MOSERS

Missouri State Employees' Retirement System

A Component Unit of the State of Missouri

Comprehensive Annual Financial Report

Fiscal Year Ended June 30, 2017

1957

In 1956, an ambitious and enterprising group of state employees discussed the possibility of starting a retirement plan and asked their colleagues to contribute 50 cents if they were interested in participating. The proceeds of that fundraising effort were used to hire an actuarial firm to draft the legislation that culminated in the creation of MOSERS. In September 1957, MOSERS was established under an act of the 69th General Assembly (HB 188).

Missouri State Employees' Retirement System

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Comprehensive Annual Financial Report

Fiscal Year Ended June 30, 2017

John Watson
Executive Director

Lori Woratzeck
Chief Finance Officer

MOSERS®

MISSION

MOSERS exists to advance the financial security of its members.

VISION

We endeavor to:

Exceed customer expectations

Educate stakeholders

Ensure sound investment practices

Encourage responsible funding of the plan

through a commitment to Excellence. Always.

VALUES

Quality • Respect • Integrity

Openness • Accountablity

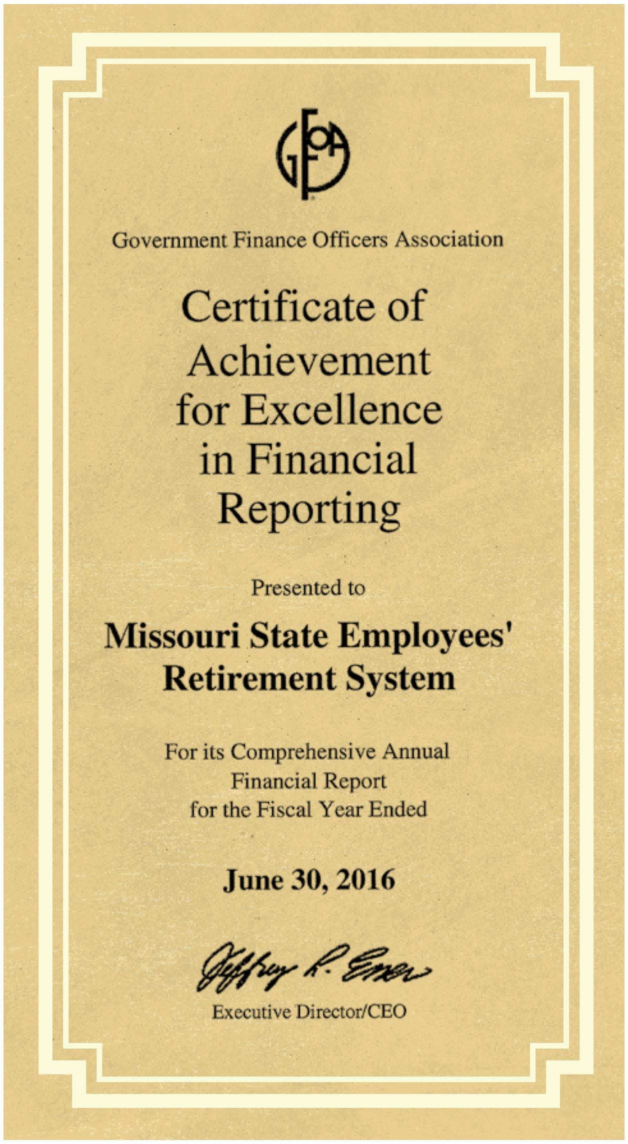
1967

MOSERS' first *Handbook of Information*, dated July 1, 1958 states "A member in the state service may retire at his option with the consent of his employer if he has attained the age of 60 years and having had at least 20 years of creditable service." The maximum annual salary on which a member's benefits were calculated was initially $7,500. In October 1967, the maximum annual salary increased to $15,000.

During Fiscal Year 1967, MOSERS paid $1.47 million in benefits to such members.

Introductory Section

Professional Awards



Government Finance Officers Association

Certificate of Achievement for Excellence in Financial Reporting

Presented to

Missouri State Employees' Retirement System

For its Comprehensive Annual Financial Report for the Fiscal Year Ended

June 30, 2016

Executive Director/CEO

Certificate of Achievement for Excellence in Financial Reporting

MOSERS' *Comprehensive Annual Financial Report* for the fiscal year ended June 30, 2016, was awarded the Certificate of Achievement for Excellence in Financial Reporting by the Government Finance Officers Association of the United States and Canada (GFOA). This was the 28th consecutive year that MOSERS has received this prestigious award. The Certificate of Achievement is the highest form of recognition for excellence in state and local government financial reporting. To be awarded a Certificate of Achievement, a government must publish an easily readable and efficiently organized comprehensive annual financial report (CAFR). The CAFR must satisfy generally accepted accounting principles, applicable legal requirements, and GFOA reporting standards.

Public Pension Coordinating Council

Public Pension Standards Award For Funding and Administration 2016

Presented to

Missouri State Employees' Retirement System

In recognition of meeting professional standards for plan funding and administration as set forth in the Public Pension Standards.

Presented by the Public Pension Coordinating Council, a confederation of

National Association of State Retirement Administrators (NASRA)
National Conference on Public Employee Retirement Systems (NCPERS)
National Council on Teacher Retirement (NCTR)

Alan H. Winkle
Program Administrator

Public Pension Standards Award

MOSERS received the Public Pension Standards Award from the Public Pension Coordinating Council (PPCC) in 2016, in recognition of meeting professional standards for plan design and administration as set forth in the Public Pension Standards. This award is presented by the PPCC, a confederation of the National Association of State Retirement Administrators (NASRA), the National Conference on Public Employee Retirement Systems (NCPERS), and the National Council on Teacher Retirement (NCTR).

Letter of Transmittal

Missouri State Employees' Retirement System
Mailing Address: PO Box 209, Jefferson City, MO 65102-0209
Phone: (573) 632-6100 • (800) 827-1063 | Fax: (573) 632-6103
Relay MO: 711 (Voice) • (800) 735-2966 (TTY)
Website: *www.mosers.org* | Email: *mosers@mosers.org*
Visit us at 907 Wildwood Drive, Jefferson City, MO

October 16, 2017

The Board of Trustees
Missouri State Employees' Retirement System
907 Wildwood Drive
Jefferson City, MO 65109

Dear Board Members:

It is my pleasure to submit the 2017 *Comprehensive Annual Financial Report* (CAFR) of the Missouri State Employees' Retirement System (MOSERS). This CAFR is a presentation of the financial results for MOSERS within the specific time frame of the last fiscal year. These financial results provide useful measurements for the evaluation of programs and represent a chronicle of plan status from one year to another. At MOSERS, a strong emphasis is placed on transparency. We believe the production of this report assists in that overall mission.

Report Contents and Structure

This CAFR is designed to satisfy the reporting requirements of state law as stipulated in Sections 104.480, 104.1006, and 105.661 of the Revised Statutes of Missouri (RSMo), as amended. Management has prepared the basic financial statements of MOSERS and is responsible for the integrity and fairness of the information presented. Some amounts included in the financial statements and elsewhere may be based on estimates and judgments. These estimates and judgments were products of the best business practices available. The accounting policies followed in preparing the basic financial statements conform with U.S. generally accepted accounting principles. Financial information presented throughout the CAFR is consistent with that which is displayed in the basic audited financial statements.

Ultimate responsibility for the CAFR and the basic financial statements rests with the board of trustees. The executive director and the MOSERS staff assist board members in fulfilling their responsibilities. Systems of internal controls and proper records are maintained. These controls include standards in the hiring and training of employees, the establishment of an organizational structure, and the communication of policies and guidelines throughout the organization. Internal controls are reviewed through internal audit programs and all internal audit reports are submitted to the board of trustees.

Williams-Keepers, LLC conducted an independent audit of the basic financial statements in accordance with U.S. generally accepted auditing standards. This audit is described in the *Independent Auditors' Report* on page 17 in the *Financial Section*. Management has provided the external auditors with full and unrestricted access to MOSERS' staff to discuss their audit and related findings, to facilitate independent validation of the integrity of the plan's financial reporting, and verify the adequacy of the internal controls in place.

Management's Discussion and Analysis in the *Financial Section* serves as an introduction to and overview of the financial statements. Additional financial information can be found in the financial statements and schedules included in the *Financial Section* of this report.

MOSERS is considered a component unit of the state of Missouri for financial reporting purposes and, as such, the financial statements in this report are also included in the *State of Missouri Comprehensive Annual Financial Report*.

Profile of MOSERS

MOSERS is a body corporate and an instrumentality of the state of Missouri that was established in 1957 by state law, under the management of a board of trustees, for the purpose of providing retirement benefits to most state employees. MOSERS provides for those retirement benefits through pension trust funds, in keeping with the fiduciary responsibilities of the board members, staff, and certain outside service providers. As of June 30, 2017, MOSERS serves more than 49,000 active employees and pays benefits to more than 47,000 benefit recipients.

Subsequent to its creation, MOSERS was further assigned the task of providing most members of the retirement system with term life and long-term disability insurance. MOSERS maintains an internal service fund to account for the flow of funds related to this insurance and contracts with insurance companies to provide those benefits through insured defined benefit plans. MOSERS maintains membership information on those eligible for the insurance coverage and collects and remits the premiums to the insurance company. Currently, the life and long-term disability insurance plans are insured through a third-party, The Standard insurance company, with oversight by MOSERS.

The State of Missouri Deferred Compensation Plan is administered through a contractual relationship with ICMA-RC as the third-party record keeper with oversight by MOSERS. Investment options are made available to participants who retain responsibility for the investment of their individual accounts. Administrative costs are accounted for through an internal service fund by MOSERS. Separate audited financial statements are issued by the Deferred Compensation Plan reflecting member investments.

The board also has responsibility for oversight of the CURP, a mandatory 401(a) defined contribution plan for new education employees hired after June 30, 2002, by the regional colleges and universities that participate in MOSERS. The employer contribution rate (5.89% in FY17) is 1% less than the employer normal cost of the defined benefit plan for general state employees. TIAA is responsible for third-party administration and for providing investment products and education to plan members.

Funded Status and Valuation Results

The board adopts actuarial assumptions based upon experience studies conducted at least every five years. The most recent experience study was adopted effective June 30, 2016. The most notable changes from this study included the adoption of updated mortality tables and a reduction in the investment return assumption from 8.0% to 7.65%. The board also committed to reducing the investment return assumption by .15% each year until the rate reaches 7.05%. For the June 30, 2017 valuation, the investment return assumption was reduced to 7.50% based upon the commitment made by the board in FY16.

For funding purposes, the actuarial value of assets (AVA), which is a smoothed value that recognizes investment gains and losses on the AVA over a rolling five-year period, is used to determine funding levels. For the amortization of the unfunded actuarial accrued liability (UAAL), MOSERS uses a closed amortization period with 27 years remaining.

As of June 30, 2017, MSEP was 67.5% pre-funded and the Judicial Plan was 26.9% pre-funded. MSEP reflected a decrease from the June 30, 2016 funded status of 69.6% and the Judicial Plan reflected an increase from the June 30, 2016, funded status of 26.2%.

For financial statement purposes, a net pension liability (NPL) is presented instead of the UAAL. The NPL is calculated using the market value of assets to determine the fiduciary net position in accordance with GASB 67. As of June 30, 2017, the fiduciary net position as a percentage of total pension liability was 60.41% for MSEP and 24.39% for the Judicial Plan.

The required opinion letter from the board's retained actuary, Cavanaugh Macdonald, is contained on page 89. Additional information regarding the financial condition of the pension trust funds can be found in the *Actuarial Section* of this report.

Plan Membership

During a 2010 special legislative session, the General Assembly authorized new benefit tiers known as the "MSEP 2011" and the "Judicial Plan 2011." These tiers affect MSEP and Judicial Plan members employed for the first time on or after January 1, 2011. With the total MSEP active membership of 48,910, the MSEP 2011 represents approximately 39% of that membership. With the total Judicial Plan active membership of 410, the Judicial Plan 2011 represents approximately 32% of that membership. As active membership increases in these new tiers, there is a decreasing component in the annual employer contribution. Over time, these new benefit tiers will result in a significant savings to the employer while continuing to provide a reasonable benefit in retirement for our state employees.

Investments

MOSERS' investments generated a time-weighted return of 3.5%, net of fees, for FY17. The total fund returned 1.9% more than would have been expected through passive investing. Additional information regarding the investments of the pension trust funds can be found in the *Investment Section* of this report.

Legislative Changes During FY 2017

- **House Bill 5** – The General Assembly and the Governor authorized the appropriation of $393 million to MOSERS for FY18 which fully funded the board-certified employer contribution rates.
- **Senate Bill 62** – SB 62 included several provisions that affect MOSERS. Effective January 1, 2018, the vesting period for most MSEP 2011 members will be reduced from 10 years to 5 years. Additionally, new terminated-vested members of MSEP 2011 will: 1) not be eligible to receive service credit for sick leave accruals, 2) not have survivor benefits payable at the time of death but rather at the time when the member would have been eligible for normal retirement, and 3) have cost-of-living adjustments begin on the second anniversary of retirement, rather than on the first anniversary of retirement. These three items combined with the vesting changes resulted in a decrease of approximately $1.7 million in plan liability.

  SB 62 set the employer contribution rate to CURP at 6% rather than being 1% below MOSERS' employer normal cost effective July 1, 2018 (FY19). This bill also requires new employees hired on or after July 1, 2018 to contribute 2% of payroll to the CURP.

  SB 62 allowed the MOSERS Board of Trustees to choose to establish a buyout program for terminated-vested members with the program authorization expiring May 31, 2018. The board subsequently voted to implement the program by offering a buyout amount equal to 60% of the present value of the future normal retirement benefit calculated using a 7.50% discount rate. The program is completely voluntary and provides another benefit option to approximately 17,000 members who are no longer working in a benefit eligible position with the state and are not yet eligible to retire. Payments will be made after November 30, 2017.
- **Senate Bill 34** – Provisions were modified relative to pension forfeiture and a public employee who commits a job-related felony. Original pension forfeiture provisions were passed in 2014. SB 34 provided for the employer to notify the affected retirement plan, rather than the court, when an employee is convicted, rather than "found guilty" of a felony in direct connection of job duties.

Administrative Initiatives

Project Phoenix

During FY17, MOSERS began the process of replacing its 30-year-old pension administration system with a new system that has been named "Phoenix." Six staff members have been dedicated to work full time on the project and others will be assisting on a part-time basis. MOSERS hired Linea Solutions to assist in the development of a comprehensive request for proposal document and hired Icon Integration to lead our data cleansing efforts in preparation for future conversion activities. We anticipate that a software vendor will be selected in mid FY18.

Vendor Contracts

A process was initiated to review and bid long-term consulting contracts which resulted in substantial savings to the systems. Cavanaugh Macdonald was hired as the actuarial consultant resulting in annual savings estimated at $57,000. TIAA was retained to continue as the CURP third-party administrator, but the bid process resulted in investment line-up improvements which included a fee reduction of approximately 36% in total record keeping and investment option expenses (approximately $176,000 annually), and the general asset consultant fees were reduced by approximately $234,000 per year.

Budgeting

The MOSERS Board of Trustees annually approves the administrative expense budgets for MOSERS' operations and investment departments. MOSERS' governance policy requires an exception report to the board of trustees by the executive director if expenses are expected to exceed budgeted amounts by 10% and to seek board approval in advance for any unscheduled salary increases or staff expansions not included in the budget approved by the board before the beginning of the fiscal year. There were no budget exceptions to report for the year.

Awards

MOSERS was awarded the Certificate of Achievement for Excellence in Financial Reporting by the Government Finance Officers Association of the United States and Canada (GFOA) for its comprehensive annual financial report for the fiscal year ended June 30, 2016. This was the 28th consecutive year that MOSERS has received this prestigious award. In order to be awarded a Certificate of Achievement, a government must publish an easily readable and efficiently organized comprehensive annual financial report. The report must satisfy generally accepted accounting principles and applicable legal requirements. A Certificate of Achievement is valid for a period of one year only. We believe that our current comprehensive annual financial report continues to meet the Certificate of Achievement Program's requirements and we are submitting it to the GFOA to determine its eligibility for another certificate.

MOSERS received the Public Pension Coordinating Council (PPCC), Public Pension Standards Award, in recognition of meeting the professional standards for plan design and administration as set forth in the Public Pension Standards. This award is presented by the PPCC, a confederation of the National Association of State Retirement Administrators (NASRA), the National Conference on Public Employee Retirement Systems (NCPERS), and the National Council on Teacher Retirement (NCTR).

These prestigious awards recognize MOSERS for financial and professional standards of excellence and are gratifying to MOSERS' staff. These notable awards can be viewed on page 5.

Conclusion

This report is a product of the combined efforts of MOSERS' staff and advisors functioning under the board's leadership. It is intended to provide complete and reliable information that facilitates the management decision making process, serves as a means for determining compliance with legal requirements, and allows for the evaluation of responsible guardianship of system funds. MOSERS received an unmodified opinion from our independent auditor on the financial statements included in this report. The opinion of the independent auditor is on page 17.

Copies of this report are provided to the Governor, State Auditor, the Joint Committee on Public Employee Retirement of the General Assembly, and all state agencies that form the link between MOSERS and its members. Their cooperation contributes significantly to the success of MOSERS.

As the spotlight continues to shine on public pensions, it is important to remember the genesis of the MOSERS retirement benefit as a component of the employer's total compensation package to recruit and retain quality employees. With the average MOSERS retirement benefit being $15,700 annually, an employee, after a career of state service, receives this element of deferred compensation, which contributes to the societal benefit of a dignified retirement. It is our honor to be a part of this process and work for this great state and Missouri's public employees.

Respectfully submitted,

John Watson

John Watson
Executive Director

Letter from the Board Chairwoman

Missouri State Employees' Retirement System
Mailing Address: PO Box 209, Jefferson City, MO 65102-0209
Phone: (573) 632-6100 • (800) 827-1063 | Fax: (573) 632-6103
Relay MO: 711 (Voice) • (800) 735-2966 (TTY)
Website: *www.mosers.org* | Email: *mosers@mosers.org*
Visit us at 907 Wildwood Drive, Jefferson City, MO

October 16, 2017

Dear Members:

On behalf of the board of trustees, I am pleased to present the MOSERS *Comprehensive Annual Financial Report* for the fiscal year ended June 30, 2017. With 2017 being the 60th anniversary of MOSERS, it is more evident than ever that the data and message contained in this report echoes all that is MOSERS as an organization: transparent, informative, educational, and enduring.

During FY17, the MOSERS Board of Trustees confirmed its commitment to sound financial practices by adopting more conservative investment return assumptions to reflect capital market expectations. While this movement in assumptions will result in higher annual employer contribution requirements in the short-term, it is the board's expectation that these changes will strengthen MOSERS' financial position and will ultimately enhance the retirement security of our members.

Public pension plans continue to experience heightened attention and MOSERS is no exception. As news articles continue to highlight important, and sometimes difficult, decisions being made by members of the General Assembly, the Governor, and the members of the MOSERS Board of Trustees, it is important to emphasize that state employee pensions are secure and MOSERS is well positioned to continue in its mission to "advance the financial security of its members."

In Missouri, the Governor and the legislature have demonstrated a commitment to contributing the full amount needed each year to pay promised benefits to retirees. The commitment from the state has been consistent since MOSERS' inception – and was evident this year as the board-certified contribution rate was fully funded for FY18.

As is often the case after an election cycle, the board experienced significant turnover this year. On behalf of the board and staff, I would like to recognize and thank State Treasurer Clint Zweifel, Senator Joe Keaveny, Representative Caleb Jones, Representative Mike Leara, and Commissioner Doug Nelson for their hard work and dedication while serving as trustees to the system. Five new trustees were added to the board during FY17 with those being State Treasurer Eric Schmitt, Senator Gina Walsh, Representative Mike Bernskoetter, Representative John Wiemann, and Commissioner Sarah Steelman. Trustees devote many hours in fulfilling their fiduciary duties and our new trustees have been active contributors to board discussion and decisions.

I wish to thank the board for their contributions this year as well as the staff for maintaining a high level of expertise and professionalism. I also wish to express my appreciation to you, our members, for your public service to this great state and your dedication and commitment to the citizens of Missouri. If you ever have any questions, please contact us at MOSERS, P.O. Box 209, Jefferson City, Missouri 65102, call us at (800) 827-1063, or visit our website at *www.mosers.org*.

Sincerely,

Shannon Owens, Chairwoman – Board of Trustees

Board of Trustees


Shannon Owens – Chairwoman
Elected Active Member

Crystal Wessing – Vice Chair
Elected Active Member

Representative Mike Bernskoetter
House Appointed Member

Lloyd J. "Joe" Carmichael
Governor Appointed Member

Don Martin
Elected Retired Member





State Treasurer Eric Schmitt
Ex-Officio Member

Antwaun Smith
Governor Appointed Member

Commissioner Sarah Steelman
Office of Administration
Ex-Officio Member

Senator Wayne Wallingford
Senate Appointed Member

Senator Gina Walsh
Senate Appointed Member

Representative John Wiemann
House Appointed Member



Administrative Organization

John Watson
Executive Director

- **Jake McMahon,** *Chief Counsel*
- **Nicki Russell,** *Chief Auditor*
- **Ronda Stegmann,** *Legislative & Policy Coordinator*
- **Lisa Verslues,** *Human Resources Coordinator*
- **Lori Woratzeck,** *Chief Finance Officer*

Mark J. Murphy
Deputy Executive Director • Operations
Chief Operations Officer

- **Stacy Gillmore,** *Chief Technology Officer*
- **Lori Leeper,** *Board & Operations Projects Coordinator*
- **Carson Lepper,** *Project Manager*
- **Pam Palmquist,** *Chief Benefits Officer*
- **Cindy Rehmeier,** *Manager – Defined Contribution Plans*
- **Candy Smith,** *Communications & Strategic Planning Coordinator*

Seth Kelly
Deputy Executive Director • Investments
Chief Investment Officer

- **Shannon Davidson,** *Deputy Chief Investment Officer*
- **Patrick Morgan,** *Investment Legal & Compliance Counsel*
- **Scott Peppard,** *Manager – Illiquid Alpha Strategies*
- **Tyson Rehfeld,** *Manager – Global Rates & Credit*

About MOSERS

Purpose

MOSERS was established September 1, 1957, and is governed by laws of the state of Missouri.

MOSERS provides retirement, survivor, and disability benefits, as well as life insurance and deferred compensation plan management to its members.

MOSERS administers benefits for most state employees, including members of the Missouri General Assembly, elected state officials, and judges. MOSERS is responsible for administering the law in accordance with the expressed intent of the Missouri General Assembly and bears a fiduciary obligation to the state employees who are its members and beneficiaries.

Administration

State law provides that responsibility for the administration of MOSERS is vested in an 11-member board of trustees. The board is comprised of the following:

- two members of the Senate appointed by the President Pro Tem of the Senate;
- two members of the House of Representatives appointed by the Speaker of the House;
- two members appointed by the Governor;
- the State Treasurer;
- the Commissioner of Administration; and
- three other system members: two active members elected by the active and terminated-vested members, and one retiree elected by the retired members.

The day-to-day management of MOSERS is delegated to the executive director who is appointed by the board and serves at its pleasure. The executive director acts as advisor to the board on all matters pertaining to the system, contracts for professional services, and employs the remaining staff needed to manage the system.

Organization

The executive director, chief operations officer, chief finance officer, and chief investment officer are responsible for planning, organizing, and administering the operations of the system under the broad policy guidance and direction of the board.

Executive

The executive staff provide administrative support by assisting the executive director, chief operations officer, and chief finance officer in the major legal, financial, operational, and oversight functions. Human resources, which includes oversight of general building maintenance, is also represented in this section.

MOSERS' office is divided into six administrative sections that perform specific functions for the system.

Benefits

Staff in the benefits section are responsible for all member data, benefit verifications and inceptions, as well as contact with members regarding the benefit programs administered by MOSERS (retirement, life insurance, and long-term disability insurance). They also conduct educational seminars in 16-plus cities around the state each year and host webinars to inform members about their MOSERS benefits.

Communications

Communications staff are responsible for presenting information in clear and concise ways to facilitate effective, well-informed decision-making, planning, and action. They produce materials for members regarding the benefits administered by MOSERS including publications such as newsletters, handbooks, forms, brochures, and the annual report. Additionally, this team works in conjunction with information technology staff on electronic materials and tools such as the public, board, secure member, and internal websites. This section coordinates activities and processes for the organization that facilitate strategic thinking, planning, and implementation.

Finance

The staff in this section are responsible for all financial records of the programs administered by MOSERS, including the preparation of financial and statistical reports and purchasing functions for MOSERS. They interface with the investment custodian, internal investment managers, Office of Administration accounting, state of Missouri employers, life insurance companies, actuaries, banks, and the IRS. They are also responsible for all billing, payment processing, and balancing of member and employer contributions.

Information Technology

The information technology section provides computer and technical design support for MOSERS' data processing activities. This team is responsible for developing and maintaining the automated systems used to administer benefits. They are also responsible for the document imaging system, network, unified communication system, and personal computers. Information technology and communications staff are jointly responsible for MOSERS' websites.

Investments

The investments staff provides investment management and consulting services to the system. Primary functions include managing assets internally, selecting external managers for portions of the portfolio, researching and implementing portfolio allocation shifts and rebalancing, providing technical advice, serving as a liaison to the investment community, and informing and advising the board and executive director on financial, economic, and political developments which may affect the system. The investments staff works closely with external investment consultants, legal counsel, and the executive director.

Project Management

The responsibilities of staff in this area include benchmarking, business continuity preparation and planning, business process mapping and analysis to identify efficiencies and mitigate risk. They are also the core staff responsible for the selection and implementation efforts of a new pension administration solution to replace MIBS. This includes working closely with multiple external vendors focused on data preparation and systems design.

Outside Professional Services

Actuary
- Cavanaugh Macdonald Consulting, LLC

Auditor
- Williams-Keepers, LLC

Governmental Consultant
- Gamble & Schlemeier, Ltd.

Legal Counsel
- Purrington Moody Weil, LLP
- Thompson Coburn, LLP

Master Custodian
- Bank of New York Mellon

Investment Management Consultants
- Albert A. Slawsky
  Board Asset Consultant
- Blackstone Alternative Asset Management, LP
  Hedge Fund Asset Consultant
- Summit Strategies Group
  General Asset Consultant
- TimberLink Consulting, LLC
  Timberland Consultant

Risk Management Consultant
- Charlesworth & Associates, LC

Third-Party Administrators
- ICMA-RC
  Deferred Compensation Plan
- The Standard
  Life Insurance and Long-Term Disability Insurance
- TIAA
  College and University Retirement Plan

Securities Lending Advisor
- Deutsche Bank AG, New York Branch

Information Technology Consulting
- Avtex Solutions, Inc.
- Dell
- Huber & Associates, Inc.

Pension System Administration Consulting
- ICON Integration and Design, Inc.
- Linea Solutions

Investment Risk Management
- MSCI BarraOne

Investment Advisors
- Actis Emerging Markets, LLP
- Alinda Capital Partners, LLC
- Alliance Bernstein Defined Contribution Investments
- AQR Capital Management, LLC
- Axiom Asia Private Capital
- Axxon Management, LP
- Bayview Asset Management, LLC
- BlackRock Financial Management, Inc.
- Blackstone Alternative Asset Management, LP
- Blackstone Real Estate Advisors
- Blakeney Management, Ltd.
- Bridgewater Associates, LP
- Campbell Global
- CarVal Investors, LLC
- Catalyst Capital Group, Inc.
- Catterton Partners
- Cornwall Capital Management, LP
- Davidson Kempner Capital Management, LLC
- Development Partners International
- DRI Capital, Inc.
- EIG Global Energy Partners, LLC
- Elliott International Capital Advisors, Inc.

Outside Professional Services continued on page 16

Outside Professional Services continued from page 15

- Eton Park Capital Management, LP
- Farallon Capital Management, LLC
- Gaoling Fund, LP
- Glenview Capital Management, LLC
- Global Forest Partners, LP
- Harvest Fund Advisors, LLC
- HBK Investments, LP
- JLL Partners, LP
- King Street Capital Management, LP
- Linden Capital Partners, LLC
- MAST Capital Management, LLC
- Merit Energy Company
- MHR Institutional Partners, LLC
- Millennium Technology Value Partners, LP
- Moon Capital Management, LP
- NISA Investment Advisors, LLC
- Oaktree Capital Management, LP
- Pacific Alternative Asset Management Company, LLC
- Perry Partners, LLC
- Pharo Global Advisors, Ltd.
- Resource Management Service, LLC
- Silchester International Investors
- Silver Creek Capital Management, LLC
- Silver Lake Partners, LP
- Silver Point Capital, LP
- SIR Capital Management, LP
- Siris Capital Group, LLC
- State Street Global Advisors
- StepStone Group
- Stone Harbor Investment Partners, LP
- Viking Global Investors, LP
- Visium Asset Management, LP
- Voya Financial
- Wellington Management Company, LLP

Investment management, custodial and consulting fees can be found in the Schedule of Investment Manager Fees on page 79. Schedules of broker commissions can be found on page 82. Additional information on investment managers can also be found in the Investment Section of this report.

1977

In 1975, the multiplier used for calculating benefits was increased to 1.25% (originally, it was 5/6 of 1% in 1957). By 1977, the average monthly benefit payment was $108 ($1,294 per year). MOSERS paid a total of $8.23 million to 6,361 retired workers in 1977.

FINANCIAL SECTION

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, 2017, 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, 2017, 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 19-23 and the *Schedule of Changes in Employers' Net Pension Liability*, *Schedule of Employer Contributions, Schedule of Annual Money-Weighted Rate of Return on Investments,* and the *Notes to the Schedules of Required Supplementary Information* on pages 51-58 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.

American Institute of Certified Public Accountants | Missouri Society of Certified Public Accountants | Member, Allinial Global

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 59-64 are presented for purposes of additional analysis and are not a required part of the financial statements.

The additional information presented on pages 59-64 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 59-64 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 16, 2017

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, 2017. 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 24-50 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 24. 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* which 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* which 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 is 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 $0.41 billion from $3.87 billion at June 30, 2016 to $4.28 billion at June 30, 2017 with a corresponding decrease in funded percentage from 69.6% to 67.5%. The UAAL for the Judicial Plan increased by $8.44 million from $404.15 million at June 30, 2016 to $412.59 million at June 30, 2017 with a corresponding increase in funded percentage from 26.2% to 26.9%. The primary reason for the increase in the UAAL in both plans was a reduction in the assumed rate of investment return from 7.65% to 7.50%. Other actuarial assumptions remained consistent with the June 30, 2016 valuation.

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 open 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 63.6% at June 30, 2016 to 60.41% at June 30, 2017 for MSEP and increased from 24.11% to 24.39% for the Judicial Plan.

Financial Reporting Highlights

- MOSERS' net position restricted for pensions decreased by $158.2 million during FY17. On June 30,2017, total plan assets (including net capital assets of $3.3 million) were $11.5 billion, exceeding total liabilities of $3.4 billion, resulting in a net position held in trust for pension benefits of $8.1 billion.
- Covered payroll, from which both employee and employer contributions are calculated, increased $20.4 million for the Missouri State Employees' Plan (MSEP) and $0.7 million for the Judicial Plan, or 1.1% and 1.3% respectively, over the last fiscal year.
- Total contributions for FY17 were $401.4 million, up from $390.1 million in FY16. Based upon the June 30, 2015 actuarial valuation, the FY17 actuarial required employer contribution rates were determined to be 16.34% for the MSEP and 55.76% for the Judicial Plan. However, the actual rates were set per the board's policy minimum contribution rates at 16.97% for the MSEP and 58.45% for the Judicial Plan. Although not prohibited to increase, future contribution rates shall not be reduced below the rate set by the June 30, 2013 valuation until the actuarial funding ratio of the plans are at least 80%. Investment and securities lending income, net of related fees was $276.7 million. Investments of the pension trust funds generated a time-weighted rate of return of 3.5%, net of fees, for the year, up from the prior year's return of 0.3%. The money-weighted rate of return, net of investment expenses as defined by GASB 67 was 3.51% for FY17.
- Investment activity expenses were $140.3 million in FY17, up from $79.1 million in FY16. Although management fees were reduced by $6.2 million from FY16 and fund pass-through expenses were reduced by approximately $2 million, this overall increase is due to paying $70 million more in incentive fees to external investment managers as a result of the performance of the funds they manage in FY17 as compared to FY16.
- Member benefit payments were $821.3 million in FY17, up $37.9 million from $783.4 million in FY16. Service transfers and refunds totaled $6.7 million in FY17, down $0.2 million from $6.9 million in FY16.
- Administrative expenses totaled $8.9 million in FY17, compared to $8.6 million in FY16.
- The internal service fund's net position increased by $0.3 million. The increase is due to reimbursement from the State of Missouri Deferred Compensation Plan's third-party record keeper to cover administrative expenses occurring in FY17 and future years.

The following schedules present *Summary Comparative Financial Statements* of the pension trust funds and internal service funds for FY17 and FY16. For each schedule, there is a brief summary of the significant changes noted in those schedules.

Pension Trust Funds

Summary Comparative Statements of Fiduciary Net Position

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

MOSERS experienced a slight decrease in the net fair value of investments (total investments less obligations under repo agreements) of $103 million, from $5.7 billion in FY16 to $5.6 billion in FY17, primarily attributable to benefit payment obligations exceeding contribution revenue and lower than expected investment returns as evidenced by MOSERS' total investment return, net of fees, of 3.5% this year. Detailed information regarding MOSERS' investment portfolio is included in the *Investment Section* of this report.

Obligations under repurchase agreements decreased from $3.6 billion in FY16 to $3.4 billion in FY17 due to decreased exposure financed with reverse repurchase agreements.

Cash and short-term investments decreased slightly due to multiple factors including benefit payment obligations exceeding contribution revenue, the timing of investment funding and obligations under derivative investments and reverse repurchase agreements.

Investment sales receivable decreased as a result of the timing of investment purchases.

The decrease in securities lending collateral is due to the investment portfolio not having any securities on loan or collateral held at fiscal year-end.

Pension Trust Funds

Summary Comparative Statements of Fiduciary Net Position

	As of June 30, 2017	As of June 30, 2016	Amount of Change	Percentage Change
Cash and short-term investments	$ 2,417,955,050	$ 2,454,419,406	$ (36,464,356)	(1.49)%
Receivables	43,498,874	89,911,461	(46,412,587)	(51.62)
Investments	9,018,590,792	9,349,306,746	(330,715,954)	(3.54)
Invested securities lending collateral	0	14,258,587	(14,258,587)	(100.00)
Net capital assets	3,316,060	3,541,901	(225,841)	(6.38)
Other assets	105,911	68,128	37,783	55.46
Total assets	11,483,466,687	11,911,506,229	(428,039,542)	(3.59)
Administrative expense payables	2,434,501	2,419,569	14,932	0.62
Investment purchase payables	10,165,707	36,690,153	(26,524,446)	(72.29)
Securities lending collateral	0	14,940,141	(14,940,141)	(100.00)
Other liabilities	9,470,802	10,083,285	(612,483)	(6.07)
Obligations under repurchase agreements	3,373,773,555	3,601,461,597	(227,688,042)	(6.32)
MOSERS investment portfolio liability (MIP)	4,628,883	4,693,919	(65,036)	(1.39)
Total liabilities	3,400,473,448	3,670,288,664	(269,815,216)	(7.35)
Net positions restricted for pensions	$ 8,082,993,239	$ 8,241,217,565	$(158,224,326)	(1.92)

Summary Comparative Statements of Changes in Fiduciary Net Position

The increase in contributions received is primarily attributable to an increase in covered payroll from FY16 to FY17.

The increase in investment income from FY16 to FY17 is attributable to an improvement in market conditions experienced by the investments of the fund. The increase in securities lending income is primarily due to higher lending margins in the lending portfolio during the fiscal year. 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 100-107 of the *Actuarial Section* of this report.

Service transfer payments decreased $1.2 million in FY17 and are dependent on the number of members electing to transfer their service out of MOSERS. Refunds of employee contributions are the result of the number of members of the MSEP 2011 tier who have terminated employment and are eligible to request a refund, as well as members employed prior to September 1, 1972 who have contributions remaining in the system. Refunds increased in FY17 by $1 million due to a larger number of terminated-nonvested MSEP 2011 members choosing to receive a refund.

Pension Trust Funds

Summary Comparative Statements of Changes in Fiduciary Net Position

	Year Ended June 30, 2017	Year Ended June 30, 2016	Amount of Change	Percentage Change
Contributions	$ 401,359,185	$ 390,869,615	$ 10,489,570	2.68%
Investment income – investing activities	276,722,915	1,213,744	275,509,171	22,699.12
Investment income (loss) – securities lending activities	21,896	(49)	21,945	44,785.71
Miscellaneous income	530,988	554,655	(23,667)	(4.27)
Total additions	678,634,984	392,637,965	285,997,019	72.84
Benefits	821,280,165	783,420,118	37,860,047	4.83
Service transfers and refunds	6,669,417	6,880,099	(210,682)	(3.06)
Administrative expenses	8,909,728	8,626,358	283,370	3.28
Total deductions	836,859,310	798,926,575	37,932,735	4.75
Net (decrease)	(158,224,326)	(406,288,610)	248,064,284	61.06
Net positions beginning of year	8,241,217,565	8,647,506,175	(406,288,610)	(4.70)
Net positions restricted for pensions	$8,082,993,239	$8,241,217,565	$(158,224,326)	(1.92)

Internal Service Funds

Summary Comparative Statements of Net Position Analysis

The increase 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 FY17 and future years.

The decrease in premiums payable and increase in other liabilities is attributable to a reclassification of year-end balances of deferred revenue in the long-term disability program.

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

Premium receipts and premium disbursements decreased 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 $0.7 million for FY17. This is attributable to a $0.7 million reimbursement paid in FY17 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, 2017, there were 63,795 participants (both active and terminated/retired), which is a decrease of 1,109 from FY16. The state of Missouri has not contributed an employer match since March 2010.

Administrative expenses decreased primarily as a result of The Standard assuming the cost of a full-time employee to work onsite at MOSERS for the life insurance and long-term disability programs.

Summary Comparative Statements of Cash Flows Analysis

The increase in cash flows from operating activities is primarily attributable to the increase in deferred compensation receipts of $0.7 million to cover current and future administrative expenses.

The decrease in cash flows from noncapital financing activities is primarily attributable to an increase in the amount of life and long-term disability insurance premium refund checks that remained outstanding at year-end.

The decrease in cash flows from investing activities is attributable to several factors including the increase in outflows for net purchase and maturities of overnight repurchase agreements of $0.9 million.

Request 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*.

Internal Service Funds

Summary Comparative Statements of Net Position

	As of June 30, 2017	As of June 30, 2016	Amount of Change	Percentage Change
Premiums receivable	$ 967,091	$ 962,006	$ 5,085	0.53%
Investments	4,291,721	3,935,042	356,679	9.06
Fixed assets net of accumulated depreciation	11,598	3,946	7,652	193.92
Leasehold improvements	970	1,940	(970)	(50.00)
Total assets	$5,271,380	$4,902,934	$ 368,446	7.51
Premiums payable	$2,518,379	$4,550,931	$(2,032,552)	(44.66)
Other liabilities	2,257,880	123,378	2,134,502	1,730.05
Total liabilities	4,776,259	4,674,309	101,950	2.18
Unrestricted net position	495,121	228,625	266,496	116.56
Total liabilities and net position	$5,271,380	$4,902,934	$ 368,446	7.51

Internal Service Funds

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

	Year Ended June 30, 2017	Year Ended June 30, 2016	Amount of Change	Percentage Change
Premium receipts	$28,779,398	$30,360,162	$(1,580,764)	(5.21)%
Deferred compensation receipts	700,000	0	700,000	100.00
Miscellaneous income	480,120	480,120	0	0.00
Total operating revenue	29,959,518	30,840,282	(880,764)	(2.86)
Premium disbursements	28,769,588	30,328,802	(1,559,214)	(5.14)
Premium refunds	9,810	31,360	(21,550)	(68.72)
Administrative expenses	950,121	1,015,578	(65,457)	(6.45)
Total operating expenses	29,729,519	31,375,740	(1,646,221)	(5.25)
Net operating income (loss)	229,999	(535,458)	765,457	142.95
Investment income	36,497	18,777	17,720	94.37
Net revenues over (under) expenses	266,496	(516,681)	783,177	151.58
Net position beginning of year	228,625	745,306	(516,681)	(69.32)
Net position end of year	$ 495,121	$ 228,625	$ 266,496	116.56

Internal Service Funds

Summary Comparative Statements of Cash Flows

	Year Ended June 30, 2017	Year Ended June 30, 2016	Amount of Change	Percentage Change
Cash flows from operating activities	$ 330,265	$(566,218)	$ 896,483	158.33%
Cash flows from noncapital financing activities	(1,080)	1,596	(2,676)	(167.67)
Cash flows from investing activities	(329,185)	564,622	(893,807)	(158.30)
Net change in cash	0	0	0	
Cash balances beginning of year	0	0	0	
Cash balances end of year	$ 0	$ 0	$ 0	

Pension Trust Funds

Statements of Fiduciary Net Position | As of June 30, 2017

	MSEP	Judicial Plan	Total
Assets			
Cash and short-term investments	$ 2,377,142,446	$ 40,812,604	$ 2,417,955,050
Receivables			
Employer contributions	13,707,849	1,458,285	15,166,134
Investment sales	10,259,116	176,136	10,435,252
Investment income receivable	17,331,102	297,554	17,628,656
Other	264,294	4,538	268,832
Total receivables	41,562,361	1,936,513	43,498,874
Investments at fair value			
U.S. treasury securities	3,865,094,642	66,358,909	3,931,453,551
Government bonds & gov't. mortgage-backed securities	47,133,502	809,224	47,942,726
Corporate bonds	144,857	2,487	147,344
Convertible bonds	599,917	10,300	610,217
U.S. dollar-denominated international corporate bonds	1,181,054	20,277	1,201,331
Limited partnerships	3,747,256,147	64,335,767	3,811,591,914
Common stock	240,136,204	4,122,842	244,259,046
International equities	964,727,815	16,563,187	981,291,002
Foreign currency	83,838	1,439	85,277
Real estate investment trust	8,242	142	8,384
Total investments	8,866,366,218	152,224,574	9,018,590,792
Capital assets			
Land	262,774	4,512	267,286
Building and building improvements	4,171,561	71,621	4,243,182
Furniture, fixtures and equipment	1,273,082	21,857	1,294,939
Software	723,888	12,428	736,316
Total capital assets	6,431,305	110,418	6,541,723
Accumulated depreciation	(3,171,217)	(54,446)	(3,225,663)
Net capital assets	3,260,088	55,972	3,316,060
Prepaid expenses and other	104,123	1,788	105,911
Total assets	11,288,435,236	195,031,451	11,483,466,687
Liabilities			
Administrative expenses payable	2,393,409	41,092	2,434,501
Investment purchases payable	9,994,120	171,587	10,165,707
Investment incentive fees payable	8,714,519	149,618	8,864,137
Employee vacation and overtime liability	596,425	10,240	606,665
Obligations under repurchase agreements	3,316,827,713	56,945,842	3,373,773,555
MOSERS investment portfolio liability (MIP)	4,550,752	78,131	4,628,883
Total liabilities	3,343,076,938	57,396,510	3,400,473,448
Net position restricted for pensions	$ 7,945,358,298	$ 137,634,941	$ 8,082,993,239

See accompanying *Notes to the Financial Statements.*

BASIC FINANCIAL STATEMENTS

Pension Trust Funds

Statements of Changes in Fiduciary Net Position | For Year Ended June 30, 2017

	MSEP	Judicial Plan	Total
Additions			
Contributions			
Employer contributions	$ 335,217,422	$ 34,246,826	$ 369,464,248
Employee contributions	25,439,343	786,745	26,226,088
Member purchases of service credit	1,691,046	0	1,691,046
Service transfer contributions	3,977,803	0	3,977,803
Total contributions	366,325,614	35,033,571	401,359,185
Investment income			
From investing activities			
Net appreciation in fair value of investments	329,824,090	5,662,673	335,486,763
Interest	36,893,888	633,423	37,527,311
Dividends	678,467	11,648	690,115
Other	42,557,190	730,654	43,287,844
Total investing activity income	409,953,635	7,038,398	416,992,033
Investing activity expenses:			
Management fees and incentives	(132,590,711)	(2,276,419)	(134,867,130)
Custody fees	(267,051)	(4,585)	(271,636)
Consultant fees	(786,292)	(13,500)	(799,792)
Performance measurement fees	(454,109)	(7,797)	(461,906)
Internal investment activity expenses	(3,803,355)	(65,299)	(3,868,654)
Total investing activity expenses	(137,901,518)	(2,367,600)	(140,269,118)
Net income from investing activities	272,052,117	4,670,798	276,722,915
From securities lending activities			
Securities lending income	54,981	944	55,925
Securities lending expenses:			
Borrower rebates	32,622	560	33,182
Management fees	(66,077)	(1,134)	(67,211)
Total securities lending activities expenses	(33,455)	(574)	(34,029)
Net income from securities lending activities	21,526	370	21,896
Total net investment income	272,073,643	4,671,168	276,744,811
Miscellaneous income	522,025	8,963	530,988
Total additions	638,921,282	39,713,702	678,634,984
Deductions			
Benefits	700,281,256	33,979,837	734,261,093
BackDROP & lump sum benefits	87,019,072	0	87,019,072
Service transfer payments	1,843,792	0	1,843,792
Contribution refunds	4,820,737	4,888	4,825,625
Administrative expenses	8,759,341	150,387	8,909,728
Total deductions	802,724,198	34,135,112	836,859,310
Net (decrease) increase in net position	(163,802,916)	5,578,590	(158,224,326)
Net position restricted for pensions:			
Beginning of year	8,109,161,214	132,056,351	8,241,217,565
End of year	$7,945,358,298	$137,634,941	$8,082,993,239

See accompanying *Notes to the Financial Statements*.

Internal Service Funds

Statements of Net Position | As of June 30, 2017

	Life & LTD	Deferred Compensation	Total
Assets			
Premiums receivable	$ 967,091	$ 0	$ 967,091
Investments at fair value	3,720,649	571,072	4,291,721
Capital assets	0	21,468	21,468
Accumulated depreciation — fixed assets	0	(9,870)	(9,870)
Leasehold improvements	0	3,880	3,880
Accumulated depreciation — leasehold	0	(2,910)	(2,910)
Total assets	$4,687,740	$583,640	$5,271,380
Liabilities and net position			
Liabilities			
Premiums payable	$2,518,379	$ 0	$2,518,379
Checks outstanding net of deposits	2,114	(1,069)	1,045
Deferred revenue	2,103,956		2,103,956
Other	147,295	5,584	152,879
Total liabilities	4,771,744	4,515	4,776,259
Unrestricted net (deficit) position	(84,004)	579,125	495,121
Total liabilities and net position	$4,687,740	$583,640	$5,271,380

See accompanying *Notes to the Financial Statements*.

Internal Service Funds

Statements of Revenues, Expenses, and Changes in Net Position | For Year Ended June 30, 2017

	Life & LTD	Deferred Compensation	Total
Operating revenues			
Premium receipts	$28,779,398	$ 0	$28,779,398
Deferred compensation receipts	0	700,000	700,000
Miscellaneous income	480,120	0	480,120
Total operating revenues	29,259,518	700,000	29,959,518
Operating expenses			
Premium disbursements	28,769,588	0	28,769,588
Premium refunds	9,810	0	9,810
Administrative expenses	532,169	417,952	950,121
Total operating expenses	29,311,567	417,952	29,729,519
Operating revenues (under) over operating expenses	(52,049)	282,048	229,999
Nonoperating revenues			
Investment income	33,984	2,513	36,497
Net revenues (under) over expenses	(18,065)	284,561	266,496
Net (deficit) position July 1, 2016	(65,939)	294,564	228,625
Net (deficit) position June 30, 2017	$ (84,004)	$ 579,125	$ 495,121

See accompanying *Notes to the Financial Statements*.

BASIC FINANCIAL STATEMENTS

Internal Service Funds

Statements of Cash Flows | Year Ended June 30, 2017

	Life & LTD	Deferred Compensation	Total
Cash flows from operating activities			
Cash received from employer and members	$ 29,253,874	$ 700,000	$ 29,953,874
Payments to outside carriers	(28,698,184)	0	(28,698,184)
Refunds of premiums to members	(9,810)	0	(9,810)
Cash payments to employees for services	(272,091)	(244,286)	(516,377)
Cash payments to other suppliers of goods and services	(226,641)	(172,597)	(399,238)
Net cash provided by operating activities	47,148	283,117	330,265
Cash flows from noncapital financing activities			
Implicit funding of checks outstanding net of deposits	2,114	(1,069)	1,045
Implicit repayment of prior years checks outstanding net of deposits	(2,125)	0	(2,125)
Net cash (used) by noncapital financing activities	(11)	(1,069)	(1,080)
Cash flows from investing activities			
Purchase of investment securities	(1,140,457,675)	(571,072)	(1,141,028,747)
Proceeds from sale and maturities of investment securities	1,140,376,554	295,513	1,140,672,067
Cash received from investment income	33,984	2,513	36,497
Purchase of capital assets	0	(9,002)	(9,002)
Net cash (used) by investing activities	(47,137)	(282,048)	(329,185)
Net increase in cash	0	0	0
Cash balances June 30, 2016	0	0	0
Cash balances June 30, 2017	$ 0	$ 0	$ 0
Reconciliation of operating revenues over operating expenses to net cash provided by operating activities			
Operating revenues (under) over operating expenses	$ (52,049)	$ 282,048	$ 229,999
Adjustments to reconcile operating revenues over operating expenses to net cash provided by operating activities			
Depreciation expense	0	2,320	2,320
Change in assets and liabilities:			
Increase (decrease) in operational accounts receivable	(5,085)	0	(5,085)
Increase (decrease) in operational liabilities	104,282	(1,251)	103,031
Total adjustments	99,197	1,069	100,266
Net cash provided by operating activities	$ 47,148	$ 283,117	$ 330,265

See accompanying *Notes to the Financial Statements*.

Notes to the Financial Statements | Year Ended June 30, 2017

(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, 2017, the employer contribution rate was 16.97% 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. As a result of smoothing, investment gains or losses, relative to what would have been earned at the assumed rate on the actuarial value of assets, were added to any previously unrecognized gains or losses and one-fifth of that total amount was recognized in the June 30, 2017 valuation, with four-fifths deferred for future recognition. In no event may the actuarial value of assets as of the valuation date be more than 125% or less than 80% of the fair value of assets on that date.

The 2017 actuarial valuation used the nominal investment return assumption of 7.50% and wage inflation and price inflation of 3% and 2.5%, respectively, to value plan liabilities. See the *Actuarial Section* for all actuarial assumptions used.

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, 2017 and 2016, the ratio of actuarial to fair value of assets was 112% and 109%, respectively, for the MSEP.

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. The MSEP provides defined-benefit pension, survivor, life insurance, and long-term disability benefits.

As of the June 30, 2017 valuation, membership* in the MSEP consisted of the following:

Retirees and beneficiaries currently receiving benefits		46,560
Terminated employees entitled to, but not yet receiving benefits		19,578
Active		
Vested	28,840	
Nonvested	20,070	48,910
Total membership		115,048

* *Excludes 178 members on leave of absence and 849 members on long-term disability.*

Contributions for MSEP (closed plan), MSEP 2000, and the MSEP 2011 tier are determined through annual actuarial valuations. Employer contributions for FY17 were 16.97% of covered payroll, which is the rate set as a minimum policy employer contribution determined by the June 30, 2013, actuarial valuation until the actuarial funding ratio of the MOSERS plan is at least 80%. Administration of the MSEP is financed through contributions to this plan from the state of Missouri and its component employers and investment earnings.

Prior to September 1, 1972, contributions by members were required. Accumulated employee contributions made prior to that time, plus interest through August 28, 1997, are refundable to the member or designated beneficiaries upon request.

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, terminated-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, an additional tier of the MSEP 2000 defined-benefit pension plan was signed into law for members of MOSERS. This tier (MSEP 2011) includes all members first employed in a benefit-eligible position on or after January 1, 2011.

Currently, general state employees in the MSEP 2011 Tier are fully vested for benefits upon accruing 10 years of credited service. The vesting requirement will change to 5 years for members employed on or after January 1, 2018.

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

- Age 67 with 10 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 10 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.

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.

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 2017 actuarial valuation of the Judicial Plan use the nominal investment return assumption of 7.50% and wage inflation and price inflation of 3% and 2.5%, respectively. See the *Actuarial Sectio*n for all actuarial assumptions used.

Judges and commissioners of the supreme court or the court of appeals, judges of the 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 pursuant to Section 478.466, RSMo, or commissioners of the 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.

Funding of the Judicial Plan on an actuarial basis began on July 1, 1998. Contributions are determined through annual actuarial valuations. Employer contributions for FY17 were 58.45% of covered payroll, which is the rate set as a minimum policy employer contribution determined by the June 30, 2013, actuarial valuation until the actuarial funding ratio of the Judicial Plan is at least 80%. 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.

As of the June 30, 2017 valuation, membership* in the Judicial Plan consisted of the following:		
Retirees and beneficiaries currently receiving benefits		559
Terminated employees entitled to, but not yet receiving benefits		25
Active		
Vested	410	
Nonvested	0	410
Total membership		994

* *Excludes 1 member on long-term disability.*

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 hired 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 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, terminated-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.

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 in a benefit-eligible position 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 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 119-120 0n 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 saver 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 as of June 30, 2017 were $2,034,459,365.

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 FY17, a total of $2,811,397 was collected from a combination of $1,828,269 in investment option asset-based fee reimbursements and $983,128 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, 2017, 14,629 currently active employees have been automatically enrolled in the plan since inception. There are 13,194 employees who continue to contribute to the plan, making the opt-out rate 9.8%.

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 0.06%, or $4,628,883, of the units invested in the MIP by Deferred Compensation participants. The schedule on page 46 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 36-37.

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.

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 liabilities' section of the *Statements of Net Position* of the internal service funds and included in the cash and short-term investments on the *Statements of Fiduciary Net Position* of the pension trust 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	$ (722,484)	$(722,484)
Pension trust funds – demand deposits	(10,666,646)	250,107
Internal service fund – insurance and deferred compensation plan demand deposits	(1,045)	161

Under the repurchase agreement, the bank does not have the right to substitute other appropriate securities. Central Trust Bank pledged the following securities to MOSERS on June 30, 2017, as collateral for overnight repurchase agreements:

Collateral for Overnight Repurchase Agreements

	Maturity	Pledged	Fair Value
Federal Farm Credit Bank	03/29/2018	$3,000,000	$2,994,240
Small Business Association Pool	12/25/2036	1,500,000	1,633,710
Small Business Association Pool	10/25/2027	3,000,000	3,265,430
Small Business Association Pool	08/25/2037	5,000,000	5,439,063
Small Business Association Pool	04/25/2035	2,300,000	2,472,590

Investments

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 0.83 times of beta-balanced capital. The limit may also be stated as 183% of beta-balanced capital. The 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, 2017.

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	$2,717,429,664	38.2%	$ 2,601,563,280	36.6%	38%
Nominal bonds	747,798,836	10.5	2,840,437,911	39.9	44
Commodities	313,169,917	4.4	1,144,649,079	16.1	20
Inflation-linked bonds	912,475,569	12.8	2,673,386,121	37.6	39
Alternative beta	2,170,513,175	30.5	2,060,111,457	28.9	31
Excess cash	255,616,205	3.6	0	0.0	0
Total internal beta-balanced portfolio	$7,117,003,366	100.0%	$11,320,147,848	159.1%	172%

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, 2017, are summarized in the table below.

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 3.51% for the year ended June 30, 2017. 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 table on pages 36 shows 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 nonproprietary information 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

June 30, 2017	Total	Fair Value Measurement Using: 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	$ 70,003,639	$ 69,997,589	$ 0	$6,050
Foreign stocks	1,344,572	1,344,572	0	0
Total equity securities	71,348,211	71,342,161	0	6,050
Debt securities				
U.S. short-term funds	717,520,000	717,520,000	0	0
Repurchase agreements	1,100,000,000	0	1,100,000,000	0
U.S. agency obligations	325,672,097	0	325,672,097	0
Foreign debt securities	49,144,056	0	49,144,056	0
U.S. corporate bonds	147,344	0	147,344	0
U.S. government	4,206,522,308	4,206,522,308	0	0
Total debt securities	6,399,005,805	4,924,042,308	1,474,963,497	0
Total investment assets	6,470,354,016	4,995,384,469	1,474,963,497	6,050
Liabilities				
Reverse repurchase agreements	(3,373,773,555)	0	(3,373,773,555)	0
Total net investment assets by fair value level	3,096,580,461	4,995,384,469	(1,898,810,058)	6,050
Investment derivative instruments				
Futures contracts	21,913,499	21,913,499	0	0
Foreign exchange forward contracts	80,225	80,225	0	0
Swap market value	(3,925,002)	0	(3,925,002)	0
Total investment derivative instruments	18,068,722	21,993,724	(3,925,002)	0
Investments measured at the net asset value (NAV)				
Commingled international equity funds	1,206,804,849			
Hedge funds	2,664,508,353			
Private equity funds	760,772,033			
Private real estate funds	118,183,607			
Private timber funds	216,143,510			
Total investments measured at NAV	4,966,412,352			
Other Investments				
Cash and receivables/payables	(10,593,016)			
Total fund value	$ 8,070,468,519			
Reconciliation to *Statement of Fiduciary Net Position*				
Total portfolio value	$ 8,070,468,519			
Reverse repurchase agreements	3,373,773,555			
STIF	(2,418,765,451)			
Uninvested cash	722,484			
Interest and dividends receivable	(5,469,068)			
Variation margin	(12,184,564)			
Accounts receivable securities sold	(10,435,252)			
Accounts payable securities purchased	10,165,707			
Fees payable	10,314,862			
Investments per *Statement of Fiduciary Net Position*	$ 9,018,590,792			

Investments Measured at the Net Asset Value

	June 30, 2017	Unfunded Commitments		Redemption Frequency (If Currently Eligible)	Redemption Notice Period (Days)
Commingled international equity funds[1]	$1,206,804,849			Daily, Monthly	1-30
Active hedge funds					
Long/short equity [2]	224,623,297			Quarterly, Semi-Annually, Annually	30-60
Merger arbitrage [3]	115,091,118			Monthly	45
Multi-strategy [4]	62,747,524			Quarterly	65
Equity market neutral [5]	99,796,938			Quarterly	90
Event driven [6]	218,867,279			Quarterly	60-65
Macro [7]	223,258,439			Monthly, Quarterly	30
Risk premia [8]	408,424,347			Bi-Weekly, Monthly	15-30
Risk parity [9]	867,275,340			Monthly	5-15
Fund-of-funds [10]	240,743,966			Monthly	95
Pending liquidated hedge funds [11]	203,680,105				
Private equity funds [12]	760,772,033	$307,845,477	€868,751		
Private real estate funds [12]	118,183,607	19,099,354	0		
Private timber funds [12]	216,143,510	0	0		
Total investments measured at NAV	$4,966,412,352	$326,944,831	€868,751		

1 **Commingled international equity funds** – Three international equity funds are considered to be commingled in nature. Each are valued at the net asset value 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 from 4 to 18 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 **Multi-strategy hedge fund** – Consisting of one fund, this fund aims to pursue varying strategies in order to diversify risks and reduce volatility. This investment is valued at NAV, is redeemable quarterly, and is not subject to lock-up restrictions.

5 **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.

6 **Event driven hedge funds** – Consisting of two funds, 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 29% of the value of these investments is eligible for redemption quarterly. The remaining 71% of the value of these investments remains restricted for 4 to 20 months.

7 **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. This investment is valued at NAV, is redeemable monthly and quarterly, and is not subject to lock-up restrictions.

8 **Risk premia hedge funds** – Consisting of two funds, these strategies 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.

9 **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. This investment is valued at NAV, is redeemable monthly, and is not subject to lock-up restrictions.

10 **Fund-of-funds** – 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.

11 **Pending liquidated hedge funds** – This item consists of 12 funds which have been fully redeemed as of June 30, 2017, for which MOSERS is awaiting final distribution of the proceeds. Approximately 83% of the value was received within 90 days of June 30, 2017. The remaining 17% will be received upon sale of the underlying investments or upon completion of the audit of the firm's annual financial statements.

12 **Private equity, real estate and timber funds** – MOSERS' private equity portfolio consists of 48 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 consists of four funds which 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, 2017, MOSERS' fixed income assets that are not U.S. government guaranteed represented 36% of fixed income securities. Credit risk associated with all fixed income holdings, including collateral for repurchase agreements, has been included in this report. The tables below summarize MOSERS' fixed income security exposure levels and credit qualities.

Average Credit Quality and Exposure Levels of Nongovernment Guaranteed Securities

Fixed Income Security Type	Fair Value June 30, 2017	Percent of all Fixed Income Assets	Weighted Average Credit Quality	Ratings Dispersion Requiring Further Disclosure
Collateralized mortgage obligations	$ 26,162,520	0.4%	AA	See below
U.S. government agencies	299,535,000	4.9	AA	See below
Non-U.S. sovereign	48,598,153	0.8	BBB	See below
Corporate bonds	1,670,687	0.0	BB	See below
Bank deposits	550,478,970	9.0	FDIC insured	None
Repurchase agreements	1,100,035,267	17.9	Not rated	None
Pooled investments	167,536,670	2.7	AAA	None
Total nongov't. guaranteed securities	$2,194,017,267	35.7%		
Total fixed income securities	$6,149,921,101			

Ratings Dispersion Detail - Fair Value

Credit Rating Level	Collateralized Mortgage Obligations	Non-U.S. Sovereign	Corporate Bonds	U.S. Government Agencies
AA	$26,162,520	$ 119,637		$299,535,000
A		9,067,829	$ 150,397	
BBB		24,720,205	1,412,433	
BB		14,690,482		
Not Rated			107,857	
	$26,162,520	$48,598,153	$1,670,687	$299,535,000

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 pages 42 of these notes.

Policies related to credit risk pertaining to MOSERS' securities lending program are found under the securities lending disclosures found on page 43 of these notes.

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.

Effective Duration of Fixed Income Assets by Security Type

Fixed Income Security Type	Fair Value June 30, 2017	Percent of all Fixed Income Assets	Weighted Average Effective Duration (Years)	Interest Rate Risk Requiring Further Disclosure
U.S. treasuries	$3,955,903,834	64.3%	8.3	See below
U.S. government agencies	299,535,000	4.9	0.2	None
Collateralized mortgage obligations	26,162,520	0.4	0.1	None
Non-U.S. sovereign	48,598,153	0.8	5.3	None
Corporate bonds	1,670,687	0.0	5.3	None
Bank deposits	550,478,970	9.0	0.0	None
Repurchase agreements	1,100,035,267	17.9	0.0	None
Pooled investments	167,536,670	2.7	0.0	None
	$6,149,921,101	100.0%	5.4	

Effective Duration Analysis of U.S. Treasuries

Maturity	Fair Value June 30, 2017	Average Effective Duration of the Security Type (Years)	Contribution to Effective Duration (Years)
Less than 1 year to maturity	$ 275,455,406	0.2	0.0
1- to 10- year maturities	2,641,400,055	5.5	3.7
Long coupon treasuries	1,039,048,373	17.4	4.6
	$3,955,903,834		8.3

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.

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 0.25% to 1.31% and had maturities of one to five days. The yield earned by the counterparties on the reverse repo transactions ranged from 0.55% to 1.32% 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 approximately $39.5 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 approximately $30.9 million of MOSERS' collateral in excess to the reverse repo balance.

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

Repurchase Agreements by Collateral Type

Collateral Type	Fair Value of Collateral June 30, 2017	Fair Value Including Accrued Interest of Repos June 30, 2017	Excess (Deficit) Collateral	Percent Over Collateralized
U.S treasuries/U.S. agencies	$ 841,500,022	$ 825,000,000	$16,500,022	
Common stock	298,027,065	275,000,000	23,027,065	
Accrued interest	0	35,267	(35,267)	
	$1,139,527,087	$1,100,035,267	$39,491,820	3.6%

Reverse Repurchase Agreements by Collateral Type

Collateral Type	Fair Value of Collateral June 30, 2017	Fair Value Including Accrued Interest of Reverse Repos June 30, 2017	Excess (Deficit) Collateral	Percent Over Collateralized
U.S. treasuries	$3,412,898,141	$3,362,281,438	$ 50,616,703	
Receivables	(8,232,672)	0	(8,232,672)	
Accrued interest	0	11,492,117	(11,492,117)	
	$3,404,665,469	$3,373,773,555	$ 30,891,914	0.9%

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, 2017, is highlighted in the table below.

Currency Exposures by Asset Class

Currency	Cash & Cash Equivalents	Equities	Fixed Income	Alternatives	Total
Argentine Peso	$ 14				$ 14
Australian Dollar	1,599,168	$ (82,420)	$ (276,290)		1,240,458
Brazilian Real	10,041	10,904,231	5,289,265		16,203,537
Canadian Dollar	(704,907)	4,025,936	(374,220)		2,946,809
Chilean Peso	31,464	1,443,236	160,100		1,634,800
Colombian Peso	7,571	490,843	4,375,831		4,874,245
Czech Koruna	12,663	287,392			300,055
Danish Krone		7,915,672			7,915,672
Egyptian Pound	222	188,864			189,086
Euro	(16,148,991)	154,650,813	5,256,681	$23,990,878	167,749,381
Hong Kong Dollar	266,573	106,050,759			106,317,332
Hungarian Forint	7,847	526,344			534,191
Indian Rupee	114,989	14,430,341			14,545,330
Indonesian Rupiah	68,379	4,038,438	5,540,079		9,646,896
Israeli Shekel		16			16
Japanese Yen	2,064,891	270,199,689			272,264,580
Malaysian Ringgit	77,680	3,919,716	2,777,419		6,774,815
Mexican Peso	23,875	8,140,260	8,683,926		16,848,061
Norwegian Krone		2,852,118			2,852,118
Pakistani Rupee		117,144			117,144
Peruvian Nuevo Sol	2		849,040		849,042
Philippine Peso	12,355	1,934,786			1,947,141
Polish Zloty	924	2,153,764	5,624,492		7,779,180
Qatari Riyal	10,187	1,093,256			1,103,443
Russian Ruble	(1,389)	1,571,962	4,754,949		6,325,522
Singapore Dollar		36,481,683			36,481,683
South African Rand	(637,549)	10,851,140	5,353,603		15,567,194
South Korean Won	(698,833)	40,899,836	1,313,324		41,514,327
Swedish Krona		12,276,390			12,276,390
Swiss Franc		109,896,095			109,896,095
Taiwan New Dollar	160,358	52,296,316			52,456,674
Thai Baht	17,022	30,524,380	1,910,471		32,451,873
Turkish Lira	1,192	11,342,429	3,573,882		14,917,503
United Arab Emirates Dirham	742	1,089,834			1,090,576
United Kingdom Pound Sterling	(323,037)	157,342,198	(296,070)		156,723,091
Uruguayan Peso			455,548		455,548
	$(14,026,547)	$1,059,853,461	$54,972,030	$23,990,878	$1,124,789,822

Derivatives

Derivative instruments are financial contracts whose values depend on the values of one or more underlying assets, reference rates, or financial indices. They include futures contracts, forward foreign currency exchange contracts, and swap contracts. The following tables summarize the various contracts in the portfolio, as of June 30, 2017.

Futures Contracts

Futures Contract	Notional Value	Exposure
Currency futures	$ 19,226,121	$ (944,974)
Fixed income futures	1,281,948,801	23,694,113
Equity index futures	147,312,359	1,091,969
Commodity futures	144,977,942	256,330
Total	$1,593,465,223	$24,097,438

Foreign Currency Forward Contracts at June 30, 2017

Currency	Net Notional Long (Short)	Exposure
Brazilian Real	$ 2,024,588	$ 4,358
Chiliean Peso	1,087,625	4,853
Colombian Peso	(131,880)	14,758
Czech Koruna	3,577,017	68,668
Euro	491,653	9,394
Indonesian Rupiah	(205,185)	(235)
Indian Rupee	1,042,572	(3,791)
Mexican Peso	(3,430,145)	(39,477)
Peruvian Nuevo Sol	(291,136)	(2,622)
Polish Zloty	556,345	12,887
Romanian Leu	2,861,817	80,478
Russian Ruble	(2,507,001)	4,052
Thai Baht	521,734	(41,191)
Turkish Lira	882,520	4,349
Uruguayan Peso	415,787	14,787
South African Rand	(1,731,409)	29,181
U.S. Dollar	(5,004,453)	0
Foreign currency forward contract asset (liability)	$ 160,449	$160,449

Swap Contracts

Counterparty Credit Rating	Notional Value	Exposure
Total return swaps - equity		
A+	$ 69,925,100	$(4,560,844)
Total	$ 69,925,100	$(4,560,844)
Total return swaps - fixed income		
A+	$524,643,852	$ 8,414,108
Total	$524,643,852	$ 8,414,108
Total return swaps - commodities		
A+	$657,937,233	$ 0
A	238,956,839	0
Total	$896,894,072	$ 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 investment income in the *Statements of Changes in Fiduciary Net Position*. For the year ended June 30, 2017, the change in fair value in the swap contracts resulted in a loss of $106.1 million of investment income. The change in fair value in the futures contracts resulted in a loss of $72.6 million of investment income. The change in fair value in the foreign exchange contracts resulted in a loss of $3.2 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, 2017, MOSERS had contracts with more than 83 limited partnerships across various types of alternative investments which collectively represent 47% of the total fund. A *Schedule of Limited Partnerships* follows on pages 44-45.

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, 2017, 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, 2017, 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 out 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, 2017
Actis Emerging Markets III	Opportunistic global equities − emerging markets	$ 11,393,891
Actis Emerging Markets IV	Opportunistic global equities − emerging markets	27,006,111
African Development Partners I, LLC	Opportunistic global equities − emerging markets	23,311,855
African Development Partners II, LLC	Opportunistic global equities − emerging markets	19,758,189
Alinda Infrastructure Fund I, LP	Opportunistic global equities − infrastructure	21,005,641
AQR DELTA Sapphire Fund, LP	Alternative beta − multi-strategy	348,556,900
AQR Global Risk Premium Fund IV, LP	External beta-balanced − risk parity	405,631,864
AQR Style Premia Fund, LP	Alternative beta − multi-strategy	59,867,447
Axiom Asia Private Capital Fund II, LP	Opportunistic global equities − emerging markets	37,773,482
Axiom Asia Private Capital Fund III, LP	Opportunistic global equities − emerging markets	48,051,826
Axxon Brazil Private Equity Fund II B, LP	Opportunistic global equities − emerging markets	25,657,177
Bayview Opportunity Domestic III b, LP	Opportunistic global equities − opportunistic mortgages	18,105,558
Bayview Opportunity Domestic, LP	Opportunistic global equities − opportunistic mortgages	4,197,423
Blackstone Real Estate Partners IV	Opportunistic global equities − active real estate	11,284,656
Blackstone Real Estate Partners V	Opportunistic global equities − active real estate	31,686,366
Blackstone Real Estate Partners VI	Opportunistic global equities − active real estate	13,915,179
Blackstone Real Estate Partners VII	Opportunistic global equities − active real estate	60,296,117
Blackstone Topaz Fund, LP	Alternative beta multi-strategy − fund-of-funds	240,743,966
Blakeney Onyx, LP	Opportunistic global equities − emerging markets	51,978,370
Bridgewater Associates – All Weather, LLC	External beta-balanced − risk parity	461,643,476
Bridgewater Associates – Diamond Ridge Fund, LLC	Alternative beta − global macro	100,543,340
Campbell Timber Fund II A, LP	Opportunistic global equities − timberland	1,005,329
CarVal Investors CVI Global Value Fund A, LP – private debt	Opportunistic global equities − distressed real estate debt	7,200,000
CarVal Investors CVI Global Value Fund A, LP – real estate	Opportunistic global equities − distressed real estate debt	7,200,000
Catalyst Fund III, LP	Opportunistic global equities − Canadian distressed debt	56,200,437
Catalyst Fund IV, LP	Opportunistic global equities − Canadian distressed debt	23,795,378
Catalyst Fund V, LP	Opportunistic global equities − Canadian distressed debt	19,327,670
Catterton Partners V, LP	Opportunistic global equities − corporate buyout	2,731,889
Cornwall Domestic, LP	Alternative beta − multi-strategy	62,747,524
Davidson Kempner Institutional Partners, LP	Alternative beta − event driven	28,676,279
DRI Capital – LSRC	Opportunistic global equities − intellectual property	14,818,718
EIG Energy Co-investment I	Opportunistic global equities − energy − mezzanine	5,167,130
EIG Energy Fund XIV, LP	Opportunistic global equities − energy − mezzanine	6,953,126
EIG Energy Fund XV, LP	Opportunistic global equities − energy − mezzanine	31,140,378
EIG Energy Fund XVI, LP	Opportunistic global equities − energy − mezzanine	23,559,874
Elliott International, Ltd.	Alternative beta − multi-strategy	190,191,000
Eton Park Fund, LP	Alternative beta − multi-strategy	350,900
Farallon Capital Institutional Partners, LP	Alternative beta − multi-strategy	2,500,000
Gaoling Fund, LP	Opportunistic global equities − long/short − equity	125,614,684
Garnet Sky Investors Company Ltd.	Opportunistic global equities − timberland	123,828,613
Gateway Energy & Resource Holdings, LLC	Opportunistic global equities − energy − diversified	15,758,412
GCM Sidecar, LP	Opportunistic global equities − long/short − equity	59,227,608
Glenview Capital Opportunity Fund, LP	Opportunistic global equities − long/short − equity	39,781,005
Global Forest Partners GTI7 Institutional Investors Company, Ltd.	Opportunistic global equities − timberland	17,889,381
HBK Merger Strategies Offshore Fund, Ltd.	Alternative beta − merger arbitrage	115,091,118

Schedule of Limited Partnerships continued on page 45

Schedule of Limited Partnerships continued from page 44

Partnership Name	Style	Investments at Fair Value as of June 30, 2017
JLL Partners Fund V, LP	Opportunistic global equities – corporate buyout	12,297,620
JLL Partners Fund VI, LP	Opportunistic global equities – corporate buyout	53,135,434
King Street Capital, LP	Alternative beta – credit driven	4,299,013
King Street Capital, Ltd.	Alternative beta – credit driven	345,655
Linden Capital Partners Co-investment, LP	Opportunistic global equities – corporate buyout	10,588,235
Linden Capital Partners II, LP	Opportunistic global equities – corporate buyout	38,689,144
Mast Credit Opportunities I, LP	Alternative beta – credit driven	21,196,607
Merit Energy Partners F-II, LP	Alternative beta – energy – oil and gas	5,154,997
MHR Institutional Partners II A, LP	Alternative beta – distressed debt	26,720,074
MHR Institutional Partners III, LP	Alternative beta – distressed debt	32,873,342
MHR Institutional Partners IV, LP	Alternative beta – distressed debt	10,047,407
Millennium Technology Value Partners Co-investment	Opportunistic global equities – direct secondaries	4,136,056
Millennium Technology Value Partners II, LP	Opportunistic global equities – direct secondaries	15,965,832
Moon Capital Global Equity Offshore Fund, Ltd.	Opportunistic global equities – long/short – equity	825,930
Newport Pioneer, LLC	Alternative beta multi-strategy – fund-of-funds	20,000
Oaktree European Credit Opportunities Fund, LP	Opportunistic global equities – European loans	679,023
OCM/GFI Power Opportunities Fund II, LP	Opportunistic global equities – corporate buyout	115,743
OCM Opportunities Fund IV b, LP	Alternative beta – distressed debt	78,224
OCM Opportunities Fund VII b, LP	Alternative beta – distressed debt	7,228,543
OCM Opportunities Fund VIII b, LP	Alternative beta – distressed debt	15,585,875
OCM Power Opportunities Fund III, LP	Opportunistic global equities – corporate buyout	13,357,793
OCM Real Estate Opportunities Fund III, LP	Opportunistic global equities – active real estate	1,001,289
Perry Partners, LP	Alternative beta – multi-strategy	40,458
Pharo Macro Fund, Ltd.	Alternative beta – global macro	122,709,138
Resource Management Service – Wildwood Timberlands, LLC	Opportunistic global equities – timberland	73,420,187
Silver Creek Special Opportunities Fund I, LP	Opportunistic global equities – fund-of-funds (special situations)	9,612,857
Silver Creek Special Opportunities Fund II, LP	Opportunistic global equities – fund-of-funds (special situations)	12,632,356
Silver Lake Partners II, LP	Opportunistic global equities – corporate buyout	4,348,208
Siris II Co-investment I	Opportunistic global equities – corporate buyout	3,983,438
Siris II Co-investment II	Opportunistic global equities – corporate buyout	7,500,000
Standard Investment Research Hedged Equity Fund, LP	Alternative beta – equity market neutral	99,796,938
StepStone Capital Buyout Fund I, LP	Opportunistic global equities – corporate buyout – fund-of-funds	6,880,171
StepStone Capital Buyout Fund II, LP	Opportunistic global equities – corporate buyout – fund-of-funds	18,096,782
StepStone Opportunities Fund II, LP	Opportunistic global equities – corporate buyout – fund-of-funds	950,711
TPG-Axon Partners (Offshore) Ltd	Opportunistic global equities – long/short – equity	1,320,083
Viking Global Equities III, Ltd.	Opportunistic global equities – long/short – equity	168,906,465
Visium Balanced Fund, LP	Opportunistic global equities – long/short – equity	3,460,388
Wellington Management – Spindrift Investors (Bermuda)	Opportunistic global equities – long/short – equity	414,115
Other Miscellaneous	Miscellaneous	12,496
		$3,811,591,914

Summary of Fair Value of Investments as of June 30, 2017

	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	$4,084,879,757	$ 3,931,453,551		
Government bonds & gov't. mortgage-backed securities	53,283,215	47,942,726		
Corporate bonds	225,519	147,344		
Convertible bonds	649,291	610,217		
U.S. dollar-denominated international corporate bonds	1,263,652	1,201,331		
Limited partnerships	2,464,132,351	3,811,591,914		
Common stock	220,586,960	244,259,046		
International equities	172,972,066	981,291,002		
Foreign currency	17,749	85,277		
Real estate investment trust	3,617	8,384		
Repurchase agreements	10,553,752	10,553,752	$4,291,721	$4,291,721
Short-term investment funds	2,418,765,451	2,418,765,451		
Total investments	$9,427,333,380	$11,447,909,995	$4,291,721	$4,291,721
Reconciliation to investments on *Statement of Fiduciary Net Position*				
Total from above		$11,447,909,995		
Less short-term investments:				
Repurchase agreements		(10,553,752)		
Short-term investment funds		(2,418,765,451)		
Investments on *Statement of Fiduciary Net Position*		$ 9,018,590,792		

Due to space limitations and printing costs, a detailed listing of the investment holdings and transactions is not provided in this annual report; however, the detailed reports are available for review as an appendix to this report at the MOSERS office.

(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, 2017.

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, 2016	$267,286	$4,284,337	$1,285,636	$724,563	$6,561,822
Additions	0	4,225	32,856	11,753	48,834
Deletions	0	(45,380)	(23,553)	0	(68,933)
Balances June 30, 2017	267,286	4,243,182	1,294,939	736,316	6,541,723
Accumulated depreciation					
Balances June 30, 2016	0	1,720,870	1,021,529	277,522	3,019,921
Depreciation expense	0	148,438	64,292	38,126	250,856
Deletions	0	(21,560)	(23,554)	0	(45,114)
Balances June 30, 2017	0	1,847,748	1,062,267	315,648	3,225,663
Net capital assets June 30, 2017	$267,286	$2,395,434	$ 232,672	$420,668	$3,316,060

Internal Service Funds

Capital Asset Account

	Leasehold Improvements	Furniture Fixtures and Equipment	Software and Licensing	Total Capital Assets
Capital assets				
Balances June 30, 2016	$3,880	$ 7,516	$4,950	$16,346
Additions	0	9,002	0	9,002
Deletions	0	0	0	0
Balances June 30, 2017	3,880	16,518	4,950	25,348
Accumulated depreciation				
Balances June 30, 2016	1,940	5,142	3,378	10,460
Depreciation expense	970	698	652	2,320
Deletions	0	0	0	0
Balances June 30, 2017	2,910	5,840	4,030	12,780
Net capital assets June 30, 2017	$ 970	$10,678	$ 920	$12,568

(5) Employers' Net Pension Liability

The components of the net pension liability as of June 30, 2017, are shown in the *Schedule of Employers' Net Pension Liability* below.

Schedule of Employers' Net Pension Liability

	MSEP	Judicial Plan
Total pension liability	$13,152,273,895	$564,417,925
MOSERS fiduciary net position	7,945,358,298	137,634,941
Employers' net pension liability	$ 5,206,915,597	$426,782,984
Plan net position as a percentage of the total pension liability	60.41%	24.39%
Covered employee payroll	$ 1,941,969,786	$ 58,150,935
Employers' net pension liability as a percentage of employee covered payroll	268.13%	733.92%

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 page 51-52. The total pension liability, as of June 30, 2017, is $13,152,273,895 for MSEP and $564,417,925 for the Judicial Plan based on an actuarial valuation performed as of June 30, 2017, and a measurement date of June 30, 2017, using generally accepted actuarial procedures.

Changes to Amortization Period

In June 2013, the board approved a change to the period over which unfunded actuarial accrued liabilities are amortized to reduce the amortization period from an open 30 years to a closed 30 years beginning July 1, 2014. This will continue to reduce by one year for each subsequent annual valuation until the period reaches one year. The board intends to reexamine the amortization period in connection with the 2030 actuarial valuation to determine whether or not it should be reduced below 15 years.

The *Summary of Actuarial Assumptions* below applies to all periods included in the measurement of the total pension liability.

Summary of Actuarial Assumptions for MSEP & Judicial Plan

Valuation date	June 30, 2017
Actuarial cost method	Entry age normal
Amortization method	Level percentage, closed
Remaining amortization period	27 years for FY19 contribution rate
Asset valuation method	Open 5-year smoothed +25/-20% market corridor
Investment rate of return	7.65% effective June 30, 2016 7.50% effective June 30, 2017
Projected salary increases	3.25 – 8.75% (MSEP) 3.0 – 5.2% (Judicial Plan)
Rate of payroll growth	3.00%
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 ending 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 7.50%. 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 7.50% 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, 2017, calculated using the discount rate of 7.50%, as well as what the net pension liability would be if it were calculated using a discount rate that is 1% lower (6.50%) or 1% higher (8.50%) than the current rate.

Sensitivity of Net Pension Liability to Changes in the Discount Rate

Employers' Net Pension Liability	1% Decrease (6.50%)	Current Discount Rate (7.50%)	1% Increase (8.50%)
MSEP	$6,704,024,789	$5,206,915,597	$3,947,666,258
Judicial Plan	484,552,509	426,782,984	377,354,336

The funding status of the plans and *Employer Schedule of Funding Progress* can be found in the *Actuarial Section* on page 96.

(6) Contributions and Reserves

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. Contributions began July 2014 at the contribution rate determined by the June 30, 2013 actuarial valuation (16.97% and 58.45% for MSEP and Judicial Plan, respectively) and will continue at or above that rate until the actuarial funding of the plans is at least 80%. 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 Benefits (OPEB)

In addition to the defined-benefit pension provided through MOSERS, the state of Missouri also funds, either partially or in its entirety, OPEB for eligible retirees 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, 2017, 25,819 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 competitive bids and is currently administered through The Standard insurance company. The cost for the year ended June 30, 2017 was $1,901,630. 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, 2017, 189 retirees were participating in the program. The coverage for this closed group is purchased as a group policy through competitive bids at a current cost of $2.07 per thousand dollars of coverage, per month, per eligible participant ($23,586 for the year ended June 30, 2017). Premiums are paid entirely by the DOLIR as provided by Section 228.225, 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 33,277 members covered under the program, as of June 30, 2017. This insured defined-benefit coverage is billed on a percentage of covered payroll (0.55%). Purchased as group policy through competitive bids, LTD is administered by The Standard insurance company. The cost for the year ended June 30, 2017 was $8,137,551. 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 in a cost-sharing multiple-employer defined-benefit post-employment health care plan administered by the Missouri Consolidated Health Care Plan (MCHCP). The plan provides medical benefits to retirees of participating governmental entities. Retirees who had medical insurance coverage for six months immediately prior to termination or state-sponsored medical coverage since the effective date of the last enrollment period (or since first eligible), before they are eligible to retire, may continue coverage into retirement.

MCHCP issues a publicly available financial report that includes *Financial Statements* and *Required Supplementary Information* for the post-employment health care plan. The report may be obtained online at *www.mchcp.org* or by calling (800) 487-0771 or writing to MCHCP, 832 Weathered Rock Court, P.O. Box 104355, Jefferson City, MO 65110-4355.

Plan funding requests are actuarially determined, approved by the MCHCP Board of Trustees and subject to appropriation by the Missouri General Assembly. MOSERS contributed $267,315 in FY15, $260,223 in FY16, and $275,895 in FY17 in accordance with the state's funding policy toward the annual required contributions for post-employment retiree health care, which equaled MOSERS' required contribution each year.

(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, 2017, MOSERS has $326,944,831 and €868,751 unfunded commitments in the private asset class.

(10) Contingencies

MOSERS is a defendant in a lawsuit involving the GM Bankruptcy. The trustee for the bankruptcy paid MOSERS $500,047 based on the assumption that it was a secured debt owed to MOSERS. It appears that the loan administrator released the security interest prior to the payment being made by the trustee. MOSERS and the other investors who received similar payments have been sued in the bankruptcy case on the theory that we were unsecured creditors who improperly received payments. MOSERS is being represented by a firm that is also representing a number of similarly situated defendants. Our group has filed a cross claim against JP Morgan and is currently engaged in that litigation.

(11) Risk Management

MOSERS is exposed to various risks of loss related to natural disasters, error, 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.

REQUIRED SUPPLEMENTARY INFORMATION

Pension Trust Funds

Schedule of Changes in Employers' Net Pension Liability | For Years Ended June 30, 2014–2017*

MSEP

	2014	2015	2016	2017
Total pension liability				
Service cost	$ 158,116,026	$ 150,412,577	$ 149,021,755	$ 152,766,134
Interest on the total pension liability	869,878,195	896,451,618	913,877,923	945,654,398
Benefit changes	0	0	0	(1,696,059)
Difference between expected and actual experience	12,376,237	(27,983,267)	61,150,083	(104,203,260)
Assumption changes	0	(57,568,553)	656,805,085	202,554,786
Benefit payments and member refunds	(680,436,107)	(728,265,800)	(757,310,503)	(793,964,857)
Net change in total pension liability	359,934,351	233,046,575	1,023,544,343	401,111,142
Total pension liability - beginning	11,134,637,484	11,494,571,835	11,727,618,410	12,751,162,753
Total pension liability - ending (a)	$11,494,571,835	$11,727,618,410	$12,751,162,753	$13,152,273,895
Plan fiduciary net position				
Employer contributions	$ 326,370,336	$ 329,752,832	$ 329,957,369	$ 335,217,422
Employee contributions	14,025,328	18,099,455	21,684,920	25,439,343
Pension plan net investment income (loss)	1,193,952,121	(237,070,529)	1,740,269	272,595,668
Benefit payments and member refunds	(680,436,107)	(728,265,800)	(757,310,503)	(793,964,857)
Pension plan administrative expense	(7,336,922)	(8,077,692)	(8,489,375)	(8,759,341)
Other	296,369,500	5,434,820	4,923,622	5,668,849
Net change in plan fiduciary net position	1,142,944,256	(620,126,914)	(407,493,698)	(163,802,916)
Plan fiduciary net position - beginning	7,993,837,570	9,136,781,826	8,516,654,912	8,109,161,214
Plan fiduciary net position - ending (b)	9,136,781,826	8,516,654,912	8,109,161,214	7,945,358,298
Net pension liability - ending (a)-(b)	$ 2,357,790,009	$ 3,210,963,498	$ 4,642,001,539	$ 5,206,915,597
Plan fiduciary net position as a percentage of total pension liability	79.49%	72.62%	63.60%	60.41%
Covered employee payroll	$ 1,902,719,928	$1,918,527,768	$ 1,921,528,936	$ 1,941,969,786
Net pension liability as a percentage of covered employee payroll	123.92%	167.37%	241.58%	268.13%

** Schedule is intended to show information for 10 years. Data for additional years will be displayed as it becomes available.*

REQUIRED SUPPLEMENTARY INFORMATION

Pension Trust Funds

Schedule of Changes in Employers' Net Pension Liability | For Years Ended June 30, 2014–2017*

Judicial Plan

	2014	2015	2016	2017
Total pension liability				
Service cost	$ 8,990,293	$ 10,613,686	$ 10,932,097	$ 12,945,567
Interest on the total pension liability	34,013,615	36,161,612	37,755,240	40,617,091
Benefit changes	0	0	0	0
Difference between expected and actual experience	13,360,614	5,103,664	(5,036,696)	(10,687,091)
Assumption changes	0	0	53,991,379	7,905,466
Benefit payments including member refunds	(29,406,625)	(31,245,906)	(32,989,714)	(33,984,725)
Net change in total pension liability	26,957,897	20,633,056	64,652,306	16,796,308
Total pension liability - beginning	435,378,358	462,336,255	482,969,311	547,621,617
Total pension liability - ending (a)	$462,336,255	$482,969,311	$547,621,617	$564,417,925
Plan fiduciary net position				
Employer contributions	$ 29,264,877	$ 32,696,686	$ 33,642,498	$ 34,246,826
Employee contributions	294,810	488,193	661,206	786,745
Pension plan net investment income (loss)	17,199,701	(3,610,352)	28,081	4,680,131
Benefit payments including member refunds	(29,406,625)	(31,245,906)	(32,979,706)	(33,984,725)
Pension plan administrative expense	(105,693)	(123,015)	(136,983)	(150,387)
Other	4,195,049	0	0	0
Net change in plan fiduciary net position	21,442,119	(1,794,394)	1,205,088	5,578,590
Plan fiduciary net position - beginning	111,203,538	132,645,657	130,851,263	132,056,351
Plan fiduciary net position - ending (b)	132,645,657	130,851,263	132,056,351	137,634,941
Net pension liability - ending (a)-(b)	$329,690,598	$352,118,048	$415,565,266	$426,782,984
Plan fiduciary net position as a percentage of total pension liability	28.69%	27.09%	24.11%	24.39%
Covered employee payroll	$ 49,587,936	$ 55,656,457	$ 57,421,016	$ 58,150,935
Net pension liability as a percentage of covered employee payroll	664.86%	632.66%	723.72%	733.92%

** Schedule is intended to show information for 10 years. Data for additional years will be displayed as it becomes available.*

REQUIRED SUPPLEMENTARY INFORMATION

Pension Trust Funds

Schedule of Employer Contributions | Last Ten Years

MSEP

Year Ended June 30	Actuarially Determined Contribution	Contributions in Relation to the Actuarially Determined Contribution**	Contribution Deficiency (Excess)	Covered Employee Payroll	Contributions as a Percentage of Covered Payroll*
2008	$249,770,156	$249,770,156	$ 0	$1,916,527,398	13.0%
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	329,957,369	329,957,369	0	1,921,528,936	17.2
2017	322,772,697	335,217,422	(12,444,725)	1,941,969,786	17.3

Judicial Plan

Year Ended June 30	Actuarially Determined Contribution	Contributions in Relation to the Actuarially Determined Contribution**	Contribution Deficiency (Excess)	Covered Employee Payroll	Contributions as a Percentage of Covered Payroll*
2008	$26,215,309	$26,215,309	0	$44,542,530	58.9%
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	33,642,498	33,642,498	0	57,421,016	58.6
2017	32,670,710	34,246,826	(1,576,116)	58,150,935	58.9

* *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.*

** *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.*

REQUIRED SUPPLEMENTARY INFORMATION

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

* *Schedule is intended to show information for 10 years. Data for additional years will be displayed as it becomes available.*

REQUIRED SUPPLEMENTARY INFORMATION

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, 2017

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 closed 27-year amortization period was used for the June 30, 2017 valuations to determine the FY19 contribution rates. The actuarial value of assets is based on a method that fully recognizes expected investment returns and averages unanticipated market returns over a 5-year period. The corridor limit is currently 80% to 125%.

The investment return rate assumption was reduced from 7.65% as of June 30, 2016, to 7.50% per year as of June 30, 2017, compounded annually (net of investment expenses). The price inflation assumption used was 2.5% per year. Projected salary assumptions were 3.25% to 8.75% for MSEP and 3.0% to 5.2% 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.

2008 | The actuarial valuations, as of June 30, 2008, reflected the following changes to the computed contribution rates for fiscal year ended June 30, 2010.

	Amount	Percent of Payroll
MSEP		
Change in benefit assumptions or methods	$4,791,318	0.25%
Experience and nonrecurring items	(574,958)	(0.03)
Judicial Plan		
Change in benefit assumptions or methods	(547,873)	(1.23)
Experience and nonrecurring items	(160,353)	(0.36)

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

REQUIRED SUPPLEMENTARY INFORMATION

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 ended 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

ADDITIONAL FINANCIAL INFORMATION

Pension Trust Funds
Schedules of Investment Expenses

Investing Activity	MSEP	Judicial Plan	Total
Investment management and administrative fees			
Actis Emerging Markets III & IV – private equity	$ 1,314,433	$ 22,567	$ 1,337,000
African Development Partners I & II, LLC – private equity	6,882,599	118,166	7,000,765
Alinda Infrastructure Fund I, LP – private equity	248,137	4,260	252,397
American Industrial Partners V & VI – private equity	1,098,253	18,856	1,117,109
AQR DELTA Sapphire Fund, LP – hedge funds	3,788,947	65,052	3,853,999
AQR Global Risk Premium Fund IV, LP – beta-balanced	2,491,944	42,784	2,534,728
AQR Style Premia Fund, LP – hedge funds	(256,555)	(4,405)	(260,960)
Astenbeck Capital – beta-balanced	14,440,025	247,917	14,687,942
Axiom Asia Private Capital Fund II & III, LP – private equity	1,403,226	24,092	1,427,318
Axxon Brazil Private Equity Fund II B – private equity	211,187	3,626	214,813
Bayview Opportunity Domestic, LP – high yield	409,936	7,038	416,974
Bayview Opportunity Domestic III b, LP – real estate	1,978,399	33,967	2,012,366
BlackRock Financial Management Bank Loans – high yield	837	14	851
Blackstone Real Estate Partners IV, V, VI, & VII – real estate	5,161,290	88,613	5,249,903
Blackstone Topaz Fund, LP – hedge funds	3,024,740	51,931	3,076,671
Blakeney Onyx, LP – emerging markets	1,223,100	20,999	1,244,099
Bridgewater Associates Diamond Ridge Fund, LLC – hedge funds	3,518,197	60,403	3,578,600
Bridgewater All Weather, LLC – beta-balanced	2,088,540	35,858	2,124,398
CarVal Investors CVI Global Value Fund A, LP – real estate	110,293	1,894	112,187
CarVal Investors CVI Global Value Fund A, LP – private debt	110,293	1,894	112,187
Castlelake Aviation II – private equity	392,299	6,735	399,034
Catalyst Fund III, IV & V, LP – private debt	6,392,392	109,749	6,502,141
Catterton Partners V, VI, & VII, LP – private equity	939,157	16,124	955,281
Cornwall Domestic, LP – hedge funds	1,039,537	17,848	1,057,385
Davidson Kempner Institutional Partners, LP – hedge funds	673,926	11,570	685,496
DRI Capital LSRC – private equity	719,803	12,358	732,161
EIG Energy Fund XIV, XV, & XVI, LP – private equity	2,310,943	39,676	2,350,619
Elliott International, Ltd. – hedge funds	7,645,014	131,255	7,776,269
Farallon Capital Institutional Partners, LP – hedge funds	56,597	972	57,569
Gaoling Fund, LP – hedge funds	7,126,563	122,354	7,248,917
Garnet Sky Investors Company, Ltd. – timber	2,578,521	44,270	2,622,791
Gateway Energy & Resource Holdings, LLC – real estate	375,998	6,455	382,453
GCM Equity Partners & Glenview Capital Opportunity Fund, LP – hedge funds	544,687	9,352	554,039
Global Forest Partners GTI7 Institutional Investors Company Ltd. – timber	579,316	9,946	589,262
Harvest Fund Advisors – real estate	703,651	12,081	715,732
HBK Merger Strategies Offshore Fund, Ltd. – hedge funds	3,207,556	55,070	3,262,626
JLL Partners V & VI, LP – private equity	3,777,109	64,848	3,841,957
King Street Capital, LP – hedge funds	81,538	1,400	82,938
Linden Capital Partners II & Linden – Co-investment I – private equity	3,654,416	62,742	3,717,158
Mast Credit Opportunities I, LP – hedge funds	816,934	14,026	830,960
Merit Energy Partners F–II, LP – real estate	183,189	3,145	186,334
MHR Institutional Partners IIA, III & IV LP – private debt	5,044,016	86,600	5,130,616
Millennium Technology Value Partners II, LP – private equity	725,355	12,453	737,808
New Mountain Partners III, LP – private equity	4,132,505	70,950	4,203,455
NISA Investment Advisors, LLC – beta-balanced	4,687,062	80,471	4,767,533

Schedule of Investment Expenses continued on page 60

Schedule of Investment Expenses continued from page 59

Investing Activity	MSEP	Judicial Plan	Total
OCM Real Estate Opportunities Fund III, LP – real estate	(75,706)	(1,300)	(77,006)
OCM Opportunities Fund IV b, VII b & VIII b, LP – private debt	271,278	4,658	275,936
OCM/GFI Power Opportunities Fund II & III, LP – private equity	1,244,038	21,359	1,265,397
Perry Partners – hedge funds	505	9	514
Pharo Macro Fund, Ltd. – hedge funds	6,691,588	114,886	6,806,474
Resource Management Service Wildwood Timberlands, LLC – timber	958,531	16,457	974,988
Silchester International Investors – int'l developed equity	4,542,856	77,995	4,620,851
Silver Creek Special Opportunities Fund I & II – private equity	63,600	1,092	64,692
Silver Lake Partners II, LP – private equity	(201,751)	(3,464)	(205,215)
SIR Hedged Equity Fund, Ltd. – hedge funds	2,991,158	51,354	3,042,512
Siris Partners II & III, LP – private equity	523,608	8,990	532,598
State Street Global Advisors – emerging markets	155,009	2,661	157,670
StepStone Capital Buyout Fund I & II, LP – private equity	267,412	4,591	272,003
StepStone Opportunities Fund II, LP – private equity	33,902	582	34,484
Stone Harbor Investment Partners, LP – emerging markets	182,190	3,128	185,318
Veritas Capital Fund III & IV, LP – private equity	2,862,296	49,142	2,911,438
Viking Global Equities III, Ltd. – hedge funds	4,444,292	76,303	4,520,595
Total investment management fees	132,590,711	2,276,419	134,867,130
Other investment fees			
Investment consultant fees			
Albert A. Slawsky	43,012	738	43,750
Summit Strategies, Inc.	716,244	12,298	728,542
TimberLink Consulting	27,036	464	27,500
Investment custodial fees			
BNY Mellon	267,051	4,585	271,636
Performance and risk measurement fees			
BNY Mellon	196,040	3,366	199,406
MSCI, Inc.	258,069	4,431	262,500
Internal investment activity expenses	3,803,355	65,299	3,868,654
Total investing activity expenses	137,901,518	2,367,600	140,269,118
Securities lending activity			
Securities lending borrower rebates	(32,622)	(560)	(33,182)
Securities lending management fees			
BNY Mellon	61,445	1,055	62,500
Deutche Bank	4,632	79	4,711
Total securities lending activity expenses	33,455	574	34,029
Total investment expenses	$137,934,973	$2,368,174	$140,303,147

ADDITIONAL FINANCIAL INFORMATION

Pension Trust Funds

Schedules of Internal Investment Activity Expenses | Year Ended June 30, 2017

	MSEP	Judicial Plan	Total
Personnel services			
Salaries	$2,348,574	$40,322	$2,388,896
Fringe benefits	808,979	13,889	822,868
Total personnel services	3,157,553	54,211	3,211,764
Professional services			
Attorney services	148,466	2,549	151,015
Total professional services	148,466	2,549	151,015
Communications			
Telephone	15,807	271	16,078
Total communications	15,807	271	16,078
Facilities			
Utilities	2,997	51	3,048
Lease expense	50,323	864	51,187
Depreciation	34,895	599	35,494
Facility maintenance	7,932	136	8,068
Vehicle maintenance and operation	204	4	208
Total facilities	96,351	1,654	98,005
Software and equipment			
Computer supplies and software	7,751	133	7,884
Depreciation	2,616	45	2,661
Loss on sale of equipment	3,236	56	3,292
Total software and equipment	13,603	234	13,837
Education, meetings and travel			
Tuition reimbursement	8,274	142	8,416
Professional development including travel	26,726	459	27,185
Due diligence travel	17,091	293	17,384
Total travel and meetings	52,091	894	52,985
General			
Research and information services	292,039	5,014	297,053
Membership dues	13,513	232	13,745
Office supplies	1,175	20	1,195
Periodicals and publications	9,444	162	9,606
Miscellaneous expense	3,313	58	3,371
Total general	319,484	5,486	324,970
Total internal investment activity expenses	$3,803,355	$65,299	$3,868,654

Pension Trust Funds

Schedules of Administrative Expenses | Year Ended June 30, 2017

	MSEP	Judicial Plan	Total
Personnel services			
Salaries	$4,339,071	$ 74,496	$4,413,567
Fringe benefits	1,787,989	30,698	1,818,687
Total personnel services	6,127,060	105,194	6,232,254
Professional services			
Actuarial services	357,455	6,137	363,592
Attorney services	182,165	3,128	185,293
Auditing services	80,545	1,383	81,928
Banking services	36,415	625	37,040
Consulting services	246,024	4,224	250,248
Total professional services	902,604	15,497	918,101
Communications			
Video production	2,007	34	2,041
Telephone	64,450	1,107	65,557
Printing	32,134	552	32,686
Postage and mailing	109,159	1,874	111,033
Total communications	207,750	3,567	211,317
Facilities			
Depreciation	111,038	1,906	112,944
Utilities	48,719	836	49,555
Facility maintenance	84,133	1,444	85,577
Vehicle maintenance and operation	4,901	84	4,985
Total facilities	248,791	4,270	253,061
Software and equipment			
Computer supplies and software	71,411	1,226	72,637
Depreciation	98,073	1,684	99,757
Maintenance agreements	273,189	4,690	277,879
Equipment rental	151,475	2,601	154,076
Loss on sale of equipment	18,706	321	19,027
Total software and equipment	612,854	10,522	623,376
Education, meetings and travel			
Board travel and meetings	22,235	382	22,617
Professional development including travel	88,745	1,524	90,269
MOSERS sponsored seminars	90,117	1,547	91,664
Due diligence travel	7,136	123	7,259
Tuition reimbursement	860	15	875
Total education, meetings and travel	209,093	3,591	212,684
General			
Advertising	24,349	417	24,766
Research and information services	76,454	1,313	77,767
Insurance	174,234	2,991	177,225
Membership dues	25,432	437	25,869
Business continuity	61,378	1,054	62,432
Office supplies	7,578	130	7,708
Periodicals and publications	81,765	1,404	83,169
Miscellaneous	(1)	0	(1)
Total general	451,189	7,746	458,935
Total administrative expenses	$8,759,341	$150,387	$8,909,728

ADDITIONAL FINANCIAL INFORMATION

Internal Service Funds

Schedules of Administrative Expenses | Year Ended June 30, 2017

	Life and LTD	Deferred Compensation	Total
Personnel services			
Salaries	$287,764	$228,614	$516,378
Employee fringe benefits	117,162	92,457	209,619
Total personnel services	404,926	321,071	725,997
Professional services			
Attorney services	560	149	709
Auditing services	5,645	38,460	44,105
Banking services	498	0	498
Total professional services	6,703	38,609	45,312
Communications			
Postage and mailing	5,473	129	5,602
Telephone	4,517	2,420	6,937
Printing	2,252	147	2,399
Video production expense	141	0	141
Total communications	12,383	2,696	15,079
Facilities			
Building use charge	17,915	6,924	24,839
Utilities	3,414	0	3,414
Maintenance	6,200	0	6,200
Total facilities	27,529	6,924	34,453
Software and equipment			
Computer supplies and equipment	5,005	5,936	10,941
Depreciation	0	2,320	2,320
Equipment maintenance	18,954	458	19,412
Equipment rental	10,616	0	10,616
Total software and equipment	34,575	8,714	43,289
Education, meetings and travel			
Board travel and meetings	1,558	0	1,558
Professional development including travel	6,100	11,792	17,892
MOSERS sponsored seminars	6,316	442	6,758
Due diligence travel	500	2,412	2,912
Total education, meetings and travel	14,474	14,646	29,120
General			
Advertising	1,707	8,604	10,311
Research and information services	5,358	14,780	20,138
Insurance	12,311	0	12,311
Membership dues	1,782	1,425	3,207
Business continuity	5,730	0	5,730
Office supplies	4,160	483	4,63
Periodicals and publications	531	0	531
Total general	31,579	25,292	56,871
Total administrative expenses	$532,169	$417,952	$950,121

Schedules of Professional Service Fees | Year Ended June 30, 2017

		Pension Trust Funds			Internal Service Funds		
Professional Services	**Nature of Service**	**MSEP**	**Judicial Plan**	**Total**	**Life and LTD**	**Deferred Compensation**	**Total**
Operation administrative expenses							
Albert A. Slawsky	Asset consulting	$ 8,667	$ 149	8,816	$ 0	$ 0	$ 0
Avtex Solutions, Inc.	Information technology consulting	3,356	58	3,414	0	0	0
Cavanaugh Macdonald	Actuarial	116,518	2,001	118,519	0	0	0
Central Bank	Banking	36,415	625	37,040	387	0	387
Charlesworth & Associates	Risk management consulting	8,980	154	9,134	0	0	0
Collector Solutions, Inc.	Banking	0	0	0	111	0	111
Corporate Renaissance Group	Information technology consulting	82	1	83	0	0	0
DeKalb County Probate Court	Legal counsel	10	0	10	0	0	0
Dell	Information technology consulting	9,961	171	10,132	0	0	0
Gabriel, Roeder, Smith & Co.	Actuarial	240,935	4,137	245,072	0	0	0
Gamble & Schlemeier, Ltd.	Governmental consulting	24,929	428	25,357	0	0	0
Huber & Associates	Information technology consulting	8,371	144	8,515	0	0	0
ICON Integration and Design, Inc.	Pension administration system consulting	89,746	1,541	91,287	0	0	0
Linea Solutions	Pension administration system consulting	91,933	1,578	93,511	0	0	0
Thompson Coburn, LLP	Legal counsel	182,156	3,127	185,283	560	149	709
Williams Keepers, LLC	Financial audit	80,545	1,383	81,928	5,645	38,460	44,105
Operations administrative expenses subtotal		902,604	15,497	918,101	6,703	38,609	45,312
Internal investment administrative expenses							
Purrington Moody Weil, LLP	Legal counsel	24,228	416	24,644	0	0	0
Thompson Coburn, LLP	Legal counsel	124,238	2,133	126,371	0	0	0
Internal investment administrative expenses subtotal		148,466	2,549	151,015	0	0	0
Total professional fees		$1,051,070	$18,046	$1,069,116	$6,703	$38,609	$45,312

Information on investment management and consulting fees can be found in the *Schedule of Investment Expenses* on pages 59-60.

1987

INVESTMENT SECTION

MOSERS' first investment transaction occurred in 1957 when a single outside advisor placed $100,000 in a 90-day U.S. Treasury Bill on behalf of plan participants. By 1987, MOSERS' total investments exceeded $1 billion. This is a notable accomplishment as it took nearly 30 years to break this mark.

Investment Section

Chief Investment Officer's Report

Missouri State Employees' Retirement System
Mailing Address: PO Box 209, Jefferson City, MO 65102-0209
Phone: (573) 632-6100 • (800) 827-1063 | Fax: (573) 632-6103
MO Relay: 7-1-1 (Voice) • (800) 735-2966 (TTY)
Website: *www.mosers.org* | Email: *mosers@mosers.org*
Visit us at 907 Wildwood Drive, Jefferson City, MO

WE ARE HERE FOR YOUR BENEFIT.

October 16, 2017

Dear Members:

I start this letter by thanking the MOSERS Board of Trustees and executive director, John Watson, for allowing me the honor of leading the investment effort at MOSERS.

MOSERS' fund returned 3.5% this fiscal year, which is 1.9% more than expected from passive investing. The extra return was made from decisions MOSERS' investment staff implemented through the year. We achieved this excess return while also cutting about $7 million in management fees (about 12% savings). Finishing with higher-than-expected returns and reducing fees are the two things staff has the most control over and, by those measurements, this year was a success.

However, our absolute return is lower than what most other pension funds experienced. The reason for the performance difference is because we do not own what they own. By way of analogy, investment portfolios are like recipes. Think of the recipe for a chocolate chip cookie. Now, think of the recipe for a brownie. The two recipes contain many of the same ingredients, but the outcomes are distinct. In 2012, MOSERS chose a cookie recipe for portfolio returns, but all other pension funds chose a brownie recipe. Therefore, since the recipes are different, it follows that MOSERS' outcomes will be different.

So far as I can tell, having foresight about which recipe will be most rewarded in any given year is impossible. This year stocks, the most common ingredient in the other pension recipes, were the highest returning asset. As a rule of thumb, other funds have 85% of their outcome linked to stocks. MOSERS has only 40% of our outcome linked to stocks. When stocks are up 18%, having 85% of your outcome linked to equities is a good thing. However, equities do not always provide these returns. In fact, sometimes they lose money. In losing environments the preference will be for fewer stocks.

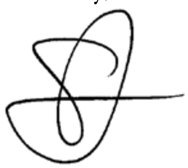
Why is our recipe different? In 2012, when the recipe was changed, MOSERS had one of the highest return hurdles in the country. Speaking technically, our "real return assumption"— that is, what we assumed our return would be after adjusting for inflation—was tied for the highest in the U.S. at 5.5%. At that time, using a recipe similar to other public pension funds would not have achieved the high return. So, in order to clear the hurdle, the portfolio had to shift to something that was different. That's why we chose a different recipe in 2012.

Now, let's talk about where MOSERS is going. Over the last two years, the MOSERS Board of Trustees has lowered the real rate of return assumption. For fiscal year 2017, the board lowered the rate from 5.5% to 5.15% and for fiscal year 2018 the board adopted a rate of 5%. It is important for MOSERS' return assumptions to be economically viable, because it will increase the likelihood of MOSERS achieving that return. There is currently a plan to continue reducing the return assumption in the future and this will increase the economic viability of MOSERS' assumptions.

In addition, lowering the return assumption reduces the need for our portfolio to be different from the pension plan universe. Accordingly, we will begin discussions to consider a deliberate transition to a portfolio with a more comfortable risk profile.

However, as we move down this path, we have to be careful to make these moves in deliberate installments which can be tolerated by all MOSERS' stakeholders. Our current situation accrued over a period of many years, so no single year will resolve the challenge. Ignoring this challenge is no longer acceptable, but we also have to acknowledge that all solutions require time. The great thing about defined benefit plans is this—we have some time. As the old saying goes: "Rome wasn't built in a day." Well, neither are solutions to pension plan funding. I am convinced that working together, MOSERS' Board of Trustees and staff members will develop a plan that answers these challenges.

Sincerely,



Seth Kelly
Chief Investment Officer

Investment Policy Summary

Guiding Principles

Critical to the financial security of present and future benefit recipients is the effectiveness and efficiency of the system's asset management program. The MOSERS Board of Trustees, charged with the responsibility for investing the assets of the system in a manner consistent with fiduciary standards set forth in the prudent person rule, has adopted the following fundamental principles to guide all investment-related decisions:

- Preserve the long-term corpus of the fund.
- Maximize total return within prudent risk parameters.
- Act in the exclusive interest of the system's members.

The investment policy summary serves as a reference point for management of system assets and outlines MOSERS' investment philosophy and practices. Investments within this report are presented on the basis of fair value using a variety of sources such as appraisals, valuations of underlying companies and assets for limited partnerships, and commingled funds, and through fair values obtained from the investment custodian.

Investment Objective

In keeping with the three guiding principles, the board has adopted the following broad investment objectives:

- Develop a real return objective (RRO) that will keep contribution rates reasonably level over long periods of time, absent changes in actuarial assumptions.
- Establish an asset allocation policy that is expected to meet the RRO over long periods of time, while minimizing the impact of the fund's volatility on the contribution rate.
- Monitor costs associated with the efficient implementation of the asset allocation through the use of internal and external resources.

Investment Beliefs

MOSERS has arrived at investment beliefs, which are the foundation for implementation of the investment portfolio to achieve the institution's objectives. These beliefs guide every decision made within MOSERS' portfolio. They are the fundamental concepts underlying the MOSERS investment program. These beliefs are:

- **Portfolio construction should focus first on risk; it is the allocation of risk that drives portfolio returns.** While investment returns receive a lot of public attention, understanding risk across asset classes improves the consistency of returns for a given level of risk and thus provides more stability in the contribution rate for the employer. Returns are the end product, where risks are the ingredients.
- **Diversification is critical because the future is unknown.** Reliable diversification requires a fundamental understanding of the economic drivers of risk and return. MOSERS' policy portfolio has been built upon the premise that very little is known about what the future holds.
- **Every investment should be examined in the context of its potential return from beta (market return) and alpha (value added return); while separation is not always possible, every effort should be made to distinguish the two distinct return components.** Beta is the return which is expected to be earned by investing passively within a specific asset class or compensated risk premium. Exposure to beta can be purchased cheaply, and over long periods of time, the beta return should be positive and coincide with the risk associated with a given asset class. In contrast, alpha is the return generated through a manager's ability to select particular investments that perform better than the asset class as a whole. Alpha is a zero-sum game.
- **Regardless of the source of the return, it is important to construct the portfolio based on a conscious decision to include a certain amount of beta exposure in the portfolio and a certain amount of alpha exposure.** By consciously selecting this balance within the portfolio, staff is better able to manage the risks of the portfolio which increases the chance the RRO is achieved.

- **Flexibility to opportunistically alter the portfolio when markets are driven to extremes as a result of short-term economic cycles is an important portfolio management tool.** As a result of the cyclical nature of the economy, asset classes or investment strategies may be more or less attractive relative to others in given time frames, thus marginal flexibility in the allocation policy provides the system with the opportunity to capitalize on this within prudent risk constraints. Under circumstances where the valuations of a particular asset class are compelling, it may make sense to modify the portfolio's allocation at the margins in order to capitalize on attractively valued opportunities without exposing the fund to additional risk.

Roles and Responsibilities

Board of Trustees

The board of trustees bears the ultimate fiduciary responsibility for the investment of system assets. Members of the board must adhere to state law and prudent standards of diligence with respect to their duties as investment fiduciaries. Accordingly, they are required to discharge their duties in the interest of plan participants. They must also "act with the same care, skill, prudence, and diligence under prevailing circumstances that a prudent person, acting in a similar capacity and familiar with those matters, would use in the conduct of a similar enterprise with similar aims."[1] Specifically related to investments, the board, taking into consideration the recommendations of staff and the external asset consultants, is charged with the duties of establishing and maintaining broad policies and objectives for the investment program.

Executive Director

The executive director is appointed by and serves at the pleasure of the board. The board has given the executive director broad authority for planning, organizing, and administering the operations and investments of the system under broad policy guidance from the board. Specifically with regard to investments, the executive director is broadly responsible for the oversight of the investment program. The executive director must ensure that system assets are invested in accordance with the board's policies and that internal controls are in place to safeguard system assets. The executive director must also certify that all manager hiring and termination decisions were made in accordance with the board's governance policy. In addition, the executive director certifies strategic allocation decisions were made in accordance with the governance policy.

Chief Investment Officer (CIO) and Internal Staff

The CIO serves at the pleasure of the executive director, yet has a direct line of communication with the board on investment-related issues. The CIO has primary responsibility for the overall direction of the investment program. The CIO works with the external asset consultants and the executive director in advising the board on policies related to the investment program. The CIO has primary responsibility to make hiring and termination decisions related to money managers with the approval of the external general asset consultant. The CIO is also responsible for making strategic allocation decisions with the approval of the external general asset consultant. Other responsibilities of the CIO include monitoring the investment of system assets, overseeing external money managers and the internally managed portfolios, and keeping the board apprised of situations which merit their attention. The internal investment staff is accountable to the CIO.

External Asset Consultants

Summit Strategies Group of St. Louis, Missouri serves as the system's external general asset consultant at the pleasure of the board. The primary duties of the external general asset consultant are to:

- Advise the board on policies related to the investment program.
- Provide a third-party perspective and level of oversight to the system's investment program.

The external general asset consultant must approve all manager hiring and termination decisions and strategic allocation decisions made by the CIO. The external general asset consultant provides advice and input to the CIO and internal investment staff on investment-related issues and money manager searches.

Blackstone Alternative Asset Management serves as the system's external hedge fund consultant at the pleasure of the board. The primary duties of the external hedge fund consultant are to:

- Advise the board on policies related to the hedge fund program.
- Provide a third-party perspective and level of oversight to the system's hedge fund investment program.

[1] Section 105.688, RSMo - Investment Fiduciaries, Duties.

The external hedge fund consultant must approve all hedge fund manager hiring and termination decisions. The external hedge fund consultant provides advice and input to the CIO and internal investment staff on hedge fund program issues and manager searches.

Chief Auditor

The chief auditor reports directly to the executive director and if, in the opinion of the chief auditor circumstances warrant, may report directly to the board. The chief auditor is independent of the system's investment operations and, among other duties, is responsible for providing objective audit and review services for the investment operations. It is the chief auditor's objective to promote adequate and effective internal controls at a reasonable cost.

Master Custodian

Bank of New York Mellon serves as the master custodian of the system's assets except in cases where investments are held in partnerships, commingled accounts, or unique asset classes where it is impossible for them to do so. The master custodian is responsible for maintaining the official book of record, providing performance reports, and serving as an additional layer of risk control in the safekeeping of system assets.

Asset Allocation

Determining the system's asset allocation is regarded as one of the most important decisions in the investment management process. The board, with advice from staff and the external general asset consultant, 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 allocation reflects the need for a diversified portfolio, which will perform well in a variety of economic conditions and will help reduce the portfolio's overall volatility. In determining the optimum mix of assets, the board considers five factors:

- The expected risk of each asset class.
- The expected rate of return for each asset class.
- The correlation between the rates of return of the asset classes.
- The investment objectives and risk constraints of the fund.
- The impact of the portfolio's volatility on the contribution rate.

While the board maintains a set policy allocation mix, they have taken steps to provide flexibility by granting authority to the CIO, with the approval of the external general asset consultants and certification of the executive director, to make strategic allocation decisions to capitalize on attractively valued opportunities within prudent risk constraints. This flexibility has allowed the system to take advantage of changing market conditions. The table below illustrates the policy asset allocation and ranges formally adopted by the board in July 2016.

Asset Allocation

Beta-Balanced Portfolio	Risk Allocation Policy	Risk Allocation Ranges[1]	Benchmark Index (weight)[2]
Global opportunistic equity	36%	25% - 47%	MSCI ACWI + .75% - (38%)[3]
Nominal bonds	24%	17% - 31%	Barclays Long Treasury - (44%)
Inflation-linked bonds	8%	5% - 10%	Barclays 1-10 TIPS - (39%)
Commodities	19%	13% - 25%	S&P GSCI/BCOM - (20%)[4]
Alternative beta	13%	9% - 17%	AQR DELTA - (31%)[5]

[1] The board has granted the CIO the authority to alter the equal risk-weighted allocation policy. This authority exists within risk ranges as depicted in the table above. These risk ranges, like the policy allocation, are driven by the long-term volatility and correlation expectations for the five betas that make up the beta-balanced portfolio. The CIO will make these strategic allocation decisions away from the policy benchmark subject to consultation and agreement from the chief general asset consultant (CGAC).

[2] Benchmarks are net of MOSERS' actual leveraging costs on borrowed assets with the exception of the alternative beta benchmark which is net of management fees.

[3] Morgan Stanley Capital International All Country World Index (net dividends). Legacy real estate and timber assets are benchmarked to the Dow Jones U.S. REIT Index and NCREIF Timber, respectively.

[4] S&P Goldman Sachs Commodity Index/Bloomberg Commodity Index. The board approved a three-year transition from S&P GSCI to BCOM beginning August 1, 2016.

[5] A diversified risk-balanced portfolio of liquid hedge fund risk premia managed by AQR Capital net of management fees.

Rebalancing

It is the responsibility of staff to ensure that the asset allocation adheres to the system's rebalancing policy. MOSERS utilizes a combination of cash market and exchange traded futures transactions to maintain the total fund's allocation at the broad policy level. Month-end reviews are conducted to bring the portfolio back within allowable ranges of the broad policy targets.

Risk Controls

MOSERS' investment program faces numerous risks; however, the primary risk to MOSERS is that the assets will not support the liabilities over long periods of time. In order to control this risk and numerous other risks that face the system, the board has taken the following steps, on an ongoing basis, to help protect the system:

- Actuarial valuations are performed each year to ensure the system is on track to meet the funding objectives of the plan. In addition, every five years an external audit of the actuary is conducted to ensure that the assumptions being made and calculation methods being utilized are resulting in properly computed liabilities.
- Asset/liability studies are conducted at least once every five years. The purpose of these studies is to ensure that the current portfolio design is structured to meet the system's liabilities. During these studies, investment expectations are also reexamined in more detail.
- A governance policy, which incorporates investment limitations, is in place to ensure that board policies are clearly identified. Within these documents, desired outcomes are identified, responsibilities for individuals are identified in relation to particular areas of the portfolio's management, and details are provided for measuring outcomes. Reporting requirements are clearly identified to ensure appropriate checks and balances are in place. In addition, annual performance audits are conducted to ensure the performance measurement tools and methodologies being utilized are proper.

Performance Objectives and Monitoring Process

Generating returns net of expenses equaling the RRO (5.15% in FY17) plus inflation remains the primary performance objective for the total fund.

The reason for the long-term focus on this objective is to preclude the temptation to overreact to events in the marketplace that have no relevance in the management of the relationship between the system's assets and liabilities. The resulting dilemma is the conflicting need to evaluate investment policy implementation decisions over shorter time frames while maintaining the longer-term focus necessary to manage and measure the fund's performance relative to the RRO. To address this problem, the board evaluates performance relative to policy and strategy benchmarks. This helps to evaluate the board's broad policy decisions and the staff and external consultant's implementation decisions. Policy benchmarks measure broad investment opportunities of each sub-asset class in which MOSERS has chosen to invest. The strategy benchmarks represent decisions made by the CIO to strategically deviate from the policy asset allocation for each sub-asset class. The returns of the strategy benchmarks are determined based upon the actual weight of the asset class multiplied by the appropriate benchmark.

The policy and strategy benchmarks are used in the following manner to evaluate board and staff decisions:

- **Board Decisions:** The value added through board policy decisions is measured by the difference between the total fund policy benchmark return and the RRO. This difference captures the value added by the board through their policy asset allocation decisions relative to the return necessary to fund the system's liabilities. A policy benchmark return greater than the RRO reflects value added through board decisions. A policy benchmark return less than the RRO reflects losses or shortfalls in performance in funding the liabilities. These policy decisions are measured over long periods of time.
- **CIO and External Consultants' Decisions:** There are two components to decisions made by the CIO and external consultants, which are monitored by the board on an ongoing basis. They are: 1) strategic allocation decisions, and 2) implementation decisions.

Strategy decisions are made by the CIO, with the approval of the external general asset consultant and the review of the executive director, to deviate from the policy benchmark weight. The difference between the strategy benchmark return and the policy benchmark return captures the value added by the CIO through strategic decisions to overweight or underweight asset allocations relative to the board's policy allocation decisions. A strategy benchmark return greater than the policy benchmark return reflects value added through the sub-asset class allocation decisions. A strategy benchmark return less than the policy benchmark return reflects losses to the fund's performance based upon strategy decisions. Strategy decisions should be measured over all periods of time with majority weight placed on outcomes that have occurred over a market cycle.

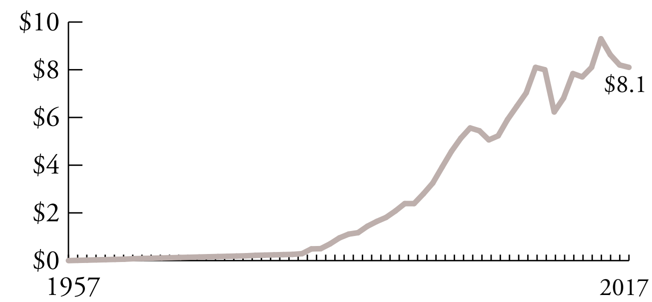
Implementation decisions are money manager selection choices made by the CIO with the approval of the appropriate external consultant and the certification of the executive director that the decision was made in accordance with the board's adopted governance policy. The value added through these decisions is measured by the difference between the actual portfolio return and the strategy benchmark return. This difference captures the value added through these external manager selection decisions. An actual portfolio return greater than the strategy benchmark return reflects value added through these external manager selection decisions. An actual portfolio return less than the strategy benchmark return reflects losses to the fund's performance based upon implementation decisions. Implementation decisions should be measured over all periods of time with a majority weight placed on outcomes that have occurred over a market cycle.

The board reviews performance information on a quarterly basis to help ensure adequate monitoring of the fund's overall performance objectives.

Total Fund Review

As of June 30, 2017, the MOSERS investment portfolio had a fair value of $8.1 billion. The graph to the right illustrates the growth of MOSERS' portfolio since the system's inception.

Total Fund Growth (Billions)



Investment Performance

MOSERS' investments generated a time-weighted return of 3.5%, net of fees, for FY17. The total fund return exceeded the 1-year policy benchmark of 1.6%. This additional 1.9% investment return produced $152 million over what would have been earned if the fund had been invested passively in the policy benchmark.

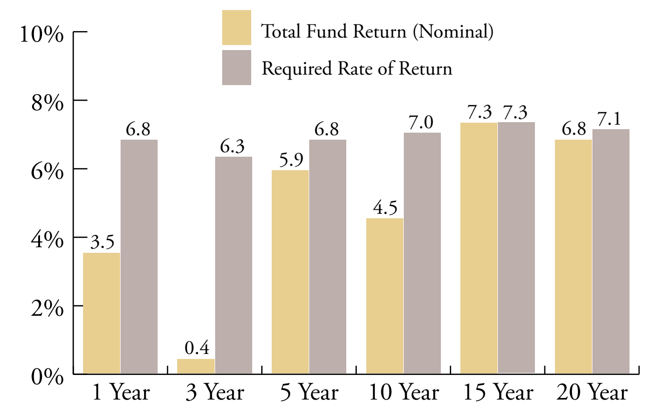
Investment Performance vs. Required Rate of Return

The total fund investment return is compared to a required rate of return. The required rate of return is established by the board to determine how well the fund is performing over the long term in order to meet future plan obligations after accounting for inflation. The required rate of return for FY17 is equal to the RRO of 5.15% plus inflation. The best known measure of inflation is the Consumer Price Index (CPI).[1]

Given the randomness of the investment markets, the portfolio should not be expected to meet the required rate of return every year. A review of long periods of time is best to evaluate whether or not the total return has kept pace with the system's funding objectives.

As indicated in the center bar chart, MOSERS' investment returns trailed the required rate of return by 0.3% over the 20-year period ended June 30, 2017.[2]

Total Fund Actual Return vs. Required Rate of Return

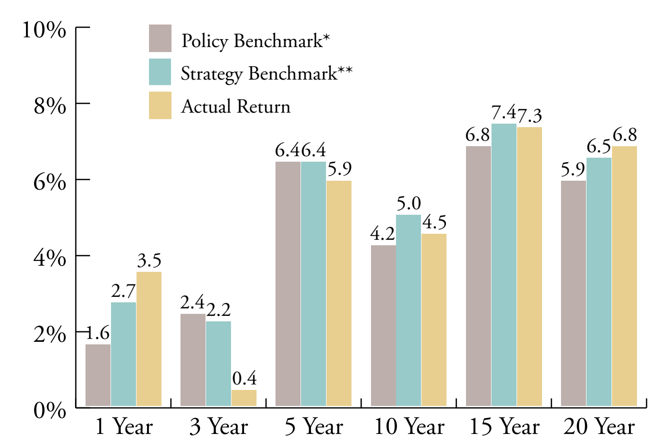


Investment Performance vs. Benchmark Comparisons

In addition to measuring performance relative to the required rate of return, the board also compares fund returns to the policy benchmark and the strategy benchmark. Returns for the total fund versus these benchmarks are displayed in the bar chart to the right.

The policy benchmark provides an indication of the returns that could have been achieved (excluding transaction costs) by a portfolio invested in the designated benchmarks for each asset class at the percentage weights allocated to each asset class in MOSERS' policy asset allocation.

Total Fund Actual Return vs. Benchmark Return



* As of June 30, 2017, the total fund policy benchmark was comprised of the following components: 38% MSCI ACWI Net +.75%, 44% Barclays Long Treasuries, 20% S&P GSCI/BCOM, 39% Barclays U.S. TIPS 1-10 YR, and 31% AQR Delta. All policy return components are adjusted for financing cost associated with the beta-balanced program. This program did not begin until September 2012.

** As of June 30, 2017, the strategy benchmark was comprised of the following components: 39.3% total opportunistic global equities strategy, 38.5% total nominal bonds strategy, 16.2% total commodities strategy, 37.6% total inflation-linked bonds strategy, and 29.2% total alternative beta strategy. All strategy return components are adjusted for financing cost associated with the beta-balanced program. This program did not begin until September 2012.

1 CPI Source: United States Department of Labor, Bureau of Labor Statistics (not seasonally adjusted).

2 Performance returns are calculated using a time-weighted rate of return on fair values.

Comparison of the total return to the policy benchmark reflects the total value added or detracted by the CIO through strategic and manager implementation decisions. Value is added when the total fund return exceeds the policy benchmark return. The total fund 1-, 10-, 15-, and 20-year actual performance over performed its policy benchmark by 1.9%, 0.3%, 0.5% and 0.9% with the actual 3- and 5-year returns trailing the policy benchmarks by 2.0% and 0.5%, respectively.

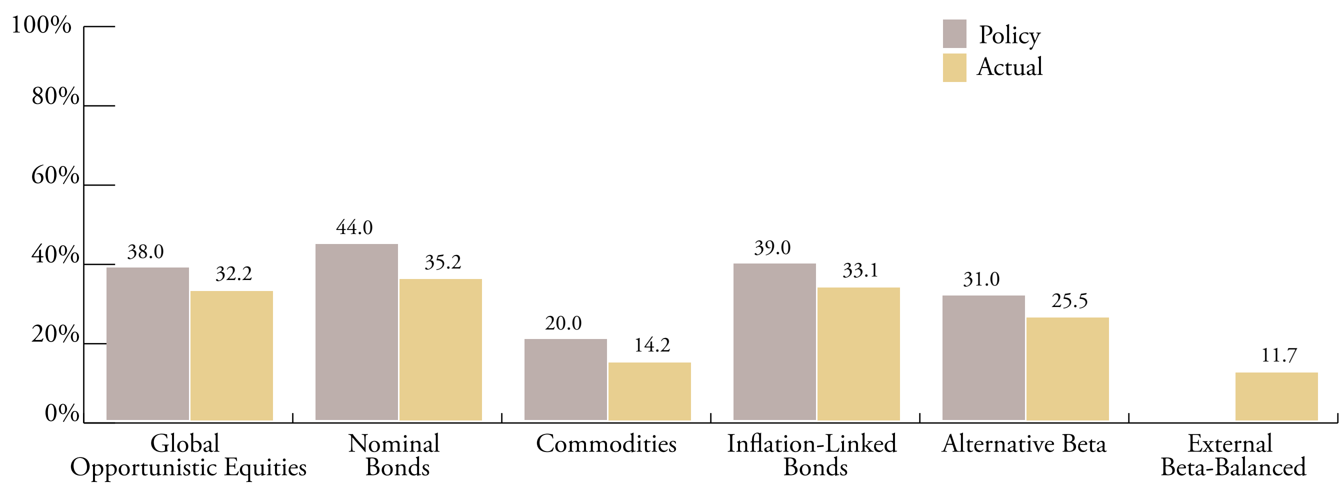
The strategy benchmark is more narrowly defined and focuses on sub-asset class allocation decisions made by the CIO. Comparison of the strategy benchmark to the policy benchmark reflects the component of the value added or detracted which can be attributed to the strategic sub-class allocation decisions made by the CIO. Value is added when the strategy benchmark return exceeds the policy benchmark return. Comparison of the strategy benchmark to the total return reflects the component of the value added which can be attributed to the manager implementation (manager hiring and termination) decisions made by the CIO and approved by the external asset consultant. Value is added when the total fund return exceeds the strategy benchmark return.

Total Fund Policy Allocation Overview

As of June 30, 2017, the board's broad policy allocation mix was 38% opportunistic global equities, 44% nominal bonds, 20% commodities, 39% inflation-linked bonds, and 31% alternative beta. The policy target, as of June 30, 2017, for each sub-asset class, along with the actual strategic allocation to each type of investment, is shown in the bar graph below.

The board has granted authority to the CIO to make strategic decisions. A strategic decision should be thought of as any decision that might cause MOSERS' actual portfolio to differ from the policy asset allocation. This has allowed MOSERS to capitalize on investment opportunities at the margin by overweighting asset classes that are viewed as "cheap" relative to their historical norm and underweighting asset classes that are "expensive" relative to their historical norm.

Total Fund Allocation | Policy vs. Actual (As a Percentage of the Total Fund)



The asset allocation is built upon the belief that diversification is critical. The tables below reflect the asset classes and their correlation to each other and the statistical performance data, net of fees, of the total fund, as of June 30, 2017.

Total Fund - Correlation Table - 5 Years

	Opportunistic Global Equities	Nominal Bonds	Commodities	Inflation-Linked Bonds	Alternative Beta
Opportunistic global equities	1.00				
Nominal bonds	(0.17)	1.00			
Commodities	0.44	(0.34)	1.00		
Inflation-linked bonds	0.25	0.64	0.14	1.00	
Alternative beta	0.39	0.15	(0.18)	0.21	1.00

Total Fund - Statistical Performance

Portfolio Characteristics	1 Year	3 Year	5 Year	10 Year	15 Year	20 Year
Annualized return	3.5%	0.4%	5.9%	4.5%	7.3%	6.8%
Annualized standard deviation	4.4%	6.4%	6.3%	8.8%	8.4%	9.3%
Sharpe ratio	0.69	0.02	0.91	0.45	0.72	0.51
Excess return*	1.9%	(2.0)%	(0.6)%	0.2%	0.6%	0.9%
Beta*	0.76	0.87	0.91	0.74	0.79	0.83
Annualized alpha*	2.2%	(1.7)%	0.0%	1.2%	1.9%	1.7%
Correlation*	0.98	0.93	0.94	0.95	0.95	0.96
Value added in dollars**	$152M	$(552)M	$(215)M	$352M	$975M	$1.7B

* *As compared to the total fund policy benchmark.*
** *MOSERS' earnings above what would have been earned if assets had been invested passively.*

Schedule of Investment Portfolios by Asset Class | As of June 30, 2017

	Fair Value	Percentage of Investments at Fair Value	Market Exposure	Percentage of Investments at Market Exposure
Internal beta-balanced				
Global opportunistic equities	$2,717,429,664	33.7%	$ 2,601,563,280	32.2%
Nominal bonds	747,798,836	9.3	2,840,437,911	35.2
Commodities	313,169,917	3.9	1,144,649,079	14.2
Inflation-linked bonds	912,475,569	11.3	2,673,386,121	33.1
Alternative beta	2,170,513,175	26.9	2,060,111,457	25.5
Total internal beta-balanced	6,861,387,161	85.1	11,320,147,848	140.2
External beta-balanced	943,582,998	11.7	943,582,998	11.7
Residual accounts from old portfolio	3,792,791	0.0	3,792,791	0.0
Cash reserve	261,705,569	3.2	0	0.0
Grand total	$8,070,468,519	100.0%	$12,267,523,637	151.9%

Reconciliation to *Statements of Fiduciary Net Position*	
Total portfolio value	$ 8,070,468,519
Reverse repurchase agreements	3,373,773,555
Short-term investment fund (STIF)	(2,418,765,451)
Uninvested cash	722,484
Interest and dividends receivable	(5,469,068)
Variation margin	(12,184,564)
Investment sales	(10,435,252)
Investment purchases payable	10,165,707
Fees payable	10,314,862
Investments per *Statements of Fiduciary Net Position*	$ 9,018,590,792

Schedule of Investment Advisors

Investment Advisors Name	Style	Portfolio Fair Value
Actis Emerging Markets	Opportunistic global equities – emerging markets	$ 38,400,002
Alinda Capital Partners	Opportunistic global equities – infrastructure	21,005,641
AQR Capital Management	Alternative beta – multi-strategy	408,424,347
AQR Capital Management	External beta balanced – risk parity	405,634,864
Axiom Asia Private Capital Associates	Opportunistic global equities – emerging markets	85,825,308
Axxon Management	Opportunistic global equities – emerging markets	25,657,177
Bayview Asset Management	Opportunistic global equities – opportunistic mortgages	22,302,981
Blackstone Alternative Asset Management	Alternative beta – fund-of-funds	240,743,966
Blackstone Real Estate Partners	Opportunistic global equities – active real estate	117,182,318
Blakeney Management	Opportunistic global equities – emerging markets	51,978,370
Bridgewater Associates	Alternative beta – global macro	100,543,340
Bridgewater Associates	External beta balanced – risk parity	461,643,476
Campbell Group	Opportunistic global equities – timberland	1,005,329
CarVal Investors	Opportunistic global equities – distressed real estate debt	14,400,000
Catalyst Capital Group	Opportunistic global equities – Canadian distressed debt	99,323,485
Catterton Partners	Opportunistic global equities – corporate buyout	2,731,889
Cornwall Capital	Alternative beta – multi-strategy	62,747,524
Davidson Kempner Capital Management	Alternative beta – event driven	28,676,279
Development Partners International	Opportunistic global equities – emerging markets	43,070,044
DRI Capital	Opportunistic global equities – intellectual property	14,818,718
EIG Energy Partners	Opportunistic global equities – energy – diversified	15,758,412
EIG Energy Partners	Opportunistic global equities – energy – mezzanine	66,820,509
Elliott Management Corporation	Alternative beta – multi-strategy	190,191,000
Farallon Capital Partners	Alternative beta – multi-strategy	2,500,000
Gaoling Fund	Opportunistic global equities – long/short – equity	125,614,684
Glenview Capital Management	Opportunistic global equities – long/short – equity	39,781,005
Glenview Capital Management Sidecar	Opportunistic global equities – active equity	59,227,608
Global Forest Partners	Opportunistic global equities – timberland	141,717,994
Harvest Fund Advisors	Opportunistic global equities – active MLP	71,143,365
HBK Capital Management	Alternative beta – merger arbitrage	115,091,118
JLL Partners	Opportunistic global equities – corporate buyout	65,433,054
King Street Capital Management	Alternative beta – credit driven	4,299,013
Linden Capital Partners	Opportunistic global equities – corporate buyout	49,277,379
Mast Capital Management	Alternative beta – credit driven	21,196,607
Merit Energy Partners	Alternative beta – energy – oil & gas	5,154,997
MHR Fund Management	Alternative beta – distressed debt	61,122,948
Millennium Technology Value Partners	Opportunistic global equities – direct secondaries	20,101,888
NISA Investment Advisors	Nominal bonds – passive long term U.S. treasuries	46,079,205
NISA Investment Advisors	Commodities – passive commodities	(6,642,698)
NISA Investment Advisors	Alternative beta – strategy	176,398,253
NISA Investment Advisors	Inflation-linked bonds – passive TIPS	268,528,249
Oaktree Capital Management	Opportunistic global equities – corporate buyout	13,357,793
Oaktree Capital Management	Opportunistic global equities – distressed debt	22,815,861
Pharo Management	Alternative beta – global macro	122,709,138

Schedule of Investment Advisors continued on page 77

Schedule of Investment Advisors continued from page 76

Investment Advisors Name	Style	Portfolio Fair Value
Resource Management Service – Wildwood Timberlands	Opportunistic global equities – timberland	73,420,187
Silchester International Investors	Opportunistic global equities – active international equity	797,676,394
Silver Creek Capital Management	Opportunistic global equities – fund-of-funds (special situations)	22,245,213
Silver Lake Management Company	Opportunistic global equities – corporate buyout	4,348,208
SIR Capital Management	Alternative beta – equity market neutral	99,796,938
Siris Capital Group	Opportunistic global equities – corporate buyout	11,483,438
State Street Global Advisors	Opportunistic global equities – passive emerging markets	174,880,049
StepStone Group	Alternative beta – fund-of-funds corporate buyouts	24,976,953
Stone Harbor Investment Partners	Alternative beta – emerging market debt	53,072,830
Viking Global Investors	Alternative beta – long/short – equity	168,906,465
Visium Asset Management	Alternative beta – long/short – equity	3,460,388
Miscellaneous (each less than $1M)		5,457,861
		$5,383,517,364

Total Fund - Top Ten Publicly Traded Separate Account Holdings

Ten Largest Holdings as of June 30, 2017	Fair Value	Percent of the Total Fund
U.S. Treasury Note – 1.750%, 2021	$246,365,200	3.05%
U.S. Treasury Note – 1.500%, 2026	168,233,468	2.08
U.S. Treasury Bond – 2.500%, 2045	138,181,676	1.71
U.S. Treasury CPI Inflation – 0.125%, 2022	131,588,543	1.63
U.S. Treasury CPI Inflation – 0.375%, 2023	131,164,678	1.62
U.S. Treasury CPI Inflation – 0.125%, 2023	130,161,409	1.61
U.S. Treasury CPI Inflation – 0.125%, 2024	129,778,974	1.61
U.S. Treasury CPI Inflation – 0.375%, 2025	128,492,657	1.59
U.S. Treasury Bond – 3.000%, 2045	124,535,140	1.54
U.S. Treasury CPI Inflation – 1.125%, 2021	122,940,399	1.52

** For a complete list of holdings, contact MOSERS.*

Schedule of Investment Results* | 1-, 3-, 5-, 10-, 15- and 20-Year Periods

Total Fund – As of June 30, 2017, the total fund policy benchmark was comprised of the following components: 38% total opportunistic global equities policy, 44% total nominal bonds policy, 20% total commodities policy, 39% total inflation-linked bonds policy, and 31% total alternative beta policy. All policy return components are adjusted for financing cost associated with the beta-balanced program. This program did not begin until September 2012.

- *Opportunistic global equities* – As of June 30, 2017, the opportunistic global equities policy was MSCI ACWI Net +.75%. Legacy real estate and timber assets are benchmarked to the Dow Jones U.S. Select REIT Index and NCREIF Timber respectively.
- *Nominal bonds* – As of June 30, 2017, the total nominal bonds policy was Barclays Long Treasury.
- *Commodities* – As of June 30, 2017, the total commodities policy was 69.5% S&P GSCI and 30.5% BCOM.
- *Inflation-linked bonds* – As of June 30, 2017, the total inflation-linked bonds policy was Barclays US TIPS 1-10 YR.
- *Alternative beta* – As of June 30, 2017, the total alternative beta policy was AQR Delta.

	1 Year	3 Year	5 Year	10 Year	15 Year	20 Year
Total fund *	3.5%	0.4%	5.9%	4.5%	7.3%	6.8%
Total fund policy benchmark	1.6%	2.4%	6.4%	4.2%	6.8%	5.9%
Opportunistic global equities	15.3%	4.9%	11.4%	6.3%	N/A	N/A
Opportunistic global equities benchmark	16.0%	7.6%	12.4%	6.4%	N/A	N/A
Nominal bonds	(6.9)%	5.1%	N/A	N/A	N/A	N/A
Nominal bonds policy benchmark	(7.8)%	5.2%	N/A	N/A	N/A	N/A
Commodities	(11.0)%	(25.7)%	(14.6)%	(7.7)%	(1.0)%	N/A
Commodities policy benchmark	(8.8)%	(24.8)%	(13.7)%	(9.7)%	(2.6)%	N/A
Inflation-linked bonds	(1.1)%	(0.1)%	(0.1)%	4.1%	5.2%	N/A
Inflation-linked bonds policy benchmark	(0.9)%	0.0%	0.0%	4.1%	5.2%	N/A
Alternative beta	6.7%	4.5%	N/A	N/A	N/A	N/A
Alternative beta policy benchmark	3.6%	6.2%	N/A	N/A	N/A	N/A
External risk parity	6.7%	0.7%	N/A	N/A	N/A	N/A
Total fund policy benchmark	1.6%	2.4%	N/A	N/A	N/A	N/A

** Time weighted rates of return on fair values adjusted for cash flows.*

Schedule of Investment Manager Fees | For the Year Ended June 30, 2017

	Total Fees	Manager Fees	Fund Pass Through Expenses (1)	Incentive Fees Earned in FY17	Portfolio Company Charges (2)
Actis Emerging Markets III	$ 570,000	$ 514,000	$ 56,000	$ 0	$ 0
Actis Emerging Markets IV	767,000	721,000	46,000	0	0
African Development Partners I, LLC	6,124,649	316,191	241,517	5,566,942	0
African Development Partners II, LLC	876,116	752,005	124,110	0	0
Alinda Infrastructure Fund I, LP	252,397	235,840	16,557	0	0
American Industrial Partners Capital Fund V, LP	569,543	345,000	30,773	193,770	0
American Industrial Partners Capital Fund VI, LP	547,566	500,000	47,566	0	0
AQR DELTA Sapphire Fund, LP	3,853,999	3,461,801	392,198	0	0
AQR Global Risk Premium Fund IV, LP	2,534,728	2,117,324	417,404	0	0
AQR Style Premia Fund, LP	(260,960)	0	56,153	(317,113)	0
Astenbeck Capital Management	14,687,942	1,922,069	7,650	12,758,223	0
Axiom Asia Private Capital Fund II, LP	527,886	315,900	40,195	171,791	0
Axiom Asia Private Capital Fund III, LP	899,432	500,000	40,536	358,896	0
Axxon Brazil Private Equity Fund II B, LP	214,813	215,288	(475)	0	0
Bayview Opportunity Domestic III b, LP	2,012,366	818,244	382,550	811,573	0
Bayview Opportunity Domestic, LP	416,974	107,313	86,872	222,788	0
BlackRock Financial Management Bank Loans	851	851	0	0	0
Blackstone Real Estate Partners IV	(264,839)	0	80,165	(345,004)	0
Blackstone Real Estate Partners V	1,637,500	0	82,871	1,554,629	0
Blackstone Real Estate Partners VI	1,861,237	285,712	36,033	1,539,492	0
Blackstone Real Estate Partners VII	2,016,005	723,857	42,261	1,249,887	0
Blackstone Topaz Fund, LP	3,076,671	2,366,927	323,611	386,133	0
Blakeney Onyx, LP	1,244,099	786,068	458,031	0	0
Bridgewater Associates - All Weather @ 12%, LLC	2,124,398	1,829,560	294,837	0	0
Bridgewater Associates - Diamond Ridge Fund, LLC	3,578,600	3,475,645	102,955	0	0
CarVal Investors CVI Global Value Fund A, LP – private debt	112,187	80,701	31,487	0	0
CarVal Investors CVI Global Value Fund A, LP – real estate	112,187	80,701	31,487	0	0
Castlelake Aviation II, LP	399,034	238,965	76,498	83,571	0
Catalyst Fund III, LP	1,362,736	984,570	77,992	300,174	0
Catalyst Fund IV, LP	1,100,975	494,376	87,043	519,556	0
Catalyst Fund V, LP	4,038,430	1,977,504	348,351	1,712,575	0
Catterton Partners V, LP	132,623	113,555	7,731	0	11,337
Catterton Partners VI, LP	242,350	154,104	5,939	75,097	7,209
Catterton Partners VII, LP	580,308	322,687	16,068	226,968	14,586
Cornwall Domestic, LP	1,057,385	1,413,338	404,887	(760,840)	0
Davidson Kempner Institutional Partners, LP	685,496	274,609	90,143	320,744	0
DRI Capital - LSRC	732,161	0	372,469	359,692	0
EIG Energy Fund XIV, LP	300,558	257,928	42,630	0	0
EIG Energy Fund XV, LP	578,248	479,837	98,411	0	0
EIG Energy Fund XVI, LP	1,471,813	500,000	53,268	918,545	0
Elliott International Ltd.	7,776,269	2,217,105	976,551	4,582,613	0
Farallon Capital Institutional Partners, LP	57,569	0	0	57,569	0
Gaoling Fund, LP	7,248,917	1,669,881	93,063	5,485,974	0
Garnet Sky Investors Company, Ltd.	2,622,791	641,276	113,438	1,868,077	0
Gateway Energy & Resource Holdings, LLC	382,453	327,214	43,583	11,656	0
Glenview Capital Opportunity Fund, LP	387,820	241,151	146,669	0	0
Glenview Sidecar	166,220	0	166,220	0	0
Global Forest Partners GTI7 Institutional Investors Company, Ltd.	589,262	420,390	168,872	0	0
Harvest Fund Advisors, LLC	715,732	715,732	0	0	0
HBK Merger Strategies Offshore Fund, Ltd.	3,262,626	750,465	279,436	2,232,725	0
JLL Partners Fund V, LP	581,137	137,631	10,875	432,631	0
JLL Partners Fund VI, LP	3,260,820	459,672	33,268	2,767,880	0
King Street Capital, LP	76,127	53,142	0	22,985	0
King Street Capital, Ltd.	6,811	6,811	0	0	0
Linden Capital Partners II, LP	3,717,158	546,161	16,570	3,154,427	0
Mast Credit Opportunities I, LP	830,960	634,252	196,708	0	0
Merit Energy Partners F-II, LP	186,334	114,824	71,510	0	0

Schedule of Investment Manager Fees continued on page 80

Schedule of Investment Manager Fees continued from page 79

	Total Fees	Manager Fees	Fund Pass Through Expenses (1)	Incentive Fees Earned in FY17	Portfolio Company Charges (2)
MHR Institutional Partners II A, LP	428,039	0	38,274	389,765	0
MHR Institutional Partners III, LP	3,986,599	341,540	59,489	3,585,570	0
MHR Institutional Partners IV, LP	715,978	656,250	59,728	0	0
Millennium Technology Value Partners II	737,808	484,664	21,912	231,232	0
New Mountain Partners III, LP	4,203,455	144,891	120,401	3,911,945	26,218
NISA Investment Advisors	4,767,533	4,767,533	0	0	0
OCM Opportunities Fund IV b, LP	2,142	0	6,614	(4,472)	0
OCM Opportunities Fund VII b, LP	630,482	186,987	137,550	305,945	0
OCM Opportunities Fund VIII b, LP	273,794	294,973	71,371	(92,550)	0
OCM Power Opportunities III, LP	511,341	167,754	17,454	326,133	0
OCM Real Estate Opportunities Fund III, LP	(77,006)	0	17,292	(94,298)	0
OCM/GFI Power Opportunities Fund II, LP	123,574	0	20,118	103,456	0
Perry Partners, LP	514	514	0	0	0
Pharo Macro Fund, Ltd.	6,806,474	2,254,041	78,444	4,473,989	0
Resource Management Service – Wildwood Timberlands, LLC	974,988	368,506	37,699	568,783	0
Silchester International Investors	4,620,851	4,620,851	0	0	0
Silver Creek Special Opportunities Fund I, LP	26,602	0	26,602	0	0
Silver Creek Special Opportunities Fund II, LP	38,090	0	38,090	0	0
Silver Lake Partners II, LP	(205,215)	12,426	995	(218,636)	0
Siris Partners II, LP	218,317	133,078	3,900	81,339	0
Siris Partners III, LP	314,281	262,500	51,781	0	0
State Street Global Advisors	157,670	157,670	0	0	0
SIR Hedged Equity Fund	3,042,511	1,924,917	182,411	935,183	0
StepStone Capital Buyout Fund I, LP	175,839	28,314	62,673	84,852	0
StepStone Capital Buyout Fund II, LP	96,164	66,253	29,911	0	0
StepStone Opportunities Fund II, LP	34,484	5,643	81,152	(52,311)	0
Stone Harbor Investment Partners	185,318	185,318	0	0	0
The Veritas Capital Fund III, LP	1,314,698	43,218	5,625	1,265,855	0
The Veritas Capital Fund IV, LP	1,596,740	158,663	4,748	1,433,329	0
Viking Global Equities III, Ltd.	4,520,596	2,441,535	92,528	1,986,533	0
Grand totals	$134,867,133	$58,327,216	$8,734,299	$67,746,268	$59,350

(1) Fund Pass Through Expenses are administrative expenses charged to the fund and paid by the limited partners (including MOSERS), in addition to the management fee. These expenses may include, but are not limited to, accounting, audit, legal, and custody expenses directly related to the administration of the underlying fund investments.

(2) Portfolio Company Charges are fees/costs paid to the general partners of private equity funds which are not applied as offsets to gross management fees. These charges are paid by the underlying portfolio companies of the funds, and therefore, are indirectly paid by MOSERS.

Asset Class Summary

In general, an improved growth outlook and continued economic improvement led to improved returns for equity assets during the fiscal year. There was a large divergence in asset class performance during the fiscal year with three asset classes delivering a negative return and two delivering a positive return. Global equities were up 18.8% during the year after being down 3.1% during the past fiscal year. Long U.S. treasury bonds were down approximately 7.2% after being up 19.3% the prior fiscal year. Commodities were down 9.0% after being down 26.1% the prior fiscal year. Inflation-linked bonds were down 0.6% after being up 4.4% during the prior fiscal year. Alternative betas were up approximately 3.6% during the fiscal year after being up 6.6% the prior fiscal year. The external beta-balanced portfolio returned 6.7% during the past year after returning a (0.9%) the prior fiscal year.

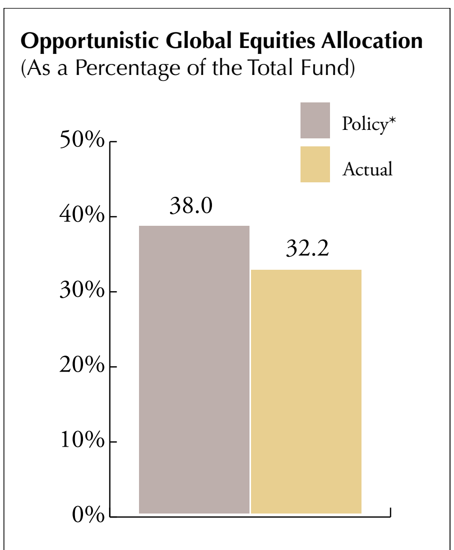
Opportunistic Global Equities

It is expected that investments in this class will perform well during periods of rising economic growth and/or falling inflation. Investments in this asset class include U.S. and non-U.S. equity investments with varying characteristics related to market capitalization and investment style. Because of the non-U.S. nature of some of these investments, foreign currency exposure will be part of this portfolio.

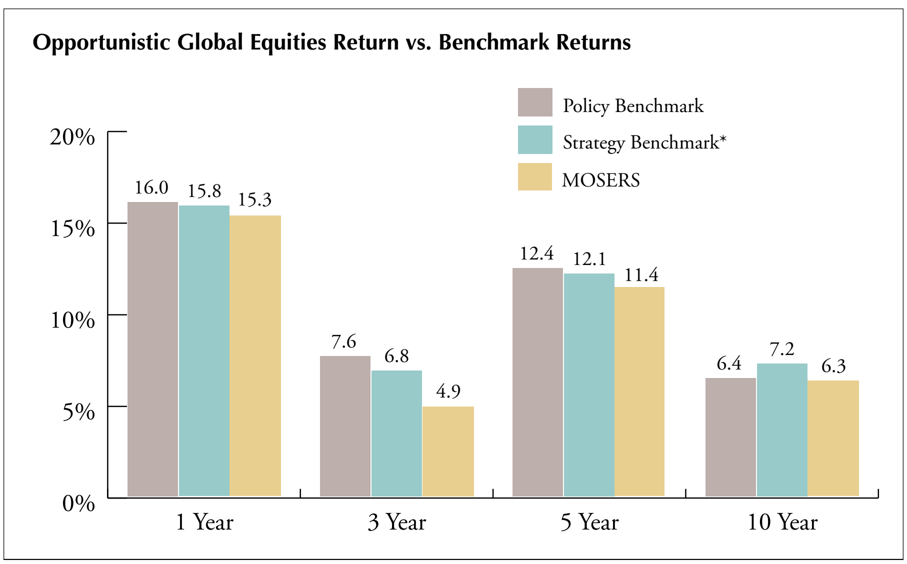
Global equities were up 18.8% during the fiscal year with most of it occurring in the eight months of the year after the presidential election in the United States. In a reversal from last year, equity returns were stronger abroad than they were at home with U.S. equities up 17.3% for the fiscal year while developed international equities were up 20.3% and emerging markets were up 23.8%.

Within the U.S equity market, the financials and information technology performed best with returns of 35.3% and 33.9% during the fiscal year, respectively. The telecom and energy sectors were the worst performing sectors with returns of (11.7%) and (4.1%), respectively. Within developed equity markets (after adjusting for currency changes to the U.S. dollar), Austria and Spain posted the best returns during the fiscal year with a 61.6% and 41.5% return, respectively. Belgium and Denmark returned the least with (0.2%) and 5.3% returns, respectively.

The market exposure of the equity portfolio on June 30, 2017, was $2,601,563,280, representing 32.2% of total fund market exposure. The bar graph below (left) illustrates the actual exposure compared to policy. For the fiscal year, the equity allocation returned 15.3% versus 16.0% for the global equity policy benchmark. The underperformance was driven by the opportunistic equity portfolio lagging its benchmark by 1.9%. The bar graph below (right) illustrates actual performance as compared to the policy and strategy benchmarks.



* As of June 30, 2017, the opportunistic global equities policy was MSCI ACWI Net +.75%.



* As of June 30, 2017, the total opportunistic global equities strategy benchmark was comprised of the following components: 17.7% actual return of domestic equity exposure, 4.9% S&P MLP, 53.9% MSCI World ex. U.S. (Net), 15.2% MSCI Emerging Markets (Net) and 8.3% MSCI China. This asset class commenced September 2002.

The tables below show the commission brokerage activity and statistical performance that occurred within the global equity portfolio in FY17.

Opportunistic Global Equities – Brokerage Activity

	Shares Traded	Volume of Trades	Commissions Paid
Baird, Robert W & Co., Inc.	4,647	$ 129,876	$ 46
Banco Bilbao Vizcaya	350,000	111,103	810
Barclays Capital, Inc.	27,413	977,006	380
BMO Capital Markets Corp.	6,711	131,537	49
BTIG, LLC	9,313	193,061	279
Citigroup Global Markets, Inc.	77,185	3,025,880	6,655
Credit Suisse	8,217	17,164,439	28,064
FBR Capital Markets & Co.	25,023	720,430	751
Goldman Sachs & Co.	3,158	128,578	95
J.P. Morgan Clearing Corp.	2,845	48,160	85
Jefferies & Co., Inc.	739,137	22,952,797	3,698
Merrill Lynch Pierce Fenner Smith, Inc.	318,411	10,598,430	5,758
Morgan Stanley & Co., Inc.	101,703	384,049,823	426,334
National Financial Services Corp.	1,202	22,387	36
Pershing, LLC	4,677	124,564	47
Raymond James & Associates, Inc.	6,620	88,794	199
RBC Capital Markets, LLC	151,718	4,055,919	776
UBS Securities, LLC	20,972	600,988	612
Weeden & Co.	3,276	207,867	78
Wells Fargo Securities, LLC	1,753,796	53,422,567	9,625
Total	3,616,024	$498,754,206	$484,377

Opportunistic Global Equities – Statistical Performance

Portfolio Characteristics	1 Year	3 Year	5 Year	10 Year
Return	15.3%	4.9%	11.4%	6.3%
Annualized standard deviation	2.0%	5.5%	6.4%	10.6%
Sharpe ratio	7.57	0.86	1.78	0.55
Excess return*	(0.7)%	(2.7)%	(1.0)%	(0.1)%
Beta*	0.31	0.49	0.62	0.67
Annualized alpha*	9.8%	1.2%	3.5%	1.8%
Correlation*	0.78	0.85	0.86	0.94

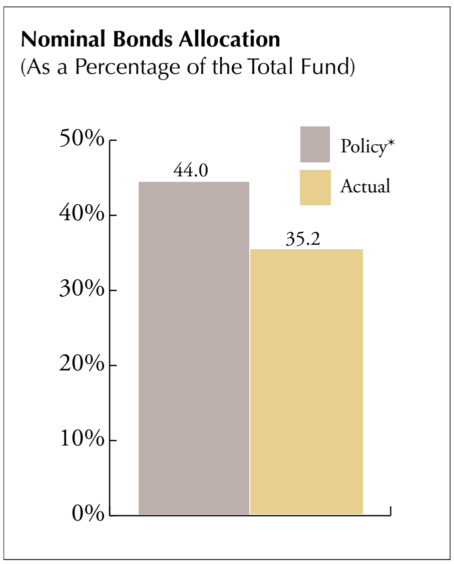
** As compared to the total opportunistic global equities policy benchmark.*

Nominal Bonds

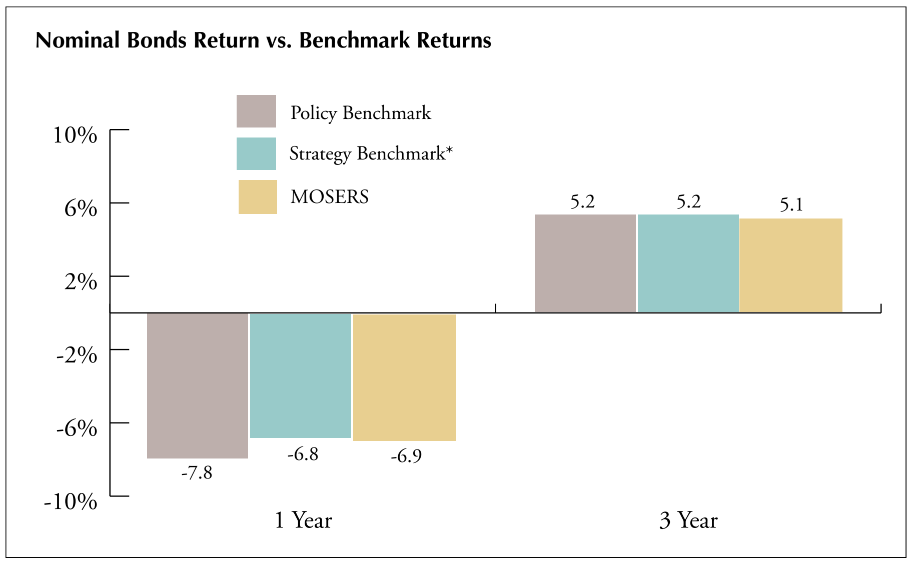
It is expected that investments in this asset class will perform well in periods of falling economic growth and falling inflation. Investments in this asset class include U.S. bonds that have been issued, collateralized or guaranteed by the U.S. Government, its agencies, or its instrumentalities. Because this asset class is invested in all U.S. bonds, there is currently not any foreign currency exposure as part of this portfolio.

Interest rates rose globally during the fiscal year leading to poor returns for nominal bonds. In the United States, the 10-year treasury rate increased approximately 0.8% as the Federal Reserve began tightening monetary policy by increasing short-term interest rates. Longer-term treasuries underperformed shorter-term treasuries during the fiscal year. For example, treasuries with a maturity of 20 years and longer returned (7.5%), while treasuries with a maturity in less than 10 years returned (1.3%). Among developed markets, Japan posted the worst 7- to 10-year maturity nominal bond performance with (10.9%), followed by Canada, (3.9%); U.S., (3.8)%; Great Britain, (3.0%); and Germany, (0.8%).

As of June 30, 2017, the market exposure of the nominal bond portfolio was $2,840,437,911, representing 35.2% of total market exposure. The bar graph below (left) illustrates the actual exposure compared to policy. For the fiscal year, the nominal bond allocation returned (6.9%) versus (7.8%) for the nominal bond policy benchmark. A strategic decision preferring to own U.S. Treasury Inflation Protected Securities (TIPS) in lieu of nominal treasuries was the cause of the outperformance this year. The bar graph below (right) illustrates actual performance as compared to the policy and strategy benchmarks.



* As of June 30, 2017, the total nominal bonds policy was Barclays Long Treasury.



* As of June 30, 2017, the total nominal bonds strategy benchmark was comprised of the following components: 95.0% total nominal bonds policy and 5.0 % Barclays U.S. Treasury Inflation Notes 10+ Year. This asset class commenced September 2012. Five-year data will be displayed when it becomes available.

The table below shows the statistical performance that occurred within the nominal bond portfolio in FY17. There was no commission brokerage activity within the nominal bond portfolio in FY17.

Nominal Bonds – Statistical Performance

Portfolio Characteristics	1 Year	3 Year
Return	(6.9)%	5.1%
Annualized standard deviation	9.0%	10.4%
Sharpe ratio	(0.81)	0.48
Excess return*	1.0%	(0.1)%
Beta*	0.93	0.95
Annualized alpha*	0.4%	0.2%
Correlation*	1.00	1.00

* *As compared to the total nominal bonds policy benchmark.*

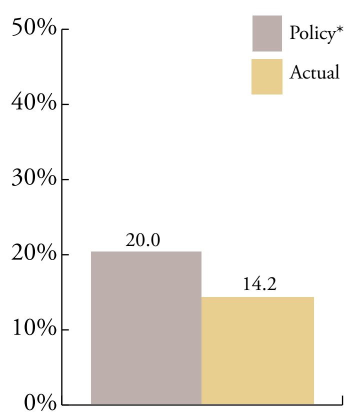
Commodities

It is expected that investments in this asset class will perform well during periods of rising economic growth and rising inflation. Investments in the asset class may include investments in raw materials, materials required in the manufacturing of finished products, the owners of raw goods, and the producers of raw materials. Because this asset class is invested in all U.S. dollar commodities there is currently not any foreign currency exposure as part of this portfolio.

Commodities again had poor performance in the fiscal year as a result of three of the four commodity sectors producing negative returns. Energy produced the worst return for a second straight year with (14.8%) return, followed by agriculture with (13.1) and precious metals with (8.4%). The only positive return came from industrial metals with a 17.5% return. Within these sectors, zinc and copper performed best with 28.5% and 20.4% returns, respectively. The worse performing commodities during the fiscal year were sugar and soy meal with (35.0%) and (26.8%) returns, respectively.

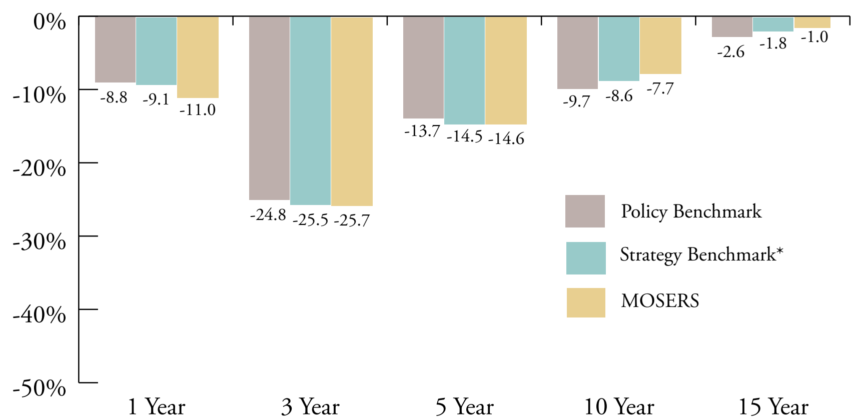
As of June 30, 2017, the market exposure of the commodities portfolio was $1,144,649,079, representing 14.2% of the total market exposure. The bar graph below (left) illustrates the actual exposure compared to policy. For the fiscal year, the commodity allocation returned (11.0%) versus (8.8%) for the commodity policy benchmark. The primary driver of the underperformance was an overweight to energy via a strategic decision that was implemented with external active management. The bar graph below (right) illustrates actual performance as compared to the policy and strategy benchmarks.

Commodities Allocation
(As a Percentage of the Total Fund)



* As of June 30, 2017, the commodities policy was S&P GSCI and BCOM.

Commodities Return vs. Benchmark Returns



* As of June 30, 2017, the total commodities strategy benchmark was comprised of the following components: 14.7% total commodities policy, 31.0% Goldman Sachs Commodity Index, 39.0% Bloomberg Commodity Index, 7.1% Bloomberg Roll Select Commodity Index, 5.4% S&P GSCI Crude Oil Index and 2.9% S&P GSCI Brent Crude Index. This asset class commenced November 1998.

The table below shows the statistical performance that occurred within the commodities portfolio in FY17. There was no commission brokerage activity within the commodities portfolio in FY17.

Commodities – Statistical Performance

Portfolio Characteristics	1 Year	3 Year	5 Year	10 Year	15 Year
Return	(11.0)%	(25.7)%	(14.6)%	(7.7)%	(1.0)%
Annualized standard deviation	13.1%	22.2%	18.9%	24.4%	23.7%
Sharpe ratio	(0.87)	(1.17)	(0.78)	(0.34)	(0.09)
Excess return*	(2.2)%	(0.9)%	(0.8)%	2.0%	1.7%
Beta*	1.00	1.07	1.05	1.02	1.01
Annualized alpha*	(2.4)%	1.1%	(0.1)%	2.4%	1.9%
Correlation*	0.99	0.99	0.99	0.98	0.99

** As compared to the total commodities policy benchmark.*

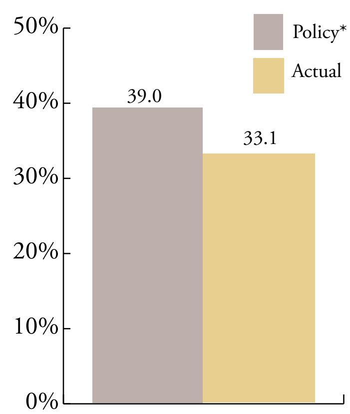
Inflation-Linked Bonds

It is expected that investments in this asset class will perform well during periods of falling economic growth and rising inflation. Investments in this asset class include U.S. bonds that have been issued, collateralized or guaranteed by the U.S Government, its agencies, or its instrumentalities. All such securities must derive a significant portion of their value from changes in the respective issuer's domestic inflation. Because this asset class is invested in all U.S. bonds, there is currently not any foreign currency exposure as part of this portfolio.

Inflation in the U.S. increased during the fiscal year to 1.6% year-over-year versus 1.0% as of June 30, 2016. Inflation continued to stay below the Federal Reserve's target inflation rate of 2.0%. The 10-year real rate (the interest rate after subtracting the inflation rate) on TIPS increased by 0.5% during the fiscal year resulting in poor performance for inflation-linked bonds. U.S. TIPS returned (0.6%) as compared to Japan, (10.2%); Canada, (3.2%); Germany, 0.5%; and Great Britain, 3.7%.

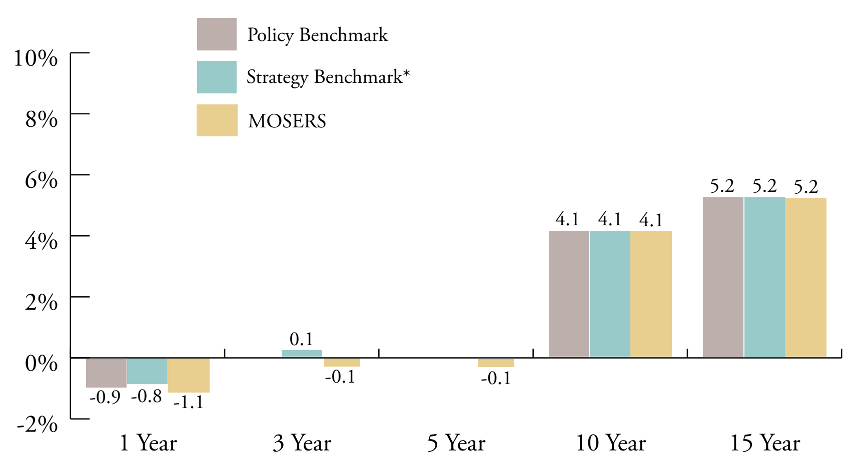
As of June 30, 2017, the market exposure of the inflation-linked bond portfolio was $2,673,386,121, representing 33.1% of total notional exposure. The bar graph below (left) illustrates the actual exposure compared to policy. For the fiscal year, the inflation-linked bond allocation returned (1.1%) versus (0.9%) for the inflation-linked bond policy benchmark. There was no internal or external active management strategy during the year; thus providing a return that closely matched the benchmark. The bar graph below (right) illustrates actual performance as compared to the policy and strategy benchmarks.

Inflation-Indexed Bonds Allocation
(As a Percentage of the Total Fund)



* As of June 30, 2017, the inflation-linked bonds policy was U.S. TIPS 1-10 YR.

Inflation-Indexed Bonds Return vs. Benchmark Returns



* As of June 30, 2017, the inflation-linked bonds strategy benchmark is equal to the inflation-linked bonds policy. This asset class commenced November 1998.

The table below shows the statistical performance that occurred within the inflation-linked bond portfolio in FY17. There was no commission brokerage activity within the inflation-linked bond portfolio in FY17.

Inflation-Linked Bonds – Statistical Performance

Portfolio Characteristics	1 Year	3 Year	5 Year	10 Year	15 Year
Return	(1.1)%	(0.1)%	(0.1)%	4.1%	5.2%
Annualized standard deviation	2.2%	3.0%	3.6%	6.0%	7.3%
Sharpe ratio	(0.76)	(0.13)	(0.08)	0.60	0.55
Excess return*	(0.3)%	(0.2)%	(0.2)%	0.0%	0.1%
Beta*	0.99	1.00	0.99	1.00	1.01
Annualized alpha*	(0.4)%	(0.2)%	(0.2)%	0.0%	0.0%
Correlation*	1.00	1.00	1.00	1.00	1.00

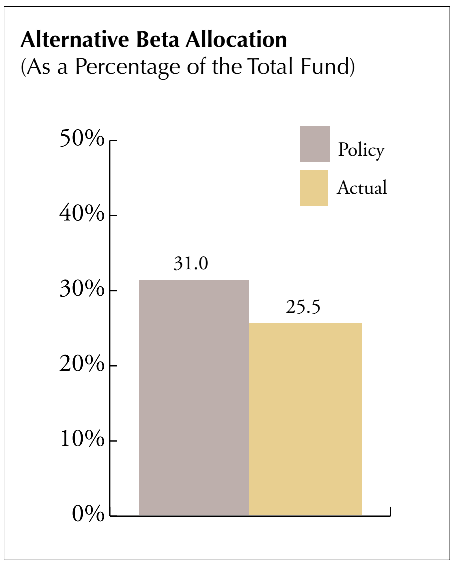
* *As compared to the total inflation-linked bonds policy benchmark.*

Alternative Beta

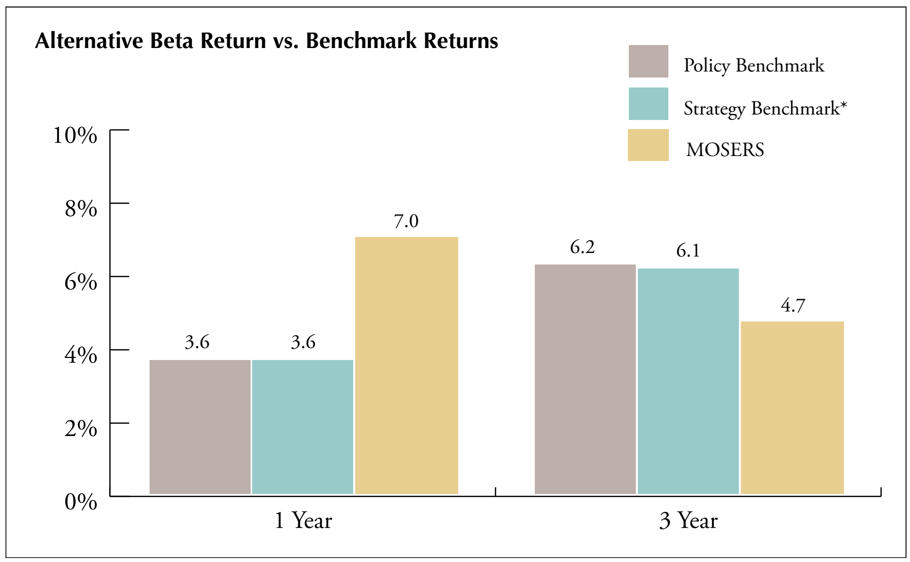
This asset class represents multiple hedge funds, and alternative betas. The hedge funds have been selected because they invest in difficult to obtain risk premiums or they are expected to produce alpha over an otherwise easy to obtain risk premium. Hedge fund betas are expected to produce positive risk premia and are obtained passively at fees lower than active management fees. As a result of the multitude of strategies being deployed, it is expected that this asset class will provide meaningful diversification to the portfolio. While the sensitivities to economics will be dependent on positioning at the time, it expected that these betas will have their best returns in rising growth environments and their worst returns in falling growth environments. Because of the non-U.S. nature of some of these investments, foreign currency exposure will be part of this portfolio.

The alternative beta portfolio performed well during the fiscal year led by strong performance from event driven and equity market neutral which returned 11.8% and 11.3%, respectively. Managed futures and global macro were drags on performance as they returned (16.0%) and (6.5%), respectively, during the fiscal year.

As of June 30, 2017, the market exposure of the alternative beta portfolio was $2,060,111,457, representing 25.5% of total market exposure. The bar graph below (left) illustrates the actual exposure compared to policy. The alternative beta allocation returned 7.0% for the fiscal year versus 3.6% for alternative beta policy benchmark. The outperformance was attributable to active hedge fund managers who collectively represented approximately 69% of the allocation and returned 8.4% for the year. The bar graph below (right) illustrates actual performance as compared to the policy and strategy benchmarks.



* As of June 30, 2017, the alternative beta policy was AQR Delta.



* As of June 30, 2017, the total opportunistic global equities strategy benchmark was comprised of the following components: 86.3% total alternative beta policy, 4.7% actual return of several managers, 2.51% JPM GBI-EM Global Diversified and 6.5% S&P Systematic Global Macro Index. This asset class commenced September 2012. Five-year data will be displayed when it becomes available.

The table below shows the statistical performance that occurred within the alternative betas portfolio in FY17. There was no commission brokerage activity within the alternative betas portfolio in FY17.

Alternative Beta – Statistical Performance

Portfolio Characteristics	1 Year	3 Year
Return	7.0%	4.7%
Annualized standard deviation	1.3%	2.5%
Sharpe ratio	4.88	1.84
Excess return*	3.4%	(1.4)%
Beta*	0.16	0.23
Annualized alpha*	6.2%	3.3%
Correlation*	0.47	0.54

* *As compared to the total alternative betas policy benchmark.*

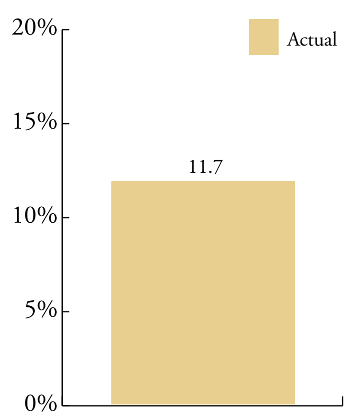
External Beta-Balanced

Bridgewater All-Weather and AQR Global Risk Premium are utilized for the external portion of the risk balanced portfolio, while the internal portion is managed by staff utilizing NISA Investment Advisors to implement the trading and operational aspects of the program.

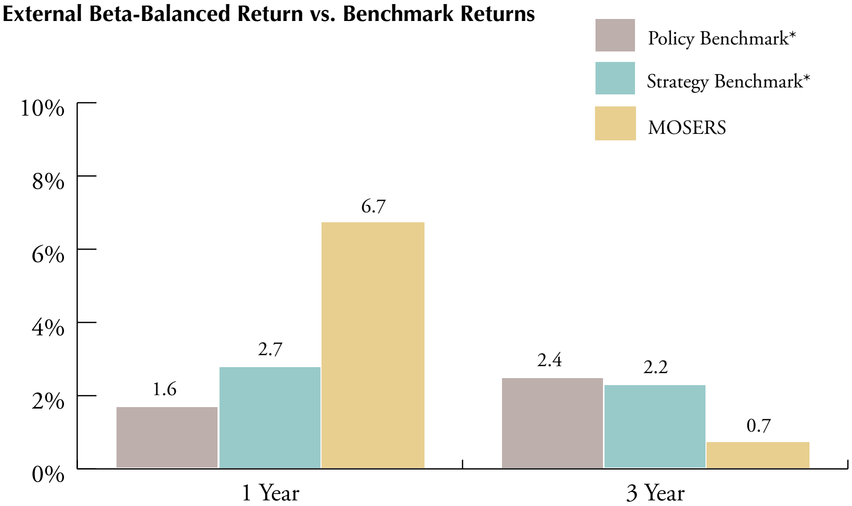
Bridgewater returned 6.2% for the fiscal year after returning 0.5% last fiscal year. AQR returned 7.1% for the fiscal year after returning (2.2%) last fiscal year. This fiscal year performance of both mangers was above median compared with other risked balanced managers. These active managers invest in similar asset classes as the internal portfolio but hold them in different weights and implement different active portfolio management decisions.

As of June 30, 2017, the external beta-balanced portfolio returned 6.7% for the fiscal year and represented 11.7%, or $943,582,998 of market exposure. The bar graph below (left) illustrates the actual exposure of the allocation. There is no policy allocation to the external beta-balance. These managers hold similar asset classes but can have different weights to those asset classes as compared to their benchmark. As a portfolio, these two managers outperformed their benchmark for the year by 5.1%. The bar graph below (right) illustrates actual performance as compared to the policy and strategy benchmarks.

External Beta-Balanced Allocation
(As a Percentage of the Total Fund)



External Beta-Balanced Return vs. Benchmark Returns



* As of June 30, 2017, the external beta-balanced policy benchmark was equal to the MOSERS' total fund policy benchmark and the strategy benchmark was equal to the MOSERS' total fund strategy benchmark. This asset class commenced October 2012. Five-year data will be displayed when it becomes available.

The table below shows the statistical performance that occurred within the external beta-balanced portfolio in FY17. There was no commission brokerage activity within the external beta-balanced portfolio in FY17.

External Beta-Balanced – Statistical Performance

Portfolio Characteristics	1 Year	3 Year
Return	6.7%	0.7%
Annualized standard deviation	6.7%	9.2%
Sharpe ratio	0.94	0.05
Excess return*	5.1%	(1.7)%
Beta*	1.09	1.25
Annualized alpha*	4.8%	(2.1)%
Correlation*	0.94	0.93

* *As compared to the total policy benchmark.*

Securities Lending Program

During the fiscal year ended June 30, 2017, MOSERS' net income through its securities lending program was $21,896. MOSERS lends its domestic equity, international equity and fixed income securities through Deutsche Bank which manages the program in an agent capacity. In an agent lending program, the agent lender is responsible for making the loans to various broker-dealers, investing the cash collateral associated with the loaned securities, marking the loans and collateral to market on a daily basis, and, in most cases, indemnifying the lender against the default of a broker-dealer to whom they have loaned securities on behalf of the beneficial owner.

In fiscal year 2017, income from domestic equity increased due to an increase in lending margin. During the fiscal year, all loans were repaid and there were no loans outstanding as of June 30, 2017. There was no income from international equity or fixed income as there were no securities to lend during the period. The tables as titled below show the last 10 years of activity for the securities lending program.

Domestic Equity

Fiscal Year	Average Lendable	Average on Loan	Average Utilization	Lending Margin (Basis Points)	Net Income (Loss)
2008	$440,025,347	$195,971,154	44.5%	36.6	$1,611,536
2009	307,082,718	114,261,769	37.2	52.0	1,596,245
2010	321,114,801	83,944,408	26.1	26.9	864,401
2011	376,047,357	111,263,248	29.6	16.5	619,648
2012	424,041,044	145,373,164	34.3	19.1	810,972
2013	238,024,131	69,543,634	29.2	25.1	596,941
2014	187,154,236	62,768,614	33.5	22.6	422,422
2015	168,456,525	53,517,452	31.8	6.9	116,204
2016	117,553,687	36,503,528	31.1	0.0	(49)
2017	36,343,073	4,063,557	11.2	6.0	21,896

International Equity

Fiscal Year	Average Lendable	Average on Loan	Average Utilization	Lending Margin (Basis Points)	Net Income
2008	$467,893,205	$56,994,925	12.2%	15.5	$726,565
2009	342,215,198	32,267,851	9.4	14.9	510,622
2010	277,251,343	19,736,528	7.1	4.0	109,946
2011	320,082,404	88,623,017	27.7	10.4	333,000
2012	309,052,299	47,666,253	15.4	7.5	230,655
2013	192,359,434	49,525,171	25.7	5.6	108,379
2014	0	0	0.0	0.0	0
2015	0	0	0.0	0.0	0
2016	0	0	0.0	0.0	0
2017	0	0	0.0	0.0	0

Fixed Income

Fiscal Year	Average Lendable	Average on Loan	Average Utilization	Lending Margin (Basis Points)	Net Income
2008	$1,082,813,165	$894,372,380	82.6%	56.4	$6,104,526
2009	859,512,525	517,356,516	60.2	43.3	3,722,523
2010	836,242,270	190,547,907	22.8	2.8	230,031
2011	805,579,308	505,690,676	62.8	7.2	581,875
2012	776,256,144	516,553,974	66.5	6.4	496,074
2013	622,620,959	427,442,773	68.7	5.1	315,060
2014	247,256,630	185,527,243	75.0	4.4	108,552
2015	0	0	0.0	0.0	0
2016	0	0	0.0	0.0	0
2017	0	0	0.0	0.0	0

1997

ACTUARIAL SECTION

Construction of a new office building was initiated in 1997 during MOSERS' 40th year of operation and was completed in February of 1998. Having grown from an initial staff of five employees in 1958 to a staff of nearly 60, the new facility was designed to welcome valued members, enhance communication and technology, and facilitate productivity including the maintenance of records for nearly 80,000 active, retired, and terminated-vested members.

Actuarial Section

Actuary's Certification Letter

Cavanaugh Macdonald
CONSULTING, LLC
The experience and dedication you deserve

October 16, 2017

The Board of Trustees
Missouri State Employees' Retirement System
907 Wildwood Drive
Jefferson City, Missouri 65109

Dear Members of the Board:

At your request, we have performed an actuarial valuation of the Missouri State Employees' Retirement System (MOSERS) as of June 30, 2017 for the purpose of determining contribution rates for fiscal year 2019. Actuarial valuations are prepared annually for the Missouri State Employees' Plan (MSEP) and the Judicial Plan. The board of trustees is responsible for establishing and maintaining the funding policies for both plans. The major findings of the valuations are contained in this section, which reflects the plan provisions in place on June 30, 2017, as amended by legislation passed by the 2017 legislature.

In preparing our report, we relied, without audit, on information (some oral and some in writing) supplied by the system's staff. This information includes, but is not limited to, statutory provisions, member data, and financial information. We found this information to be reasonably consistent and comparable with information used for other purposes. The valuation results depend on the integrity of this information. If any of this information is inaccurate or incomplete, our results may be different and our calculations may need to be revised.

We further certify that all costs, liabilities, and other factors for the plans have been determined on the basis of actuarial assumptions and methods which are individually reasonable (taking into account the experience of the plans and reasonable expectations); meet applicable Actuarial Standards of Practice (ASOPs); and which, in combination, offer our best estimate of anticipated experience affecting the plans. Nevertheless, the emerging costs of the plans will vary from those presented herein to the extent actual experience differs from that projected by the actuarial assumptions. The board of trustees has the final decision regarding the appropriateness of the assumptions and adopted them, as indicated in Appendix D of our *MSEP Actuarial Valuation Report* and Appendix C of our *Judges Actuarial Valuation Report*.

Future actuarial measurements may differ significantly from the current measurements presented in the June 30, 2017 valuation reports due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements; and changes in plan provisions or applicable law. Due to the limited scope of our assignment, we did not perform an analysis of the potential range of future measurements.

3906 Raynor Pkwy, Suite 106, Bellevue, NE 68123
Phone (402) 905-4461 • Fax (402) 905-4464
www.CavMacConsulting.com
Offices in Englewood, CO • Kennesaw, GA • Bellevue, NE

The Board of Trustees
October 16, 2017
Page 2

Actuarial computations presented in this section are for purposes of determining the recommended and statutory funding amounts for the plans. The calculations have been made on a basis consistent with our understanding of the plans' funding requirements and goals. Determinations for purposes other than meeting these requirements may be significantly different from the results shown in the June 30, 2017 valuation reports. Accordingly, additional determinations may be needed for other purposes.

We provided the information used in the supporting schedules in the *Actuarial Section*, and the *Schedule of Employers' Net Pension Liability*, *Sensitivity of Net Pension Liability to Changes in the Discount Rate*, *Schedule of Changes in Employers' Net Pension Liability* and the *Schedule of Employer Contributions* in the *Financial Section*.

Actuarial computations, based on the actuarial valuations performed as of June 30, 2017, were also prepared as of June 30, 2017 for purposes of fulfilling financial accounting requirements for the plans under Governmental Accounting Standard Number 67 (GASB 67). The assumptions used in the funding valuation were also used for GASB 67 reporting, including the use of a 7.50% discount rate for GASB 67 calculations (7.50% is the assumed rate of return used in the funding valuation). In addition, the entry age normal actuarial cost method, which is required to be used under GASB 67, is also used in the funding valuations. The actuarial assumptions and methods meet the parameters set by ASOPs, as issued by the Actuarial Standards Board, and generally accepted accounting principles (GAAP) applicable in the United States of America as promulgated by the Governmental Accounting Standards Board (GASB). Additional information related to GASB 67 can be found in the *Financial Section* of this report.

The consultants who worked on this assignment are pension actuaries. Cavanaugh Macdonald Consulting, LLC's advice is not intended to be a substitute for qualified legal or accounting counsel.

We certify that, to the best of our knowledge and belief, the June 30, 2017 actuarial valuation reports are complete and accurate and have been prepared in accordance with generally recognized and accepted actuarial principles and practices. We are members of the American Academy of Actuaries and meet the Qualification Standards to render the actuarial opinion contained herein.

Sincerely,

Patrice Beckham

Patrice A. Beckham, FSA, EA, FCA, MAAA
Principal and Consulting Actuary

Joseph A. Nichols

Joseph A. Nichols, ASA, EA, MSPA, FCA, MAAA
Consulting Actuary

Summary of Actuarial Assumptions

Actuarial Methods

Calculation of normal cost and actuarial accrued liability

The funding method used to determine the normal cost and actuarial accrued liability was the entry age actuarial cost method described below.

- **Entry age actuarial cost method** – Under the entry age normal cost method, the actuarial present value of each member's projected benefit is allocated on a level basis over the member's compensation between the entry age of the member and their assumed exit age. The portion of the actuarial present value allocated to the valuation year is called the normal cost. The actuarial present value of benefits allocated to prior years of service is called the actuarial accrued liability. The unfunded actuarial accrued liability represents the difference between the actuarial accrued liability and the actuarial value of assets as of the valuation date. The unfunded actuarial accrued liability is calculated each year and reflects experience gains/losses.

Calculation of the actuarial value of assets (AVA)

The AVA is based on an open five-year smoothing method and is determined by spreading the difference between the actual investment income on market value and expected investment income on actuarial value. The difference is added to the net unrecognized gains or losses from previous years (difference between the beginning of year market value and beginning of year actuarial value) and then divided by 5 to create a phased-in amount. This phased-in amount is then added to the expected AVA at the valuation date (beginning of the AVA plus actual cash flow plus expected investment income). The AVA is limited by a corridor and must be no less than 80% of market value of assets and no greater than 125% of market value of assets.

Changes in methods and assumptions since the prior year

The assumed rate of investment return was decreased from 7.65% effective June 30, 2016 to 7.50% effective June 30, 2017.

Actuarial Assumptions

Economic Assumptions

- **Investment return** – 7.50%, compounded annually, net of investment expenses. (7.65% in June 30, 2016 valuation)
- **Inflation** – 2.50% per year
- **Payroll growth** – 3.00% per year
- **Cost-of-living adjustment (COLA)** – 4.00% on a compounded basis when a minimum COLA of 4.00% is in effect; 2.00% on a compounded basis when no minimum COLA is in effect.
- **Interest on member contributions** – 1.50% per year

Demographic Assumptions

- **Mortality** – The mortality assumption includes an appropriate level of conservatism that reflects expected future mortality improvement.

  MSEP/MSEP 2000/MSEP2011
  - **Post-retirement** – RP-2014 Healthy Annuitant mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 120%
  - **Pre-retirement** – RP-2014 Employee mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 95% for males and 90% for females
  - **Long-term disability** – RP-2014 Disabled mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 95% for males and 90% for females

  Judicial Plan
  - **Post-retirement** – RP-2014 Healthy Annuitant mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 98%
  - **Pre-retirement** – RP-2014 Employee mortality table, projected from 2006 to 2026 with Scale MP-2015
  - **Long-term disability** – RP-2014 Disabled mortality table, projected from 2006 to 2026 with Scale MP-2015

The actuarial valuation computations were made by or under the supervision of a Member of the American Academy of Actuaries (MAAA). Assumptions were adopted based on the June 30, 2016 experience study.

MSEP – Percent of Eligible Active Members Retiring Within the Next Year | June 30, 2017

	Normal Retirement Pattern				Early Retirement Pattern		
	MSEP and MSEP 2000			MSEP 2011		MSEP	MSEP 2011
	Percent Retiring						
Retirement Age	1^{st} Year	2^{nd} Year	3^{rd} Year	Percent Retiring	Retirement Age	Percent Retiring	Percent Retiring
48	20%						
49	20	10%					
50	20	10	21%				
51	20	10	21				
52	20	10	21				
53	20	10	21				
54	20	10	21				
55	20	10	21	45%			
56	20	10	21	45			
57	20	10	21	35	57	2.4%	
58	20	10	21	35	58	3.1	
59	20	10	21	30	59	3.0	
60	20	10	21	35	60	5.1	
61	19	10	21	25	61	6.0	
62	18	22	29	40	62	6.0	10.0%
63	16	18	24	30	63	6.0	10.0
64	15	17	17	20	64	6.0	10.0
65	19	19	27	30	65		50.0
66	24	25	28	25	66		50.0
67	10	25	23	20	67		
68	20	25	23	20	68		
69	20	25	23	20	69		
70	20	25	23	20	70		
71	20	25	23	20	71		
72	20	25	23	20	72		
73	20	25	23	20	73		
74	20	25	23	20	74		
75	50	50	23	50	75		
76	50	50	23	50	76		
77	75	75	23	75	77		
78	100	100	100	100	78		

MSEP – Separations From Active Employment Before Service Retirement and Individual Pay Increase Assumptions | June 30, 2017

		Percent of Active Members Separating Within the Next Year						Pay Increase Assumptions for an Individual Employee***			
		Termination*		Death**		Disability					
Sample Ages	Years of Service	Male	Female	Male	Female	Male	Female	Years of Service	Merit and Seniority	Base (Economy)	Increase Next Year
	0	24.0%	27.5%					1	5.75%	3.00%	8.75%
	1	19.0	21.5					2	2.50	3.00	5.50
	2	15.5	16.3					3	1.50	3.00	4.50
	3	13.3	13.5					4	1.25	3.00	4.25
	4	11.2	11.3					5	1.00	3.00	4.00
25	5+	13.5	14.0	0.03%	0.01%	0.10%	0.10%	6	1.00	3.00	4.00
30		10.6	11.0	0.03	0.02	0.10	0.10	7	1.00	3.00	4.00
35		8.2	8.5	0.04	0.03	0.10	0.10	8	1.00	3.00	4.00
40		5.8	6.0	0.05	0.03	0.36	0.36	9	0.75	3.00	3.75
45		4.3	4.5	0.07	0.05	0.41	0.41	10	0.50	3.00	3.50
50		2.9	3.0	0.13	0.08	0.57	0.57	15	0.50	3.00	3.50
55		2.9	3.0	0.22	0.14	0.77	0.77	20	0.50	3.00	3.50
60		2.9	3.0	0.40	0.20	1.02	1.02	25	0.25	3.00	3.25
65		2.9	3.0	0.70	0.30	1.23	1.23	30	0.25	3.00	3.25
70		2.9	3.0	1.17	0.50	1.23	1.23				

* *Does not apply to elected officials and legislators.*

** *2% of the deaths in active service are assumed to be duty-related.*

*** *Does not apply to members of the General Assembly.*

Elected Officials and Legislators – Percent of Active Members Retiring Within the Next Year | June 30, 2017

Years of Service	Termination Male/Female	Years of Service	Termination Male/Female
0-1	8.0%	4-5	12.0%
1-2	8.0	5-6	12.0
2-3	8.0	6-7	12.0
3-4	8.0	7+	35.0

Judicial Plan – Percent of Eligible Active Members Retiring Within the Next Year | June 30, 2017

	Normal Retirement Pattern				Early Retirement Pattern		
	Judicial Plan Percent Retiring		Judicial Plan 2011 Percent Retiring			Judicial Plan Percent Retiring	
Retirement Age	Male	Female	Male	Female	Retirement Age	Male	Female
55	20%	3%					
56	16	3					
57	13	3					
58	9	3					
59	5	3					
60	8	8					
61	5	8					
62	8	8	30%	35%	62	6%	3%
63	10	8	20	20	63	6	3
64	12	8	15	20	64	6	3
65	12	15	30	50	65	6	3
66	20	15	25	25	66	6	3
67	20	15	20	25	67	6	3
68	30	15	20	25	68	6	3
69	30	15	30	50	69	6	3
70	100	100	100	100	70	100	100

Judicial Plan – Separations From Active Employment Before Service Retirement and Individual Pay Increase Assumptions | June 30, 2017

	Percent of Active Members Separating Within the Next Year				Pay Increase Assumptions for an Individual Employee			Percent of Active Members Separating Within the Next Year		
	Death		Disability					Termination		
Sample Ages	Male	Female	Male	Female	Merit and Seniority	Base (Economy)	Increase Next Year	Service Index	Male	Female
25	0.03%	0.01%	0.01%	0.01%	2.20%	3.00%	5.20%	1	0.04%	0.040%
30	0.03	0.02	0.02	0.01	2.20	3.00	5.20	2	0.010	0.023
35	0.04	0.03	0.03	0.02	1.48	3.00	4.48	3	0.013	0.023
40	0.05	0.04	0.04	0.03	0.76	3.00	3.76	4	0.013	0.023
45	0.07	0.05	0.05	0.04	0.60	3.00	3.60	5	0.013	0.023
50	0.13	0.09	0.08	0.07	0.54	3.00	3.54	6-10	0.013	0.023
55	0.24	0.16	0.13	0.12	0.44	3.00	3.44	11-15	0.017	0.023
60	0.42	0.23	0.20	0.19	0.00	3.00	3.00	16+	0.010	0.010
65	0.74	0.33	0.20	0.19	0.00	3.00	3.00			
70	1.23	0.55	0.20	0.19	0.00	3.00	3.00			

Miscellaneous Technical Assumptions – June 30, 2017

- **Form of payment**

  MSEP
  - 50% joint and survivor

  MSEP 2000/MSEP 2011
  - Straight life annuity

  Judicial Plan
  - **Hired before January 1, 2011** – 50% joint and survivor
  - **Hired on or after January 1, 2011** – Straight life annuity

- **Marital status**

  MSEP/MSEP 2000/MSEP 2011
  - **Percent married** – 70% married at retirement, 60% of those dying in active service are married
  - **Spouse's age** – Females assumed to be three years younger than males.

  Judicial Plan
  - **Percent married** – 100% married
  - **Spouse's age** – Females assumed to be four years younger than males.

- **Pay increase timing** – Beginning of the fiscal year.
- **Decrement timing** – Decrements of all types are assumed to occur mid-year.
- **Eligibility testing** – Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.
- **Benefit service** – Exact fractional service is used to determine the amount of the benefit payable.
- **Decrement relativity** – Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.
- **Decrement operation** – Disability and withdrawal do not operate during normal retirement eligibility.
- **Other liability adjustments**

  MSEP/MSEP 2000/MSEP 2011
  - Pre-Retirement survivor benefits for spouse of terminated-vested member. These factors are used to estimate the cost of immediate unreduced survivor annuities upon the death of a vested member.

Pre-Retirement Survivor Benefits for Spouse of Terminated-Vested Member

Age	Male	Female
<30	1.57	1.31
30-39	1.24	1.13
40-49	1.09	1.05
>50	1.02	1.01

- **Incidence of contributions** – Contributions are assumed to be received continuously throughout the year based upon the computed percent of payroll shown in this report, and the actual payroll payable at the time contributions are made. New entrant normal cost contributions are applied to the funding of new entrant benefits.
- **Retirement election**

  MSEP 2000
  - All regular state employees hired on or before June 30, 2000 are assumed to elect MSEP 2000 prior to age 62 and MSEP on or after age 62.
  - Elected officials, general assembly, and uniformed water patrol members hired before July 1, 2000 and administrative law judges hired before April 26, 2005 are assumed to elect MSEP at retirement.

- **Service adjustment**

  MSEP/MSEP 2000/MSEP 2011

  – It is assumed that each member will be granted eight months of service credit, four months for unused leave upon retirement and four months for military service purchases.

  MSEP 2011

  – For members hired on or after January 1, 2011 it is assumed that each member will be granted five months for unused leave.

- **Forfeitures**

  MSEP 2011

  – For those hired on or after January 1, 2011, 50% of state employees terminating at first vesting eligibility are assumed to take a refund and forfeit their deferred pension. This percentage decreases to 0% at first retirement eligibility.

  Judical Plan

  – No vested members are assumed to take a refund of employee contributions.

- **Salary and benefit limits** – For purposes of the valuation, no limits were applied to member compensation or benefits.
- **Commencement age for deferred vested benefit** – normal retirement date
- **Data Adjustments**

  MSEP/MSEP 2000/MSEP 2011

  Active and retired member data was reported as of May 31, 2017. It was brought forward to June 30, 2017 by adding one month of service for all active members and the June COLA for certain retired members. Financial information continues to be reported as of June 30. This procedure was instituted to provide sufficient time for the board of trustees to certify the appropriate contribution rate prior to the statutory deadline.

  Active members reported with less than a $100 annualized salary were assumed to receive the average active member pay.

  When the option of choosing plans is available, terminated-vested members are reported with two records, one with benefits under the MSEP and one with benefits under the MSEP 2000. Because it is unknown what the member will elect at retirement, both records are valued and the plan that produces the higher present value of future benefits is used for valuation purposes.

  For any retired member who has elected a joint and survivor benefit, yet has no beneficiary date of birth provided, it was assumed that the beneficiary is three years younger for male retirees and three years older for female retirees.

  For members reported with no gender, the member is assumed to be male.

  Due to limitations in our valuation program, members who are not eligible for normal retirement prior to age 85 had their date of birth adjusted.

  Judicial Plan

  Active and retired member data was reported as of May 31, 2017. It was brought forward to June 30, 2017 by adding one month of service for all active members and the June COLA for certain retired members. Financial information continues to be reported as of June 30. This procedure was instituted to provide sufficient time for the board of trustees to certify the appropriate contribution rate prior to the statutory deadline.

  Active members reported no annualized salary were assumed to receive the average active member pay.

Other Technical Valuation Procedures

Salary increases are assumed to apply to annual amounts.

Decrements are assumed to occur mid-year, except that immediate retirement is assumed for those who are at or older than the age at which retirement rates are 100%. Standard adjustments are made for multiple decrements.

No actuarial liability is included for participants who terminated without being vested prior to the valuation date, except those due a refund of contributions.

Pension Trust Funds

Employer Schedule of Funding Progress | Last Ten Years

MOSERS uses the entry-age normal actuarial cost method which allocates the actuarial present value of each member's projected benefits on a level basis over the member's pensionable compensation between the entry age of the member and assumed exit ages.

MSEP

Actuarial Valuation Date	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) Entry Age (b)	Unfunded AAL (UAAL) (b-a)	Percent Funded (a/b)	Annual Covered Payroll (c)	UAAL Percentage of Covered Payroll [(b-a)/c]
6/30/2008	$7,838,495,768	$ 9,128,347,470	$1,289,851,702	85.9%	$1,916,527,398	67.3%
6/30/2009	7,876,079,342	9,494,806,715	1,618,727,373	83.0	2,002,402,087	80.8
6/30/2010	7,923,377,393	9,853,155,445	1,929,778,052	80.4	1,945,095,321	99.2
6/30/2011	8,022,481,408	10,123,544,043	2,101,062,635	79.2	1,875,569,816	112.0
6/30/2012	7,897,167,203	10,793,651,577	2,896,484,374	73.2	1,864,069,493	155.4
6/30/2013	8,096,436,929	11,134,637,484	3,038,200,555	72.7	1,880,212,950	161.6
6/30/2014	8,637,758,955	11,494,571,835	2,856,812,880	75.1	1,902,719,928	150.1
6/30/2015	8,792,485,658	11,727,618,410	2,935,132,752	75.0	1,918,527,768	153.0
6/30/2016	8,878,057,191	12,751,162,753	3,873,105,562	69.6	1,921,528,936	201.6
6/30/2017	8,872,381,848	13,152,273,895	4,279,892,047	67.5	1,941,969,786	220.4

Judicial Plan

Actuarial Valuation Date	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) Entry Age (b)	Unfunded AAL (UAAL) (b-a)	Percent Funded (a/b)	Annual Covered Payroll (c)	UAAL Percentage of Covered Payroll [(b-a)/c]
6/30/2008	$ 73,194,379	$354,796,453	$281,602,074	20.6%	$44,542,530	632.2%
6/30/2009	81,337,881	369,106,841	287,768,960	22.0	45,505,512	632.4
6/30/2010	88,976,738	382,012,773	293,036,035	23.3	46,112,730	635.5
6/30/2011	98,398,628	393,484,589	295,085,961	25.0	45,888,020	643.1
6/30/2012	102,266,706	413,332,538	311,065,832	24.7	45,835,501	678.7
6/30/2013	111,140,339	435,378,358	324,238,019	25.5	48,697,726	665.8
6/30/2014	124,269,105	462,336,255	338,067,150	26.9	49,587,936	681.8
6/30/2015	134,349,908	482,969,311	348,619,403	27.8	55,656,457	626.4
6/30/2016	143,468,860	547,621,617	404,152,575	26.2	57,421,016	703.8
6/30/2017	151,828,631	564,417,925	412,589,294	26.9	58,150,935	709.5

See *Required Schedule of Employer Contributions* on page 53.
See accompanying *Independent Auditors' Report.*

Pension Trust Funds

Summary of Member Data Included in Valuations | June 30, 2017

Active Members

Valuation Group	Number	Payroll	Group Averages		
			Salary	Age (Yrs.)	Service (Yrs.)
MSEP					
Regular state employees	46,219	$1,785,837,129	$ 38,639	45.1	10.7
Elected officials	6	659,985	109,998	44.0	1.3
Legislative clerks	11	381,400	34,673	65.5	19.6
Legislators	193	6,941,688	35,967	51.7	4.8
Uniformed water patrol	10	697,444	69,744	41.0	15.2
Conservation department	1,373	61,206,748	44,579	44.3	14.1
School-term salaried employees	1,076	83,638,379	77,731	57.7	21.8
Administrative law judges	22	2,607,013	118,501	59.8	22.7
Total MSEP group	48,910	$1,941,969,786	39,705	45.4	11.0
Judicial Plan	410	$ 58,150,935	$141,832	56.6	11.8

Retired Lives

Type of Benefit Payment	Number	Annual Benefits	Group Averages	
			Benefit	Age (Yrs.)
MSEP				
Retirement	41,362	$649,445,064	$15,701	69.7
Disability	3	11,496	3,832	63.7
Survivor of active member	1,686	18,185,640	10,786	62.9
Survivor of retired member	3,509	42,554,004	12,127	75.7
Total MSEP group	46,560	$710,196,204	15,253	70.1
Judicial Plan	559	$ 34,627,428	$61,945	75.8

Others

Group	Terminated-Vested	Terminated-Nonvested	Leave of Absence	Long-Term Disability
MSEP	19,578	3,899	178	849
Judicial Plan	25	0	1	0

Active Members by Attained Age and Years of Service | June 30, 2017

MSEP

Attained Age	Years of Service to Valuation Date 0-4	5-9	10-14	15-19	20-24	25-29	30-34	35+	Totals No.	Valuation Payroll
< 24	2,327	9							2,336	$ 66,852,920
25-29	3,988	541	18						4,547	151,045,244
30-34	2,808	1,529	525	12					4,874	178,131,868
35-39	2,059	1,363	1,338	539	16				5,315	204,999,372
40-44	1,554	1,062	1,082	1,331	456	14			5,499	222,347,386
45-49	1,575	1,051	981	1,367	1,311	419	43		6,747	277,262,442
50-54	1,352	995	974	1,277	1,149	931	365	24	7,067	297,356,254
55-59	1,166	912	930	1,254	979	663	444	155	6,503	274,084,255
60-64	639	663	728	892	588	408	225	151	4,294	187,269,704
65+	184	288	300	348	214	145	103	146	1,728	82,620,341
Totals	17,652	8,413	6,876	7,020	4,713	2,580	1,180	476	48,910	$1,941,969,786

While not used in the financial computations, the following group averages are computed and shown because of their general interest.
Group Averages: Age — 45.4 years • Service — 11 years • Annual pay — $39,705

Judicial Plan

Attained Age	Years of Service to Valuation Date 0-4	5-9	10-14	15-19	20-24	25-29	30+	Totals No.	Valuation Payroll
< 39	16							16	$ 2,225,848
40-44	17	6	4					27	3,715,567
45-49	20	12	12	3				47	6,445,016
50-54	25	22	14	8	3			72	10,147,096
55-59	24	17	15	19	12	3		90	12,811,009
60-64	12	16	15	10	22	8	10	93	13,402,052
65+	1	5	16	22	12	4	5	65	9,404,347
Totals	115	78	76	62	49	15	15	410	$58,150,935

While not used in the financial computations, the following group averages are computed and shown because of their general interest.
Group Averages: Age — 56.6 years • Service — 11.8 years • Annual pay — $141,832

Schedules of Active Member Valuation Data | Ten Years Ended June 30, 2017

MSEP

	Schedule of Active Member Valuation Data			
Valuation Date	Number	Annual Payroll	Annual Average Pay	% Increase in Average Pay
June 30, 2008	54,542	$1,916,527,398	$35,139	3.44%
June 30, 2009	55,057	2,002,402,087	36,370	3.50
June 30, 2010	53,478	1,945,095,321	36,372	0.01
June 30, 2011	51,660	1,875,569,816	36,306	(0.18)
June 30, 2012	51,332	1,864,069,493	36,314	0.02
June 30, 2013	50,833	1,880,212,950	36,988	1.86
June 30, 2014	50,621	1,902,719,928	37,588	1.62
June 30, 2015	49,980	1,918,527,768	38,386	2.12
June 30, 2016	49,464	1,921,528,936	38,847	1.20
June 30, 2017	48,910	1,941,969,786	39,705	2.21

Judicial Plan

	Schedule of Active Member Valuation Data			
Valuation Date	Number	Annual Payroll	Annual Average Pay	% Increase in Average Pay
June 30, 2008	401	$44,542,530	$111,079	8.78%
June 30, 2009	397	45,505,512	114,623	3.19
June 30, 2010	402	46,112,730	114,708	0.07
June 30, 2011	399	45,888,020	115,008	0.26
June 30, 2012	398	45,835,501	115,165	0.14
June 30, 2013	400	48,697,726	121,744	5.71
June 30, 2014	405	49,587,936	122,439	0.57
June 30, 2015	405	55,656,457	137,423	12.24
June 30, 2016	408	57,421,016	140,738	2.41
June 30, 2017	410	58,150,935	141,832	0.80

Retirees and Beneficiaries Added and Removed | Ten Years Ended June 30, 2017*

MSEP

Fiscal Year Ended	Classification	Benefit Type	Added to Rolls: Number	Added to Rolls: Annual Allowances	Removed from Rolls: Number	Removed from Rolls: Annual Allowances
June 30, 2009	General employees	Retirement	2,195	$37,338,992	852	$9,903,887
		Survivor of active	82	996,258	54	390,167
		Survivor of retired	251	3,077,466	110	827,564
		Disability	0	876	1	4,237
	Lincoln University - vested	Retirement	0	0	0	0
		Survivor of active	0	0	0	0
	Legislators	Retirement	21	746,414	8	120,396
		Survivor of active	0	5,137	1	14,128
		Survivor of retired	4	84,108	2	20,473
	Elected officials	Retirement	2	105,141	0	0
		Survivor of active	0	2,997	0	0
		Survivor of retired	0	1,274	0	0
	ALJs	Retirement	3	168,517	2	90,337
		Survivor of retired	2	57,238	1	27,354
June 30, 2010	General employees	Retirement	2,298	34,755,192	833	9,979,318
		Survivor of active	83	1,054,292	49	276,401
		Survivor of retired	246	3,080,424	117	1,078,265
		Disability	0	830	1	2,985
	Lincoln University - vested	Retirement	1	5,671	0	0
		Survivor of active	0	0	0	0
	Legislators	Retirement	12	201,562	12	239,880
		Survivor of active	0	3,975	1	16,709
		Survivor of retired	5	78,765	0	0
	Elected officials	Retirement	0	0	1	66,911
		Survivor of active	0	3,117	0	0
		Survivor of retired	1	34,780	0	0
	ALJs	Retirement	3	113,877	1	46,794
		Survivor of retired	0	7,332	0	0
June 30, 2011	General employees	Retirement	2,850	41,203,358	892	10,670,476
		Survivor of active	65	914,689	46	261,503
		Survivor of retired	298	3,059,195	176	1,670,990
		Disability	0	79	1	1,732
	Lincoln University - vested	Retirement	1	1,780	0	0
		Survivor of active	0	0	0	0
	Legislators	Retirement	41	601,171	10	185,635
		Survivor of active	0	2,903	1	19,612
		Survivor of retired	5	73,841	2	16,628
	Elected officials	Retirement	0	0	0	0
		Survivor of active	0	3,242	0	0
		Survivor of retired	0	1,053	0	0
	ALJs	Retirement	4	212,519	0	0
		Survivor of retired	0	2,599	1	27,724

** Schedule is intended to show information for10 years. Additional years will be displayed as they become available.*

Source of Data: MOSERS benefit payment database as of June 30, 2017.
Other Actuarial Section information reported based on MOSERS data as of May 31, 2017.

Rolls at End of Year				
Number	Annual Allowances	Percentage Increase (Decrease) in Annual Allowances	Average Annual Allowances	Percentage Increase (Decrease) in Average Annual Allowances
27,942	$425,200,398	6.90%	$15,217	1.76%
1,364	12,095,246	5.28	8,867	3.10
2,259	22,538,130	11.09	9,977	4.15
10	33,055	(9.23)	3,306	(0.15)
13	55,953	0.00	4,304	0.00
1	2,624	0.00	2,624	0.00
262	5,207,953	13.66	19,878	8.03
13	146,210	(5.79)	11,247	1.45
56	771,979	8.98	13,785	5.09
14	620,135	20.42	44,295	3.21
1	77,924	4.00	77,924	4.00
1	33,117	4.00	33,117	4.00
26	1,177,522	7.11	45,289	2.99
11	275,852	12.15	25,077	1.95
29,407	449,976,272	5.83	15,302	0.56
1,398	12,873,137	6.43	9,208	3.85
2,388	24,540,289	8.88	10,277	3.01
9	30,900	(6.52)	3,433	3.84
14	61,624	10.14	4,402	2.28
1	2,624	0.00	2,624	0.00
262	5,169,635	(0.74)	19,731	(0.74)
12	133,476	(8.71)	11,123	(1.10)
61	850,744	10.20	13,947	1.18
13	553,224	(10.79)	42,556	(3.93)
1	81,041	4.00	81,041	4.00
2	67,897	105.02	33,949	2.51
28	1,244,605	5.70	44,450	(1.85)
11	283,184	2.66	25,744	2.66
31,365	480,509,154	6.79	15,320	0.12
1,417	13,526,323	5.07	9,546	3.67
2,510	25,928,494	5.66	10,330	0.52
8	29,247	(5.35)	3,656	6.50
15	63,404	2.89	4,227	(3.98)
1	2,624	0.00	2,624	0.00
293	5,585,171	8.04	19,062	(3.39)
11	116,767	(12.52)	10,615	(4.57)
64	907,957	6.73	14,187	1.72
13	553,224	0.00	42,556	0.00
1	84,283	4.00	84,283	4.00
2	68,950	1.55	34,475	1.55
32	1,457,124	17.08	45,535	2.44
10	258,059	(8.87)	25,806	0.24

Retirees and Beneficiaries Added and Removed continued on pages 102-107.

Retirees and Beneficiaries Added and Removed continued from pages 100-101.

MSEP

			Added to Rolls		Removed from Rolls	
Fiscal Year Ended	Classification	Benefit Type	Number	Annual Allowances	Number	Annual Allowances
June 30, 2012	General employees	Retirement	2,637	$39,423,910	895	$11,116,063
		Survivor of active	82	1,129,634	34	197,452
		Survivor of retired	282	3,665,503	158	1,416,283
		Disability	0	458	0	0
	Lincoln University - vested	Retirement	0	0	2	11,032
		Survivor of active	0	0	0	0
	Legislators	Retirement	13	229,979	8	139,545
		Survivor of active	0	3,531	0	0
		Survivor of retired	4	80,142	3	52,550
	Elected officials	Retirement	2	86,431	0	0
		Survivor of active	0	3,371	0	0
		Survivor of retired	0	1,336	0	0
	ALJs	Retirement	3	124,248	3	158,072
		Survivor of active	1	25,592	0	0
		Survivor of retired	2	57,704	0	0
June 30, 2013	General employees	Retirement	2,632	40,416,533	983	12,869,826
		Survivor of active	97	1,080,366	64	400,983
		Survivor of retired	323	4,085,887	150	1,363,799
		Disability	0	696	1	3,854
	Lincoln University - vested	Retirement	2	5,980	0	0
		Survivor of active	0	0	0	0
	Legislators	Retirement	37	442,937	15	320,292
		Survivor of active	0	3,851	0	0
		Survivor of retired	9	176,283	6	88,725
	Elected officials	Retirement	1	53,873	0	0
		Survivor of active	0	3,506	0	0
		Survivor of retired	0	1,458	0	0
	ALJs	Retirement	4	233,124	2	111,466
		Survivor of active	0	1,024	0	0
		Survivor of retired	2	65,892	1	22,759
June 30, 2014	General employees	Retirement	2,612	37,411,991	944	12,205,892
		Survivor of active	90	1,095,464	34	262,401
		Survivor of retired	324	3,954,360	157	1,504,423
		Disability	0	408	2	7,391
	Lincoln University - vested	Retirement	0	0	0	0
		Survivor of active	0	0	0	0
	Legislators	Retirement	18	239,904	7	95,748
		Survivor of active	0	3,680	0	0
		Survivor of retired	5	39,520	5	44,445
	Elected officials	Retirement	0	0	1	19,605
		Survivor of active	0	2,788	0	0
		Survivor of retired	1	10,811	0	0
	ALJs	Retirement	1	50,072	2	78,138
		Survivor of active	1	27,358	0	0
		Survivor of retired	0	7,404	1	30,930

** Schedule is intended to show information for 10 years. Additional years will be displayed as they become available.*

Source of Data: MOSERS benefit payment database as of June 30, 2017.
Other Actuarial Section information reported based on MOSERS data as of May 31, 2017.

Rolls at End of Year				
Number	**Annual Allowances**	**Percentage Increase (Decrease) in Annual Allowances**	**Average Annual Allowances**	**Percentage Increase (Decrease) in Average Annual Allowances**
33,107	$508,817,001	5.89	$15,369	0.32%
1,465	14,458,505	6.89	9,869	3.38
2,634	28,177,714	8.67	10,698	3.56
8	29,705	1.57	3,713	1.56
13	52,372	(17.40)	4,029	(4.68)
1	2,624	0.00	2,624	0.00
298	5,675,605	1.62	19,046	(0.08)
11	120,298	3.02	10,936	3.02
65	935,549	3.04	14,393	1.45
15	639,655	15.62	42,644	0.21
1	87,654	4.00	87,654	4.00
2	70,286	1.94	35,143	1.94
32	1,423,300	(2.32)	44,478	(2.32)
1	25,592	0.00	25,592	0.00
12	315,763	22.36	26,314	1.97
34,756	536,363,708	5.41	15,432	0.41
1,498	15,137,889	4.70	10,105	2.39
2,807	30,899,802	9.66	11,008	2.90
7	26,546	(10.63)	3,792	2.13
15	58,351	11.42	3,890	(3.45)
1	2,623	(0.04)	2,623	(0.04)
320	5,798,251	2.16	18,120	(4.86)
11	124,149	3.20	11,286	3.20
68	1,023,107	9.36	15,046	4.54
16	693,528	8.42	43,346	1.65
1	91,160	4.00	91,160	4.00
2	71,744	2.07	35,872	2.07
34	1,544,957	8.55	45,440	2.16
1	26,615	4.00	26,615	4.00
13	358,896	13.66	27,607	4.91
36,424	561,569,807	4.70	15,418	(0.09)
1,554	15,970,952	5.50	10,277	1.70
2,974	33,349,739	7.93	11,214	1.87
5	19,563	(26.31)	3,913	3.19
15	58,351	0.00	3,890	0.00
1	2,623	0.00	2,623	0.00
331	5,942,407	2.49	17,953	(0.92)
11	127,829	2.96	11,621	2.97
68	1,018,182	(0.48)	14,973	(0.49)
15	673,923	(2.83)	44,928	3.65
1	93,948	3.06	93,948	3.06
3	82,555	15.07	27,518	(23.29)
33	1,516,891	(1.82)	45,966	1.16
2	53,973	102.79	26,987	1.40
12	335,370	(6.56)	27,948	1.24

Retirees and Beneficiaries Added and Removed continued on pages 102-107.

Retirees and Beneficiaries Added and Removed continued from pages 100-101.

MSEP

			Added to Rolls		Removed from Rolls	
Fiscal Year Ended	Classification	Benefit Type	Number	Annual Allowances	Number	Annual Allowances
June 30, 2015	General employees	Retirement	2,865	$43,527,132	1,061	$13,940,436
		Survivor of active	111	1,160,798	56	434,928
		Survivor of retired	350	4,399,848	180	1,673,736
		Disability	0	180	1	5,220
	Lincoln University - vested	Retirement	1	2,340	0	0
		Survivor of active	0	0	0	0
	Legislators	Retirement	16	236,916	4	130,116
		Survivor of active	0	3,432	1	15,180
		Survivor of retired	3	61,956	9	79,944
	Elected officials	Retirement	0	0	0	0
		Survivor of active	1	15,802	0	0
		Survivor of retired	0	0	0	0
	ALJs	Retirement	3	128,952	0	0
		Survivor of active	0	1,452	0	0
		Survivor of retired	0	6,612	0	0
June 30, 2016	General employees	Retirement	2,815	40,917,948	1,147	15,381,612
		Survivor of active	101	1,023,096	56	377,484
		Survivor of retired	365	4,493,892	222	2,073,192
		Disability	0	108	0	0
	Lincoln University - vested	Retirement	1	3,444	1	3,936
		Survivor of active	0	0	0	0
	Legislators	Retirement	8	107,412	15	427,428
		Survivor of active	0	3,084	0	0
		Survivor of retired	7	173,760	3	50,448
	Elected officials	Retirement	0	0	0	0
		Survivor of active	0	0	0	0
		Survivor of retired	0	0	0	0
	ALJs	Retirement	5	230,472	2	150,888
		Survivor of active	0	1,176	0	0
		Survivor of retired	2	84,588	2	62,220
June 30, 2017	General employees	Retirement	2,774	43,603,596	1,266	17,194,704
		Survivor of active	83	1,067,292	52	491,640
		Survivor of retired	381	4,701,360	220	2,029,572
		Disability	0	72	1	3,216
	Lincoln University - vested	Retirement	0	0	0	0
		Survivor of active	0	0	0	0
	Legislators	Retirement	28	347,844	15	354,564
		Survivor of active	0	1,512	1	5,328
		Survivor of retired	7	103,872	3	73,068
	Elected officials	Retirement	3	135,531	1	53,873
		Survivor of active	0	0	0	0
		Survivor of retired	0	0	0	0
	ALJs	Retirement	8	445,728	0	0
		Survivor of active	1	31,080	0	0
		Survivor of retired	1	48,108	0	0

* *Schedule is intended to show information for 10 years. Additional years will be displayed as they become available.*

Source of Data: MOSERS benefit payment database as of June 30, 2017.
Other Actuarial Section information reported based on MOSERS data as of May 31, 2017.

Rolls at End of Year				
Number	Annual Allowances	Percentage Increase (Decrease) in Annual Allowances	Average Annual Allowances	Percentage Increase (Decrease) in Average Annual Allowances
38,227	$591,156,503	5.27%	$15,464	0.30%
1,608	16,696,822	4.54	10,384	1.04
3,144	36,075,851	8.17	11,475	2.33
4	14,523	(25.76)	3,631	(7.21)
16	60,691	4.01	3,793	(2.49)
1	2,623	0.00	2,623	0.00
339	6,049,207	1.80	17,844	(0.61)
10	116,081	(9.19)	11,608	(0.11)
66	1,000,194	(1.77)	15,154	1.21
15	673,923	0.00	44,928	0.00
2	109,750	16.82	54,875	(41.59)
3	82,555	0.00	27,518	0.00
36	1,645,843	8.50	45,718	(0.54)
2	55,425	2.69	27,713	2.69
12	341,982	1.97	28,499	1.97
39,895	616,692,839	4.32	15,458	(0.04)
1,653	17,342,434	3.87	10,491	1.03
3,287	38,496,551	6.71	11,712	2.07
4	14,631	0.74	3,658	0.74
16	60,199	(0.81)	3,762	(0.82)
1	2,623	0.00	2,623	0.00
332	5,729,191	(5.29)	17,257	(3.29)
10	119,165	2.66	11,917	2.66
70	1,123,506	12.33	16,050	5.91
15	673,924	0.00	44,928	0.00
2	112,085	2.13	56,043	2.13
3	83,954	1.69	27,985	1.70
39	1,725,427	4.84	44,242	(3.23)
2	56,601	2.12	28,301	2.12
12	364,350	6.54	30,363	6.54
41,403	643,101,731	4.28	15,533	0.49
1,684	17,918,086	3.32	10,640	1.42
3,448	41,168,339	6.94	11,940	1.95
3	11,487	(21.49)	3,829	4.67
16	60,199	0.00	3,762	0.00
1	2,623	0.00	2,623	0.00
345	5,722,471	(0.12)	16,587	(3.88)
9	115,349	(3.20)	12,817	7.55
74	1,154,310	2.74	15,599	(2.81)
17	755,582	12.12	44,446	(1.07)
2	112,176	0.08	56,088	0.08
3	84,372	0.50	28,124	0.50
47	2,171,155	25.83	46,195	4.41
3	87,681	54.91	29,227	3.27
13	412,458	13.20	31,728	4.50

Retirees and Beneficiaries Added and Removed | Ten Years Ended June 30, 2017*

Judicial Plan

		Added to Rolls		Removed from Rolls	
Fiscal Year Ended	Benefit Type	Number	Annual Allowances	Number	Annual Allowances
June 30, 2009	Retirement	30	$ 1,922,615	15	$ 957,943
	Survivor of active	1	59,484	0	0
	Survivor of retired	9	418,266	2	61,344
June 30, 2010	Retirement	12	1,137,305	13	750,021
	Survivor of active	0	32,700	2	32,399
	Survivor of retired	11	436,312	5	130,920
June 30, 2011	Retirement	36	2,501,248	9	563,214
	Survivor of active	0	14,893	1	35,792
	Survivor of retired	4	167,535	9	206,465
June 30, 2012	Retirement	18	1,490,554	14	1,074,572
	Survivor of active	0	22,717	0	0
	Survivor of retired	8	371,622	6	218,310
June 30, 2013	Retirement	27	2,233,387	13	851,802
	Survivor of active	0	28,591	1	33,778
	Survivor of retired	8	355,101	10	288,980
June 30, 2014	Retirement	18	1,671,667	8	443,807
	Survivor of active	2	66,272	0	0
	Survivor of retired	5	254,117	7	216,813
June 30, 2015	Retirement	39	3,599,880	21	1,395,888
	Survivor of active	0	34,344	0	0
	Survivor of retired	18	705,444	5	198,348
June 30, 2016	Retirement	16	1,671,084	14	1,078,356
	Survivor of active	0	15,072	1	43032
	Survivor of retired	8	368,868	10	354,144
June 30, 2017	Retirement	21	2,128,128	16	1,239,612
	Survivor of active	0	9,852	0	0
	Survivor of retired	12	497,508	2	87,936

** Schedule is intended to show information for 10 years. Additional years will be displayed as they become available.*

Rolls at End of Year				
Number	Annual Allowances	Percentage Increase (Decrease) in Annual Allowances	Average Annual Allowances	Percentage Increase (Decrease) in Average Annual Allowances
326	$19,624,545	5.17%	$60,198	0.33%
37	1,056,425	5.97	28,552	3.10
103	3,139,829	12.83	30,484	5.16
325	20,011,829	1.97	61,575	2.29
35	1,056,726	0.03	30,192	5.74
109	3,445,221	9.73	31,608	3.69
352	21,949,863	9.68	62,358	1.27
34	1,035,827	(1.98)	30,466	0.91
104	3,406,291	(1.13)	32,753	3.62
356	22,365,845	1.90	62,825	0.75
34	1,058,544	2.19	31,134	2.19
106	3,559,603	4.50	33,581	2.53
370	23,747,431	6.18	64,182	2.16
33	1,053,358	(0.49)	31,920	2.52
104	3,625,723	1.86	34,863	3.82
380	24,975,291	5.17	65,724	2.40
35	1,119,630	6.29	31,989	0.22
102	3,663,027	1.03	35,912	3.01
398	25,951,423	9.28	65,205	1.59
35	1,087,702	3.26	31,077	(2.64)
115	4,132,819	13.99	35,938	3.08
400	26,544,151	2.28	66,360	1.77
34	1,059,742	(2.57)	31,169	0.30
113	4,147,543	0.36	36,704	2.13
405	27,432,667	3.35	67,735	2.07
34	1,069,594	0.93	31,459	0.93
123	4,557,115	9.88	37,050	0.94

Short-Term Solvency Test | Ten Years Ended June 30, 2017

MSEP

Fiscal Year	Actuarial Accrued Liabilities for: Member Contributions* (1)	Current Retirees and Beneficiaries (2)	Active and Inactive Members, Employer Financed Portion (3)	Actuarial Value of Assets Available for Benefits	Percentage of Actuarial Liabilities Covered by Actuarial Value of Assets Available for (1)	(2)	(3)
2008	$ 0	$4,408,682,437	$4,719,665,033	$7,838,495,768	100.0%	100.0%	72.7%
2009	0	4,737,859,976	4,756,946,739	7,876,079,342	100.0	100.0	66.0
2010	0	5,012,677,769	4,840,477,676	7,923,377,393	100.0	100.0	60.1
2011	599,761	5,357,794,617	4,765,149,665	8,022,481,408	100.0	100.0	55.9
2012	5,431,451	5,749,411,068	5,038,809,058	7,897,167,203	100.0	100.0	42.5
2013	14,507,994	6,062,654,441	5,057,475,049	8,096,436,929	100.0	100.0	39.9
2014	27,111,467	6,347,728,717	5,119,731,651	8,637,758,955	100.0	100.0	44.2
2015	42,731,658	6,695,631,737	4,989,255,015	8,792,485,658	100.0	100.0	41.2
2016	60,618,379	7,305,895,284	5,384,649,090	8,878,057,191	100.0	100.0	28.1
2017	78,979,370	7,559,623,100	5,513,671,425	8,872,381,848	100.0	100.0	22.4

Judicial Plan

Fiscal Year	Actuarial Accrued Liabilities for: Member Contributions* (1)	Current Retirees and Beneficiaries (2)	Active and Inactive Members, Employer Financed Portion (3)	Actuarial Value of Assets Available for Benefits	Percentage of Actuarial Liabilities Covered by Actuarial Value of Assets Available for (1)	(2)	(3)
2008	$ 0	$216,369,879	$138,426,574	$ 73,194,379	100.0%	33.8%	0.0%
2009	0	231,505,591	137,601,250	81,337,881	100.0	35.1	0.0
2010	0	236,113,077	145,899,696	88,976,738	100.0	37.7	0.0
2011	59,958	251,532,354	141,892,277	98,398,628	100.0	39.1	39.1
2012	209,817	258,642,149	154,480,572	102,266,706	100.0	39.5	39.5
2013	421,753	274,911,416	160,045,189	111,140,339	100.0	40.4	40.3
2014	716,564	285,124,436	176,495,255	124,269,105	100.0	43.6	43.3
2015	1,204,757	316,042,514	165,722,040	134,349,908	100.0	42.5	42.1
2016	1,855,955	354,715,048	191,050,614	143,468,860	100.0	40.4	39.9
2017	2,232,405	377,099,534	185,085,986	151,828,631	100.0	39.7	39.7

** Prior year member contribution amounts have been corrected from previous reports.*

Analysis of Financial Experience | Year Ended June 30, 2017

Actual experience will never coincide exactly with assumed experience (except by coincidence). Gains and losses may offset each other over a period of years, but sizable year-to-year variations from assumed experience are common. Detail on the analysis of the financial experience is shown below.

MSEP

	$ Millions
Unfunded actuarial accrued liability (UAAL) at beginning of year	$ 3,873.1
Normal cost from last valuation	141.9
Actual employer contributions	(360.7)
Administrative expenses	8.8
Interest accrual	293.9
Expected UAAL before changes	3,957.0
Change from any changes in benefits, assumptions, or methods	112.4
Expected UAAL after changes	4,069.4
Less: Actual UAAL at end of year	(4,279.9)
Gain (loss)	$ (210.5)
Gain (loss) as a percent of expected accrued liabilities ($13,062)	(1.6)%

Valuation Date June 30	Actuarial Gain (Loss) as a % of Beginning Accrued Liabilities
2008	0.1%
2009	(5.2)
2010	(4.0)
2011	(2.4)
2012	(4.7)
2013	(2.8)
2014	2.1
2015	(0.9)
2016	(3.2)
2017	(1.6)

Judicial Plan

	$ Millions
Unfunded actuarial accrued liability (UAAL) at beginning of year	$404.2
Normal cost from last valuation	12.0
Actual employer contributions	(35.0)
Administrative expenses	0.2
Interest accrual	30.5
Expected UAAL before changes	411.9
Change from any changes in benefits, assumptions, or methods	(0.9)
Expected UAAL after changes	411.0
Less: Actual UAAL at end of year	(412.6)
Gain (loss)	$ (1.6)
Gain (loss) as a percent of expected accrued liabilities ($567)	(0.3)%

Valuation Date June 30	Actuarial Gain (Loss) as a % of Beginning Accrued Liabilities
2008	(3.0)%
2009	(1.8)
2010	(1.1)
2011	(0.4)
2012	(0.6)
2013	(2.6)
2014	1.5
2015	(1.5)
2016	0.1
2017	(0.3)

Comparison of Plans for General State Employees | June 30, 2017

MSEP

Benefit Provisions	MSEP (closed plan)
Membership eligibility	• Employed prior to July 1, 2000 in a permanent position normally requiring at least 1,040 hours of work per year and vested in MSEP.
Vesting	• 5 years
Base benefit formula	• .016 x FAP x service *In the past, formula increases have been passed along to MSEP retirees.*
Temporary benefit formula	• Not available
Benefit payment options	• Life income annuity • *Unreduced* joint & 50% survivor • Joint & 100% survivor • Life income with 60 guaranteed payments • Life income with 120 guaranteed payments
Cost-of-living adjustment (COLA)	• If hired before August 28, 1997, will receive 4-5% each year until reaching the 65% cap. After COLA cap is met the rate is based on 80% of the percentage increase in the average CPI (0-5%). • If hired on or after August 28, 1997, annual COLA will be based on 80% of the percentage increase in the average CPI (0-5%).
Normal retirement eligibility	• Age 65 with 5 years of service • Age 60 with 15 years of service "Rule of 80"- at least age 48 with age and service equaling 80 or more *Age 50 if first became eligible prior to August 28, 2003*
Early retirement eligibility	• Age 55 with 10 years of service *Base benefit will be reduced ½ of 1% (.005) for each month member's age is younger than normal retirement.*
Death before retirement	• Non duty-related death *(vested members)* – Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member's life income annuity paid to eligible children. • Duty-related death *(no minimum service requirement).* – Survivor benefit to eligible spouse or children no less than 50% of average compensation.
In-service COLA	• COLA given for service beyond age 65. COLA provisions are determined by employment date.
BackDROP	• Must work at least 2 years beyond normal retirement eligibility to be eligible for BackDROP.
Service purchases	• May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate. May also purchase qualifying public sector service at full actuarial cost.
Service transfers	• May transfer state service to other positions covered by MOSERS under 104.800.
Member contributions	• None

MSEP 2000	MSEP 2011
• Employed for the first time on or after July 1, 2000, but prior to January 1, 2011, in a permanent position normally requiring at least 1,040 hours of work per year. • If left state employment prior to becoming vested and returned to employment on or after July 1, 2000, in a permanent position normally requiring at least 1,040 hours of work per year.	• Employed for the first time on or after January 1, 2011, in a permanent position normally requiring at least 1,040 hours of work per year.
• 5 years	• 10 years (5 years, effective January 1, 2018)
• .017 x FAP x service *Future formula increases, if any, will not be passed along to retirees.*	• .017 x FAP x service *Future formula increases, if any, will not be passed along to retirees.*
• .008 x FAP x service *Available to those who retire under the "Rule of 80."*	• .008 x FAP x service *Available to those who retire under the "Rule of 90."*
• Life income annuity • Joint & 50% survivor • Joint & 100% survivor • Life income with 120 guaranteed payments • Life income with 180 guaranteed payments	• Life income annuity • Joint & 50% survivor • Joint & 100% survivor • Life income with 120 guaranteed payments • Life income with 180 guaranteed payments
• Based on 80% of the percentage increase in the average CPI (0-5%).	• Based on 80% of the percentage increase in the average CPI (0-5%).
• Age 62 with 5 years of service "Rule of 80" — at least age 48 with age and service equaling 80 or more *Age 50 if first became eligible prior to August 28, 2003* *Terminated-vested members not eligible for "Rule of 80."*	• Age 67 with 10 years of service • "Rule of 90" — at least age 55 with age and service equaling 90 or more *Terminated-vested members not eligible for "Rule of 90."*
• Age 57 with 5 years of service *Base benefit will be reduced ½ of 1% (.005) for each month member's age is younger than normal retirement.*	• Age 62 at the time of termination with 10 years of service *Base benefit will be reduced ½ of 1% (.005) for each month member's age is younger than normal retirement.* *Terminated-vested members are not eligible.*
• Non duty-related death *(vested members)* – Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member's life income annuity paid to eligible children. • Duty-related death *(no minimum service requirement).* – Survivor benefit to eligible spouse or children no less than 50% of average compensation.	• Non duty-related death *(vested members)* – Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member's life income annuity paid to eligible children. • Duty-related death *(no minimum service requirement).* – Survivor benefit to eligible spouse or children no less than 50% of average compensation.
• Not available	• Not available
• Must work at least 2 years beyond normal retirement eligibility to be eligible for BackDROP.	• Not available
• May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate. May also purchase qualifying public sector service at full actuarial cost.	• May purchase qualifying public sector service at full actuarial cost.
• May transfer service under 104.1090 from other systems with written agreements to transfer required funds.	• Not available
• None	• 4% of pay

Comparison of Plans for Legislators | June 30, 2017

MSEP

Benefit Provisions	MSEP (closed plan)
Membership eligibility	• Elected to the General Assembly and employed prior to July 1, 2000 and vested in MSEP.
Vesting	• 3 full-biennial assemblies (6 years)
Base benefit formula	• Biennial assemblies x $150 *In the past, formula increases have been passed along to MSEP retirees.*
Temporary benefit formula	• Not available
Benefit payment options	• Life income annuity • *Unreduced* joint & 50% survivor • Joint & 100% survivor • Life income with 60 guaranteed payments • Life income with 120 guaranteed payments
Cost-of-living adjustment (COLA)	• If sworn in before August 28, 1997, will receive 4-5% each year until reaching 65% cap. After COLA cap is met the rate is based on 80% of the percentage increase in the average CPI (0-5%). • If sworn in on or after August 28, 1997, COLA will be based on 80% of the percentage increase in the average CPI (0-5%).
Normal retirement eligibility	• Age 55 with 3 full-biennial assemblies or • "Rule of 80" — at least age 48 with age and service equaling 80 or more
Early retirement eligibility	• Not available
Death before retirement	• Non duty-related death *(vested members)* – Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member's life income annuity paid to eligible children. • Duty-related death *(no minimum service requirement)* – Survivor benefit to eligible spouse or children no less than 50% of the rate of compensation.
In-service COLA	• COLA given for service beyond age 65. COLA provisions are determined by employment date.
BackDROP	• Not available
Service purchases	• May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate. May also purchase qualifying public sector service at full actuarial cost.
Service transfers	• May transfer state service to other positions covered by MOSERS under 104.800.
Member contributions	• None

MSEP 2000	MSEP 2011
• Elected to the General Assembly and employed on or after July 1, 2000, but prior to January 1, 2011	• Elected to the General Assembly and first employed in a benefit-eligible position on or after January 1, 2011
• 3 full-biennial assemblies (6 years)	• 3 full-biennial assemblies (6 years)
• (Active legislator's pay ÷ 24) x service *Capped at 100% of pay; future formula increases, if any, will not be passed along to retirees.*	• (Active legislator's pay ÷ 24) x service *Capped at 100% of pay; future formula increases, if any, will not be passed along to retirees.*
• Not available	• Not available
• Life income annuity • Joint & 50% survivor • Joint & 100% survivor • Life income with 120 guaranteed payments • Life income with 180 guaranteed payments	• Life income annuity • Joint & 50% survivor • Joint & 100% survivor • Life income with 120 guaranteed payments • Life income with 180 guaranteed payments
• Benefit adjustment based on increase in pay for an active member of the general assembly.	• Benefit adjustment based on increase in pay for an active member of the general assembly.
• Age 55 with 3 full-biennial assemblies or • "Rule of 80" — at least age 50 with age and service equaling 80 or more *Terminated-vested members not eligible for "Rule of 80."*	• Age 62 at time of termination with 3 full-biennial assemblies or • "Rule of 90" — at least age 55 with age and service equaling 90 or more *Terminated-vested members not eligible for "Rule of 90."*
• Not available	• Not available
• Non duty-related death *(vested members)* – Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member's life income annuity paid to eligible children. • Duty-related death *(no minimum service requirement)* – Survivor benefit to eligible spouse or children no less than 50% of rate of compensation.	• Non duty-related death *(vested members)* – Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member's life income annuity paid to eligible children. • Duty-related death *(no minimum service requirement)* – Survivor benefit to eligible spouse or children no less than 50% of rate of compensation.
• Not available	• Not available
• Not available	• Not available
• May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate. May also purchase qualifying public sector service at full actuarial cost.	• May purchase qualifying public sector service at full actuarial cost.
• May transfer service under 104.1090 from other systems with written agreements to transfer required funds.	• Not available
• None	• 4% of pay

Comparison of Plans for Statewide Elected Officials | June 30, 2017

MSEP

Benefit Provisions	MSEP (closed plan)
Membership eligibility	• Elected to state office and employed prior to July 1, 2000, and vested in MSEP
Vesting	• 4 years (1 term)
Base benefit formula	• Less than 12 years of service FAP x .016 x service • 12 or more years of service Monthly statutory compensation x .50 *In the past, formula increases have been passed along to MSEP retirees.*
Temporary benefit formula	• Not available
Benefit payment options	• Life income annuity • *Unreduced* joint & 50% survivor • Joint & 100% survivor • Life income with 60 guaranteed payments • Life income with 120 guaranteed payments
Cost-of-living adjustment (COLA)	• Less than 12 years of service – If sworn in before August 28, 1997 will receive 4-5% each year until they reach 65% cap. After COLA cap is met the rate is based on 80% of the percentage increase in the average CPI (0-5%). – If sworn in between August 28, 1997 and June 30, 2000, will receive a COLA equal to 80% of percentage increase in the average CPI (0 5%). • 12 or more years of service – 12 or more years of service will receive a COLA based on increases in statutory compensation for the highest position held. – Sworn in before August 28, 1997 will receive 4-5% each year until they reach 65% cap. After COLA cap is met the rate is based on 80% of the percentage increase in the average CPI (0-5%). – Sworn in between August 28, 1997 and June 30, 2000, will receive a COLA equal to 80% of percentage increase in the average CPI (0-5%).
Normal retirement eligibility	• Age 60 with 15 years of service or • "Rule of 80" — at least age 50 with age and service equaling 80 or more
Early retirement eligibility	• Age 55 with 10 years of service
Death before retirement	• Non duty-related death *(vested members)* – Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member's life income annuity paid to eligible children. • Duty-related death *(no minimum service requirement)* – Survivor benefit to eligible spouse or children no less than 50% of current pay.
In-service COLA	• COLA provisions determined by amount of service relative to 12 years and date of employment.
BackDROP	• Not available
Service purchases	• May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate. May also purchase qualifying public sector service at full actuarial cost.
Service transfers	• May transfer state service to other positions covered by MOSERS under 104.800.
Member contributions	• None

MSEP 2000	MSEP 2011
• Elected to state office and employed for the first time on or after July 1, 2000, but prior to January 1, 2011	• Elected to state office and employed for the first time in a benefit-eligible position on or after January 1, 2011
• 4 years (1 term)	• 4 years (1 term)
• (Active elected official's pay ÷ 24) x service *Capped at 12 years of service or 50% of pay; future formula increases, if any, will not be passed along to retirees.*	• (Active elected official's pay ÷ 24) x service *Capped at 12 years of service or 50% of pay; future formula increases, if any, will not be passed along to retirees.*
• Not available	• Not available
• Life income annuity • Joint & 50% survivor • Joint & 100% survivor • Life income with 120 guaranteed payments • Life income with 180 guaranteed payments	• Life income annuity • Joint & 50% survivor • Joint & 100% survivor • Life income with 120 guaranteed payments • Life income with 180 guaranteed payments
• Benefit adjustment based on increase in pay for an active statewide elected official.	• Benefit adjustment based on increase in pay for an active statewide elected official.
• Age 55 with 4 years of service or • "Rule of 80" - at least age 50 with age and service equaling 80 or more *Terminated-vested members not eligible for "Rule of 80."*	• Age 62 at time of termination with 4 years of service or • "Rule of 90" - at least age 55 with age and service equaling 90 or more *Terminated-vested members not eligible for "Rule of 90."*
• Not available	• Not available
• Non duty-related death *(vested members)* – Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member's life income annuity paid to eligible children. • Duty-related death *(no minimum service requirement)* – Survivor benefit to eligible spouse or children no less than 50% of current pay.	• Non duty-related death *(vested members)* – Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member's life income annuity paid to eligible children. • Duty-related death *(no minimum service requirement)* – Survivor benefit to eligible spouse or children no less than 50% of current pay.
• Not available	• Not available
• Not available	• Not available
• May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate; may also purchase qualifying public sector service at full actuarial cost.	• May purchase qualifying public sector service at full actuarial cost.
• May transfer service under 104.1090 from other systems with written agreements to transfer required funds.	• Not available
• None	• 4% of pay

Comparison of Plans for Judges | June 30, 2017

Judicial Plan

Benefit Provisions	Judicial Plan (closed plan)
Membership eligibility	• Must be a judge or commissioner of the supreme court or the court of appeals, a judge of the circuit court, probate court, magistrate court, court of common pleas, court of criminal corrections, a justice of the peace, or a commissioner or deputy commissioner of the circuit court appointed after February 29, 1972; a commissioner of the juvenile division of the circuit court appointed pursuant to Section 211.023, RSMo; a commissioner of the drug court pursuant to Section 478.466, RSMo; or a commissioner of the family court.
Vesting	• Immediate
Base benefit formula	• Monthly pay x .50 = monthly base benefit
Temporary benefit formula	• Not available
Benefit payment options	• Life income annuity • Automatic *unreduced* joint and 50% survivor option *If married at least two continuous years immediately preceding judges death.*
Cost-of-living adjustment (COLA)	• If hired before August 28, 1997, will receive 4-5% each year until reaching 65% cap. After COLA cap is met the rate is based on 80% of the percentage increase in the average CPI (0-5%) • If hired on or after August 28, 1997, based on 80% of the percentage increase in the average CPI (0-5%).
Normal retirement eligibility	• Age 62 with 12 years service • Age 60 with 15 years service • Age 55 with 20 years service
Reduced retirement eligibility	• Age 60 if less than 15 years service • Age 62 if less than 12 years service
Death before retirement	• Non duty-related death – Survivor benefit to eligible spouse equal to 50% of the benefit the member would have received based on service to age 70.
In-service COLA	• Judges who are at least age 60 and work beyond the date first eligible for unreduced benefits will receive COLAs for each year worked beyond normal retirement eligibility. COLA provisions are determined by date of employment.
BackDROP	• Not available
Service purchases	• May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate. May also purchase qualifying public sector service at full actuarial cost.
Service transfers	• May transfer state service to other positions covered by MOSERS under 104.800.
Member contributions	• None

Judicial Plan 2011

- Must be a judge or commissioner of the supreme court or the court of appeals, a judge of the circuit court, probate court, magistrate court, court of common pleas, court of criminal corrections, a justice of the peace, or a commissioner or deputy commissioner of the circuit court; a commissioner of the juvenile division of the circuit court appointed pursuant to Section 211.023, RSMo; a commissioner of the drug court pursuant to Section 478.466, RSMo; or a commissioner of the family court appointed or elected a judge and employed in a benefit-eligible position as a judge for the first time on or after January 1, 2011.

- Immediate
- Monthly pay x .50 = monthly base benefit
- Not available
- Life income annuity
- Joint & 50% survivor
- Joint & 100% survivor
- Life income with 120 guaranteed payments
- Life income with 180 guaranteed payments
- Based on 80% of the percentage increase in the average CPI (0-5%)

- Age 67 with 12 years service
- Age 62 with 20 years service

- Age 67 if less than 12 years service
- Age 62 if less than 20 years service
- Non duty-related death
  - Survivor benefit to eligible spouse equal to 50% of the benefit the member would have received based on service to age 70.
- Not available

- Not available
- May purchase qualifying public sector service at full actuarial cost.

- May transfer state service to other positions covered by MOSERS under 104.800.
- 4% of pay

Comparison of Plans for Uniformed Members of the Water Patrol* | June 30, 2017

MSEP

Benefit Provisions	MSEP (closed plan)	MSEP 2000
Membership eligibility	• Employed prior to July 1, 2000 in a permanent position normally requiring at least 1,040 hours of work a year, and vested in MSEP.	• Employed for the first time on or after July 1, 2000, in a permanent position normally requiring at least 1,040 hours of work a year. • Members who left state employment prior to becoming vested and returned to work on or after July 1, 2000, in a permanent position normally requiring at least 1,040 hours of work a year.
Vesting	• 5 years of service	• 5 years of service
Base benefit formula	• 1.6% x FAP x service increased by 33.3%	• 1.7% x FAP x service
Temporary benefit formula	• Not available	• 0.8% x FAP x service *(must retire under "Rule of 80")*
Benefit payment options	• Life income annuity • *Unreduced* joint and 50% survivor • Joint & 100% survivor • 60 or 120 guaranteed payments	• Life income annuity • Joint & 50% survivor • Joint & 100% survivor • 120 or 180 guaranteed payments
Cost-of-living adjustment (COLA)	• If hired before August 28, 1997, will receive 4-5% each year until reaching 65% cap. After COLA cap is met, the rate is based on 80% of the percentage increase in the average CPI (0-5%). • If hired on or after August 28, 1997, based on 80% of the percentage increase in the average CPI (0-5%).	• Based on 80% of the percentage increase in the average CPI (0-5%).
Normal retirement eligibility	• Age 55 with 5 years of service • "Rule of 80"- minimum age 48	• Age 62 with 5 years of service • "Rule of 80" - minimum age 48
Early retirement eligibility	• Not available	• Age 57 with 10 years of service
Death before retirement	• Non duty-related death *(vested members)* – Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member's life income annuity paid to eligible children. • Duty-related death *(no minimum service requirement)* – Survivor benefit to eligible spouse or children no less than 50% of current pay.	• Non duty-related death *(vested members)* – Survivor benefit to eligible spouse calculated using the joint & 100% survivor option or 80% of the member's life income annuity paid to eligible children. • Duty-related death *(no minimum service requirement)* – Survivor benefit to eligible spouse or children no less than 50% of current pay.
In-service COLA	• COLA given for service beyond age 65. COLA provisions are determined by employment date.	• Not available
BackDROP	• Must work at least two years beyond normal retirement eligibility to be eligible for BackDROP.	• Must work at least two years beyond normal retirement eligibility to be eligible for BackDROP.
Service purchases	• May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate. May also purchase qualifying public sector service at full actuarial cost.	• May purchase up to 4 years of active-duty military service or qualifying public sector service at subsidized rate. May also purchase qualifying public sector service at full actuarial cost.
Service transfers	• May transfer state service to other positions covered by MOSERS under 104.800.	• May transfer state service to other positions covered by MOSERS under 104.1090.
Member contributions	• None	• None

* *Eligibility for membership in the MSEP and MSEP 2000 is closed for uniformed members of the water patrol. Employees hired on or after January 1, 2011, are members of the Missouri Department of Transportation and Patrol Employees' Retirement System (MPERS).*

SUMMARY OF PLAN PROVISIONS

Life Insurance Plans | June 30, 2017

MOSERS administers basic and optional term life insurance plans for eligible state employees and retirees.

Active Members*

Plan Provision	Requirement
• **Basic life insurance** - An amount equal to one times annual salary (with a minimum of $15,000) while actively employed.	• Actively employed in an eligible state position resulting in membership in MOSERS.
• **Duty-related death benefit** - Duty-related death benefit equivalent to two times the annual salary the member was earning at the time of death in addition to the basic life insurance amount of one times annual salary.	• Actively employed in an eligible state position resulting in membership in MOSERS.
• **Optional life insurance** - Additional life insurance may be purchased in a flat amount in multiples of $10,000 not to exceed the maximum (lesser of six times annual salary or $800,000). Spouse coverage may be purchased in multiples of $10,000 up to a maximum of $100,000; however, the amount of spouse coverage cannot exceed the amount of optional life insurance coverage the member has purchased. Coverage for children is available in a flat amount of $10,000 per child.	• Actively employed in an eligible state position resulting in membership in MOSERS.

* *Terminating employees may convert coverage up to the amount they had as an active employee at individual rates. Not available to employees of the Department of Conservation or colleges and universities except Lincoln University and the State Technical College.*

Retired Members

Plan Provision	Requirement
• **Basic life insurance at retirement** - $5,000 basic life insurance during retirement.	• Must retire directly from active employment.
• **Optional life insurance at retirement (MSEP)** - An employee may retain up to the lesser of $60,000 or the amount of optional life insurance coverage held at the time of retirement at the group rate and may convert any remaining basic and optional life insurance at individual rates. Coverage for spouse ends at member's retirement and may be converted at individual rates.	• Must retire directly from active employment.
• **Optional life insurance at retirement (MSEP 2000)** - Under "Rule of 80", an employee may retain the current amount of coverage prior to retirement until age 62 at which time coverage is reduced to $60,000, and may convert any remaining basic and optional life insurance at individual rates. Coverage for spouse ends at member's retirement and may be converted at individual rates.	• Must retire directly from active employment.
• **Optional life insurance at retirement (MSEP 2011)** - Under "Rule of 90", an employee may retain the current amount of coverage prior to retirement until age 62 at which time coverage is reduced to $60,000, and may convert any remaining basic and optional life insurance at individual rates. Coverage for spouse ends at member's retirement and may be converted at individual rates.	• Must retire directly from active employment.

Note: Insured employees may port their life insurance and their dependent life insurance when their coverage has been reduced or terminated if they meet certain qualifications.

Long-Term Disability (LTD) Insurance Plans | June 30, 2017

MOSERS administers the LTD Plan for eligible state employees who become disabled during active employment.

Active Members

Classification	Requirement
General state employees, legislators, and elected state officials - Members of MOSERS in a position normally requiring 1,040 hours of work a year are covered under the LTD plan, unless they work for a state agency which has its own LTD plan.	• Eligible participants receive 60% of their compensation minus primary social security, workers' compensation, and employer provided income. Benefits commence after 90 days of disability or when sick leave benefits are no longer payable, whichever occurs last. LTD benefits cease upon the earliest of (i) when disability ends, (ii) when the member is first eligible for normal retirement benefits or is receiving early retirement benefits, (iii) upon a member's death, (iv) the date benefits become payable under any other group long-term disability insurance plan, or, (v) the date the member fails to provide proof of continued disability and entitlement to LTD benefits.
Water patrol	• Uniformed members who are eligible for statutory occupational disability receive benefits equal to 50% of compensation with no offset for social security at the time of disability. For nonoccupational disabilities, eligible participants receive the same benefit as general employees.
Judges	• In addition to the disability benefits provided to general employees, judges may receive benefits under the state constitution. Participants may receive 50% of salary until the current term expires.

Changes in Plan Provisions

The 2017 legislative session came to an end on May 12. Senate Bill 62 was passed and then signed by the Governor. This bill fixes the College & University Retirement Plan (CURP) employer contribution rate at 6% of payroll and requires new employees to contribute 2% of payroll to the CURP. These provisions are effective July 1, 2018.

Two significant provisions affecting MOSERS were amended into SB 62 and were passed.

- Members of the MSEP 2011 will see a reduction in the vesting period from 10 years to 5 years. Offset provisions were included to ensure no increase in plan liability and affect MSEP 2011 members who terminate employment on or after January 1, 2018 with a vested retirement benefit. These members will: 1) receive their cost-of-living adjustment (COLA) in retirement at the 2nd anniversary of retirement (rather than the 1st anniversary), 2) not receive service credit for any unused sick leave accruals, and 3) provide a survivor benefit, if married, at the date of retirement eligibility, rather than the date of death.
- The MOSERS Board of Trustees was given the authority to establish a terminated-vested buyout program. This provision stipulates that any member who participates in the buyout program and returns to state employment will be considered a new employee with no prior service credit. The authority to establish a buyout program terminates on May 31, 2018. MOSERS' actuarial professionals indicated a potential savings with this provision of approximately $7.1 million annually, with a 50% participation rate.

Senate Bill 34 was also passed and was signed by the Governor. Provisions within this bill modified the original pension forfeiture statutes passed by the General Assembly in 2014 that apply to all public pension plans in Missouri. SB 34 modifies "found guilty" within the statute to "convicted" and requires the "employer" to report the conviction to the associated retirement plan rather than "the court." The original provisions passed in 2014 are related to a felony committed in direct connection with or directly related to an employee's duties on or after August 28, 2014.

Actuarial Present Values | June 30, 2017

MSEP

Actuarial Present Value June 30, 2017	Actuarial Present Value	Portion Covered by Future Normal Cost Contributions	Actuarial Accrued Liabilities
Active members			
Service retirement benefits based on services rendered before and likely to be rendered after valuation date	$5,333,879,237	$ 741,465,417	$ 4,592,413,820
Disability benefits likely to be paid to present active members who become totally and permanently disabled	155,214,308	98,421,685	56,792,623
Survivor benefits likely to be paid to widow(er)s and children of present active members who die before retiring	62,950,941	16,883,733	46,067,208
Separation benefits likely to be paid to present active members	222,057,440	141,299,477	80,757,963
Active member totals	$5,774,101,926	$ 998,070,312	4,776,031,614
Members on leave of absence & LTD			
Service retirement benefits based on service rendered before the valuation date			107,083,816
Terminated-vested members			
Service retirement benefits based on service rendered before the valuation date			702,658,035
Retired lives			7,559,623,100
Pending refunds			6,877,330
Total actuarial accrued liability			13,152,273,895
Less: actuarial value of assets			8,872,381,848
Unfunded actuarial accrued liability			$ 4,279,892,047
Funded ratio			67.5%

Judicial Plan

Actuarial Present Value June 30, 2017	Actuarial Present Value	Portion Covered by Future Normal Cost Contributions	Actuarial Accrued Liabilities
Active members			
Service retirement benefits based on services rendered before and likely to be rendered after valuation date	$246,659,691	$72,113,464	$174,546,227
Disability benefits likely to be paid to present active members who become totally and permanently disabled	1,366,910	1,233,476	133,434
Survivor benefits likely to be paid to widow(er)s and children of present active members who die before retiring	5,102,166	3,146,899	1,955,267
Separation benefits likely to be paid to present active members	8,392,578	8,749,482	(356,904)
Active member totals	$261,521,345	$85,243,321	176,278,024
Terminated-vested members			11,040,367
Retired lives			377,099,534
Total actuarial accrued liability			564,417,925
Less: actuarial value of assets			151,828,631
Unfunded actuarial accrued liability			$412,589,294
Funded ratio			26.9%

2007

STATISTICAL SECTION

Initially, 17,513 employees became members of MOSERS upon the system's inception in 1957. By 2007, MOSERS was serving 100,470 members (54,763 actively employed; 29,129 retired / beneficiaries; 16,578 terminated-vested). Additionally, MOSERS benefit recipients were located in all 50 states and Puerto Rico as well as in at least 14 other countries.

Statistical Section

Summary

Plan Membership

Membership in the pension trusts administered by MOSERS increased by 1,265. Active members decreased by 552, retired members and their beneficiaries increased by 1,751, and terminated-vested members increased by 66. Membership data for the last ten years ended June 30, 2017, can be found on page 132. The location of benefit recipients, showing that the majority remain in the state of Missouri after retirement, is depicted on page 133.

Valuation Assets vs Pension Liabilities

The charts on 128-130 graphically represent the funding progress of the pension plans for the 10 years ended June 30, 2017. The bar charts in the middle of the pages show the portion of the pension liabilities that are unfunded compared to the portion covered by assets in the trust funds. The bar charts on the bottom of the pages illustrate the funded ratio of the plans for the ten years ended June 30, 2017.

The existence of the unfunded actuarial accrued liabilities is not necessarily an indication of financial problems, but the fluctuations are important and must be monitored and controlled.

The remainder of this section contains various statistical and historical data considered useful in evaluating the condition of the plans.

All nonaccounting data is taken from MOSERS' internal sources except for that information which is derived from the actuarial valuations (pages 128-132, 136, and 146-147). Member data may differ between some schedules since the valuations are performed using data as of May 31 each year.

Changes in Net Position | Last Ten Fiscal Years

	2008	2009	2010	2011
MSEP				
Additions				
Employer contributions	$249,770,156	$ 252,105,008	$ 251,226,187	$ 263,418,048
Employee contributions	0	0	0	599,761
Member service purchases	3,085,133	3,235,999	3,576,954	2,814,551
Service transfer contributions	38,069	28,075	10,009	142,248
Investment income (net of expenses)	110,627,355	(1,508,376,715)	859,898,512	1,395,677,299
Other	572,274	619,060	639,901	659,474
Total additions to plan net position	364,092,987	(1,252,388,573)	1,115,351,563	1,663,311,381
Deductions				
Benefits	479,853,891	511,466,555	543,284,289	597,424,954
Refunds	0	0	3,106	0
Service transfers out	251,443	0	462,970	17,745,828
Administrative expenses	6,950,878	7,088,483	7,064,544	7,054,581
Total deductions from plan net position	487,056,212	518,555,038	550,814,909	622,225,363
Change in net position	$(122,963,225)	$(1,770,943,611)	$ 564,536,654	$1,041,086,018
Judicial Plan				
Additions				
Employer contributions	$ 26,215,309	$ 27,725,882	$ 27,029,198	$ 27,702,682
Employee contributions	0	0	0	59,958
Investment income (net of expenses)	1,043,940	(15,847,382)	9,909,718	17,460,050
Other	5,506	6,504	7,374	8,250
Total additions to plan net position	27,264,755	11,885,004	36,946,290	45,230,940
Deductions				
Benefits	22,058,085	23,232,088	24,230,545	25,488,531
Refunds	0	0	0	0
Administrative expenses	66,880	74,473	81,414	88,253
Total deductions from plan net position	22,124,965	23,306,561	24,311,959	25,576,784
Change in net position	$ 5,139,790	$ (11,421,557)	$ 12,634,331	$ 19,654,156
Internal Service Fund				
Operating revenues				
Premium receipts	$ 27,957,666	$ 28,990,057	$ 29,098,799	$ 28,829,638
Deferred compensation receipts	60,393,973	75,661,047	69,143,267	54,221,226
Miscellaneous income	536,493	1,027,380	1,039,369	981,404
Total operating revenues	88,888,132	105,678,484	99,281,435	84,032,268
Operating expenses				
Premium disbursements	27,927,265	28,968,981	29,077,825	28,804,638
Deferred compensation disbursements	60,371,802	75,683,218	69,143,267	54,221,226
Premium refunds	30,401	21,076	20,974	24,999
Administrative expenses	708,100	819,581	797,020	826,809
Total operating expenses	89,037,568	105,492,856	99,039,086	83,877,672
Nonoperating revenues				
Investment income	77,396	20,755	9,816	11,071
Change in net position	$ (72,040)	$ 206,383	$ 252,165	$ 165,667

2012	2013	2014	2015	2016	2017
$ 263,373,924	$ 274,655,284	$ 326,370,336	$ 329,752,832	$ 329,957,369	$ 335,217,422
4,955,399	9,698,883	14,025,328	18,099,455	21,684,920	25,439,343
2,869,085	3,475,123	2,909,423	1,859,005	2,815,749	1,691,046
2,675,339	2,446,627	2,252,206	3,575,815	2,107,873	3,977,803
158,102,123	778,008,348	1,484,709,539	(237,603,530)	1,194,422	272,073,643
448,463	489,193	450,453	533,001	545,847	522,025
432,424,333	1,068,773,458	1,830,717,285	116,216,578	358,306,180	638,921,282
611,522,451	646,708,308	677,097,411	723,994,041	750,440,412	787,300,328
123,709	622,341	1,421,856	2,479,264	3,798,199	4,820,737
588,180	1,911,665	1,916,840	1,792,495	3,071,892	1,843,792
7,017,057	7,575,883	7,336,922	8,077,692	8,489,375	8,759,341
619,251,397	656,818,197	687,773,029	736,343,492	765,799,878	802,724,198
$(186,827,064)	$ 411,955,261	$1,142,944,256	$(620,126,914)	$(407,493,698)	$(163,802,916)
$ 26,324,526	$ 28,330,649	$ 29,264,877	$ 32,696,686	$ 33,642,497	$ 34,246,826
149,859	211,936	294,810	488,193	661,206	786,745
2,061,916	10,724,252	21,388,261	(3,618,469)	19,273	4,671,168
5,849	6,743	6,489	8,117	8,808	8,963
28,542,150	39,273,580	50,954,437	29,574,527	34,331,784	39,713,702
26,821,412	27,802,871	29,406,625	31,245,906	32,979,706	33,979,837
0	0	0	0	10,008	4,888
91,514	104,428	105,693	123,015	136,983	150,387
26,912,926	27,907,299	29,512,318	31,368,921	33,126,697	34,135,112
$ 1,629,224	$ 11,366,281	$ 21,442,119	$ (1,794,394)	$ 1,205,087	$ 5,578,590
$ 28,578,326	$ 28,961,637	$ 29,563,054	$ 30,177,918	$ 30,360,162	$ 28,779,398
17,500,476	0	1,000,000	0	0	700,000
608,187	480,120	480,120	480,120	480,120	480,120
46,686,989	29,441,757	31,043,174	30,658,038	30,840,282	29,959,518
28,556,036	28,930,950	29,544,110	30,157,271	30,328,802	28,769,588
17,500,476	0	0	0	0	0
22,291	30,687	18,942	20,646	31,360	9,810
778,529	805,457	755,945	960,827	1,015,578	950,121
46,857,332	29,767,094	30,318,997	31,138,744	31,375,740	29,729,519
11,068	12,075	11,886	12,549	18,777	36,497
$ (159,275)	$ (313,262)	$ 736,063	$ (468,157)	$ (516,681)	$ 266,496

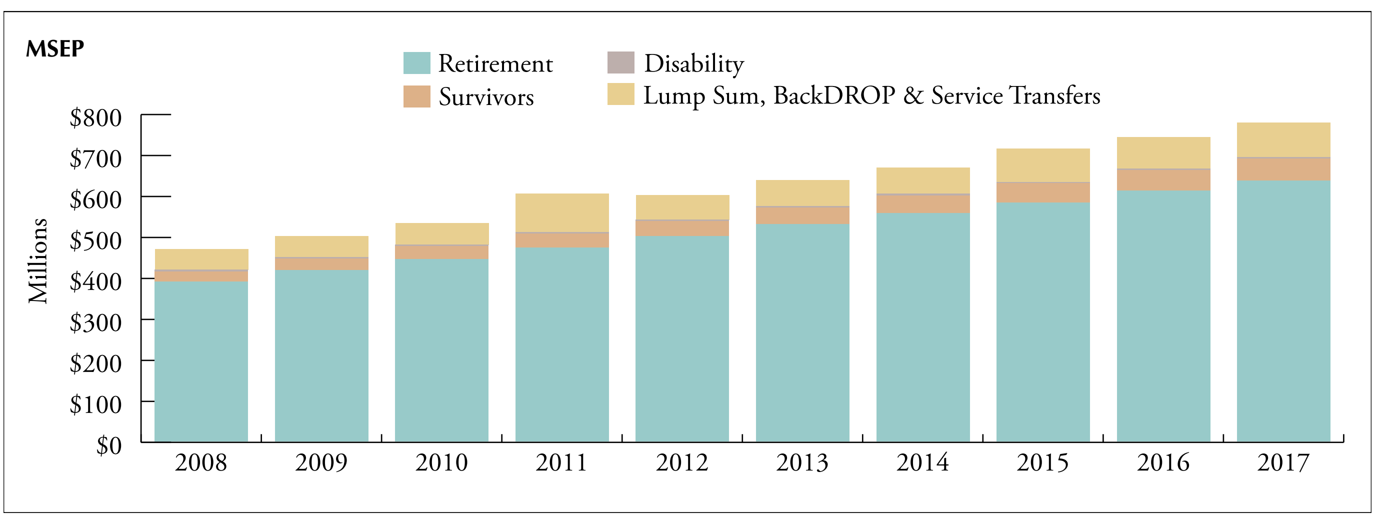
Deductions from Net Position for Benefits and Refunds by Type | Last Ten Fiscal Years

MSEP

Type of benefit	2008	2009	2010	2011
Retirement	$393,328,057	$421,847,017	$448,880,110	$476,841,741
Survivors	31,894,702	34,615,979	37,718,898	39,968,601
Disability	36,825	33,812	33,403	29,191
Lump sum	454,643	272,189	409,787	293,147
BackDROP and service transfers	54,139,664	54,697,557	56,705,060	98,038,103
Total benefits	$479,853,891	$511,466,554	$543,747,258	$615,170,783
Refunds	$ 0	$ 0	$ 3,106	$ 0

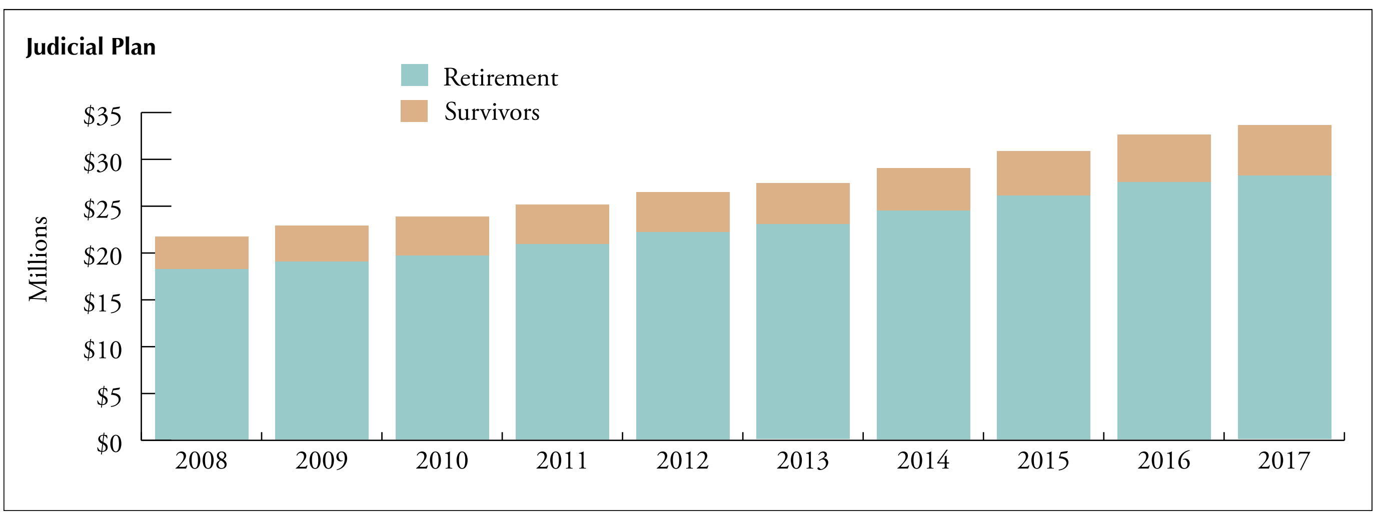
Judicial Plan

Type of benefit	2008	2009	2010	2011
Retirement	$18,342,676	$19,143,753	$19,784,720	$21,025,904
Survivors	3,715,409	4,088,335	4,445,825	4,462,627
Total benefits	$22,058,085	$23,232,088	$24,230,545	$25,488,531
Refunds	$ 0	$ 0	$ 0	$ 0



2012	2013	2014	2015	2016	2017
$504,555,055	$533,962,630	$560,553,490	$586,597,187	$615,708,229	$640,637,749
42,963,959	46,659,381	49,922,170	52,940,062	56,495,787	59,628,687
29,503	27,255	22,468	16,857	15,470	14,821
229,650	191,320	286,184	57,525	267,198	123,005
64,332,464	67,779,388	68,229,937	86,174,905	81,025,620	88,739,858
$612,110,631	$648,619,974	$679,014,249	$725,786,536	$753,512,304	$789,144,120
$ 123,709	$ 622,341	$ 1,421,856	$ 2,479,264	$ 3,798,199	$ 4,820,737

2012	2013	2014	2015	2016	2017
$22,284,844	$23,123,707	$24,609,421	$26,181,505	$27,641,108	$28,304,733
4,536,569	4,679,169	4,797,204	5,064,400	5,338,598	5,675,104
$26,821,413	$27,802,876	$29,406,625	$31,245,905	$32,979,706	$33,979,837
$ 0	$ 0	$ 0	$ 0	$ 10,008	$ 4,888



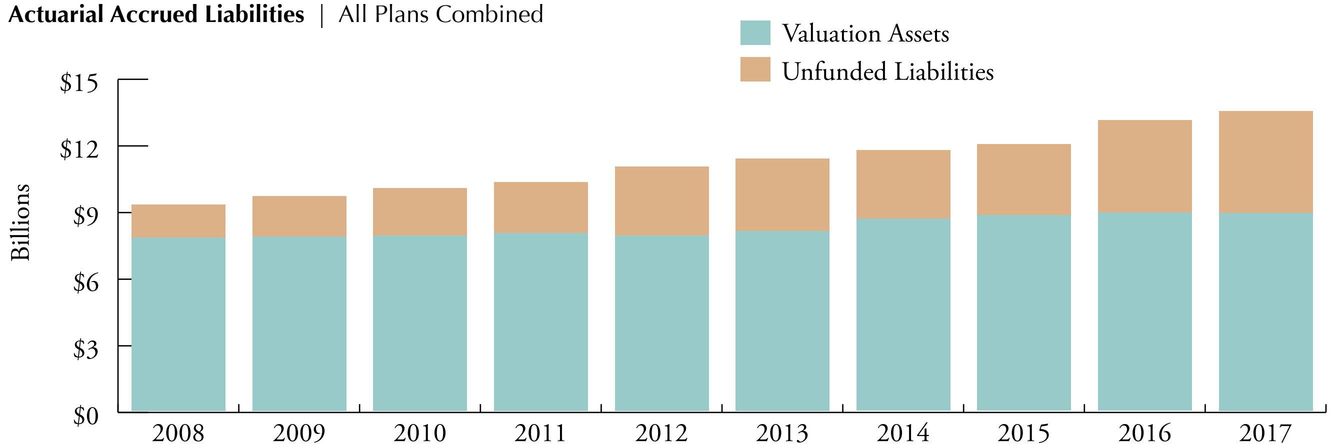
Pension Trust Funds

Valuation Assets (Smoothed Market) vs. Pension Liabilities | Ten Years Ended June 30, 2017

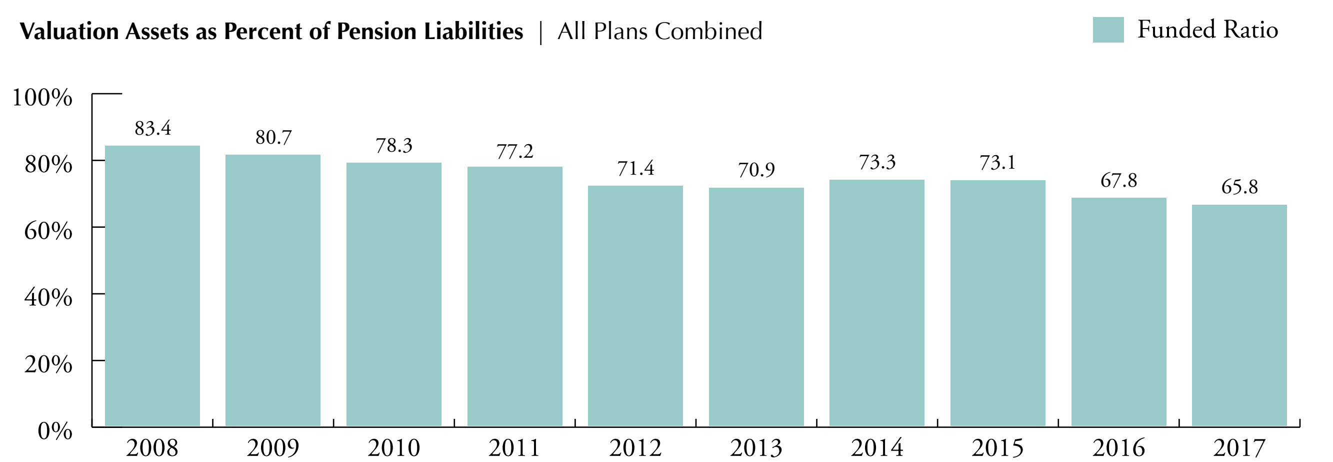
MSEP & Judicial Plans Combined

	Dollars in Billions			
Fiscal Year	Valuation Assets	Unfunded Liabilities	Accrued Liabilities	Funded Ratios
2008	$7.9117	$1.5714	$ 9.4831	83.4%
2009	7.9574	1.9065	9.8639	80.7
2010	8.0123	2.2228	10.2350	78.3
2011	8.1210	2.3960	10.5170	77.2
2012	7.9994	3.2076	11.2070	71.4
2013	8.2075	3.3624	11.5700	70.9
2014	8.7621	3.1949	11.9569	73.3
2015	8.9268	3.2838	12.2106	73.1
2016	9.0216	4.2772	13.2988	67.8
2017	9.0242	4.6925	13.7167	65.8

Actuarial Accrued Liabilities | All Plans Combined



Valuation Assets as Percent of Pension Liabilities | All Plans Combined

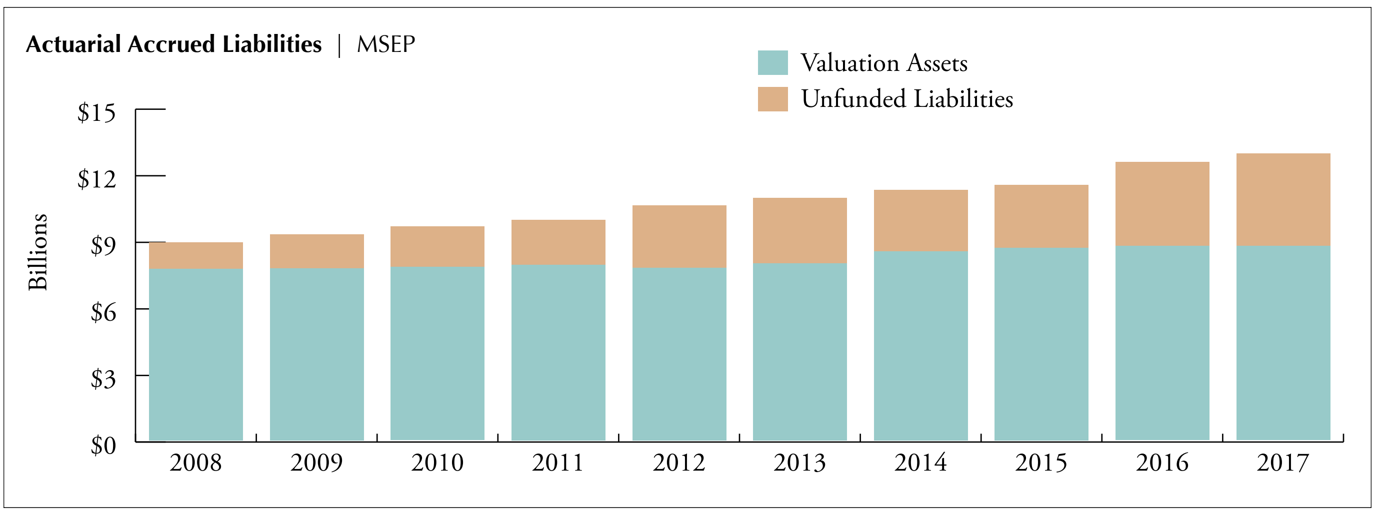


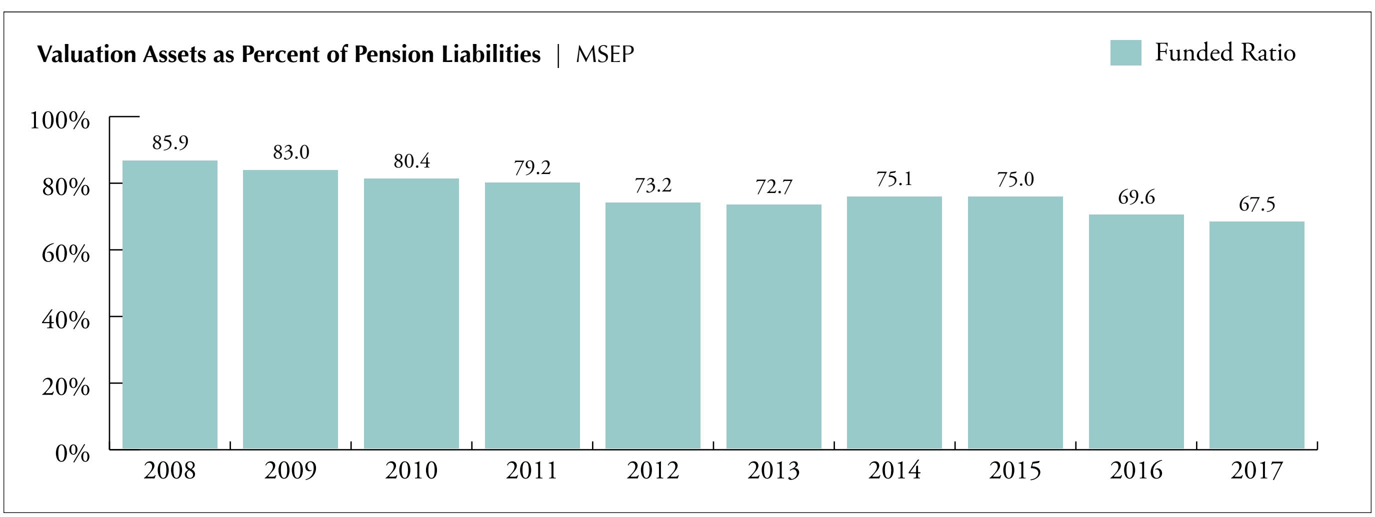
Pension Trust Funds

Valuation Assets (Smoothed Market) vs. Pension Liabilities | Ten Years Ended June 30, 2017

MSEP

	Dollars in Billions			
Fiscal Year	Valuation Assets	Unfunded Liabilities	Accrued Liabilities	Funded Ratios
2008	$7.8385	$1.2898	$ 9.1283	85.9%
2009	7.8761	1.6187	9.4948	83.0
2010	7.9234	1.9300	9.8532	80.4
2011	8.0225	2.1010	10.1240	79.2
2012	7.8972	2.8965	10.7937	73.2
2013	8.0964	3.0382	11.1346	72.7
2014	8.6378	2.8568	11.4946	75.1
2015	8.7925	2.9351	11.7276	75.0
2016	8.8781	3.8731	12.7512	69.6
2017	8.8724	4.2799	13.1523	67.5





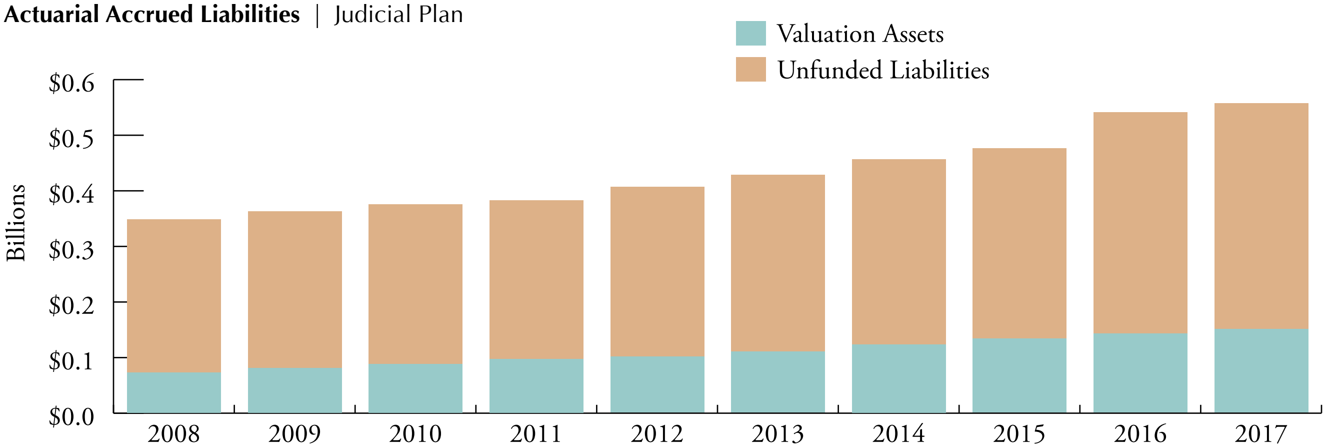
Pension Trust Funds

Valuation Assets (Smoothed Market) vs. Pension Liabilities | Ten Years Ended June 30, 2017

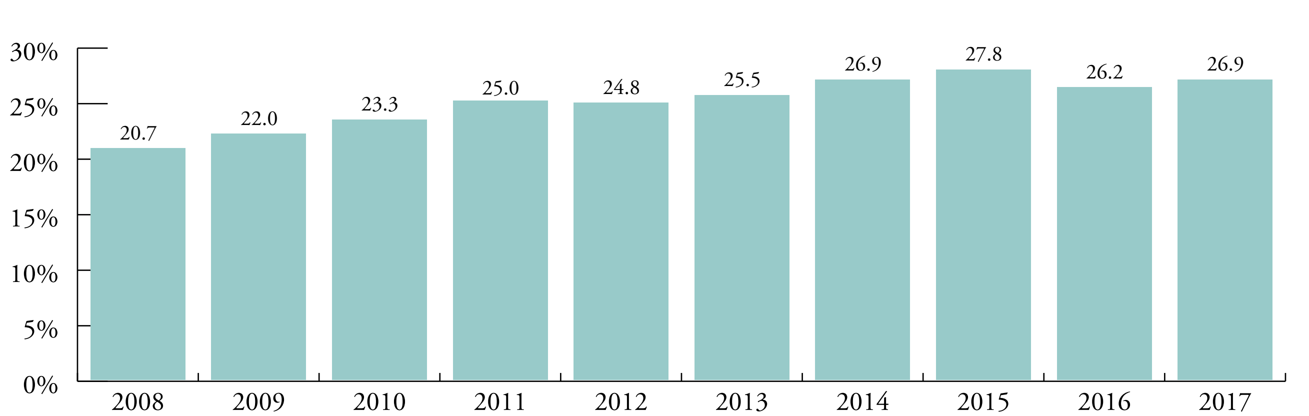
Judicial Plan

Fiscal Year	Valuation Assets	Unfunded Liabilities	Accrued Liabilities	Funded Ratios
	Dollars in Billions			
2008	$0.0732	$0.2816	$0.3548	20.7%
2009	0.0813	0.2878	0.3691	22.0
2010	0.0890	0.2930	0.3820	23.3
2011	0.0984	0.2951	0.3935	25.0
2012	0.1023	0.3111	0.4133	24.8
2013	0.1111	0.3242	0.4354	25.5
2014	0.1243	0.3381	0.4623	26.9
2015	0.1343	0.3486	0.4830	27.8
2016	0.1435	0.4041	0.5476	26.2
2017	0.1518	0.4126	0.5644	26.9

Actuarial Accrued Liabilities | Judicial Plan

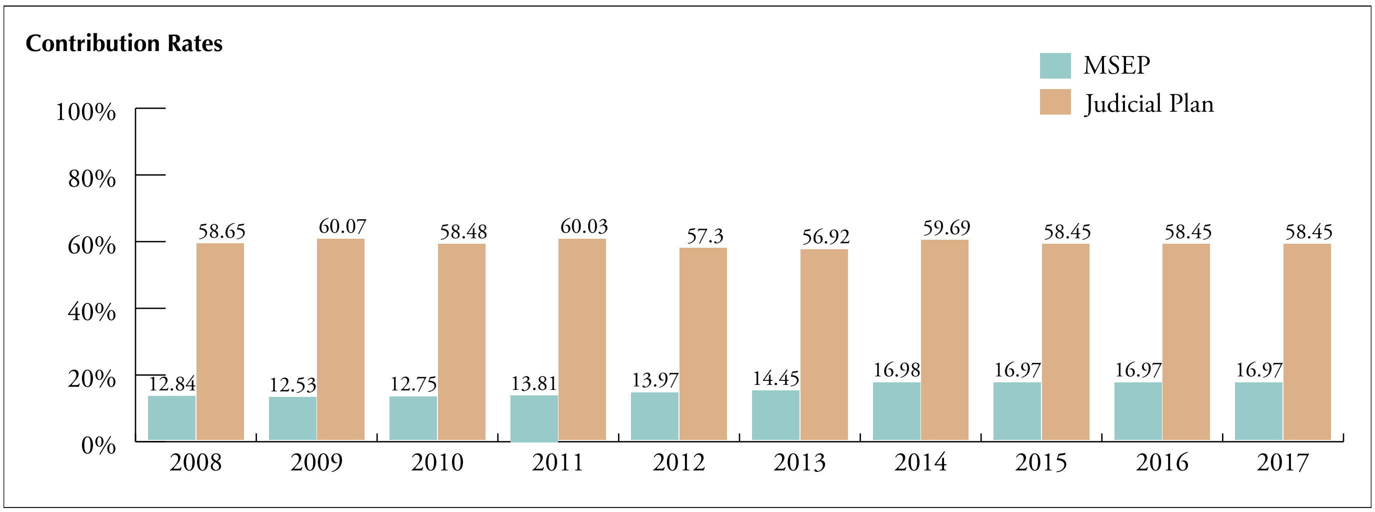


Valuation Assets as Percent of Pension Liabilities | Judicial Plan



Contribution Rates as a Percent of Payroll | Last Ten Fiscal Years

Fiscal Year	MSEP	Judicial Plan
2008	12.84%	58.65%
2009	12.53	60.07
2010	12.75	58.48
2011	13.81	60.03
2012	13.97	57.30
2013	14.45	56.92
2014	16.98	59.69
2015	16.97	58.45
2016	16.97	58.45
2017	16.97	58.45

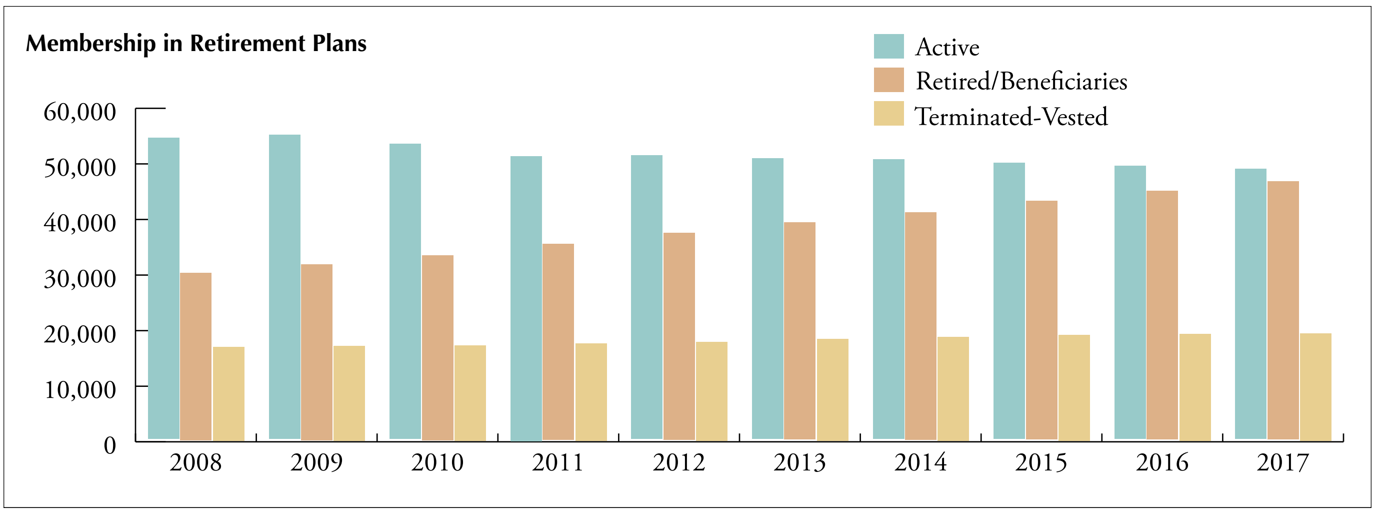


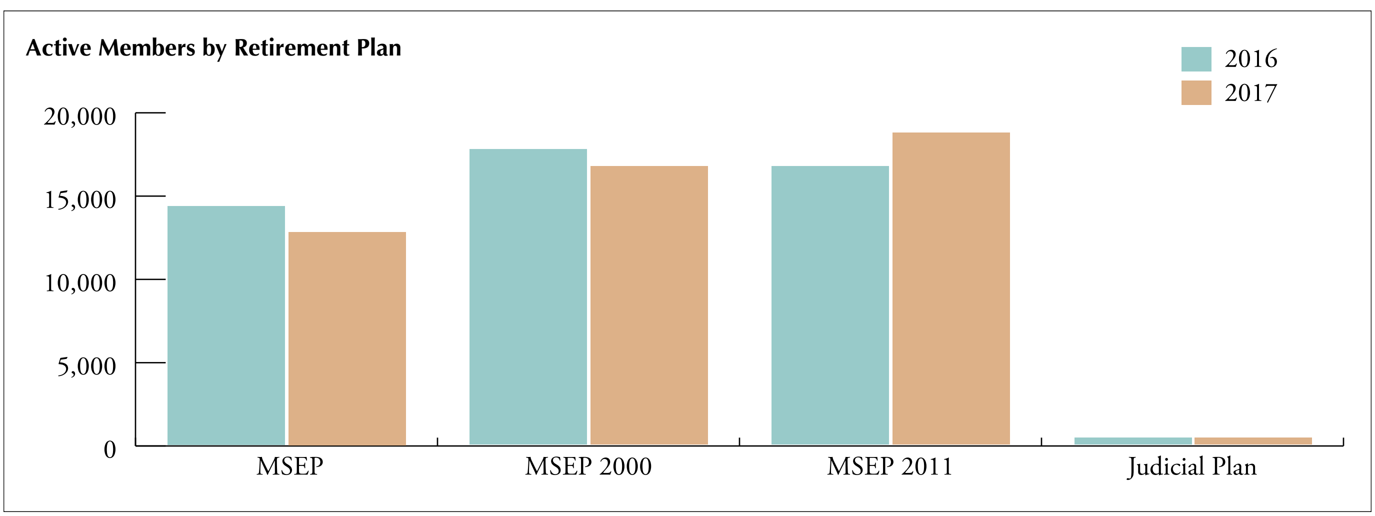
Membership in Retirement Plans | Last Ten Fiscal Years

MSEP & Judicial Plans Combined

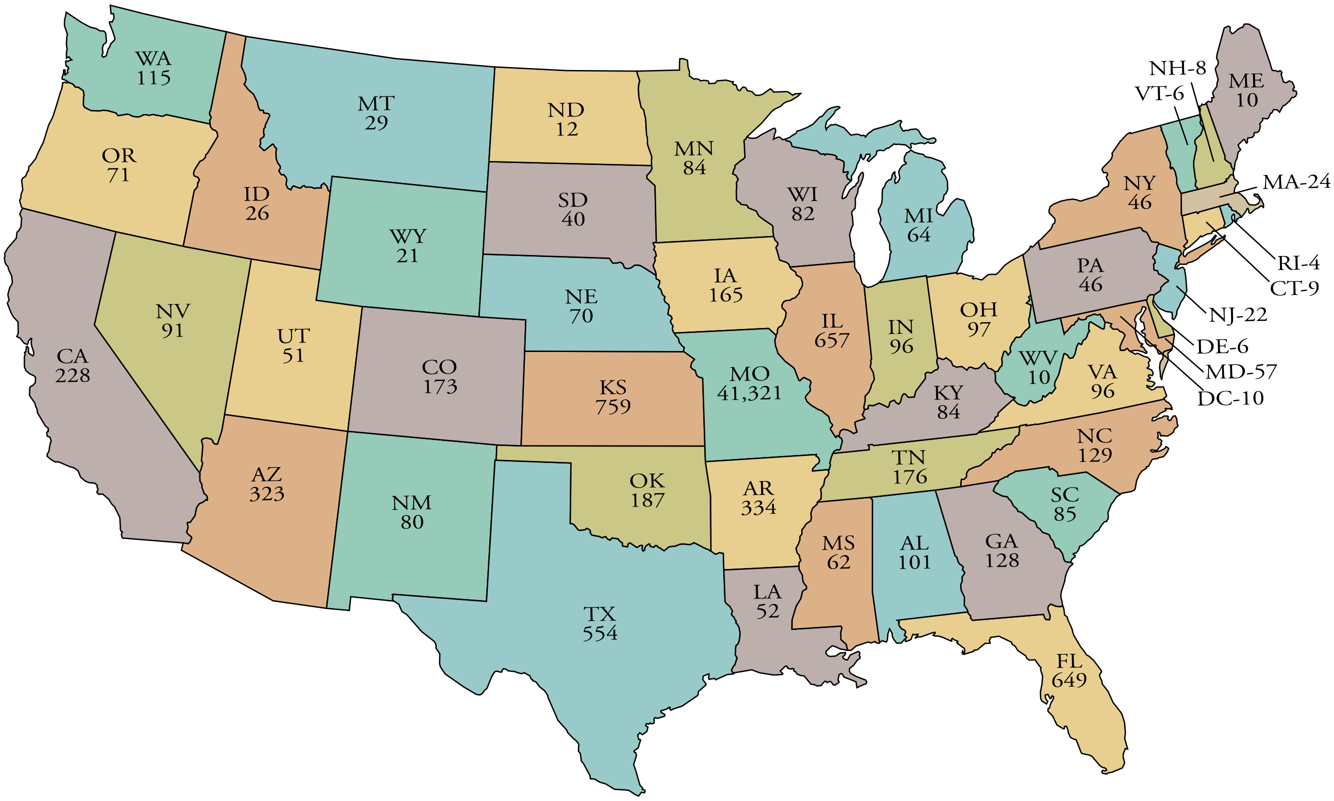
Fiscal Year	Active*	Retired/Beneficiaries	Terminated-Vested	Totals
2008	54,943	30,572	17,123	102,638
2009	55,454	32,100	17,304	104,858
2010	53,880	33,716	17,441	105,037
2011	52,059	35,801	17,757	105,617
2012	51,730	37,796	18,075	107,601
2013	51,233	39,636	18,581	109,450
2014	51,026	41,511	18,957	111,494
2015	50,385	43,503	19,319	113,207
2016	49,872	45,368	19,538	114,778
2017	49,320	47,119	19,603	116,042

* *Excludes members on leave of absence and long-term disability.*





Distribution of Benefit Recipients by Location | June 30, 2017



Benefit Recipients Outside the Continental United States

17	Alaska
10	Hawaii
1	Army Post Office
1	Argentina
3	Australia
1	Brazil
14	Canada
1	Costa Rica
1	Croatia
1	Czech Republic
1	Ecuador
1	Germany
1	Guam
1	India
2	Ireland
2	Israel
2	Italy
1	Lativa
1	Mexico
1	Marshall Islands
1	P. R. China
2	Philippines
1	Sri Lanka
1	Sweden
1	Thailand
1	The Netherlands
1	United Arab Emirates
3	United Kingdom
4	Virgin Islands

Benefit Recipients by Type of Retirement and Option Selected | June 30, 2017

MSEP

Amount of Monthly Benefit	Number of Benefit Recipients	Type of Retirement A	B	C	D	E	F	G
1-250	5,572	2,051	2,608	263	559	1	0	90
251-500	7,977	3,852	2,820	433	774	2	0	96
501-750	5,597	3,276	1,396	314	573	0	0	38
751-1000	5,033	3,752	615	200	431	0	0	35
1001-1250	4,514	3,789	287	134	288	0	0	16
1251-1500	3,779	3,315	125	99	232	0	0	8
1501-1750	3,064	2,766	79	62	154	0	0	3
1751-2000	2,465	2,271	43	40	108	0	0	3
Over 2000	9,058	8,413	72	153	416	0	0	4
Total	47,059	33,485	8,045	1,698	3,535	3	0	293

Judicial Plan

Amount of Monthly Benefit	Number of Benefit Recipients	Type of Retirement A	B	C	D	E	F	G
1-250	4	0	2	0	2	0	0	0
251-500	8	0	6	0	1	0	0	1
501-750	7	0	3	0	3	0	0	1
751-1000	6	1	1	1	2	0	0	1
1001-1250	4	0	3	0	1	0	0	0
1251-1500	9	1	5	1	0	0	0	2
1501-1750	6	0	3	0	2	0	0	1
1751-2000	6	0	1	3	1	0	0	1
Over 2000	519	315	57	30	114	0	0	3
Total	569	317	81	35	126	0	0	10

Type of Retirement
A - Normal retirement
B - Early retirement
C - Survivor of active
D - Survivor of retired
E - Disability
F - Occupational disability (Water Patrol)
G - Ex-spouse

Option Selected									
1	2	3	4	5	6	7	8	9	10
0	17	260	224	323	0	1,185	440	43	3,080
8	37	269	227	479	2	1,721	817	32	4,385
11	29	136	88	320	1	1,164	1,025	6	2,817
7	26	81	55	355	1	1,185	1,016	4	2,303
9	19	68	41	458	0	1,008	753	1	2,157
6	11	53	32	456	1	863	591	2	1,764
6	7	50	26	414	0	655	391	0	1,515
9	3	28	20	381	0	513	305	0	1,206
69	19	91	40	1,242	1	2,517	1,196	0	3,883
125	168	1,036	753	4,428	6	10,811	6,534	88	23,110

Option Selected									
1	2	3	4	5	6	7	8	9	10
4	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	1
5	0	0	0	1	0	0	0	0	1
3	0	0	0	0	0	1	0	0	2
3	0	0	0	0	0	0	0	0	1
7	0	0	0	0	0	0	0	0	2
5	0	0	0	0	0	0	0	0	1
2	0	0	0	1	0	0	0	0	3
485	0	0	0	22	0	0	0	1	11
521	0	0	0	24	0	1	0	1	22

Option Selected
1 - Automatic 50% joint & survivor
2 - 60 guaranteed payments
3 - 120 guaranteed payments
4 - 180 guaranteed payments
5 - 50% joint & survivor
6 - 75% joint & survivor
7 - 100% joint & survivor
8 - Unreduced 50% joint & survivor
9 - Automatic minor survivor
10 - No survivor option (includes pop-ups)

Benefits Payable Tabulated by Type of Benefit and by Option | June 30, 2017

MSEP (Closed Plan)

Type of Benefit	Number	Annual Benefits	Average Annual Benefits
Service retirement			
Life annuity	5,805	$ 83,298,036	$14,349
Joint and 50% survivor (unreduced)	5,204	97,108,116	18,660
Joint and 100% survivor	3,016	64,744,092	21,467
Life income with 60 guaranteed payments	139	1,594,128	11,469
Life income with 120 guaranteed payments	173	2,064,924	11,936
Survivor beneficiary	2,577	33,608,208	13,042
Total	16,914	282,417,504	16,697
Disability retirement	3	11,496	3,832
Death-in-service	1,465	17,185,068	11,730
Grand totals	18,382	$299,614,068	16,299

MSEP 2000

Type of Benefit	Number	Annual Benefits	Average Annual Benefits
Service retirement			
Life annuity	16,847	$234,665,676	$13,929
Joint and 50% survivor	4,039	78,872,196	19,528
Joint and 100% survivor	4,725	73,981,704	15,658
Life income with 60 guaranteed payments	23	340,632	14,810
Life income with 120 guaranteed payments	766	7,617,840	9,945
Life income with 180 guaranteed payments	623	5,139,768	8,250
Survivor beneficiary	932	8,945,796	9,598
Total	27,955	409,563,612	14,651
Death-in-service	220	984,780	4,476
Grand totals	28,175	$410,548,392	14,571

Judicial Plan

Type of Benefit	Number	Annual Benefits	Average Annual Benefits
Service retirement			
Life annuity	5	$ 326,856	$65,371
Joint and 50% survivor	392	28,393,644	72,433
Joint and 100% survivor	1	10,668	10,668
Survivor beneficiary	126	4,727,364	37,519
Total	524	33,458,532	63,852
Death-in-service	35	1,168,896	33,397
Grand totals	559	$34,627,428	61,945

Average Monthly Benefit Amounts | Ten Years Ended June 30, 2017

MSEP

Members Retiring During Fiscal Year		Years Credited Service by Category <5	5-10	10-15	15-20	20-25	25-30	30+	All Members
	Average monthly benefit	$ 0	$ 267	$ 458	$ 725	$ 1,090	$ 1,586	$ 2,025	$ 919
2008	Average final average salary	$ 0	$ 2,373	$ 2,422	$ 2,775	$ 2,904	$ 3,363	$ 3,658	$ 2,835
	Number of retirees	0	425	412	344	369	382	195	2,127
	Average monthly benefit	$ 111	$ 292	$ 489	$ 748	$ 1,226	$ 1,637	$ 2,191	$ 976
2009	Average final average salary	$ 1,596	$ 2,435	$ 2,463	$ 2,855	$ 3,212	$ 3,462	$ 3,993	$ 2,966
	Number of retirees	1	461	391	322	416	388	180	2,159
	Average monthly benefit	$ 442	$ 287	$ 488	$ 777	$ 1,186	$ 1,606	$ 2,138	$ 940
2010	Average final average salary	$ 6,215	$ 2,523	$ 2,535	$ 2,890	$ 3,167	$ 3,455	$ 3,845	$ 2,968
	Number of retirees	2	500	449	351	394	338	222	2,256
	Average monthly benefit	$ 367	$ 336	$ 492	$ 819	$ 1,220	$ 1,652	$ 2,142	$ 1,006
2011	Average final average salary	$ 1,442	$ 2,631	$ 2,507	$ 3,063	$ 3,234	$ 3,523	$ 3,884	$ 3,063
	Number of retirees	4	601	498	444	495	495	280	2,817
	Average monthly benefit	$ 126	$ 303	$ 521	$ 818	$ 1,232	$ 1,624	$ 2,271	$ 939
2012	Average final average salary	$ 7,854	$ 2,572	$ 2,648	$ 3,050	$ 3,295	$ 3,488	$ 4,109	$ 3,055
	Number of retirees	5	592	537	407	473	373	196	2,583
	Average monthly benefit	$ 251	$ 326	$ 523	$ 753	$ 1,243	$ 1,697	$ 2,017	$ 928
2013	Average final average salary	$ 3,744	$ 2,665	$ 2,593	$ 2,814	$ 3,314	$ 3,637	$ 3,689	$ 3,011
	Number of retirees	5	600	558	386	438	388	204	2,579
	Average monthly benefit	$ 280	$ 308	$ 520	$ 809	$ 1,199	$ 1,691	$ 2,207	$ 937
2014	Average final average salary	$ 4,426	$ 2,675	$ 2,614	$ 3,029	$ 3,229	$ 3,650	$ 3,999	$ 3,066
	Number of retirees	5	636	507	370	436	392	199	2,545
	Average monthly benefit	$ 219	$ 315	$ 522	$ 801	$ 1,268	$ 1,723	$ 2,217	$ 999
2015	Average final average salary	$ 5,058	$ 2,596	$ 2,624	$ 2,954	$ 3,416	$ 3,729	$ 4,016	$ 3,119
	Number of retirees	6	644	519	437	450	487	250	2,793
	Average monthly benefit	$ 151	$ 307	$ 506	$ 819	$ 1,300	$ 1,838	$ 2,360	$ 1,016
2016	Average final average salary	$ 3,284	$ 2,623	$ 2,600	$ 3,020	$ 3,445	$ 3,968	$ 4,204	$ 3,175
	Number of retirees	6	611	502	430	505	423	215	2,692
	Average monthly benefit	$ 309	$ 339	$ 562	$ 946	$ 1,365	$ 1,860	$ 2,391	$ 1,116
2017	Average final average salary	$ 4,658	$ 2,731	$ 2,849	$ 3,426	$ 3,641	$ 4,030	$ 4,291	$ 3,406
	Number of retirees	9	518	508	459	440	477	239	2,650
Ten Years Ended June 30, 2017									
	Average monthly benefit	$ 250	$ 310	$ 510	$ 807	$ 1,237	$ 1,697	$ 2,198	$ 980
	Average final average salary	$ 4,463	$ 2,592	$ 2,593	$ 3,002	$ 3,296	$ 3,645	$ 3,973	$ 3,075
	Number of retirees	43	5,588	4,881	3,950	4,416	4,143	2,180	25,201

Note: COLA increases and temporary benefits payable under MSEP 2000 until age 62 are excluded from the above for comparison purposes.

Average Monthly Benefit Amounts | Ten Years Ended June 30, 2017

General Employees in the MSEP*

Members Retiring During Fiscal Year		<5	5-10	10-15	15-20	20-25	25-30	30+	All Members
		Years Credited Service by Category							
	Average monthly benefit	$ 0	$ 262	$ 451	$ 713	$ 1,090	$ 1,586	$ 2,025	$ 917
2008	Average final average salary	$ 0	$ 2,371	$ 2,418	$ 2,760	$ 2,904	$ 3,363	$ 3,658	$ 2,833
	Number of retirees	0	421	408	342	369	382	195	2,117
	Average monthly benefit	$ 111	$ 267	$ 470	$ 740	$ 1,209	$ 1,635	$ 2,175	$ 965
2009	Average final average salary	$ 1,596	$ 2,404	$ 2,440	$ 2,854	$ 3,187	$ 3,460	$ 3,971	$ 2,952
	Number of retirees	1	447	387	320	413	387	179	2,134
	Average monthly benefit	$ 60	$ 281	$ 475	$ 773	$ 1,179	$ 1,601	$ 2,113	$ 932
2010	Average final average salary	$ 4,258	$ 2,519	$ 2,519	$ 2,890	$ 3,154	$ 3,456	$ 3,815	$ 2,957
	Number of retirees	1	496	446	350	393	337	220	2,243
	Average monthly benefit	$ 39	$ 302	$ 472	$ 802	$ 1,217	$ 1,622	$ 2,124	$ 992
2011	Average final average salary	$ 925	$ 2,612	$ 2,486	$ 3,052	$ 3,234	$ 3,518	$ 3,862	$ 3,055
	Number of retirees	3	571	491	440	494	492	278	2,769
	Average monthly benefit	$ 126	$ 290	$ 502	$ 805	$ 1,232	$ 1,617	$ 2,271	$ 932
2012	Average final average salary	$ 7,854	$ 2,557	$ 2,626	$ 3,036	$ 3,295	$ 3,475	$ 4,109	$ 3,045
	Number of retirees	5	584	532	404	473	372	196	2,566
	Average monthly benefit	$ 169	$ 301	$ 502	$ 746	$ 1,234	$ 1,697	$ 1,995	$ 921
2013	Average final average salary	$ 4,244	$ 2,653	$ 2,568	$ 2,813	$ 3,295	$ 3,637	$ 3,645	$ 3,001
	Number of retirees	3	574	551	384	437	388	203	2,540
	Average monthly benefit	$ 262	$ 298	$ 514	$ 803	$ 1,195	$ 1,691	$ 2,207	$ 935
2014	Average final average salary	$ 5,382	$ 2,663	$ 2,612	$ 3,029	$ 3,230	$ 3,650	$ 3,999	$ 3,065
	Number of retirees	3	629	503	368	435	392	199	2,529
	Average monthly benefit	$ 219	$ 301	$ 517	$ 786	$ 1,268	$ 1,723	$ 2,208	$ 994
2015	Average final average salary	$ 5,058	$ 2,581	$ 2,623	$ 2,947	$ 3,416	$ 3,729	$ 4,007	$ 3,116
	Number of retirees	6	633	517	433	450	487	249	2,775
	Average monthly benefit	$ 151	$ 297	$ 506	$ 819	$ 1,285	$ 1,838	$ 2,343	$ 1,011
2016	Average final average salary	$ 3,284	$ 2,617	$ 2,600	$ 3,020	$ 3,420	$ 3,968	$ 4,184	$ 3,168
	Number of retirees	6	603	502	430	502	423	213	2,679
	Average monthly benefit	$ 230	$ 313	$ 551	$ 934	$ 1,355	$ 1,853	$ 2,379	$ 1,109
2017	Average final average salary	$ 5,026	$ 2,710	$ 2,839	$ 3,414	$ 3,624	$ 4,016	$ 4,265	$ 3,395
	Number of retirees	6	500	504	456	439	476	238	2,619
Ten Years Ended June 30, 2017									
	Average monthly benefit	$ 171	$ 293	$ 498	$ 797	$ 1,230	$ 1,692	$ 2,186	$ 973
	Average final average salary	$ 4,617	$ 2,578	$ 2,581	$ 2,996	$ 3,286	$ 3,641	$ 3,955	$ 3,068
	Number of retirees	34	5,458	4,841	3,927	4,405	4,136	2,170	24,971

** Excludes legislators, elected officials, water patrol, and administrative law judges.*
Note: COLA increases and temporary benefits payable under MSEP 2000 until age 62 are excluded from the above for comparison purposes.

Average Monthly Benefit Amounts | Ten Years Ended June 30, 2017

Legislators in the MSEP

Members Retiring During Fiscal Year		<5	5-10	10-15	15-20	20-25	25-30	30+	All Members
		Years Credited Service by Category							
2008	Average monthly benefit	$ 0	$ 816	$ 1,156	$ 1,742	$ 0	$ 0	$ 0	$ 1,045
	Average final average salary	$ 0	$ 2,613	$ 2,613	$ 2,613	$ 0	$ 0	$ 0	$ 2,613
	Number of retirees	0	4	2	1	0	0	0	7
2009	Average monthly benefit	$ 0	$ 910	$ 1,496	$ 2,057	$ 2,395	$ 0	$ 0	$ 1,201
	Average final average salary	$ 0	$ 2,993	$ 2,993	$ 2,993	$ 2,993	$ 0	$ 0	$ 2,993
	Number of retirees	0	13	3	2	1	0	0	19
2010	Average monthly benefit	$ 0	$ 982	$ 1,496	$ 2,245	$ 0	$ 3,242	$ 0	$ 1,559
	Average final average salary	$ 0	$ 2,993	$ 2,993	$ 2,993	$ 0	$ 2,993	$ 0	$ 2,993
	Number of retirees	0	4	1	1	0	1	0	7
2011	Average monthly benefit	$ 0	$ 992	$ 1,512	$ 2,021	$ 2,744	$ 3,242	$ 0	$ 1,247
	Average final average salary	$ 0	$ 2,993	$ 2,993	$ 2,993	$ 2,993	$ 2,993	$ 0	$ 2,993
	Number of retirees	0	30	4	4	1	1	0	40
2012	Average monthly benefit	$ 0	$ 1,069	$ 1,659	$ 2,225	$ 0	$ 0	$ 0	$ 1,335
	Average final average salary	$ 0	$ 2,993	$ 2,993	$ 2,993	$ 0	$ 0	$ 0	$ 2,993
	Number of retirees	0	7	3	1	0	0	0	11
2013	Average monthly benefit	$ 374	$ 907	$ 1,513	$ 2,120	$ 0	$ 0	$ 0	$ 1,036
	Average final average salary	$ 2,993	$ 2,993	$ 2,993	$ 2,993	$ 0	$ 0	$ 0	$ 2,993
	Number of retirees	2	25	5	2	0	0	0	34
2014	Average monthly benefit	$ 307	$ 1,051	$ 1,496	$ 1,995	$ 2,744	$ 0	$ 0	$ 1,296
	Average final average salary	$ 2,993	$ 2,993	$ 2,993	$ 2,993	$ 2,993	$ 0	$ 0	$ 2,993
	Number of retirees	2	6	3	2	1	0	0	14
2015	Average monthly benefit	$ 0	$ 977	$ 1,735	$ 2,162	$ 0	$ 0	$ 0	$ 1,315
	Average final average salary	$ 0	$ 2,993	$ 2,993	$ 2,993	$ 0	$ 0	$ 0	$ 2,993
	Number of retirees	0	10	2	3	0	0	0	15
2016	Average monthly benefit	$ 0	$ 1,048	$ 0	$ 0	$ 0	$ 0	$ 0	$ 1,048
	Average final average salary	$ 0	$ 2,993	$ 0	$ 0	$ 0	$ 0	$ 0	$ 2,993
	Number of retirees	0	7	0	0	0	0	0	7
2017	Average monthly benefit	$ 499	$ 954	$ 1,580	$ 1,995	$ 0	$ 0	$ 0	$ 1,041
	Average final average salary	$ 2,993	$ 2,993	$ 2,993	$ 2,993	$ 0	$ 0	$ 0	$ 2,993
	Number of retirees	2	17	3	1	0	0	0	23
Ten Years Ended June 30, 2017									
	Average monthly benefit	$ 393	$ 964	$ 1,522	$ 2,066	$ 2,628	$ 3,242	$ 0	$ 1,186
	Average final average salary	$ 2,993	$ 2,981	$ 2,964	$ 2,971	$ 2,993	$ 2,993	$ 0	$ 2,978
	Number of retirees	6	123	26	17	3	2	0	177

Note: COLA increases and temporary benefits payable under MSEP 2000 until age 62 are excluded from the above for comparison purposes.

Average Monthly Benefit Amounts | Ten Years Ended June 30, 2017

Elected Officials in the MSEP

Members Retiring During Fiscal Year		Years Credited Service by Category <5	5-10	10-15	15-20	20-25	25-30	30+	All Members
2008	Average monthly benefit	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
	Average final average salary	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
	Number of retirees	0	0	0	0	0	0	0	0
2009	Average monthly benefit	$ 0	$ 3,336	$ 4,852	$ 0	$ 0	$ 0	$ 0	$ 4,094
	Average final average salary	$ 0	$ 8,979	$ 9,703	$ 0	$ 0	$ 0	$ 0	$ 9,341
	Number of retirees	0	1	1	0	0	0	0	2
2010	Average monthly benefit	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
	Average final average salary	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
	Number of retirees	0	0	0	0	0	0	0	0
2011	Average monthly benefit	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
	Average final average salary	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
	Number of retirees	0	0	0	0	0	0	0	0
2012	Average monthly benefit	$ 0	$ 0	$ 3,781	$ 0	$ 0	$ 0	$ 0	$ 3,781
	Average final average salary	$ 0	$ 0	$ 8,093	$ 0	$ 0	$ 0	$ 0	$ 8,093
	Number of retirees	0	0	2	0	0	0	0	2
2013	Average monthly benefit	$ 0	$ 0	$ 4,489	$ 0	$ 0	$ 0	$ 0	$ 4,489
	Average final average salary	$ 0	$ 0	$ 8,979	$ 0	$ 0	$ 0	$ 0	$ 8,979
	Number of retirees	0	0	1	0	0	0	0	1
2014	Average monthly benefit	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
	Average final average salary	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
	Number of retirees	0	0	0	0	0	0	0	0
2015	Average monthly benefit	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
	Average final average salary	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
	Number of retirees	0	0	0	0	0	0	0	0
2016	Average monthly benefit	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
	Average final average salary	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
	Number of retirees	0	0	0	0	0	0	0	0
2017	Average monthly benefit	$ 0	$ 2,993	$ 3,099	$ 0	$ 5,576	$ 0	$ 0	$ 3,889
	Average final average salary	$ 0	$ 8,979	$ 7,207	$ 0	$ 11,152	$ 0	$ 0	$ 9,113
	Number of retirees	0	1	1	0	1	0	0	3
Ten Years Ended June 30, 2017									
	Average monthly benefit	$ 0	$ 3,165	$ 4,000	$ 0	$ 5,576	$ 0	$ 0	$ 3,988
	Average final average salary	$ 0	$ 8,979	$ 8,415	$ 0	$ 11,152	$ 0	$ 0	$ 8,898
	Number of retirees	0	2	5	0	1	0	0	8

Note: COLA increases are excluded from the above for comparison purposes.

Average Monthly Benefit Amounts | Ten Years Ended June 30, 2017

Uniformed Water Patrol in the MSEP

Members Retiring During Fiscal Year		Years Credited Service by Category <5	5-10	10-15	15-20	20-25	25-30	30+	All Members
2008	Average monthly benefit	$ 0	$ 0	$ 750	$ 0	$ 0	$ 0	$ 0	$ 750
	Average final average salary	$ 0	$ 0	$ 2,541	$ 0	$ 0	$ 0	$ 0	$ 2,541
	Number of retirees	0	0	1	0	0	0	0	1
2009	Average monthly benefit	$ 0	$ 0	$ 0	$ 0	$ 0	$ 2,351	$ 5,113	$ 3,732
	Average final average salary	$ 0	$ 0	$ 0	$ 0	$ 0	$ 4,173	$ 7,902	$ 6,038
	Number of retirees	0	0	0	0	0	1	1	2
2010	Average monthly benefit	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 4,886	$ 4,886
	Average final average salary	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 7,184	$ 7,184
	Number of retirees	0	0	0	0	0	0	2	2
2011	Average monthly benefit	$ 0	$ 0	$ 721	$ 0	$ 0	$ 3,086	$ 4,553	$ 3,200
	Average final average salary	$ 0	$ 0	$ 2,964	$ 0	$ 0	$ 5,077	$ 6,912	$ 5,388
	Number of retirees	0	0	1	0	0	2	2	5
2012	Average monthly benefit	$ 0	$ 0	$ 0	$ 959	$ 0	$ 0	$ 0	$ 959
	Average final average salary	$ 0	$ 0	$ 0	$ 2,794	$ 0	$ 0	$ 0	$ 2,794
	Number of retirees	0	0	0	1	0	0	0	1
2013	Average monthly benefit	$ 0	$ 69	$ 0	$ 0	$ 0	$ 0	$ 0	$ 69
	Average final average salary	$ 0	$ 1,291	$ 0	$ 0	$ 0	$ 0	$ 0	$ 1,291
	Number of retirees	0	1	0	0	0	0	0	1
2014	Average monthly benefit	$ 0	$ 0	$ 780	$ 0	$ 0	$ 0	$ 0	$ 780
	Average final average salary	$ 0	$ 0	$ 2,507	$ 0	$ 0	$ 0	$ 0	$ 2,507
	Number of retirees	0	0	1	0	0	0	0	1
2015	Average monthly benefit	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 4,539	$ 4,539
	Average final average salary	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 6,321	$ 6,321
	Number of retirees	0	0	0	0	0	0	1	1
2016	Average monthly benefit	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 4,221	$ 4,221
	Average final average salary	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 6,375	$ 6,375
	Number of retirees	0	0	0	0	0	0	2	2
2017	Average monthly benefit	$ 0	$ 0	$ 0	$ 1,079	$ 0	$ 0	$ 0	$ 1,079
	Average final average salary	$ 0	$ 0	$ 0	$ 2,846	$ 0	$ 0	$ 0	$ 2,846
	Number of retirees	0	0	0	1	0	0	0	1
Ten Years Ended June 30, 2017									
	Average monthly benefit	$ 0	$ 69	$ 750	$ 1,019	$ 0	$ 2,841	$ 4,622	$ 2,933
	Average final average salary	$ 0	$ 1,291	$ 2,671	$ 2,820	$ 0	$ 4,776	$ 6,896	$ 4,967
	Number of retirees	0	1	3	2	0	3	8	17

Note: COLA increases and temporary benefits payable under MSEP 2000 until age 62 are excluded from the above for comparison purposes.

Average Monthly Benefit Amounts | Ten Years Ended June 30, 2017

Administrative Law Judges and Legal Advisors in the MSEP

Members Retiring During Fiscal Year		<5	5-10	10-15	15-20	20-25	25-30	30+	All Members
		Years Credited Service by Category							
2008	Average monthly benefit	$ 0	$ 0	$ 1,679	$ 3,968	$ 0	$ 0	$ 0	$ 2,824
	Average final average salary	$ 0	$ 0	$ 3,359	$ 7,936	$ 0	$ 0	$ 0	$ 5,648
	Number of retirees	0	0	1	1	0	0	0	2
2009	Average monthly benefit	$ 0	$ 0	$ 0	$ 0	$ 4,200	$ 0	$ 0	$ 4,200
	Average final average salary	$ 0	$ 0	$ 0	$ 0	$ 8,400	$ 0	$ 0	$ 8,400
	Number of retirees	0	0	0	0	2	0	0	2
2010	Average monthly benefit	$ 823	$ 0	$ 2,827	$ 0	$ 4,101	$ 0	$ 0	$ 2,645
	Average final average salary	$ 8,172	$ 0	$ 5,851	$ 0	$ 8,202	$ 0	$ 0	$ 7,019
	Number of retirees	1	0	2	0	1	0	0	4
2011	Average monthly benefit	$ 0	$ 0	$ 3,216	$ 4,101	$ 0	$ 0	$ 0	$ 3,511
	Average final average salary	$ 0	$ 0	$ 6,433	$ 8,202	$ 0	$ 0	$ 0	$ 7,023
	Number of retirees	0	0	2	1	0	0	0	3
2012	Average monthly benefit	$ 0	$ 2,493	$ 0	$ 4,378	$ 0	$ 4,204	$ 0	$ 3,692
	Average final average salary	$ 0	$ 8,756	$ 0	$ 8,756	$ 0	$ 8,408	$ 0	$ 8,640
	Number of retirees	0	1	0	1	0	1	0	3
2013	Average monthly benefit	$ 0	$ 0	$ 2,657	$ 0	$ 4,134	$ 0	$ 4,450	$ 3,747
	Average final average salary	$ 0	$ 0	$ 5,314	$ 0	$ 8,267	$ 0	$ 8,900	$ 7,494
	Number of retirees	0	0	1	0	1	0	1	3
2014	Average monthly benefit	$ 0	$ 2,433	$ 0	$ 0	$ 0	$ 0	$ 0	$ 2,433
	Average final average salary	$ 0	$ 8,146	$ 0	$ 0	$ 0	$ 0	$ 0	$ 8,146
	Number of retirees	0	1	0	0	0	0	0	1
2015	Average monthly benefit	$ 0	$ 2,259	$ 0	$ 3,012	$ 0	$ 0	$ 0	$ 2,636
	Average final average salary	$ 0	$ 7,936	$ 0	$ 6,023	$ 0	$ 0	$ 0	$ 6,980
	Number of retirees	0	1	0	1	0	0	0	2
2016	Average monthly benefit	$ 0	$ 853	$ 0	$ 0	$ 3,811	$ 0	$ 0	$ 3,072
	Average final average salary	$ 0	$ 3,508	$ 0	$ 0	$ 7,623	$ 0	$ 0	$ 6,594
	Number of retirees	0	1	0	0	3	0	0	4
2017	Average monthly benefit	$ 401	$ 0	$ 0	$ 5,065	$ 0	$ 5,298	$ 5,273	$ 4,009
	Average final average salary	$ 5,777	$ 0	$ 0	$ 10,129	$ 0	$ 10,596	$ 10,546	$ 9,262
	Number of retirees	1	0	0	1	0	1	1	4
Ten Years Ended June 30, 2017									
	Average monthly benefit	$ 612	$ 2,010	$ 2,737	$ 4,105	$ 4,010	$ 4,751	$ 4,862	$ 3,340
	Average final average salary	$ 6,975	$ 7,087	$ 5,540	$ 8,209	$ 8,020	$ 9,502	$ 9,723	$ 7,542
	Number of retirees	2	4	6	5	7	2	2	28

Note: COLA increases are excluded from the above for comparison purposes.

Average Monthly Benefit Amounts | Ten Years Ended June 30, 2017

Judicial Plan

Members Retiring During Fiscal Year		<5	5-10	10-15	15-20	20-25	25-30	30+	All Members
		Years Credited Service by Category							
2008	Average monthly benefit	$ 592	$ 2,045	$ 4,120	$ 4,828	$ 5,132	$ 4,593	$ 5,186	$ 3,908
	Average final average salary	$ 5,821	$ 6,203	$ 8,276	$ 9,656	$ 10,264	$ 9,186	$ 10,373	$ 8,537
	Number of retirees	2	2	6	3	3	2	1	19
2009	Average monthly benefit	$ 494	$ 1,786	$ 3,663	$ 4,528	$ 5,286	$ 5,127	$ 5,020	$ 3,559
	Average final average salary	$ 5,775	$ 7,469	$ 7,811	$ 9,012	$ 10,572	$ 10,255	$ 10,040	$ 8,361
	Number of retirees	5	2	7	7	3	3	1	28
2010	Average monthly benefit	$ 458	$ 1,333	$ 4,507	$ 3,802	$ 0	$ 5,181	$ 4,973	$ 3,972
	Average final average salary	$ 6,597	$ 8,000	$ 9,577	$ 7,604	$ 0	$ 10,362	$ 9,946	$ 9,047
	Number of retirees	1	1	2	2	0	2	3	11
2011	Average monthly benefit	$ 0	$ 2,188	$ 4,615	$ 4,566	$ 4,807	$ 4,866	$ 4,650	$ 4,384
	Average final average salary	$ 0	$ 7,994	$ 9,299	$ 9,132	$ 9,613	$ 9,732	$ 9,299	$ 9,187
	Number of retirees	0	4	9	10	5	3	5	36
2012	Average monthly benefit	$ 1,740	$ 2,353	$ 4,561	$ 4,621	$ 0	$ 5,020	$ 0	$ 3,684
	Average final average salary	$ 9,114	$ 7,797	$ 10,179	$ 9,241	$ 0	$ 10,040	$ 0	$ 9,055
	Number of retirees	1	5	4	4	0	1	0	15
2013	Average monthly benefit	$ 0	$ 2,277	$ 4,234	$ 4,625	$ 5,444	$ 5,452	$ 5,293	$ 4,699
	Average final average salary	$ 0	$ 8,123	$ 8,696	$ 9,251	$ 10,888	$ 10,904	$ 10,585	$ 9,767
	Number of retirees	0	2	6	4	5	4	2	23
2014	Average monthly benefit	$ 0	$ 2,310	$ 4,571	$ 5,151	$ 5,117	$ 4,869	$ 5,293	$ 4,313
	Average final average salary	$ 0	$ 8,259	$ 9,143	$ 10,303	$ 10,233	$ 9,738	$ 10,585	$ 9,435
	Number of retirees	0	4	6	3	3	1	1	18
2015	Average monthly benefit	$ 1,114	$ 3,140	$ 5,572	$ 5,572	$ 5,970	$ 5,572	$ 5,848	$ 5,392
	Average final average salary	$ 11,143	$ 9,419	$ 11,143	$ 11,143	$ 11,940	$ 11,143	$ 11,697	$ 11,253
	Number of retirees	1	3	7	10	7	4	7	39
2016	Average monthly benefit	$ 0	$ 4,193	$ 5,575	$ 5,452	$ 6,166	$ 5,844	$ 0	$ 5,545
	Average final average salary	$ 0	$ 11,688	$ 11,503	$ 10,903	$ 12,332	$ 11,688	$ 0	$ 11,569
	Number of retirees	0	2	3	5	4	2	0	16
2017	Average monthly benefit	$ 602	$ 4,487	$ 5,506	$ 6,054	$ 5,878	$ 6,178	$ 5,931	$ 5,293
	Average final average salary	$ 8,136	$ 11,696	$ 11,367	$ 12,108	$ 11,756	$ 12,355	$ 11,861	$ 11,574
	Number of retirees	2	3	2	4	6	4	2	23
Ten Years Ended June 30, 2017									
	Average monthly benefit	$ 681	$ 2,663	$ 4,591	$ 4,982	$ 5,544	$ 5,381	$ 5,321	$ 4,549
	Average final average salary	$ 6,970	$ 8,654	$ 9,426	$ 9,958	$ 11,088	$ 10,762	$ 10,641	$ 9,855
	Number of retirees	12	28	52	52	36	26	22	228

Note: COLA increases are excluded from the above for comparison purposes.

Retirees and Beneficiaries
Tabulated by Fiscal Year of Retirement | As of June 30, 2017

MSEP

Fiscal Year of Retirement	Number	Total Annual Benefit	Average Monthly Benefit
1974	1	$ 4,138	$ 345
1975	1	892	74
1976	3	15,680	436
1977	7	67,235	800
1978	11	55,452	420
1979	9	61,898	573
1980	13	88,426	567
1981	24	224,372	779
1982	25	223,024	743
1983	18	170,122	788
1984	47	454,758	806
1985	66	631,948	798
1986	98	936,233	796
1987	117	1,361,418	970
1988	157	2,140,975	1,136
1989	192	3,165,104	1,374
1990	204	3,082,014	1,259
1991	288	5,159,630	1,493
1992	329	5,330,631	1,350
1993	436	7,206,667	1,377
1994	431	7,252,038	1,402
1995	596	10,629,883	1,486
1996	632	11,601,858	1,530
1997	662	11,908,702	1,499
1998	800	15,104,922	1,573
1999	932	17,639,918	1,577
2000	1,024	19,132,729	1,557
2001	2,087	38,212,157	1,526
2002	1,464	23,399,681	1,332
2003	1,588	26,691,545	1,401
2004	2,152	34,166,922	1,323
2005	1,578	23,142,815	1,222
2006	1,734	24,327,907	1,169
2007	2,078	29,950,745	1,201
2008	2,095	29,800,916	1,185
2009	2,189	31,618,974	1,204
2010	2,287	32,096,413	1,170
2011	2,913	43,037,880	1,231
2012	2,725	37,759,507	1,155
2013	2,832	38,312,721	1,127
2014	2,856	38,671,049	1,128
2015	3,162	45,481,498	1,199
2016	3,119	44,779,488	1,196
2017	3,077	47,520,915	1,287
	47,059	$ 712,621,799	$1,262

Retirees and Beneficiaries
Tabulated by Fiscal Year of Retirement | As of June 30, 2017

Judicial Plan

Fiscal Year of Retirement	Number	Total Annual Benefit	Average Monthly Benefit
1976 & prior	1	$ 11,113	$ 926
1977	0	0	0
1978	1	15,945	1,329
1979	0	0	0
1980	1	21,743	1,812
1981	0	0	0
1982	0	0	0
1983	1	21,357	1,780
1984	1	22,700	1,892
1985	0	0	0
1986	1	27,266	2,272
1987	6	284,067	3,945
1988	3	161,392	4,483
1989	4	210,179	4,379
1990	5	267,363	4,456
1991	9	409,716	3,794
1992	4	217,584	4,533
1993	6	266,620	3,703
1994	3	121,614	3,378
1995	12	864,827	6,006
1996	7	325,468	3,875
1997	5	325,124	5,419
1998	19	1,174,388	5,151
1999	14	891,658	5,307
2000	15	998,454	5,547
2001	15	1,287,232	7,151
2002	14	1,002,330	5,966
2003	20	1,326,826	5,528
2004	16	1,036,844	5,400
2005	15	1,177,350	6,541
2006	15	641,727	3,565
2007	52	3,231,235	5,178
2008	27	1,592,464	4,915
2009	33	1,784,685	4,507
2010	14	804,032	4,786
2011	37	2,191,610	4,936
2012	20	974,227	4,059
2013	31	2,016,888	5,422
2014	24	1,393,601	4,839
2015	55	3,722,820	5,641
2016	27	1,647,204	5,084
2017	36	2,181,780	5,050
	569	$34,651,433	$5,075

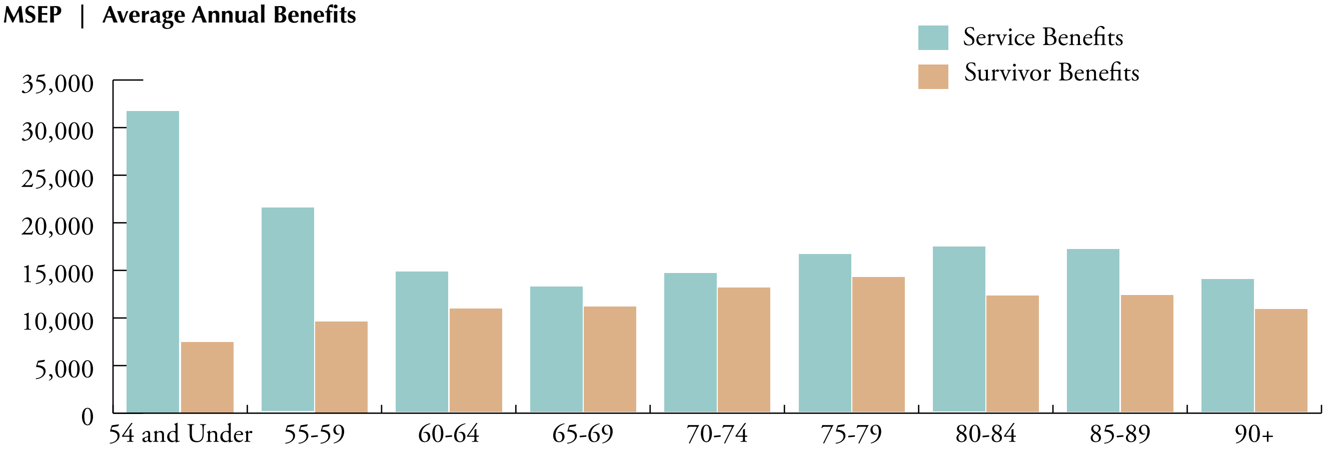
Total Benefits Payable
Tabulated by Attained Ages of Benefit Recipients | As of June 30, 2017

MSEP

	Service Retirement		Survivors and Beneficiaries		Totals	
Attained Ages	No.	Annual Benefits	No.	Annual Benefits	No.	Annual Benefits
54 and Under	515	$ 16,536,108	562	$ 4,201,644	1,077	$ 20,737,752
55-59	3,396	73,612,968	350	3,389,556	3,746	77,002,524
60-64	8,421	125,820,948	500	5,510,040	8,921	131,330,988
65-69	11,140	148,586,652	730	8,196,180	11,870	156,782,832
70-74	8,045	118,820,832	732	9,679,344	8,777	128,500,176
75-79	4,716	79,241,088	745	10,678,620	5,461	89,919,708
80-84	2,769	48,568,776	724	8,961,348	3,493	57,530,124
85-89	1,525	26,422,572	534	6,638,160	2,059	33,060,732
90+	838	11,846,616	318	3,484,752	1,156	15,331,368
Totals	41,365	$649,456,560	5,195	$60,739,644	46,560	$710,196,204

Average age at retirement: 60.0 years • Average age now: 69.9 years

MSEP | Average Annual Benefits



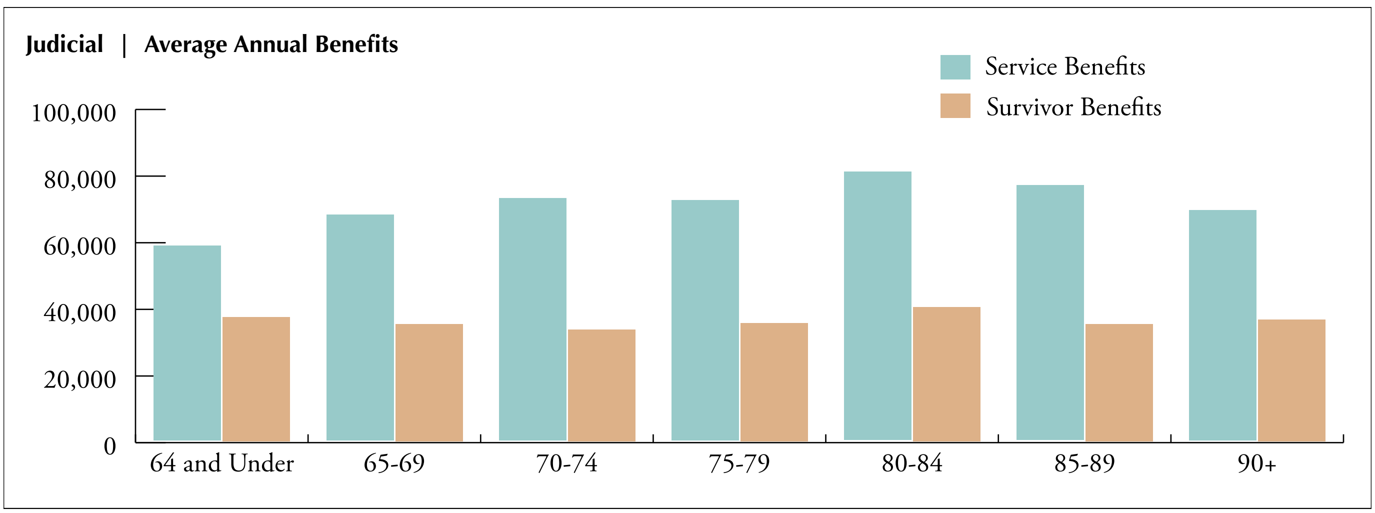
Average benefit paid: $15,701 service benefits • $11,692 survivor benefits

Total Benefits Payable
Tabulated by Attained Ages of Benefit Recipients | As of June 30, 2017

Judicial Plan

	Service Retirement		Survivors and Beneficiaries		Totals	
Attained Ages	No.	Annual Benefits	No.	Annual Benefits	No.	Annual Benefits
64 and Under	28	$ 1,662,084	13	$ 491,772	41	$ 2,153,856
65-69	103	7,082,364	13	463,932	116	7,546,296
70-74	108	7,963,584	24	816,396	132	8,779,980
75-79	77	5,626,752	18	647,388	95	6,274,140
80-84	38	3,103,296	22	900,492	60	4,003,788
85-89	28	2,171,892	39	1,391,712	67	3,563,604
90+	16	1,121,196	32	1,184,568	48	2,305,764
Totals	398	$28,731,168	161	$5,896,260	559	$34,627,428

Average age at retirement: 63.8 years • Average age now: 74.1 years



Average benefit paid: $72,189 service benefits • $36,623 survivor benefits

2017

With 60 years of experience, MOSERS has matured in its primary role of providing financial security to its members. MOSERS' net assets now total $8.1 billion and the system's membership has increased to more than 116,000. In FY17, MOSERS paid benefits to 46,560 retirees and beneficiaries whose average monthly benefit was $1,271 ($15,253 per year). Nearly 90% of the $734 million MOSERS paid in benefits was to Missouri residents.

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