

Notes to Financial Statements (continued)

establishes guidelines for permissible investments of the System.

(B) Fair Value of Investments**i. Fair Value Levels**

PSERS measures and records its investments using fair value measurement guidelines established by generally accepted accounting principles. These guidelines recognize a three-tiered fair value hierarchy as follows:

- **Level 1 inputs:** Level 1 inputs are quoted prices (unadjusted) for identical assets or liabilities in active markets. A quoted price for an identical asset or liability in an active market (e.g., an equity security traded on a major exchange) provides the most reliable fair value measurement and, if available, should be used to measure fair value in that particular market.
- **Level 2 inputs:** The categorization of an asset/liability as Level 1 requires that it is traded in an active market. If an instrument is not traded in an active market, it may fall to Level 2. Level 2 inputs are inputs that are observable, either directly or indirectly, but do not qualify as Level 1.
- **Level 3 inputs:** Reporting entities may use unobservable inputs to measure fair value if relevant observable inputs are not available, thereby allowing for situations in which there is little, if any, market activity for the asset or liability at the measurement date. These unobservable inputs are considered Level 3.

Debt, equity, and derivative instrument securities classified in Level 1 of the fair value hierarchy are valued using prices quoted in active markets for those securities. Debt securities classified in Level 2 of the fair value hierarchy are valued using a matrix pricing technique. Matrix pricing is used to value securities based on the securities' relationship to benchmark quoted prices and recently printed security specific trading levels. Short-term securities are carried at cost, which approximates fair value, unless they have published market prices or quotations from national securities exchanges or securities pricing services, in which case they are valued at the published market price. Fixed income securities and common and preferred stocks are generally valued based on published market prices and quotations from national securities exchanges or securities pricing services. Securities which are not traded on a national securities exchange are valued by the respective fund manager or other third parties based on similar sales. For alternative investments, which include private equity, private debt, venture capital and equity real estate

investments where no readily ascertainable market value exists, management, in consultation with the general partner and investment advisors, has determined the fair values for the individual investments based upon the partnership's most recent available financial information.

Directly-owned real estate investments are primarily valued based on appraisals performed by independent appraisers and, for properties not appraised, the present value of the projected future net income stream is used. Real estate owned investments are reported net of related debt borrowed against the market value of the property. At June 30, 2016, \$132,000,000 in line of credit advances were netted against the related property valuation and classified as Level 1. During FY 2017, the System entered into an open-ended repurchase agreement with another lender and used the proceeds to pay back the line of credit balance. The repurchase agreement, which had a balance of \$132,000,000 at June 30, 2017, is netted against the related property valuation and classified as Level 1. It is payable at an interest rate equivalent to 1 month LIBOR plus 40 basis points and is collateralized by certain fixed income investments of the System.

Derivative instruments classified in Level 1 of the fair value hierarchy are valued using observable exchange, dealer, or broker market pricing.

The Premium Assistance investment assets have the following recurring fair value measurements at June 30, 2017 and 2016:

- PSERS Short-Term Investment Fund of \$62,257,000 and \$23,944,000 for the years ended 2017 and 2016, respectively, is valued using pricing quoted in active markets for those securities (Level 1 inputs).
- Other domestic short-term investments of \$20,660,000 and \$64,943,000 for the years ended 2017 and 2016, respectively, are valued using a matrix pricing model (Level 2 inputs).

The HOP investment assets have the following recurring fair value measurements at June 30, 2017 and 2016:

- PSERS Short-Term Investment Fund of \$89,755,000 and \$89,125,000 for the fiscal years ended 2017 and 2016, respectively, is valued using pricing quoted in active markets for those securities (Level 1 inputs).
- Other domestic short-term investments of \$129,996,000 and \$104,205,000 for the fiscal years ended 2017 and 2016, respectively, are valued using pricing quoted in active markets for those securities (Level 1 inputs).

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At June 30, 2017, the System had the following recurring fair value measurements.

Investments and Derivative Instruments Measured at Fair Value

(Dollar Amounts in Thousands)

	2017	Fair Value Measurements Using		
		Level 1	Level 2	Level 3
Pension investments:				
Investments by fair value level				
Short term:				
PSERS Short-Term Investment Fund	\$ 5,565,178	\$ 5,565,178	\$ -	\$ -
Other domestic short-term	105,174	30,832	74,342	-
International short-term	134,000	132,601	1,399	-
	<u>5,804,352</u>	<u>5,728,611</u>	<u>75,741</u>	<u>-</u>
Fixed income:				
Domestic asset-backed and mortgage-backed securities	1,589,887	-	1,585,156	4,731
U.S. government and agency obligations	1,073,883	1,073,883	-	-
Domestic corporate and taxable municipal bonds	1,927,373	554,004	1,373,369	-
International fixed income	370,141	-	370,141	-
	<u>4,961,284</u>	<u>1,627,887</u>	<u>3,328,666</u>	<u>4,731</u>
Common and preferred stock:				
Domestic common and preferred stock	5,649,599	5,609,569	-	40,030
International common and preferred stock	5,688,266	5,688,266	-	-
	<u>11,337,865</u>	<u>11,297,835</u>	<u>-</u>	<u>40,030</u>
Directly-owned real estate	<u>367,078</u>	<u>(132,000)</u>	<u>-</u>	<u>499,078</u>
Total investments by fair value level	<u>22,470,579</u>	<u>\$ 18,522,333</u>	<u>\$ 3,404,407</u>	<u>\$ 543,839</u>
Investments measured at the net asset value (NAV)				
Collective trust funds	<u>12,816,147</u>			
Equity real estate	<u>4,973,477</u>			
Alternative investments:				
Private equity	5,883,902			
Special situations (Private debt)	5,053,043			
Venture capital	985,995			
	<u>11,922,940</u>			
Total investments measured at the NAV	<u>29,712,564</u>			
Total investments measured at fair value	<u>\$ 52,183,143</u>			
Investment derivative instruments				
Futures	\$ (10,152)	\$ (10,152)	\$ -	\$ -
Total return type swaps	(2,413)	(2,413)	-	-
Foreign exchange contracts	(195,195)	(195,195)	-	-
Options	12,009	12,009	-	-
Total investment derivative instruments	<u>\$ (195,751)</u>	<u>\$ (195,751)</u>	<u>\$ -</u>	<u>\$ -</u>

Notes to Financial Statements (continued)

At June 30, 2016, the System had the following recurring fair value measurements.

Investments and Derivative Instruments Measured at Fair Value

(Dollar Amounts in Thousands)

	2016	Fair Value Measurements Using		
		Level 1	Level 2	Level 3
Pension investments:				
Investments by fair value level				
Short term:				
PSERS Short-Term Investment Fund	\$ 4,459,476	\$ 4,459,476	\$ -	\$ -
Other domestic short-term	132,603	129,859	-	2,744
International short-term	106,425	105,455	970	-
	<u>4,698,504</u>	<u>4,694,790</u>	<u>970</u>	<u>2,744</u>
Fixed income:				
Domestic asset-backed and mortgage-backed securities	1,450,885	-	1,450,885	-
U.S. government and agency obligations	923,896	909,123	14,773	-
Domestic corporate and taxable municipal bonds	1,195,561	-	1,195,561	-
International fixed income	482,171	-	481,327	844
	<u>4,052,513</u>	<u>909,123</u>	<u>3,142,546</u>	<u>844</u>
Common and preferred stock:				
Domestic common and preferred stock	5,331,356	5,329,831	-	1,525
International common and preferred stock	5,124,942	5,124,867	-	75
	<u>10,456,298</u>	<u>10,454,698</u>	<u>-</u>	<u>1,600</u>
Directly-owned real estate	<u>330,599</u>	<u>(132,000)</u>	<u>-</u>	<u>462,599</u>
Total investments by fair value level	<u>19,537,914</u>	<u>\$ 15,926,611</u>	<u>\$ 3,143,516</u>	<u>\$ 467,787</u>
Investments measured at the net asset value (NAV)				
Collective trust funds	<u>12,143,184</u>			
Equity real estate	<u>4,835,469</u>			
Alternative investments:				
Private equity	5,792,265			
Special situations (Private debt)	4,441,297			
Venture capital	965,638			
	<u>11,199,200</u>			
Total investments measured at the NAV	<u>28,177,853</u>			
Total investments measured at fair value	<u>\$ 47,715,767</u>			
Investment derivative instruments				
Futures	\$ 32,019	\$ 32,019	\$ -	\$ -
Total return type swaps	302,321	302,321	-	-
Foreign exchange contracts	(9,932)	(9,932)	-	-
Total investment derivative instruments	<u>\$ 324,408</u>	<u>\$ 324,408</u>	<u>\$ -</u>	<u>\$ -</u>

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The valuation method for investments measured at the net asset value (NAV) per share (or its equivalent) at June 30, 2017 and 2016 are presented in the following tables.

Investments measured at the NAV				
(Dollar Amounts in Thousands)				
	<u>June 30, 2017</u>	<u>Unfunded Commitments</u>	<u>Redemption Frequency</u>	<u>Redemption Notice Period</u>
Collective trust funds (a)	\$ 12,816,147	\$ -	see note (a)	0 - 90 Days
Equity real estate (b)	4,973,477	2,063,824	see note (b)	
Alternative investments:				
Private equity (c)	5,883,902	2,855,180	see note (c)	
Special situations (Private debt) (d)	5,053,043	2,933,173	see note (d)	
Venture capital (e)	985,995	324,830	see note (e)	
	<u>11,922,940</u>			
Total investments measured at the NAV	\$ 29,712,564			

Investments measured at the NAV				
(Dollar Amounts in Thousands)				
	<u>June 30, 2016</u>	<u>Unfunded Commitments</u>	<u>Redemption Frequency</u>	<u>Redemption Notice Period</u>
Collective trust funds (a)	\$ 12,143,184	\$ 160,000	see note (a)	0 - 90 Days
Equity real estate (b)	4,835,469	2,205,905	see note (b)	
Alternative investments:				
Private equity (c)	5,792,265	3,404,544	see note (c)	
Special situations (Private debt) (d)	4,441,297	3,175,050	see note (d)	
Venture capital (e)	965,638	422,282	see note (e)	
	<u>11,199,200</u>			
Total investments measured at the NAV	\$ 28,177,853			

ii. Investments at Net Asset Value (NAV)

- (a) Collective trust fund investments (CTF) consist primarily of domestic and international institutional funds. The fair value of CTF is based on the reported share value of the respective fund. CTF are managed by state chartered banks for which various state banking departments have regulatory oversight and investment advisors for which regulatory agencies such as the Securities and Exchange Commission have regulatory oversight. Investments that are not subject to this oversight are subject to annual independent audits. Redemption frequency for these assets range from monthly, to quarterly, to annual. One asset has a 2-year hard lock that expires on December 31, 2017.
- (b) Equity real estate includes real estate funds that invest primarily in U.S., Latin American, European and Asian commercial real estate. Fund investments can be made across the capital structure of each property venture. The fair value of the investments in this type have been determined using the NAV per share (or its equivalent) of the System's ownership interest in partners' capital. These investments cannot be easily redeemed. Distributions from each fund may be received as: 1) cash flows from operations or 2) return of capital from dispositions. It is expected that the underlying assets of the funds will be liquidated over the next 7 to 12 years.
- (c) Private equity includes U.S. buyout funds and international buyout funds that invest mostly in private companies across a variety of industries (although

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they may invest in public companies from time to time). The fair value of the investments in this type have been determined using the NAV per share (or its equivalent) of the System's ownership interest in partners' capital. These investments cannot be easily redeemed. The nature of private equity investments is that distributions are received through the liquidation of the underlying assets of the fund. The expected holding period of a private equity portfolio company is 3 to 7 years.

- (d) Special situations (Private debt) includes private investment funds that invest across the fixed income capital structure primarily in North America and Western Europe. The fair value of the investments in this type have been determined using the NAV per share (or its equivalent) of the System's ownership interest in partners' capital. These investments cannot be easily redeemed. Instead, the nature of the investments in this type is that distributions are received through the orderly liquidation of the underlying assets of the fund throughout the stated term of the fund. It is expected that the underlying assets of the funds will be liquidated over the next 3 to 7 years.
- (e) Venture capital includes U.S. based private funds, that finance young, relatively small, rapidly growing companies, typically in either the health care or information technology sectors. The fair value of the investments in this type have been determined using the NAV per share (or its equivalent) of the System's ownership interest in partners' capital. These investments cannot be easily redeemed. The nature of venture capital investments is that distributions are received through the liquidation of the underlying assets of the fund. It is expected that the underlying assets of the funds will be liquidated over the next 5 to 10 years.

(C) Deposit and Investment Risk Disclosures**i. Deposits**

Custodial credit risk for deposits is the risk that, in the event of a financial institution failure, the System would not be able to recover the value of the deposits. The Commonwealth's Treasury Department is the custodian of the System's funds. Commonwealth Treasury Department deposits must be held in insured depositories approved by the Commonwealth's Board of Finance and Revenue and must be fully collateralized.

The System, through its third party administrator, maintains certain bank deposits for the operation of its voluntary

The following table discloses aggregate market value by credit quality rating category. Many securities have ratings from more than one NRSRO and sometimes those ratings differ from one NRSRO to another. The data listed below uses the rating (expressed as S&P equivalent) available from Fitch, Moody's and/or S&P that indicates the lowest credit quality at June 30, 2017 and 2016.

Quality Rating	(Dollar Amounts in Thousands)	
	2017 Fair Value	2016 Fair Value
AAA	\$ 797,203	\$ 638,124
AA	210,405	153,353
A	414,985	238,902
BBB	739,916	455,746
BB and Below	431,513	254,925
NR*	11,419,428	10,592,798
Total Exposed to Credit Risk	14,013,450	12,333,848
US Government Guaranteed**	1,531,272	1,331,821
Total Fixed Income and Short-Term Investments	\$ 15,544,722	\$ 13,665,669

* Not Rated securities include \$4,476,419 and \$4,632,435 in collective trust funds and \$5,718,223 and \$4,572,545 in PSERS Short Term Investment Fund assets at at June 30, 2017 and 2016 respectively.

** Comprised of U.S. government and agency obligations explicitly guaranteed by the U.S. government and not considered to have credit risk.

HOP. These deposits are not required to be collateralized by statute or policy. These deposits totaled \$129,996,000 and \$104,205,000 at June 30, 2017 and 2016, respectively, and are under the custody of M&T Bank which has an A rating by Standard and Poor's (S&P) and an Aa3 rating by Moody's Investor Services (Moody's).

ii. Investment Risks

The System's investments, including derivatives and other similar investments, may be subject to various risks. Among these risks are concentration of credit risk, custodial credit risk, credit risk, interest rate risk, and foreign currency risk. The policies addressing each one of these risks, discussed in more detail below, are contained within the Investment Policy Statement, Objectives, and Guidelines reviewed and approved annually by the Board. Due to the level of risk associated with certain investments, it is possible that changes in the values of investments may occur in the near term and that such changes could materially affect the amounts reported in the Statements of Fiduciary Net Position.