Financial Section

Independent Auditors' Report

WILLIAMS KEEPERS LLC
CERTIFIED PUBLIC ACCOUNTANTS & CONSULTANTS

2005 West Broadway, Suite 100, Columbia, MO 65203
OFFICE (573) 442-6171 FAX (573) 777-7800
3220 West Edgewood, Suite E, Jefferson City, MO 65109
OFFICE (573) 635-6196 FAX (573) 644-7240
www.williamskeepers.com

The Board of Trustees
Missouri State Employees' Retirement System

We have audited the accompanying financial statements of the pension trust and internal service funds of the Missouri State Employees' Retirement System (MOSERS), a component unit of the State of Missouri, as of and for the year ended June 30, 2018, and the related notes to the financial statements, which collectively comprise the MOSERS' 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 opinions on these financial statements based on our audit. We conducted our audit in accordance with U.S. generally accepted auditing standards. 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 auditor considers 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 the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinions.

Opinions

In our opinion, the financial statements referred to above present fairly, in all material respects, the respective financial position of the pension trust and internal service funds of MOSERS as of June 30, 2018, and the respective changes in financial position and, where applicable, cash flows thereof for the year then ended in conformity with U.S. generally accepted accounting principles.

Other Matters

Required Supplementary Information

U.S. generally accepted accounting principles require that the *Management's Discussion and Analysis* on pages 19-24 and the *Schedule of Changes in Employers' Net Pension Liability*, *Schedule of Employer Contributions, Schedule of Annual Money-Weighted Rate of Return on Investments, Schedule of Proportionate Share of the Net OPEB Liability, Schedule of Employer Contributions for OPEB,* and the *Notes to the Schedules of Required Supplementary Information* on pages 56-66 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 U.S. generally accepted auditing standards, 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.

Other Information

Our audit was conducted for the purpose of forming opinions on the financial statements that collectively comprise MOSERS' basic financial statements. The *Introductory*, *Investment*, *Actuarial,* and *Statistical Sections* and the additional information on pages 67-74 are presented for purposes of additional analysis and are not a required part of the financial statements.

The additional information presented on pages 67-74 is the responsibility of management and was derived from and relates directly to the underlying accounting and other records used to prepare the financial statements. Such information has been subjected to the auditing procedures applied in the audit of the basic financial statements and certain additional procedures, including comparing and reconciling such information directly to the underlying accounting and other records used to prepare the basic financial statements or to the basic financial statements themselves, and other additional procedures in accordance with U.S. generally accepted auditing standards. In our opinion, the additional information presented on pages 67-74 is fairly stated in all material respects in relation to the basic financial statements as a whole.

The *Introductory*, *Investment*, *Actuarial,* and *Statistical Sections* have not been subjected to the auditing procedures applied in the audit of the basic financial statements and, accordingly, we do not express an opinion or provide any assurance on them.

Williams-Keepers LLC

October 19, 2018

Management's Discussion and Analysis

This discussion and analysis of the Missouri State Employees' Retirement System (MOSERS) provides an overview of the retirement system's financial activities for the fiscal year ended June 30, 2018. It is intended to be used in conjunction with the *Transmittal Letter* beginning on page 6 and *Financial Statements* and *Notes to the Financial Statements*, on pages 25-55 of this report.

Using This Financial Report

This Comprehensive Annual Financial Report (CAFR) reflects the activities of MOSERS as reported in the *Statements of Fiduciary Net Position* and the *Statements of Changes in Fiduciary Net Position*, which begin on page 25. These statements are prepared in conformity with generally accepted accounting principles. The *Notes to the Financial Statements* are an integral part of the financial statements and include additional information not readily evident in the statements themselves. The *Required Supplementary Information* (RSI) and *Additional Financial Information* following the *Notes to the Financial Statements* provide historical information and additional details considered useful in evaluating the condition of the plan.

Investment data in the *Financial Section* is presented at fair value. See the *Actuarial Section* of this report for a detailed discussion of the actuarial value of assets and liabilities and the funded status of the plans.

The basic financial statements contained in this section of the CAFR consist of:

- The *Statements of Fiduciary Net Position* report the pension trust funds' assets, liabilities, and resulting net position, where total assets less current liabilities equal net position held in trust for future pension benefits available at the end of the fiscal year. It is a snapshot of the financial position of the pension trust funds at that specific point in time.
- The *Statements of Changes in Fiduciary Net Position* summarize the pension trust funds' financial transactions that have occurred during the fiscal year where additions less deductions equal net change in net position. It supports the change that has occurred to the prior year's net position on the *Statements of Fiduciary Net Position*.
- The *Statements of Net Position* of the internal service funds are similar to the *Statements of Fiduciary Net Position* in that it is also a snapshot of the financial position of the internal service funds where net position plus liabilities equals assets.
- The *Statements of Revenues, Expenses, and Changes in Net Position* of the internal service funds is similar to the *Statements of Changes in Fiduciary Net Position* in that it also reports a summary of the financial activity that occurred over the period of the fiscal year where revenues less expenses equals net revenue and supports the change to the prior year's net position.
- The *Statements of Cash Flows* of the internal service funds report the financial transactions of the fiscal year of the internal service funds on a cash basis. It is similar to the *Statements of Revenues, Expenses and Changes in Net Position*; however, the focus of this statement is on the change to cash balances with accrued income and expense items eliminated.
- The *Notes to the Financial Statements* are an integral part of the above financial statements and include additional information not readily evident in the statements themselves.
- *Management's Discussion and Analysis*, the *Required Supplementary Information*, and *Additional Financial Information* following the *Notes to the Financial Statements* provide detailed historical information considered useful in evaluating the condition of the plans administered by MOSERS.

Funding Analysis

The unfunded actuarial accrued liability (UAAL) for MSEP increased by $0.5 billion from $4.28 billion at June 30, 2017, to $4.78 billion at June 30, 2018, with a corresponding decrease in funded percentage from 67.5% to 64.9%. The UAAL for the Judicial Plan increased by $19.06 million from $412.59 million at June 30, 2017, to $431.65 million at June 30, 2018, with an increase in funded percentage from 26.9% to 27.3%. The primary reason for the increase in the UAAL in both plans was a reduction in the assumed rate of investment return from 7.50% to 7.25% and the recognition of prior year losses.

To determine the UAAL of the plans, MOSERS uses a smoothed value of assets which recognizes market gains and losses on the actuarial value of assets over a five-year closed period. For GASB 67 financial statement reporting purposes, the market value of assets is used to determine plan net position. The plan net position as a percentage of total pension liability decreased from 60.4% at June 30, 2017, to 59.0% at June 30, 2018, for MSEP and increased from 24.4% to 25.3% for the Judicial Plan.

Financial Reporting Highlights

- MOSERS' net position restricted for pensions increased by $108.5 million during FY18. On June 30, 2018, total plan assets (including net capital assets of $3.2 million) were $12.2 billion, exceeding total liabilities of $4.0 billion, resulting in a net position held in trust for pension benefits of $8.2 billion.
- Covered payroll, from which both employee and employer contributions are calculated, decreased $26.8 million for the Missouri State Employees' Plan (MSEP) and increased $1.4 million for the Judicial Plan, or (1.4%) and 2.4% respectively, over the last fiscal year.
- Total contributions for FY18 were $451.0 million, up from $401.4 million in FY17. Based upon the June 30, 2016 actuarial valuation, the FY18 actuarial required employer contribution rates were determined to be 19.45% for the MSEP and 62.09% for the Judicial Plan.
- Investment income, net of related fees, was $589.6 million. Investments of the pension trust funds generated a time-weighted rate of return of 7.4%, net of fees, for the year, up from the prior year's return of 3.5%. The money-weighted rate of return, net of investment expenses as defined by GASB Statement No. 67, was 7.57% for FY18.
- Investment activity expenses were $104.0 million in FY18, down from $140.3 million in FY17. The $36.3 million reduction was primarily due to a $9.2 million reduction in management fees and a $26.9 million reduction in incentive fees paid in FY18. The lower fees were driven by investment staff reducing exposure to higher fee managers and managers subject to incentive fee arrangements.
- Member benefit payments were $853.8 million in FY18, up $32.5 million from $821.3 million in FY17. Service transfers and refunds totaled $68.6 million in FY18, up $61.9 million from $6.7 million in FY17 due primarily to the buyout program offered during the year.
- Administrative expenses totaled $10.2 million in FY18, compared to $15.7 million in FY17. Administrative costs for FY17 were restated to include $6.8 million for OPEB expense due to the implementation of GASB Statement No. 75 during FY18 (see Note 12 on page 55). Other administrative costs increased $.8 million from FY17 to FY18 primarily due to increased consulting fees related to the implementation of a new pension administration system and $.5 million in OPEB expenses.
- A net OPEB liability of $7.1 million was reported in FY17, and $7.2 million in FY18, due to the implementation of GASB Statement No. 75, Accounting and Financial Reporting for Postemployment Benefits other than Pension in FY18. This liability represents MOSERS' proportionate share of the net OPEB liability for its employees to participate in the State Retiree Welfare Benefit Trust in retirement. Deferred outflows of $.3 million were reported in both FY17 and FY18 reflecting the premiums paid subsequent to the measurement date of the plan liability.
- The internal service fund's net position decreased by $0.2 million. This is due to an increase in administrative expenses to bring the State of Missouri Deferred Compensation Plan's education department in-house.

The schedules on pages 21-24 present *Summary Comparative Financial Statements* of the pension trust funds and internal service funds for FY18 and FY17. For each schedule, there is a brief summary of the significant changes noted in those schedules.

Requests for Information

This financial report is designed to provide a general overview of the system's finances for all those interested in the system. Questions concerning any of the information provided in this report or requests for additional information should be addressed to MOSERS at P.O. Box 209, Jefferson City, MO 65102 or by email at *mosers@mosers.org*.

Pension Trust Funds

Summary Comparative Statements of Fiduciary Net Position

	As of June 30, 2018	As of June 30, 2017*	Amount of Change	Percentage Change
Assets				
Cash and short-term investments	$ 3,532,158,169	$ 2,417,955,050	$ 1,114,203,119	46.08%
Receivables	152,195,889	43,498,874	108,697,015	249.88
Investments	8,535,881,439	9,018,590,792	(482,709,353)	(5.35)
Net capital assets	3,237,785	3,316,060	(78,275)	(2.36)
Other assets	44,847	105,911	(61,064)	(57.66)
Total assets	12,223,578,129	11,483,744,419	740,051,442	6.05
Deferred outflow of resources	301,182	277,732	23,450	8.44
Liabilities				
Administrative expense payables	2,320,559	2,434,501	(113,942)	(4.68)
Investment purchase payables	162,762,193	10,165,707	152,596,486	1501.09
Other liabilities	8,700,871	9,470,802	(769,931)	(8.13)
Obligations under repurchase agreements	3,853,968,794	3,373,773,555	480,195,239	14.23
MOSERS investment portfolio liability (MIP)	4,014,950	4,628,883	(613,933)	(13.26)
Net OPEB liability	7,272,038	7,118,443	153,595	2.16
Total liabilities	4,039,039,405	3,407,591,891	631,447,514	15.63
Deferred inflow of resources	71,907	0	71,907	100.00
Net positions restricted for pensions	$ 8,184,707,999	$ 8,076,152,528	$ 108,555,471	1.34

* *Some balances have been restated due to the adoption of GASB Statement No. 75, Other Post-Employment Benefits.*

The largest components of the net position of the pension trust funds are the cash, short-term investments, and investments (less obligations under repurchase agreements).

MOSERS' net position restricted for pension benefits increase by $0.1 billion from $8.08 billion in FY17 to $8.18 billion in FY18. The increase was due to the total investment return, net of fees, of 7.4% for FY18 exceeding the negative cash flow generated by benefit payments in excess of contribution revenue.

The net increase in investment receivables over investment liabilities was $44.13 million. This increase is due to the timing of investment transactions not completed by June 30.

Detailed information regarding MOSERS' investment portfolio is included in the *Investment Section* of this report.

Pension Trust Funds

Summary Comparative Statements of Changes in Fiduciary Net Position

	Year Ended June 30, 2018	Year Ended June 30, 2017*	Amount of Change	Percentage Change
Additions				
Contributions	$ 450,974,449	$ 401,359,185	$ 9,615,264	12.36%
Investment income – investing activities	589,611,104	276,722,915	312,888,189	113.07
Investment income – securities lending activities	0	21,896	(21,896)	(100.00)
Miscellaneous income	548,581	530,988	17,593	3.31
Total additions	1,041,134,134	678,634,984	362,499,150	53.42
Deductions				
Benefits	853,758,969	821,280,165	32,478,804	3.95
Service transfers and refunds	68,609,753	6,669,417	61,940,336	928.72
Administrative expenses	10,209,941	15,750,439	(5,540,498)	(35.18)
Total deductions	932,578,663	843,700,021	88,878,642	10.53
Net increase (decrease)	108,555,471	(165,065,037)	273,620,508	165.77
Net position beginning of year	8,076,152,528	8,241,217,565	(165,065,037)	(2.00)
Net positions restricted for pensions	$ 8,184,707,999	$ 8,076,152,528	$ 108,555,471	1.34

* *Some balances have been restated due to the adoption of GASB Statement No. 75, Other Post-Employment Benefits.*

The increase in contributions received is primarily attributable to an increase in contribution rates from FY17 to FY18.

The increase in investment income from FY17 to FY18 is attributable to market performance. The fund returned 7.4% in FY18 compared to 3.5% in FY17. The decrease in securities lending income is due to suspension of the securities lending program in FY18. The *Investment Section* of this report contains additional information regarding investments and securities lending activity.

The total benefit payments increased as a result of an increase in the number of benefit recipients plus cost-of-living adjustments provided to existing benefit recipients. Detailed schedules of these changes can be viewed on pages 110-121 of the *Actuarial Section* of this report.

Service transfers and refunds increased by $61.9 million. Of this increase, $61.7 million was primarily due to the buyout program offered in FY18.

Administrative expenses decreased $5.5 million. FY17 administrative expenses were restated to include $6.8 million for OPEB expenses due to the implementation of GASB Statement 75 (See Note 12 on page 55). The FY18 OPEB expenses were $.5 million, causing a net increase of $6.3 million. Other administrative expenses increased $.8 million from FY17 to FY18 primarily due to increased consulting fees related to the implementation of a new pension administration system.

Internal Service Funds

Summary Comparative Statements of Net Position

	As of June 30, 2018	As of June 30, 2017	Amount of Change	Percentage Change
Assets				
Premiums receivable	$ 945,148	$ 967,091	$ (21,943)	(2.27)%
Investments at fair value	4,294,253	4,291,721	2,532	0.06
Fixed assets net of accumulated depreciation	12,800	11,598	1,202	10.36
Leasehold improvements	0	970	(970)	(100.00)
Total assets	$ 5,252,201	$ 5,271,380	$ (19,179)	(0.36)
Liabilities				
Premiums payable	$ 2,493,654	$ 2,518,379	$ (24,725)	(0.98)
Deferred revenue	2,083,270	2,103,956	(20,686)	(0.98)
Other liabilities	397,165	153,924	243,241	158.03
Total liabilities	4,974,089	4,776,259	197,830	4.14
Unrestricted net position	278,112	495,121	(217,009)	(43.83)
Total liabilities and net position	$ 5,252,201	$ 5,271,380	$ (19,179)	(0.36)

The decrease in premiums receivable is attributable to normal fluctuations in the month-end balance of life and long-term disability insurance premiums receivable during the year, which are dependent on the number of members participating and amount of their coverage.

The increase in investments is attributable to reimbursement from the State of Missouri Deferred Compensation Plan's third-party record keeper to cover administrative expenses in FY18 and future years.

The increase in other liabilities is due to expenses allocated from the pension trust fund to the internal service fund but not yet paid for by the fund.

Long-term disability premiums are paid by the state on all active employees based upon a blended rate estimated by MOSERS. The Standard is paid the actual rate based upon active employees that are not yet eligible to retire. The deferred revenue balance represents amounts paid by the state in excess of that needed to pay the premiums. The reduction in deferred revenue during FY18 reflects a lower amount received than was needed to pay the premiums. This amount reduced the deferred revenue balance. This balance is estimated to continue to decrease in the future.

Internal Service Funds

Summary Comparative Statements of Revenues, Expenses, and Changes in Net Position

	Year Ended June 30, 2018	Year Ended June 30, 2017	Amount of Change	Percentage Change
Operating revenues				
Premium receipts	$ 31,119,232	$ 28,779,398	$ 2,339,834	8.13%
Deferred compensation receipts	800,000	700,000	100,000	14.29
Miscellaneous income	480,120	480,120	0	0.00
Total operating revenues	32,399,352	29,959,518	2,439,834	8.14
Operating expenses				
Premium disbursements	31,100,612	28,769,588	2,331,024	8.10
Premium refunds	14,211	9,810	4,401	44.86
Administrative expenses	1,587,344	950,121	637,223	67.07
Total operating expenses	32,702,167	29,729,519	2,972,648	10.00
Net operating (loss) income	(302,815)	229,999	(532,814)	(231.66)
Nonoperating revenues				
Investment income	85,806	36,497	49,309	135.10
Net revenues (under) over expenses	(217,009)	266,496	(483,505)	(181.43)
Net position beginning of year	495,121	228,625	266,496	116.56
Net position end of year	$ 278,112	$ 495,121	$ (217,009)	(43.83)

Premium receipts and premium disbursements increased due to a change in method for recording deferred revenue in the long-term disability program. Prior to FY17, amounts paid by the state in excess of amounts needed to pay The Standard were recorded as an expense and payable when received. These amounts were reclassified as deferred revenue in FY17.

Deferred compensation receipts and disbursements were $0.8 million for FY18. This is attributable to a $0.8 million reimbursement paid in FY18 to cover current and future administrative expenses to the internal service fund at MOSERS from the State of Missouri Deferred Compensation Plan's third-party record keeper, which collects deferred compensation contributions directly from employers. As of June 30, 2018, there were 64,556 participants (including active, inactive, and retired), which is an increase of 761 from FY17. The state of Missouri has not contributed an employer match since March 2010.

Administrative expenses increased due to an increase in expenses to bring the State of Missouri Deferred Compensation Plan's education department in-house.

Internal Service Funds

Summary Comparative Statements of Cash Flows

	Year Ended June 30, 2018	Year Ended June 30, 2017	Amount of Change	Percentage Change
Cash flows from operating activities	$ (81,359)	$ 330,265	$ (411,624)	(124.63)%
Cash flows from noncapital financing activities	(13)	(1,080)	1,067	98.80
Cash flows from investing activities	81,372	(329,185)	410,557	124.72
Net change in cash	0	0	0	
Cash balances beginning of year	0	0	0	
Cash balances end of year	$ 0	$ 0	$ 0	

The decrease in cash flows from operating activities is primarily attributable to the increase in deferred compensation payroll and fringe benefits associated with bringing the State of Missouri Deferred Compensation Plan's education department in-house.

The increase in cash flows from investing activities is attributable the increase in net sale of overnight repurchases to pay for administrative costs.

Basic Financial Statements

Pension Trust Funds

Statements of Fiduciary Net Position | As of June 30, 2018

	MSEP	Judicial Plan	Total
Assets			
Cash and short-term investments	$ 3,467,892,777	$ 64,265,392	$ 3,532,158,169
Receivables			
Contributions	15,390,037	1,592,973	16,983,010
Investment income	48,790,442	904,162	49,694,604
Investment sales	83,467,162	1,546,775	85,013,937
Other receivables	495,162	9,176	504,338
Total receivables	148,142,803	4,053,086	152,195,889
Investments at fair value			
U.S. treasury securities	4,196,311,319	77,764,109	4,274,075,428
Government bonds & gov't mortgage-backed securities	45,259,388	838,726	46,098,114
Corporate bonds	233,695,919	4,330,745	238,026,664
U.S. dollar-denominated international corporate bonds	41,267,878	764,757	42,032,635
Limited partnerships	2,893,466,144	53,620,382	2,947,086,526
Common stock	131,027,142	2,428,135	133,455,277
International equities	838,439,860	15,537,581	853,977,441
Foreign currency	1,101,675	20,416	1,122,091
Real estate investment trust	7,131	132	7,263
Total investments	8,380,576,456	155,304,983	8,535,881,439
Capital assets			
Land	262,423	4,863	267,286
Building and building improvements	4,165,980	77,202	4,243,182
Furniture, fixtures and equipment	1,376,009	25,500	1,401,509
Software	722,919	13,397	736,316
Total capital assets	6,527,331	120,962	6,648,293
Accumulated depreciation	(3,348,456)	(62,052)	(3,410,508)
Net capital assets	3,178,875	58,910	3,237,785
Prepaid expenses and other	44,031	816	44,847
Total assets	11,999,834,942	223,683,187	12,223,518,129
Deferred outflow of resources	295,702	5,480	301,182
Liabilities			
Administrative and benefit expense payables	2,278,338	42,221	2,320,559
Investment purchases payable	159,800,837	2,961,356	162,762,193
Investment incentive fees payable	7,868,598	145,817	8,014,415
Employee vacation and overtime liability	673,966	12,490	686,456
Obligations under repurchase agreements	3,783,848,261	70,120,533	3,853,968,794
MOSERS investment portfolio liability (MIP)	3,941,901	73,049	4,014,950
Net OPEB liability	7,139,728	132,310	7,272,038
Total liabilities	3,965,551,629	73,487,776	4,039,039,405
Deferred inflow of resources	70,591	1,316	71,907
Net position restricted for pensions	$ 8,034,508,424	$ 150,199,575	$ 8,184,707,999

See accompanying *Notes to the Financial Statements.*

Pension Trust Funds

Statements of Changes in Fiduciary Net Position | For the Year Ended June 30, 2018

	MSEP	Judicial Plan	Total
Additions			
Contributions			
Employer contributions	$ 379,557,962	$ 36,892,203	$ 416,450,165
Member contributions	28,303,993	902,320	29,206,313
Member purchases of service credit	2,020,720	0	2,020,720
Service transfer contributions	3,297,251	0	3,297,251
Total contributions	413,179,926	37,794,523	450,974,449
Investment income			
From investing activities:			
Net appreciation in fair value of investments	620,043,390	11,490,358	631,533,748
Interest	60,196,973	1,115,543	61,312,516
Dividends	560,480	10,387	570,867
Other income	157,126	2,912	160,038
Total investing activity income	680,957,969	12,619,200	693,577,169
Investing activity expenses:			
Management and incentive fees	(96,649,483)	(1,791,064)	(98,440,547)
Custody fees	(355,598)	(6,590)	(362,188)
Consultant fees	(649,296)	(12,032)	(661,328)
Performance measurement fees	(451,078)	(8,359)	(459,437)
Internal investment activity expenses	(3,969,013)	(73,552)	(4,042,565)
Total investing activity expenses	(102,074,468)	(1,891,597)	(103,966,065)
Total net investment income	578,883,501	10,727,603	589,611,104
Miscellaneous income	538,600	9,981	548,581
Total additions	992,602,027	48,532,107	1,041,134,134
Deductions			
Benefits	733,750,284	35,651,489	769,401,773
BackDROP & lump sum benefits	84,357,196	0	84,357,196
Inactive-vested buyout payments	61,041,258	0	61,041,258
Service transfer payments	2,060,037	0	2,060,037
Contribution refunds	5,502,698	5,760	5,508,458
Administrative expenses	10,024,178	185,763	10,209,941
Total deductions	896,735,651	35,843,012	932,578,663
Net increase in net position	95,866,376	12,689,095	108,555,471
Net position restricted for pensions			
Beginning of year	7,938,642,048	137,510,480	8,076,152,528
End of year	$ 8,034,508,424	$ 150,199,575	$ 8,184,707,999

See accompanying *Notes to the Financial Statements.*

Internal Service Funds
Statement of Net Position | As of June 30, 2018

	Total
Assets	
Premiums receivable	$ 945,148
Investments at fair value	4,294,253
Capital assets	23,370
Accumulated depreciation — fixed assets	(10,570)
Leasehold improvements	3,880
Accumulated depreciation — leasehold	(3,880)
Total assets	$ 5,252,201
Liabilities and net position	
Liabilities	
Premiums payable	$ 2,493,654
Deferred revenue	2,083,270
Other liabilities	397,165
Total liabilities	4,974,089
Unrestricted net position	278,112
Total liabilities and net position	$ 5,252,201

See accompanying *Notes to the Financial Statements*.

Internal Service Funds

Statement of Revenues, Expenses, and Changes in Net Position | For the Year Ended June 30, 2018

	Total
Operating revenues	
Premium receipts	$ 31,119,232
Deferred compensation receipts	800,000
Miscellaneous income	480,120
Total operating revenues	32,399,352
Operating expenses	
Premium disbursements	31,100,612
Premium refunds	14,211
Administrative expenses	1,587,344
Total operating expenses	32,702,167
Net operating (loss)	(302,815)
Nonoperating revenues	
Investment income	85,806
Net revenues (under) expenses	(217,009)
Net position beginning of year	495,121
Net position end of year	$ 278,112

See accompanying *Notes to the Financial Statements*.

Internal Service Funds

Statement of Cash Flows | For the Year Ended June 30, 2018

	Total
Cash flows from operating activities	
Cash received from employers and members	$ 32,421,295
Payments to outside carriers	(30,902,768)
Refunds of premiums to members	(14,211)
Cash payments to employees for services	(1,302,596)
Cash payments to other suppliers of goods and services	(283,079)
Net cash (used) by operating activities	(81,359)
Cash flows from noncapital financing activities	
Implicit funding of checks outstanding net of deposits	1,032
Implicit repayment of prior years checks outstanding net of deposits	(1,045)
Net cash (used) by noncapital financing activities	(13)
Cash flows from investing activities	
Purchase of investment securities	(1,275,186,148)
Proceeds from sale and maturities of investment securities	1,275,183,616
Cash received from investment income	85,806
Purchase of capital assets	(1,902)
Net cash provided by investing activities	81,372
Net cash	0
Cash balances beginning of year	0
Cash balances end of year	$ 0
Reconciliation of net operating (loss) to net cash provided (used) by operating activities	
Net operating (loss)	$ (302,815)
Adjustments to reconcile net operating (loss) to net cash provided (used) by operating activities	
Depreciation expense	1,670
Change in assets and liabilities:	
Increase in operational accounts receivable	21,943
Increase in operational liabilities	197,843
Total adjustments	221,456
Net cash (used) by operating activities	$ (81,359)

See accompanying *Notes to the Financial Statements*.

Notes to the Financial Statements | Year Ended June 30, 2018

(1) Plan Descriptions and Contribution Information

Missouri State Employees' Plan (MSEP)

The MSEP is a cost-sharing multiple-employer, defined-benefit public employee retirement plan with two benefit structures known as the MSEP (closed plan) and MSEP 2000 (which includes the MSEP 2011 tier), which are administered by the Missouri State Employees' Retirement System (MOSERS) in accordance with Sections 104.010 and 104.312 to 104.1215 of the Revised Statutes of Missouri (RSMo). As established under Section 104.320, RSMo, MOSERS is a body corporate and an instrumentality of the state. In the system are vested the powers and duties specified in Sections 104.010 and 104.312 to 104.1215, RSMo and such other powers as may be necessary or proper to enable it, its officers, employees, and agents to carry out fully and effectively all the purposes of Sections 104.010 and 104.312 to 104.1215, RSMo.

Responsibility for the operation and administration of the system is vested in the 11-member MOSERS Board of Trustees as defined by state law. Due to the nature of MOSERS' reliance on funding from the state of Missouri and the overall control of the plan document by the legislative and executive branches of state government, the MSEP is considered a component unit of the state of Missouri financial reporting entity and is included in the state's financial reports as a pension trust fund.

The board intends to follow a financing pattern which computes and requires contribution amounts which, expressed as a percent of active member payroll, will remain approximately level from year to year and from one generation of citizens to the next generation. For the year ended June 30, 2018, the employer contribution rate was 19.45% of covered payroll.

Complete recognition of the year-to-year swings in the fair value of system assets would produce contribution rate changes that would run counter to the "approximately level" goal. A common actuarial practice, referred to as asset smoothing, is used to address that issue. The board adopted a new asset smoothing method effective with the June 30, 2018 valuation. Under the new method, the difference between the actual and assumed investment return on the market value of assets is recognized evenly over a five-year period. No corridor is used with the new method. In addition, the total unrecognized investment experience as of June 30, 2017, will be recognized evenly over a seven-year period beginning June 30, 2018.

At any point in time, the ratio of actuarial to fair value of assets will be more or less than the fair value but, if the smoothing method is prudent and properly constructed, those values will converge over time. As of June 30, 2018 and 2017, the ratio of actuarial to fair value of assets was 110% and 112%, respectively, for the MSEP.

The 2018 actuarial valuation used the nominal investment return assumption of 7.25% and wage inflation and price inflation of 2.5% each to value plan liabilities. See the *Actuarial Section* for all actuarial assumptions used.

As of the June 30, 2018 valuation, membership in the MSEP consisted of the following:

Retirees and beneficiaries currently receiving benefits		48,207
Active		
Vested	30,384	
Nonvested	17,422	47,806
Inactive		
Vested (not yet receiving benefits)*	16,386	
Nonvested (with contributions balances)	15,619	32,005
Total membership		**128,018**

* *Includes 178 members on leave of absence and 732 on long-term disability.*

Generally, all full-time state employees, employed before July 2000 who became vested and were not covered under another state-sponsored retirement plan, are eligible for membership in the MSEP (closed plan). Full-time state employees who were employed after July 1, 2000, but before January 1, 2011, are members in the MSEP 2000. Those first employed in a benefit-eligible position on or after January 1, 2011, are members of the MSEP 2011 tier of the MSEP 2000. MOSERS participates as an employer in the MSEP and MSEP 2000.

Unless otherwise delineated, data for MSEP is inclusive of members in the MSEP 2000 and MSEP 2011, which all provide defined-benefit pension, survivor, life insurance, and long-term disability benefits.

Contributions for the MSEP are determined through annual actuarial valuations. Employer contributions for FY18 were 19.45% of covered payroll. Administration of the MSEP is financed through contributions from the state of Missouri and its component employers, employee contributions (from MSEP 2011 tier members only), and investment earnings.

For a summary of benefits for general employees, legislators, and elected officials under the MSEP, MSEP 2000, and MSEP 2011 tier, refer to the *Summary of Plan Provisions* in the *Actuarial Section* of this report.

MSEP (closed plan)
General state employees are fully vested for benefits upon accruing 5 years of credited service. Under the MSEP, general employees may retire with full benefits upon the earliest of attaining:

- Age 65 with 5 years of service;
- Age 60 with 15 years of service; or
- Age 48 with age and service equaling 80 or more –"Rule of 80."

General employees may retire early at age 55 with at least 10 years of service with reduced benefits. The base benefit in the general employee plan is equal to 1.6% multiplied by the final average pay multiplied by years of credited service.

Members hired prior to August 28, 1997, receive cost-of-living adjustments (COLAs) annually based on 80% of the percentage increase in the average consumer price index (CPI) from one year to the next, with a minimum rate of 4% and maximum rate of 5% until the cumulative amount of COLAs equals 65% of the original benefit. Thereafter, the 4% minimum rate is eliminated. Members hired on or after August 28, 1997, and members who have met their COLA cap receive COLAs annually based on 80% of the percentage increase in the average CPI from one year to the next, up to a maximum rate of 5%.

Qualified, inactive-vested members may make a one-time election to receive the present value of their future benefit in a lump-sum payment rather than a monthly benefit at retirement age. To qualify, they must have left state employment on or after October 1, 1984, and prior to September 1, 2002, have less than 10 years of service, not be within five years of retirement eligibility, meet age requirements, and have a benefit present value of less than $10,000.

There are no employee (member) contributions to the MSEP.

MSEP 2000
General state employees are fully vested for benefits upon accruing 5 years of credited service. Under the MSEP 2000, general employees may retire with full benefits upon the earliest of attaining:

- Age 62 with 5 years of service; or
- Age 48 with age and service equaling 80 or more –"Rule of 80."

General employees may retire early at age 57 with at least 5 years of service with reduced benefits. The base benefit in the general employee plan is equal to 1.7% multiplied by final average pay multiplied by years of credited service.

Those retiring under "Rule of 80" receive an additional temporary benefit equivalent to 0.8% multiplied by final average pay multiplied by years of credited service which is payable until age 62.

COLAs are provided annually based on 80% of the percentage increase in the average CPI from one year to the next, up to a maximum rate of 5%.

There are no employee (member) contributions to the MSEP 2000.

MSEP 2011 Tier
On July 19, 2010, legislation was signed into law adding a new tier (MSEP 2011) to the MSEP 2000 defined-benefit pension plan. This tier includes all members first employed in a benefit-eligible position on or after January 1, 2011.

Legislation signed into law on July 14, 2017, changed the original vesting requirement of 10 years to 5 years for actively employed members of the MSEP 2011, effective January 1, 2018.

Under the MSEP 2011, general employees may retire with full benefits upon the earliest of attaining:

- Age 67 with 5 years of service; or
- Age 55 with age and service equaling 90 or more – "Rule of 90."

General employees may retire early at age 62 with at least 5 years of service with reduced benefits. The base benefit in the general employee plan is equal to 1.7% multiplied by final average pay multiplied by years of credited service.

Those retiring under "Rule of 90" receive an additional temporary benefit equivalent to 0.8% multiplied by final average pay multiplied by years of credited service, which is payable until age 62.

COLAs are provided annually based on 80% of the percentage increase in the average CPI from one year to the next, up to a maximum rate of 5%.

Employees (members) are required to contribute 4% of pay to the MSEP 2011.

Judicial Plan

The Judicial Plan is a single-employer, public employee retirement plan administered in accordance with Sections 476.445 to 476.690, RSMo. Responsibility for the operation and administration of the Judicial Plan is vested in the MOSERS Board of Trustees. Due to the nature of MOSERS' reliance on funding from the state of Missouri and the overall control of the plan document by the legislative and executive branches of state government, the Judicial Plan is considered a component unit of the state of Missouri financial reporting entity and is included in the state's financial reports as a pension trust fund.

The 2018 actuarial valuation of the Judicial Plan used the nominal investment return assumption of 7.25% and wage inflation and price inflation of 2.5% each. See the *Actuarial Section* for all actuarial assumptions used.

Judges and commissioners of the supreme court or the court of appeals, judges of any circuit court, probate court, magistrate court, court of common pleas, court of criminal corrections, justices of the peace, commissioners or deputy commissioners of the circuit court appointed after February 29, 1972, commissioners of the juvenile division of the circuit court appointed pursuant to Section 211.023, RSMo, commissioners of the drug court or commissioners of any family court are eligible for membership in the Judicial Plan. The Judicial Plan provides defined-benefit pension, survivor, life insurance, and disability benefits. Members are immediately vested.

As of the June 30, 2018 valuation, membership in the Judicial Plan consisted of the following:

Retirees and beneficiaries currently receiving benefits		569
Active		
Vested	415	
Nonvested	0	415
Inactive		
Vested (not yet receiving benefits)		26
Total membership		**1,010**

Funding of the Judicial Plan on an actuarial basis began on July 1, 1998. Contributions are determined through annual actuarial valuations. Employer contributions for FY18 were 62.09% of covered pay. The state of Missouri makes the employer contribution to the Judicial Plan. Administration of the Judicial Plan is financed through contributions to this plan from the state of Missouri and investment earnings.

Judicial Plan (closed plan)

Members of the Judicial Plan may retire with full benefits upon the earliest of attaining:

- Age 62 with 12 years of service;
- Age 60 with 15 years of service; or
- Age 55 with 20 years of service.

Employees may retire early at age 62 with less than 12 years of service or age 60 with less than 15 years of service with a reduced benefit that is based upon years of service relative to 12 or 15 years.

In the Judicial Plan, the base benefit for members with 12 or more years of service is equivalent to 50% of compensation on the highest court served.

Members first employed prior to August 28, 1997, receive COLAs annually based on 80% of the percentage increase in the average CPI from one year to the next, with a minimum rate of 4% and a maximum rate of 5% until the cumulative amount of COLAs equals 65% of the original benefit. Thereafter, the 4% minimum rate is eliminated. Members first employed on or after August 28, 1997, and members who have met their COLA cap receive COLAs annually based on 80% of the percentage increase in the average CPI from one year to the next, up to a maximum rate of 5%.

Qualified, inactive-vested members may make a one-time election to receive the present value of their future benefit in a lump-sum payment rather than a monthly benefit at retirement age. To qualify, they must have left state employment on or after August 28, 1997, and prior to September 1, 2002, have less than 10 years of service, not be within five years of retirement eligibility, and have a benefit present value of less than $10,000.

Judicial Plan 2011 Tier

On July 19, 2010, an additional tier of the defined-benefit Judicial Plan was signed into law. This tier (Judicial Plan 2011) includes all new judicial members first serving as a judge on or after January 1, 2011.

Under the Judicial Plan 2011, members may retire with full benefits upon the earliest of attaining:

- Age 67 with 12 years of service; or
- Age 62 with 20 years of service; or

Judicial Plan 2011 members may retire early at age 67 with less than 12 years of service with reduced benefits, or age 62 with less than 20 years of service with a reduced benefit based on years of service.

For a more detailed summary of benefits for members of the Judicial Plan, refer to the *Summary of Plan Provisions* in the *Actuarial Section* of this report.

Missouri State Insured Defined-Benefit Insurance Plan

The Missouri State Insured Defined-Benefit Insurance Plan is accounted for as an internal service fund of the state of Missouri and is administered through The Standard, which is a third-party administrator with oversight by MOSERS. It provides basic life insurance in an amount equal to one times annual salary while actively employed (with a $15,000 minimum) to eligible members of the MSEP, MSEP 2000 (except employees of the Missouri Department of Conservation and certain state colleges and universities), MSEP 2011, Judicial Plan, Judicial Plan 2011, and certain members of the Public School Retirement System.

The plan also provides duty-related death benefits, optional life insurance for active employees and retirees who are eligible for basic coverage, and a long-term disability insurance plan for eligible members. For a more detailed description of insurance benefits, refer to page 133-134 in the *Actuarial Section* of this report.

Due to the nature of MOSERS' reliance on funding from the state of Missouri and its component employers, and the overall control of the plan document by the legislative and executive branches of state government, the Missouri State Insured Defined-Benefit Insurance Plan is considered a component unit of the state of Missouri financial reporting entity and is included in the state's financial reports as an internal service fund. Administration of the Missouri State Insured Defined-Benefit Insurance Plan is financed through contributions from the state of Missouri and its component employers.

State of Missouri Deferred Compensation Plan (MO Deferred Comp)

MO Deferred Comp is a retirement savings plan for state of Missouri employees, including faculty and staff at 10 state universities. Money invested in the plan provides income in retirement to supplement the member's defined-benefit pension and Social Security benefits. Funds are automatically deducted from the employee's pay and placed in their account. The participant decides how the money will be invested. Employees may also roll over eligible pre-tax distributions from other qualified retirement plans.

The State of Missouri Deferred Compensation Plan is accounted for as an internal service fund. MOSERS uses ICMA-RC as an external provider for record keeping. Total plan assets were $2,167,901,956 as of June 30, 2018.

Record keeping of individual accounts and management of investment options are paid from charges to the participants and investment option asset-based fee reimbursement arrangements. Participants in the plan manage individual accounts by choosing investment options from the available fund lineup. MOSERS' role is to oversee the plan, choose external providers and investment options, and develop communications to plan participants. In FY18, a total of $2,841,881 was collected from a combination of $1,879,676 in investment option asset-based fee reimbursements and $962,205 in participant fees.

Effective July 1, 2012, new permanent full-time and part-time employees are automatically enrolled at 1% of pay into the State of Missouri Deferred Compensation Plan. As of June 30, 2018, 16,117 currently active employees have been automatically enrolled in the plan since inception. There are 14,610 employees who continue to contribute to the plan, making the opt-out rate 9.4%.

Audited financial statements for the State of Missouri Deferred Compensation Plan can be viewed online at *www.modeferredcomp.org*.

(2) Summary of Significant Accounting Policies and Plan Asset Matters

Basis of Accounting

The financial statements of the MSEP, the Judicial Plan, the Missouri State Insured Defined-Benefit Insurance Plan, and the State of Missouri Deferred Compensation Plan were prepared using the accrual basis of accounting. The accompanying financial statements are prepared in accordance with accounting principles generally accepted in the U.S. that apply to governmental accounting.

Contributions are recognized as revenues when due, pursuant to statutory requirements. Benefits and refunds are recognized when due and payable and expenses are recorded when the corresponding liabilities are incurred regardless of when contributions are received or payment is made. The direct method of reporting cash flows is used.

Estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the U.S. requires management to make estimates and assumptions that affect the accompanying financial statements and disclosures. Actual results could differ from those estimates.

Method Used to Value Investments

Section 104.440, RSMo allows the board of trustees to invest the trust fund assets in accordance with the prudent person rule. Investments of the pension trust funds and the internal service funds are reported on the basis of fair value. MOSERS unitizes investments for the purpose of allowing participants in the State of Missouri Deferred Compensation Plan the option to invest in the MOSERS investment portfolio (MIP). For financial reporting purposes, investments throughout this CAFR are reported in whole and include 0.05%, or $4,014,950, of the units invested in the MIP by Deferred Compensation participants. The schedule on page 48 provides a summary of the fair value of the investments as reported on the *Statements of Fiduciary Net Position* of the pension trust funds and *Statements of Net Position* of the internal service funds.

Disclosures regarding fair value measurements, the level of fair value hierarchy, and valuation techniques can be found in note *(3) Cash and Investments* on pages 38-39.

Fair values for the equity real estate investments are based on appraisals. Fair values of the limited partnership investments are based on valuations of the underlying companies of the limited partnerships as reported by the general partner. Certain limited partnerships reflect values and related performance on a quarter lag basis due to the nature of those investments and the time it takes to value them. Fair value of the commingled funds is determined based on the underlying asset values. The remaining assets are primarily valued by the system's master custodian, BNY Mellon, using the last trade price information supplied by various pricing data vendors.

Other Post-Employment Benefits

During the fiscal year ended June 30, 2018, MOSERS implemented GASB Statement No. 75, Accounting and Financial Reporting for Postemployment Benefits Other than Pensions. For purposes of measuring the net OPEB liability, deferred outflows of resources and deferred inflows of resources related to OPEB, and OPEB expense, information about the fiduciary net position and additions to/deductions from fiduciary net position have been determined on the same basis as they are reported. For this purpose, employer contributions are recognized as revenue when due and payable. Benefits are recognized when due and payable in accordance with the terms of the Plan (see Note 7 on page 51).

Capital Assets

The MOSERS building and other capital assets are stated at cost less accumulated depreciation.

(3) Cash and Investments

Cash

Custodial credit risk for cash deposits and investments is the risk that, in the event of a bank failure, the system and plan deposits may not be returned. The board adopted the following policy on June 18, 2009:

The executive director shall require that banks managing demand deposit accounts for any retirement plan associated with MOSERS (MOSERS' defined-benefit plan and the deferred compensation plan/state incentive compensation plan) to hold, at minimum, collateral security in either MOSERS' name or the State of Missouri Deferred Compensation Plan and in an amount equal to, or more than, the amount on deposit that exceeds the Federal Deposit Insurance Corporation (FDIC) insured amount. The types of collateral security shall be included on a list maintained by the State Treasurer's office in accordance with Section 30.270 RSMo, but in no case may a bank pledge collateral that does not specifically allow MOSERS to release the collateral or pledge collateral that represents securities of the pledging banks.

Cash balances represent both demand deposit accounts held at the bank and investment cash on deposit with the investment custodian. To maximize investment income, the float caused by outstanding checks is invested in an internally managed short-term investment account, thus causing a possible negative book balance. Negative book balances are reflected in the cash and short-term investments on the *Statements of Fiduciary Net Position* of the pension trust funds and the liabilities section of the *Statements of Net Position* of the internal service funds.

The table below is a schedule of the aggregate book and bank balances of all cash accounts.

Aggregate Book and Bank Balances

	Cash Balances	
	Book	Bank/Investment Custodian
Pension trust funds – investment custodian	$ 289,866	$ 289,866
Pension trust funds – demand deposits	(11,570,995)	553,875
Internal service fund – insurance and deferred compensation plan demand deposits	(1,031)	514

Under the repurchase agreement, the bank does not have the right to substitute other appropriate securities. The bank pledged the following securities to MOSERS on June 30, 2018, as collateral for overnight repurchase agreements:

Collateral for Overnight Repurchase Agreements

	Maturity	Pledged	Fair Value
Federal Home Loan Bank	09/14/2018	$ 10,825,000	$ 10,822,510
Federal Home Loan Bank	05/15/2019	9,700,000	9,936,486
Grundy County, MO	12/01/2020	180,000	176,722
Callaway County, MO School District	03/01/2021	100,000	98,320
Dekalb County, MO School District	04/15/2022	100,000	99,744
Small Business Association Pool	05/25/2031	7,891,632	7,905,504
Small Business Association Pool	06/25/2032	1,000,000	1,063,359
Small Business Association Pool	08/25/2035	4,000,000	4,227,188
Small Business Association Pool	11/25/2036	4,143,632	4,454,566
Small Business Association Pool	01/25/2037	5,000,000	5,223,633
Small Business Association Pool	02/25/2037	5,000,000	5,364,844
Small Business Association Pool	11/25/2037	1,180,000	1,260,065
Small Business Association Pool	02/25/2038	1,000,000	1,085,547
Small Business Association Pool	04/25/2038	2,000,000	2,170,547
Small Business Association Pool	04/25/2039	5,000,000	5,398,438

Investment Policy

In 2015, MOSERS completed a transition to a portfolio that shifted from a return-driven process to a risk-driven process using an allocation approach that focuses on fundamental economic factors such as growth and inflation as well as other factors with expected return values such as credit, carry, and illiquidity. In July 2016, the board voted to adjust the policy portfolio slightly but still maintain the risk-driven approach to asset allocation.

MOSERS' policy, with respect to the allocation of invested assets, is established and may be amended by the board of trustees' majority vote. The board's guiding principles with respect to the investment of MOSERS' assets are to preserve the long-term corpus of the fund, maximize total return within prudent risk parameters, and act in the exclusive interest of the members of the system. The board has developed a risk-weighted policy allocation that is designed to achieve the long-term required return objectives of the system, given certain risk constraints. The current asset allocation reflects a diversified portfolio, which will perform well in a variety of economic conditions and will help reduce the portfolio's overall volatility.

The board has authorized staff to create and maintain an internally managed beta-balanced portfolio that utilizes a modest amount of leverage in order to balance the risk allocations equally across the five asset classes contained in that portfolio. The leverage is limited to .83 times beta-balanced capital. The total exposure is limited to 183% of the beta-balanced capital. The first table below illustrates the fair value, market exposure, and policy exposure of the internally managed beta-balanced portfolio by asset class as of June 30, 2018.

The long-term expected rate of return on pension plan investments was determined using a building-block method in which best-estimate rates of expected future real rates of return (expected returns, net of pension plan investment expense and inflation) are developed for each major asset class. These ranges are combined to produce the long-term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage and by adding expected inflation. Best estimates of geometric real rates of return for each major asset class included in MOSERS' target asset allocation as of June 30, 2018, are summarized in the last table below.

Schedule of Internally Managed Leverage

Internal Beta-Balanced Portfolio	Fair Value of Internally Managed Beta-Balanced Capital	Percent of Investments at Fair Value	Market Exposure	Percent of Investments at Market Exposure	Policy Exposure Beta-Balanced
Opportunistic global equities	$ 2,901,667,761	38.7%	$ 3,040,786,070	40.5%	38%
Nominal bonds	1,020,791,097	13.6	2,943,258,313	39.2	44
Commodities	446,412,239	6.0	1,327,951,329	17.7	20
Inflation-linked bonds	1,023,504,890	13.6	2,672,104,671	35.6	39
Alternative beta	2,110,615,527	28.1	2,110,615,527	28.1	31
Total internal beta-balanced portfolio	$ 7,502,991,514	100.0%	$12,094,715,910	161.1%	172%

Target Asset Allocation

	Policy Allocation	Long-Term Expected Real Rate of Return*	Weighted Average Long-Term Expected Real Rate of Return
Opportunistic global equities	38.0%	5.5%	2.1%
Nominal bonds	44.0	1.0	0.5
Commodities	20.0	4.5	0.9
Inflation-linked bonds	39.0	0.8	0.3
Alternative beta	31.0	4.5	1.4
	172.0%		5.2%

* *Represents best estimates of geometric rates of return for each major asset class included.*

Concentration of Credit Risk

Concentration of credit risk is the risk of loss attributed to the magnitude of an investment in a single-issuer. Issuer concentration limits are established in individual portfolio guidelines that generally do not allow a single issuer to be greater than 5% of the portfolio's fair value. As of fiscal year end, there is no single issuer exposure, exclusive of investments issued or explicitly guaranteed by the U.S. government, within MOSERS' portfolio that comprises 5% or more of the overall portfolio or MOSERS' fiduciary net position. Therefore, there is no concentration of credit risk to report.

Money-Weighted Rate of Return

The annual money-weighted rate of return on pension plan investments, net of pension plan investment expense, was 7.57% for the year ended June 30, 2018. The money-weighted rate of return expresses investment performance, net of investment expense, adjusted for changing amounts actually invested.

Fair Value Measurement

MOSERS categorizes its fair value measurements within the fair value hierarchy established by generally accepted accounting principles. The hierarchy is based on the valuation inputs used to measure the fair value of the asset and give the highest priority to unadjusted quoted prices in active markets for identical assets or liabilities (level 1 measurements) and the lowest priority to unobservable inputs (level 3 measurements).

- **Level 1** – Unadjusted quoted prices for identical instruments in active markets.
- **Level 2** – Quoted prices for similar instruments in active markets; quoted prices for identical or similar instruments in markets that are not active; and model-derived valuations in which all significant inputs are observable.
- **Level 3** – Valuations derived from valuation techniques in which significant inputs are unobservable.

Investments that are measured at fair value using the net asset value per share (or its equivalent) as a practical expedient are not classified in the fair value hierarchy.

The categorization of investments within the hierarchy is based upon the pricing transparency of the instrument and should not be perceived as the particular investment's risk.

In instances where inputs used to measure fair value fall into different levels in the fair value hierarchy, fair value measurements in their entirety are categorized based on the lowest level input that is significant to the valuation. MOSERS' assessment of the significance of particular inputs to these fair value measurements requires judgment and considers factors specific to each asset or liability. The tables on pages 38-39 show the fair value leveling of the investments.

Debt, equities, and investment derivatives classified in level 1 of the fair value hierarchy are valued using prices quoted in active markets for those securities.

Debt securities and liabilities classified in level 2 have non-proprietary information that was readily available to market participants from multiple independent sources, which are known to be actively involved in the market. Pricing inputs may include market quotations, yields, maturities, call features and ratings. Derivative securities classified in level 2 are securities whose values are derived daily from associated traded securities.

Private equity securities classified in level 2 are valued at the price observed in subsequent market activity.

Investments and Derivative Instruments Measured at Fair Value

		Fair Value Measurement Using		
June 30, 2018	Total	Quoted Prices in Active Markets for Identifical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Investments by fair value level				
Assets				
Equity securities				
U.S. common and preferred stock	$ 39,909,892	$ 39,903,842	$ 0	$ 6,050
Foreign stocks	862,917	862,917	0	0
Total equity securities	40,772,809	40,766,759	0	6,050
Debt securities				
U.S. short-term funds	665,709,000	665,709,000	0	0
Repurchase agreements	1,100,000,000	0	1,100,000,000	0
U.S. agency obligations	866,944,904	0	866,944,904	0
Foreign debt securities	88,485,656	0	88,485,656	0
U.S. corporate bonds	237,671,757	0	237,671,757	0
U.S. government	5,173,727,347	5,173,727,347	0	0
Total debt securities	8,132,538,664	5,839,436,347	2,293,102,317	0
Total investment assets	8,173,311,473	5,880,203,106	2,293,102,317	6,050
Liabilities				
Reverse repurchase agreements	(3,853,968,794)	0	(3,853,968,794)	0
Total net investment assets by fair value level	4,319,342,679	5,880,203,106	(1,560,866,477)	6,050
Investment derivative instruments				
Futures contracts	20,086,959	20,086,959	0	0
Foreign exchange forward contracts	(363,060)	(363,060)	0	0
Swap market value	(35,520,967)	0	(35,520,967)	0
Total investment derivative instruments	(15,797,068)	19,723,899	(35,520,967)	0
Investments measured at net asset value (NAV)				
Commingled international equity funds	948,436,029			
Hedge funds	2,063,529,776			
Private equity funds	597,947,369			
Private real estate funds	91,533,628			
Private timber funds	192,306,895			
Total investments measured at NAV	3,893,753,697			
Other investments				
Cash and receivables/payables	(25,590,054)			
Total fund value	$ 8,171,709,255			
Reconciliation to *Statement of Fiduciary Net Position*				
Total portfolio value	$ 8,171,709,255			
Reverse repurchase agreements	3,853,968,794			
Short-term investment fund (STIF)	(3,529,778,213)			
Uninvested cash	(289,866)			
Interest and dividends receivable	(49,694,604)			
Other payables	2,915,084			
Accounts receivable securities sold	(85,013,937)			
Accounts payable securities purchased	162,762,193			
Fees payable	9,302,733			
Investments per *Statement of Fiduciary Net Position*	$ 8,535,881,439			

Investments Measured at the Net Asset Value

	June 30, 2018	Unfunded Commitments	Redemption Frequency (If Currently Eligible)	Redemption Notice Period (Days)
Commingled international equity funds [1]	$ 948,436,029		Daily, Monthly	1-30
Active hedge funds				
Long/short equity [2]	268,915,714		Quarterly, Semi-Annually, Annually	30-60
Merger arbitrage [3]	121,279,322		Monthly	45
Equity market neutral [4]	99,758,765		Quarterly	90
Event driven [5]	231,123,000		Quarterly	60-65
Macro [6]	172,395,917		Monthly, Quarterly	30
Risk premia [7]	327,665,811		Bi-Weekly, Monthly	15-30
Risk parity [8]	597,439,990		Monthly	5-15
Fund-of-funds [9]	205,209,053		Monthly	95
Pending liquidated hedge funds [10]	39,742,204			
Private equity funds [11]	597,947,369	$ 259,230,574		
Private real estate funds [11]	91,533,628	10,567,666		
Private timber funds [11]	192,306,895			
Total investments measured at net asset value (NAV)	$ 3,893,753,697	$ 269,798,240		

1 **Commingled international equity funds** – Three international equity funds are considered to be commingled in nature. Each are valued at the NAV held at the end of the period based upon the fair value of the underlying investments.

2 **Long/short equity hedge funds** – Consisting of three funds, this strategy invests both long and short in U.S. and global equity securities, with a goal of adding growth and minimizing market exposure. These investments are valued at NAV. Due to contractual lock-up restrictions, these investments remain restricted for 4 to 12 months.

3 **Merger arbitrage hedge fund** – Consisting of one fund, this strategy invests in the common stock of companies that are involved in publicly announced mergers and seeks to generate attractive returns while dampening volatility. This investment is valued at NAV, is redeemable monthly, and is not subject to lock-up restrictions.

4 **Equity market neutral hedge fund** – Consisting of one fund, this strategy invests both long and short in U.S. and global equity securities, with the goal of having little to no net market exposure. This investment is valued at NAV, is redeemable quarterly, and is not subject to lock-up restrictions.

5 **Event driven hedge fund** – Consisting of one fund, this strategy seeks to gain an advantage from pricing inefficiencies that may occur at the onset or in the aftermath of a corporate action or related event. These investments are valued at NAV. Due to contractual lock-up restrictions, approximately 19% of the value of these investments is eligible for redemption quarterly. The remaining 81% of the value of these investments remains restricted for 4 to 20 months.

6 **Macro hedge funds** – Consisting of two funds, this strategy seeks to take advantage of macroeconomic dislocations between countries by trading a number of different markets and financial instruments. These investments are valued at NAV, are redeemable monthly and quarterly, and are not subject to lock-up restrictions.

7 **Risk premia hedge fund** – Consisting of one fund, this strategy seek to capture hedge fund betas through the use of systematic, bottom-up security selection across major hedge fund strategies. Style premia such as value, momentum, and carry help build the long/short portfolios. This investment is valued at NAV, is redeemable at least monthly, and is not subject to lock-up restrictions.

8 **Risk parity funds** – Consisting of two funds, these strategies attempt to build a more efficient portfolio through an equal risk methodology. They take long only positions across equity indices, developed nominal bonds, TIPS, commodities, and credit. Diversification benefits decrease both the expected return and volatility thus requiring leverage to maintain a similar return to a more conventional portfolio. These investments are valued at NAV, are redeemable monthly, and are not subject to lock-up restrictions.

9 **Fund-of-fund** – Consisting of one fund, this fund seeks to provide diversification by holding a number of funds within a single fund structure. This investment is valued at NAV, is redeemable monthly, and is not subject to lock-up restrictions.

10 **Pending liquidated hedge funds** – This item consists of 11 funds which have been fully redeemed as of June 30, 2018, for which MOSERS is awaiting final distribution of the proceeds, which will be received upon sale of the underlying investments or upon completion of the audit of the firm's annual financial statements.

11 **Private equity, real estate, and timber funds** – MOSERS' private equity portfolio consists of 46 funds with exposure to buyout funds, distressed funds, infrastructure, energy, royalty funds, and special situations. The real estate portfolio, comprised of five funds, invests mainly in U.S. commercial real estate. The timber portfolio, which consists of three funds, invests in global timberland. The fair values of the majority of these funds has been determined using net assets valued one quarter in arrears plus current quarter cash flows. These funds are not eligible for redemption. Distributions are received when underlying investments within the funds are liquidated, which, on average, can occur over the span of 5 to 10 years.

Credit Risk

Credit risk is the risk that an issuer or other counterparty to an investment will not fulfill its obligations to MOSERS. As of June 30, 2018, MOSERS' fixed income assets that are not U.S. Government guaranteed represented 36% of fixed income securities. In preparing this report, credit risk associated with all fixed income holdings, including collateral for repurchase agreements has been included. The tables below summarize MOSERS' fixed income security exposure levels and credit qualities.

As a matter of practice, there are no overarching limitations for credit risk exposures within the overall fixed income portfolio. Each individual portfolio within fixed income is managed in accordance with operational guidelines that are specific as to permissible credit quality ranges, exposure levels within individual quality tiers, and average credit quality.

Credit risk for derivative instruments held by the system results from counterparty risk assumed by MOSERS. This is essentially the risk that the counterparty to a MOSERS transaction will be unable to meet its obligation. Information regarding MOSERS' credit risk related to derivatives is found under the derivatives disclosures on page 44 of these notes.

Policies related to credit risk pertaining to MOSERS' securities lending program are found under the securities lending disclosures found on page 45 of these notes.

Average Credit Quality and Exposure Levels of Nongovernment Guaranteed Securities

Fixed Income Security Type	Fair Value June 30, 2018	Percent of all Fixed Income Assets	Weighted Average Credit Quality	Ratings Dispersion Requiring Further Disclosure
Collateralized mortgage obligations	$ 19,410,605	0.2%	AA	See below
U.S. government agencies	847,566,000	10.4	AA	See below
Asset backed securities	643,827	0.0	A	See below
Non-U.S. sovereign	48,549,132	0.6	BBB	See below
Corporate bonds	280,306,441	3.4	BBB	See below
Bank deposits	605,908,055	7.4	FDIC insured	None
Repurchase agreements	1,100,127,306	13.5	Not rated	None
Pooled investments	60,846,980	0.7	AAA	None
Total nongov't. guaranteed securities	$ 2,963,358,346	36.2%		
Total fixed income securities	$ 8,159,723,683			

Ratings Dispersion Detail - Fair Value

Credit Rating Level	Collateralized Mortgage Obligations	Non-U.S. Sovereign	Corporate Bonds	Asset-Backed Securities	U.S. Government Agencies
AAA	$ 0	$ 0	$ 474,640	$ 0	$ 0
AA	19,410,605	0	8,088,232	612,025	847,566,000
A	0	7,520,430	102,667,197	0	0
BBB	0	24,809,748	165,655,806	0	0
BB	0	15,730,724	3,420,566	0	0
B	0	488,230	0	0	0
Not Rated	0	0	0	31,802	0
	$ 19,410,605	$ 48,549,132	$ 280,306,441	$ 643,827	$ 847,566,000

Interest Rate Risk

Interest rate risk is the risk that changes in interest rates will adversely affect the fair value of an investment. This risk is managed by using the effective duration or option adjusted methodology. It is widely used in the management of fixed income assets by quantifying the risk of interest rate changes. This methodology takes into account optionality on bonds and scales the risk of price changes on bonds depending upon the degree of change in rates and the slope of the yield curve. Within the investment policy, operational guidelines specify the degree of interest rate risk taken within the system's fixed income portfolios, with the exception of some portfolios in which credit risk is the predominant factor and is also controlled by specific guidelines. MOSERS believes that the reporting of effective duration found in the tables below quantifies to the fullest extent possible the interest rate risk of the system's fixed income securities.

MOSERS invests in mortgage-backed securities, which are reported at fair value in the *Statements of Fiduciary Net Position* of the pension trust funds. Such securities have embedded within them the risk of being called, whereby the issuer has the option to keep the debt outstanding in rising interest rate environments or repay the debt in declining interest rate environments, a factor that advantages the issuer. MOSERS invests in these securities to diversify the portfolio with high quality and liquid investments which capture a significant yield premium that is intended to compensate for the call risk. This risk is incorporated within the effective duration calculation used in the interest rate risk analysis.

Effective Duration of Fixed Income Assets by Security Type

Fixed Income Security Type	Fair Value June 30, 2018	Percent of all Fixed Income Assets	Weighted Average Effective Duration (Years)	Interest Rate Risk Requiring Further Disclosure
U.S. treasuries	$ 5,196,365,337	63.7%	8.7	See below
U.S. government agencies	847,566,000	10.4	0.2	None
Asset-backed securities	643,827	0.0	6.7	None
Collateralized mortgage obligations	19,410,605	0.2	0.0	None
Non-U.S. sovereign	48,549,132	0.6	5.3	None
Corporate bonds	280,306,441	3.4	4.0	None
Bank deposits	605,908,055	7.4	0.0	None
Repurchase agreements	1,100,127,306	13.5	0.0	None
Pooled investments	60,846,980	0.8	0.0	None
	$ 8,159,723,683	100.0%	5.7	

Effective Duration Analysis of U.S. Treasuries

Maturity	Fair Value June 30, 2018	Average Effective Duration of the Security Type (Years)	Contribution to Effective Duration (Years)
Less than 1 year to maturity	$ 919,700,045	0.0	0.0
1- to 10-year maturities	2,483,540,432	5.2	2.5
Long coupon treasuries	1,793,124,860	17.9	6.2
	$ 5,196,365,337		8.7

Repurchase Agreements

Tri-party repurchase agreements (repos) are a secured loan by a financial institution with the collateral held at a custodian bank. In a tri-party repo transaction, MOSERS transfers cash to a financial institution and the financial institution transfers securities to the custodian bank. Simultaneously, the financial institution promises to repay the loan in the future plus interest in exchange for the return of the securities.

Reverse repurchase agreements (reverse repos) are used to convert securities into cash. In a reverse repo transaction, MOSERS transfers securities that are owned in the portfolio to a financial institution and the financial institution transfers cash to MOSERS. Simultaneously, MOSERS promises to repay the loan in the future plus interest in exchange for the return of the securities.

Typical collateral for repos and reverse repos include treasury securities, agency securities, mortgage-backed securities, investment grade corporate bonds, commercial paper, and common stock. Repos and reverse repos are typically done for an overnight term; however, they can be done for a longer term. MOSERS enters into repo transactions to earn interest on short-term funds and enters into reverse repos to finance the purchase of additional securities.

The yield earned by MOSERS on the repo transactions ranged from 0.98% to 2.06% and had maturities of one to 5 days.

The yield earned by the counterparties on the reverse repo transactions ranged from 1.30% to 2.39% and had maturities of one month to one year. The maturities of the investments made with reverse repo proceeds generally have maturities of one to 30 years.

In repo transactions, MOSERS may have credit risk if the counterparty fails to repay the loan and the value of the securities held as collateral fall below the loan balance. To minimize this risk, MOSERS requires the financial institution to send collateral with a market value greater than the value of the loan and revalues the collateral on a daily basis. As of fiscal year end, MOSERS held $43.9 million of counterparty collateral in excess to the repo balance.

In a reverse repo transaction, MOSERS may be subject to credit risk if the counterparty fails to return the securities and the value of the securities held as collateral rise above the loan balance. To minimize this risk, MOSERS sends the minimum amount of collateral required by the financial institution and requires the financial institution to revalue the collateral and return excess collateral on a daily basis. As of fiscal year end, counterparties held $25.5 million of MOSERS' collateral in excess to the reverse repo balance.

The tables below summarize MOSERS' exposure for repo and reverse repo transactions.

Tri-Party Repurchase Agreements by Collateral Type

Collateral Type	Fair Value of Collateral June 30, 2018	Fair Value Including Accrued Interest of Repos June 30, 2018	Excess (Deficit) Collateral	Percent Over Collateralized
U.S. treasuries/U.S. gov't. agencies	$ 765,000,112	$ 750,000,000	$ 15,000,112	
Common stock	379,055,637	350,000,000	29,055,637	
Accrued interest	0	127,306	(127,306)	
	$ 1,144,055,749	$ 1,100,127,306	$ 43,928,443	4.0%

Reverse Repurchase Agreements by Collateral Type

Collateral Type	Fair Value of Collateral June 30, 2018	Fair Value Including Accrued Interest of Reverse Repos June 30, 2018	Excess (Deficit) Collateral	Percent Over Collateralized
U.S. treasuries	$ 3,904,629,952	$ 3,853,968,794	$ 50,661,158	
Receivables	(1,687,555)	0	(1,687,555)	
Accrued interest	0	23,518,239	(23,518,239)	
	$ 3,902,942,397	$ 3,877,487,033	$ 25,455,364	0.7%

Foreign Currency Risk

Foreign currency risk is the risk that changes in exchange rates will adversely impact the fair value of an investment. MOSERS' currency risk exposures, or exchange rate risk, primarily reside within MOSERS' international equity investment holdings. MOSERS' implementation policy allows external managers to decide what action to take regarding their respective portfolio's foreign currency exposures using currency forward contracts. MOSERS' exposure to foreign currency risk in U.S. dollars, as of June 30, 2018, is highlighted in the table below.

Currency Exposures by Asset Class

Currency	Cash & Cash Equivalents	Equities	Fixed Income	Alternatives	Total
Argentine Peso	$ 4	$ 0	$ 0	$ 0	$ 4
Australian Dollar	(229,607)	581,216	(495,464)	0	(143,855)
Brazilian Real	4,382	5,347,613	5,519,322	0	10,871,317
Canadian Dollar	2,653,376	10,372,198	(1,002,479)	0	12,023,095
Chilean Peso	6,043	836,770	177,264	0	1,020,077
Chinese Yuan Renminbi	30	7	0	0	37
Colombian Peso	6,984	296,101	3,968,046	0	4,271,131
Czech Koruna	2,731	167,611	865,803	0	1,036,145
Danish Krone	0	1,918,539	0	0	1,918,539
Egyptian Pound	169	100,611	0	0	100,780
Euro	438,792	136,074,045	2,315,250	667,515	139,495,602
Hong Kong Dollar	(63,219)	95,511,462	0	0	95,448,243
Hungarian Forint	1,511	254,521	0	0	256,032
Indian Rupee	21,135	7,883,221	0	0	7,904,356
Indonesian Rupiah	39,856	1,757,620	5,485,876	0	7,283,352
Israeli Shekel	0	16	0	0	16
Japanese Yen	(96,404)	250,133,346	0	0	250,036,942
Kazakhstan Tenge	0	0	144,852	0	144,852
Malaysian Ringgit	6,213	2,126,111	0	0	2,132,324
Mexican Peso	4,541	4,291,896	6,628,348	0	10,924,785
New Taiwan Dollar	(363,060)	0	0	0	(363,060)
Pakistani Rupee	2,176	43,428	0	0	45,604
Peruvian Nuevo Sol	1	0	377,036	0	377,037
Philippine Peso	1,789	865,222	0	0	867,011
Polish Zloty	2,321	1,029,315	5,092,174	0	6,123,810
Qatari Riyal	757	728,176	0	0	728,933
Romanian New Leu	0	0	721,989	0	721,989
Russian Ruble	0	1,187,417	5,872,032	0	7,059,449
Singapore Dollar	0	23,555,154	0	0	23,555,154
South African Rand	67,015	5,571,077	5,508,842	0	11,146,934
South Korean Won	(644,052)	27,251,625	641,563	0	27,249,136
Swedish Krona	0	8,249,716	0	0	8,249,716
Swiss Franc	0	91,712,993	0	0	91,712,993
Thai Baht	17,512	18,980,116	1,122,499	0	20,120,127
Turkish Lira	2,182	9,885,601	4,179,006	0	14,066,789
United Arab Emirates Dirham	1,215	506,854	0	0	508,069
United Kingdom Pound Sterling	(811,298)	128,803,525	119,300	0	128,111,527
Uruguayan Peso	0	0	417,445	0	417,445
	$ 1,073,095	$ 836,023,123	$ 47,658,704	$ 667,515	$ 885,422,437

Derivatives

Derivative instruments are financial contracts whose values depend on the values of one or more underlying assets, reference rates, or financial indexes. They include futures contracts, swap contracts, options contracts, and forward foreign currency exchange. The following tables summarize the various contracts in the portfolio as of June 30, 2018.

Futures Contracts

Futures Contract	Notional Value	Exposure
Currency futures	$ (271,365,108)	$ 3,909,919
Fixed income futures	489,401,076	22,072,980
Equity index futures	370,506,089	(5,912,705)
Commodity futures	91,509,546	16,765
Total	$ 680,051,603	$ 20,086,959

Foreign Currency Forward Contracts

Currency	Net Notional Long (Short)	Exposure
Argentine Peso	$ 3,780,135	$ (741,486)
Brazilian Real	(348,453)	9,823
Chiliean Peso	2,141,412	(53,131)
Colombian Peso	(1,581,300)	40,163
Czech Koruna	2,665,871	(11,783)
Indonesian Rupiah	(1,462,330)	45,271
Mexican Peso	(542,006)	(20,366)
Peruvian Sol	(770,496)	(181)
Polish Zloty	1,085,446	(22,709)
Romanian Leu	440,631	(4,784)
Thai Baht	(787,150)	24,874
Turkish Lira	(395,217)	209
South African Rand	1,028,783	7,980
U.S. Dollar	(5,981,446)	0
Foreign currency forward contract asset (liability)	$ (726,120)	$ (726,120)

Swap Contracts

Counterparty Credit Rating	Notional Value	Exposure
Total return swaps - equity		
A+	$ 673,173,065	$ (2,945,132)
Total	$ 673,173,065	$ (2,945,132)
Total return swaps - fixed income		
A+	$ 527,773,693	$ 2,869,105
Total	$ 527,773,693	$ 2,869,105
Total return swaps - commodities		
A+	$ 883,546,443	$ 0
A	445,573,393	0
Total	$ 1,329,119,836	$ 0

While the board has no formal policy specific to derivatives, the MOSERS investment implementation program, through its external managers, holds investments in futures contracts, swap contracts, and forward foreign currency exchange. MOSERS enters into these certain derivative instruments as investments primarily to enhance the performance and reduce the volatility of its portfolio. It enters swaps and futures contracts to gain or hedge exposure to certain markets and to manage interest rate risk and enters into forward foreign currency exchange contracts primarily to hedge foreign currency exposure.

The notional values associated with these derivative instruments are generally not recorded in the financial statements; however, the amounts for the exposure on these instruments are recorded in the *Statements of Fiduciary Net Position* and the total changes in fair value for the year are included as net appreciation in fair value of investments in the *Statements of Changes in Fiduciary Net Position*. For the year ended June 30, 2018, the change in fair value in the swap contracts resulted in a gain of $115.9 million of investment income. The change in fair value in the futures contracts resulted in a gain of $92.8 million of investment income. The change in fair value in the foreign exchange contracts resulted in a loss of $0.6 million of investment income. MOSERS does not anticipate additional significant market risk from the derivative arrangements.

MOSERS could be exposed to risk if the counterparties to the contracts are unable to meet the terms of the contracts. MOSERS' investment managers seek to control this risk through counterparty credit evaluations and approvals, counterparty credit limits, and exposure monitoring procedures. MOSERS anticipates that the counterparties will be able to satisfy their obligations under the contracts. Investments in limited partnerships and commingled funds may include derivatives that are not shown in the derivative totals.

Limited Partnerships

Many of MOSERS' alternative investments are organized in the form of limited partnerships. In these partnerships, the manager is a general partner and the limited partners are the investors. Investments in limited partnerships are accounted for using the equity method of accounting and their earnings or losses for the period are included in investment income using the equity method.

As of June 30, 2018, MOSERS had contracts with over 76 limited partnerships across various types of alternative investments which collectively represent 36% of the total fund. A *Schedule of Limited Partnerships* follows on pages 46-47.

Securities Lending Program

The board of trustees' investment policy permits the pension trust funds to participate in a securities lending program. Fixed income, international equity and domestic equity securities of the pension trust funds are loaned to participating brokers who provide collateral in the form of cash, U.S. Treasury or government agency securities, or letters of credit issued by approved banks. Collateral must be provided in the amount of 102% of market value for domestic loans and 105% of market value for international loans. MOSERS does not have the authority to pledge or sell collateral securities, without borrower default.

As of June 30, 2018, Deutsche Bank AG, New York Branch, served as the agent for the fixed income, domestic equity and international equity securities lending programs. In this capacity, MOSERS reduces credit risk by allowing Deutsche Bank to lend these securities to a diverse group of dealers on behalf of MOSERS. Indemnification against dealer default is provided by Deutsche Bank AG, a "BBB rated" bank. With each of MOSERS' securities lending programs, a majority of loans are open loans and can be terminated on demand by either MOSERS or the borrower. Net income from the three lending programs is split on a 90/10 basis between MOSERS and Deutsche Bank respectively.

Daily monitoring of securities that are on loan ensures proper collateralization levels and mitigates counterparty risk. Cash collateral from all three programs is commingled and invested in a separately managed short-term investment account for MOSERS. This cash collateral account is managed by Deutsche Bank. On June 30, 2018, there were no securities on loan or cash collateral held in the account. For all of the securities lending operational services, the custodian is paid an annual fee, which is netted against MOSERS' earnings in the securities lending programs managed by Deutsche Bank. The custodian fee is not being charged while there are no loans outstanding.

Schedule of Limited Partnerships

Partnership Name	Style	Investments at Fair Value as of June 30, 2018
Actis Emerging Markets III	Opportunistic global equities – emerging markets	$ 8,546,000
Actis Emerging Markets IV	Opportunistic global equities – emerging markets	32,267,422
Alinda Infrastructure Fund I, LP	Opportunistic global equities – infrastructure	144,981
AQR DELTA Sapphire Fund, LP	Alternative beta – multi-strategy	327,665,811
AQR Global Risk Premium Fund IV, LP	External beta-balanced – risk parity	297,528,042
Axiom Asia Private Capital Fund II, LP	Opportunistic global equities – emerging markets	29,358,637
Axiom Asia Private Capital Fund III, LP	Opportunistic global equities – emerging markets	60,340,893
Axxon Brazil Private Equity Fund II B, LP	Opportunistic global equities – emerging markets	29,342,341
Bayview Opportunity Domestic IIIb, LP	Opportunistic global equities – opportunistic mortgages	7,184,636
Bayview Opportunity Domestic, LP	Opportunistic global equities – opportunistic mortgages	275,175
Blackstone Real Estate Partners IV	Opportunistic global equities – active real estate	9,574,748
Blackstone Real Estate Partners V	Opportunistic global equities – active real estate	16,477,295
Blackstone Real Estate Partners VI	Opportunistic global equities – active real estate	9,229,445
Blackstone Real Estate Partners VII	Opportunistic global equities – active real estate	56,193,342
Blackstone Topaz Fund, LP	Alternative Beta multi-strategy – fund of funds	205,209,053
Blakeney Onyx, LP	Opportunistic global equities – emerging markets	1,762,816
Bridgewater Associates – All Weather, LLC	External beta-balanced – risk parity	299,911,948
Bridgewater Associates – Diamond Ridge Fund, LLC	Alternative beta – global macro	115,220,885
CarVal Investors CVI Global Value Fund A, LP – private debt	Opportunistic global equities – distressed real estate debt	6,950,000
CarVal Investors CVI Global Value Fund A, LP – real estate	Opportunistic global equities – distressed real estate debt	6,950,000
Catalyst Fund III, LP	Opportunistic global equities – Canadian distressed debt	45,521,845
Catalyst Fund IV, LP	Opportunistic global equities – Canadian distressed debt	16,291,316
Catalyst Fund V, LP	Opportunistic global equities – Canadian distressed debt	23,680,244
Catterton Partners V, LP	Opportunistic global equities – corporate buyout	384,546
Cornwall Domestic, LP	Alternative beta – multi-strategy	17,262,998
DRI Capital – LSRC	Opportunistic global equities – intellectual property	12,988,292
EIG Energy Co-investment I	Opportunistic global equities – energy – mezzanine	5,122,022
EIG Energy Fund XIV, LP	Opportunistic global equities – energy – mezzanine	5,709,321
EIG Energy Fund XV, LP	Opportunistic global equities – energy – mezzanine	29,162,222
EIG Energy Fund XVI, LP	Opportunistic global equities – energy – mezzanine	29,434,070
Elliott International, Ltd.	Alternative beta – multi-strategy	231,123,000
Eton Park Fund, LP	Alternative beta – multi-strategy	99,183
Farallon Capital Institutional Partners, LP	Alternative beta – multi-strategy	1,880,474
Gaoling Fund, LP	Opportunistic global equities – long/short – equity	160,352,387
Garnet Sky Investors Company, Ltd.	Opportunistic global equities – timberland	107,009,858
Gateway Energy & Resource Holdings, LLC	Opportunistic global equities – energy – diversified	12,511,704
GCM Sidecar, LP	Opportunistic global equities – long/short – equity	66,620,964
Glenview Capital Opportunity Fund, LP	Opportunistic global equities – long/short – equity	41,942,363

Schedule of Limited Partnerships continued from page 46

Partnership Name	Style	Investments at Fair Value as of June 30, 2018
Global Forest Partners GTI7 Institutional Investors Company, Ltd.	Opportunistic global equities – timberland	13,746,939
HBK Merger Strategies Offshore Fund, Ltd.	Alternative beta – merger arbitrage	121,279,322
JLL Partners Fund V, LP	Opportunistic global equities – corporate buyout	2,988,310
JLL Partners Fund VI, LP	Opportunistic global equities – corporate buyout	19,860,764
King Street Capital, LP	Alternative beta – credit driven	2,234,416
King Street Capital, Ltd.	Alternative beta – credit driven	196,697
Linden Capital Partners Co-investment, LP	Opportunistic global equities – corporate buyout	45,000
Linden Capital Partners II, LP	Opportunistic global equities – corporate buyout	28,762,406
Mast Credit Opportunities I, LP	Alternative beta – credit driven	14,607,205
Merit Energy Partners F–II, LP	Alternative beta – energy – oil & gas	4,910,313
MHR Institutional Partners IIA, LP	Alternative beta – distressed debt	28,519,410
MHR Institutional Partners III, LP	Alternative beta – distressed debt	33,689,556
MHR Institutional Partners IV, LP	Alternative beta – distressed debt	17,746,117
Millennium Technology Value Partners Co-investment	Opportunistic global equities – direct secondaries	3,976,541
Millennium Technology Value Partners II, LP	Opportunistic global equities – direct secondaries	19,544,830
Moon Capital Global Equity Offshore Fund, Ltd.	Opportunistic global equities – long/short – equity	721,089
Oaktree European Credit Opportunities Fund, LP	Opportunistic global equities – European loans	667,515
OCM Opportunities Fund VIIb, LP	Alternative beta – distressed debt	6,243,174
OCM Opportunities Fund VIIIb, LP	Alternative beta – distressed debt	13,892,684
OCM Power Opportunities Fund III, LP	Opportunistic global equities – corporate buyout	6,934,984
OCM Real Estate Opportunities Fund III, LP	Opportunistic global equities – active real estate	58,798
Perry Partners, LP	Alternative beta – multi–strategy	27,434
Pharo Macro Fund, Ltd.	Alternative beta – global macro	57,167,960
Resource Management Service – Wildwood Timberlands, LLC	Opportunistic global equities – timberland	71,550,098
Silver Creek Special Opportunities Fund I, LP	Opportunistic global equities – fund-of-funds (special situations)	8,179,376
Silver Creek Special Opportunities Fund II, LP	Opportunistic global equities – fund-of-funds (special situations)	11,827,879
Silver Lake Partners II, LP	Opportunistic global equities – corporate buyout	2,283,614
SIRIS II Co–investment I	Opportunistic global equities – corporate buyout	6,035,512
SIRIS II Co–investment II	Opportunistic global equities – corporate buyout	7,380,000
Standard Investment Research Hedged Equity Fund, LP	Alternative beta – equity market neutral	99,758,765
StepStone Capital Buyout Fund I, LP	Opportunistic global equities – corporate buyout – fund-of-funds	5,569
StepStone Capital Buyout Fund II, LP	Opportunistic global equities – corporate buyout – fund-of-funds	11,022,716
StepStone Opportunities Fund II, LP	Opportunistic global equities – corporate buyout – fund-of-funds	1,265,431
TPG – Axon Partners (Offshore), Ltd.	Opportunistic global equities – long/short – equity	1,096,083
Visium Balanced Fund, LP	Opportunistic global equities – long/short – equity	1,344,567
Wellington Management Spindrift Investors (Bermuda)	Opportunistic global equities – long/short – equity	272,058
Other Miscellaneous	Miscellaneous	13,115
		$2,947,086,526

Summary of Fair Value of Investments as of June 30, 2018

	Pension Trust Funds		Internal Service Funds	
	Investments at Cost Value	**Investments at Fair Value**	**Investments at Cost Value**	**Investments at Fair Value**
U.S. treasury securities	$ 4,502,110,250	$ 4,274,075,428		
Government bonds & gov't. mortgage-backed securities	55,898,457	46,098,114		
Corporate bonds	$242,756,018	$238,026,664		
U.S. dollar-denominated international corporate bonds	43,214,610	42,032,635		
Limited partnerships	1,733,922,922	2,947,086,526		
Common stock	112,706,642	133,455,277		
International equities	139,465,930	853,977,441		
Foreign currency	19,771	1,122,091		
Real estate investment trust	3,617	7,263		
Repurchase agreements	13,282,975	13,282,975	$ 4,294,253	$ 4,294,253
Short-term investment funds	3,529,778,213	3,529,778,213		
Total investments	$10,373,159,405	$ 12,078,942,627	$ 4,294,253	$ 4,294,253

Reconciliation to investments on *Statement of Fiduciary Net Position*	
Total investments	$ 12,078,942,627
Less short-term investments:	
Repurchase agreements	(13,282,975)
Short-term investment funds	(3,529,778,213)
Investments on *Statement of Fiduciary Net Position*	$ 8,535,881,439

Detailed reports are available upon request.

(4) Capital Assets

Office building, furniture, fixtures, and equipment costing $1,000 or more when acquired are recorded at cost at the time of acquisition and are reported net of accumulated depreciation. Improvements, which increase the useful life of the property, are also capitalized. Maintenance and repairs are charged to expense as incurred. Depreciation is computed using the straight-line method over the estimated useful life of the related assets according to the following guidelines:

- 5 years for furniture, fixtures, and equipment
- 40 years for building
- 5 years for software and licensing

Below are schedules of the capital asset account balances for the pension trust funds and the internal service funds – State of Missouri Deferred Compensation Plan for the year ended June 30, 2018.

Pension Trust Funds
Capital Asset Account

	Land	Building and Building Improvements	Furniture Fixtures and Equipment	Software and Licensing	Total Capital Assets
Capital assets					
Balances June 30, 2017	$ 267,286	$ 4,243,182	$ 1,294,939	$ 736,316	$ 6,541,723
Additions	0	0	138,193	0	138,193
Deletions	0	0	(31,623)	0	(31,623)
Balances June 30, 2018	267,286	4,243,182	1,401,509	736,316	6,648,293
Accumulated depreciation					
Balances June 30, 2017	0	1,847,748	1,062,267	315,648	3,225,663
Depreciation expense	0	142,407	44,289	28,779	215,475
Deletions	0	0	(30,630)	0	(30,630)
Balances June 30, 2018	0	1,990,155	1,075,926	344,427	3,410,508
Net capital assets June 30, 2018	$ 267,286	$ 2,253,027	$ 325,583	$ 391,889	$ 3,237,785

Internal Service Funds
Capital Asset Account

	Leasehold Improvements	Furniture Fixtures and Equipment	Software and Licensing	Total Capital Assets
Capital assets				
Balances June 30, 2017	$ 3,880	$ 16,518	$ 4,950	$ 25,348
Additions	0	1,902	0	1,902
Balances June 30, 2018	3,880	18,420	4,950	27,250
Accumulated depreciation				
Balances June 30, 2017	2,910	5,840	4,030	12,780
Depreciation expense	970	239	461	1,670
Balances June 30, 2018	3,880	6,079	4,491	14,450
Net capital assets June 30, 2018	$ 0	$ 12,341	$ 459	$ 12,800

(5) Employers' Net Pension Liability

The components of the net pension liability, as of June 30, 2018, are in the *Schedule of Employers' Net Pension Liability* below.

Schedule of Employers' Net Pension Liability

	MSEP	Judicial Plan
Total pension liability	$ 13,612,763,961	$ 593,788,592
MOSERS fiduciary net position	8,034,508,424	150,199,575
Employers' net pension liability	$ 5,578,255,537	$ 443,589,017
Plan net position as a percentage of the total pension liability	59.02%	25.30%
Covered payroll	$ 1,951,454,817	$ 59,417,302
Employers' net pension liability as a percentage of employee covered payroll	285.85%	746.57%

Actuarial valuation of an ongoing plan involves estimates of the reported amounts and assumptions about the probability of occurrence of events far into the future. Examples include assumptions about future employment mortality and future salary increases. Amounts determined regarding the net pension liability are subject to continual revision as actual results are compared with past expectations and new estimates are made about the future. The *Schedule of Changes in Employers' Net Pension Liability* presents multi-year trend information about whether the plan fiduciary net positions are increasing or decreasing over time relative to the total pension liability. These schedules are presented in the *Required Supplementary Information* on pages 56-59. The total pension liability, as of June 30, 2018, is $13,612,763,961 for MSEP and $593,788,592 for the Judicial Plan based on an actuarial valuation performed as of June 30, 2018, and a measurement date of June 30, 2018, using generally accepted actuarial procedures.

Changes to Amortization Period, Asset Smoothing Method, and Economic Assumptions

In July 2018, the board made several changes to actuarial methods and assumptions based upon an *Economic Assumption Report* presented by its outside actuarial consultant. Based upon this study, the board voted to reduce the investment return assumption to 7.25% with a 2.5% inflation assumption, effective June 30, 2018; then to 7.10% with a 2.35% inflation assumption, effective June 30, 2019; and then to 6.95% with a 2.25% inflation assumption, effective June 30, 2020, and thereafter. The asset smoothing method was moved to a 5-year closed method with a 7-year transition to recognize previous losses. The amortization period was reset to a layered 30-year closed period from a 30-year closed period with 26 years remaining. The *Summary of Actuarial Assumptions* below applies to all periods included in the measurement of the total pension liability.

Summary of Actuarial Assumptions for the MSEP & the Judicial Plan

Valuation date	June 30, 2018
Actuarial cost method	Entry age normal
Amortization method	Level percentage, closed
Remaining amortization period	30 years
Asset valuation method	Closed 5-year
Investment rate of return	7.25% (effective June 30, 2018)
Projected salary increases	3.0 – 8.5% (MSEP) 2.75 – 4.95% (Judicial Plan)
Rate of payroll growth	2.50%
COLAs	4.00%/2.00%*
Price inflation	2.50%

Mortality rates are based on the RP-2014 Healthy Annuitant mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 120% for the MSEP and 98% for the Judicial Plan. The preretirement mortality table used was the RP-2014 Employee mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 95% for males and 90% for females for the MSEP.

An experience study covering the five-year period ended June 30, 2015, was performed in 2016.

* *On a compound basis, 4.00% for the first 12 years, 3.06% for the 13th year, and 2.00% per year thereafter. When no minimum COLA is in effect, the annual COLA is assumed to be 2.00% (80% of the 2.50% price inflation), on a compounded basis.*

The discount rate used to measure the total pension liability was 7.25%. The projection of cash flows used to determine the discount rate assumed that contributions from participating employers will be made using the actuarially determined rates. Based on those assumptions, MOSERS' fiduciary net position was projected to be available to make all the projected future benefit payments of the current plan members. As a result, the long-term expected rate of return on pension plan investments of 7.25% was applied to all periods of projected benefit payments to determine the total pension liability.

The table below presents the net pension liability of the plans, as of June 30, 2018, calculated using the discount rate of 7.25%, as well as what the net pension liability would be if it were calculated using a discount rate that is 1% lower (6.25%) or 1% higher (8.25%) than the current rate.

Sensitivity of Net Pension Liability to Changes in the Discount Rate

Employers' Net Pension Liability	1% Decrease (6.25%)	Current Discount Rate (7.25%)	1% Increase (8.25%)
MSEP	$7,125,771,094	$5,578,255,537	$4,276,970,991
Judicial Plan	$ 504,645,591	$ 443,589,017	$ 391,378,208

The funding status of the plans and *Employer Schedule of Funding Progress* can be found in the *Actuarial Section* on page 106.

(6) Contributions

The MSEP and the Judicial Plan are pension plans covering substantially all state of Missouri employees and judges. The state of Missouri and its component employers make required contributions to the plans. The required contributions are expressed as a level percentage of covered payroll and are actuarially determined using an individual entry-age normal actuarial cost method. MSEP 2011 and Judicial Plan 2011 members are required to contribute 4% of their pay. Costs of administering the plans are financed from the contributions to the pension trust funds and investment earnings.

(7) Other Post-Employment Benefit (OPEB) Plans

In addition to the defined-benefit pension provided through MOSERS, the state of Missouri also funds, either partially or in its entirety, OPEB plans for eligible members as follows:

Retiree Life Insurance

Members who retire on or after October 1, 1985, are eligible for $5,000 of state-sponsored basic life insurance coverage if they retire directly from active employment. As of June 30, 2018, 26,777 retirees were participating in the program. This insured defined-benefit coverage is financed on a percentage of payroll (.115%) and is purchased as a group policy through The Standard insurance company. The cost for the year ended June 30, 2018, was $1,880,705.73. Premiums are contributed entirely by the state and its component employers as provided by Section 104.515, RSMo.

Retirees of the Department of Labor and Industrial Relations (DOLIR), who retired prior to January 1, 1996, are eligible for state-sponsored insured defined-benefit insurance coverage in the same amount of coverage they were receiving through the DOLIR. As of June 30, 2018, 180 retirees were participating in the program. The coverage for this closed group is purchased as a group policy at a current cost of $2.07 per thousand dollars of coverage, per month, per eligible participant ($21,399 for the year ended June 30, 2018). Premiums are paid entirely by the DOLIR as provided by Section 288.225, RSMo. Retirees of the DOLIR who retired on or after January 1, 1996, are eligible for $5,000 of state-sponsored life insurance coverage if they retire directly from active employment. They are included in the group described in the preceding paragraph.

Long-Term Disability Insurance (LTD)

MOSERS provides LTD coverage for eligible members and generally includes those active members of MOSERS' retirement plans who do not have other disability coverage and are not yet eligible to receive normal (unreduced) retirement benefits.

There were 32,836 members covered under the program, as of June 30, 2018. This insured defined-benefit coverage is financed on a percentage of covered payroll (0.55%). Purchased as group policy, LTD is administered by The Standard insurance company. The cost for the year ended June 30, 2018, was $8,129,863.44. Premiums are contributed by the state and its component employers as provided for by Section 104.515, RSMo.

Post-Employment Retiree Health Care

MOSERS participates as an employer in a cost-sharing, multiple-employer, defined benefit, other post-employment benefits plan, the State Retiree Welfare Benefit Trust (SRWBT), operated by Missouri Consolidated Health Care Plan (MCHCP). Employees may participate at retirement if eligible to receive a monthly retirement benefit from MOSERS. The terms and conditions governing post-employment benefits are vested with the MCHCP Board of Trustees within the authority granted under Chapter 103 of the Revised Statutes of Missouri (2000) as amended ("RSMo") 103.003 through 103.178. The SRWBT does not issue a separate stand-alone financial report. Financial activity of the SRWBT is included in the *MCHCP Comprehensive Annual Financial Report* as a fiduciary fund and is intended to present only the financial position of the activities attributable to the SRWBT. Additionally, MCHCP is considered a component unit of the state of Missouri reporting entity and is included in the state's financial report.

The plan's financial statements are available on MCHCP's website at *www.mchcp.org*.

Benefits

The SRWBT was established and organized on June 27, 2008, pursuant to the Revised Statutes of Missouri (2000) as amended ("RSMo") 103.003 through 103.178 to provide health and welfare benefits for the exclusive benefit of current and future retired employees of the state and their dependents who meet eligibility requirements, except for those retired members covered by other OPEB plans of the state. MCHCP's three medical plans offer the same basic coverage such as preventative care, freedom to choose care from a nationwide network of primary care providers, specialists, pharmacies and hospitals, usually at a lower negotiated group discount and the same covered benefits for both medical and pharmacy. Benefits are the same in all three plans; other aspects differ such as premium, deductible and out of pocket costs. Retiree benefits are the same as for active employees.

Contributions

Contributions are established, and may be amended by the MCHCP Board of Trustees, with the authority granted under Chapter 103 of the Revised Statutes of Missouri (2000) as amended ("RSMo") 103.003 through 103.178. For the fiscal year ended June 30, 2017, employers were required to contribute 4.26% for the period July 1, 2016, through December 31, 2016, and 4.02% for the period January 1, 2017, through June 30, 2017, of gross active employee payroll toward their required contributions. Employees do not contribute to this plan. No payables to the plan were outstanding at year end.

OPEB Liabilities, OPEB Expense, and Deferred Outflows of Resources and Deferred Inflows of Resources

At June 30, 2018, MOSERS reported a liability of $7,272,038 for its proportionate share of the net OPEB liability. The net OPEB liability was measured as of June 30, 2017, and the total OPEB liability used to calculate the net OPEB liability was determined by an actuarial valuation as of that date. MOSERS proportion of the net OPEB liability was based on a projection of its long-term share of contributions to the OPEB plan relative to the projected contributions of all participating entities, actuarially determined. At June 30, 2017, MOSERS proportion was .4121%.

For the year ended June 30, 2018, MOSERS recognized OPEB expense of $503,233. As of June 30, 2018, MOSERS reported deferred outflows of resources and deferred inflows of resources related to OPEB from the following sources:

Deferred Outflows/Inflows of Resources Related to Post-Employment Retiree Health Care

	Deferred Outflows of Resources	Deferred Inflows of Resources
Difference between expected and actual experience		$13,196
Net difference between projected and actual earnings on plan investments		709
Changes in proportion and differences between district contributions and proportionate share of contributions		58,002
MOSERS contributions subsequent to the measurement date	$301,182	
	$301,182	$71,907

In the year ended June 30, 2019, $301,182 will be reported as deferred outflows of resources related to OPEB resulting from MOSERS contributions subsequent to the measurement date and will be recognized as a reduction of the net OPEB liability in the year ended June 30, 2019. Other amounts reported as deferred inflows of resources related to OPEB will be recognized in OPEB expense as follows:

Deferred Outflows/Inflows of Resources Related to Post-Employment Retiree Health Care to be Recognized in Future Years

Year Ending June 30	
2019	$ (9,219)
2020	(9,219)
2021	(9,219)
2022	(9,219)
2023	(8,302)
Thereafter	(26,729)
Total	$ (71,907)

Actuarial Assumptions

The collective total OPEB liability for the June 30, 2017, measurement date was determined by an actuarial valuation as of January 1, 2017, with updated procedures used to roll forward the total OPEB liability to June 30, 2017. This actuarial valuation used the following actuarial assumptions:

Summary of Actuarial Assumptions for Post-Employment Retiree Health Care

Valuation Year	July 1, 2016 – June 30, 2017
Actuarial cost method	Entry age normal, level percentage of payroll
Asset valuation method	Market value
Discount rate (blended)	5.71%
Projected payroll growth rate	4.0%
Inflation rate	3.0%
Health care cost trend rate (medical & prescription drugs combined)	
Nonmedicare	6.5% for fiscal year 2017 (rate decreases by 0.25% per year to an ultimate rate of 5.0% in fiscal 2023 and later)
Medicare	7.5% for fiscal year 2017 (rate decreases by 0.25% per year to an ultimate rate of 5.0% in fiscal year 2027 and later)

Mortality: RP-2016 for Employees/Annuitants without collar adjustments using Scale MP-2016.

The last experience study was conducted for the period July 1, 2008, through June 30, 2012. The last independent actuarial review of the reasonableness and accuracy of actuarial assumptions, actuarial cost methods, and valuations was conducted as of June 30, 2016.

A discount rate of 5.71% was used to measure the total OPEB liabilities. The projection of cash flows used to determine the discount rate assumed that contributions from plan members will be made at the current contribution rates and the contributions will be made at statutorily required rates, actuarially determined. This discount rate was determined as a blend of the best estimate of the expected return on plan assets and the 20-year high quality municipal bond rate as of the measurement date. For years where expected benefit payments can be covered by projected trust assets, expected returns are used. For years where payments are not expected to be covered by trust assets, the municipal Bond Buyer 20-Bond General Obligation Index rate is utilized.

Sensitivity of MOSERS' proportionate share of the Net OPEB Liability to Changes in the Discount Rate

The following table presents MOSERS' net OPEB liability, calculated using a discount rate of 5.71%, as well as what the net OPEB liability would be if it were calculated using a discount rate that is one percent lower or one percent higher:

Sensitivity of the Net OPEB Liability to Changes in Discount Rate (in thousands)

	1% Decrease in Discount Rate (4.71%)	Current Discount Rate (5.71%)	1% Increase in Discount Rate (6.71%)
Net OPEB liability	8,588	7,272	6,230

Sensitivity of MOSERS' proportionate share of the Net OPEB Liability to Changes in the Health Care Cost Trend Rates

The following table presents MOSERS' net OPEB liability, calculated using the current trend rate, as well as what the net OPEB liability would be if it were calculated using a trend rate that is one percent lower or one percent higher:

Sensitivity of the Net OPEB Liability to Changes in Health Care Cost Trend Rates (in thousands)

	1% Decrease in Trend Rates	Current Trend Rates	1% Increase in Trend Rates
Net OPEB liability	6,198	7,272	8,632

Long-Term Expected Rate of Return

The target allocation and expected real rate of return for each major asset class are listed below:

Long-Term Expected Rate of Return

Asset Class	Target Allocation	Expected Real Rate of Return
Large cap stocks	20.0%	5.7%
Mid cap stocks	10.0%	6.0%
Small cap stocks	10.0%	6.0%
High-yield bonds	10.0%	2.6%
BarCap aggregate bonds	20.0%	1.0%
Long government/credit	25.0%	1.4%
Cash equivalents	5.0%	0.3%

(8) Plan Termination

MOSERS and its related plans are administered in accordance with Missouri statutes. Plans can only be terminated by an amendment to these statutes by the Missouri legislature.

On April 26, 2005, Senate Bill 202 was enacted, which terminated the Administrative Law Judges and Legal Advisors' Plan (ALJLAP) for new hires only. Under this legislation, individuals who assume a position after April 26, 2005, who would have otherwise been covered by the ALJLAP, will instead participate in the MSEP or the MSEP 2000, depending on when they initially became state employees. For fiscal years 2005 and after, all liabilities and assets of the ALJLAP were transferred and combined with the MSEP. Membership totals for the ALJLAP are included in the MSEP in all relevant sections of this report.

(9) Commitments

As of June 30, 2018, MOSERS has $269,798,240 in unfunded commitments in the private asset class.

During FY19, MOSERS entered into a contract with a software and consulting firm to provide and implement a pension administration system at a cost of approximately $9.4 million. As of June 30, 2018, no amounts had been paid.

(10) Contingencies

There were no contingencies which would have a material impact on the financial statements as of June 30,2018.

(11) Risk Management

MOSERS is exposed to various risks of loss related to natural disasters, errors, and omissions, loss of assets, torts, etc. MOSERS has chosen to cover such losses through the purchase of commercial insurance to help mitigate some of the exposure to those risks. There have been no material insurance claims filed or paid during the past three years.

(12) Change in Accounting Principle

During the fiscal year ended June 30, 2018, MOSERS implemented GASB Statement No. 75, Accounting and Financial Reporting for Postemployment Benefits Other than Pensions. This statement established standards for measuring and recognizing liabilities, deferred outflows and inflows of resources, and expenses related to Other Post Employment Benefits.

As a result of the implementation, net position restricted for pensions as of June 30, 2017, was restated as follows:

Restatement of FY17 Net Positions

	MSEP	Judicial	Total
Net position restricted for pensions, as previously reported	$7,945,358,298	$137,634,941	$8,082,993,239
Prior period adjustment			
OPEB liability (as of June 30, 2017)	(6,988,929)	(129,514)	(7,118,443)
Deferred outflow of resources	272,679	5,053	277,732
Net position restricted for pensions, as restated	$7,938,642,048	$137,510,480	$8,076,152,528

Pension Trust Funds

Schedule of Changes in Employers' Net Pension Liability | For Years Ended June 30, 2014–2018*

MSEP

	2014	2015
Total pension liability		
Service cost	$ 158,116,026	$ 150,412,577
Interest on the total pension liability	869,878,195	896,451,618
Benefit changes	0	0
Difference between expected and actual experience	12,376,237	(27,983,267)
Assumption changes	0	(57,568,553)
Benefit payments and member refunds	(680,436,107)	(728,265,800)
Net change in total pension liability	359,934,351	233,046,575
Total pension liability - beginning	11,134,637,484	11,494,571,835
Total pension liability - ending (a)	$ 11,494,571,835	$ 11,727,618,410
Plan fiduciary net position		
Employer contributions	$ 326,370,336	$ 329,752,832
Employee contributions	14,025,328	18,099,455
Pension plan net investment income (loss)	1,193,952,121	(237,070,529)
Benefit payments and member refunds	(680,436,107)	(728,265,800)
Pension plan administrative expense	(7,336,922)	(8,077,692)
Other	296,369,500	5,434,820
Net change in plan fiduciary net position	1,142,944,256	(620,126,914)
Plan fiduciary net position - beginning	7,993,837,570	9,136,781,826
Plan fiduciary net position - ending (b)	9,136,781,826	8,516,654,912
Net pension liability - ending (a)-(b)	$ 2,357,790,009	$ 3,210,963,498
Plan fiduciary net position as a percentage of total pension liability	79.49%	72.62%
Covered payroll	$ 1,902,719,928	$ 1,918,527,768
Net pension liability as a percentage of covered employee payroll	123.92%	167.37%

* *Schedule is intended to show last 10 fiscal years and will be displayed as it becomes available.*

** *Some balances have been reclassified since the completion of the GASB 67 valuation. This is due to the adoption of GASB Statement No. 75 (Other Post-Employment Benefits).*

Schedule of Changes in Employers' Net Pension Liability *continued from page 56*

2016	2017	2018**
$ 149,021,755	$ 152,766,134	$ 157,351,979
913,877,923	945,654,398	956,201,619
0	(1,696,059)	0
61,150,083	(104,203,260)	(118,252,032)
656,805,085	202,554,786	351,899,973
(757,310,503)	(793,964,857)	(886,711,473)
1,023,544,343	401,111,142	460,490,066
11,727,618,410	12,751,162,753	13,152,273,895
$ 12,751,162,753	$ 13,152,273,895	$ 13,612,763,961
$ 329,957,369	$ 335,217,422	$ 379,557,962
21,684,920	25,439,343	28,303,993
1,740,269	272,595,668	576,188,826
(757,310,503)	(793,964,857)	(886,711,473)
(8,489,375)	(8,759,341)	(9,799,256)
4,923,622	5,668,849	1,610,073
(407,493,698)	(163,802,916)	89,150,125
8,516,654,912	8,109,161,214	7,945,358,299
8,109,161,214	7,945,358,298	8,034,508,424
$ 4,642,001,539	$ 5,206,915,597	$ 5,578,255,537
63.60%	60.41%	59.02%
$ 1,921,528,936	$ 1,975,353,105	$ 1,951,454,817
241.58%	263.59%	285.85%

Pension Trust Funds

Schedule of Changes in Employers' Net Pension Liability | For Years Ended June 30, 2014–2018*

Judicial Plan

	2014	2015
Total pension liability		
Service cost	$ 8,990,293	$ 10,613,686
Interest on the total pension liability	34,013,615	36,161,612
Benefit changes	0	0
Difference between expected and actual experience	13,360,614	5,103,664
Assumption changes	0	0
Benefit payments and member refunds	(29,406,625)	(31,245,906)
Net change in total pension liability	26,957,897	20,633,056
Total pension liability - beginning	435,378,358	462,336,255
Total pension liability - ending (a)	$ 462,336,255	$ 482,969,311
Plan fiduciary net position		
Employer contributions	$ 29,264,877	$ 32,696,686
Employee contributions	294,810	488,193
Pension plan net investment income (loss)	17,199,701	(3,610,352)
Benefit payments	(29,406,625)	(31,245,906)
Pension plan administrative expense	(105,693)	(123,015)
Other	4,195,049	0
Net change in plan fiduciary net position	$ 21,442,119	$ (1,794,394)
Plan fiduciary net position - beginning	111,203,538	132,645,657
Plan fiduciary net position - ending (b)	132,645,657	130,851,263
Net pension liability - ending (a)-(b)	$ 329,690,598	$ 352,118,048
Plan fiduciary net position as a percentage of total pension liability	28.69%	27.09%
Covered payroll	$ 49,587,936	$ 55,656,457
Net pension liability as a percentage of covered employee payroll	664.86%	632.66%

* *Schedule is intended to show last 10 fiscal years and will be displayed as it becomes available.*

** *Some balances have been reclassified since the completion of the GASB 67 valuation. This is due to the adoption of GASB Statement No. 75 (Other Post-Employment Benefits).*

Schedule of Changes in Employers' Net Pension Liability continued from page 58

2016	2017	2018**
$ 10,932,097	$ 12,945,567	$ 12,997,198
37,755,240	40,617,091	41,018,371
0	0	0
(5,036,696)	(10,687,091)	(1,319,696)
53,991,379	7,905,466	12,332,042
(32,989,714)	(33,984,725)	(35,657,248)
64,652,306	16,796,308	29,370,667
482,969,311	547,621,617	564,417,925
$ 547,621,617	$ 564,417,925	$ 593,788,592
$ 33,642,498	$ 34,246,826	$ 36,892,203
661,206	786,745	902,320
28,081	4,680,131	10,677,666
(32,989,714)	(33,984,725)	(35,657,248)
(136,983)	(150,387)	(181,595)
0	0	(68,711)
$ 1,205,088	$ 5,578,590	$ 12,564,635
130,851,263	132,056,351	137,634,940
132,056,351	137,634,941	150,199,575
$ 415,565,266	$ 426,782,984	$ 443,589,017
24.11%	24.39%	25.30%
$ 57,421,016	$ 58,591,661	$ 59,417,302
723.72%	728.40%	746.57%

Pension Trust Funds
Schedule of Employer Contributions | Last Ten Fiscal Years

MSEP

Year Ended June 30	Actuarially Determined Contribution	Contributions in Relation to the Actuarially Determined Contribution**	Contribution Deficiency (Excess)	Covered Payroll	Contributions as a Percentage of Covered Payroll*
2009	$252,105,008	$252,105,008	$ 0	$2,002,402,087	12.6%
2010	251,226,187	251,226,187	0	1,945,095,321	12.9
2011	263,418,048	263,418,048	0	1,875,569,816	14.0
2012	263,373,924	263,373,924	0	1,864,069,493	14.1
2013	274,655,284	274,655,284	0	1,880,212,950	14.6
2014	326,370,336	326,370,336	0	1,902,719,928	17.2
2015	329,752,832	329,752,832	0	1,918,527,768	17.2
2016	310,124,928	329,957,369	(19,832,414)	1,921,528,936	17.2
2017	322,772,697	335,217,422	(12,444,725)	1,975,353,105	19.0
2018	379,557,962	379,557,962	0	1,951,454,817	19.5

Judicial Plan

Year Ended June 30	Actuarially Determined Contribution	Contributions in Relation to the Actuarially Determined Contribution*	Contribution Deficiency (Excess)	Covered Payroll	Contributions as a Percentage of Covered Payroll**
2009	$27,725,882	$27,725,882	$ 0	$45,505,512	60.9%
2010	27,029,198	27,029,198	0	46,112,730	58.6
2011	27,702,682	27,702,682	0	45,888,020	60.4
2012	26,324,526	26,324,526	0	45,835,501	57.4
2013	28,330,649	28,330,649	0	48,697,726	58.2
2014	29,264,877	29,264,877	0	49,587,936	59.0
2015	32,696,686	32,696,686	0	55,656,457	58.7
2016	31,604,527	33,642,498	(2,037,971)	57,421,016	58.6
2017	32,670,710	34,246,826	(1,576,116)	58,591,661	58.5
2018	36,892,203	36,892,203	0	59,417,302	62.1

* *Since the percent of payroll contribution rate was applied to pension payroll during the fiscal year, the actuarially determined contribution is equal to the actual contribution.*

** *Actuarial contribution rate shown is the actual employer contribution made divided by payroll in force on May 31 reported for valuation. This rate as computed may vary from the board's certified employer contribution rate due to the fluctuations in membership and pay during the year.*

Pension Trust Funds

Schedule of Annual Money-Weighted Rate of Return on Investments*

Year Ended June 30	Annual Money-Weighted Rate of Return — Net of Investment Expense
2014	19.25%
2015	(2.60)
2016	0.08
2017	3.51
2018	7.57

* *Schedule is intended to show last 10 fiscal years and will be displayed as it becomes available.*

Pension Trust Funds

Notes to the Schedules of Required Supplementary Information | Last Ten Years

Actuarial Methods and Assumptions for Valuations Performed as of June 30, 2018

The entry-age actuarial cost method of valuation is used in determining liabilities and normal cost. Regular actuarial valuations provide valuable information about the composite change in the unfunded actuarial accrued liabilities (whether or not the liabilities are increasing or decreasing, and by how much). Since the future cannot be predicted with precision, actual experience is expected to differ from assumed experience. Differences occurring in the past between assumed experience and actual experience (actuarial gains and losses) become part of actuarial accrued liabilities. Unfunded actuarial accrued liabilities are amortized to produce payments (principal and interest), which are expressed as a percent of payroll. A layered, closed 30-year amortization period was used for the June 30, 2018 valuations to determine the FY20 contribution rates. The actuarial value is calculated by recognizing the difference between the actual and expected return on the market value of assets each year over a closed five-year period. In addition, the total unrecognized investment experience as of June 30, 2017, will be recognized evenly over a seven-year period beginning June 30, 2018.

The investment return rate assumption was reduced from 7.50%, as of June 30, 2017, to 7.25% per year, as of June 30, 2018, compounded annually (net of investment expenses). The price inflation assumption used was 2.5% per year. Projected salary assumptions were 3.00% to 8.50% for the MSEP and 2.75% to 4.95% for the Judicial Plan. The assumption used for annual post-retirement benefit increases (COLAs) is 4.0% (on a compound basis) when a minimum COLA is in effect. When no minimum COLA is in effect, the annual COLA is assumed to be 2.00% (80% of the 2.50% price inflation), on a compounded basis.

2009

The actuarial valuations, as of June 30, 2009, reflected the following changes to the computed contribution rates for fiscal year ended June 30, 2011.

	Amount	Percent of Payroll
MSEP		
State of Missouri general pay freeze	$ (4,405,285)	(0.22)%
Experience and nonrecurring items	55,466,538	2.77
Change in valuation asset corridor from +/- 20% to +/- 30%	(29,835,791)	(1.49)
Judicial Plan		
State of Missouri general pay freeze	350,392	0.77
Experience and nonrecurring items	496,010	1.09
Change in valuation asset corridor from +/- 20% to +/- 30%	(141,067)	(0.31)

2010

The actuarial valuations, as of June 30, 2010, reflected the following changes to the computed contribution rates for fiscal year ended June 30, 2012.

	Amount	Percent of Payroll
MSEP		
State of Missouri general pay freeze	$ (2,528,624)	(0.13)%
Addition of new tier of benefits effective January 1, 2011	(17,311,348)	(0.89)
Experience and nonrecurring items	25,480,749	1.31
Change in timing of contributions	(2,528,624)	(0.13)
Judicial Plan		
State of Missouri general pay freeze	(308,955)	(0.67)
Addition of new tier of benefits effective January 1, 2011	(493,406)	(1.07)
Experience and nonrecurring items	438,071	0.95
Change in timing of contributions	(894,587)	(1.94)

2011 The actuarial valuations, as of June 30, 2011, reflected the following changes to the computed contribution rates for fiscal year ended June 30, 2013.

	Amount	Percent of Payroll
MSEP		
State of Missouri general pay freeze	$(6,376,937)	(0.34)%
Experience and nonrecurring items	17,630,356	0.94
Change in normal cost due to increasing population in MSEP 2011	(2,250,684)	(0.12)
Judicial Plan		
State of Missouri general pay freeze	(293,683)	(0.64)
Experience and nonrecurring items	289,095	0.63
Change in normal cost due to increasing population in Judicial Plan 2011	(169,786)	(0.37)

2012 The actuarial valuations, as of June 30, 2012, reflected the following changes to the computed contribution rates for fiscal year ended June 30, 2014.

	Amount	Percent of Payroll
MSEP		
Change in assumptions or methods	$21,623,206	1.16%
Experience and nonrecurring items	25,537,752	1.37
Judicial Plan		
Change in assumptions or methods	948,795	2.07
Experience and nonrecurring items	320,849	0.70

2013 The actuarial valuations, as of June 30, 2013, reflected the following changes to the computed contribution rates for fiscal year ended June 30, 2015.

	Amount	Percent of Payroll
MSEP		
Change in benefit assumptions or methods	$18,990,151	1.01%
Experience and nonrecurring items	(376,043)	(0.02)
Judicial Plan		
Change in benefit assumptions or methods	(603,852)	(1.24)

2014 The actuarial valuations, as of June 30, 2014, reflected the following changes to the computed contribution rates for fiscal year ended June 30, 2016.

	Amount	Percent of Payroll
MSEP		
Recognition of asset gains	$16,173,119	0.85%
Experience and nonrecurring items	(1,141,632)	(0.06)
Change in normal cost due to increasing population in MSEP 2011 and experience	4,376,256	0.23
Judicial Plan		
Change in normal cost due to increasing population in Judicial Plan 2011 and experience	(510,756)	(1.03)
Anticipated change in salary levels	(1,180,193)	(2.38)

2015

The actuarial valuations, as of June 30, 2015, reflected the following changes to the computed actuarially determined contribution (ADC) rates for fiscal year ended June 30, 2017. Actual contribution rate differs from computed ADC due to minimum funding policy adopted by the board in September 2014, requiring contributions to be no less than 16.97% of covered payroll for MSEP and 58.45% for Judicial Plan until the funding ratio is at least 80% for each plan.

	Amount	Percent of Payroll
MSEP		
Recognition of asset losses	$ 7,674,111	0.40%
Experience and nonrecurring items	4,412,614	0.23
Change in normal cost due to increasing population in MSEP 2011 and experience	(4,604,467)	(0.24)
Liability (gain) loss	(1,918,528)	(0.10)
Change in benefit assumptions or methods	3,069,644	0.16
Minimum funding policy contribution	(1,151,117)	(0.06)
Judicial Plan		
Recognition of asset losses	116,879	0.21
Experience and nonrecurring items	417,423	0.75
Change in normal cost due to increasing population in Judicial Plan 2011 and experience	(372,898)	(0.67)
Liability (gain) loss	361,767	0.65
Minimum funding policy contribution	(122,444)	(0.22)

2016

The actuarial valuations, as of June 30, 2016, reflected the following changes to the computed actuarially determined contribution (ADC) rates for fiscal year ended June 30, 2018.

	Amount	Percent of Payroll
MSEP		
Recognition of asset losses	$ 21,136,818	1.10%
Change in normal cost due to increasing population in MSEP 2011 and experience	(3,843,058)	(0.20)
Liability (gain) loss	3,843,058	0.20
Projected payroll higher than expected	(192,153)	(0.01)
Change in benefit assumptions or methods	39,583,496	2.06
Minimum funding policy contribution	(768,612)	(0.04)
Judicial Plan		
Recognition of asset losses	9,415,492	0.49
Experience and nonrecurring items	(13,258,550)	(0.69)
Change in benefit assumptions or methods	130,856,121	6.81
Change in normal cost due to increasing population in Judicial 2011 and experience	(1,345,070)	(0.07)
Minimum funding policy contribution	(4,035,211)	(0.21)

2017

The actuarial valuations, as of June 30, 2017, reflected the following changes to the computed actuarially determined contribution (ADC) rates for fiscal year ending June 30, 2019.

	Amount	Percent of Payroll
MSEP		
Recognition of asset losses	$ 14,758,970	0.76%
Recognition of liability gains	(1,359,379)	(0.07)
Change in benefit assumptions or methods	13,982,182	0.72
Projected payroll lower than expected	970,985	0.05
Minimum funding policy contribution	(776,788)	(0.04)
Normal cost	(2,524,561)	(0.13)
Change in effective employee contribution rate	1,359,379	0.07
Transition/actuarial software	(12,622,804)	(0.65)
Experience and nonrecurring items	970,985	0.04
Judicial Plan		
Recognition of asset losses	226,789	0.39
Recognition of liability gains	(122,117)	(0.21)
Change in benefit assumptions or methods	453,577	0.78
Projected payroll lower than expected	343,091	0.59
Minimum funding policy contribution	(104,672)	(0.18)
Normal cost	(360,536)	(0.62)
Change in effective employee contribution rate	58,151	0.10
Transition/actuarial software	186,083	0.32
Other experience	261,679	0.45

2018

The actuarial valuations, as of June 30, 2018, reflected the following changes to the computed actuarially determined contribution (ADC) rates for fiscal year ending June 30, 2020.

	Amount	Percent of Payroll
MSEP		
Recognition of asset losses	$13,022,972	0.68%
Recognition of liability gains	(5,362,400)	(0.28)
Change in benefit assumptions or methods	16,087,201	0.84
Projected payroll lower than expected	12,256,915	0.64
Normal cost	(574,543)	(0.03)
Change in effective employee contribution rate	(3,064,229)	(0.16)
Voluntary buyout program	(2,681,200)	(0.14)
Experience and nonrecurring items	191,514	0.01
Judicial Plan		
Recognition of asset losses	196,521	0.33
Recognition of liability gains	(81,411)	(0.14)
Change in benefit assumptions or methods	58,151	0.10
Projected payroll lower than expected	151,192	0.26
Normal cost	(186,083)	(0.32)
Change in effective employee contribution rate	(110,487)	(0.19)
Other experience	29,075	0.05

Schedule of Proportionate Share of the Net OPEB Liability | For the Year Ended June 30, 2018*

State Retiree Welfare Benefit Trust

	2018
MOSERS' proportion of the net OPEB liability	0.4121%
MOSERS' proportionate share of the net OPEB liability	$ 7,272,038
MOSERS' covered-employee payroll	$ 6,669,717
MOSERS' proportionate share of the net OPEB liability as a percentage of its covered-employee payroll	109%
Plan fiduciary net position as a percentage of the total OPEB liability	6.64%

** The amounts presented in this schedule were determined as of the previous fiscal year end. Intended to show information for 10 years, data for additional years will be displayed as it becomes available.*

Schedule of Employer Contributions for OPEB | For the Year Ended June 30, 2018*

State Retiree Welfare Benefit Trust

	2018
Contractually required contribution	$ 277,732
Contributions in relation to the contractually required contribution	$ 277,732
Contribution deficiency (excess)	$ 0
MOSERS' covered-employee payroll	$ 6,669,717
Contributions as a percentage of covered-employee payroll	4.16%

** The amounts presented in this schedule were determined as of the previous fiscal year end. Intended to show information for 10 years, data for additional years will be displayed as it becomes available.*

Pension Trust Funds

Schedules of Investment Expenses | For the Year Ended June 30, 2018

Investing Activity	MSEP	Judicial Plan	Total
Investment management and administrative fees			
Actis Emerging Markets III & IV – private equity	$ 1,015,187	$ 18,813	$ 1,034,000
African Development Partners I & II, LLC – private equity	2,351,847	43,583	2,395,430
Alinda Infrastructure Fund I, LP – private equity	93,163	1,726	94,889
AQR DELTA Sapphire Fund, LP – hedge funds	3,897,930	72,235	3,970,165
AQR Global Risk Premium Fund, LP – beta-balanced	2,402,358	44,519	2,446,877
AQR Style Premia Fund, LP – hedge funds	1,738,447	32,216	1,770,663
Astenbeck Capital – beta-balanced	256,720	4,757	261,477
Axiom Asia Private Capital Fund II & III, LP – private equity	1,878,560	34,813	1,913,373
Axxon Brazil Private Equity Fund II – private equity	254,816	4,722	259,538
Bayview Opportunity Domestic, LP – high yield	147,737	2,738	150,475
Bayview Opportunity Domestic III, LP – real estate	1,133,332	21,002	1,154,334
BlackRock Financial Management Bank Loans – high yield	(1,428)	(26)	(1,454)
Blackstone Real Estate Partners IV, V, VI, & VII – real estate	4,997,963	92,620	5,090,583
Blackstone Topaz Fund, LP – hedge funds	2,642,349	48,967	2,691,316
Blakeney Onyx, LP – emerging markets	604,628	11,205	615,833
Bridgewater Associates Diamond Ridge Fund, LLC – hedge funds	3,877,255	71,851	3,949,106
Bridgewater All Weather, LLC – beta-balanced	1,961,386	36,347	1,997,733
Campbell Timber Fund II A, LP – timber	1,215	23	1,238
CarVal Investors CVI Global Value Fund A, LP – real estate	26,877	498	27,375
CarVal Investors CVI Global Value Fund A, LP – private debt	26,877	498	27,375
Catalyst Fund III, IV & V, LP – private debt	(1,712,285)	(31,731)	(1,744,016)
Catterton Partners V, VI, & VII, LP – private equity	46,609	864	47,473
Cornwall Domestic, LP – hedge funds	897,458	16,631	914,089
Davidson Kempner Institutional Partners, LP – hedge funds	371,995	6,894	378,889
DRI Capital LSRC – private equity	360,931	6,689	367,620
EIG Energy Fund XIV, XV, & XVI, LP – private equity	2,358,582	43,708	2,402,290
Elliott International, Ltd. – hedge funds	9,574,227	177,425	9,751,652
Farallon Capital Institutional Partners, LP – hedge funds	(127,274)	(2,359)	(129,633)
Gaoling Fund, LP – hedge funds	12,763,100	236,520	12,999,620
Garnet Sky Investors Company, Ltd. – timber	8,678,102	160,819	8,838,921
Gateway Energy & Resource Holdings, LLC – real estate	370,519	6,866	377,385
GCM Equity Partners & Glenview Capital Opportunity Fund, LP – hedge funds	696,675	12,910	709,585
Global Forest Partners GTI7 Institutional Investors Company, Ltd. – timber	119,038	2,206	121,244
Harvest Fund Advisors – real estate	559,714	10,372	570,086
HBK Merger Strategies Offshore Fund, Ltd. – hedge funds	2,459,877	45,585	2,505,462
JLL Partners V & VI, LP – private equity	3,094,752	57,351	3,152,103
King Street Capital, LP – hedge funds	238,834	4,426	243,260
Linden Capital Partners II & Linden Co – Investment I – private equity	469,003	8,691	477,694
Mast Credit Opportunities I, LP – hedge funds	477,740	8,853	486,593
Merit Energy Partners F–II, LP – real estate	90,860	1,684	92,544
MHR Institutional Partners IIA, III & IV LP – private debt	1,791,028	33,190	1,824,218

Schedules of Investment Expenses continued on page 68

Schedules of Investment Expenses continued from page 67

Investing Activity	MSEP	Judicial Plan	Total
Millennium Technology Partners II, LP – private equity	1,411,731	26,162	1,437,893
NISA Investment Advisors, LLC – beta-balanced	5,033,176	93,272	5,126,448
OCM Real Estate Opportunities Fund III, LP – real estate	9,680	179	9,859
OCM Opportunities Fund IVb, VII & VIIIb, LP – private debt	324,317	6,010	330,327
OCM/GFI Power Opportunities Fund II & III, LP – private equity	1,281,039	23,740	1,304,779
Perry Capital – hedge funds	277	5	282
Pharo Macro Fund, Ltd. – hedge funds	5,142,762	95,303	5,238,065
Resource Management Service Wildwood Timberlands, LLC – timber	663,016	12,287	675,303
Silchester International Investors – int'l developed equity	4,766,590	88,332	4,854,922
Silver Creek Special Opportunities Fund I & II – private equity	60,540	1,122	61,662
Silver Lake Partners II, LP – private equity	16,972	315	17,287
SIR Hedged Equity Fund, Ltd. – hedge funds	3,327,527	61,664	3,389,191
State Street Global Advisors – emerging markets	146,777	2,720	149,497
StepStone Capital Buyout Fund I & II, LP – private equity	1,004,297	18,611	1,022,908
StepStone Opportunities Fund II, LP – private equity	152,425	2,825	155,250
Stone Harbor Investment Partners, LP – emerging markets	198,428	3,677	202,105
Viking Global Equities III, Ltd. – hedge funds	223,225	4,139	227,364
Total investment management fees	96,649,483	1,791,064	98,440,547
Other investment fees			
Investment consultant fees			
Summit Strategies, Inc.	595,297	11,031	606,328
TimberLink Consulting	53,999	1,001	55,000
Investment custodial fees			
BNY Mellon	355,598	6,590	362,188
Performance and risk measurement fees			
BNY Mellon	175,805	3,258	179,063
MSCI, Inc.	275,273	5,101	280,374
Internal investment activity expenses	3,969,013	73,552	4,042,565
Total investing activity expenses	$ 102,074,468	$ 1,891,597	$ 103,966,065

Pension Trust Funds

Schedules of Internal Investment Activity Expenses | For the Year Ended June 30, 2018

	MSEP	Judicial Plan	Total
Personnel services			
Salaries	$ 2,334,228	$ 43,257	$ 2,377,485
Fringe benefits	867,883	16,083	883,966
Total personnel services	3,202,111	59,340	3,261,451
Professional services			
Attorney services	264,181	4,896	269,077
Consulting services	1,166	22	1,188
Total professional services	265,347	4,918	270,265
Communications			
Telephone	11,365	211	11,576
Total communications	11,365	211	11,576
Facilities			
Utilities	2,611	48	2,659
Lease expense	66,698	1,236	67,934
Depreciation	31,300	580	31,880
Facility maintenance	7,582	140	7,722
Vehicle maintenance and operation	210	4	214
Total facilities	108,401	2,008	110,409
Software and equipment			
Computer supplies and software	372	7	379
Depreciation	2,128	39	2,167
Loss on sale of equipment	488	9	497
Total software and equipment	2,988	55	3,043
Education, meetings and travel			
Tuition reimbursement	7,015	130	7,145
Professional development including travel	16,961	314	17,275
Due diligence travel	1,370	25	1,395
Total travel and meetings	25,346	469	25,815
General			
Research and information services	327,888	6,076	333,964
Membership dues	14,987	278	15,265
Office supplies	927	17	944
Periodicals and publications	9,653	180	9,833
Total general	353,455	6,551	360,006
Total internal investment activity expenses	$ 3,969,013	$ 73,552	$ 4,042,565

Pension Trust Funds

Schedules of Administrative Expenses | For the Year Ended June 30, 2018

	MSEP	Judicial Plan	Total
Personnel services			
Salaries	$ 4,524,603	$ 83,848	$ 4,608,451
Fringe benefits	2,104,730	39,004	2,143,734
Total personnel services	6,629,333	122,852	6,752,185
Professional services			
Actuarial services	252,360	4,677	257,037
Attorney services	322,434	5,975	328,409
Auditing services	74,838	1,387	76,225
Banking services	39,277	728	40,005
Consulting services	896,472	16,613	913,085
Total professional services	1,585,381	29,380	1,614,761
Communications			
Video production	1,449	27	1,476
Telephone	61,590	1,141	62,731
Printing	35,814	664	36,478
Postage and mailing	183,058	3,392	186,450
Total communications	281,911	5,224	287,135
Facilities			
Depreciation	108,516	2,011	110,527
Utilities	55,790	1,034	56,824
Facility maintenance	132,782	2,461	135,243
Vehicle maintenance and operation	4,533	84	4,617
Total facilities	301,621	5,590	307,211
Software and equipment			
Computer supplies and software	26,393	489	26,882
Depreciation	69,611	1,290	70,901
Maintenance agreements	347,057	6,431	353,488
Equipment rental	156,574	2,902	159,476
Gain on sale of equipment	(1,861)	(34)	(1,895)
Total software and equipment	597,774	11,078	608,852
Education, meetings and travel			
Board travel and meetings	38,445	712	39,157
Professional development including travel	85,566	1,586	87,152
MOSERS sponsored seminars	97,934	1,815	99,749
Due diligence travel	369	7	376
Tuition reimbursement	7,728	143	7,871
Total education, meetings and travel	230,042	4,263	234,305
General			
Advertising	3,132	57	3,189
Research and information services	52,855	979	53,834
Insurance	167,334	3,101	170,435
Membership dues	13,793	256	14,049
Business continuity	64,226	1,190	65,416
Office supplies	455	8	463
Periodicals and publications	96,321	1,785	98,106
Total general	398,116	7,376	405,492
Total administrative expenses	$10,024,178	$ 185,763	$10,209,941

Schedules of Professional Service Fees | For the Year Ended June 30, 2018

Professional Services	Pension Trust Funds MSEP	Pension Trust Funds Judicial Plan	Pension Trust Funds Total	Internal Service Funds Life and LTD	Internal Service Funds Deferred Compensation	Internal Service Funds Total
Operation administrative expenses						
Actuarial services						
Cavanaugh Macdonald Consulting, LLC	$ 252,360	$ 4,677	$ 257,037	$ 0	$ 0	$ 0
Attorney services						
Thompson Coburn, LLP	322,434	5,975	328,409	0	4,809	4,809
Auditing services						
Williams-Keepers, LLC	74,616	1,384	76,000	5,252	38,300	43,552
Banking services						
Central Bank	39,277	728	40,005	552	0	552
Consulting services						
Albert Slawsky – investment consulting	50,946	944	51,890	0	0	0
Charlesworth & Associates – risk management	7,411	137	7,548	0	0	0
Gamble & Schlemeier, Ltd. – governmental affairs	25,451	472	25,923	0	0	0
ICON Integration and Design, Inc. – pension administration system	381,474	7,069	388,543	0	0	0
Korn Ferry – personnel recruiting	94,253	1,747	96,000	0	0	0
Linea Solutions – pension administration system	149,216	2,765	151,981	0	0	0
Mosaic Governance Advisors, LLC – strategic planning	58,737	1,088	59,825	0	0	0
Secureworks – information technology	11,452	212	11,664	0	0	0
Sikich, LLP – strategic communications	20,497	380	20,877	0	0	0
Verus Advisory, Inc. – investment consulting	32,972	611	33,583	0	0	0
World Wide Technology – information technology	58,744	1,089	59,833	0	0	0
Miscellaneous services less than $2,500 each	5,541	102	5,643	240	0	240
Operations administrative expenses	1,585,381	29,380	1,614,761	6,044	43,109	49,153
Investment administrative expenses						
Legal services						
Purrington Moody Weil, LLP	4,985	92	5,077	0	0	0
Thompson Coburn, LLP	257,860	4,779	262,639	0	0	0
Miscellaneous services less than $1,500 each	2,502	47	2,549	0	0	0
Investment administrative expenses	265,347	4,918	270,265	0	0	0
Total professional fees	$1,850,728	$34,298	$1,885,026	$6,044	$43,109	$49,153

Information on investment management and consulting fees can be found in the *Schedule of Investment Expenses* on pages 67-68.

Internal Service Funds
Combined Statements of Net Position | As of June 30, 2018

	Life & LTD	Deferred Compensation	Total
Assets			
Premiums receivable	$ 945,148	$ 0	$ 945,148
Investments at fair value	3,973,375	320,878	4,294,253
Capital assets	0	23,370	23,370
Accumulated depreciation — fixed assets	0	(10,570)	(10,570)
Leasehold improvements	0	3,880	3,880
Accumulated depreciation — leasehold	0	(3,880)	(3,880)
Total assets	$ 4,918,523	$ 333,678	$ 5,252,201
Liabilities and net position			
Liabilities			
Premiums payable	$ 2,493,654	$ 0	$ 2,493,654
Deferred revenue	2,083,270	0	2,083,270
Other liabilities	387,708	9,457	397,165
Total liabilities	4,964,632	9,457	4,974,089
Unrestricted net (deficit) position	(46,109)	324,221	278,112
Total liabilities and net position	$ 4,918,523	$ 333,678	$ 5,252,201

Internal Service Funds
Combined Statements of Revenues, Expenses, and Changes in Net Position | For Year Ended June 30, 2018

	Life & LTD	Deferred Compensation	Total
Operating revenues			
Premium receipts	$ 31,119,232	$ 0	$ 31,119,232
Deferred compensation receipts	0	800,000	800,000
Miscellaneous income	480,120	0	480,120
Total operating revenues	31,599,352	800,000	32,399,352
Operating expenses			
Premium disbursements	31,100,612	0	31,100,612
Premium refunds	14,211	0	14,211
Administrative expenses	526,023	1,061,321	1,587,344
Total operating expenses	31,640,846	1,061,321	32,702,167
Net operating (loss)	(41,494)	(261,321)	(302,815)
Nonoperating revenues			
Investment income	79,389	6,417	85,806
Net revenues over (under) expenses	37,895	(254,904)	(217,009)
Net position (deficit) July 1, 2017	(84,004)	579,125	495,121
Net position (deficit) June 30, 2018	$ (46,109)	$ 324,221	$ 278,112

Internal Service Funds

Combined Statements of Cash Flows | For the Year Ended June 30, 2018

	Life & LTD	Deferred Compensation	Total
Cash flows from operating activities			
Cash received from employers and members	$ 31,621,295	$ 800,000	$ 32,421,295
Payments to outside carriers	(30,902,768)	0	(30,902,768)
Refunds of premiums to members	(14,211)	0	(14,211)
Cash payments to employees for services	(409,164)	(893,432)	(1,302,596)
Cash payments to other suppliers of goods and services	(121,570)	(161,509)	(283,079)
Net cash provided (used) by operating activities	173,582	(254,941)	(81,359)
Cash flows from noncapital financing activities			
Implicit funding of checks outstanding net of deposits	1,869	(837)	1,032
Implicit repayment of prior years checks outstanding net of deposits	(2,114)	1,069	(1,045)
Net cash (used) provided by noncapital financing activities	(245)	232	(13)
Cash flows from investing activities			
Purchase of investment securities	(1,179,900,849)	(95,285,299)	(1,275,186,148)
Proceeds from sale and maturities of investment securities	1,179,648,123	95,535,493	1,275,183,616
Cash received from investment income	79,389	6,417	85,806
Purchase of capital assets	0	(1,902)	(1,902)
Net cash (used) provided by investing activities	(173,337)	254,709	81,372
Net increase (decrease) in cash	0	0	0
Cash balances June 30, 2017	0	0	0
Cash balances June 30, 2018	$ 0	$ 0	$ 0
Reconciliation of net operating (loss) to net cash provided (used) by operating activities			
Net operating (loss)	$ (41,494)	$ (261,321)	$ (302,815)
Adjustments to reconcile net operating (loss) to net cash provided (used) by operating activities			
Depreciation expense	0	1,670	1,670
Change in assets and liabilities:			
Increase in operational accounts receivable	21,943	0	21,943
Increase in operational liabilities	193,133	4,710	197,843
Total adjustments	215,076	6,380	221,456
Net cash provided (used) by operating activities	$ 173,582	$ (254,941)	$ (81,359)

Internal Service Funds

Schedules of Administrative Expenses | For the Year Ended June 30, 2018

	Life and LTD	Deferred Compensation	Total
Personnel services			
Salaries	$ 289,593	$ 614,257	$ 903,850
Employee fringe benefits	119,571	279,174	398,745
Total personnel services	409,164	893,431	1,302,595
Professional services			
Attorney services	0	4,809	4,809
Auditing services	5,252	38,300	43,552
Banking services	792	0	792
Total professional services	6,044	43,109	49,153
Communications			
Postage and mailing	10,187	241	10,428
Telephone	4,322	9,065	13,387
Printing	2,513	877	3,390
Video production expense	102	1,312	1,414
Total communications	17,124	11,495	28,619
Facilities			
Building use charge	14	8,702	8,716
Utilities	3,915	0	3,915
Maintenance	9,427	0	9,427
Total facilities	13,356	8,702	22,058
Software and equipment			
Computer supplies and equipment	1,542	7,372	8,914
Depreciation	0	1,670	1,670
Equipment maintenance	24,341	8,131	32,472
Equipment rental	10,988	0	10,988
Total software and equipment	36,871	17,173	54,044
Education, meetings and travel			
Board travel and meetings	2,698	0	2,698
Professional development including travel	6,535	9,875	16,410
MOSERS sponsored seminars	6,873	50,308	57,181
Due diligence travel	26	3,379	3,405
Total education, meetings and travel	16,132	63,562	79,694
General			
Advertising	220	5,931	6,151
Research and information services	3,503	15,023	18,526
Insurance	11,743	0	11,743
Membership dues	968	2,125	3,093
Business continuity	6,759	0	6,759
Office supplies	4,107	770	4,877
Periodicals and publications	32	0	32
Total general	27,332	23,849	51,181
Total administrative expenses	$ 526,023	$ 1,061,321	$ 1,587,344