investments are not being disclosed at this time.

### Section 3 - Investment Information

## Commitment to Pennsylvania-Based Investment Managers (as of December 31, 2015) (continued)

<i>Pennsylvania-Based Manager</i>	<i>Market Value (in millions) (1)</i>	<i>Percentage of the Fund (1)</i>
Venture Capital:		
Adams Capital Management, LP		
Co-Investment 2000 Fund, L.P.		
Co-Investment Fund II, L.P.		
Cross Atlantic Technology Fund II		
Cross Atlantic Technology Fund, L.P.		
LLR Equity Partners II, L.P.		
LLR Equity Partners III, L.P.		
LLR Equity Partners IV, L.P.		
LLR Equity Partners, L.P.		
NEPA Venture Fund II		
Novitas Capital, L.P.		
Novitas Capital II, L.P.		
Quaker Bio-Ventures, L.P.		
Quaker Bio-Ventures II, L.P.		
SCP Private Equity Partners I, L.P.		
SCP Private Equity Partners II, L.P.		
TDH III, L.P.		
<b>Subtotal Venture Capital:</b>	<b>\$449.5</b>	<b>1.0%</b>
<b>Total External Management</b>	<b>\$ <u>2,790.6</u></b>	<b><u>6.0%</u></b>
<b>Total Investment Portfolios Managed in PA</b>	<b>\$ <u>16,169.1</u></b>	<b><u>34.7%</u></b>

(1) Market values and percentage of the fund for individual Real Estate and Private Market investments are not being disclosed at this time.



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**Summary of Investments in  
Pennsylvania  
(as of December 31, 2015)**

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.

The following is a table of Pennsylvania-based investments and other statistics at December 31, 2015 (\$’s in millions):

<i>Asset Class</i>	<i>Total PA Market Value (PSERS' Portion)</i>	<i>Total PA Market Value (Total Invested)</i>	<i># of People Employed</i>	<i>Payroll</i>
U.S. Equities	\$ 175.7	\$ 175.7	*	\$ *
Fixed Income	61.5	61.5	*	*
Private Real Estate	79.8	2,327.4	290	6.8
Private Markets:				
Venture Capital	121.4	408.9	3,419	77.9
Private Equity	1,073.1	13,512.5	22,492	535.7
Private Debt	<u>201.7</u>	<u>1,689.7</u>	<u>8,426</u>	<u>207.6</u>
<b>Total</b>	<b>\$ <u>1,713.2</u></b>	<b>\$ <u>18,176.0</u></b>	<b><u>34,627</u></b>	<b>\$ <u>828.0</u></b>

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

**U.S. Equities**

PSERS invests in the stock of Pennsylvania-based companies through the various U.S. Equity portfolios managed by external and internal portfolio managers. PSERS has always had investments in large national firms located in Pennsylvania, a list of which is included later in this section.

**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, a list of which is included later in this section.

**Private Real Estate**

PSERS has investments in limited partnerships that have invested in Pennsylvania real estate properties. PSERS has committed \$70 million in BPG/PSERS Co-Investment Fund managed by Equus Capital Partners, Ltd., located in

Philadelphia. In addition, PSERS has committed \$225 million in three funds (LEM Real Estate Mezzanine Fund II, LEM RE High Yield Debt & Preferred Equity Fund III and LEM Multifamily Senior Equity Fund IV) managed by LEM Mezzanine Partners in Philadelphia. Finally, PSERS has committed \$150 million in two funds (Exeter Industrial Value Fund II and III) managed by Exeter Property Group, located in Plymouth Meeting.

As of December 31, 2015, PSERS’ Pennsylvania real estate portfolio contained 66.0 million square feet of office, retail, and warehouse space and 45,778 apartment, hotel and condominium units. The gross market value of the Pennsylvania real estate portfolio investments totaled \$2.3 billion, of which PSERS’ ownership share was \$79.8 million. The portfolio contains numerous notable Pennsylvania real estate investments, including:

- 5 North Fifth Street - PSERS owns a 100% interest in this major downtown Harrisburg, PA office building that contains 70,693 square feet of office space. The building is PSERS’ headquarters and is fully occupied by PSERS.
- 20 Stanwix – DRA (Fund VIII) acquired a 338,000 sf office tower in Pittsburgh, PA’s Central Business District that is currently 91% leased.
- Brixmor - Blackstone Real Estate Partners VI made an investment in a nationwide portfolio of neighborhood shopping centers, comprising over 91 million square feet of gross leasable area in 39 states. There are 18 centers comprising over 7.0 million square feet of this portfolio located in Pennsylvania. This company listed on the NYSE on October 30, 2013.

**Summary of Investments in  
Pennsylvania  
(as of December 31, 2015)  
(continued)**

**Venture Capital**

PSERS' Venture Capital program has committed \$2.8 billion to 57 partnerships since the inception of the program. In addition to the current international scope of venture capital investments, a historical objective of this program has been to target partnerships that demonstrate an ability to invest in Pennsylvania-based companies. Selected partnerships offer diversification according to geographic region and financing stage within Pennsylvania. From the inception of this program to December 31, 2015, 29 of the 57 venture capital partnerships were headquartered in Pennsylvania.

PSERS is generally the lead investor in many of the venture capital funds in which PSERS invests. As a lead investor, PSERS provides Pennsylvania with capital from numerous out-of-state investors. As of December 31, 2015, PSERS' Venture Capital partnerships invested in 113 Pennsylvania locations employing 3,419 employees with a combined payroll of \$77.9 million. The market value of these investments was \$409 million, of which PSERS' share was \$121.4 million.

A key objective of PSERS' venture capital program is to attract both national and regional funds into the Pennsylvania small business community. Venture capital investments serve to accelerate economic growth in both the business sector and the community due to an increase in employment and revenues within the Commonwealth.

Following are a sample of Pennsylvania companies in which PSERS invested through the Venture Capital program:

- Coredial, LLC, Blue Bell, PA – Coredial is a provider of cloud software and services focused on unified communications. Their SwitchConnex platform offers unparalleled services that, combined with their exceptional people, proven processes, and innovative technology, enables their Partners to successfully sell, deliver, manage, and invoice under their own brand. Coredial's flexible software platform, web portal and great business model have assisted businesses in growing their companies. LLR Equity Partners IV, L.P. made this investment.
- Parsa Therapeutics, Inc. Philadelphia, PA – Tarsa Therapeutics develops oral calcitonin for the treatment and prevention of osteoporosis. An estimated 10 million people in the U. S. have osteoporosis and 34 million more have low bone mass that puts them at risk of the disease. Calcitonin, a naturally occurring peptide hormone that is present in most vertebrates, binds to specific receptors on bone cells known as osteoclasts and prevents the

bone from being resorbed. Tarsa Therapeutics has developed TBRIA™ delayed release tablets in an oral formulation of calcitonin. Quaker BioVentures II, L.P. made this investment.

- Strategic Distribution, Inc., Bristol, PA. - Strategic Distribution, Inc. provides outsourced maintenance, repair and operations supply chain management services. Strategic Distribution, Inc. manages the procurement and inventory management of more than 2.0 million maintenance, repair and operations SKUs through the combination of customer integrated technology, on-site professional staff and centralized, supplier-agnostic sourcing and operations departments. LLR Equity Partners III made this investment.
- TELA Bio, Inc. Malvern, PA - TELA Bio is developing and commercializing innovative biosurgical products for use in advanced surgical reconstruction procedures. The company is targeting the hernia repair market initially and has licensed a founding technology that promises to address unmet clinical needs. The company is currently conducting animal studies to optimize the core technology prior to a targeted commercial launch in 2014. Quaker BioVentures II made this investment.

**Private Equity**

PSERS' Private Equity program has committed \$18.8 billion to 142 partnerships since the inception of the program. From the inception of this program to December 31, 2015, 7 of the 142 partnerships were headquartered in Pennsylvania.

PSERS is the lead investor in many of the private equity funds in which it invests. As a lead investor, PSERS provides Pennsylvania with capital from numerous out-of-state investors. As of December 31, 2015, PSERS' Private Equity partnerships invested in 485 Pennsylvania locations employing 22,492 employees with a combined payroll of \$535.7 million. The market value of these investments was \$13.5 billion, of which PSERS' share was \$1.1 billion.

The following companies are a sample of Pennsylvania investments funded through PSERS' private equity partnerships:

- Bacharach, Inc., New Kensington, PA - Bacharach was founded in 1909 and changed ownership several times before it was purchased by an individual in 1986 from United Technologies. Between 1986 and mid-2000's, Bacharach rapidly diversified its product line through new introductions and acquisitions. Today, Bacharach is a leading manufacturer of handheld and fixed-based instruments for the measurement and detection of gases and the recovery of refrigerants. The company's products include instruments that detect, measure and record combustion and

**Summary of Investments in  
Pennsylvania  
(as of December 31, 2015)  
(continued)**

environmental gases, temperature, relative humidity, air velocity and other air quality and safety parameters. Bacharach sells its products to a mix of customers including heating, ventilation, air conditioning and refrigeration (HVAC/R) distributors, industrial and master distributors, catalog houses and Original Equipment Manufacturers (OEMs). PNC Equity Partners III made this investment.

- Blaschak Coal Corp., Mahanoy City, PA - Blaschak Coal Corp. (“Blaschak”) is a miner, preparer and marketer of anthracite, a relatively rare form of coal that has high carbon content and low levels of impurities, making it a valuable fuel for a variety of industrial applications and home heating. Blaschak is a market leader and one of the few fully integrated U.S. anthracite companies with a large reserve base, multiple mines, multiple preparation plants, a bagging plant, rail and truck loading facilities and extensive marketing operations serving several end markets. Milestone Partners III made this investment.
- CODi, Inc., Harrisburg, PA – CODi, Inc. is a provider of lightweight, high-quality laptop computer cases and information technology accessories to Fortune 500 companies. CODi’s accumulated knowledge dealing with the “corporate road warrior” allows the company to uniquely service corporate and consumer needs with precision. CODi uses a direct sales force to its competitive advantage, allowing a one-stop solution for customers in a market where distributors and value-added resellers are the norm. This one-stop approach allows high profitability as it captures up to three levels of contributions margins. Milestone Partners II made this investment.
- Primanti Bros., Pittsburgh, PA – Primanti Bros. is a restaurant that serves sandwiches, burgers, buffalo wings, salad, and pizza in a sports oriented environment. Since Primanti Bros. was founded in 1933 they have expanded to 20 locations with 16 of them located in the Pittsburgh area. Additional plans for expansion are currently underway. Primanti Bros. signature sandwiches have been featured in National Geographic, and on the Travel Channel’s Man V. Food and Food Paradise television shows. Catterton Partners VII, L.P. made this investment.

**Private Debt**

PSERS’ Private Debt program has committed \$5.1 billion to 34 partnerships since the inception of the program. From the inception of this program to December 31, 2015, three of the 30 private debt partnerships were headquartered

in Pennsylvania. PSERS has committed \$375 million to the three Pennsylvania-based funds managed by Versa Capital Management (formerly known as Chrysalis Capital Partners), which are located in Wayne, Pennsylvania.

PSERS is the lead investor in many of the private debt funds in which PSERS invests. As of December 31, 2015, PSERS’ private debt partnerships invested in 164 Pennsylvania locations employing 8,426 employees with a combined payroll of \$207.6 million. The market value of these investments was \$1.7 billion, of which PSERS’ share was \$201.7 million.

The following companies are a sample of Pennsylvania investments made through PSERS’ Private Debt Program:

- Albertsons, Philadelphia, PA – Albertsons is one of the largest food and drug retailers in the United States, with both a strong local presence and national scale. Their mission is to run really great stores and provide great customer service and they guarantee the freshness and taste of the products they sell. Albertsons operates more than 2,200 stores across 33 states. In Pennsylvania, it operates 43 stores under the ACME brand name. This investment was made through Cerberus Institutional Partners V, L.P.
- DynaVox, Pittsburgh, PA - DynaVox, a former division of Sunrise Medical spun-out in May 2004, is the market leader in the alternative and augmentative communication industry, developing and selling devices and software for individuals affected by speech disabilities resulting from traumatic, congenital or degenerative conditions. This investment was made through New York Life Investment Management Mezzanine Partners I.
- Gabes (formerly known as Gabriel Brothers), Harrisburg PA – Gabes offers famous brands at up to 70 percent off department and specialty stores. They offer a variety of clothing for women, men and children, footwear, accessories, purses, handbags, and wallets, bath and beauty products, housewares and home accents including linens, rugs, cookware, and home décor, small electronics and snack foods. Gabes operates 55 stores in ten states. This investment was made through New York Life Capital Partners IV, L.P.
- Keane & Sons Drilling Corp., Lewis Run, PA – Keane & Sons Drilling provides oilfield services in the Appalachian Basin, including top hole drilling and hydraulic fracturing services to major operators in the Marcellus Shale basin and across the U.S. This investment was made through Cerberus Institutional Partners, L.P. – Series Four.

**Summary of Investments in  
Pennsylvania  
(as of December 31, 2015)  
(continued)**

**PSERS Private Market Internal Co-Investment Program**

PSERS' Private Market Internal Co-Investment Program has committed \$257.7 million to 21 investments since the inception of the program. PSERS's Private Market Internal Co-Investment Program was initiated in 2013 and consists of co-investments and secondary fund investments where PSERS is already a Limited Partner. The number of employees, payroll, and market value are included within the private equity figures.

**PSERS Private Debt Internal Program**

PSERS' Private Debt Internal Program has committed \$11 million to 2 investments since the inception of the program. PSERS' Private Debt Internal Program was initiated in 2015 and was organized for the purpose of co-investing in companies that are headquartered in Pennsylvania, companies whose business primarily originates from Pennsylvania, or companies who earn a majority of their revenue in Pennsylvania, or in real properties located in Pennsylvania.



## Section 3 - Investment Information

### Pennsylvania-Based Publicly Traded Stocks (as of December 31, 2015)

<i>Security</i>	<i>Shares Outstanding</i>	<i>Market Value</i>
Air Products & Chemicals, Inc.	12,668	\$ 1,648,233
Airgas, Inc.	91,650	12,677,028
Allegheny Technologies, Inc.	31,944	359,370
American Eagle Outfitters	51,916	804,698
Amerigas Partners LP	392,594	13,454,196
Amerisourcebergen Corp.	12,763	1,323,651
Ametek, Inc.	15,542	832,896
Ansys, Inc.	25,801	2,386,593
Aqua America, Inc.	51,151	1,524,300
Carpenter Technology Corp.	14,242	431,105
Comcast Corp.	159,539	9,002,786
Cone Midstream Partners LP	50,406	496,499
Consol Energy, Inc.	51,094	403,643
CrossAmerica Partners LP	290,834	7,538,417
Dentsply International, Inc.	9,138	556,047
Dicks Sporting Goods, Inc.	26,117	923,236
EQT Corp.	639,318	14,169,047
Federated Investors, Inc.	27,466	786,901
FMC Corp.	8,730	341,605
Fulton Financial Corp.	50,456	656,433
Hershey Company	9,387	837,977
Interdigital, Inc.	10,266	503,445
Kennametal, Inc.	23,081	443,155
Kraft Heinz Co.	38,848	2,826,580
Liberty Property Trust	42,843	1,330,275
Lincoln National Corp.	16,169	812,654
MSA Safety, Inc.	9,203	400,054
National Penn Bancshares, Inc.	186,468	2,299,150
Pep Boys	556,234	10,240,268
PNC Financial Services Group	33,178	3,162,195
PPG Industries, Inc.	17,593	1,738,540
PPL Corp.	43,892	1,498,034
Rice Energy, Inc.	20,390	222,251
Rice Midstream Partners LP	1,361,021	18,360,173
Rite Aid Corp.	1,470,588	11,529,410
SEI Investments Co.	40,096	2,101,030
Sunoco Logistics Partners LP	1,425,651	36,639,231
Talen Energy	18,629	116,059
Teleflex, Inc.	12,062	1,585,550
Toll Bros., Inc.	47,012	1,565,500
Triumph Group, Inc.	14,298	568,346

### Section 3 - Investment Information

#### Pennsylvania-Based Publicly Traded Stocks (as of December 31, 2015) (continued)

<i>Security</i>	<i>Shares Outstanding</i>	<i>Market Value</i>
UGI Corp.	49,996	\$ 1,687,865
United States Steel Corp.	42,409	338,424
Universal Health Services, Inc.	5,958	711,921
Urban Outfitters Inc.	5,672	129,038
Vishay Intertechnology, Inc.	39,268	473,179
West Pharmaceutical Services, Inc.	20,900	1,258,598
Westinghouse Air Brake Technologies Corp.	27,972	<u>1,989,369</u>
<b>Total</b>		<b>\$ <u>175,684,955</u></b>

#### Pennsylvania-Based Bonds (as of December 31, 2015)

<i>Security</i>	<i>Interest Rate (%)</i>	<i>Maturity Date</i>	<i>Par Value</i>	<i>Market Value</i>
ACE INA Holdings, Inc.	3.150	03/15/2025	470,000	\$ 464,506
Comcast Corp.	9.455	11/15/2022	615,000	849,094
Comcast Corp.	6.400	03/01/2040	302,000	374,818
Exelon Generation Company	5.600	06/15/2042	425,000	395,747
FS Investment Corp.	4.250	01/15/2020	25,750,000	25,850,425
FS Investment Corp.	4.750	05/15/2022	20,000,000	19,405,000
Montgomery County PA	6.030	09/01/2039	3,400,000	3,767,404
Montgomery County PA	5.900	09/01/2030	1,000,000	1,108,540
PNC Bank	0.537	08/01/2017	2,500,000	2,492,200
PNC Bank	0.633	01/28/2016	1,000,000	999,930
PPG Industries	3.600	11/15/2020	2,000,000	2,053,940
Rohm & Haas Company	6.000	09/15/2017	1,024,000	1,089,915
Verizon Pennsylvania Inc.	8.350	12/15/2030	2,229,000	<u>2,662,340</u>
<b>Total</b>				<b>\$ <u>61,513,859</u></b>

**Section 3 - Investment Information**

**Real Estate Separate Account Pennsylvania Properties**  
(as of December 31, 2015)

*Real Estate Separate Account Pennsylvania Properties*

Property	Location	Description	Manager
5 North Fifth Street	Harrisburg	5 story office building (PSERS headquarters)	L&B Realty Advisors

Total market value (unaudited) of Pennsylvania-based properties was \$8.1 million as of December 31, 2015.



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### Section 3 - Investment Information

## Pennsylvania-Based Private Equity/Venture Capital/ Private Debt Partnerships

(Dollar Amounts in Millions)

(Since the inception of the program as of December 31, 2015)

<i>Partnership</i>	<i>Location</i>	<i>PSERS Maximum Capital Commitment</i>
Adams Capital Management, L.P.	Sewickley	\$ 12.5
APA/Fostin Venture Fund I (closed)	King of Prussia	20.0
CEO Venture Fund I (closed)	Pittsburgh	1.0
CEO Venture Fund II (closed)	Pittsburgh	15.0
Co-Investment 2000 Fund, L.P.	Wayne	135.0
Co-Investment Fund II, L.P.	Wayne	135.0
Commonwealth Venture Partners I (closed)	Philadelphia	20.0
Commonwealth Venture Partners II (closed)	Philadelphia	10.0
Cross Atlantic Technology Fund, L.P.	Radnor	30.1
Cross Atlantic Technology Fund II, L.P.	Radnor	21.1
Graham Partners Investments, L.P.	Newtown Square	56.7
Incline Equity Partners III (PSERS), L.P.	Pittsburgh	65.0
Keystone Minority Capital Fund (closed)	Philadelphia	0.1
Keystone Venture Fund IV (closed)	Philadelphia	7.8
LLR Equity Partners, L.P.	Philadelphia	62.5
LLR Equity Partners II, L.P.	Philadelphia	75.0
LLR Equity Partners III, L.P.	Philadelphia	187.5
LLR Equity Partners IV, L.P.	Philadelphia	200.0
Loyalhanna Venture Fund (closed)	Pittsburgh	15.0
Milestone Partners II, L.P.	Rosemont	29.9
Milestone Partners III, L.P.	Rosemont	60.0
Milestone Partners IV, L.P.	Rosemont	70.0
NEPA Venture Fund I (closed)	Bethlehem	1.0
NEPA Venture Fund II	Bethlehem	5.0
Novitas Capital I, L.P.	Wayne	30.0
Novitas Capital II, L.P.	Wayne	75.0
P/A Fund (closed)	King of Prussia	30.0
PNC Equity Partners, L.P.	Pittsburgh	43.1
PNC Equity Partners II, L.P.	Pittsburgh	68.1
Quaker BioVentures, L.P.	Philadelphia	69.4
Quaker BioVentures II, L.P.	Philadelphia	100.0
SCP Private Equity Partners I, L.P.	Wayne	62.5
SCP Private Equity Partners II, L.P.	Wayne	125.0
TDH III, L.P.	Rosemont	7.3
Technology Leaders, L.P. (closed)	Wayne	10.0
TL Ventures III, L.P. (closed)	Wayne	50.0
Versa Capital Partners, L.P. (f/k/a Chrysalis)	Wayne	75.0
Versa Capital Partners II, L.P.	Wayne	150.0
Versa Capital Partners III, L.P.	Wayne	150.0
<b>Total</b>		<b><u>\$ 2,280.6</u></b>

**Section 3 - Investment Information****Pennsylvania-Based Real Estate  
Partnerships****(Dollar Amounts in Millions)****(Since the inception of the program as of December 31, 2015)**

<i>Partnership</i>	<i>Location</i>	<i>PSERS Maximum Capital Commitment</i>
BPG Investment Partnership IV, L.P. (closed)	Philadelphia	\$ 75.0
BPG Investment Partnership V, L.P.	Philadelphia	50.0
BPG Investment Partnership VI, L.P.	Philadelphia	87.5
BPG/PSERS Co-Investment Fund	Philadelphia	100.0
Exeter Industrial Value Fund II, L.P.	Plymouth Meeting	75.0
Exeter Industrial Value Fund III, L.P.	Plymouth Meeting	75.0
LEM RE High Yield Debt & Preferred Equity Fund III, L.P.	Philadelphia	75.0
LEM Real Estate Mezzanine Fund II, L.P.	Philadelphia	75.0
Lubert-Adler Real Estate Fund II	Philadelphia	50.0
Lubert-Adler Real Estate Fund III	Philadelphia	150.0
Lubert-Adler Real Estate Fund IV	Philadelphia	100.0
Lubert-Adler Real Estate Fund V	Philadelphia	100.0
Lubert-Adler Real Estate Fund VI	Philadelphia	<u>150.0</u>
<b>Total</b>		<b>\$ <u>1,162.5</u></b>



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**Investment Program Summary**  
**(as of December 31, 2015)**

This section describes PSERS' major and minor asset classes, and their roles in the overall portfolio. **For purposes of managing the overall structure of the Fund, PSERS divides its nine asset classes into either Traditional or Non-Traditional:**

<u>Traditional Asset Classes</u>	<u>Non-Traditional Asset Classes</u>
Equity	Private Markets
Fixed Income	Real Estate
Risk Parity	Absolute Return
Master Limited Partnerships	Infrastructure
Commodities	

## Section 3 - Investment Information

### Summary of PSERS’ Equity Investments (as of December 31, 2015)

Public Market Global Equity exposure is a Traditional asset class that PSERS uses to diversify the investments of the Fund. PSERS’ investment plan diversifies equity investments and balances equity management styles. PSERS contracts with external investment managers and hires internal portfolio managers to manage equity portfolios.

#### Policy

Equities are utilized by the Fund primarily because their expected large return premiums versus inflation will, if realized, help preserve and enhance the real value of the Fund over long periods of time. The Public Market Global Equity Exposure asset class is to be managed on a total return basis.

Equity investments consist almost entirely of publicly-traded securities listed on major world-wide stock exchanges or derivatives such as swaps or listed futures that replicate the performance of equity indexes such as the S&P 500 Index. Swaps and futures are employed by PSERS’ portable alpha portfolios to equitize cash.

PSERS’ Asset Allocation targets an eventual allocation of 20.5% of assets to Global Public Market Equity Exposure.

#### Market Value as of December 31, 2015:

- U.S.: \$3,316.6 million, or 7.1% of the Fund’s total market value.

- Non-U.S.: \$6,382.2 million, or 13.7% of the Fund’s total market value.
- Total: \$9,698.8 million, or 20.8% of the Fund’s total market value.

**Number of External Investment Managers:** PSERS had contracts with 9 external investment managers responsible for various Non-U.S. Equity portfolios. This includes one external manager (Pareto) which has been assigned a mandate to hedge foreign currency exposure.

#### Number of Internal Portfolio Managers:

- U.S.: PSERS had two employees managing various U.S. Equity portfolios with a combined market value of \$3,316.6 million.
- Non-U.S.: PSERS had one employee managing one Non-U.S. Equity portfolio with a market value of \$3,181.9 million.

#### Types of Investment Portfolios at December 31, 2015:

- U.S.: 73.5% large capitalization stock strategies, and 26.5% medium/small capitalization stock strategies. 100% of these investments are passively-managed portfolios, managed internally by PSERS staff.
- Non-U.S.: 84.2% large capitalization stock strategies, 12.0% small capitalization strategies, and 3.8% emerging market stock strategies. 49.9% of these investments are passively managed portfolios, managed internally by PSERS staff, and 50.1% of these investments are actively-managed portfolios, managed externally.

### Summary of PSERS’ U.S. Equity Portfolios (unaudited) (as of December 31, 2015)

	Market Value (in millions)	% of U. S. Equities	% of Total Fund
<b><i>Passively Managed Portfolios</i></b>			
PSERS S&P 400 Index Fund	\$ 448.4	13.5%	1.0%
PSERS S&P 500 Index Fund	2,436.3	73.5%	5.2%
PSERS S&P 600 Index Fund	430.9	13.0%	0.9%
Other	1.0	0.0%	0.0%
<b>Total Passively Managed U.S. Equity</b>	<b>\$ 3,316.6</b>	<b>100.0%</b>	<b>7.1%</b>
<b>Total U.S. Equity</b>	<b>\$ 3,316.6</b>	<b>100.0%</b>	<b>7.1%</b>

Numbers may not add due to rounding.



### Section 3 - Investment Information

## Summary of PSERS' Non-U.S. Equity Portfolios (unaudited) (as of December 31, 2015)

	Market Value (in millions)	% of Non-U. S. Equities	% of Total Fund
<b><u>Passively Managed Portfolios</u></b>			
PSERS ACWI x-US Index Fund	\$ 3,181.9	49.9%	6.8%
<b><u>Actively Managed Developed Large Cap Portfolios</u></b>			
Baillie Gifford Overseas Ltd.	\$ 828.6	13.0%	1.8%
BlackRock Financial Management, Inc.	494.9	7.7%	1.1%
Marathon Asset Management Limited	894.0	14.0%	1.9%
Pareto Investment Management, Ltd.	(26.7) a	(0.4%)	(0.1%)
<b>Total Actively Managed Developed Large Cap Non-U.S. Equity</b>			
	<b>\$ 2,190.8</b>	<b>34.3%</b>	<b>4.7%</b>
<b><u>Actively Managed Emerging Market Portfolios</u></b>			
Wasatch Advisors, Inc.	246.5	3.8%	0.5%
<b>Total Actively Managed Emerging Market Non-U.S. Equity</b>			
	<b>\$ 246.5</b>	<b>3.8%</b>	<b>0.5%</b>
<b><u>Actively Managed Developed Small Cap Portfolios</u></b>			
Acadian Asset Management	\$ 183.4	2.9%	0.4%
Batterymarch Financial Management, Inc.	74.3	1.2%	0.2%
Oberweis Asset Management, Inc.	149.9	2.3%	0.3%
Pyramis Global Advisors	133.6	2.1%	0.3%
Wasatch Advisors, Inc.	221.8	3.5%	0.5%
<b>Total Actively Managed Developed Small Cap Non-U.S. Equity</b>			
	<b>\$ 763.0</b>	<b>12.0%</b>	<b>1.7%</b>
<b>Total Non-U.S. Equity</b>			
	<b>\$ 6,382.2</b>	<b>100.0%</b>	<b>13.7%</b>

a - The Market Value represents the cumulative unrealized net loss on foreign exchange contracts.

Numbers may not add due to rounding.

### Summary of PSERS' Private Market Investments (as of December 31, 2015)

Private Market investments is a Non-Traditional asset class that PSERS uses to diversify the investments of the Fund. The primary vehicle used to invest funds in this asset class is the limited partnership. Individual management groups selected by PSERS form these partnerships for the purpose of investing in and managing private equity and unlisted-subordinated debt positions on behalf of PSERS and other limited partners. PSERS' Asset Allocation currently targets an allocation of 17.0% to Private Market investments. Private Market Investment sub-asset class explanations are as follows:

**Private Equity** involves investments in private companies which normally do not have technology risk associated with traditional venture capital investments. It has evolved to include the financing of more mature, profitable companies that do not have access to, or qualify for, public equity and debt funding. Private Equity strategies include:

- *Buyouts* - Investment strategy is to acquire the assets of a publicly or privately held company. A subset of this category is the leveraged buyout, where financing enables companies to be acquired through the use of borrowed funds. Typically, the assets of target companies serve as collateral for loans originated in the transaction.
- *Secondary Partnerships* - An investment strategy to acquire interests in established limited partnerships. Secondary investing can often be lucrative due to the fact that the partnerships are purchased at significant discounts to net asset value and the timing of the purchase frequently occurs as the acquired partnerships begin to realize profits.

**Venture Capital** is considered the financing of young, relatively small, rapidly growing companies. In traditional venture capital investments, companies have a 5-10 year investment horizon and develop technology for a particular market, such as pharmaceuticals, software, medical products, etc. Venture capital strategies are typically classified as follows:

- *Seed* - An investment strategy that involves companies that are still in the conceptual stage of growth. Seed stage investing involves product viability risk.
- *Early Stage* - An investment strategy involving financing portfolio companies for product development and initial marketing, manufacturing

and sales activities. Typically, early stage companies have been formed, but revenues have not been realized. Early stage investment involves risks associated with defining competitive markets, developing production and marketing channels.

- *Later Stage* - An investment strategy involving financing portfolio companies for rapid expansion. Risk at this stage revolves around capturing market share while increasing production and delivery capabilities and building sales volume.
- *Balanced* - An investment strategy including a variety of portfolio company development stages (Seed, Early, Later, etc.).

**Private Debt** involves investments in the secured and/or unsecured debt obligations of private and/or public companies. This debt is typically acquired through directly negotiated or competitively bid transactions. Owners of these debt instruments typically take either an active or passive role in the management of the firm. Private Debt strategies are typically classified as follows:

- *Mezzanine* - Investments in unsecured or junior debt securities with equity enhancements such as warrants or nominally priced equity.
- *Distressed Debt* - Investments in the debt obligations of under-performing companies that are in need of operating or financial restructuring, and are either in or out of bankruptcy.
- *Structured Products* - Investments in the debt tranche of a security that is generally leveraged and backed by a diversified pool of assets. Assets include bank debt, investment grade debt, non-investment grade debt, or mortgages.

**PSERS Private Market Internal Co-Investment Program** consists of co-investments made alongside of General Partners with whom PSERS has a strong relationship. These relationships aid in the generation of deal flow for investments and also serve as additional due diligence for the evaluation of General Partners. The investments have the potential for higher returns as they have low or no fees and no carried interest. This program also provides PSERS with the ability to buy secondary interests in funds from other Limited Partners usually at a discount to net asset value.

#### Policy

For the Private Market investments program, PSERS' long-term investment objective is to achieve a risk-adjusted total return, net of fees, that exceeds market returns for similar investments.

**Summary of  
PSERS' Private Market Investments  
(as of December 31, 2015)  
(continued)**

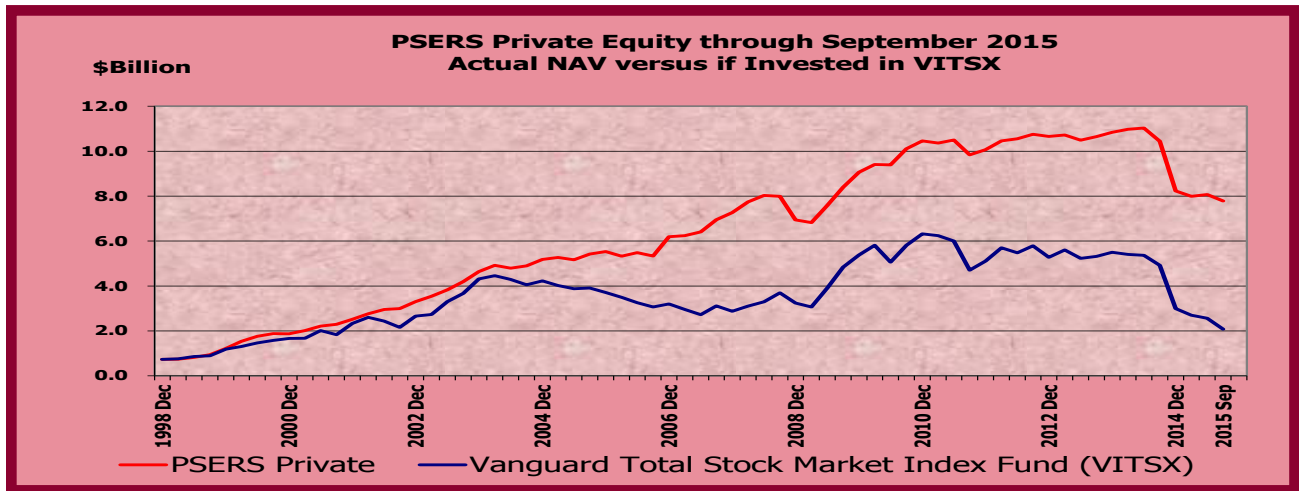
**Public Equity vs. Private Equity**

Arguments have been made that Private Equity is just an expensive form of investing in public equities and can be replicated by passively managed public equity indexes. While disagreeing with that statement, PSERS would strongly agree that Private Equity is not an asset class for individuals or smaller institutional investors. Individuals and small institutional investors typically lack the expertise, ability to diversify managers, and, most importantly, access to top quartile managers. A lack of access means that returns relative to passively managed public market indexes will most likely not justify the incremental costs associated with investing in this asset class. PSERS has enjoyed success in Private Equity due to having a strong, internal management team, excellent consulting relationships, and, most importantly, access to top quartile managers.

Why is Private Equity an area where potentially attractive excess returns can be achieved? The answer in a word is inefficiency. Private markets provide the opportunity to

negotiate and set a price between the owner of a business and the buyer/investor in a private fashion. There is a very large private economy that exists that is in need of operating expertise, capital to grow their business, an exit out of the family business where the next generation does not want to be involved, etc. In public market equities, there are thousands of buyers and sellers setting the prices of these securities every day with a significant amount of disclosure into the finances of these companies. No such mechanism exists in the private markets. Thus, private markets provide fertile grounds for investing.

PSERS has been investing in Private Equity since the mid 1980's. While this is an expensive asset class in which to invest, PSERS has had significant success. To measure this success, PSERS modeled what the returns would have been if, instead of investing in Private Equity, the cash that flows into/out of Private Equity investments were made into/out of a very low cost mutual fund that seeks to replicate the U.S. equity market. PSERS chose the Vanguard Total Stock Market Index Fund (VITSX) due to its low cost (currently 0.02%) and its success at closely matching the returns of the overall U.S. stock market. **Below is a chart of the performance of PSERS Private Equity program versus the performance of the Vanguard Total Stock Market Index Fund from December 1998 through September 2015:**



As illustrated above, PSERS has been able to generate almost \$6 billion in incremental value versus the passive, low cost index approach to equity investing.

Below are the more recent total returns for the past 10 years (through September 30, 2015) for PSERS Private Equity Program, the Vanguard Total Stock Market Index Fund (VITSX), the Vanguard 500 Index Fund Admiral Shares (VFIAX), and PSERS Internally-Managed S&P 500 Index Portfolio (PSERS 500) (VITSX, VFIAX, and PSERS 500 with dividends reinvested):

	<b>10 Year, Net of Fee Return (Sep 2005 - Sep 2015)</b>
PSERS Private Equity Program	<b>11.59%</b>
Vanguard Total Stock Market Index (VITSX)	<b>7.14%</b>
PSERS Internally-Managed S&P 500 Index Fund	<b>7.07%</b>
Vanguard 500 Index Fund Admiral Shares (VFIAX)	<b>6.79%</b>

**Summary of  
PSERS' Private Market Investments  
(as of December 31, 2015)  
(continued)**

**Market Value as of December 31, 2015:** \$7,582.2 million, or 16.3% of the Fund's total market value. **Sub-asset class market values (unaudited) and fund percentages were as follows:**

	<b>Total Commitment (in millions)</b>	<b>Market Value (in millions)</b>	<b>Percent Allocation to Total Fund</b>
<b>Private Equity</b>	\$ 14,173.5	\$ 5,602.3	12.0%
<b>Venture Capital</b>	2,498.1	893.2	1.9
<b>Private Debt</b>	<u>4,393.8</u>	<u>1,086.7</u>	<u>2.4</u>
<b>Totals</b>	<b>\$ <u>21,065.4</u></b>	<b>\$ <u>7,582.2</u></b>	<b><u>16.3%</u></b>

**Number of In-House Co-Investments:** PSERS' Private Market Internal Co-Investment Program consists of 21 investments with committed capital totaling \$257.7 million through December 31, 2015.

**Number of Internal Portfolio Managers:** PSERS had three employees managing Private Market portfolios.

**Summary of  
PSERS' Real Estate Investments  
(as of December 31, 2015)**

Private Real Estate exposure is a Non-Traditional asset class that PSERS uses to diversify the investments of the Fund. The primary objective of the real estate program is to invest in real property directly or indirectly through global publicly-traded real estate securities (PTRES), direct investments, commingled fund investments, limited partnerships, and direct private placements. This is done in a prudent manner to create a diversified real estate portfolio of high quality investments which will enhance PSERS' overall long-term investment performance, diversify the asset base, and reduce the volatility of the total investment portfolio returns.

	Total Commitment (Millions)	Market Value (Millions)	Percent Allocation to Total Fund
Separate Accounts	\$ N/A	\$ 317.4	0.7%
PTRES	N/A	188.5	0.4
Core Real Estate	462	227.2	0.5
Opportunistic Real Estate	5,518	3,186.2	6.8
Value Added Real Estate	<u>3,282</u>	<u>1,267.8</u>	<u>2.7</u>
<b>Totals</b>	<b><u>\$ 9,262</u></b>	<b><u>\$ 5,187.1</u></b>	<b><u>11.1%</u></b>

**Policy**

The real estate program is designed to create the highest possible risk-adjusted returns in a controlled, coordinated, and comprehensive manner. Recognizing that real estate market conditions and PSERS' objectives for real estate may change over time, the program is reviewed periodically and updated as needed. The existing target allocation is 12.0% of total assets, of which 11.0% is designated for Private Real Estate and 1.0% for PTRES.

Investments are made through global PTRES, direct investments, commingled fund investments, limited partnerships, and direct private placements. It is PSERS' intent to liquidate any investment at the point in time when its value has been maximized. PSERS seeks to diversify its real estate portfolio by investing in a mix of Opportunistic (30%), Value Added (50%) and Core (20%) real estate investments.

*Opportunistic* real estate investing is the financing, acquisition or investment in real estate assets, real estate companies, portfolios of real estate assets, private and public Real Estate Investment Trusts (REIT's) that do not have access to traditional public equity or debt financing. Opportunistic real estate consists of investment strategies that seek to exploit market inefficiencies with an emphasis on total return. Opportunistic investments require specialized expertise and the flexibility to respond quickly to market imbalances or changing market conditions. Investments may include non-traditional property types and/or assets that involve development, re-development, or leasing risks.

*Value Added* real estate investing typically focuses on both income growth and appreciation potential, where opportunities created by dislocations and inefficiencies between and within segments of the real estate capital markets are capitalized upon to enhance returns. Investments can include high-yield equity and debt investments and undervalued or impaired properties in need of repositioning, re-development, or leasing.

*Core* real estate investing is the financing, acquisition or investment in real estate assets, real estate companies, portfolios of real estate assets, and private REITs that are broadly diversified by property type and location, focused primarily on completed, well-leased properties with modest levels of leasing risk, using relatively low leverage, and investing mainly in institutional property types and qualities allowing for relative ease of resale.

**Market Value as of December 31, 2015:** \$5,187.1 million or 11.1% of the Fund's total market value.

**Number of Internal Portfolio Managers:** PSERS had two employees managing real estate portfolios.

**Number of In-House Co-Investments:** PSERS' Real Estate Internal Program consists of 9 investments with committed capital of \$110 million through December 31, 2015. PSERS' Real Estate Internal Program was initiated in 2012 (first investment closed in 2013) and consists of co-investments and secondary fund investments where PSERS is already a Limited Partner.

### Summary of PSERS' Fixed Income Investments (as of December 31, 2015)

Fixed Income exposure is a Traditional asset class that PSERS uses to diversify the investments of the Fund. PSERS' investment plan diversifies Fixed Income investments and balances Fixed Income management styles. PSERS contracts with external investment managers and hires internal portfolio managers to manage Fixed Income portfolios.

#### Policy

Fixed Income investments are utilized by the Fund to help diversify the overall Fund and for a variety of purposes as follows:

- *Nominal bonds* are used for their ability to serve as a hedge against disinflation and/or deflation, their general ability to produce current income in the form of periodic interest payments, and their ability to provide sufficient liquidity to meet the Fund's obligations to pay member benefits and support other investment commitments;
- *Inflation-linked bonds* are used for their ability to serve as a hedge against inflation, their general ability to produce current income in the form of periodic interest payments, and their ability to provide sufficient liquidity to meet the Fund's obligations to pay member benefits and support other investment commitments; and
- *High yield securities and emerging market bonds* are used for their ability to generate high current income in the form of periodic interest payments as well as offering greater total return opportunities than high grade debt.

PSERS' Asset Allocation targets an eventual allocation of 24.5% of assets to Fixed Income, 7.5% of which is designated to Investment Grade, 8.0% of which is designated to Credit-Related, 6.0% of which is designated to TIPS strategies, and 3.0% designated to Cash.

**Market Value as of December 31, 2015:** \$13,068.5 million, or 28.1% of the Fund's total market value.

**Number of External Investment Managers:** PSERS had contracts with 29 external investment managers responsible for various Fixed Income portfolios.

**Number of Internal Portfolio Managers:** PSERS had three employees managing various Fixed Income portfolios.

#### **Types of Investment Portfolios at December 31, 2015:**

- 8.4% Non-U.S. Fixed Income portfolios
- 18.4% U.S. Core/Core Plus portfolios
- 21.5% Global TIPS portfolios
- 24.8% Credit Opportunity portfolios
- 0.9% U.S. Long Treasury portfolios
- 25.8% Cash portfolios
- 0.2% PSERS In-house Co-Investment portfolio
- 41.8% was managed by internal portfolio managers and 58.2% was managed by external investment managers

### Section 3 - Investment Information

## Summary of PSERS' Fixed Income Portfolios (unaudited) (as of December 31, 2015)

	Market Value (in millions)	% of Total Fixed Income	% of Total Fund
<b><u>Actively Managed U.S. Core/Core Plus Fixed</u></b>			
<b><u>Income Portfolios</u></b>			
BlackRock U.S. Extended Core Global Alpha Fund	\$ 857.1	6.5%	1.8%
Pacific Investment Management Co. (PIMCO)	218.5	1.7	0.5
PSERS Active Aggregate	1,131.3	8.7	2.5
Pugh Capital Management, Inc.	94.9	0.7	0.2
SEI Investments Management Corp.	99.0	0.8	0.2
Other	<u>2.3</u>	<u>0.0</u>	<u>0.0</u>
<b>Total Actively Managed U.S. Core/Core Plus</b>			
<b>Fixed Income</b>	<b>\$ <u>2,403.1</u></b>	<b><u>18.4%</u></b>	<b><u>5.2%</u></b>
<b><u>Actively Managed Treasury Inflation-Protected</u></b>			
<b><u>Securities (TIPS) Portfolios</u></b>			
Black River Asset Management, LLC	\$ 395.7	3.0%	0.8%
Bridgewater Associates, Inc.	1,538.1	11.8	3.3
PSERS TIPS Portfolio	<u>876.2</u>	<u>6.7</u>	<u>1.9</u>
<b>Total Actively Managed Treasury Inflation-</b>			
<b>Protected Securities (TIPS)</b>	<b>\$ <u>2,810.0</u></b>	<b><u>21.5%</u></b>	<b><u>6.0%</u></b>
<b><u>Actively Managed U.S. Long Treasury Portfolios</u></b>			
PSERS U.S. Long Treasuries	\$ 46.9	0.4%	0.1%
Pacific Investment Management Co. (PIMCO)	<u>72.8</u>	<u>0.5</u>	<u>0.2</u>
<b>Total Actively Managed U.S. Long Treasury Portfolios</b>			
	<b>\$ <u>119.7</u></b>	<b><u>0.9%</u></b>	<b><u>0.3%</u></b>

Numbers may not add due to rounding.

### Section 3 - Investment Information

## Summary of PSERS' Fixed Income Portfolios (unaudited) (as of December 31, 2015) (continued)

	Market Value (in millions)	% of Total Fixed Income	% of Total Fund
<b><u>Actively Managed Credit Opportunity Portfolios</u></b>			
Apollo European Principal Finance Fund II, LP	\$ 144.7	1.1%	0.3%
Avenue Energy Opportunities Fund, LP	110.5	0.8	0.2
BlackRock Mortgage (Offshore) Investors Fund	0.2	0.0	0.0
Brigade Distressed Value Offshore Fund	106.1	0.8	0.2
Brigade Structured Credit Offshore Fund	189.4	1.4	0.4
Carlyle Energy Mezzanine Opportunity Fund, LP	126.2	1.0	0.3
Carlyle Energy Mezzanine Opportunity Fund II, LP	1.7	0.0	0.0
Cerberus Levered Loan Opportunities Fund, LP	41.8	0.3	0.1
Cerberus Levered Loan Opportunities Fund II, LP	151.0	1.2	0.3
Cerberus PSERS Levered Loan Opportunities Fund, LP	43.5	0.3	0.1
Galton Onshore Mortgage Revolver Fund III, LP	74.3	0.6	0.2
Hayfin Special Opportunities Fund, LP	205.8	1.6	0.4
ICG Europe Fund V, LP	215.9	1.6	0.5
International Infrastructure Finance Company Fund, LP	104.1	0.8	0.2
LBC Credit Partners II, LP	28.8	0.2	0.1
LBC Credit Partners III, LP	156.8	1.2	0.3
Mariner Investment Group	164.7	1.3	0.4
Oaktree Loan Fund	10.8	0.1	0.0
Pareto High Yield Currency Hedge	(8.1) a	(0.1)	0.0
Park Square - PSERS Credit Opportunities Fund, LP	35.0	0.3	0.1
PSERS TAO Partners Parallel Fund, LP	191.0	1.5	0.4
Sankaty Advisors LLC - Bank Loans	301.7	2.3	0.6
Sankaty Credit Opportunities Fund IV, LP	81.2	0.6	0.2
Sankaty Credit Opportunities Fund V-A, LP	273.7	2.1	0.6
Sankaty Credit Opportunities VI-A, LP	7.5	0.1	0.0
Sankaty Middle Market Opportunities Fund	67.4	0.5	0.1
Sankaty Middle Market Opportunities Fund II, LP	116.7	0.9	0.3
Summit Partners Credit Fund II, LP	62.7	0.5	0.1
TOP NPL (A), LP	26.3	0.2	0.1
TPG Opportunities Partners II, LP	47.5	0.4	0.1
TPG Opportunities Partners III, LP	38.7	0.3	0.1
Varde Scratch & Dent Fund, LP	<u>119.3</u>	<u>0.9</u>	<u>0.3</u>
<b>Total Actively Managed Credit Opportunity Fixed Income</b>	<b>\$ <u>3,236.9</u></b>	<b><u>24.8%</u></b>	<b><u>7.0%</u></b>
<b>Total Actively Managed U.S. Fixed Income</b>	<b>\$ <u>8,569.7</u></b>	<b><u>65.6%</u></b>	<b><u>18.5%</u></b>

a - The Market Value represents the cumulative unrealized net loss on foreign exchange contracts  
Numbers may not add due to rounding.



### Section 3 - Investment Information

## Summary of PSERS' Fixed Income Portfolios (unaudited) (as of December 31, 2015) (continued)

	Market Value (in millions)	% of Total Fixed Income	% of Total Fund
<b><i>Actively Managed Non-U.S. Developed Markets</i></b>			
<b><i>Fixed Income Portfolios</i></b>			
Alliance Bernstein	\$ 255.4	1.9%	0.5%
Pacific Investment Management Co. (PIMCO)	<u>182.1</u>	<u>1.4</u>	<u>0.4</u>
<b>Total Actively Managed Non-U.S. Developed Markets</b>			
<b>Fixed Income</b>	<b>\$ <u>437.5</u></b>	<b><u>3.3%</u></b>	<b><u>0.9%</u></b>
<b><i>Actively Managed Global Emerging Markets Fixed</i></b>			
<b><i>Income Portfolios</i></b>			
Franklin Templeton	\$ 331.6	2.5%	0.7%
Pacific Investment Management Co. (PIMCO)	255.0	2.0	0.6
Stone Harbor Investment Partners	<u>82.2</u>	<u>0.6</u>	<u>0.2</u>
<b>Total Actively Managed Global Emerging Markets</b>			
<b>Fixed Income</b>	<b>\$ <u>668.8</u></b>	<b><u>5.1%</u></b>	<b><u>1.5%</u></b>
<b><i>In-house Co-Investment Portfolio</i></b>			
PSERS Private Debt Co-Investments	<u>23.1</u>	<u>0.2</u>	<u>0.0</u>
<b><i>Internally Managed Cash Portfolio</i></b>			
PSERS Proprietary Fund	<u>3,369.4</u>	<u>25.8</u>	<u>7.2</u>
<b>Total Fixed Income</b>	<b>\$ <u>13,068.5</u></b>	<b><u>100.0%</u></b>	<b><u>28.1%</u></b>

Numbers may not add due to rounding.

## Section 3 - Investment Information

### Summary of PSERS' Absolute Return Investments (as of December 31, 2015)

Absolute Return exposure is a Non-Traditional asset class that PSERS uses to diversify the investments of the Fund. PSERS contracts with external investment managers to manage absolute return portfolios.

#### Policy

Absolute Return investments, sometimes referred to as hedge funds, are utilized by the Fund primarily to generate returns that are uncorrelated to the equities, fixed income, and commodities asset classes and to diversify the overall Fund. The benchmark for PSERS' Absolute Return program is the 3-month LIBOR return plus 3.5%.

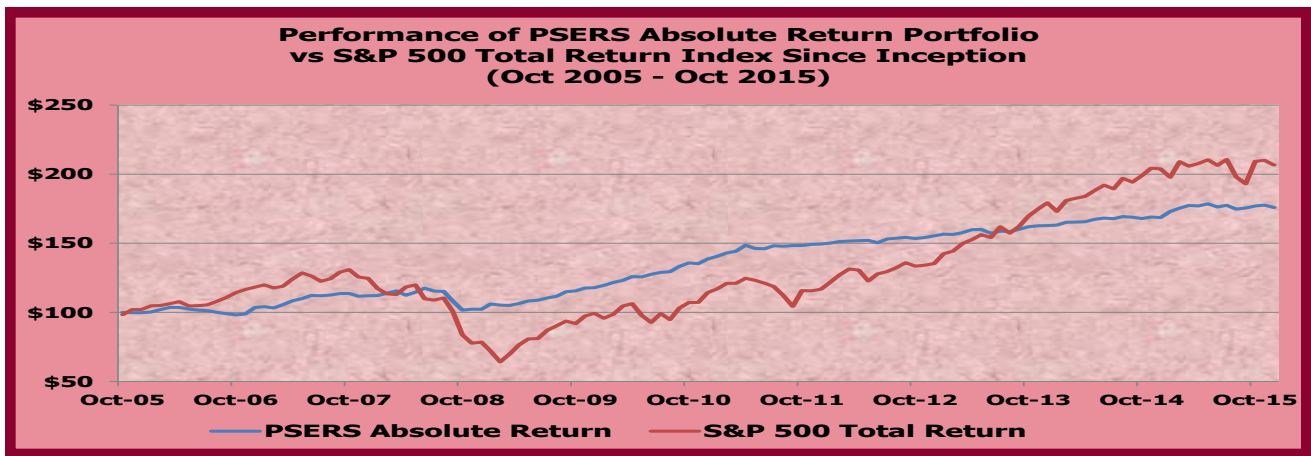
Absolute Return investments are made in a variety of unique, non-directional investment strategies, including global macro, relative value, event driven, capital structure

arbitrage, reinsurance, volatility and other opportunistic strategies. The Fund shall diversify this program by manager and style.

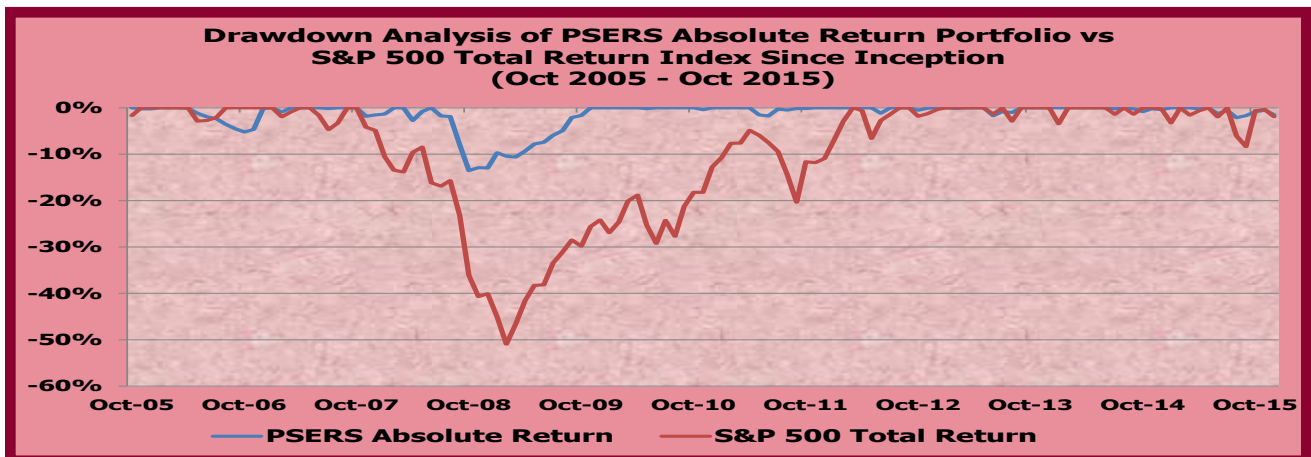
PSERS' Asset Allocation currently targets an allocation of 10.0% of assets in Absolute Return investments.

Following are four charts which compare the returns of the Absolute Return program against the S&P 500 Total Return Index, a well-known index which is included here to show the general trend in the equity market and is not intended to imply that the performance of the program should be compared to the index.

The chart below compares the performance of PSERS Absolute Return program to the return of the S&P 500 Total Return Index since the inception of the Absolute Return program in October 2005 and shows that the program has generated consistent, positive returns for the Fund during a volatile period for the S&P 500 Total Return Index.

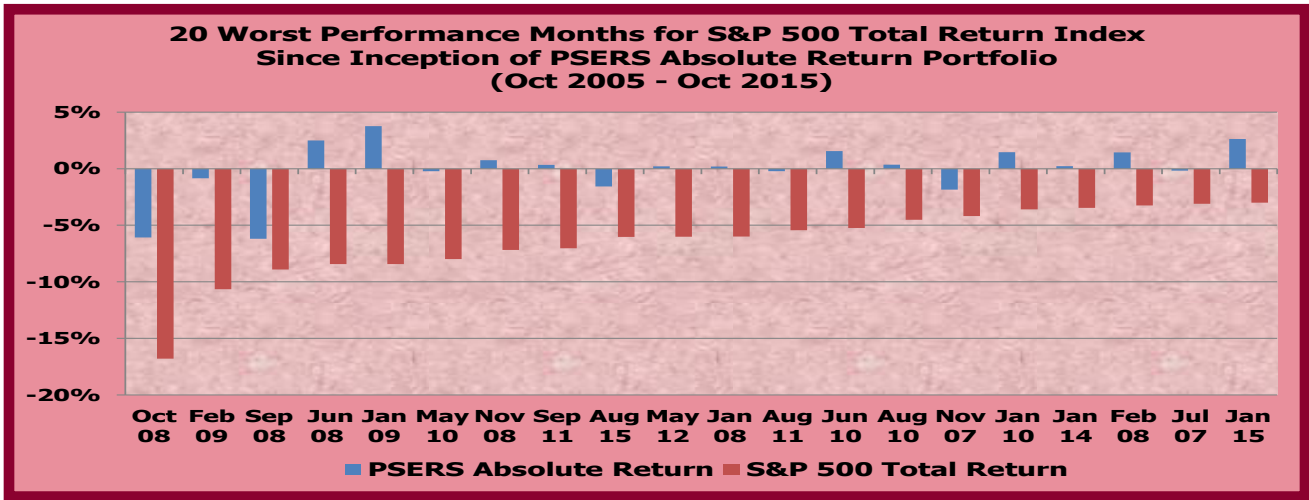


The chart below compares the performance drawdowns of PSERS Absolute Return program to the performance drawdowns of the S&P 500 Total Return Index since the inception of the Absolute Return program in October 2005 and shows that the program has provided protection during recent performance drawdowns of the S&P 500 Total Return Index.

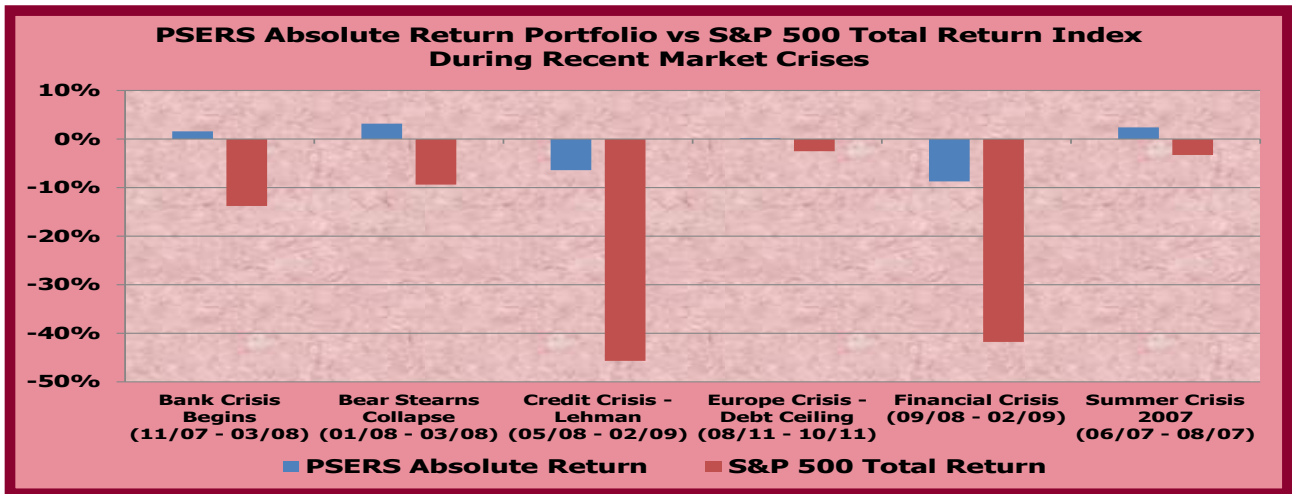


**Summary of PSERS'  
Absolute Return Investments  
(as of December 31, 2015)  
(continued)**

The chart below shows the returns of PSERS Absolute Return program during the 20 worst performance months of the S&P 500 Total Return Index since the inception of the Absolute Return program in October 2005.



The chart below compares the returns of PSERS Absolute Return program to the returns of the S&P 500 Total Return Index during recent market crises.



These four charts show that since the inception of the Absolute Return program in October 2005, the program has provided diversification from equity market risk, the largest risk of the Fund, while generating positive returns in excess of the 3-month LIBOR return plus 3.5%.

## Section 3 - Investment Information

### Summary of PSERS' Absolute Return Investments (as of December 31, 2015) (continued)

**Market Value as of December 31, 2015:** \$4,813.2 million, or 10.3% of the Fund's total market value.

**Number of External Investment Managers:** PSERS had contracts with 15 external investment managers responsible for the various Absolute Return portfolios.

**Number of Internal Investment Managers:** None.

### Summary of PSERS' Absolute Return Investments (unaudited) (as of December 31, 2015)

	<u>Market Value</u> (in millions)	<u>% of Total</u> <u>Absolute Return</u>	<u>% of</u> <u>Total Fund</u>
<b><u>Actively Managed Absolute Return Portfolios</u></b>			
Aeolus Property Catastrophe Fund	\$ 228.0	4.7%	0.5%
Black River Fixed Income Relative Value Opportunity Fund	306.5	6.4	0.6
BlackRock Capital Structure Investments Fund	298.7	6.2	0.6
Brevan Howard Fund, Ltd.	264.4	5.5	0.6
Bridgewater Pure Alpha Fund II, Ltd.	859.7	17.9	1.8
Brigade Leveraged Capital Structures Offshore Fund	228.7	4.8	0.5
Capula Global Relative Value Fund	374.7	7.8	0.8
Capula Tail Risk Fund	348.9	7.2	0.7
Caspian Select Credit International Fund	215.8	4.5	0.5
Ellis Lake Domestic Fund	26.1	0.5	0.1
Palmetto Fund, Ltd.	239.9	5.0	0.5
Oceanwood Opportunity Fund	216.3	4.5	0.5
OWS Credit Opportunity Offshore Fund III	198.6	4.1	0.4
PIMCO Absolute Return Strategy V Offshore Fund, Ltd.	267.9	5.6	0.6
PIMCO Global Credit Opportunity Offshore Fund, Ltd.	262.2	5.4	0.5
PIMCO Multi-Asset Volatility Offshore Fund, Ltd.	238.7	5.0	0.5
Perry Partners, LP	168.3	3.5	0.4
Sciens Aviation Special Opportunities Fund II, LP	28.1	0.6	0.1
Sciens Aviation Special Opportunities Fund III, LP	41.7	0.9	0.1
<b>Total Absolute Return</b>	<b>\$ <u>4,813.2</u></b>	<b><u>100.0%</u></b>	<b><u>10.3%</u></b>

Numbers may not add due to rounding.

## Section 3 - Investment Information

### Summary of PSERS' Risk Parity Portfolios (as of December 31, 2015)

Risk Parity exposure is a Traditional asset class that PSERS uses to diversify the investments of the Fund. PSERS' investment plan allocates capital to various Risk Parity strategies to diversify implementation and management styles. PSERS uses both an internal investment manager as well as contracts with external investment managers to manage Risk Parity portfolios.

#### Policy

Risk Parity strives to generate investment returns through a more diversified allocation by endeavoring to balance market risk factor exposures as opposed to capital exposures. PSERS' Risk Parity investment managers each have proprietary methods to define and measure the risk factors upon which they manage their portfolios. Inclusion of this asset class is expected to reduce the portfolio's overall risk exposure over long-term horizons because it is designed to be more resistant to market downturns than

traditional investment strategies, and further enhances the System's diversification due to the risk-balancing portfolio construction.

The Fund benchmarks its Risk Parity investments to a custom benchmark: MSCI ACWI (\$Net) (50%); Barclays Capital U.S. Treasury Index (75%); Barclays Capital World Inflation Linked Bond Index Hedged (55%); Bloomberg Commodity Index (Total Return) (15%); Bloomberg Gold Subindex (5%); and 3-Month LIBOR (-100%).

PSERS' Asset Allocation currently targets an allocation of 9.0% of assets to Risk Parity investments. The Risk Parity investments are targeted to be 100.0% actively managed.

**Market Value as of December 31, 2015:** \$3,526.1 million, or 7.6% of the Fund's total market value.

**Number of External Investment Managers:** PSERS had contracts with four external investment managers to manage Risk Parity portfolios.

**Number of Internal Investment Managers:** PSERS had one employee managing one Risk Parity portfolio.

### Summary of PSERS' Risk Parity Portfolios (unaudited) (as of December 31, 2015)

	Market Value (in millions)	% of Total Risk Parity	% of Total Fund
<b><u>Risk Parity Portfolios</u></b>			
AQR GRP EL 20 Offshore Fund, Ltd.	\$ 273.1	7.7%	0.6%
BlackRock Market Advantage II, Ltd.	358.4	10.2	0.8
Bridgewater All Weather @ 15% Fund	926.1	26.3	2.0
Bridgewater Optimal Portfolio, Ltd.	592.6	16.8	1.2
D.E Shaw Orienteer Fund, LLC	828.4	23.5	1.8
PSERS Risk Parity	<u>547.5</u>	<u>15.5</u>	<u>1.2</u>
<b>Total Risk Parity</b>	<b>\$ <u>3,526.1</u></b>	<b><u>100.0%</u></b>	<b><u>7.6%</u></b>

*Numbers may not add due to rounding.*

## Section 3 - Investment Information

### Summary of PSERS' Master Limited Partnerships (as of December 31, 2015)

Master Limited Partnership (MLP) exposure is a Traditional asset class that PSERS uses to diversify the investments of the Fund. PSERS' investment plan diversifies MLP investments and balances MLP management styles. PSERS contracts with external investment managers and hires internal portfolio managers to manage MLP portfolios.

#### Policy

MLP securities, which are publicly traded on a securities exchange, avoid federal and state income taxes by meeting specific qualifications of the IRS related to the production, processing or transportation of oil, natural gas, and coal. MLP securities are utilized by the System due to their attractively low funding costs and low correlation to stock and bond returns, attractive growth characteristics, and their ability to produce current income in the form of periodic distributions.

The Fund benchmarks its MLP investments to the S&P MLP Total Return Index.

PSERS' Asset Allocation currently targets an allocation of 4.0% of assets to MLP investments and consists of both actively managed and passively managed portfolios.

**Market Value as of December 31, 2015:** \$1,938.7 million, or 4.2% of the Fund's total market value.

**Number of External Investment Managers:** PSERS had contracts with three external investment managers to manage MLP portfolios.

**Number of Internal Investment Managers:** PSERS had one employee managing one MLP portfolio.

#### Types of Investment Portfolios at December 31, 2015:

- 79.4% actively managed portfolios (managed externally)
- 20.6% passively managed portfolios (internally managed)

### Summary of PSERS' Master Limited Partnerships (unaudited) (as of December 31, 2015)

	Market Value (in millions)	% of Total MLPs	% of Total Fund
<b><i>Actively Managed Master Limited Partnership Portfolios</i></b>			
Atlantic Trust Private Wealth Management	\$ 449.7	23.2%	1.0%
Harvest Fund Advisors, LLC	612.0	31.6	1.3
Salient Capital Advisors, LLC	<u>476.8</u>	<u>24.6</u>	<u>1.0</u>
<b>Total Actively Managed Master Limited Partnerships</b>	<b>\$ <u>1,538.5</u></b>	<b><u>79.4%</u></b>	<b><u>3.3%</u></b>
<b><i>Passively Managed Portfolio</i></b>			
PSERS S&P MLP Index	\$ 400.2	20.6%	0.9%
<b>Total Master Limited Partnerships</b>	<b>\$ <u>1,938.7</u></b>	<b><u>100.0%</u></b>	<b><u>4.2%</u></b>

Numbers may not add due to rounding.

## Section 3 - Investment Information

### Summary of PSERS' Commodity Investments (as of December 31, 2015)

Commodity exposure is a Traditional asset class that PSERS uses to diversify the investments of the Fund. PSERS' investment plan diversifies Commodity investments and balances Commodity management styles. PSERS contracts with external investment managers and hires internal portfolio managers to manage commodity portfolios.

#### Policy

Commodity investments such as gold, oil and wheat, are utilized by the Fund for diversification within the portfolio and to act as a hedge against unanticipated inflation. 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 the changes in the rate of inflation. However, stock and bond valuations are based on longer-term expectations and react negatively to inflation. Therefore, commodity returns

have had a historically negative correlation to stock and bond returns. As such, commodities, when combined with stocks and bonds, lower the risk of a portfolio.

The Fund benchmarks its Commodity investments (excluding Gold) to the Bloomberg Commodity Index. The Bloomberg Commodity Index is calculated on an excess return basis and reflects commodities futures prices. Gold is benchmarked to the Bloomberg Commodity Gold Subindex.

PSERS' Asset Allocation currently targets an allocation of 3.0% of assets to Commodity investments which includes a 2% target allocation to a Diversified Commodity Bucket and a 1% asset allocation to Gold.

**Market Value as of December 31, 2015:** \$793.7 million, or 1.7% of the Fund's total market value.

**Number of External Investment Managers:** PSERS had contracts with three external investment managers to manage Commodity portfolios.

**Number of Internal Investment Managers:** PSERS had one employee managing two commodity portfolios.

### Summary of PSERS' Commodity Portfolios (unaudited) (as of December 31, 2015)

	<u>Market Value (in millions)</u>	<u>% of Total Commodities</u>	<u>% of Total Fund</u>
<b><u>Full Discretion Commodity Portfolio</u></b>			
Wellington Management Company, LLP	\$ <u>337.4</u>	<u>42.5%</u>	<u>0.7%</u>
<b><u>Core/Enhanced Commodity Portfolios</u></b>			
Gresham, LLC	291.2	36.7%	0.6
PSERS Commodity Beta*	172.1	21.7	0.4
PSERS Gold Fund	<u>(7.0)</u> a	<u>(0.9)</u>	<u>0.0</u>
<b>Total Core/Enhanced Commodities</b>	<b>\$ <u>456.3</u></b>	<b><u>57.5%</u></b>	<b><u>1.0%</u></b>
<b>Total Commodities</b>	<b>\$ <u>793.7</u></b>	<b><u>100.0%</u></b>	<b><u>1.7%</u></b>

\* - Includes PIMCO Commodities Alpha investment.

a - The Market Value represents the net payable on swap contracts.

Numbers may not add due to rounding.

## Section 3 - Investment Information

### Summary of PSERS' Infrastructure Investments (as of December 31, 2015)

Infrastructure exposure is a Non-Traditional asset class that PSERS uses to diversify the investments of the Fund. This asset class was initially approved by the Board effective October 1, 2015, and PSERS is in the process of selecting one or more investment managers. To gain initial exposure to the asset class, PSERS made the investments summarized below.

#### Policy

Infrastructure targets stable, defensive investments primarily within the energy, power, water, and transportation sectors. The program plays a strategic role within the System by providing steady returns and cash yields, defensive growth,

inflation protection, capital preservation and diversification benefits. Infrastructure investments augment the System's Real Assets portfolio, which also includes Real Estate, MLP and Commodity investments.

The Fund benchmarks its Infrastructure investments to the FTSE Developed Core Infrastructure 50/50 Index.

PSERS' Asset Allocation currently targets an allocation of 1.0% of assets in Infrastructure investments.

**Market Value as of December 31, 2015:** \$ (23.3) million, or (0.1)% of the Fund's total market value.

**Number of External Investment Managers:** None.

**Number of Internal Investment Managers:** PSERS had one employee managing one portfolio that is 100% passively managed.

### Summary of PSERS' Infrastructure (unaudited) (as of December 31, 2015)

	Market Value (in millions)	% of Total Infrastructure	% of Total Fund
<b><u>Actively Managed Portfolio</u></b>			
Pareto Investment Management, Ltd.	\$ (0.7) a	3.0%	0.0 %
<b><u>Passively Managed Portfolio</u></b>			
PSERS Infrastructure Index	\$ (22.6) b	97.0%	(0.1)%
<b>Total Infrastructure</b>	<b>\$ (23.3)</b>	<b>100.0%</b>	<b>(0.1)%</b>

a - The Market Value represents the cumulative unrealized net loss on foreign exchange contracts.

b - The Market Value represents the net payable on swap contracts.

Numbers may not add due to rounding.



### Section 3 - Investment Information

## Investment Fees by Manager Fiscal Year Ended June 30, 2015 (Dollar Amounts in Thousands)

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

<u>Manager</u>	<u>Location</u>		<u>Total Fees</u>
<b><u>U.S. Equity</u></b>			
AH Lisanti Capital Growth, LLC	New York	NY	\$ 156
AllianceBernstein LP	New York	NY	113
First Pacific Advisors, Inc.	Los Angeles	CA	584
NorthPointe Capital, LLC	Troy	MI	32
Radcliffe Capital Management, L.P.	Bala Cynwyd	PA	<u>1,767</u>
<b>Total - U.S. Equity</b>			<b>2,652</b>
<b><u>Non - U.S. Equity</u></b>			
Acadian Asset Management, LLC	Boston	MA	891
Baillie Gifford Overseas Ltd.	Edinburgh	UK	4,393
Batterymarch Financial Management, Inc.	Boston	MA	577
BlackRock Financial Management, Inc.	San Francisco	CA	6,141
BlackRock Institutional Trust Company, N.A.	San Francisco	CA	1,405
Marathon Asset Management Limited	London	UK	2,298
Oberweis Asset Management, Inc.	North Aurora	IL	1,339
Pareto Investment Management, Ltd.	New York	NY	935
Pyramis Global Advisors Trust Company	Smithfield	RI	1,091
Wasatch Advisors, Inc.	Salt Lake City	UT	4,569
Westwood Global Investments, LLC	Boston	MA	<u>171</u>
<b>Total - Non - U.S. Equity</b>			<b>23,810</b>
<b><u>Fixed Income</u></b>			
AllianceBernstein L.P.	New York	NY	766
Apollo European Principal Finance Fund II(Dollar A), L.P.	New York	NY	2,524
Avenue Energy Opportunities Fund, L.P.	New York	NY	163
BlackRock Financial Management, Inc.	New York	NY	6,301
Brevan Howard US, LLC	New York	NY	21
Bridgewater Associates, LP	Westport	CT	18,573
Brigade Capital Management, LLC	New York	NY	2,453
Cargill Financial Services Corporation	Hopkins	MN	7,825
Carlyle Energy Mezzanine Opportunities Fund, LP	Washington	DC	2,800
Cerberus Levered Loan Opportunities Fund I, L.P.	New York	NY	1,266
Cerberus Levered Loan Opportunities Fund II, L.P.	New York	NY	3,448
Franklin Templeton Investment Counsel, LLC	Fort Lauderdale	FL	1,991
Galton Onshore Mortgage Recovery Fund III, L.P.	Harrison	NY	80

## Section 3 - Investment Information

### Investment Fees by Manager Fiscal Year Ended June 30, 2015 (Dollar Amounts in Thousands) (continued)

<u>Manager</u>	<u>Location</u>		<u>Total Fees</u>
<b><u>Fixed Income (continued)</u></b>			
Hayfin Credit Opportunities Fund, L.P.	George Town	Cayman Islands	\$ 2,537
ICG Europe Fund V, L.P.	St. Helier	Guernsey	2,722
International Infrastructure Finance Company, L.P.	Harrison	NY	1,500
LBC Credit Partners II, L.P.	Philadelphia	PA	2,115
LBC Credit Partners III, L.P.	Philadelphia	PA	2,250
Mariner Investment Group, LLC	Harrison	NY	1,307
Oaktree Loan Fund, L.P.	Los Angeles	CA	73
Pacific Investment Management Company (PIMCO)	Newport Beach	CA	5,141
Piedmont Investment Advisors, LLC	Durham	NC	137
Pugh Capital Management, Inc.	Seattle	WA	179
PSERS TAO Partners Parallel Fund, L.P.	Darien	CT	623
Radcliffe Capital Management, L.P.	Bala Cynwyd	PA	1,341
Sankaty Advisors LLC Bank Loans	Wilmington	DE	2,098
Sankaty Credit Opportunities IV, L.P.	Wilmington	DE	2,692
Sankaty Credit Opportunities V, L.P.	Wilmington	DE	2,394
Sankaty Middle Markets Opportunity Fund, L.P.	Wilmington	DE	974
Sankaty Middle Markets Opportunity Fund II, L.P.	Wilmington	DE	681
SEI Investments Company	Oaks	PA	655
Stone Harbor Investment Partners, L.P.	New York	NY	2,268
Strategic Fixed Income, LLC	Arlington	VA	163
Summit Partners Credit Fund II, L.P.	Boston	MA	928
TOP NPL (A), L.P.	Fort Worth	TX	223
TPG Opportunities Partners II (A), L.P.	Fort Worth	TX	696
TPG Opportunities Partners III (A), L.P.	Fort Worth	TX	2,138
Varde Scratch and Dent Fund, L.P.	Minneapolis	MN	243
<b>Total - Fixed Income</b>			<b>84,289</b>
<b><u>Real Estate-Direct Ownership</u></b>			
Charter Oak Advisors, Inc.	King of Prussia	PA	1,046
GF Management, Inc.	Philadelphia	PA	131
Grosvenor Investment Management U.S., Inc.	Philadelphia	PA	35
L & B Realty Advisors, L.L.P.	Dallas	TX	53
<b>Subtotal - Real Estate-Direct Ownership</b>			<b>1,265</b>
<b><u>Real Estate-Partnerships/Funds</u></b>			
AG Core Plus Realty Fund III, L.P.	New York	NY	589
Almanac Realty Securities V, L.P.	New York	NY	738
Almanac Realty Securities VI, L.P.	New York	NY	986

## Section 3 - Investment Information

### Investment Fees by Manager Fiscal Year Ended June 30, 2015 (Dollar Amounts in Thousands) (continued)

<u>Manager</u>	<u>Location</u>		<u>Total Fees</u>
<b><u>Real Estate-Partnerships/Funds (continued)</u></b>			
Almanac Realty Securities VII, L.P.	New York	NY	\$ 137
Apollo European Real Estate Fund III, L.P.	Purchase	NY	718
Apollo European Real Estate Fund IV, L.P.	Purchase	NY	2,120
Apollo Real Estate Finance Corporation	New York	NY	758
Apollo Value Enhancement Fund VII, L.P.	Purchase	NY	1,330
Apollo Value Enhancement Fund VIII, L.P.	Purchase	NY	1,158
AREFIN Co-Invest Corporation	New York	NY	(1)
AvalonBay Value Added Fund, L.P.	Alexandria	VA	808
AvalonBay Value Added Fund II, L.P.	Alexandria	VA	(5)
Avenue Real Estate Fund Parallel, L.P.	New York	NY	1,138
Beacon Capital Strategic Partners V, L.P.	Boston	MA	471
Bell Institutional Fund IV, LLC	Wilmington	DE	715
Bell Institutional Fund V, LLC	Wilmington	DE	863
BlackRock Asia Property Fund III, L.P.	Hamilton	Bermuda	552
BlackRock Europe Property Fund III, L.P.	London	UK	876
Blackstone Real Estate Debt Strategies II, L.P.	New York	NY	1,511
Blackstone Real Estate Partners Europe III, L.P.	New York	NY	1,955
Blackstone Real Estate Partners Europe IV, L.P.	New York	NY	1,392
Blackstone Real Estate Partners VI.TE.1, L.P.	New York	NY	2,754
Blackstone Real Estate Partners VII.TE.1, L.P.	New York	NY	3,522
BPG Co-Investment Partnership, LP	Philadelphia	PA	268
BPG Investment Partnership V, L.P.	Philadelphia	PA	(2)
BPG Investment Partnership VI, L.P.	Philadelphia	PA	130
Broadway Partners Parallel Fund P II, L.P.	New York	NY	69
Broadway Partners Parallel Fund P III, L.P.	New York	NY	250
Brookfield Strategic Real Estate Partners, L.P.	New York	NY	2,250
Cabot Industrial Value Fund IV, L.P.	Boston	MA	726
Carlyle Europe Real Estate Partners III-A, L.P.	Washington	DC	1,257
Carlyle Realty Partners IV, L.P.	Washington	DC	1,086
Carlyle Realty Partners V, L.P.	Washington	DC	906
Carlyle Realty Partners VI, L.P.	Washington	DC	677
Carlyle Realty Partners VII, L.P.	Washington	DC	1,082
DLJ Real Estate Capital Partners II, L.P.	New York	NY	116
DLJ Real Estate Capital Partners III, L.P.	New York	NY	930
DLJ Real Estate Capital Partners IV, L.P.	New York	NY	2,175
DRA Growth and Income Fund VI, L.P.	New York	NY	999
DRA Growth and Income Fund VII, L.P.	New York	NY	1,865
DRA Growth and Income Fund VIII, L.P.	New York	NY	361

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

## Section 3 - Investment Information

### Investment Fees by Manager Fiscal Year Ended June 30, 2015 (Dollar Amounts in Thousands) (continued)

<u>Manager</u>	<u>Location</u>		<u>Total Fees</u>
<b><u>Real Estate-Partnerships/Funds (continued)</u></b>			
Exeter Industrial Value Fund II, L.P.	Plymouth Meeting	PA	\$ 755
Exeter Industrial Value Fund III, L.P.	Plymouth Meeting	PA	1,112
Fillmore West Fund, L.P.	San Francisco	CA	370
Fortress Investment Fund IV, L.P.	New York	NY	818
Fortress Investment Fund V (Fund A), L.P.	New York	NY	2,009
Hines U.S. Office Value Added Fund, L.P.	Houston	TX	20
JPMCB Strategic Property Fund	New York	NY	245
Latitude Management Real Estate Capital III, Inc.	Providence	RI	886
LCCG RE Special Situations Mortgage Fund, LLC	Irving	TX	46
Legg Mason Real Estate Capital II, Inc.	Los Angeles	CA	979
LEM RE High Yield Debt & Preferred Equity Fund III, L.P.	Philadelphia	PA	563
LEM Real Estate Mezzanine Fund II, L.P.	Philadelphia	PA	244
Lubert-Adler Real Estate Fund IV, L.P.	Philadelphia	PA	45
Lubert-Adler Real Estate Fund V, L.P.	Philadelphia	PA	298
Lubert-Adler Real Estate Fund VI, L.P.	Philadelphia	PA	430
Madison Marquette Retail Enhancement Fund, L.P.	Washington	DC	818
Morgan Stanley Real Estate Fund IV Special Dom., L.P.	New York	NY	16
Morgan Stanley Real Estate Fund IV Special Int'l, L.P.	New York	NY	95
Morgan Stanley Real Estate Fund V Special Int'l, L.P.	New York	NY	153
Morgan Stanley Real Estate Fund V Special U.S., L.P.	New York	NY	45
Morgan Stanley Real Estate Fund VI Special Int'l, L.P.	New York	NY	536
Morgan Stanley Real Estate Fund VII Global, L.P.	New York	NY	1,269
O' Connor North American Property Partners, L.P.	New York	NY	430
O' Connor North American Property Partners II, L.P.	New York	NY	778
Paladin Realty Latin America Investors III, L.P.	Los Angeles	CA	1,480
Paramount Group Real Estate Fund VII, L.P.	New York	NY	375
Peabody Global Real Estate Partners, L.P.	New York	NY	25
PRISA	Parsippany	NJ	735
ProLogis North American Industrial Fund, L.P.	Denver	CO	387
RCG Longview Debt Fund IV, L.P.	New York	NY	250
RCG Longview Debt Fund V, L.P.	New York	NY	938
RCG Longview Equity Fund, L.P.	New York	NY	457
Senior Housing Partnership Fund IV, L.P.	Parsippany	NJ	895
Senior Housing Partnership Fund V, L.P.	Parsippany	NJ	139
Silverpeak Legacy Pension Partners II, L.P.	New York	NY	845
Silverpeak Legacy Pension Partners III, L.P.	New York	NY	1,014
Silverpeak/PSERS Real Estate, L.P.	New York	NY	65
Strategic Partners Fund II RE, L.P.	New York	NY	79

## Section 3 - Investment Information

### Investment Fees by Manager Fiscal Year Ended June 30, 2015 (Dollar Amounts in Thousands) (continued)

<u>Manager</u>	<u>Location</u>		<u>Total Fees</u>
<b><u>Real Estate-Partnerships/Funds (continued)</u></b>			
Strategic Partners Fund IV RE, L.P.	New York	NY	\$ 281
Stockbridge Real Estate Fund, L.P.	New York	NY	2,049
Stockbridge Real Estate Fund II, L.P.	New York	NY	1,122
Stockbridge Real Estate Fund III, L.P.	New York	NY	1,785
Strategic Partners Value Enhancement Fund, L.P.	Los Angeles	CA	335
UBS (US) Trumbull Property Fund, L.P.	Hartford	CT	889
<b>Subtotal - Real Estate-Partnerships/Funds</b>			<b>67,335</b>
<b><u>Real Estate-Farmland</u></b>			
Prudential Agricultural Group	Lisle	IL	355
<b>Subtotal - Real Estate-Farmland</b>			<b>355</b>
<b>Total Real Estate</b>			<b>68,955</b>
<b><u>Private Equity</u></b>			
ABS Capital Partners II, L.P.	Baltimore	MD	3
Actis Emerging Markets 3, L.P.	London	UK	2,677
Actis Global 4 L.P.	London	UK	1,796
Apax Europe VII-B, L.P.	St. Peter Port	Guernsey	167
Baring Asia Private Equity Fund III, L.P.	Hong Kong	China	634
Baring Asia Private Equity Fund IV, L.P.	Hong Kong	China	2,243
Baring Asia Private Equity Fund V, L.P.	Hong Kong	China	3,508
Blue Point Capital Partners III (B), L.P.	Cleveland	OH	749
Bridgepoint Europe III-A, L.P.	London	UK	1,126
Bridgepoint Europe IV, L.P.	London	UK	2,234
Capital International Private Equity Fund V, L.P.	San Francisco	CA	1,003
Capital International Private Equity Fund VI, L.P.	San Francisco	CA	1,473
Catterton Growth Partners, L.P.	Greenwich	CT	639
Catterton Growth Partners II, L.P.	Greenwich	CT	1,436
Catterton Partners V, L.P.	Greenwich	CT	390
Catterton Partners VI, L.P.	Greenwich	CT	1,240
Catterton Partners VII, L.P.	Greenwich	CT	1,773
Cinven Fund (Fourth), L.P. (The)	London	UK	1,239
Cinven Fund (Fifth), L.P. (The)	London	UK	1,347
Coller International Partners VI, L.P.	London	UK	1,500
Crestview Capital Partners, L.P.	New York	NY	487
Crestview Partners II (PF), L.P.	New York	NY	1,157
Crestview Partners III, L.P.	New York	NY	652

## Section 3 - Investment Information

### Investment Fees by Manager Fiscal Year Ended June 30, 2015 (Dollar Amounts in Thousands) (continued)

<u>Manager</u>	<u>Location</u>		<u>Total Fees</u>
<b>Private Equity (continued)</b>			
CVC Capital Partners Asia III Pacific, L.P.	George Town	Cayman Islands	\$ 1,333
CVC European Equity Partners V (A), L.P.	George Town	Cayman Islands	908
DCPF VI Oil and Gas Co-Investment Fund, L.P.	Boston	MA	33
Denham Commodity Partners Fund VI, L.P.	Boston	MA	1,158
Energy & Mineral Group Fund III, L.P.	Houston	TX	2,390
Equistone Partners Europe Fund V E, L.P.	London	UK	388
Evergreen Pacific Partners, L.P.	Seattle	WA	14
Evergreen Pacific Partners II, L.P.	Seattle	WA	212
First Reserve Fund XI, L.P.	Greenwich	CT	943
First Reserve Fund XII, L.P.	Greenwich	CT	1,850
GoldPoint Partners Co-Investment V, L.P.	New York	NY	500
HgCapital 7, L.P.	London	UK	2,047
HGGC Fund II, L.P.	Palo Alto	CA	1,337
Incline Equity Partners III, L.P.	Pittsburgh	PA	771
Irving Place Capital Partners III, L.P.	New York	NY	670
Landmark Equity Partners XIII, L.P.	Simsbury	CT	445
Landmark Equity Partners XIV, L.P.	Simsbury	CT	1,499
Milestone Partners II, L.P.	Rosemont	PA	74
Milestone Partners III, L.P.	Rosemont	PA	165
Milestone Partners IV, L.P.	Rosemont	PA	761
Morgan Stanley PE Asia Fund IV, L.P.	New York	NY	1,500
New Mountain Partners III, L.P.	New York	NY	1,630
New Mountain Partners IV, L.P.	New York	NY	2,914
New York Life Capital Partners III, L.P.	New York	NY	707
New York Life Capital Partners IV, L.P.	New York	NY	520
NGP Natural Resources X, L.P.	Irving	TX	1,323
NGP Natural Resources XI, L.P.	Irving	TX	10
Odyssey Investment Partners Fund V, L.P.	New York	NY	2,000
Orchid Asia V, L.P.	Grand Cayman	Cayman Islands	755
Orchid Asia VI, L.P.	Grand Cayman	Cayman Islands	1,079
PAI Europe IV, L.P.	Paris	France	838
PAI Europe V, L.P.	Paris	France	580
PAI Europe VI, L.P.	Paris	France	2,729
Palladium Equity Partners IV, L.P.	New York	NY	393
Partners Group Secondary 2008, L.P.	St. Peter Port	Guernsey	1,966
Partners Group Secondary 2011, L.P.	St. Peter Port	Guernsey	1,250
Permira IV, L.P.	London	UK	854
PNC Equity Partners II, L.P.	Pittsburgh	PA	122

## Section 3 - Investment Information

### Investment Fees by Manager Fiscal Year Ended June 30, 2015 (Dollar Amounts in Thousands) (continued)

<u>Manager</u>	<u>Location</u>		<u>Total Fees</u>
<b><u>Private Equity (continued)</u></b>			
StepStone International Investors III, L.P.	London	UK	\$ 743
Sterling Capital Partners, L.P.	Northbrook	IL	433
Strategic Partners II, L.P.	New York	NY	535
Strategic Partners III-B, L.P.	New York	NY	500
Strategic Partners IV, L.P.	New York	NY	464
Strategic Partners V, L.P.	New York	NY	1,095
Strategic Partners VI, L.P.	New York	NY	1,406
Trilantic Capital Partners IV, L.P.	New York	NY	310
Trilantic Capital Partners V, L.P.	New York	NY	<u>1,208</u>
<b>Subtotal - Private Equity</b>			<b>74,835</b>
<b><u>Private Debt</u></b>			
Apollo Investment Fund VIII, L.P.	New York	NY	2,236
Avenue Asia Special Situations Fund IV, L.P.	New York	NY	823
Avenue Special Situations Fund VI, L.P.	New York	NY	329
Cerberus Institutional Partners, L.P. (Series Three)	New York	NY	216
Cerberus Institutional Partners, L.P. (Series Four)	New York	NY	1,580
Cerberus Institutional Partners V, L.P.	New York	NY	2,281
Gleacher Mezzanine Fund II, L.P.	New York	NY	265
Gold Hill Venture Lending 03-A, L.P.	Santa Clara	CA	5
GSC Recovery III, L.P.	Greenwich	CT	290
NYLIM Mezzanine Partners Parallel Fund, L.P.	New York	NY	39
NYLIM Mezzanine Partners Parallel Fund II, L.P.	New York	NY	164
OCM Opportunities Fund VII, L.P.	Los Angeles	CA	320
OCM Opportunities Fund VII-B, L.P.	Los Angeles	CA	552
Venor Special Situations Fund II, L.P.	New York	NY	25
Versa Capital Fund, L.P.	Philadelphia	PA	827
Versa Capital Fund II, L.P.	Philadelphia	PA	225
Windjammer Senior Equity Fund IV, L.P.	Newport Beach	CA	<u>1,635</u>
<b>Subtotal - Private Debt</b>			<b>11,812</b>
<b><u>Venture Capital</u></b>			
Aisling Capital II, L.P.	New York	NY	460
Aisling Capital III, L.P.	New York	NY	374
Co-Investment Fund II, L.P. (The)	Radnor	PA	1,355
KBL Partnership, L.P.	New York	NY	136
LLR Equity Partners II, L.P.	Philadelphia	PA	346
LLR Equity Partners III, L.P.	Philadelphia	PA	2,068

## Section 3 - Investment Information

### Investment Fees by Manager Fiscal Year Ended June 30, 2015 (Dollar Amounts in Thousands) (continued)

<u>Manager</u>	<u>Location</u>		<u>Total Fees</u>
<b><u>Venture Capital (continued)</u></b>			
LLR Equity Partners IV, L.P.	Philadelphia	PA	\$ 3,500
Novitas Capital, L.P.	Wayne	PA	10
Novitas Capital II, L.P.	Wayne	PA	42
Psilos Group Partners III, L.P.	New York	NY	637
Quaker BioVentures, L.P.	Philadelphia	PA	662
Quaker BioVentures II, L.P.	Philadelphia	PA	1,134
SCP Private Equity Partners II, L.P.	Wayne	PA	482
Starvest Partners II, L.P.	New York	NY	588
Strategic Partners III-VC, L.P.	New York	NY	220
Strategic Partners IV VC, L.P.	New York	NY	266
Summit Partners Growth Equity Fund VIII, L.P.	Boston	MA	928
Tenaya Capital IV-P, L.P.	New York	NY	415
Tenaya Capital V-P, LP	New York	NY	920
Tenaya Capital VI, L.P.	New York	NY	<u>1,000</u>
<b>Subtotal - Venture Capital</b>			<b>15,543</b>
			<b>102,190</b>
<b><u>Absolute Return</u></b>			
Aeolus Capital Management Ltd.	Hamilton	Bermuda	11,504
Anderson Global Macro Fund	New York	NY	481
Black River Asset Management LLC	Minnetonka	MN	6,044
BlackRock Financial Management, Inc.	San Francisco	CA	4,226
Brevan Howard Fund, Ltd.	George Town	Cayman Islands	6,005
Bridgewater Associates, Inc.	Westport	CT	25,365
Brigade Capital Management, LLC	New York	NY	1,132
Capula Global Relative Value Fund	London	UK	9,301
Capula Tail Risk Fund	London	UK	6,762
Caspian Select Credit International Fund	New York	NY	1,419
Ellis Lake Domestic Fund, LP	New York	NY	(13)
Nephila Capital Ltd.	Hamilton	Bermuda	6,369
Oceanwood Opportunities Fund	George Town	Cayman Islands	6,218
Pacific Investment Management Company (PIMCO)	Newport Beach	CA	27,682
Perry Partners L.P.	New York	NY	803
Sciens Aviation Special Opportunities Fund II, L.P.	Miami	FL	2,457
Sciens Aviation Special Opportunities Fund III, L.P.	Miami	FL	<u>1,481</u>
<b>Total - Absolute Return</b>			<b>117,236</b>

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



### Section 3 - Investment Information

## Investment Fees by Manager Fiscal Year Ended June 30, 2015 (Dollar Amounts in Thousands) (continued)

<u>Manager</u>	<u>Location</u>		<u>Total Fees</u>
<b><u>Commodities</u></b>			
Cargill Financial Services Corporation	Hopkins	MN	\$ 1,794
Credit Suisse Asseet Management, LLC	New York	NY	407
Gresham Investment Management, LLC	New York	NY	1,522
Wellington Management Company, L.L.P.	Boston	MA	<u>4,512</u>
<b>Total - Commodities</b>			<b>8,235</b>
<b><u>Master Limited Partnerships</u></b>			
Harvest Fund Advisors, LLC	Wayne	PA	3,923
Salient Capital Advisors, LLC	Houston	TX	3,102
Stein Roe Investment Counsel D/B/A Atlantic Trust	Chicago	IL	<u>4,884</u>
<b>Total - Master Limited Partnerships</b>			<b>11,909</b>
<b><u>Risk Parity</u></b>			
AQR Capital Management, LLC	Greenwich	CT	2,211
Bridgewater All Weather Fund @15%, Ltd.	Westport	CT	6,572
D. E. Shaw & Co., L.P.	New York	NY	<u>4,130</u>
<b>Total - Risk Parity</b>			<b>12,913</b>
<b>Total External Management</b>			<b>432,189</b>
<b>Total Internal Management</b>			<b><u>9,189</u> *</b>
<b>Total Investment Management</b>			<b><u>\$ 441,378</u></b>

\*Internal Management expenses include salaries and fringe benefits of \$5,613 and operating expenses of \$3,576.

### Section 3 - Investment Information

## PSERS Investment Earnings over Policy Benchmark Fiscal Year Ended June 30, 2015 (Dollar Amounts in Millions)

The table below demonstrates that over the past 16 fiscal years, on average, every dollar PSERS has spent in investment fees and expenses has resulted in investment earnings of \$3.31 above the Policy Benchmark's dollar returns.

<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>\$1 of Investment Expenses Translates into \$\$\$ in Excess Earnings</u></i>
2015	\$ 455	1.02%	\$ 497	\$ 2.09
2014	482	2.74%	1,519	4.15
2013	558	2.28%	1,243	3.23
2012	481	1.45%	900	2.87
2011	515	2.81%	1,573	4.05
2010	522	3.72%	1,754	4.36
2009	478	(5.87)%	(3,131)	(5.55)
2008	399	(0.98)%	(618)	(0.55)
2007	314	7.45%	2,360	8.52
2006	211	3.30%	1,635	8.75
2005	193	2.33%	1,090	6.65
2004	191	3.33%	1,388	8.27
2003	179	(0.42)%	(141)	(0.21)
2002	163	0.57%	319	2.96
2001	144	2.27%	1,200	9.33
2000	<u>125</u>	1.85%	<u>934</u>	<u>8.47</u>
<b>Total</b>	<b><u>\$ 5,410</u></b>		<b><u>\$ 12,522</u></b>	<b><u>\$ 3.31</u></b>

\*Dollar amounts in millions.