Arkansas Teacher Retirement System

Annual Actuarial Valuation of Active and Inactive Members June 30, 2019

Report of the June 30, 2019 Actuarial Valuation

Outline of Contents

Pages	Items
-	Cover Letter
Section A	**Executive Summary**
Section B	**Valuation Results**
B-1	Computed Employer Rates
B-2	Historical Contribution Rates
B-3	Actuarial Liabilities
B-4	Total Retiree Accrued Liabilities
B-5	Financing Benefit Promises (Pie Chart)
B-6	Short Condition Test
B-7	Actuarial Accrued Liabilities and Valuation Assets
B-8	Closed Group Population Projection (Pie Chart)
Section C	**Summary of Benefits**
C-1	Summary of Provisions
C-11	Sample Calculations
Section D	**Financial Information**
D-1	Valuation Assets
D-5	Market Value of Assets
D-6	Market Value Reconciliation
D-7	Schedule of Funding Progress
D-8	Plan Maturity Measures
Section E	**Covered Member Data**
E-1	Active Members
E-5	Deferred Vested Members
E-6	T-DROP Members
E-8	Retirees and Beneficiaries by Type of Annuity
E-9	Historical Graphs
E-10	Benefit and Purchasing Power Changes
Section F	**Financial Principles**
Section G	**Actuarial Assumptions**
Section H	**Glossary**

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December 13, 2019

Board of Trustees
Arkansas Teacher Retirement System
Little Rock, Arkansas

Dear Board Members:

Presented in this report are the results of the ***Annual Actuarial Valuation of non-retired members as of June 30, 2019.*** The June 30th annual valuation of retired lives receiving monthly benefits indicates the liabilities for future benefit payments to existing retirees. These liabilities are covered in detail in a separate report. They are also covered briefly in this report on page B-4.

The purposes of the valuation are to measure the System's funding progress and to determine the amortization period that results from the statutory employer and employee rates and the actuarial assumptions that the Board has adopted. This report should not be relied on for any purpose other than the purposes described herein. Financial results associated with the benefits described in this report that are developed for purposes other than those identified above may be significantly different than those in this report.

This report was prepared at the request of the Board and is intended for use by the Retirement System and those designated or approved by the Board. This report may be provided to parties other than the Retirement System only in its entirety and only with the permission of the Board. GRS is not responsible for unauthorized use of this report.

The valuation was based upon census data and financial information provided by the System's administrative staff. Preparation of this data requires considerable staff time. The helpful cooperation of the Arkansas Teacher Retirement System (ATRS) staff in furnishing the data is acknowledged with appreciation. We checked for internal and year-to-year consistency, but did not audit the data. We are not responsible for the accuracy or completeness of any data provided by ATRS.

This report was prepared using certain assumptions approved by the Board. The actuarial assumptions used for valuation purposes are summarized in Section G. These assumptions reflect experience during the period July 1, 2010 to June 30, 2015 and expectations for the future.

Future actuarial measurements may differ significantly from the current measurements presented in this report 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. The scope of an actuarial valuation does not contain an analysis of the potential range of such future measurements.

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To the best of our knowledge, this report is complete and accurate and was made in accordance with standards of practice promulgated by the Actuarial Standards Board. The actuarial assumptions used for the valuation produce results which, individually and in the aggregate, are reasonable.

This report has been prepared by actuaries who have substantial experience valuing public employee retirement systems. Brian B. Murphy, Judith A. Kermans and Heidi G. Barry are Members of the American Academy of Actuaries (MAAA) and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein. The individuals submitting this report are independent of the plan sponsor.

Respectfully submitted,

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BBM/JAK/HGB:rmn

SECTION A

EXECUTIVE SUMMARY

Executive Summary

General Financial Objective. Section 24-7-401 (a) of the Arkansas Code provides as follows (emphasis added):

(1) The financial objective of the Arkansas Teacher Retirement System is to establish and receive contributions that expressed as percentages of active member payroll will **remain approximately level from generation to generation of Arkansas citizens.**
(2) Contributions received each year shall be sufficient:
   (A) To **fully cover the costs of benefit commitments** being made to members for their service being rendered **in that year**; and
   (B) To **make a level payment** that if paid annually over a reasonable period of future years will **fully cover the unfunded costs** of benefit commitments for service previously rendered.

Arkansas Teacher Retirement System Status: Based upon the results of the June 30, 2019 actuarial valuations, ***ATRS is satisfying the financial objective of level-contribution-percent financing.***

This report contains the results of the June 30, 2019 valuation. The table below shows a summary of the data used in the valuation. This data was the basis for determining valuation results and recommended employer contribution rates.

	Number	Average	Type of Average
Active not in T-DROP	68,457	$39,065	Pay
Active in T-DROP	3,707	62,812	Pay
Deferred Vested	13,033	5,336	Annual Projected Benefit
Retired	48,677	23,558	Annual Current Benefit
Total Members	**133,874**		

Included in the 2019 valuation were 4,077 reemployed retirees (included in the Retired data file) with total earnings of $120.0 million. ATRS receives full employer contributions on these individuals per Arkansas Code Section 24-7-708. The actuarial valuation assumes the number of working members will remain constant at the current level. In some recent years the total number of working members has decreased. A decreasing population means less contribution income for the retirement system than expected and can lead to funding difficulty in extreme cases. ATRS receives employer contributions on behalf of all working members.

Actuarial Assumptions: There were no assumption changes in the June 30, 2019 valuation. In our judgement the actuarial assumptions in use, and in particular the 7.5% investment return assumption, are reasonable for the purposes described in this report. However, it is possible that the 7.5% assumption may not satisfy actuarial standards for purposes of the June 30, 2020 valuation.

Benefit Changes: There were no benefit provision changes adopted for consideration in the June 30, 2019 valuation.

Executive Summary - (Continued)

Contribution Rate Changes

Employer and member contribution rates will change in the future according to the following schedule. This schedule of changes has been incorporated into the results shown in this report.

	Contribution Rate	
Fiscal Year	**Member**	**Employer**
2020	6.25%	14.25%
2021	6.50%	14.50%
2022	6.75%	14.75%
2023 and Later	7.00%	15.00%

Results of the Valuation

The amortization period this year is 28 years, unchanged from last year's period of 28 years. This result is heavily dependent upon member and employer rates increasing in accordance with the schedule above. While 28 years is a reasonable period that meets statutory requirements, use of such a period will result in unfunded liabilities that are projected to increase in dollar amount for approximately the next 10 years. This condition is called "negative amortization" and is falling out of favor. The ATRS has targeted 18 years as the threshold in recent legislation. The contribution rate based upon the target amortization period would be approximately 17.7% payroll.

The Arkansas Teacher Retirement System remains stable with an 80.2% funded position as of June 30, 2019. Unless there is an investment loss in Fiscal Year 2020, the amortization period is likely to decrease in the next valuation due to the scheduled phase-in of net investment gains.

The rate of Investment return was 5.19%# this year. As of June 30, 2019, the market value of assets exceeded the actuarial value of assets by approximately $329 million. (Please refer to page D-3 for details.) Investment gains and losses that occur each year are smoothed in over a 4-year period. After considering smoothing, the recognized return this year was 7.90%, compared to an assumed 7.5% return for Fiscal 2019. The smoothing is expected to introduce downward pressure on the amortization period next year.

\# *The actuary calculated this return figure which may not exactly match the investment consultant's figure.*

Other Observations

General Implications of Contribution Allocation Procedure or Funding Policy on Future Expected Plan Contributions and Funded Status

Given the plan's contribution allocation procedure, if all actuarial assumptions are met (including the assumption of the plan earning 7.50% on the actuarial value of assets), it is expected that:

1) The unfunded actuarial accrued liabilities will be fully amortized after 28 years.
2) The funded status of the plan will increase gradually towards a 100% funded ratio.
3) The unfunded accrued liability will increase for an extended period before beginning to decline.

Limitations of Funded Status Measurements

Unless otherwise indicated, a funded status measurement presented in this report is based upon the actuarial accrued liability and the actuarial value of assets. Unless otherwise indicated, with regard to any funded status measurements presented in this report:

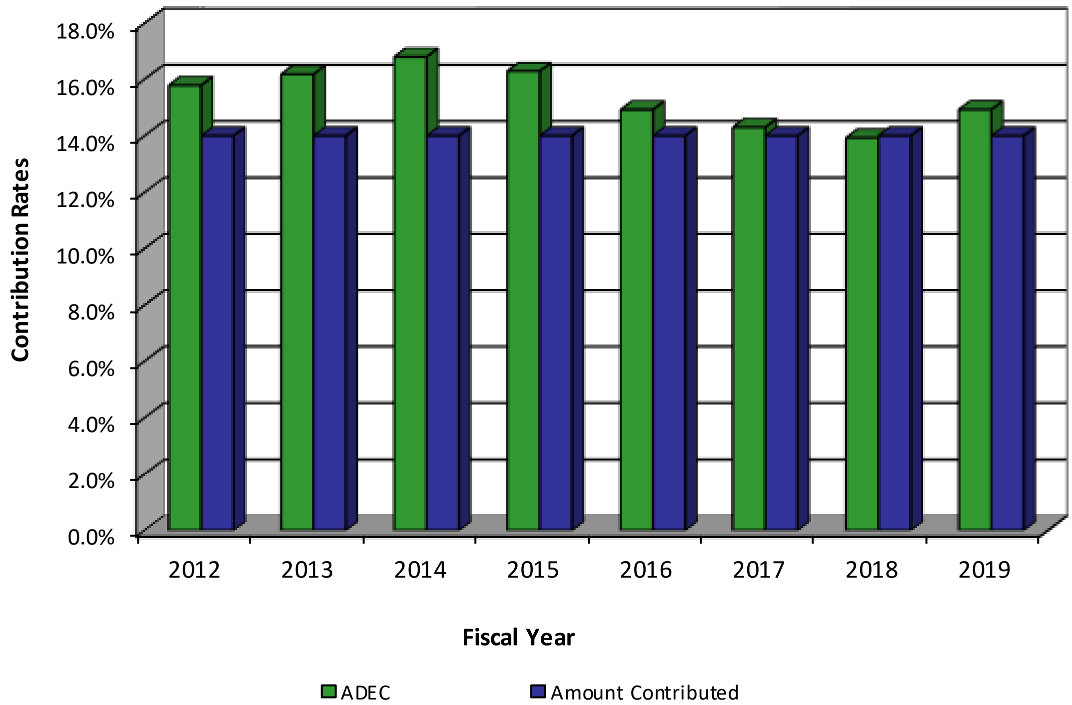
1) The measurement is inappropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations; in other words, of transferring the obligations to an unrelated third party in an arm's length market value type transaction.
2) The measurement is dependent upon the actuarial cost method which, in combination with the plan's amortization policy, affects the timing and amounts of future contributions. A funded status measurement in this report of 100% is not synonymous with no required future contributions. If the funded status were 100%, the plan would still require future normal cost contributions (i.e., contributions to cover the cost of the active membership accruing an additional year of service credit).
3) The measurement would produce a different result if the market value of assets were used instead of the actuarial value of assets, unless the market value of assets is used in the measurement.

Limitations of Project Scope

Actuarial standards do not require the actuary to evaluate the ability of the plan sponsor or other contributing entity to make required contributions to the plan when due. Such an evaluation was not within the scope of this project and is not within the actuary's domain of expertise. Consequently, the actuary performed no such evaluation.

Executive Summary - (Concluded)

The following graph shows a history of the amounts contributed vs. the employer contributions, based on a maximum amortization period of 30 years. The results would look different if the Actuarially Determined Employer Contribution (ADEC) were calculated according to the Board's target of 18 years.



The amount contributed is less than the 30-year contribution in FY 2012-2017 and FY 2019. In FY 2018 (June 30, 2016 valuation), the amount contributed exceeded the 30-year contribution.

The calculated amortization period was 29 years in the June 30, 2017 valuation, which determined the FY 2019 ADEC, and was based on anticipated increases in the employer and member contribution rates. The employer and member rates are scheduled to increase by 0.25% increments beginning in Fiscal Year 2020 and ending in Fiscal Year 2023. The ultimate employer and member contribution rates will be 15% and 7%, respectively. Because the FY 2019 employer contribution rate was 14%, the amount contributed in FY 2019 was less than the 30-year contribution ADEC.

SECTION B

VALUATION RESULTS

Determination of Amortization Period
Computed as of June 30, 2019 and June 30, 2018

Computed Contributions for	Percents of Active Member Payroll			
	June 30, 2019			June 30, 2018
	Teachers	Support	Combined	Combined
Normal Cost				
Age & Service Annuities	10.43%	6.93%	**9.44%**	9.40%
Deferred Annuities	1.19%	2.08%	**1.44%**	1.44%
Survivor Benefits	0.36%	0.27%	**0.33%**	0.33%
Disability Benefits	0.48%	0.38%	**0.45%**	0.45%
Refunds of Member Contributions	0.46%	1.11%	**0.64%**	0.65%
Total	12.92%	10.77%	**12.30%**	12.27%
Average Member Contributions	6.47%	4.93%	**6.04%**	6.01%
Net Employer Normal Cost	6.45%	5.84%	**6.26%**	6.26%
Unfunded Actuarial Accrued Liabilities			**8.74%**	8.74%
Employer Contribution Rate			**15.00%**	15.00%
Amortization Years			**28**	28

The calculated amortization period of 28 years is based on anticipated increases in the employer and member contribution rates. The Fiscal Year 2019 employer and member contribution rates were 14% and 6%, respectively. The employer and member rates are scheduled to increase by 0.25% increments beginning in Fiscal Year 2020 and ending in Fiscal Year 2023. The ultimate employer and member contribution rates will be 15% and 7%, respectively, which are reflected in the above schedule.

The amortization period is the number of years it will take to pay off the unfunded liability of $4.3 billion assuming that the employer contribution rate increases to 15% according to the schedule described above. Since 2000, the period has varied from a low of 19 years to a high of over 100 years. Unless there is an investment loss in FY 2020, the amortization period is likely to decrease in the next valuation. Please see additional comments regarding the amortization period on page A-2.

Computed Employer Contribution Rates
10-Year Comparative Statement

Valuation Date June 30	Active Members in Valuation **		Average Annual Pay		Consumer Price (Inflation) Index		Employer Contributions	
	Number	Annual Payroll ($Millions)	Amount	% Change	Value	% Change	Computed Financing Period (Years)	Total Employer Rate
2010#	72,208	$ 2,381	$ 32,980	0.5 %	$ 218.0	1.1 %	52	14.0 %
2011#*	76,780	2,728	35,534	7.7 %	225.7	3.6 %	66	14.0 %
2012	75,627	2,714	35,891	1.0 %	229.5	1.7 %	over 100	14.0 %
2013#	74,925	2,727	36,400	1.4 %	233.5	1.8 %	70	14.0 %
2014	74,352	2,758	37,092	1.9 %	238.3	2.1 %	39	14.0 %
2015	72,919	2,777	38,088	2.7 %	238.6	0.1 %	33	14.0 %
2016	72,232	2,785	38,557	1.2 %	241.0	1.0 %	29	14.0 %
2017#*	72,148	2,814	38,997	1.1 %	245.0	1.6 %	29	14.0 %
2018*	72,341	2,872	39,702	1.8 %	252.0	2.9 %	28	14.0 %
2019*	72,164	2,907	40,285	1.5 %	256.1	1.6 %	28	14.0 %

* *Revised assumptions; employer and employee rates scheduled to increase to 15% and 7%, respectively, in 4 steps beginning in FY 2020.*

\# *Legislated benefit or contribution rate changes.*

** *Beginning with the June 30, 2011 valuation, active members include T-DROP members and payroll. ATRS also receives contributions on return to work retirees, but they are not included on this schedule.*

Computed Actuarial Liabilities as of June 30, 2019

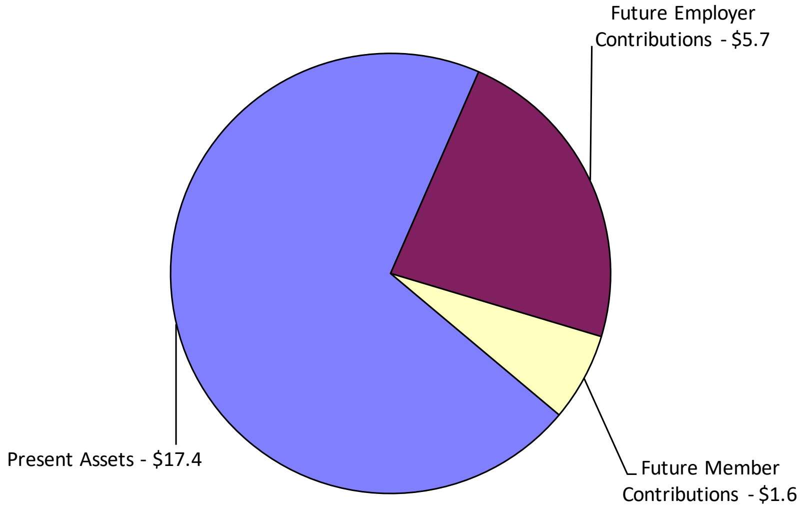
Actuarial Present Value of	(1) Total Present Value	Entry Age Actuarial Cost Method (2) Portion Covered by Future Normal Cost Contributions	(3) Actuarial Accrued Liabilities (1)-(2)
Age and service retirement allowances based on total service likely to be rendered by present active members.	$ 8,499,151,125	$2,293,101,942	$ 6,206,049,183
Age and service retirement allowances based on total service likely to be rendered by present T-DROP members.	2,156,293,215	46,120,476	2,110,172,739
Vested Deferred Benefits likely to be paid present active and inactive members.	1,166,885,755	356,030,916	810,854,839
Survivor benefits expected to be paid on behalf of present active members.	223,686,863	82,295,078	141,391,785
Disability Benefits expected to be paid on behalf of present active members.	218,496,068	107,868,475	110,627,593
Refunds of Member contributions expected to be paid on behalf of present active members.	20,368,008	150,338,146	(129,970,138)
Benefits payable to present retirees and beneficiaries.	12,459,741,018	0	12,459,741,018
Total	$24,744,622,052	$3,035,755,033	$21,708,867,019
Funding Value of Assets	17,412,534,651	0	17,412,534,651
Liabilities to be Covered by Future Contributions	$ 7,332,087,401	$3,035,755,033	$ 4,296,332,368

Liabilities for Retirees July 1, 2019
Tabulated by Type of Benefit Being Paid

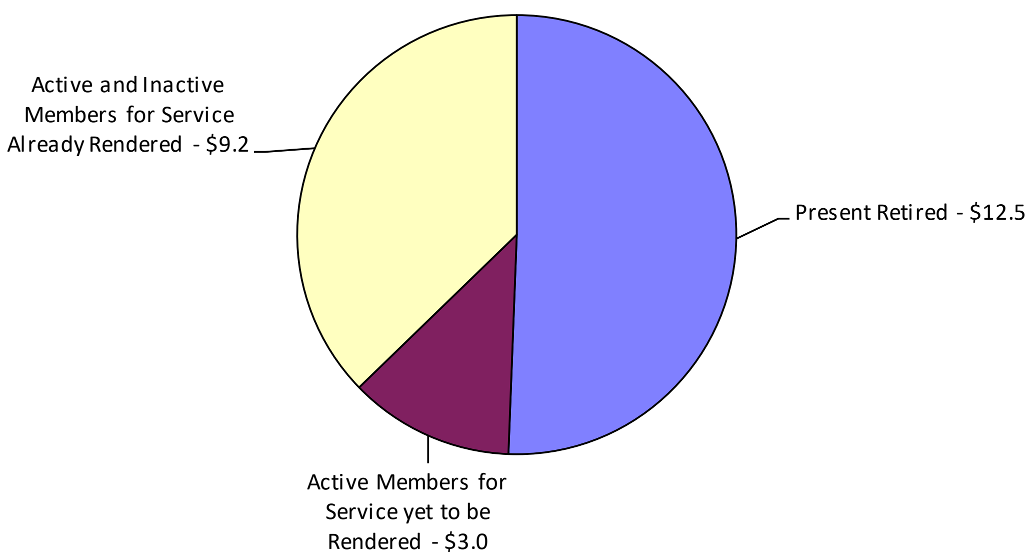
Type of Annuity	Liabilities July 1, 2019 Men	Women	Totals
RETIREMENT RESERVE ACCOUNT			
Age & Service Annuities			
Option 1 (Straight Life)	$ 1,429,353,924	$ 6,932,439,545	$ 8,361,793,469
Option A (100% Joint & Survivor)	853,640,970	922,770,063	1,776,411,033
Option B (50% Joint & Survivor)	416,536,325	656,173,461	1,072,709,786
Option C (10 Years Certain & Life)	29,232,531	137,380,133	166,612,664
Beneficiaries	59,095,326	165,455,980	224,551,306
Total Age & Service	2,787,859,076	8,814,219,182	11,602,078,258
Disability Annuities			
Option 1	50,134,417	280,225,085	330,359,502
Option A	27,571,540	44,463,076	72,034,616
Option B	5,459,407	12,791,619	18,251,026
Option C	200,950	2,039,728	2,240,678
Beneficiaries	19,613,307	23,826,698	43,440,005
Total Disability	102,979,621	363,346,206	466,325,827
Act 793	9,461,601	5,584,844	15,046,445
Retirement Reserve Account	2,900,300,298	9,183,150,232	12,083,450,530
Act 808 Retirement Reserve Account	8,090,772	3,026,689	11,117,461
Total Retirement Reserve Account	2,908,391,070	9,186,176,921	12,094,567,991
SURVIVORS' BENEFIT ACCOUNT			
Beneficiaries of Deceased Members	$ 48,241,084	$ 58,065,350	$ 106,306,434
RETIREMENT SYSTEM TOTALS			
Total Annuity Liabilities	2,956,632,154	9,244,242,271	12,200,874,425
Cash Benefit Account Liabilities			133,829,621
Liabilities for Lump Sum Death Benefits			125,036,972
Total	$ 2,956,632,154	$ 9,244,242,271	$ 12,459,741,018

Financing $24.7 Billion of Benefit Promises for Present Active and Retired Members June 30, 2019

Sources of Funds
($ Billions)



Uses of Funds



Short Condition Test

ATRS' funding objective is to meet long-term benefit promises through contributions that remain approximately level from year to year as a percent of member payroll. If the contributions to the System are level in concept and soundly executed, the System will ***pay all promised benefits when due -- the ultimate test of financial soundness***. Testing for level contribution rates is the long-term test.

A short condition test is one means of checking a system's progress under its funding program. In a short condition test, the plan's present assets (cash and investments) are compared with: 1) Member contributions on deposit; 2) The liabilities for future benefits to present retired lives; and 3) The liabilities for service already rendered by members. In a system that has been following the discipline of level percent-of-payroll financing, the liabilities for member contributions on deposit (liability 1) and the liabilities for future benefits to present retired lives (liability 2) will be fully covered by present assets (except in rare circumstances). In addition, the liabilities for service already rendered by members (liability 3) will be partially covered by the remainder of present assets. The larger the funded portion of liability 3, the stronger the condition of the system. Liability 3 being fully funded is unusual, but highly desired.

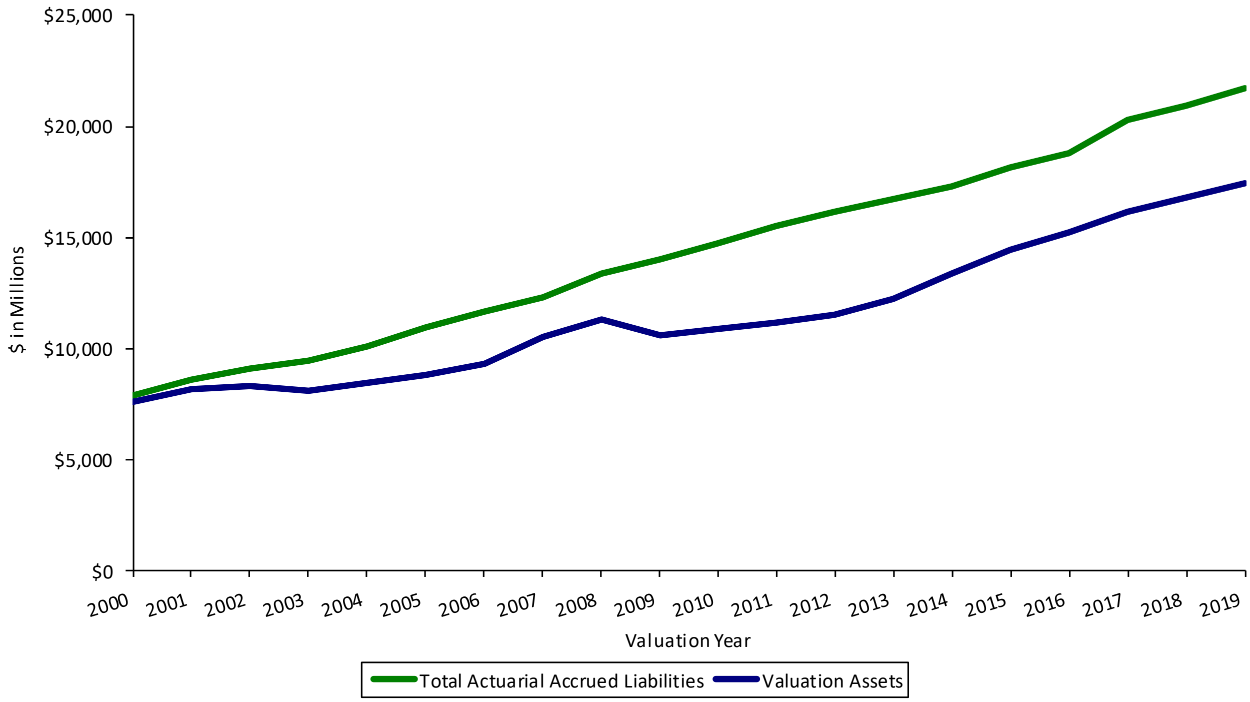
The schedule below illustrates the history of Liability 3 of the System and is indicative of the ATRS objective of following the discipline of level percent-of-payroll financing.

Val. Date June 30	(1) Member Contrb.	(2) Retirees and Benef.	(3) Active and Inactive Members (Employer Financed Portion)	Present Valuation Assets	Portion of Present Values Covered by Present Assets			
					(1)	(2)	(3)	Total
	------------------------$ Millions------------------------							
2010#	$ 848	$ 6,516	$ 7,333	$ 10,845	100%	100%	47%	74%
2011#*	929	7,132	7,460	11,146	100%	100%	41%	72%
2012	981	7,649	7,509	11,484	100%	100%	38%	71%
2013#	1,027	8,181	7,510	12,247	100%	100%	40%	73%
2014	1,077	8,777	7,456	13,375	100%	100%	47%	77%
2015	1,128	9,778	7,230	14,434	100%	100%	49%	80%
2016	1,184	10,430	7,198	15,239	100%	100%	50%	81%
2017#*	1,254	11,337	7,707	16,131	100%	100%	46%	79%
2018	1,312	11,851	7,772	16,756	100%	100%	46%	80%
2019	1,377	12,460	7,872	17,413	100%	100%	45%	80%

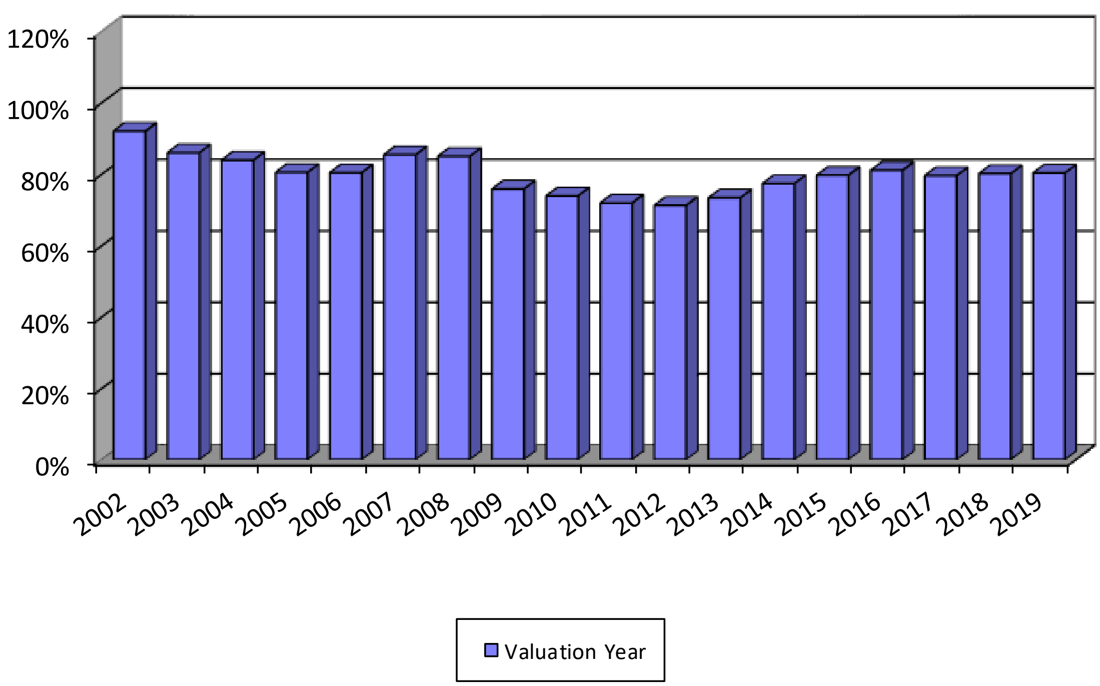
* *Revised actuarial assumptions or methods.*

\# *Legislated benefit or contribution rate change.*

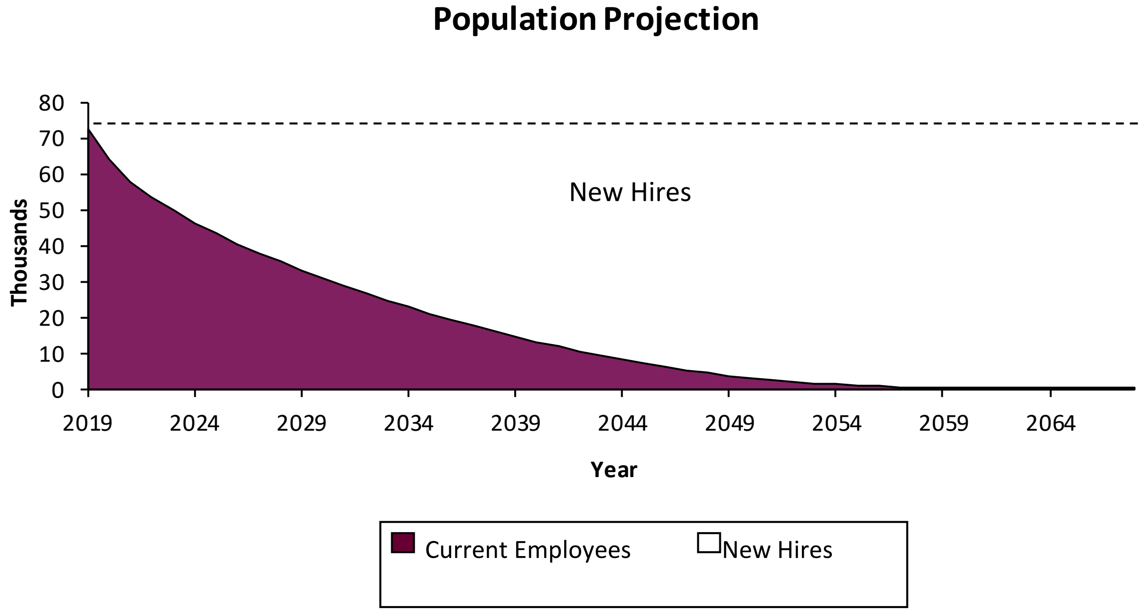
Actuarial Accrued Liabilities and Valuation Assets

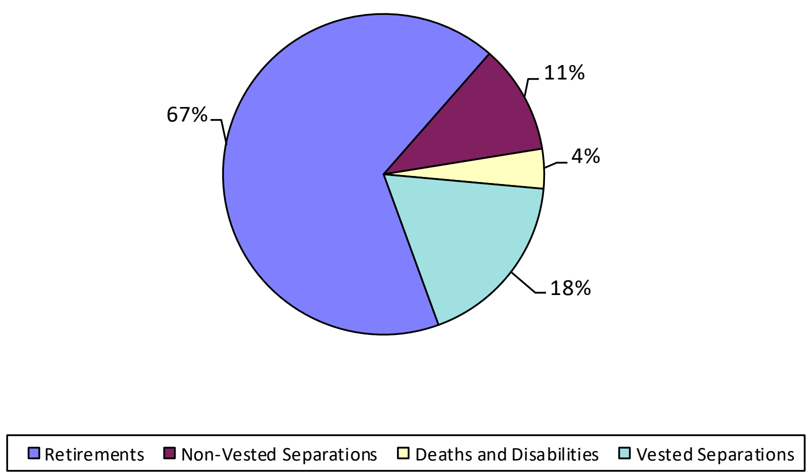


Valuation Assets as a Percent of Accrued Liabilities (Funded Ratio)



Expected Development of Present Population
June 30, 2019 (Excludes Rehired Retirees)





The charts show the expected future development of the present population in simplified terms. The retirement system presently covers 72,164 active members (includes T-DROP). Eventually, 11% of the population is expected to terminate covered employment prior to retirement and forfeit eligibility for an employer provided benefit. Approximately 85% of the present population is expected to receive monthly retirement benefits. Approximately 4% of the present population is expected to become eligible for death-in-service or disability benefits. Within 9 years, over half of the covered membership is expected to consist of new hires.

SECTION C

SUMMARY OF BENEFITS

Summary of Provisions
June 30, 2019

1. **Voluntary Retirement – A.C.A. § 24-7-701.** A member may retire at age 60 with 5 or more years of credited service, or after 28 years of credited service regardless of age.

2. **Early Retirement – A.C.A. § 24-7-702.** A member who has more than 25 but less than 28 years of credited service and has not attained age 60 years may retire and receive an immediate early retirement annuity. The early annuity is an age & service annuity reduced by the lesser of (i) and (ii) below:

   (i) 10/12 of 1% multiplied by the number of months by which early retirement precedes completion of 28 years of service, or

   (ii) 10/12 of 1% multiplied by the number of months by which early retirement precedes the attainment of age 60 years.

   Act 750 of 2017 allows the ATRS Board to set by resolution the early annuity reduction at a rate between 5% and 15% per year, to be prorated monthly if the System's actuary certifies that the amortization period to pay the unfunded liabilities exceeds 18 years. The Board adjusted the reduction to 10% per year beginning August 1, 2017 by Resolution 2017-14 on April 17, 2017.

3. **Deferred Retirement – A.C.A. § 24-7-707.** An inactive member who has 5 or more years of credited ATRS service will be entitled to an age & service annuity beginning at age 60, provided accumulated contributions are on deposit with the retirement system.

4. **Disability Retirement – A.C.A. § 24-7-704.** An active member with 5 or more years of actual and reciprocal service, who becomes totally and permanently disabled may be retired and receive a disability annuity computed in the same manner as an age & service annuity. In order to qualify for disability retirement, the member must exhibit symptoms of physical or mental incapacitation while the member is an active member (Act 973 of 2011). A member who is eligible for age and service retirement (age 60 and 5 years of service or 28 years of service at any age) is no longer eligible to apply for disability retirement. Act 219 of 2015 requires an ATRS disability retiree to obtain a Social Security Administration determination letter finding that the retiree is disabled within 36 months of the effective date of disability retirement. If a member cannot provide the SSA determination letter within the 36-month period, benefits will be terminated, the member will be returned to active service, and all member history will be restored. The requirement to qualify for SSA disability shall not apply to a disability retiree who was age 57 or older before July 1, 2015, because that member would qualify for age & service benefits prior to requiring the SSA determination of disability. Additionally, the retiree may apply for an extension of the 36-month deadline if the retiree can demonstrate the SSA determination is in progress. Act 549 of 2017 allows a disabled retiree to return to work for an ATRS covered employer as a part-time employee or in a lesser position than held previously and not be disqualified from disability retirement.

4. **Disability Retirement – A.C.A. § 24-7-704 (Cont.)** If a retiree tries to return to full time employment, and fails, the suspended disability benefit will be restored to what it would have been had they not tried to return to work, or a recomputed benefit using the additional service, whichever is higher. Additionally, this act allows a retiree who was unable to secure a fully favorable Social Security disability determination letter to seek the ATRS medical committee's review of the case and its findings, which may find that the member is still disabled according to the ATRS definition of "disabled", shall be ruled as a final disposition in the matter.

5. **Final Average Salary (FAS) – A.C.A. § 24-7-736. The ATRS Board made changes to the final average salary by Resolution 2017-33 on November 13, 2017. Effective in Fiscal Year 2019, a member's final average salary is the average of the annual salaries paid during the period of 5 years of credited service producing the highest annual average. Except for inactive members, a benchmark 3-year FAS of as of 6/30/2018 is established as a minimum FAS.** Beginning July 1, 2009, no salary paid in any year which is utilized in the computation of the members' final average salary, shall exceed the percentage increase of the base year, unless the difference in value between the next-highest year and the base year is within the amount of the salary differential (defined below). (Act 611 of 2017). If a member has a break in covered employment for eight years or more between any of the member's highest salary years used in the calculation of final average salary, then anti-spiking checking does not apply to the next highest year in the formula (Act 225 of 2011 – effective date of law July 27, 2011). There will no longer be any stacking of part-time college/teaching work for school district employees (Act 513 of 2011). Act 555 of 2013 limits the use of a reciprocal system's calculation of FAS if the ATRS member's reciprocal service credit is less than the number of years used to calculate the FAS for ATRS. Beginning July 1, 2014, if a member has less than three years of reciprocal service (the number of years used to calculate ATRS' FAS), then ATRS will obtain the salary and service credit from the reciprocal system, and use that salary and service as if it had all been earned in ATRS to calculate a FAS for retirement. Act 720 of 2013 made a minor change to final average salary for members who stop work during their last year of employment immediately before retirement. The Board may adjust the final average salary calculation by board resolution provided that the percentage range is no lower than 105% nor higher than 120% per year; and the salary differential is no lower than $1,250 nor higher than $5,000. Act 611 of 2017. The ATRS Board adjusted the percentage lower to 110% and salary differential allowance to $5,000 by Resolution 2017-13 on April 17, 2017.

6. **Age & Service Annuity and Disability Annuity – A.C.A. §§ 24-7-705, 24-7-727 (stipend). The annuity payable will not be less than the total of: years of contributory service times 2.15% of FAS; plus years of noncontributory service times 1.39% of FAS (1.25% for service earned after 2019); plus stipend for all members with 10 or more years of ATRS actual service.** Act 966 of 2013 allows the ATRS Board to set the contributory multiplier for service credit earned after June 30, 2013, within a range of 1.75% to 2.15%. The noncontributory multiplier for service credit earned after June 30, 2013, may be set within a range of 0.5% and 1.39%. In addition, this act would allow the Board to set special multiplier rates for the first 10 years of ATRS service earned after June 30, 2013, for both contributory and noncontributory service. This act is dependent upon the actuary's certification that the amortization period is in excess of 18 (Act 551 of 2017) years to pay unfunded liabilities prior to any reduction to the multipliers.

6. **Age & Service Annuity and Disability Annuity – A.C.A. §§ 24-7-705, 24-7-727 (stipend) Cont. By Board Resolution 2017-31 on November 13, 2017, the noncontributory multiplier will become 1.25% beginning in FY 2020. By Board Resolution 2017-32 on November 13, 2017, the contributory multiplier and noncontributory multiplier for the first 10 years of service has been reduced to 1.75% and 1.0% respectively beginning July 1, 2018. Once a member accrues 10 years of service, all service including the first 10 years is then credited at the standard rate in place at the time the service was earned.**

7. **T-DROP – A.C.A. §§ 24-7-1301–1316.** A member with 28 or more years of service may participate in the Teacher Deferred Retirement Option Plan (T-DROP, Act 1096 of 1995). T-DROP participants do not make member contributions. A T-DROP deposit is made monthly to the participant's T-DROP account. The T-DROP deposit is the amount that would have been paid had the member retired, reduced by 1% for each year of contributory, noncontributory, and reciprocal service (Act 605 of 2013). Members who enter T-DROP with less than 30 years of service are subject to an additional 6% reduction for each year less than 30 years. Act 750 of 2017 allows the Board to adjust the additional T-DROP reduction factor between ½% and 1% of the plan benefit for each month the member begins participating in the plan prior to having 30 years of credited service. T-DROP deposits are increased each year by 3% of the member's initial T-DROP deposit. T-DROP Deposits cease at the earlier of 10 years of T-DROP participation or separation from service. T-DROP participants may continue in covered employment after 10 years of T-DROP participation, but do not accumulate additional T-DROP deposits. T-DROP participants receive interest annually on the balance of the T-DROP account. Regular T-DROP interest is credited for 10 or less years of participation. Post 10-year T-DROP interest is credited for more than 10 years of participation.

   Regular T-DROP interest is a combination of a fixed interest rate and an incentive interest rate. An incentive rate may be approved by the Board to encourage continued participation in T-DROP, if the estimated ATRS rate of return is 2% greater than the ATRS actuarial assumed rate of return in the preceding calendar year. Beginning in fiscal year 2019, the Board has set the Regular T-DROP fixed interest rate at 3% and the maximum incentive rate at 3% by Resolution 2017-35 on November 13, 2017. The fixed and incentive interest rates may be adopted by board resolution prior to the beginning of the fiscal year and would apply to subsequent fiscal years unless modified by the Board. For fiscal year 2019, the Board set the Regular T-DROP fixed interest rate at 3% and the incentive interest rate at 3%, resulting in a total interest rate of 6%, by Resolution 2018-09 on February 5, 2018.

   Post 10-year T-DROP interest has been in effect since July 1, 2010. Act 1049 of 2017 allows the Post 10-year T-DROP interest rate (24-7-1307) to be determined as appropriate by the Board and adopted by the resolution prior to the beginning of the fiscal year in which the interest rate shall apply. Post 10-year T-DROP interest is a combination of a variable interest rate and an incentive interest rate, to encourage continued participation in T-DROP. The Post 10-year T-DROP variable interest rate formula is based on investment returns and other factors. On November 13, 2017, the ATRS Board by Resolution 2017-36 set the formula for the variable interest rate and the maximum combined variable and incentive interest rate for fiscal year 2019 and beyond. The Post 10-year T-DROP variable interest rate is calculated as 2% less than the system's rate of return, but not less than 4%, nor greater than 6%. The maximum Post 10-year T-DROP combined interest rate including the incentive interest rate is 7.5%. The Post 10-year T-DROP incentive interest rate can be awarded if the estimated ATRS rate of

T-DROP – A.C.A. § 24-7-1301-1316 (Cont). return is 2% greater than the ATRS actuarial assumed rate of return in the preceding calendar year. For fiscal year 2019, the Board set the Post 10-year T-DROP variable interest rate at 6% and the incentive interest rate at 1%, resulting in a combined interest rate of 7%, by Resolution 2018-10 on February 5, 2018.

Upon actual retirement, the member may receive the T-DROP account balance in the form of a lump sum, a Cash Balance Account (CBA), or as an additional annuity. The T-DROP distribution may be a combination of lump sum, CBA, and additional annuity.

8. **Post-Retirement Increases – A.C.A. §§ 24-7-713, 24-7-727 (compound COLA).** Each July 1, annuities are adjusted to be equal to the base annuity times 100% plus 3% for each full year in the period from the effective date of the base annuity to the current July 1. The base annuity is the amount of the member's annuity on the later of July 1, 2001 or the effective date of retirement, as re-determined by Acts 396 of 1999 and 992 of 1997. The July 1, 2009 cost of living adjustment for retirees was compounded. The annuity was set to 103% of the June 30, 2009 retirement benefit amount. After it was calculated on July 1, 2009, the base amount was reset to be the July 1, 2009 benefit amount. Future cost of living raises will be established by the new updated base amount. Future cost of living adjustments will be evaluated on an annual basis to determine if a simple or compound cost of living increase will be given, depending on the financial condition of the System. Act 967 of 2013 gives the ATRS Board authority to reverse the compounding of a benefit and reset the base amount to the pre-compounding amount. If this reversal were to occur, it would include participants in the T-DROP plan. The future benefits of a member would not be reduced to recover any benefits paid to a member as a result of the compounding. In addition, the member's benefit on the date of the reversal would not be impacted, but future COLA's would be based upon the reset base amount. This act is dependent upon the actuary's certification that the amortization period is in excess of 30 years to pay unfunded liabilities prior to any reversal of the compounding of the COLA. Act 780 of 2017 allows the right to reverse the 2009 compound COLA when unfunded liabilities exceed an 18 year amortization. The act also allows a phase in of the change during months in which a COLA raise is given to prevent any retiree or option beneficiary from having an actual reduction in monthly benefit payments.

9. **Survivor Benefits – A.C.A. § 24-7-710.** Upon the death of an active member, who has 5 or more years of actual and reciprocal service, the following annuities are payable:

   (a) The surviving spouse receives an annuity computed in the same manner as if the member had (i) retired the date of his death with entitlement to an annuity, (ii) elected Option A - 100% Survivor Annuity, and (iii) nominated the spouse as joint beneficiary. If the member has attained age 60 and has acquired 5 years of credited service or has acquired 25 years of credited service regardless of age, the annuity begins immediately; otherwise the annuity begins the month following the date the member would have attained age 60. Under certain circumstances, a lump sum distribution may be made to the beneficiary(ies) of the deceased member.

Survivor Benefits – A.C.A. § 24-7-710. Cont.

(b) A surviving child's benefit is prorated to an amount equal to 1% of the member's highest salary year for each quarter of a year credited as actual service in the system, up to 20% or up to a maximum of $20,000 per year. If there is more than 1 surviving dependent, the benefits are capped to the lesser of 60% of the member highest salary or $60,000 per year to be divided equally among the dependents. Act 505 of 2017. A child is dependent until the child's death, marriage, or attainment of age 18 (age 23 if the child is a full-time student).

10. **Lump Sum Death Benefit – A.C.A. § 24-7-720.** Beneficiaries of deceased active members or retirees with 10 or more years of ATRS credited service are eligible to receive a lump sum death benefit of up to $10,000 ($6,667 for noncontributory service-benefit). The amount will be prorated for members who have both contributory service and noncontributory service. Members with 15 or more years of contributory service will receive the full $10,000 (Act 977 of 2011).

11. **Members' Contributions – A.C.A. § 24-7-406. Member Contributions – A.C.A. § 24-7-406.** Through FY 2019, contributory members contribute 6% of their salaries. Members that are participating in the T-DROP program or are working retirees do not make member contributions. If a member leaves service prior to becoming eligible to retire, the accumulated member contributions are returned upon request. No interest is credited to a member's contributions for the first year of membership; after 1 year, interest is credited. The ATRS Board set the interest rate on refunded contributions to 0.08% for fiscal year 2017 and beyond by Resolution 2017-17 on April 17, 2017. Act 550 of 2017 allows the ATRS Board to increase the employee contribution rate beyond 6% if the amortization period to pay the unfunded liabilities of the system exceeds 18 years. The Board set the member contribution rate to 6.25%, 6.50%, 6.75%, and 7.00% for FY 2020, FY 2021, FY2022, and FY 2023 and thereafter, respectively, by Resolution 2017-30 on November 13, 2017.

    Effective July 1, 1986, a noncontributory plan was created. Effective July 1, 1999 the default choice for new members is contributory. Effective July 1, 1997, all future member contributions are tax-deferred in accordance with §414(h) of the Internal Revenue Code of the United States. Effective July 1, 2005, all noncontributory members whose status changes from support to teacher (contracted for more than 181 days), will become contributory. Each July 1, members who previously elected to be noncontributory may elect to change to contributory status under Act 385 of 2005. The election is irrevocable.

12. **Act 808 Retirement – A.C.A. § 24-4-732.** Any employee of a state agency who was an active member of the Arkansas Teacher Retirement System on April 8, 1987, and who qualified for retirement before January 1, 1988, could become a member of the Arkansas Public Employees Retirement System and retire from that system. All credited service was transferred to that system but the member's contributions were retained by the Arkansas Teacher Retirement System and the benefit amount is transferred monthly to the Arkansas Public Employees Retirement System. Each July 1, annuities are adjusted by 3% (compound escalator).

13. **Act 793 Retirement – A.C.A. § 24-4-522.** Any employee who was a member of the rehabilitation services in 1977 was permitted to become a member of the Arkansas Public Employees Retirement System. Liabilities associated with prior service earned through June 30, 1978 remain in the Arkansas Teacher Retirement System. Future service is allocated to the Arkansas Public Employees Retirement System. Each July 1, annuities are adjusted by 3% (compound escalator).

14. **Retiree Benefit Stipend – A.C.A. § 24-7-713.** Each retired member as of June 30, 2008, with 5 or more years of ATRS credited service receives a $75 per month stipend. Members in T-DROP do not receive the $75 per month stipend until actual retirement. For all members retiring on or after July 1, 2008, a minimum of 10 years of ATRS credited service is required to receive the $75 per month stipend. Act 603 of 2013 allows the ATRS Board to increase or decrease the stipend to a minimum of $1 per month and a maximum of $75 per month. This act is dependent upon the actuary's certification that the amortization period is in excess of 18 years to pay unfunded liabilities prior to any reduction in the current stipend. The stipend for fiscal year 2018 remains at $75 per month. **By Board Resolution 2017-34 on November 13, 2017 the benefit stipend is removed from the base amount for all retirees and beneficiaries beginning in fiscal year 2019 and the benefit stipend will be reduced to $50.00 for fiscal year 2020 and beyond. The Resolution contains a "hold harmless" provision that prevents the lowering of the stipend if it would actually reduce the total monthly benefit. This would only affect retirees when the COLA is less than $25 per month.**

15. **Optional Forms of Benefits – A.C.A. § 24-7-706:**

    Option 1 *(Straight Life Annuity)*

    A member will receive the maximum monthly benefit for which he/she qualifies, throughout his/her lifetime. No monthly benefits will be paid to his/her beneficiary after the member's death. Should a member die before he/she has drawn in benefits an amount equal to his/her contributions plus earned interest, the balance will be paid to a designated beneficiary. The designated beneficiary may be anyone chosen by the member.

    Option A *(100% Survivor Annuity)*

    Under this option a member will receive a reduced annuity throughout his/her lifetime. Upon the member's death, the designated beneficiary will receive the same annuity for the balance of his/her lifetime.

    Option B *(50% Survivor Annuity)*

    Under this option a member will receive a reduced annuity throughout his/her lifetime. Upon the member's death, the designated beneficiary will receive one-half (1/2) of this annuity for the balance of his/her lifetime.

    Option C (Annuity for Ten Years Certain and Life Thereafter)

    A reduced monthly benefit payable for 120 months. After that time, a member's monthly allowance will revert to the amount he/she would have received under the regular plan and continue for life. If the member dies before receiving 120 payments, the designated beneficiary will receive a monthly benefit in the same amount until monthly benefits to both the member and the beneficiary equal 120 monthly payments. No further benefits are then payable to the beneficiary.

Pop-Up Election

Following the death of or a divorce from the member's designated beneficiary, his or her benefit reverts (pops-up) to the straight life annuity amount from the elected optional annuity amount. The member may then elect new beneficiaries in accordance with Arkansas Code and rules adopted by the ATRS board.

Option Factors are based upon a 5.0% interest rate and the RP-2014/MP2017 tables (static projection to 2022) adjusted with a 50% unisex mix.

16. **Refund of Member Contributions – A.C.A. § 24-7-711.** Any termination refund made to a member or a lump sum payout made to a surviving spouse after July 1, 2011, cancels all service credit, including noncontributory service credit (Act 976 of 2011); any repurchase of refunded service will be as contributory years at actuarial cost (Act 69 of 2011). Act 140 of 2013 specifies that all membership rights (including noncontributory service credit) and beneficiary designations to the ATRS are cancelled when a member gets a refund of his or her contributions.

17. **Contract Buyout – A.C.A. § 24-7-735.** During periods of contract buyout/litigation/termination, members will not receive service credit if no on-call service or on site work is performed. ATRS will not allow the purchase of the time between actual work and the settlement (Act 163 of 2011) unless the settlement was made to resolve a claim of wrongful termination (Act 436 of 2017).

18. **Actuarial Cost of Service – A.C.A. §§ 24-1-107, 24-2-502, 24-7-202, 24-7-406, 24-7-501, 24-7-502, 24-7-612, 24-7-602, 24-7-603, 24-7-604, 24-7-606, 24-7-607, 24-7-610, 24-7-611.** Effective July 1, 2011, all service purchases will be at actuarial cost (Act 69 of 2011).

19. **Deceased Member Refund of Contributions – § 24-7-711.** Effective July 1, 2011, if a beneficiary is not eligible for survivor benefits, or if a surviving spouse is eligible and chooses a contribution refund, the interest on the refund stops the July 1 following the member's death (Act 136 of 2011).

20. **Limit Lookback to Five Years – A.C.A. §§ 24-7-202, 24-7-205.** Effective July 1, 2011, absent intentional nondisclosure, fraud, misrepresentation, criminal act, or obvious/documented error by an employer of ATRS members can no longer establish old service previously unreported unless such service is acquired by purchase at actuarial cost (Act 138 of 2011). Act 241 of 2017 allows ATRS to correct an understated service credit error upon which all required contributions have been paid, even if beyond the 5-year look-back period.

21. **Service Credit Requirements – A.C.A. §§ 24-7-501, 24-7-502, 24-7-601, 24-7-603, 24-7-604, 24-7-606, 24-7-607, 24-7-611.** Effective July 1, 2011, members must receive 160 days of service to be credited with a year of service credit (Act 974 of 2011).

22. **T-DROP Cash Balance Account.** Effective July 1, 2012, a T-DROP cash balance account was established that allows members exiting (retiring) from T-DROP to place all or a portion of their T-DROP proceeds into a Cash Balance Account (CBA) at ATRS. On November 13, 2017, by Resolution 2017-38 the Board set the CBA interest rate schedule based on years of participation as follows: 2.50% for year one, 2.75% for year two, 3.00% for year three, 3.25% for year four, 3.50% for year five, and 4.00% for year

six and beyond. The Board granted all CBA participants a 1% incentive rate for fiscal year 2019 by Resolution 2018-11 on February 5, 2018.

23. **Delinquent Member Contributions – A.C.A. § 24-7-205.** Act 336 of 2013 allows members to forfeit service credit for any contributory fiscal year for which there is a balance due to the system.

24. **Purchase of "Air Time" as a Result of Wrongful Termination – A.C.A. §§ 24-7-702, 24-7-735, 6-17-413.** Act 521 of 2013 allows a member to purchase service credit under a settlement agreement or court order to resolve a claim of wrong termination if the service credit is purchased from the date of termination by an ATRS employer to the date of the resolution of the dispute. This service credit would be purchased at actuarial cost.

25. **Buyout of Inactive Members—A.C.A. § 24-7-505.** Act 606 of 2013 allows the ATRS Board to create a voluntary "buyout plan" for inactive vested members. The System will make a one-time lump sum payment to a member, a surviving spouse, or an alternate payee in exchange for a member, surviving spouse, or alternate payee's cancellation of membership and retirement benefit rights. The buyout plan will be established by Board rules. The rule is 16-1 Cash and Savings Help Program for Members (CASH). This particular plan offering ended June 30, 2015. Depending upon the success of the plan, it may be extended by the Board. Act 647 of 2017 allows the buyout plan to be extended, modified, or expanded by board resolution. The ATRS Board expanded the CASH program to include all inactive vested members, regardless of service type by Resolution 2017-18 on May 10, 2017. The ATRS Board offered the FY 2019 CASH program for all inactive vested members to end on June 30, 2019 by Resolution 2017-35 on October 1, 2018.

26. **Private School Service—A.C.A. § 24-7-607.** Prior to Act 90 of 2015, private school service had to be recognized by the Arkansas Department of Education as positions that required the issuance of teaching licenses. The certification of this service credit was performed by one employee of the Arkansas Department of Education, and that one employee retired. Upon that employee's retirement, the Arkansas Department of Education no longer certified private school service credit. No certifications occurred for approximately a year until legislation could be passed to allow ATRS to make this determination. In addition, a distinction was made between certified and noncertified private school service credit. Certified private school service (basically administrative and teaching) could be purchased at actuarial cost, up to 15 years. Noncertified private school service could be purchased at actuarial cost, up to 5 years.

27. **Military Service Credit—A.C.A. § 24-7-602.** Act 301 of 2015 made technical corrections to the ATRS laws. In the military service credit section, ATRS was not in compliance with a state law that was passed in 2009, Act 295, which repealed the requirement for free military service credit to be granted only if the service was not credited under any other plan except Social Security and the requirement that receipt of a pension from the federal military retirement system paid solely for disability shall not be considered as having service with another retirement plan. The military technical corrections bill raised questions by some of the legislators, and Act 558 of 2015 was passed to further clarify military service credit. Compulsory military service was changed throughout the law to read: "federal military draft". The word "honorable" was inserted before discharge in order for the member to obtain free military service credit throughout the law.

28. **Lump-Sum Payment of Reserve Value of Small Annuity—A.C.A. 24-7-716.** Prior to passage of Act 225 of 2015, ATRS would pay out a reserve value to a member whose monthly benefit was less than $20 per month. This was optional for the member. The reserve value was calculated by multiplying the annual annuity by the reserve factor for the member's age. Act 225 of 2015 repealed this law..

29. **Pension Advance Prohibition – A.C.A. § 24-7-715**. Prohibits a pension advance company from obtaining a retiree's benefit to repay a loan. Act 199 of 2017.

30. **Accrued Sick Leave – A.C.A. § 24-7-601.** Allows unused accrued sick leave, whether paid or unpaid, to count as service credit to determine retirement eligibility for survivor benefits and lump sum death benefits. One day of service shall be added to the service credit for the fiscal year of the member's death for each day of unused sick leave. This does not include catastrophic leave and other unused donated leave. Act 200 of 2017.

31. **Spousal Survivor Benefit – A.C.A. § 24-7-710.** Members may direct an alternative residual beneficiary to receive a lump sum payment of the member's residue amount or T-DROP balance. No spousal survivor benefits will be payable if an alternative beneficiary who is not the surviving spouse is designated by the member. Act 243 of 2017.

32. **Settlement Agreements – A.C.A. § 24-7-202, § 24-7-735.** Salary or service credit may be purchased as part of a settlement agreement between a member and his/her employer. Salary will be added to the salary at the time of purchase and will be determined using the same factors used to calculate an additional monthly benefit in the annuitization of a T-DROP distribution. It is assumed the member would have retired immediately at the time of the purchase. Act 436 of 2017.

33. **Outsourcing – A.C.A. § 24-7-506.** This Act defines outsourcing to mean employment for an ATRS covered employer through a third party, private employer, independent contractor, or other contractual relationship. This Act defines that a person who performs services that are necessary for the normal daily operation for an ATRS covered employer is considered an Embedded Employee. This Act gives the ATRS covered employer a one-time decision to choose between two options for handling their Embedded Employees. The decision must be made within 60 days after the effective date of this Act or that first outsourcing. The first option for the ATRS covered employer is to become a participating employer and make embedded employees participating members of ATRS. The second option for the ATRS covered employer is to become a Surcharge Employer and opt to pay a surcharge on the Embedded Employee's salary to ATRS to help cover the actuarial cost. The surcharge starts at ½% the first year and slowly rises to 3% over 4 years with a hard cap of 4%. The Embedded Employees of a Surcharge Employer will not be members of ATRS. The services necessary for normal daily operations include: substitute teaching, teacher's aides, food service, transportation service, custodial service, security services, and school nursing. Only those working on the premises are subject to the surcharge. The surcharge is ONLY on SALARY of embedded employees. All salary is reported in the aggregate with the contractor's salary amount being the final word unless it is clearly in error. The Division of Youth Services shall be a participating Employer and may designate any or all Embedded Employees as members of ATRS. The law shall not apply to post-secondary higher education institutions. Act 575 of 2017.

34. **Concurrent Reciprocal Service Credit – A.C.A. § 24-7-601.** This act allows ATRS members with the option of waiving their ATRS service in the event the member had concurrent service in two (2) state-supported retirement systems. This Act gives the member the option to surrender either ATRS service or the reciprocal plan service. If a member worked full time under a reciprocal retirement system and only part-time under ATRS, this Act will allow the member to waive the ATRS service to obtain a higher benefit based upon the full time service in the other system. This act will allow concurrent reciprocal members the option to voluntarily elect to waive service in ATRS. The member's employer-accrued contributions and employee-accrued contributions in the system remain with the system. Act 612 of 2017.

35. **Employer Contribution Rate – A.C.A. § 24-7-401.** Employer contributions are collected on active members, T-DROP participants (even those who work beyond the 10-year participation period), and working retirees (Act 743 of 2009). Through fiscal year 2019, the employer contribution rate is 14%. For the fiscal year beginning July 1, 2018, the Board may modify the employer contribution rate for future fiscal years above 14% in increments of 0.25% per fiscal year provided the system has a greater than 18-year amortization period to pay unfunded liabilities without an employer contribution rate of more than 14% limited to a maximum employer contribution rate of 15%. Act 821 of 2017. The Board set the employer contribution rate to 14.25%, 14.50%, 14.75%, and 15.00% for FY 2020, FY 2021, FY2022, and FY 2023 and thereafter, respectively, by Resolution 2017-40 on November 13, 2017.

36. **Forfeiture of Benefits by Certain Persons – A.C.A. §§ 24-1-301, 302, 303, 304, 305.** Act 756 of 2017 provides for a beneficiary's forfeiture of benefits under a public retirement system when the beneficiary unlawfully kills a member or retirant.

Sample Benefit Computations for a Member Retiring June 30, 2019

The data for the Example member is shown below.

A.	$35,000	Final Average Compensation
B.	32	Total Service Credit
C.	27	Contributory Service Credit
D.	60	Age of Retiree
E.	55	Age of Spouse
F.	100%	Percentage of Retirement Allowance to Continue to Spouse after Retiree's Death (Retiree Chooses this Percentage)

The computations that would be made for this case are:

		Annual
G.	Non-Contributory Base: 1.39% x A x B	$15,568
H.	Extra for Contributory: 0.76% x A x C	7,182
I.	Subtotal Benefit: G + H	22,750
J.	Health Stipend	600
K.	Total Benefit: I + J	23,350
L.	Adjustment for Line F election: (1 - 0.78571) x I	4,875
M.	Annual Amount Payable	$18,475

Projected Benefits, taking into account increases after retirement would be:

Year Ended June 30	Annual Amount
2020	$18,475
2021	19,011
2022	19,547
2023	20,083
2024	20,619

Thereafter, the amount would increase by $536 annually for life.

Sample T-DROP Benefit Computations for a Member Entering T-DROP June 30, 2019

The data for the Example member is shown below.

A.	$35,000	Final Average Compensation
B.	28	Total Service Credit
C.	28	Contributory Service Credit
D.	55	Age of Retiree

The computations that would be made for this case are:

			Annual Amount
E.	Non-Contributory Base:	1.39% x A x B	$13,622
F.	Extra for Contributory:	0.76% x A x C	7,448
G.	Reduction for T-DROP Plan: (1% for each year of service) 0.28 x (E+F)		5,900
H.	Reduction for Entering T-DROP with less than 30 years of service (6% for each year less than 30): 0.12 x (E + F - G)		1,820
I.	Annual Deposit E + F – G – H		$13,350

Projected Deposits, taking into account increases after DROP, and 5 years duration would be:

Year Ended June 30	Amount Deposited
2020	$13,350
2021	13,751
2022	14,151
2023	14,552
2024	14,952
Total	$70,756

The amount deposited, plus credited interest, can be paid as a lump sum or as an annuity. A portion of the deposits can also be placed into a Cash Balance account.

SECTION D

FINANCIAL INFORMATION

This information is presented in draft form for review by the System's auditor. Please let us know if there are any items the auditor changes so that we may maintain consistency with the System's financial statements.

Asset Valuation Method

An essential step in the valuation process is comparing valuation assets with computed liabilities. Valuation assets are those assets that are recognized for funding purposes.

Asset valuation methods are distinguished by the timing of the recognition of investment income. Total investment income is the sum of ordinary income and capital value changes. Under a pure market value approach, ordinary investment income and all capital value changes would be recognized immediately. Because of market volatility, use of pure market values in retirement funding can result in volatile contribution rates and unstable financial ratios, contrary to ATRS objectives.

Under the ATRS asset valuation method (see page D-3), assumed investment return is recognized fully each year. Differences between actual and assumed investment return are phased-in over a closed 4-year period. During periods when investment performance exceeds the assumed rate, the funding value will tend to be less than the market value. Conversely, during periods when investment performance is less than the assumed rate, funding value will tend to be greater than market value. If assumed rates are exactly realized for 3 consecutive years, funding value will become equal to market value.

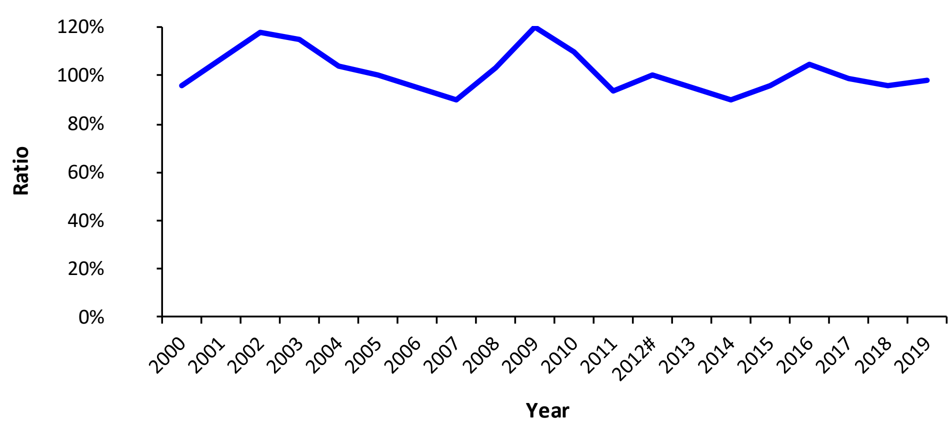
A multi-year comparison of market value to funding (actuarial) value is on the following page.

Asset Valuation Method

Valuation Date June 30	Market Value of Assets (1)	Actuarial Value of Assets (2)	Ratio of AV to MV (2) / (1)
2000	$ 7,978	$ 7,620	96%
2001	7,643	8,166	107%
2002	7,084	8,328	118%
2003	7,050	8,113	115%
2004	8,122	8,424	104%
2005	8,811	8,817	100%
2006	9,868	9,332	95%
2007	11,637	10,519	90%
2008	11,018	11,319	103%
2009	8,847	10,617	120%
2010	9,884	10,845	110%
2011	11,895	11,146	94%
2012#	11,484	11,484	100%
2013	12,830	12,247	95%
2014	14,856	13,375	90%
2015	15,036	14,434	96%
2016	14,559	15,239	105%
2017	16,285	16,131	99%
2018	17,493	16,756	96%
2019	17,742	17,413	98%

 # Actuarial Value set equal to Market Value.

Ratio of Actuarial Value to Market Value



This year the market value of assets is greater than the actuarial value (see page A-2 for a more detailed explanation). To prevent unreasonably large differences between market value and actuarial value, there is a requirement that the recognized assets must always be between 80% and 120% of the market value (see page D-3).

Development of Funding Value of Assets

Year Ended June 30:	2016	2017	2018	2019	2020	2021	2022
A. Funding Value Beginning of Year	$ 14,433,823,989	$ 15,238,522,015	$ 16,131,466,927	$ 16,756,062,928			
B. Market Value End of Year	14,558,576,729	16,284,808,245	17,492,627,740	17,741,621,773			
C. Market Value Beginning of Year	15,035,701,313	14,558,576,729	16,284,808,245	17,492,627,740			
D. Non-Investment Net Cash Flow	(504,645,210)	(555,761,481)	(606,938,770)	(642,256,050)			
E. Investment Return							
E1. Market Total: B - C - D	27,520,626	2,281,992,997	1,814,758,265	891,250,083			
E2. Assumed Rate	8.00%	8.00%	7.50%	7.50%	7.50%		
E3. Amount for Immediate Recognition	1,134,520,111	1,196,851,302	1,187,099,816	1,232,620,118			
E4. Amount for Phased-In Recognition: E1-E3	(1,106,999,485)	1,085,141,695	627,658,449	(341,370,035)			
F. Phased-In Recognition of Investment Return							
F1. Current Year: 0.25 x E4	(276,749,871)	271,285,424	156,914,612	(85,342,509)	Unknown	Unknown	Unknown
F2. First Prior Year	(107,015,212)	(276,749,871)	271,285,424	156,914,612	$ (85,342,509)	Unknown	Unknown
F3. Second Prior Year	364,334,749	(107,015,212)	(276,749,871)	271,285,424	156,914,612	$ (85,342,509)	Unknown
F4. Third Prior Year	194,253,459	364,334,750	(107,015,210)	(276,749,872)	271,285,423	156,914,613	$ (85,342,508)
F5. Total Recognized Investment Gain	**174,823,125**	**251,855,091**	**44,434,955**	**66,107,655**	342,857,526	71,572,104	(85,342,508)
G. Funding Value End of Year:							
G1. Preliminary Funding Value End of Year: A+D+E3+F5	**15,238,522,015**	**16,131,466,927**	**16,756,062,928**	**17,412,534,651**			
G2. Upper Corridor Limit: 120% x B	**17,470,292,075**	**19,541,769,894**	**20,991,153,288**	**21,289,946,128**			
G3. Lower Corridor Limit: 80% x B	**11,646,861,383**	**13,027,846,596**	**13,994,102,192**	**14,193,297,418**			
G4. Funding Value End of Year	**15,238,522,015**	**16,131,466,927**	**16,756,062,928**	**17,412,534,651**			
H. Actual/Projected Difference between Market and Funding Value	(679,945,286)	153,341,318	736,564,812	329,087,122	(13,770,404)	(85,342,508)	-
I. Market Rate of Return	0.19 %	15.98 %	11.36 %	5.19 %			
J. Funding Rate of Return	9.23 %	9.68 %	7.78 %	7.90 %			
K. Ratio of Funding Value to Market Value	104.67 %	99.06 %	95.79 %	98.15 %			

The Funding Value of Assets recognizes assumed investment return (line E3) fully each year. Differences between actual and assumed investment income (line E4) are phased-in over a closed 4-year period. During periods when investment performance exceeds the assumed rate, Funding Value of Assets will tend to be less than Market Value. During periods when investment performance is less than the assumed rate, Funding Value of Assets will tend to be greater than Market Value. ***The Funding Value of Assets is unbiased with respect to Market Value***. At any time it may be either greater or less than Market Value. If assumed rates (applied to the funding value of assets) are exactly realized for 3 consecutive years, it will become equal to Market Value.

The assets of the Retirement System, as of June 30, 2019, were reported to your actuary to be $17,741,621,773. This amount, reduced by a funding value adjustment of $329,087,122 this year, is used to finance the Retirement System liability.

	Assets at June 30	
Accounts	**2019**	**2018**
Regular Accounts		
Members' Deposit Accounts		
Contributions	$ 1,348,149,014	$ 1,287,855,312
Interest	9,669,786,261	9,645,971,617
Total	11,017,935,275	10,933,826,929
T-Drop Member Deposit Accounts		
Contributions	28,594,336	23,942,761
Interest	26,900,241	27,387,222
Total	55,494,577	51,329,983
Cash Balance Account	133,829,621	109,036,167
Employer's Accumulation Account	(5,848,501,337)	(5,509,753,553)
Retirement Reserve Account	11,844,778,384	11,366,265,784
Act 808 Retirement Reserve Account	11,497,384	12,599,124
T-Lump Payable	411,492,155	417,126,689
Survivors Benefit Account	105,863,197	102,835,207
Total Regular Accounts	17,732,389,256	17,483,266,330
Other Accounts		
Income Expense Account	9,232,517	9,361,410
Other Special Reserves	-	-
Miscellaneous	-	-
Total Other Accounts	9,232,517	9,361,410
Total Accounting Value of Assets	17,741,621,773	17,492,627,740
Funding Value Adjustment	(329,087,122)	(736,564,812)
Funding Value of Assets	$ 17,412,534,651	$ 16,756,062,928

Market Value of Assets

The net market value of assets at year-end was $17,741,621,773 and was invested as shown below.

	Market Value at June 30	
	2019	2018
Cash	$ 256,387,142	$ 318,615,761
Receivables		
Unsettled Trades and Accrued Return	60,000,798	69,884,770
Member Contributions	8,667,210	7,880,721
Employer Contributions	28,253,478	26,178,880
Other	571,587	250,097
Total Receivables	97,493,073	104,194,468
Investments		
Government Securities	50,473,001	25,842,362
Domestic Equities	2,472,540,708	2,849,088,275
International Equities	1,073,645,442	961,598,275
Commingled Funds	7,233,968,477	7,041,685,885
Corporate Bonds	1,076,593,959	706,597,635
Asset and Mortgage-backed Securities	39,156,489	40,072,559
Mortgages (CMO's)	-	1,970,135
Conventional Mortgages	-	-
Alternative Investments	5,386,398,892	5,196,546,158
Limited Partnerships	72,122,080	70,411,826
Real Estate	52,354,702	57,238,826
Other Investments	-	208,000,000
Investment Derivative Instruments	(93,525)	939,281
Total Investments	17,457,160,225	17,159,991,217
Invested Securities Lending	469,822,525	506,400,659
Net Equipment	222,647	251,858
Total Assets	18,281,085,612	18,089,453,963
Liabilities		
Survivor Benefits for Minors	227,543	238,734
Other Payables	8,569,746	8,830,843
Securities Related Payables	60,879,610	81,447,941
Securities Lending Collateral	469,786,940	506,308,705
Total Liabilities	539,463,839	596,826,223
Net Market Value	$ 17,741,621,773	$ 17,492,627,740
Change from Prior Year	248,994,033	1,207,819,495

Market Value Reconciliation

Assets developed during the year as follows:

	Year Ended June 30	
	2019	**2018**
Net Market Value July 1	$ 17,492,627,740	$ 16,284,808,245
Additions		
Employer Contributions	430,864,656	424,488,126
Employee Contributions	141,885,632	138,766,747
Appreciation	806,983,870	1,747,857,306
Interest	38,632,142	30,987,644
Dividends	92,234,448	81,573,200
Real Estate	7,671,704	7,596,033
Other	1,182,214	1,247,762
Securities Lending Activity	4,421,291	5,075,453
Total Additions	1,523,875,957	2,437,592,271
Deductions		
Age & Service Benefits	1,008,092,044	958,281,766
Disability Benefits	40,330,710	39,770,821
Option Benefits	30,013,681	28,756,398
Survivor Benefits	11,267,137	10,848,118
Reciprocal Service	55,891,519	52,914,304
Act 808	2,439,111	2,725,690
Refunds	9,679,783	9,455,405
Active Member Death	278,972	304,927
T-DROP Benefits	41,550,591	44,827,681
CBA Benefits	13,318,361	11,297,546
CASH Benefit Program	2,144,429	11,010,987
Investment Expense	52,740,802	50,242,703
Administrative Expense	7,134,784	9,336,430
Total Deductions	1,274,881,924	1,229,772,776
Miscellaneous	-	-
Net Market Value June 30	$ 17,741,621,773	$ 17,492,627,740

Schedule of Funding Progress
(Dollar Amounts in Millions)

Valuation Date June 30	(1) Actuarial Value of Assets	(2) Entry Age AAL	(3) UAAL (2)-(1)	(4) Funding Ratio (1)/(2)	(5) Annual Payroll	Liabilities as a % of Payroll		
						Unfunded (3)/(5)	Funded (1)/(5)	Total (2)/(5)
2000+	$ 7,620	$ 7,879	$ 259	96.7%	$ 1,485	17.4%	513.2%	530.6%
2001+	8,166	8,561	395	95.4%	1,557	25.4%	524.4%	549.8%
2002*	8,328	9,062	734	91.9%	1,628	45.1%	511.5%	556.6%
2003+	8,113	9,445	1,332	85.9%	1,683	79.1%	482.1%	561.2%
2004	8,424	10,050	1,626	83.8%	1,748	93.0%	481.9%	574.9%
2005	8,817	10,973	2,156	80.4%	1,962	109.9%	449.4%	559.3%
2006	9,332	11,623	2,291	80.3%	2,080	110.1%	448.7%	558.8%
2007+	10,519	12,329	1,810	85.3%	2,191	82.6%	480.1%	562.7%
2008+	11,319	13,334	2,015	84.9%	2,268	88.8%	499.1%	587.9%
2009	10,617	14,019	3,402	75.7%	2,318	146.8%	458.0%	604.8%
2010+	10,845	14,697	3,852	73.8%	2,381	161.8%	455.5%	617.3%
2011+*	11,146	15,521	4,375	71.8%	2,728	160.4%	408.6%	569.0%
2012	11,484	16,139	4,655	71.2%	2,714	171.5%	423.2%	594.7%
2013+*	12,247	16,718	4,471	73.3%	2,727	164.0%	449.1%	613.1%
2014	13,375	17,310	3,935	77.3%	2,758	142.7%	484.9%	627.6%
2015	14,434	18,136	3,702	79.6%	2,777	133.3%	519.8%	653.1%
2016	15,239	18,812	3,573	81.0%	2,785	128.3%	547.2%	675.5%
2017+*	16,131	20,298	4,167	79.5%	2,814	148.1%	573.2%	721.3%
2018+*	16,756	20,935	4,179	80.0%	2,872	145.5%	583.4%	728.9%
2019	17,413	21,709	4,296	80.2%	2,907	147.8%	599.0%	746.8%

+ *Legislated benefit or contribution rate change.*

* *Revised actuarial assumptions.*

A system with a high ratio of assets or liabilities to payroll will tend to experience more volatility than a system with a lesser ratio, assuming a similar asset allocation.

Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution

The determination of the accrued liability and the actuarially determined contribution requires the use of assumptions regarding future economic and demographic experience. Risk measures, as illustrated in this report, are intended to aid in the understanding of the effects of future experience differing from the assumptions used in the course of the actuarial valuation. Risk measures may also help with illustrating the potential volatility in the accrued liability and the actuarially determined contribution that result from the differences between actual experience and the actuarial assumptions.

Future actuarial measurements may differ significantly from the current measurements presented in this report 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 due to changing conditions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period, or additional cost or contribution requirements based on the Plan's funded status); and changes in plan provisions or applicable law. The scope of an actuarial valuation does not include an analysis of the potential range of such future measurements.

Examples of risk that may reasonably be anticipated to significantly affect the plan's future financial condition include:

1. Investment risk – actual investment returns may differ from the expected returns;
2. Asset/Liability mismatch – changes in asset values may not match changes in liabilities, thereby altering the gap between the accrued liability and assets and consequently altering the funded status and contribution requirements;
3. Contribution risk – actual contributions may differ from expected future contributions. For example, actual contributions may not be made in accordance with the plan's funding policy or material changes may occur in the anticipated number of covered employees, covered payroll, or other relevant contribution base;
4. Salary and Payroll risk – actual salaries and total payroll may differ from expected, resulting in actual future accrued liability and contributions differing from expected;
5. Longevity risk – members may live longer or shorter than expected and receive pensions for a period of time other than assumed; and
6. Other demographic risks – members may terminate, retire or become disabled at times or with benefits other than assumed resulting in actual future accrued liability and contributions differing from expected.

The effects of certain trends in experience can generally be anticipated. For example, if the investment return since the most recent actuarial valuation is less (or more) than the assumed rate, the cost of the plan can be expected to increase (or decrease). Likewise, if longevity is improving (or worsening), increases (or decreases) in cost can be anticipated.

The timely receipt of the actuarially determined contributions is critical to support the financial health of the plan. Users of this report should be aware that contributions made at the actuarially determined rate do not necessarily guarantee benefit security.

Plan Maturity Measures

Risks facing a pension plan evolve over time. A young plan with virtually no investments and paying few benefits may experience little investment risk. An older plan with a large number of members in pay status and a significant trust may be much more exposed to investment risk. Generally accepted plan maturity measures are discussed below and on the following pages. An additional historical summary of plan maturity measures can be found on page D-11.

	2019	2018	2017	2016	2015
Ratio of the Market Value of Assets to Total Payroll	6.1	6.1	5.8	5.2	5.4
Ratio of Actuarial Accrued Liability to Payroll	7.5	7.3	7.2	6.8	6.5
Ratio of Actives to Retirees and Beneficiaries	1.5	1.5	1.6	1.7	1.8
Ratio of Net Cash Flow to Market Value of Assets	-3.6%	-3.5%	-3.4%	-3.5%	-3.0%
Duration of the Present Value of Future Benefits	13.82	13.86	13.88	13.39	13.50

Ratio of the Market Value of Assets to Payroll

The relationship between assets and payroll is a useful indicator of the potential volatility of contributions. The market value of assets is currently 6.1 times the payroll indicating that a return on assets 2% different from assumed would equal approximately 12% of payroll. Such a change could affect the amortization period by approximately 5 years based on 2019 results. While asset smoothing would reduce the effect, asset gains and losses much larger than 2% are common. An increasing level of this maturity measure generally indicates an increasing volatility in the amortization period.

Ratio of Actuarial Accrued Liability to Payroll

As the ratio of actuarial accrued liability to payroll increases, the amortization period becomes increasingly sensitive to the effects of demographic gains and losses, and assumption changes. For example, a 1% demographic gain or loss would correspond to 7.468% of payroll and would affect the amortization period by 3 years based on the 2019 results.

Ratio of Actives to Retirees and Beneficiaries

A young plan with many active members and few retirees will have a high ratio of active to retirees. A mature open plan may have close to the same number of actives to retirees resulting in a ratio near 1.0. A super-mature or closed plan may have significantly more retirees than actives resulting in a ratio below 1.0.

Ratio of Net Cash Flow to Market Value of Assets

A positive net cash flow means contributions exceed benefits and expenses. A negative cash flow means existing funds are being used to make payments. A certain amount of negative net cash flow is generally expected to occur when benefits are prefunded through a qualified trust. Large negative net cash flows as a percent of assets may indicate a super-mature plan or a need for additional contributions.

Plan Maturity Measures
(Concluded)

Duration of Present Value of Future Benefits

The duration of the present value of future benefits may be used to approximate the sensitivity to a 1% change in the assumed rate of return. For example, the current duration of 13.8 indicates that the present value of future benefits would increase approximately 13.8% if the assumed rate of return were lowered 1%. Such a change could affect the amortization period by 20 years or more.

Funded Ratio

The Funded ratio is the most widely known measure of a plan's financial strength, but the trend in the funded ratio is much more important than the absolute ratio. The funded ratio should trend to 100%. As it approaches 100%, it is important to re-evaluate the level of investment risk in the portfolio and potentially to re-evaluate the assumed rate of return.

Ratio of Unfunded Actuarial Accrued Liability to Payroll

The ratio of unfunded liability to payroll gives an indication of the plan sponsor's ability to actually pay off the unfunded liability. A value above approximately 300% or 400% may indicate difficulty in discharging the unfunded liability within a reasonable time frame.

Standard Deviation of Investment Return to Payroll

This measure illustrates the impact of a one standard deviation change in investment return as a percent of payroll. Investment return experience other than expected ultimately affects the employer contribution rates. The higher the ratio of this risk metric, the greater the expected volatility in employer contribution rates. Absent changes in investment policy, this metric is expected to increase as the assets grow to 100% of the AAL.

Additional Risk Assessment

Additional risk assessment is outside the scope of the annual actuarial valuation. Additional assessment may include scenario tests, sensitivity tests, stochastic modeling, stress tests, and a comparison of the present value of accrued benefits at low-risk discount rates with the actuarial accrued liability.

Plan Maturity Measures (Based on Market Value of Assets)

Valuation Date June 30	(1) Accrued Liabilities (AAL)	(2) Market Value of Assets	(3) Unfunded AAL (1)-(2)	(4) Valuation Payroll	(5) % Change in Payroll	(6) Funded Ratio (2)/(1)	(7) Annuitant Liabilities (AnnLiab)	(8) AnnLiab/ AAL (7)/(1)	(9) Liability/ Payroll (1)/(4)	(10) Assets/ Payroll (2)/(4)	(11) Est. Porfolio Std. Dev.	(12) Std. Dev. % of Pay (10)x(11)	(13) Unfunded/ Payroll (3)/(4)	(14) Net External Cash Flow (NECF)	(15) NECF/ Assets (9)/(2)	(16) Portfolio Rate of Return	(17) 10-year Trailing Average
2010#	$ 14,697	$ 9,884	$ 4,813	$ 2,381	2.7%	67.2%	$ 6,516	44.3%	617.3%	415.1%			202.2%	$ (203)	-2.1%	14.2%	3.6%
2011#*	15,521	11,895	3,626	2,728	14.6%	76.6%	7,132	46.0%	569.0%	436.1%			132.9%	(201)	-1.7%	22.6%	6.1%
2012	16,139	11,484	4,655	2,714	-0.5%	71.2%	7,649	47.4%	594.7%	423.2%			171.5%	(285)	-2.5%	-1.1%	6.6%
2013#	16,718	12,830	3,888	2,727	0.5%	76.7%	8,181	48.9%	613.1%	470.5%			142.6%	(337)	-2.6%	14.9%	8.0%
2014	17,310	14,856	2,454	2,758	1.1%	85.8%	8,777	50.7%	627.6%	538.6%			89.0%	(395)	-2.7%	19.2%	8.2%
2015	18,136	15,036	3,100	2,777	0.7%	82.9%	9,778	53.9%	653.1%	541.5%			111.6%	(445)	-3.0%	4.3%	7.7%
2016	18,812	14,559	4,253	2,785	0.3%	77.4%	10,430	55.4%	675.5%	522.8%			152.7%	(505)	-3.5%	0.2%	6.3%
2017#*	20,298	16,285	4,013	2,814	1.0%	80.2%	11,337	55.9%	721.3%	578.7%			142.6%	(556)	-3.4%	16.0%	6.0%
2018	20,935	17,493	3,442	2,872	2.1%	83.6%	11,851	56.6%	728.9%	609.0%	12.7%	77.3%	119.9%	(607)	-3.5%	11.4%	7.6%
2019	21,709	17,742	3,967	2,907	1.2%	81.7%	12,460	57.4%	746.8%	610.3%	12.5%	76.3%	136.5%	(642)	-3.6%	5.2%	10.4%

(*) ATRS had experience studies in these years leading to a change or "true up" in actuarial assumptions. A pattern of periodic studies is a sign of a well-run system and suggests the extent to which the liability measures the actuary provides are likely to be realistic.

(#) ATRS had benefit changes in these years. Benefit increases cause liabilities to rise; benefit decreases cause liabilities to fall. In either case benefit changes affect the year by year comparability of the measures on this page.

(6). The Funded ratio is the most widely known measure of a plan's financial strength, but the trend in the funded ratio is much more important than the absolute ratio. The funded ratio should trend to 100%. As it approaches 100%, it is important to re-evaluate the level of investment risk in the portfolio and potentially to re-evaluate the assumed rate of return.

(9) and (10) The ratios of liabilities and assets to payroll gives an indication of both maturity and volatility. Many systems have values between 500% and 700%. Values significantly above that range may indicate difficulty in supporting the benefit level as a level % of payroll.

(13) The ratio of unfunded liability to payroll gives an indication of the plan sponsor's ability to actually pay off the unfunded liability. A value above approximately 300% or 400% may indicate difficulty in discharging the unfunded liability within a reasonable time frame.

(14) and (15) The ratio of Net External Cash Flow to assets is an important measure of sustainability. Negative ratios are common and expected for a maturing system. In the longer term, this ratio should be on the order of approximately -4%. A ratio that is significantly more negative than that for an extended period could be a leading indicator of potential exhaustion of assets.

(16) and (17) Investment return is probably the largest single risk that most systems face. The year by year return and the 10-year geometric average give an indicator of the realism of the systems assumed return. The averages are of course distorted by the extraordinary events of 2008.

SECTION E

COVERED MEMBER DATA

Active Members in Valuation June 30, 2019
by Attained Age and Years of Service
(Excludes T-Drop and Rehired Retirees)

Attained Age	Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	No.	Valuation Payroll
Under 20	749							749	$ 1,686,825
20-24	2,075	10						2,085	45,016,677
25-29	4,913	1,219	12					6,144	217,986,790
30-34	3,292	3,310	778	9				7,389	280,302,302
35-39	3,023	2,226	2,833	801	5			8,888	359,454,908
40-44	2,416	1,933	2,067	2,262	552	5		9,235	395,273,138
45-49	1,916	1,747	1,955	1,811	2,324	508		10,261	466,712,664
50-54	1,515	1,293	1,473	1,565	1,446	1,412	48	8,752	378,447,800
55-59	1,404	1,010	1,300	1,356	1,420	999	78	7,567	290,157,367
60	209	202	205	215	266	199	18	1,314	49,188,509
61	187	176	200	220	211	170	11	1,175	44,366,470
62	201	153	155	159	183	158	21	1,030	36,880,165
63	206	144	140	122	135	124	10	881	32,419,343
64	140	116	106	120	112	85	7	686	23,723,412
65	139	98	101	87	60	73	17	575	18,477,768
66	102	79	48	15	20	30	4	298	8,424,447
67	105	58	44	16	11	8	6	248	5,771,560
68	100	52	34	17	4	6	2	215	4,554,845
69	101	45	15	3	3	3	1	171	3,066,676
70 & Up	439	219	100	20	8	1	7	794	12,359,050
Totals	**23,232**	**14,090**	**11,566**	**8,798**	**6,760**	**3,781**	**230**	**68,457**	**$2,674,270,716**

Group Averages:

Age: 44.1 years

Service: 10.1 years

WOMEN Active Members in Valuation June 30, 2019
by Attained Age and Years of Service
(Excludes T-Drop and Rehired Retirees)

Attained Age	Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	No.	Valuation Payroll
Under 20	245							245	$ 631,188
20-24	1,511	4						1,515	33,962,850
25-29	3,746	944	6					4,696	162,853,679
30-34	2,569	2,470	606	5				5,650	204,638,294
35-39	2,481	1,742	2,221	616	3			7,063	272,414,521
40-44	1,956	1,557	1,618	1,791	421	2		7,345	298,180,439
45-49	1,480	1,407	1,629	1,493	1,797	407		8,213	356,043,245
50-54	1,102	976	1,213	1,342	1,158	1,103	31	6,925	287,319,794
55-59	964	725	992	1,141	1,222	802	61	5,907	218,520,669
60	139	144	155	179	230	173	15	1,035	37,810,323
61	122	122	158	171	185	149	10	917	34,170,718
62	132	97	109	128	152	127	15	760	26,254,069
63	115	97	110	96	116	111	7	652	23,665,586
64	79	67	78	92	86	74	7	483	16,479,269
65	83	53	77	61	51	63	16	404	13,226,986
66	59	53	32	12	13	27	3	199	5,740,454
67	55	29	31	13	8	7	5	148	3,642,409
68	51	27	19	12	3	5	2	119	2,475,536
69	54	25	9	2	2	3	1	96	1,738,142
70 & Up	225	106	51	15	6		6	409	6,268,773
Totals	**17,168**	**10,645**	**9,114**	**7,169**	**5,453**	**3,053**	**179**	**52,781**	**$ 2,006,036,944**

Group Averages:

Age: 44.2 years

Service: 10.5 years

MEN Active Members in Valuation June 30, 2019
by Attained Age and Years of Service
(Excludes T-Drop and Rehired Retirees)

Attained Age	Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	No.	Valuation Payroll
Under 20	504							504	$ 1,055,637
20-24	564	6						570	11,053,827
25-29	1,167	275	6					1,448	55,133,111
30-34	723	840	172	4				1,739	75,664,008
35-39	542	484	612	185	2			1,825	87,040,387
40-44	460	376	449	471	131	3		1,890	97,092,699
45-49	436	340	326	318	527	101		2,048	110,669,419
50-54	413	317	260	223	288	309	17	1,827	91,128,006
55-59	440	285	308	215	198	197	17	1,660	71,636,698
60	70	58	50	36	36	26	3	279	11,378,186
61	65	54	42	49	26	21	1	258	10,195,752
62	69	56	46	31	31	31	6	270	10,626,096
63	91	47	30	26	19	13	3	229	8,753,757
64	61	49	28	28	26	11		203	7,244,143
65	56	45	24	26	9	10	1	171	5,250,782
66	43	26	16	3	7	3	1	99	2,683,993
67	50	29	13	3	3	1	1	100	2,129,151
68	49	25	15	5	1	1		96	2,079,309
69	47	20	6	1	1			75	1,328,534
70 & Up	214	113	49	5	2	1	1	385	6,090,277
Totals	**6,064**	**3,445**	**2,452**	**1,629**	**1,307**	**728**	**51**	**15,676**	**$ 668,233,772**

Group Averages:

Age: 44.1 years

Service: 9.1 years

Summary of Active Members
(Excludes T-Drop and Rehired Retirees)

	Teachers		Support		Total Active Members	
	No.	Valuation Payroll	No.	Valuation Payroll	No.	Valuation Payroll
Women	27,709	$ 1,403,840,634	25,072	$ 602,196,310	52,781	$ 2,006,036,944
Men	7,882	454,753,715	7,794	213,480,057	15,676	668,233,772
All	35,591	$ 1,858,594,349	32,866	$ 815,676,367	68,457	$ 2,674,270,716

	Teachers	Support	Total
Members Contributing Now	33,398	18,108	51,506
Members Not Contributing	2,193	14,758	16,951
All	35,591	32,866	68,457

		Group Averages			Active Member Payroll
June 30	Number	Age	Service	Annual Earnings	($ Millions)
2002	62,011	43.8	9.4	$26,254	$1,628
2003	62,432	44.0	9.5	26,963	1,683
2004	63,185	44.2	9.5	27,660	1,748
2005	65,793	44.2	9.4	29,826	1,962
2006	67,710	44.3	9.3	30,714	2,080
2007	69,226	44.4	9.3	31,645	2,191
2008	70,172	44.5	9.4	32,319	2,268
2009	70,655	44.7	9.5	32,804	2,318
2010	72,208	44.7	9.7	32,980	2,381
2011	72,293	44.8	9.9	33,995	2,458
2012	71,195	45.0	10.1	34,362	2,446
2013	70,660	45.0	10.2	34,920	2,467
2014	70,225	44.7	10.2	35,673	2,505
2015	68,945	44.6	10.3	36,717	2,531
2016	68,368	44.4	10.2	37,235	2,546
2017	68,337	44.3	10.2	37,707	2,577
2018	68,645	44.2	10.2	38,477	2,641
2019	68,457	44.1	10.1	39,065	2,674

Deferred Vested Members at June 30, 2019
by Attained Age

Age	Number	Estimated Annual Benefits	Contribution Balance
Below 40	1,899	$ 10,695,715	$ 26,282,786
40	258	1,497,825	3,704,122
41	285	1,814,616	4,335,409
42	255	1,691,865	4,259,864
43	317	2,100,931	4,791,186
44	325	2,120,942	4,836,793
45	353	2,154,416	4,532,601
46	304	1,848,805	4,165,053
47	377	2,228,671	4,498,105
48	451	2,752,481	5,402,116
49	393	2,348,489	4,704,381
50	411	2,564,524	4,912,708
51	468	2,587,194	4,330,874
52	477	2,689,386	5,019,764
53	470	2,526,053	4,561,587
54	568	3,147,753	5,630,910
55	600	3,065,297	5,474,877
56	542	3,253,342	5,597,267
57	589	3,447,382	6,369,820
58	595	3,515,258	7,208,314
59	586	3,528,461	7,002,140
60 & Up	2,437	7,480,447	13,197,405
Future Beneficiaries #	73	486,252	0
Totals	**13,033**	**$ 69,546,105**	**$ 140,818,082**

 # These are beneficiaries of deceased active members who are eligible for a pension at age 62.

An inactive member is no longer actively working but has sufficient service credit to qualify for a monthly benefit at retirement age.

All Members Participating in T-DROP at June 30, 2019
by Attained Age

Age	Number	Current T-DROP Contribution	Original T-DROP Contribution	T-DROP Account Balance	Pay
48	3	$ 32,971	$ 32,011	$ 33,051	$ 114,786
49	2	64,326	61,331	106,415	171,700
50	22	496,349	480,161	562,698	1,489,907
51	77	1,734,051	1,667,730	2,321,444	4,955,931
52	145	3,052,696	2,913,678	4,854,599	8,909,063
53	188	4,172,539	3,924,946	8,882,600	12,126,307
54	252	5,710,027	5,330,084	14,207,682	16,577,333
55	274	6,010,991	5,488,371	20,093,220	17,245,473
56	318	7,096,010	6,428,354	26,397,601	20,329,773
57	355	8,220,127	7,334,346	38,493,675	22,787,894
58	350	8,022,818	7,008,437	44,406,625	21,995,355
59	334	7,577,755	6,833,693	45,945,147	21,176,284
60	316	6,165,850	6,266,867	48,872,778	19,758,642
61	315	6,035,199	6,099,274	47,561,558	19,393,667
62	238	4,027,379	4,466,868	36,534,422	14,263,915
63	187	3,444,595	3,730,996	28,150,467	11,516,850
64	160	2,355,900	2,882,061	23,281,641	9,444,484
65	79	1,340,367	1,515,012	13,193,876	4,919,201
66	37	518,226	698,405	6,042,976	2,164,957
67	22	352,332	393,951	3,629,471	1,331,107
68	17	361,170	320,568	2,570,301	1,050,932
69	5	79,352	80,713	759,649	366,201
70	3	90,040	76,611	531,365	225,515
71	4	76,894	61,622	651,353	223,505
72	4	112,574	93,902	802,026	303,474
Totals	**3,707**	**$ 77,150,538**	**$ 74,189,992**	**$ 418,886,640**	**$ 232,842,256**

A T-DROP member continues to work, but does not accrue retirement benefits. A reduced benefit is paid into the T-DROP account (see pages C-3 and C-4) during T-DROP participation. Deposits to T-DROP cease at 10 years of T-DROP participation. T-DROP participants may continue in covered employment after 10 years of participation, but do not accumulate additional service credit or make member contributions. ATRS receives full employer contributions on behalf of these people.

Active, TDROP and Return to Work Members as of June 30, 2019

June 30	Number				Total Payroll $Millions
	Active	TDROP	RTW	Total	
2011	72,293	4,487	4,093	80,873	$ 2,818
2012	71,195	4,432	4,001	79,628	2,803
2013	70,660	4,265	4,025	78,950	2,819
2014	70,225	4,127	3,845	78,197	2,851
2015	68,945	3,974	3,741	76,660	2,874
2016	68,368	3,864	3,829	76,061	2,888
2017	68,337	3,811	3,881	76,029	2,922
2018	68,645	3,696	4,029	76,370	2,986
2019	68,457	3,707	4,077	76,241	3,027

The actuarial valuation assumes the number of working members will remain constant at the current level. In some recent years the total number of working members has decreased. A decreasing population means less contribution income for the Retirement System than expected and can lead to funding difficulties in extreme cases.

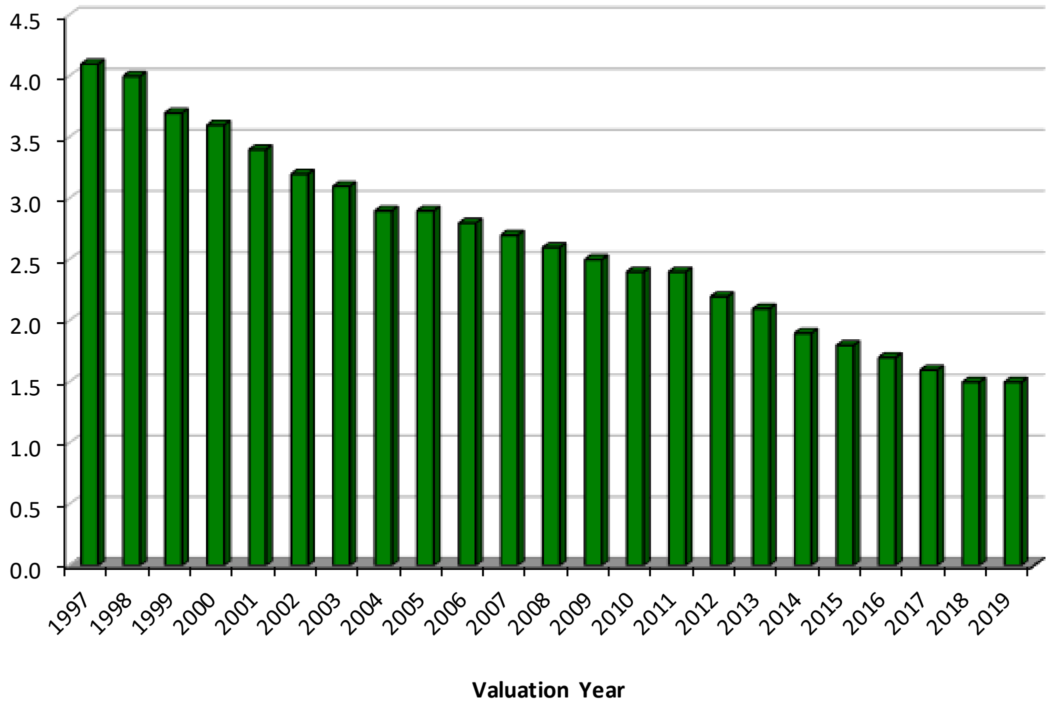
Annuities Being Paid Retirees and Beneficiaries July 1, 2019
by Type of Annuity Being Paid

Type of Annuity	No.	Annual Amounts: Original Annuities	Annual Amounts: Base Annuities	Annual Amounts: Current Annuities
RETIREMENT RESERVE ACCOUNT				
Age & Service				
Option 1 (Basic single life)	34,822	$ 536,527,556	$ 635,952,502	$ 817,888,770
Option A (Joint & 100% Survivor)	5,347	90,885,402	105,199,277	135,091,423
Option B (Joint & 50% Survivor)	2,646	59,630,747	72,029,638	92,575,663
Option C (10 year certain)	647	10,487,013	10,843,078	13,301,146
Beneficiaries	1,184	20,870,802	19,822,864	26,335,193
Totals	44,646	718,401,520	843,847,359	1,085,192,195
Disability				
Option 1	2,325	23,916,629	26,462,857	34,361,609
Option A	366	4,014,482	4,098,562	5,243,781
Option B	82	1,176,934	1,265,843	1,612,749
Option C	19	153,776	142,976	189,228
Beneficiaries	287	3,174,378	3,407,328	4,621,403
Totals	3,079	32,436,199	35,377,566	46,028,770
Act 793	168	$ 942,172	$ 1,849,229	1,849,229
Totals	47,893	751,779,891	881,074,154	1,133,070,194
SURVIVOR'S BENEFIT ACCOUNT				
Beneficiaries of Deceased Members	741	$ 7,821,593	$ 8,879,432	$ 11,313,962
OTHER ANNUITIES				
Act 808	43	818,053	2,355,810	2,355,810
RETIREMENT SYSTEM TOTALS				
Total Annuities Being Paid	48,677	$ 760,419,537	$ 892,309,396	$ 1,146,739,966

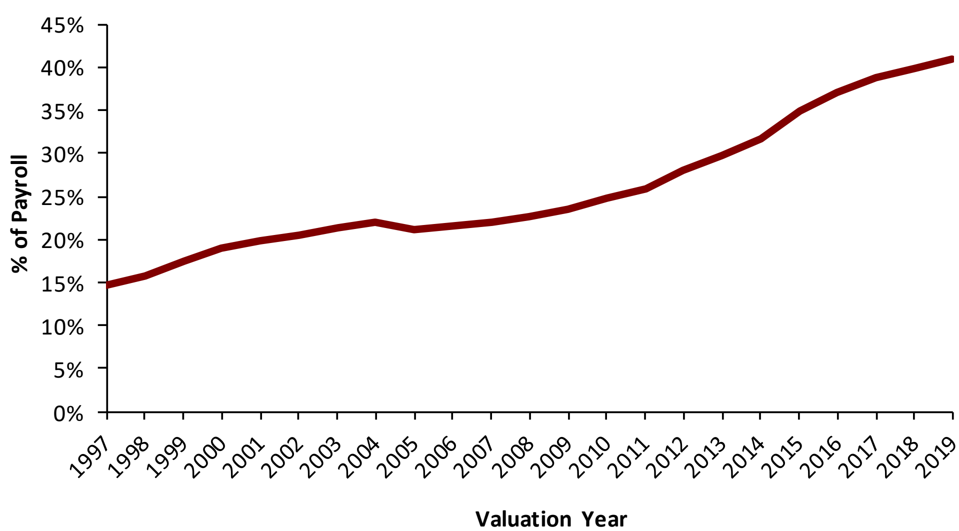
The Original Annuity is the annuity at the date of retirement.
The Base Annuity is the amount from which the 3.0% COLA is calculated.
The Current Annuity is the annuity payable at July 1, 2019 (Includes July 1 COLA).

Historical Graphs

Active Members Per Retired Life *



Retirement Benefits Being Paid as a Percent of Member Payroll *



** Beginning with the June 30, 2011 valuation, active members include T-DROP participants and payroll.*

Benefit Changes during Recent Years of Retirement & Related Changes in Purchasing Power (1990 $)

Year Ended June 30	Increase Beginning of Year+	Benefit Dollars in Year*	Inflation (Loss) in Year#	Purchasing Power at Year End 1990 $	Purchasing Power at Year End % of 1990
1990	$ - - - -	$ 11,000	- - - -	$ 11,000	100%
1991	330	11,330	(4.7)%	10,822	98%
1992	1,005	12,335	(3.1)%	11,429	104%
1993	1,045	13,380	(3.0)%	12,036	109%
1994	1,082	14,462	(2.5)%	12,693	115%
1995	400	14,862	(3.0)%	12,660	115%
1996	400	15,262	(2.8)%	12,652	115%
1997	772	16,034	(2.3)%	12,993	118%
1998	481	16,515	(1.7)%	13,161	120%
1999	1,383	17,898	(2.0)%	13,989	127%
2000	1,129	19,027	(3.7)%	14,336	130%
2001	1,406	20,433	(3.2)%	14,911	136%
2002	807	21,240	(1.1)%	15,337	139%
2003	562	21,802	(2.1)%	15,417	140%
2004	562	22,364	(3.3)%	15,314	139%
2005	562	22,926	(2.5)%	15,312	139%
2006	562	23,488	(4.3)%	15,037	137%
2007	562	24,050	(2.7)%	14,994	136%
2008	562	24,612	(5.0)%	14,611	133%
2009	562	25,174	1.4 %	15,161	138%
2010	755	25,929	(1.1)%	15,453	140%
2011	778	26,707	(3.6)%	15,370	140%
2012	778	27,485	(1.7)%	15,558	141%
2013	778	28,263	(1.8)%	15,723	143%
2014	778	29,041	(2.1)%	15,828	144%
2015	778	29,819	(0.1)%	16,232	148%
2016	778	30,597	(1.0)%	16,491	150%
2017	778	31,375	(1.6)%	16,638	151%
2018	778	32,153	(2.9)%	16,575	151%
2019	751	32,904	(1.6)%	16,687	152%
2020	451	33,355			

* *The $11,000 benefit used to begin this schedule is an arbitrary amount. A smaller beginning amount could show a smaller purchasing power loss in percent loss.*

\# *Based on Consumer Price Index, All Urban Consumers, United States City Average (June values).*

Benefit Changes During Recent Years of Retirement & Related Changes in Purchasing Power (2000 $)

Year Ended June 30	Increase Beginning of Year+	Benefit Dollars in Year*	Inflation (Loss) in Year#	Purchasing Power at Year End	
				2000 $	% of 2000
2000	$ - - - -	$ 11,600	- - - -	$ 11,600	100%
2001	1,003	12,603	(3.2)%	12,207	105%
2002	523	13,126	(1.1)%	12,579	108%
2003	372	13,498	(2.1)%	12,668	109%
2004	372	13,870	(3.3)%	12,605	109%
2005	372	14,242	(2.5)%	12,624	109%
2006	372	14,614	(4.3)%	12,417	107%
2007	372	14,986	(2.7)%	12,400	107%
2008	372	15,358	(5.0)%	12,100	104%
2009	372	15,730	1.4 %	12,573	108%
2010	472	16,202	(1.1)%	12,815	110%
2011	486	16,688	(3.6)%	12,746	110%
2012	486	17,174	(1.7)%	12,902	111%
2013	486	17,660	(1.8)%	13,039	112%
2014	486	18,146	(2.1)%	13,125	113%
2015	486	18,632	(0.1)%	13,460	116%
2016	486	19,118	(1.0)%	13,675	118%
2017	486	19,604	(1.6)%	13,797	119%
2018	486	20,090	(2.9)%	13,745	118%
2019	459	20,549	(1.6)%	13,831	119%
2020	159	20,708			

* *The $11,600 benefit used to begin this schedule is an arbitrary amount. A smaller beginning amount could show a smaller purchasing power loss in percent loss.*

\# *Based on Consumer Price Index, All Urban Consumers, United States City Average (June values).*

Benefit Changes During Recent Years of Retirement & Related Changes in Purchasing Power (2010 $)

Year Ended June 30	Increase Beginning of Year	Benefit Dollars in Year*	Inflation (Loss) in Year#	Purchasing Power at Year End	
				2010 $	% of 2010
2010	$ - - - -	$ 11,900	- - - -	$ 11,900	100%
2011	357	12,257	(3.6)%	11,836	99%
2012	357	12,614	(1.7)%	11,981	101%
2013	357	12,971	(1.8)%	12,108	102%
2014	357	13,328	(2.1)%	12,188	102%
2015	357	13,685	(0.1)%	12,499	105%
2016	357	14,042	(1.0)%	12,699	107%
2017	357	14,399	(1.6)%	12,812	108%
2018	357	14,756	(2.9)%	12,764	107%
2019	330	15,086	(1.6)%	12,837	108%
2020	30	15,116			

* *The $11,900 benefit used to begin this schedule is an arbitrary amount. A smaller beginning amount could show a smaller purchasing power loss in percent loss.*

\# *Based on Consumer Price Index, All Urban Consumers, United States City Average (June values).*

SECTION F

FINANCIAL PRINCIPLES

Financial Principles and Operational Techniques

Promises Made and To Be Paid For. As each year is completed, the System, in effect, hands an "IOU" to each member then acquiring a year of service credit. The "IOU" says: "The Arkansas Teacher Retirement System owes you one year's worth of retirement benefits, payments in cash commencing when you qualify for retirement."

The related ***key financial questions*** are:
Which generation of taxpayers contributes the money to cover the IOU?
The present taxpayers, who receive the benefit of the member's present year of service?
Or the future taxpayers, who happen to be in Arkansas at the time the IOU becomes a cash demand?

The financial objective of the ATRS is that this year's taxpayers contribute the money to cover the IOUs being handed out this year so that ***the employer contribution rate will remain approximately level from generation to generation*** -- our children and our grandchildren will not have to contribute greater percents of pay than we contribute now. This objective was set forth in Act 793 of 1977.

(There are systems which have ***a design for deferring contributions to future <u>taxpayers</u>***, lured by a lower contribution rate now and putting aside the fact that the contribution rate must then relentlessly grow much greater over decades of time -- consume now, and let your children face higher contribution rates after you retire.)

An inevitable byproduct of the level-cost design is the accumulation of reserve assets for decades and the income produced when the assets are invested. ***Investment income*** becomes the ***third and largest contributor*** for benefits to employees, and is interlocked with the contribution amounts required from employees and employers.

Translated to actuarial terminology, this level-cost objective means that the contribution rates must total at least the following:

> Normal Cost (the cost of members' service being rendered this year)
> … plus …
> Interest on Unfunded Actuarial Accrued Liabilities (unfunded accrued liabilities are the difference between (i) liabilities for service already rendered and (ii) the accrued assets of the plan).

Computing Contributions to Support System Benefits. From a given schedule of benefits and from the employee data and asset data furnished, the actuary determines the contribution rates to support the benefits, by means of ***an actuarial valuation***. An actuarial valuation has a number of ingredients such as: the rate of investment income which plan assets will earn; the rates of withdrawal of active members who leave covered employment before qualifying for any monthly benefit; the rates of mortality; the rates of disability; the rates of pay increases; and the assumed age or ages at actual retirement. In an actuarial valuation, assumptions must be made as to what the above rates will be, for the next year and for decades in the future. Only the subsequent actual experience of the System can indicate the degree of accuracy of the assumptions.

Reconciling Differences Between Assumed Experience and Actual Experience. Once actual experience has occurred and been observed, it will not coincide exactly with assumed experience, regardless of the accuracy of the various financial assumptions or the skill of the actuary and the precision of the calculations made. The System copes with these continually changing differences by having annual actuarial valuations. Each actuarial valuation is a complete recalculation of assumed future experience, taking into account all past differences between assumed and actual experience. The result is continual adjustments in financial position.

The Actuarial Valuation Process

The financing diagram on the next page shows the relationship between the two fundamentally different philosophies of paying for retirement benefits: the method where contributions match cash benefit payments (or barely exceed cash benefit payments, as in the Federal Social Security program), and is thus an ***increasing contribution method***; and the ***level contribution method*** which equalizes contributions between the generations.

The actuarial valuation is the mathematical process by which the level contribution rate is determined, and the flow of activity constituting the valuation may be summarized as follows:

A. ***Census Data***, furnished by plan administrator
  Retired lives now receiving benefits
  Former employees with vested benefits not yet payable
  Active employees

B. + ***Asset data*** (cash & investments), furnished by plan administrator

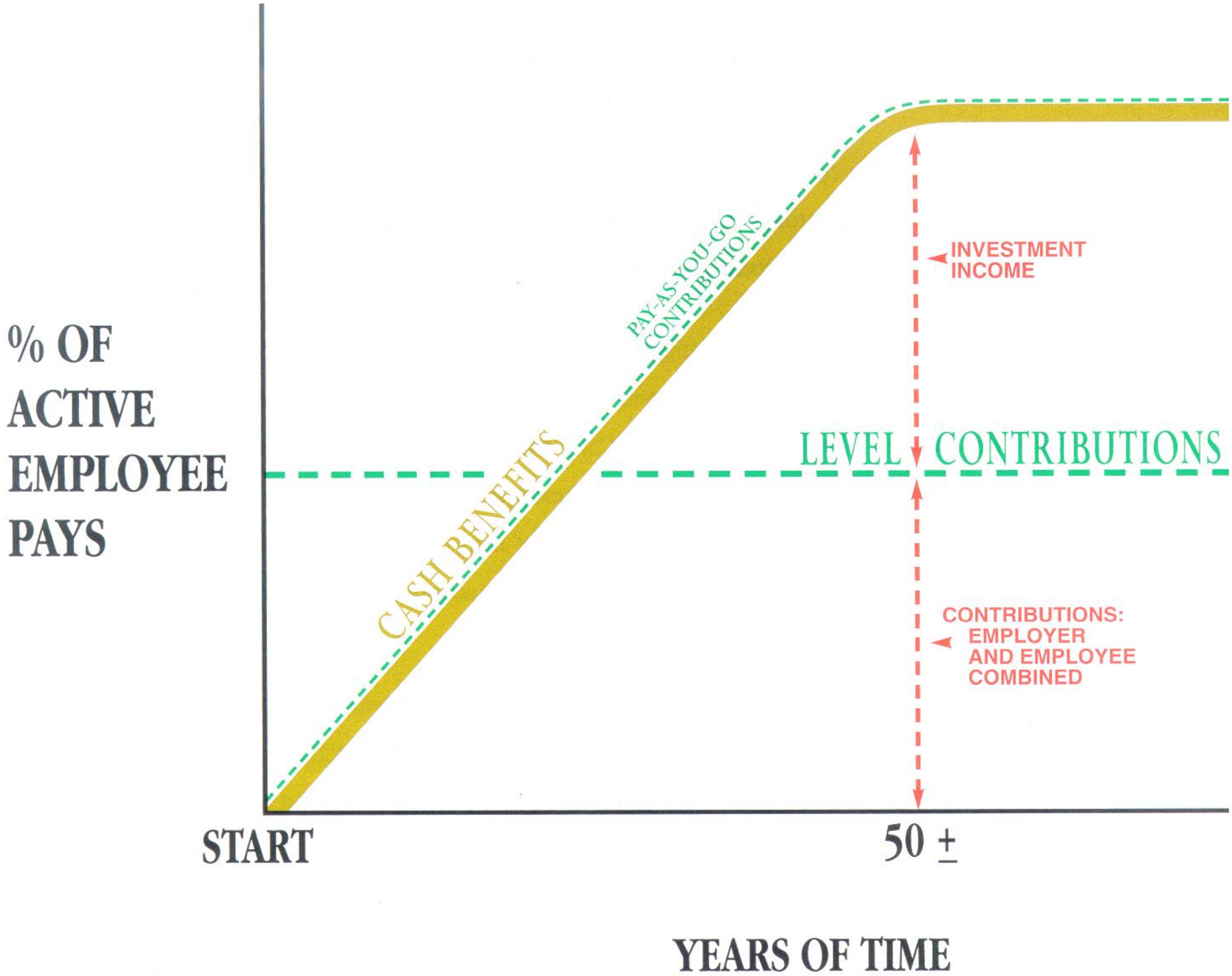
C. + **Benefit provisions** that establish eligibility and amounts of payments to members

D. + ***Assumptions concerning future financial experiences in various risk areas***, which assumptions are established by the Board of Trustees after consulting with the actuary.

E. + ***The funding method*** for employer contributions (the long-term planned pattern for employer contributions)

F. + ***Mathematically combining the assumptions, the funding method, and the data***

G. = Determination of:
  Plan financial position, and/or
  New Employer Contribution Rate



CASH BENEFITS LINE. This relentlessly increasing line is the fundamental reality of retirement plan financing. It happens each time a new benefit is added for future retirements (and happens regardless of the design for contributing for benefits).

LEVEL CONTRIBUTION LINE. Determining the level contribution line requires detailed assumptions concerning a variety of experiences in future decades, including:

- Economic Risk Areas
  - Rates of investment return
  - Rates of pay increase
  - Changes in active member group size
- Non-Economic Risk Areas
  - Ages at actual retirement
  - Rates of mortality
  - Rates of withdrawal of active members (turnover)
  - Rates of disability

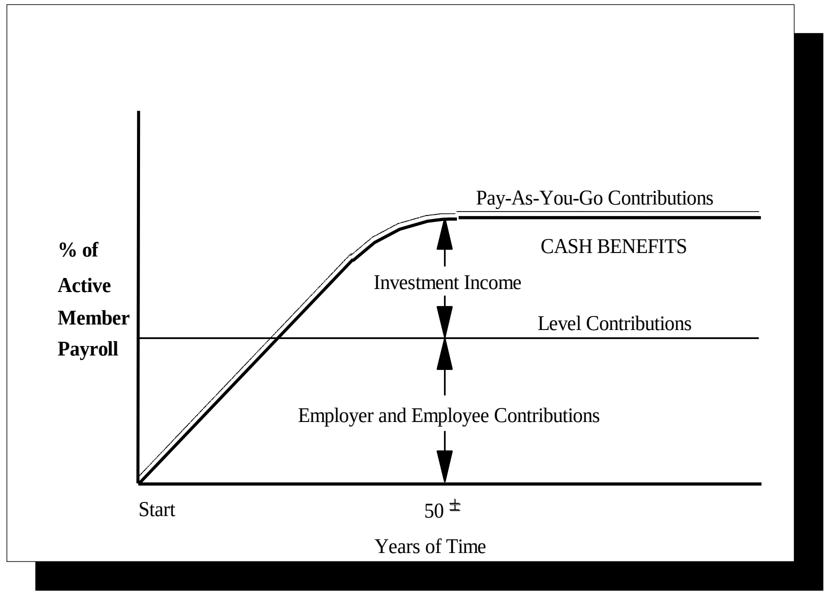
SECTION G

ACTUARIAL ASSUMPTIONS

Selection of Assumptions Used in Actuarial Valuations

Economic Assumptions

Investment return
Pay increases to individual employees:
  the portion for economic changes
Active member group size and
  total payroll growth



Demographic Assumptions

Actual ages at service retirement
Pay increases to individual members:
  the portion for merit & seniority
Disability while actively employed
Separations before retirement
Mortality after retirement
Mortality before retirement

Relationship Between Plan Governing Body and the Actuary

The actuary should have the primary responsibility for choosing the ***demographic*** assumptions used in the actuarial valuation, making use of specialized training and experience.

The actuary and other professionals can provide guidance concerning the choice of suitable economic assumptions.

Guidance regarding the selection of economic assumptions for measuring pension obligations is provided by Actuarial Standards of Practice (ASOP) No. 27. The standard requires that the selected economic assumptions be consistent with each other. That is, the selection of the investment return assumption should be consistent with the selection of the payroll growth and inflation assumptions.

ASOP No. 27 defines a reasonable economic assumption as an assumption that has the following characteristics: (a) It is appropriate for the purpose of the measurement; (b) It reflects the actuary's professional judgment; (c) It takes into account historical and current economic data that is relevant as of the valuation date; (d) It reflects the actuary's estimate of future experience, the actuary's observation of the estimates inherent in market data, or a combination thereof; and (e) It has no significant bias (i.e., it is not significantly optimistic or pessimistic), except when provisions for adverse deviation or plan provisions that are difficult to measure are included and disclosed under Section 3.5.1, or when alternative assumptions are used for the assessment of risk.

Summary of Assumptions Used in Actuarial Valuations for the Arkansas Teacher Retirement System Assumptions Adopted by Board of Trustees After Consulting with Actuary

The actuarial assumptions used in the valuation are shown in this section. Assumptions were established based upon an Experience Study covering the period July 1, 2010 through June 30, 2015. The Board of Trustees adopts the actuarial assumptions used for actuarial valuation purposes after consulting with the actuary. The actuarial assumptions represent estimates of future experience.

Economic Assumptions

The ***price inflation*** assumption is 2.50% although no specific Price Inflation is needed for this valuation. It is assumed that the 3% COLA will always be paid.

The ***wage inflation*** assumption is 2.75%. This consists of 2.50% related to pure price inflation and 0.25% related to general economic improvements.

The investment return rate used in the valuation was 7.50% per year, compounded annually (net after administrative expenses). This rate of return is not the assumed real rate of return. The real rate of return over wage inflation in this valuation is defined to be the portion of investment return which is more than the wage inflation rate. Considering wage inflation recognition of 2.75%, the 7.50% rate translates to an assumed real rate of return over wage inflation of 4.75%. This rate was first used for the ***June 30, 2017*** valuation. The assumed real rate of return over price inflation is 5%.

Pay increase assumptions for individual active members are shown on pages G-7 and G-8. Part of the assumption for each age is for a merit and/or seniority increase, and the other 2.75% recognizes wage inflation. These rates were first used for the ***June 30, 2017*** valuation.

The Active Member Group size is assumed to remain constant at its present level.

Total active member payroll is assumed to increase 2.75% per year, which is the portion of the individual pay increase assumptions attributable to wage inflation. This rate was first used for the ***June 30, 2017*** valuation.

Non-Economic Assumptions

The mortality tables used were the RP-2014 Healthy Annuitant, Disabled Annuitant and Employee Mortality headcount weighted tables for males and females. Mortality rates were adjusted for future mortality improvements using projection scale MP-2017 from 2006. Related values are shown on page G-4. These tables were first used for the ***June 30, 2017*** valuation.

A limited fluctuation credibility procedure was used to determine the appropriate scaling factor of each gender and each member classification (see the 2010-2015 Experience Study), and are shown below:

	Scaling Factor
Healthy Male Retirees	**101%**
Healthy Female Retirees	**91%**
Disabled Male Retirees	**99%**
Disabled Female Retirees	**107%**
Male Active Members	**94%**
Female Active Members	**84%**

The probabilities of retirement for members eligible to retire are shown on pages G-5 and G-6. The rates for full retirement and reduced retirement were first used in the ***June 30, 2017*** valuation.

The probabilities of withdrawal from service, ***death-in-service*** and ***disability*** are shown for sample ages on pages G-7 and G-8. These rates were first used in the ***June 30, 2017*** valuation.

The entry age actuarial cost method of valuation was used in determining accrued liabilities and normal cost.

Differences 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 contribution amounts (the total of principal & interest) which are level percents of payroll contributions.

These cost methods were first used in the June 30, 1986 valuation.

The Fiscal Year 2019 employer and member contribution rates were 14% and 6%, respectively. The employer and member rates are scheduled to increase by 0.25% increments beginning in Fiscal Year 2020 and ending in Fiscal Year 2023. The ultimate employer and member contribution rates will be 15% and 7%, respectively. The projected unfunded actuarial accrued liabilities were increased when developing the amortization period to account for the temporary shortfalls in the employer and employee contribution rates.

Asset Valuation Method. A market value related asset method is used as described on page D-1. This method was first used in the June 30, 1995 valuation. It was modified following the 1997-2002 Experience Study to include an 80% - 120% market value corridor.

The data about persons now covered and about present assets was furnished by the System's administrative staff. Although examined for general reasonableness, the data was not audited by the Actuary. Members whose dates of birth were not supplied were assumed to be 40 years old on the valuation date. Members whose salaries were not supplied and that entered T-DROP were assumed to have the group average pay of those with salary data as of the valuation date that entered T-DROP.

Single Life Retirement Values

Sample Attained Ages in 2019	Present Value of $1.00 Monthly for Life		Present Value of $1 Monthly for Life Increasing 3.0% Annually		Future Life Expectancy (Years)		Percent Dying within Next Year	
	Men	Women	Men	Women	Men	Women	Men	Women
40	$150.78	$154.22	$198.67	$205.14	42.65	46.91	0.33 %	0.28 %
45	146.82	151.45	191.26	199.48	37.86	42.10	0.41 %	0.32 %
50	141.65	147.57	181.99	192.01	33.15	37.29	0.53 %	0.36 %
55	135.01	142.16	170.65	182.24	28.57	32.49	0.71 %	0.44 %
60	126.70	135.10	157.13	170.16	24.16	27.81	0.98 %	0.60 %
65	116.61	126.06	141.50	155.51	20.00	23.29	1.36 %	0.82 %
70	104.37	114.48	123.61	137.92	16.08	18.95	1.97 %	1.24 %
75	89.86	100.41	103.61	117.82	12.46	14.88	3.07 %	2.05 %
80	73.73	84.39	82.70	96.30	9.24	11.25	5.10 %	3.48 %
85	57.47	67.50	62.75	74.91	6.57	8.15	8.75 %	6.12 %
Base	2635 x 1.01	2636 x 0.91	2635 x 1.01	2636 x 0.91				
Projection	939	940	939	940				

* *Applicable to calendar year 2019. Rates and life expectancies in future years are determined by the MP-2017 projection scale.*

Sample Attained Ages	Benefit Increasing 3.0% Yearly	Portion of Age 60 Lives Still Alive	
		Men	Women
60	$100.00	100%	100%
65	115.00	95%	97%
70	130.00	88%	92%
75	145.00	79%	86%
80	160.00	67%	77%
Ref		2635 x 1.01	2636 x 0.91

Probabilities of Retirement for Members

Retirement Ages	% of Active Participants Retiring with Unreduced Benefits			
	Education		Support	
	Male	Female	Male	Female
48	8%	7%	8%	6%
49	8%	7%	8%	6%
50	8%	7%	8%	6%
51	8%	7%	8%	6%
52	8%	7%	8%	6%
53	8%	7%	8%	6%
54	8%	7%	8%	6%
55	8%	9%	8%	6%
56	8%	9%	8%	6%
57	8%	11%	8%	11%
58	8%	11%	8%	11%
59	17%	14%	8%	15%
60	17%	17%	13%	13%
61	24%	17%	13%	15%
62	24%	29%	28%	23%
63	27%	26%	25%	19%
64	27%	24%	25%	23%
65	54%	50%	47%	50%
66	54%	53%	47%	44%
67	54%	39%	47%	38%
68	54%	39%	47%	38%
69	54%	39%	47%	38%
70	54%	39%	47%	38%
71	54%	39%	47%	38%
72	54%	39%	47%	38%
73	54%	39%	47%	38%
74	54%	39%	47%	38%
75	100%	100%	100%	100%
Ref	2634	2635	2636	2637

These rates are based upon data presented in the 2010-2015 experience study and were first used in the 2017 valuation.

Probabilities of Reduced Retirement for Members

Retirement Ages	% of Active Participants Retiring with Reduced Benefits			
	Education		Support	
	Male	Female	Male	Female
50	1.5%	1.0%	0.5%	1.5%
51	1.5%	1.0%	1.0%	1.5%
52	1.5%	1.5%	1.5%	2.0%
53	1.5%	2.0%	2.0%	2.0%
54	2.0%	2.0%	2.5%	2.0%
55	2.5%	2.5%	3.0%	2.0%
56	3.0%	2.5%	3.5%	2.0%
57	5.0%	2.5%	4.5%	2.5%
58	5.0%	2.5%	4.5%	2.5%
59	3.5%	2.5%	4.5%	2.5%
Ref	2640	2638	2641	2639

These are 50% of the rates presented in the 2010-2015 experience study and were first used in the 2017 valuation. These rates anticipate reduced election of early retirement due to the increase in the early retirement reduction from 5% to 10%.

Duration of T-DROP for Members

Present T-DROP members are assumed to remain in T-DROP according to the following table:

Entry Age	Assumed Duration Years
50-56	7
57	6
58	5
59+	4

Teachers
Separations from Active Employment Before Age and Service Retirement & Individual Pay Increases

Sample Ages in 2019	Service	Death Men	Death Women	Disability Men	Disability Women	Other Men	Other Women
	0					17.80%	12.60%
	1					13.10%	11.10%
	2					12.10%	10.10%
	3					8.60%	8.70%
	4					5.70%	6.50%
25	5 & Up	0.06%	0.02%	0.03%	0.03%	4.50%	5.40%
30		0.06%	0.02%	0.03%	0.03%	3.60%	4.30%
35		0.07%	0.03%	0.03%	0.04%	2.70%	2.90%
40		0.08%	0.05%	0.05%	0.09%	2.00%	2.00%
45		0.12%	0.07%	0.16%	0.19%	1.60%	1.60%
50		0.19%	0.11%	0.40%	0.43%	1.30%	1.40%
55		0.32%	0.19%	0.86%	0.73%	1.10%	1.20%
60		0.56%	0.28%	1.15%	1.00%	0.90%	1.00%
65		0.97%	0.39%	1.15%	1.00%	0.70%	0.80%
Ref:		2633 x 0.94	2634 x 0.84	747 x 1	748 x 1	1029 1381	1030 1382

Percent of Active Members Separating within the Next Year

* *Applicable to calendar year 2019. Rates and life expectancies in future years are determined by the MP-2017 projection scale.*

Age	Merit & Seniority	Base (Economic)	Increase Next Year
20	5.00%	2.75%	7.75%
25	2.90%	2.75%	5.65%
30	2.40%	2.75%	5.15%
35	1.90%	2.75%	4.65%
40	1.40%	2.75%	4.15%
45	0.70%	2.75%	3.45%
50	0.30%	2.75%	3.05%
55	0.00%	2.75%	2.75%
60	0.00%	2.75%	2.75%
65	0.00%	2.75%	2.75%
Ref:	472		

Pay Increase Assumptions for an Individual Member

Support Employees
Separations From Active Employment Before Age and Service Retirement & Individual Pay Increases

Sample Ages in 2019	Service	Percent of Active Members Separating within the Next Year					
		Death		Disability		Other	
		Men	Women	Men	Women	Men	Women
	0					49.90%	47.50%
	1					30.10%	28.30%
	2					19.40%	19.10%
	3					15.30%	14.90%
	4					11.80%	12.10%
25	5 & Up	0.06%	0.02%	0.03%	0.02%	9.20%	9.70%
30		0.06%	0.02%	0.09%	0.04%	7.30%	6.90%
35		0.07%	0.03%	0.09%	0.05%	5.60%	5.00%
40		0.08%	0.05%	0.10%	0.07%	4.50%	4.40%
45		0.12%	0.07%	0.22%	0.16%	3.70%	4.00%
50		0.19%	0.11%	0.51%	0.34%	3.30%	3.60%
55		0.32%	0.19%	0.86%	0.59%	3.30%	3.30%
60		0.56%	0.28%	1.11%	0.76%	3.30%	2.80%
65		0.97%	0.39%	1.11%	0.80%	2.80%	2.10%
Ref:		2633 x 0.94	2634 x 0.84	749 x 1	750 x 1	1031 1383	1032 1384

* *Applicable to calendar year 2019. Rates and life expectancies in future years are determined by the MP-2017 projection scale.*

Age	Pay Increase Assumptions for an Individual Member		
	Merit & Seniority	Base (Economic)	Increase Next Year
20	5.00%	2.75%	7.75%
25	3.75%	2.75%	6.50%
30	2.60%	2.75%	5.35%
35	2.40%	2.75%	5.15%
40	2.10%	2.75%	4.85%
45	1.00%	2.75%	3.75%
50	0.50%	2.75%	3.25%
55	0.00%	2.75%	2.75%
60	0.00%	2.75%	2.75%
65	0.00%	2.75%	2.75%
Ref:	473		

Miscellaneous and Technical Assumptions
June 30, 2019

Marriage Assumption:	100% of males and 100% of females are assumed to be married for purposes of death-in-service benefits. Male spouses are assumed to be three years older than female spouses.
Pay Increase Timing:	Beginning of (Fiscal) year. This is equivalent to assuming that reported pays represent amounts paid to members during the year ended on the valuation date.
Decrement Timing:	Decrements are assumed to occur mid-year, with the exception of normal and early retirement, which are assumed to occur at the beginning of the year. This implies that people who worked the entire school year are reported as active members even if they retired at the end of the year.
Eligibility Testing:	Eligibility for benefits is determined based upon the age nearest birthday and the service nearest whole year on the date of the valuation.
Decrement Relativity:	Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.
Decrement Operation:	Disability does not operate during the first 5 years of service. Disability and turnover do not operate during retirement eligibility.
Normal Form of Benefit:	The assumed normal form of benefit is the straight life form.
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. The payroll used for this purpose is payroll for all active members plus payroll for members in the T-DROP and retirees who returned to work.
Liability Adjustments:	The liability calculations assume that the non-contributory and contributory multipliers for the first ten years of service are at the standard rate at the time the service is earned.
Data Adjustments:	Members whose dates of birth were not supplied were assumed to be 40 years old on the valuation date. Members whose salaries were not supplied and that entered the T-DROP were assumed to have the group average pay of those with salary data as of the valuation that entered the T-DROP.

SECTION H

GLOSSARY

Glossary

Accrued Service. The service credited under the plan which was rendered before the date of the actuarial valuation.

Accumulated Benefit Obligation. The actuarial present value of vested and non-vested benefits based on service to date and past and current salary levels.

Actuarial Accrued Liability. The difference between (i) the actuarial present value of future plan benefits, and (ii) the actuarial present value of future normal cost. Sometimes referred to as "accrued liability" or "past service liability."

Actuarial Assumptions. Estimates of future plan experience with respect to rates of mortality, disability, turnover, retirement, rate or rates of investment income and salary increases. Decrement assumptions (rates of mortality, disability, turnover and retirement) are generally based on past experience, often modified for projected changes in conditions. Economic assumptions (salary increases and investment income) consist of an underlying rate in an inflation-free environment plus a provision for a long-term average rate of inflation.

Actuarial Cost Method. A mathematical budgeting procedure for allocating the dollar amount of the "actuarial present value of future plan benefits" between the actuarial present value of future normal cost and the actuarial accrued liability. Sometimes referred to as the "actuarial funding method."

Actuarial Equivalent. A single amount or series of amounts of equal value to another single amount or series of amounts, computed on the basis of the rate(s) of interest and mortality tables used by the plan.

Actuarial Present Value. The amount of funds presently required to provide a payment or series of payments in the future. It is determined by discounting the future payments at a predetermined rate of interest, taking into account the probability of payment.

Actuarial Present Value of Credited Projected Benefits or Pension Benefit Obligation**.** The present value of future benefits based on service to date and the effect projected salary increases.

Actuary. A person who is trained in the applications of probability and compound interest to solve problems in business and finance that involve payment of money in the future, contingent upon the occurrence of future events. Most actuaries in the United States are Members of the American Academy of Actuaries. The Society of Actuaries is an international research, education and membership organization for actuaries in the life and health insurance, employee benefits, and pension fields. It administers a series of examinations leading initially to Associateship and the designation A.S.A. and ultimately to Fellowship with the designation F.S.A. The federal government certifies actuaries to practice under ERISA with the designation of E.A.

Amortization. Paying off an interest-bearing liability by means of periodic payments of interest and principal, as opposed to paying it off with a lump sum payment.

Glossary

Experience Gain (Loss). A measure of the difference between actual experience and that expected based upon a set of actuarial assumptions during the period between two actuarial valuation dates, in accordance with the actuarial cost method being used.

Normal Cost. The annual cost assigned, under the actuarial funding method, to current and subsequent plan years. Sometimes referred to as "current service cost." Any payment toward the unfunded actuarial accrued liability is not part of the normal cost.

Plan Termination Liability. The actuarial present value of future plan benefits based on the assumption that there will be no further accruals for future service and salary. The termination liability will generally be less than the liabilities computed on a "going concern" basis and is not normally determined in a routine actuarial valuation.

Reserve Account. An account used to indicate that funds have been set aside for a specific purpose and are not generally available for other uses.

Unfunded Actuarial Accrued Liability. The difference between the actuarial accrued liability and valuation assets. Sometimes referred to as "unfunded accrued liability."

Valuation Assets. The value of current plan assets recognized for valuation purposes. Generally based on book value plus a portion of unrealized appreciation or depreciation.

GRS Retirement Consulting

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December 13, 2019

Mr. Clint Rhoden
Executive Director
Arkansas Teacher Retirement System
1400 West Third
Little Rock, Arkansas 72201

Re: Report of June 30, 2019 Actuarial Valuation of Active and Inactive Members

Dear Mr. Rhoden

Enclosed are 15 copies of the report. If you need anything else, please call.

Sincerely,

Judith A. Kermans, EA, FCA, MAAA

JAK:rmn
Enclosures

One Towne Square | Suite 800 | Southfield, Michigan 48076-3723