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PENNSYLVANIA STATE EMPLOYEES' RETIREMENT SYSTEM
DEFERRED COMPENSATION PLAN

Financial Statements
with Required Supplementary Information

December 31, 2018 and 2017

(With Independent Auditors' Report Thereon)

PENNSYLVANIA STATE EMPLOYEES' RETIREMENT SYSTEM
DEFERRED COMPENSATION PLAN

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Independent Auditors' Report

The Members of the Board
Pennsylvania State Employees' Retirement System
Deferred Compensation Plan:

We have audited the accompanying financial statements of the Pennsylvania State Employees' Retirement System Deferred Compensation Plan as of and for the years ended December 31, 2018 and 2017, and the related notes to the financial statements, which collectively comprise the Deferred Compensation Plan's basic financial statements as listed in the table of contents.

Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with U.S. generally accepted accounting principles; this includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditors' Responsibility

Our responsibility is to express an opinion on these financial statements based on our audits. We conducted our audits in accordance with auditing standards generally accepted in the United States of America. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditors' judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditors consider internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Opinion

In our opinion, the financial statements referred to above present fairly, in all material respects, the net position available for benefits of the Pennsylvania State Employees' Retirement System Deferred Compensation Plan as of December 31, 2018 and 2017, and the changes in its net position available for benefits for the years then ended, in accordance with U.S. generally accepted accounting principles.

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Other Matters

Required Supplementary Information

U.S. generally accepted accounting principles require that the management's discussion and analysis on pages 3-5 be presented to supplement the basic financial statements. Such information, although not a part of the basic financial statements, is required by the Governmental Accounting Standards Board who considers it to be an essential part of financial reporting for placing the basic financial statements in an appropriate operational, economic, or historical context. We have applied certain limited procedures to the required supplementary information in accordance with auditing standards generally accepted in the United States of America, which consisted of inquiries of management about the methods of preparing the information and comparing the information for consistency with management's responses to our inquiries, the basic financial statements, and other knowledge we obtained during our audit of the basic financial statements. We do not express an opinion or provide any assurance on the information because the limited procedures do not provide us with sufficient evidence to express an opinion or provide any assurance.

KPMG LLP

Harrisburg, Pennsylvania
May 31, 2019

This section presents management's discussion and analysis of the Pennsylvania State Employees' Retirement System Deferred Compensation Plan's (Deferred Compensation Plan) financial statements and the significant events and conditions that affected the operations and performance of the Deferred Compensation Plan during the years ended December 31, 2018, 2017, and 2016.

Overview of the Basic Financial Statements

1. **Basic Financial Statements**. The Deferred Compensation Plan presents Statements of Net Position Available for Benefits as of December 31, 2018 and 2017 and Statements of Changes in Net Position Available for Benefits for the years then ended. These statements reflect resources available for the payment of benefits as of year end, and the sources and uses of those funds during the year.

2. **Notes to Basic Financial Statements**. The notes to basic financial statements are an integral part of the financial statements and provide additional detailed information to provide a better understanding of the financial statements. The notes discuss, among other things, the Deferred Compensation Plan's organization, contributions, and how asset values are determined.

Background

The State Employees' Retirement Board (SERB) is the trustee for the Deferred Compensation Plan, an Internal Revenue Code (IRC) Section 457(b) retirement plan for eligible government employees and officers. The Deferred Compensation Plan started as a voluntary tax-deferred supplemental retirement plan but also allows voluntary post-tax contributions through a Roth option. The participants may direct their deferrals among 11 investment options. A third-party administrator (TPA) maintains individual participant records. Investment advisors selected by the SERB manage the Deferred Compensation Plan's investment options. The Deferred Compensation Plan began accepting initial deferrals in 1988.

The investments are composed of primarily three core equity index funds – U.S. Large Company Stock Index Fund that is a Standard & Poor's (S&P) 500 index of large-cap companies, a U.S. Small/Mid Company Stock Fund that is an index of domestic mid and small-cap companies, and an International Company Stock Index Fund. The Deferred Compensation Plan also offers a U.S. Bond Index Fund, a Stable Value Fund, a Short Term Investment Fund, and Self-Directed Brokerage Accounts. Three "Profile Funds" are also available to the participants. These funds are composed of a mix of the equity, cash, and bond core index funds, tailored to a participant's risk profile that allows them to invest in a conservative, moderate, or aggressive portfolio. The Deferred Compensation Plan also offers a 60/40 Balanced Stock & Bond Fund, which uses a mix of the U.S. Large Company Stock Index and the U.S. Bond Index Funds. These portfolios are automatically rebalanced each quarter by the TPA.

Net Position Available for Benefits

The net position was $3.3 billion and $3.5 billion as of December 31, 2018 and 2017, respectively, which was a decrease of approximately $168 million. In 2016, plan net position was $3.2 billion. Of the three asset classes of equities, bonds, and cash, 50.3% of the net plan position was invested in the three core equity funds (large-cap; mid and small-cap; and international equities) at year end 2018. At the end of 2017, those same investment funds accounted for 53.3% of the plan net position available for benefits. The fixed income portfolios, U.S. Bond Index Fund and Stable Value Fund, accounted for 44.1% and 41.2% of plan net position in 2018 and 2017, respectively. The Short Term Investment Fund accounted for 2.1% and 1.9% of the plan net position available for benefits in 2018 and 2017, respectively.

Contributions and Investment Income

Contributions increased to $145.7 million in 2018 from $135.4 million in 2017. Contributions were $135.8 million in 2016.

Net investment loss in 2018 was $114.2 million compared to income of $370.3 million in 2017. Net investment income was $188.6 million in 2016. The decrease in net investment income in 2018 was attributed primarily to lower broad market equity returns as the S&P 500 Index and the Dow Jones U.S. Completion Stock Market Index returned -4.38% and -9.57%, respectively, versus returns of 21.8% and 18.1%, respectively, in 2017. The S&P 500 Index and the Dow Jones U.S. Completion Stock Market Index returned 12.0% and 15.8%, respectively, in 2016.

Program Benefits and Expenses

Benefits paid to participants increased to $107.4 million in 2018 from $98.4 million in 2017. Benefits paid to participants in 2016 were $91.0 million. The election to select a payment is voluntary up to age 70½ and is typically dependent upon the participant's separation from service. The Deferred Compensation Plan offers a variety of payout methods. A majority of participants select a periodic payment either annually, semiannually, quarterly, or monthly. The number of participants receiving payments increased to approximately 9,000 for 2018 from approximately 8,300 for 2017. The number of participants receiving payments in 2016 was approximately 7,700. A 457(b) plan is permitted to accept rollovers from other retirement plans, and to permit rollovers out of the Deferred Compensation Plan into Individual Retirement Accounts (IRAs), 401(k) plans, or other qualified plans. Net rollovers out of the Deferred Compensation Plan increased to $87.4 million in 2018 from $73.6 million in 2017. In 2016, net rollovers out of the Deferred Compensation Plan were $47.4 million.

Deferred Compensation Plan participants are responsible for all Deferred Compensation Plan fees. The TPA expenses were $4.4 million in 2018 and $4.2 million in 2017. In 2016, these expenses were $3.7 million. A large portion of the fee is based on a percentage of plan assets, as the plan asset base changes, a corresponding change to the fees occurs. For the first three quarters of 2018, plan assets increased. However during the last quarter of 2018 losses occurred, which helped contribute to the overall decrease in plan assets.

PENNSYLVANIA STATE EMPLOYEES' RETIREMENT SYSTEM
DEFERRED COMPENSATION PLAN

Management's Discussion and Analysis

December 31, 2018 and 2017

(Unaudited)

Condensed Financial Information

($ millions)

	Net Position				
Assets	**2018**	**Increase (decrease)**	**2017**	**Increase (decrease)**	**2016**
Total receivables	$ 6	$ 1	$ 5	$ —	$ 5
Total investments	3,323	(169)	3,492	329	3,163
Securities lending collateral pool	—	(22)	22	20	2
Total assets	3,329	(190)	3,519	349	3,170
Liabilities					
Total payables	2	—	2	—	2
Obligations under securities lending	—	(22)	22	20	2
Total liabilities	2	(22)	24	20	4
Total net position	$ 3,327	$ (168)	$ 3,495	$ 329	$ 3,166

	Changes in Net Position				
Additions	**2018**	**Increase (decrease)**	**2017**	**Increase (decrease)**	**2016**
Net investment (loss)/income	$ (114)	$ (484)	$ 370	$ 182	$ 188
Contributions	146	10	136	—	136
Total additions	32	(474)	506	182	324
Deductions					
Benefit payments	108	10	98	7	91
Plan transfers	87	13	74	27	47
Third party and administrative expenses	5	—	5	1	4
Total deductions	200	23	177	35	142
(Decrease)/increase in net position	$ (168)	$ (497)	$ 329	$ 147	$ 182

BASIC FINANCIAL STATEMENTS

PENNSYLVANIA STATE EMPLOYEES' RETIREMENT SYSTEM
DEFERRED COMPENSATION PLAN

Statements of Net Position Available for Benefits

December 31, 2018 and 2017

($ thousands)

	2018	2017
Assets:		
Receivables:		
Contributions receivable	$ 5,392	$ 5,325
Accrued investment income receivables	246	97
Other receivables	93	150
Total receivables	5,731	5,572
Investments:		
Cash and temporary investments	2,591	5,932
Short term investment fund	70,823	66,815
U.S. bond index fund	403,335	374,982
U.S. large company stock index fund	1,109,041	1,229,894
U.S. small/mid company stock index fund	372,001	421,944
International company stock index fund	191,621	210,204
Stable value fund	1,063,254	1,063,116
Group annuity contract	1,034	1,081
Self-directed brokerage accounts	109,487	118,123
Total investments	3,323,187	3,492,091
Securities lending collateral pool	—	21,518
Total assets	3,328,918	3,519,181
Liabilities:		
Payables:		
Participant payables	134	99
Fees payable and accrued expenses	1,416	1,962
Other payables	305	272
Total payables	1,855	2,333
Obligations under securities lending	—	21,518
Total liabilities	1,855	23,851
Net position available for benefits	$ 3,327,063	$ 3,495,330

See accompanying notes to basic financial statements.

PENNSYLVANIA STATE EMPLOYEES' RETIREMENT SYSTEM
DEFERRED COMPENSATION PLAN

Statements of Changes in Net Position Available for Benefits

Years ended December 31, 2018 and 2017

($ thousands)

	2018	2017
Additions:		
Investment income:		
From investing activities:		
Net (depreciation)/appreciation in fair value of investments	$ (125,981)	$ 348,266
Interest	12,950	25,629
Total investing activities (loss)/income	(113,031)	373,895
Less investment expenses	1,167	3,632
Net (loss)/income from investing activities	(114,198)	370,263
From securities lending activities:		
Securities lending income	7	19
Securities lending expense	—	(1)
Net income from securities lending activities	7	18
Net investment (loss)/income	(114,191)	370,281
Contributions from participants	145,662	135,357
Total additions	31,471	505,638
Deductions:		
Benefits and refunds to participants	107,447	98,397
Plan transfers	87,383	73,633
Third party expenses	4,432	4,224
Administrative expenses	476	376
Total deductions	199,738	176,630
(Decrease)/increase in net position	(168,267)	329,008
Net position available for benefits, beginning of year	3,495,330	3,166,322
Net position available for benefits, end of year	$ 3,327,063	$ 3,495,330

See accompanying notes to basic financial statements.

(1) Organization and Description of the Plan

(a) Program Summary

The following description of the Pennsylvania State Employees' Retirement System Deferred Compensation Plan (Deferred Compensation Plan) provides only general information. Participants should refer to the Plan Document for a more complete description of the Deferred Compensation Plan provisions.

The Deferred Compensation Plan was established by the Commonwealth of Pennsylvania General Assembly on November 6, 1987, through Act 81 and in accordance with Section 457(b) of the Internal Revenue Code (IRC) of 1986, as amended. Under the Deferred Compensation Plan provisions, eligible employees of the Commonwealth of Pennsylvania (commonwealth) may voluntarily elect to contribute a portion of their compensation into the Deferred Compensation Plan through payroll deductions. The commonwealth does not make any contributions to the Deferred Compensation Plan. The Deferred Compensation Plan is included in the commonwealth's financial reports as a pension trust fund.

(b) Contributions

Under the Deferred Compensation Plan provisions, eligible employees may contribute to the Deferred Compensation Plan through payroll deductions. In accordance with Section 457(b) of the IRC, the amount of an individual's annual contributions for 2018 was limited to an amount not to exceed the lesser of $18,500 or 100% of the individual's gross compensation. In 2017, the annual contribution limit was $18,000. Individuals age 50 or over may make an additional "catch-up" contribution. In 2018 and 2017, the additional "catch-up" contribution was $6,000. Special catch-up is allowed for previously missed contributions for participants within three years of normal retirement age. In 2018 and 2017, the deferral limit for special catch-up was $37,000 and $36,000, respectively. Contributions can be made to the Deferred Compensation Plan using either the before-tax method in which amounts are deferred for federal income tax purposes or the Roth option in which contributions are made on an after-tax basis.

Contributions receivable represent amounts withheld from employees' pay but not remitted to the investment managers at December 31. Contributions are credited by the applicable investment managers upon receipt from the commonwealth.

(c) Participant Accounts

Participants electing to contribute to the Deferred Compensation Plan have the option of investing their contributions in any of the following core investments:

- *Short Term Investment Fund*, which invests in a variety of securities including those issued by the U.S. Treasury, agency securities, short-term corporate debt instruments such as commercial paper, repurchase agreements, and certificates of deposit, is managed by the Commonwealth of Pennsylvania Treasury Department (Treasury Department).
- *U.S. Bond Index Fund*, which is a collective investment fund that invests in investment grade corporate and government issues, mortgage-backed securities, asset-backed securities, and commercial mortgage-backed securities, is managed by Mellon Capital Management Corporation (Mellon).

- *U.S. Large Company Stock Index Fund*, which is a collective investment fund that invests in publicly traded common stocks included in the S&P 500 Index, is managed by Mellon.
- *U.S. Small/Mid Company Stock Index Fund*, which is a collective investment fund that invests in medium and small capitalization components of the U.S. equity market (primarily the portion not covered by the S&P 500 Index), is managed by Mellon.
- *International Company Stock Index Fund*, which is a collective investment fund that invests in international stocks in the European, Australian, and Far East markets, is managed by Mellon.
- *Stable Value Fund*, which is a structure that allows participants an opportunity to gain exposure to fixed income investments without the return volatility normally associated with bond funds because of an associated insurance wrap provider. Participants receive the quarterly agreed-upon crediting rates regardless of actual investment performance. Fund managers and insurance providers for this fund have transitioned from 2017 to 2018.

In addition to the core investments, the Deferred Compensation Plan also offers the following:

- *Aggressive Portfolio Fund*, which is a blend of the core investments, consists of 48% in the U.S. Large Company Stock Index Fund, 20% in the U.S. Bond Index Fund, 20% in the International Company Index Fund, and 12% in the U.S. Small/Mid Company Stock Index Fund.
- *Moderate Portfolio Fund*, which is a blend of the core investments, consists of 40% in the U.S. Bond Index Fund, 36% in the U.S. Large Company Stock Index Fund, 15% in the International Company Index Fund, and 9% in the U.S. Small/Mid Company Stock Index Fund.
- *Conservative Portfolio Fund*, which is a blend of the core investments, consists of 50% in the U.S. Bond Index Fund, 20% in the Short Term Investment Fund, 17% in the U.S. Large Company Stock Index Fund, 8% in the International Company Index Fund, and 5% in the U.S. Small/Mid Company Stock Index Fund.
- *60/40 Balanced Stock & Bond Fund*, which is a blend of the core investments, consists of 60% in the U.S. Large Company Stock Index Fund and 40% in the U.S. Bond Index Fund.
- *Self-Directed Brokerage Accounts*, which is a mutual fund window whereby a participant may choose to invest in a variety of mutual funds offered through the Charles Schwab Corporation.

Investment income includes the realized and unrealized gains/losses and interest for each of the funds. These funds do not distribute dividends to shareholders. Earnings and dividends on securities held are reinvested. Purchases and sales of securities are recorded on a trade-date basis.

The Pennsylvania State Employees' Retirement System provides certain management and administrative services to the Deferred Compensation Plan on an ongoing basis. During 2018 and 2017, the Deferred Compensation Plan paid approximately $476,000 and $376,000 for those services, respectively. The Deferred Compensation Plan receives $275,000 annually from the third-party administrator (TPA) to cover these costs, which is a reduction of third party expenses.

(Continued)

(d) Payment of Benefits

Participants may withdraw the current value of funds contributed to the Deferred Compensation Plan upon termination of employment, death, disability, retirement, or approved unforeseeable emergencies within Deferred Compensation Plan guidelines. Accounts that have no activity in a two-year period and a balance under $5,000 may also be voluntarily distributed.

Upon retirement or termination of service, participants may elect various payout options including lump-sum, equal annual payments, or elect to defer receipt of funds until some future date. Minimum distributions as required by Internal Revenue Service guidelines must commence no later than age 70½ including the Roth option. Rollovers to other qualified retirement plans or IRAs are permitted. All investments are for the exclusive benefit of participants and their beneficiaries.

Upon a participant's death, with certain exceptions, any amount due under the participant's account is paid to the beneficiary or the estate. Distributions to participants are recorded at the time withdrawals are made from participant accounts.

(2) Summary of Significant Accounting Policies

(a) Basis of Accounting in Preparing Financial Statements

The financial statements of the Deferred Compensation Plan are prepared on the accrual basis of accounting under which deductions are recorded when the liability is incurred, additions are recorded in the accounting period in which they are earned and become measurable, and investment purchases and sales are recorded as of their trade date.

(b) Use of Estimates

Management of the Deferred Compensation Plan has made certain estimates and assumptions relating to the reporting of assets and liabilities and the disclosure of contingent assets and liabilities to prepare these financial statements in conformity with accounting principles generally accepted in the United States of America. Actual results could differ from those estimates.

(c) Valuation of Investments

The Short Term Investment Fund and temporary investment portion of the Stable Value Fund are valued at cost, which approximates fair value. The U.S. Bond Index, U.S. Large Company Stock Index Fund, U.S. Small/Mid Company Stock Index Fund, International Company Stock Index Fund, and Self-Directed Brokerage Accounts are valued based on quoted redemption values on the last business day of the calendar year, which represents fair value.

The Stable Value Fund uses a fund manager to oversee the two main components to its investment strategy. The first component addresses building a diversified investment portfolio of high-quality fixed income securities with the second component maintaining an insurance wrap provider. This second component provides the stability of the return stream by smoothing investment returns over time. Historically, SERS utilized one investment manager and one insurance wrap provider for its Stable Value Fund. As a result of assets in this investment option growing over time, in 2018 SERS diversified the strategy by having the fund manager allocate across six different investment managers and six insurance wrap providers.

In 2017, the fixed income holdings portion of the Stable Value Fund was valued based on quoted redemption values on the last business day of the calendar year, which represented fair value. As a result of the change in strategy as noted above, in 2018 the fixed income holdings portion of the Stable Value Fund is valued at contract value, which approximates fair value.

The group annuity contract, which is no longer offered to participants as an investment option, is valued at contract value, which approximates fair value. Contract value for the group annuity contract represents contributions made under the contract, plus earnings, less payments made to retirees and terminated participants.

(3) Agreement with Third-Party Administrator

The State Employees' Retirement Board (SERB) selected Great-West Life & Annuity Insurance Company (Great-West) as the Deferred Compensation Plan TPA. Today, Empower Retirement is the brand name for its services division, and Great-West Financial is the brand for its insurance, annuity, and investment businesses. Great-West receives the following compensation for third-party administration services:

- Third-party administration charge – A $24.00 annual fee is charged to each participant in the Deferred Compensation Plan for record-keeping services. The full fee is due to Great-West. This charge is assessed monthly.
- Third-party asset fee – This charge is assessed monthly on the value of all accounts in the Deferred Compensation Plan. The fee varies depending on the type of investment. The fee ranges from 0.07% to 0.375%. This includes 0.07% payable to Great-West for TPA services and manager fees ranging from 0.00% to 0.305%. The program asset fee is assessed against the account of each participant proportionately according to the value of each individual account.
- Investment advice fee – Great-West, through its subsidiary Advised Assets Group LLC, provides participants with online advisory tools and services based upon the level of involvement desired in managing their accounts. Guidance is offered at no additional cost. Advice is offered for an annual fee of $25.00. All advice fees are assessed quarterly. Managed accounts provide ongoing professional asset management at the individual participant level. Plan participants receive a personalized and strategically designed retirement portfolio that is automatically managed quarterly. The managed account fee structure is asset based and through September 30, 2017, ranged from 0.30% to 0.60% based on the participant account balance. As of October 1, 2017, the managed account fee decreased and ranged from 0.15% to 0.45%.

(4) Investments

(a) Program Overview

The Deferred Compensation Plan's core investments are managed by three fund managers. At December 31, 2018 and 2017, one fund manager, Mellon, managed approximately 62.5% and 64.1%, respectively, of the Deferred Compensation Plan total investment portfolio. There is also concentration in the fixed income type of investment. The fixed income portfolios, which consist of the U.S. Bond Index Fund and the fixed income investments within the Stable Value Fund, made up 44.1% and 41.2% of the Deferred Compensation Plan total investment portfolio in 2018 and 2017, respectively. These concentrations are solely determined by the participants' elections to invest in the available investment options selected by the SERB.

(b) Fair Value Hierarchy

The fair value hierarchy, which contains three levels, is based on the valuation inputs used to measure an asset's fair value. Level 1 inputs are quoted prices in active markets for identical assets or liabilities. Level 2 inputs are quoted prices for similar assets or liabilities in active markets, quoted prices for identical or similar assets or liabilities in markets that are not active, or other than quoted prices that are observable. Level 3 inputs are unobservable inputs used to measure fair value if relevant observable inputs are not available for the asset or liability at the reporting date.

Collective investment funds and self-directed brokerage accounts are reported at fair value based on the Deferred Compensation Plan's ownership percentage of underlying investments as of the last business day of the calendar year, and are categorized as Level 1. The collective investment funds comprise two U.S. equity funds, one international equity fund, and one U.S. bond fund. Using a mix of these funds, the Deferred Compensation Plan offers a balanced fund and three profile funds, which are aggressive, moderate, and conservative.

For 2017, fixed income holdings of the Stable Value Fund were maintained with one manager and one insurance wrap provider valued using a matrix pricing technique, and categorized as Level 2. Matrix pricing was used to value securities based on the securities' relationship to benchmark quoted prices. As a result of changing the strategy of the Stable Value Fund in 2018 to a multi-manager and multi-insurance wrap set-up, the Stable Value Fund is not valued within the fair value hierarchy.

For 2018, the Stable Value Fund excluding the commonwealth Treasury Department's STIF is valued at Net Asset Value (NAV), which approximates fair value. NAV for the Stable Value Fund represents the consolidated values of the multiple managers that were hired by the fund manager.

The Deferred Compensation Plan also has investments that are not measured at fair value or NAV. The Short Term Investment Fund and commonwealth Treasury Department's STIF are valued at cost plus accrued interest, which approximates fair value. The group annuity contract, which is no longer offered to participants, is valued at contract value, which approximates fair value. Contract value for the group annuity contract represents contributions made under the contract, plus earnings, less payments made to retirees and terminated participants.

The Deferred Compensation Plan has the following recurring fair value, NAV, and other measurements as of December 31, 2018 and 2017:

	2018 ($ thousands)			
	Level 1 Fair value	NAV	Other	Total
Stable value fund	$ —	$ 1,019,018	$ 44,236	$ 1,063,254
Self-directed brokerage accounts	109,487	—	—	109,487
Collective investment funds:				
U.S. large company stock index fund	1,109,041	—	—	1,109,041
U.S. small/mid company index fund	372,001	—	—	372,001
U.S. bond index fund	402,722	—	613	403,335
International company stock index fund	191,621	—	—	191,621
Cash and temporary investments	—	—	2,591	2,591
Short term investment fund	—	—	70,823	70,823
Group annuity contract	—	—	1,034	1,034
Total	$ 2,184,872	$ 1,019,018	$ 119,297	$ 3,323,187

	2017 ($ thousands)				
	Investments measured at fair value				
	Fair value	Level 1	Level 2	Other	Total
Stable value fund:					
Government	$ 448,749	$ —	$ 448,749	$ —	$ 448,749
Mortgage-backed securities	218,525	—	218,525	—	218,525
Corporates	169,246	—	169,246	—	169,246
Asset-backed securities	91,287	—	91,287	—	91,287
Agencies	59,708	—	59,708	—	59,708
Sovereign debt	10,127	—	10,127	—	10,127
U.S. private placements	5,622	—	5,622	—	5,622
Short-term investments	—	—	—	59,852	59,852
Total stable value fund	1,003,264	—	1,003,264	59,852	1,063,116
Self-directed brokerage accounts	118,123	118,123	—	—	118,123
Collective investment funds:					
U.S. large company stock index fund	1,229,894	1,229,894	—	—	1,229,894
U.S. small/mid company index fund	421,944	421,944	—	—	421,944
U.S. bond index fund	374,316	374,316	—	666	374,982
International company stock index fund	210,204	210,204	—	—	210,204
Cash and temporary investments	—	—	—	5,932	5,932
Short term investment fund	—	—	—	66,815	66,815
Group annuity contract	—	—	—	1,081	1,081
Total	$ 3,357,745	$ 2,354,481	$ 1,003,264	$ 134,346	$ 3,492,091

(Continued)

(c) Concentration of Credit, Custodial Credit, Credit, Interest Rate, and Foreign Currency Risk

The Deferred Compensation Plan cash and temporary investments, Short Term Investment Fund, Stable Value Fund, and U.S. Bond Index Fund are subject to various risks. Among these risks are: concentration of credit, custodial credit, credit, interest rate, and foreign currency risk. Each of these risks are discussed below.

Concentration of credit risk is the risk of loss attributed to the magnitude of investment in a single issuer. As of December 31, 2018 and 2017, the Deferred Compensation Plan had no single issuer that exceeded 5% of total investments. Investments issued or explicitly guaranteed by the U.S. government and investments in mutual funds, external investment pools, and other pooled investments were excluded.

Custodial credit risk is the risk that, in the event of the failure of the counterparty to a transaction, the Deferred Compensation Plan would be unable to recover the value of investment or collateral securities that are in the possession of an outside party. In accordance with the contractual relationship between the commonwealth Treasury Department and its custodial agent, where securities are used as evidence of the investment, these securities are held by the custodian in book-entry form. These securities are defined as insured or registered investments for which the securities are held by the agent in the Deferred Compensation Plan's name, and therefore have a minimal level of custodial credit risk losses. All remaining investments do not have securities that are used as evidence of the investments.

Credit risk is the risk that an issuer or the counterparty to an investment will not fulfill its obligations. The credit risk of a debt instrument is measured by nationally recognized statistical rating agencies such as Moody's Investor Services (Moody's), S&P, and Fitch Ratings (Fitch).

The Deferred Compensation Plan's proportionate share of the underlying investments of the U.S. Bond Index Fund, which is a collective investment fund, are included in the credit and interest rate risk tables below. The Deferred Compensation Plan's interest in the U.S. Bond Index Fund was 14.9% representing $403.3 million and 14.3% representing $375.0 million at December 31, 2018 and 2017, respectively.

For securities exposed to credit risk in the fixed income investments of the Deferred Compensation Plan, the following tables disclose aggregate fair value, by the least favorable credit rating issued using Moody's, S&P, and Fitch credit ratings at December 31, 2018 and 2017:

Debt Securities Exposed to Credit Risk (2018)
($ thousands)

	AAA	AA	A	BAA	BA and below	Short-term investments[1/]	Total exposed to credit risk[2/,3/]
Mortgage-backed securities	$ 6,739	$ 119,023	$ —	$ —	$ —	$ —	$ 125,762
Corporates	590	6,568	32,934	53,048	3,005	—	96,145
Short-term investments[1/]	—	—	—	—	—	74,027	74,027
Sovereign debt	8,288	1,957	2,124	4,090	27	—	16,486
Agencies	269	2,096	471	321	21	—	3,178
Asset-backed securities	2,028	55	—	—	—	—	2,083
Total	$ 17,914	$ 129,699	$ 35,529	$ 57,459	$ 3,053	$ 74,027	$ 317,681

[1/] Represents investments in the commonwealth Treasury Department's STIF and Short Term Investment Fund. This comprises short-term, investment grade securities, which are mainly U.S. Treasuries, agencies, or repurchase agreements. It also comprises short term assets in the U.S. Bond Index Fund from the Statements of Net Position Available for Benefits.

[2/] Debt securities exposed to credit risk and U.S. government guaranteed securities, as noted in the subsequent paragraph, comprises cash and temporary investments, the Short Term Investment Fund and the U.S. Bond Index Fund from the Statements of Net Position Available for Benefits.

[3/] This does not include Stable Value Fund starting in 2018.

Debt Securities Exposed to Credit Risk (2017)
($ thousands)

	AAA	AA	A	BAA	BA and below	Short-term investments[1/]	Total exposed to credit risk[2/]
Mortgage-backed securities	$ 5,677	$ 274,648	$ —	$ —	$ —	$ —	$ 280,325
Corporates	2,441	9,831	125,692	72,671	3,532	—	214,167
Short-term investments[1/]	—	—	—	—	—	133,264	133,264
Asset-backed securities	79,544	13,554	—	—	—	—	93,098
Agencies	279	61,915	554	283	18	—	63,049
Sovereign debt	8,362	1,967	2,891	4,515	—	—	17,735
U.S. private placements[3/]	—	—	5,403	—	—	—	5,403
Total	$ 96,303	$ 361,915	$ 134,540	$ 77,469	$ 3,550	$ 133,264	$ 807,041

[1/] Represents investments in the commonwealth Treasury Department's STIF and Short Term Investment Fund. This comprises short-term, investment grade securities, which are mainly U.S. Treasuries, agencies, or repurchase agreements. It also comprises short term assets in the U.S. Bond Index Fund and Stable Value Fund from the Statements of Net Position Available for Benefits.

[2/] Debt securities exposed to credit risk and U.S. government guaranteed securities, as noted in the subsequent paragraph, comprises cash and temporary investments, the Short Term Investment Fund the U.S. Bond Index Fund, and the Stable Value Fund from the Statements of Net Position Available for Benefits.

[3/] Private placements raise capital via offerings directly to qualified investors rather than through public offerings. Private placements do not have to register with the Securities and Exchange Commission (SEC) if the securities are purchased for investment as opposed to resale. These private placements are corporate debt purchased pursuant to SEC Rule 144A and have registration rights with the SEC.

Obligations explicitly guaranteed by the U.S. government (treasuries and Government National Mortgage Association securities) with a fair value of $159 million and $704 million as of December 31, 2018 and 2017, respectively, are not included in the preceding tables because they are not considered to have credit risk.

Interest rate risk is the risk that will adversely affect the fair value of an investment, should market interest rates rise or fall. Option-adjusted duration is the measure of the portfolio's exposure to changes in interest rates. The following table discloses the interest rate types and durations of the fixed income investments of the Deferred Compensation Plan as of December 31, 2018 and 2017:

Debt Option-Adjusted Durations ($ thousands)

	2018		2017	
	Fair value	**Option-adjusted duration**	**Fair value**	**Option-adjusted duration**
U.S. private placements[1/]	$ —	—	$ 5,622	6.3
Collective investment funds	402,722	5.9	374,316	6.0
Government	—	—	448,749	3.9
Mortgage-backed securities	—	—	218,525	3.6
Sovereign debt	—	—	10,127	2.6
Corporates	—	—	169,246	2.3
Agencies	—	—	59,708	1.1
Asset-backed securities	—	—	91,287	0.8
Short-term investments[2/]	74,027	0.1	133,264	0.1
Total[3/]	$ 476,749		$ 1,510,844	

1/ Private placements raise capital via offerings directly to qualified investors rather than through public offerings. Private placements do not have to register with the SEC if the securities are purchased for investment as opposed to resale. These private placements are corporate debt purchased pursuant to SEC Rule 144A and have registration rights with the SEC.

2/ Represents investments in the commonwealth Treasury Department's STIF and Short Term Investment Fund. This comprises short-term, investment grade securities, which are mainly U.S. Treasuries, agencies, or repurchase agreements, and also includes insignificant investments in cash, receivables, and payables. The investments are pooled together by utilization of the commonwealth Treasury Department's STIF, and the Deferred Compensation Plan recognizes its respective allocation.

3/ Total fair values of the fixed income sector comprises cash and temporary investments, the Short Term Investment Fund, the U.S. Bond Index Fund, and the Stable Value Fund from the Statements of Net Position Available for Benefits. Stable Value Fund is only included for 2017.

The Deferred Compensation Plan prohibits investments by the manager in the active bond portfolio in the following categories: real estate, Real Estate Investment Trust issues, mortgages (mortgage pass-throughs are exempt), secured term loans, oil and gas production properties, convertible or preferred stock, private placements (other than corporate debt purchased pursuant to SEC Rule 144A that has registration rights with the SEC), loaning of money or securities, hypothecating of any assets in the portfolio, interest and principal only strips, inverse floaters, and inverse interest-only securities.

Foreign currency risk is the risk that changes in the exchange rates will adversely affect the fair value of an investment. The International Company Stock Fund seeks to track more than 1,000 foreign stocks representing established companies in 21 countries located in Western Europe and the Pacific Rim. Since the International Company Stock Index Fund is a collective investment fund, the Deferred Compensation Plan is indirectly exposed to foreign currency risk through those underlying securities.

(5) Derivative Financial Instruments

The Deferred Compensation Plan, through investments in collective investment funds trusteed by The Bank of New York Mellon (BNY Mellon) and managed by employees of Mellon (in their capacities as dual officers of BNY Mellon), indirectly holds certain derivative financial instruments. A derivative is a risk shifting agreement, the value of which is derived from the value of an underlying asset. The underlying asset could be a physical commodity, an interest rate, a company's stock, a stock index, a currency, or virtually any other tradable instrument upon which two parties can agree. The derivatives most commonly used by Mellon include currency forwards, futures, options, and swaps. The Deferred Compensation Plan's exposure to these instruments was not significant as of December 31, 2018 and 2017. The collective investment funds that the Deferred Compensation Plan is invested in currently utilize the following derivative instruments:

- U.S. Large Company Stock Index Fund – stock index futures
- U.S. Small/Mid Company Stock Index Fund – stock index futures
- International Company Stock Index Fund – stock index futures, currency forwards

These instruments are used in the investment management of the collective funds to the extent that their use is consistent with the specific collective fund's objective. Derivatives are viewed within the context of the collective fund's total portfolio. Mellon has instituted policies and procedures designed to ensure that derivative transactions are in keeping with the overall strategy and that such transactions are properly reviewed and monitored.

Mellon may take long or short positions in derivative instruments for, but not limited to, the following purposes: to create or hedge required exposure; to create or hedge model driven recommended exposure; as an adjustment to asset exposures within the parameters set in the collective fund's investment instructions and guidelines; to achieve transactional efficiency; to adjust the duration of a fixed income portfolio; if applicable, to achieve the appropriate degree of leverage, as stated in the collective fund's investment instructions and guidelines; and to facilitate meeting the collective fund's objectives.

As an advisor to these funds, Mellon evaluates the risks associated with derivatives in these collective funds. SERS monitors the risks related to derivatives and monitors Mellon's evaluation of risks by reviewing Mellon financial statements, exposure reports, and holdings reports on an ongoing basis.

Some of the risks associated with the use of derivatives include the following:

Market Risk: Market risk represents the risk of adverse movements in markets (including asset prices, volatility, changes in yield curve, implied volatility, or other market variables) for the derivatives or the underlying assets, reference rate or index to which the derivative instrument relates. Such risk is created by holding any security, physical, or derivative, which creates exposure to movements in process of a security or market. Additionally, some derivatives involve economic leverage, which could increase the volatility of these investments as they may fluctuate in value more than the underlying instrument. Mellon assesses the risk associated with derivatives in the context of the collective fund's total portfolio, taking into account the effective exposure of derivative instruments.

Liquidity Risk: Two types of liquidity risk are generally faced in derivative activities. The first is market liquidity risk, which applies to all investments. This is the risk that positions cannot easily be sold or unwound due to inadequate market depth or disruptions in the marketplace. The second is portfolio liquidity risk, which is the risk that there are insufficient funds in the portfolio to meet margin calls and other financial obligations resulting from derivative activities. Mellon has established restrictions and processes to assist with minimizing the impact of liquidity risk on the collective fund's portfolio.

Counterparty Risk: Counterparty risk is the risk that a counterparty (the party with whom a derivative contract is made) will fail to perform contractual obligations under a contract. This is also sometimes referred to as credit risk. Mellon has established guidelines and procedures designed to limit the impact of counterparty risk. The creditworthiness of counterparties is evaluated prior to approval and counterparty exposure and creditworthiness is reviewed regularly.

Operational Risk: Operational risk is the risk that deficiencies in the effectiveness and accuracy of the information systems or internal controls will result in a material loss. This risk is associated with human error, systems failures, inadequate procedures, and internal management controls. For example, there is risk that the valuation system incorrectly calculates a price for a derivative or its equivalent exposure.

The Deferred Compensation Plan offers participants the ability to invest in a Stable Value Fund, which is a Synthetic Guaranteed Investment Contract (SGIC). The SGIC provides a guaranteed crediting rate based on the underlying bond portfolio and is adjusted quarterly. For 2018, the annualized net-of-fee crediting rates were 2.164% for the first and second quarter, 2.293% for the third quarter, and 2.421% for the fourth quarter. For 2017, the annualized crediting rates were 2.057% for the first quarter, 2.141% for the second quarter, 2.207% for the third quarter, and 2.245% for the fourth quarter. The value of the underlying investments of the SGIC at December 31, 2018 was $1,063 million and the book value was $1,077 million. The value of the underlying investments of the SGIC at December 31, 2017 was $1,063 million and the book value was $1,062 million. In 2018, the book value – which was the total cost of the investment (amount paid at time of purchase plus or minus any additional deposits or withdrawals) plus accrued interest – exceeded the underlying investment value. The impact of this shortfall is covered by the insurance wrap providers, however, these two values will converge back over time through the quarterly crediting rate that is applied.

(6) Securities Lending

In accordance with a contract between the commonwealth's treasurer and its custodian, the Deferred Compensation Plan participated in a securities lending program in 2017. Starting in 2018 due to the change in structure of the Stable Value Fund, the Deferred Compensation Plan no longer participates in securities lending.

As of December 31, 2017, the Deferred Compensation Plan’s credit exposure to individual borrowers was limited because the amounts the Deferred Compensation Plan owed the borrowers exceeded the amounts the borrowers owed the Deferred Compensation Plan. The treasurer’s contract with the lending agent required the agent to indemnify the Deferred Compensation Plan if the borrowers failed to return the underlying securities and the collateral was inadequate to replace the loaned securities or if the borrowers failed to pay income distributions on the loaned securities.

Cash collateral was invested, together with the cash collateral on loaned securities of other commonwealth entities, in a short-term collective investment pool. The duration of the investments in the pool at December 31, 2017, was two days.

As of December 31, 2017, the fair value of loaned securities was approximately $21.1 million. The fair value of the associated collateral was approximately $21.5 million, most of which was held as noncash.

(7) Tax Qualification Status

According to the U.S. Treasury Department, the Deferred Compensation Plan is an eligible deferred compensation plan pursuant to IRC Section 457(b). Therefore, compensation deferred under the Deferred Compensation Plan, including income attributable to the deferred compensation, will be includible in gross income for the taxable year or years in which amounts are paid or otherwise made available to a participant or a participant’s beneficiary in accordance with the terms of the Deferred Compensation Plan.

(8) Risks and Uncertainties

The Deferred Compensation Plan, as directed by participants, may invest in various types of investment securities. Investment securities are exposed to various risks, such as interest rate, market, and credit risk. Due to the level of risk associated with certain investment securities, it is possible that changes in the values of investment securities may occur in the near term and that such change could materially affect the amounts reported in the statements of net position available for benefits.

(9) Related Parties

Certain members of the SERB are participants in the Deferred Compensation Plan.