October 26, 2017

Teachers' and State Employees' Retirement System
Principal Results of Actuarial Valuation
as of December 31, 2016

Board of Trustees Meeting
David Driscoll and Mike Ribble

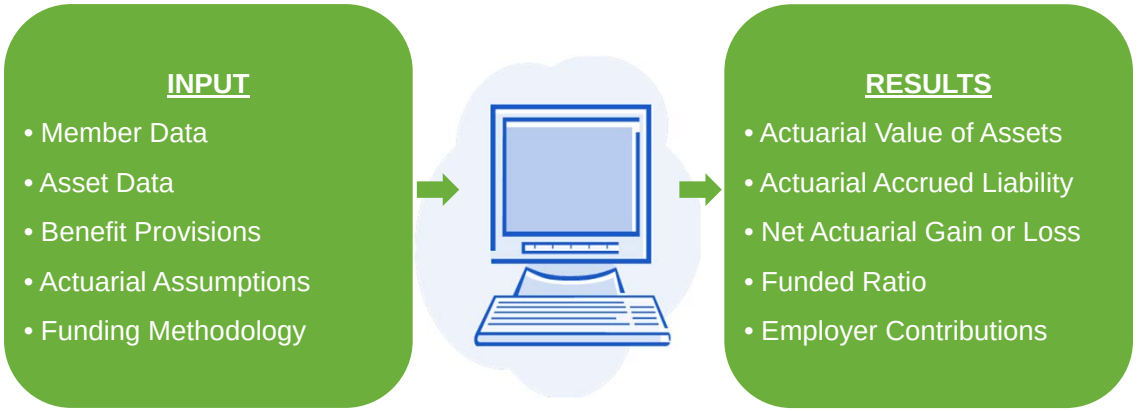
Conduent Human Resource Services

Purpose of the Annual Actuarial Valuation

- As of the end of each calendar year:
  - An annual actuarial valuation is performed on TSERS
  - The actuary determines the amount of employer contributions to be made to TSERS during each member's career that, when combined with investment return and member contributions, are expected to be sufficient to pay for retirement benefits.
- In addition, the annual actuarial valuation is performed to:
  - Determine the progress on funding TSERS
  - Explore why the results of the current valuation differ from the results of the valuation of the previous year
  - Satisfy regulatory and accounting requirements

The Valuation Process

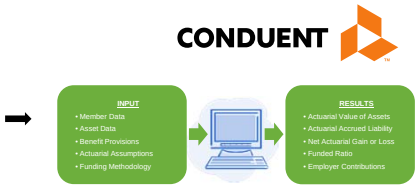
The following diagram summarizes the inputs and results of the actuarial valuation process.



A detailed summary of the valuation process and a glossary of actuarial terms are provided in Appendix A of the actuarial report.

Valuation Input

Membership Data



Number as of	12/31/2016	12/31/2015
Active members	305,013	305,291
Members currently receiving Disability Income Plan benefits	7,477	7,531
Terminated members and survivors of deceased members entitled to benefits but not yet receiving benefits	151,581	143,214
Retired members and survivors of deceased members currently receiving benefits	208,443	201,522
Total	672,514	657,558

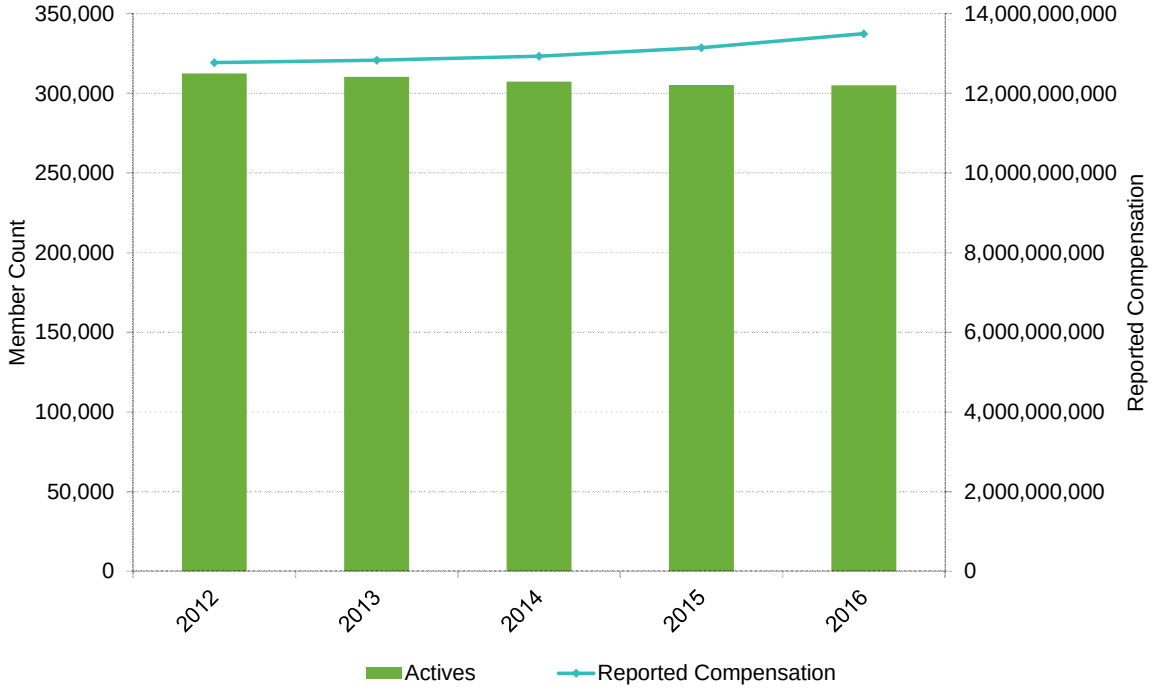
The number of active members decreased by 0.1% from the previous valuation date. The decrease in active members results in less benefits accruing, but also fewer contributions supporting the system.

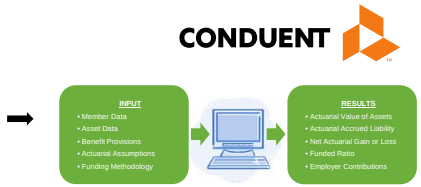
The number of retired members and survivors of deceased members currently receiving benefits increased by 3.4% from the previous valuation. The increase in retiree population is consistent with expectations.

A detailed summary of the membership data used in this valuation is provided in Section 3 and Appendix B of the actuarial report.

Valuation Input

Membership Data: Active Members





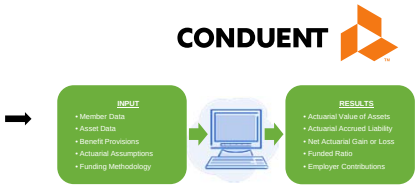
Reported compensation has increased by 2.7% and has slightly grown over the past five years. Covered payroll is expected to increase by approximately 3% annually in the future.

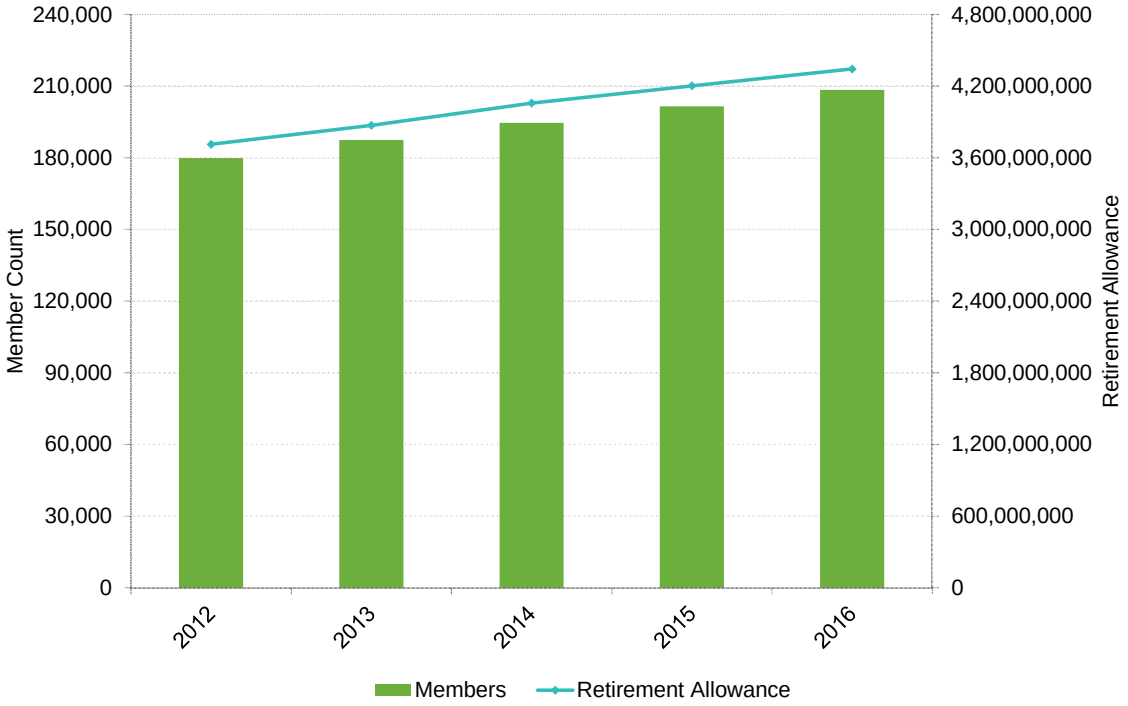
Payroll that is not increasing as fast as we assume results in less benefits accruing than we anticipate, but also fewer contributions supporting the system.

A detailed summary of the membership data used in this valuation is provided in Section 3 and Appendix B of the actuarial report.

Valuation Input

Membership Data: Retired Members and Survivors of Deceased Members



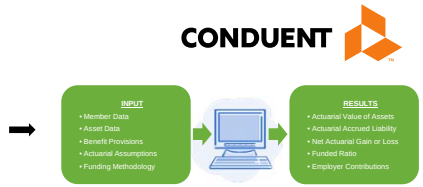


The number of retired members and survivors of deceased members and the benefits paid to these members has been increasing steadily, as expected based on plan assumptions.

A detailed summary of the membership data used in this valuation is provided in Section 3 and Appendix B of the actuarial report.

Valuation Input

Asset Data: Market Value of Assets



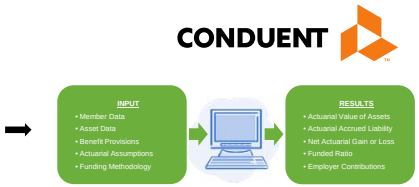
Asset Data as of	12/31/2016	12/31/2015
Beginning of Year Market Value of Assets	$ 62,669,341,716	$ 64,587,417,979
Contributions	2,237,806,330	2,124,259,141
Benefit Payments	(4,490,780,171)	(4,272,052,586)
Investment Income	3,830,155,739	229,717,182
Net Increase/(Decrease)	1,577,181,898	(1,918,076,263)
End of Year Market Value of Assets	$ 64,246,523,614	$ 62,669,341,716
Estimated Net Investment Return on Market Value	6.22%	0.36%

The Market Value of Assets is $64.2 billion as of December 31, 2016 and was $62.7 billion as of December 31, 2015. The investment return for the market value of assets for calendar year 2016 was 6.22%.

The market value of assets is provided in Section 4 of the actuarial report.

Valuation Input

Asset Data: Market Value of Assets and Asset Returns

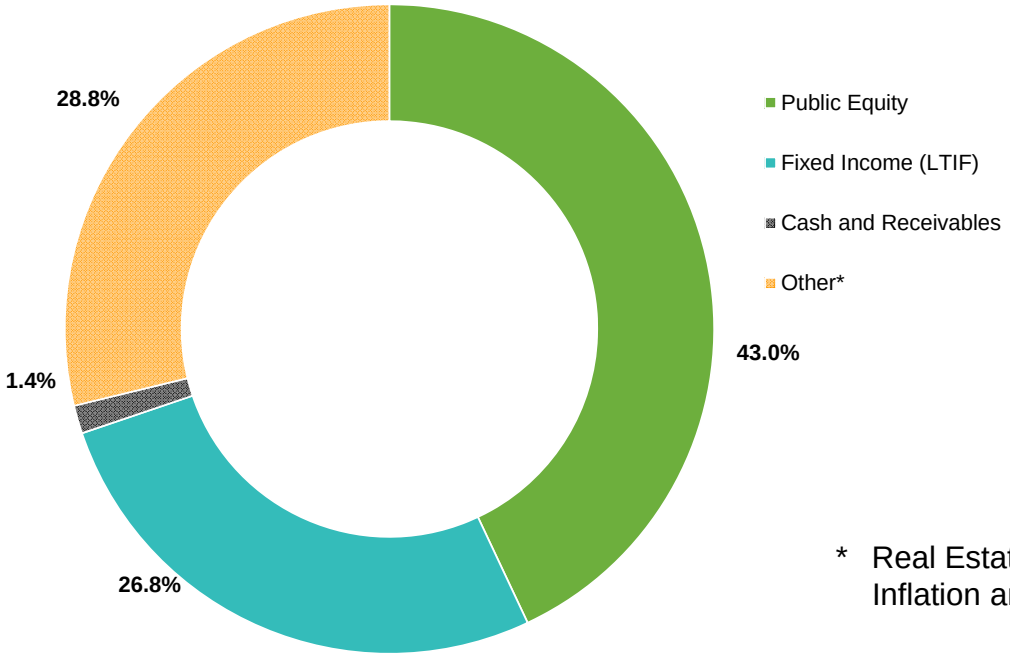


Returns were less than the 7.25% assumed rate of return (as of the prior valuation), resulting in a higher required contribution than anticipated as of the December 31, 2016 baseline projections presented in the December 31, 2015 actuarial report.

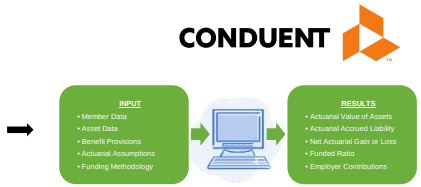
A detailed summary of the market value of assets is provided in Section 4 of the actuarial report.

Valuation Input

Asset Data: Allocation of Investments by Category



* Real Estate, Alternatives, Inflation and Credit

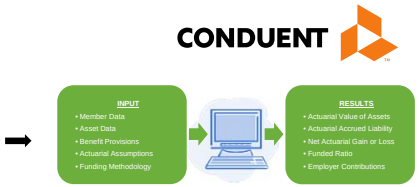


Based on historical market returns, the current asset allocation, the current investment policy, and the expectation of future asset returns, as reviewed in the last experience study, the 7.20% discount rate used in this valuation is reasonable and appropriate.

A detailed summary of the market value of assets is provided in Section 4 of the actuarial report.

Valuation Input

Benefit Provisions



Benefit provisions are described in North Carolina General Statues, Chapter 135.

The valuation reflects the following changes in benefit provisions from the prior year's valuation:

- 1.0% cost-of-living adjustment effective July 1, 2017 for retired members and survivors of deceased members receiving benefits as of July 1, 2016 (and a prorated increase for those who retired after July 1, 2016 but before June 30, 2017)
- Reclassification of probation/parole officers as law enforcement officers with respect to service rendered on or after July 1, 2017

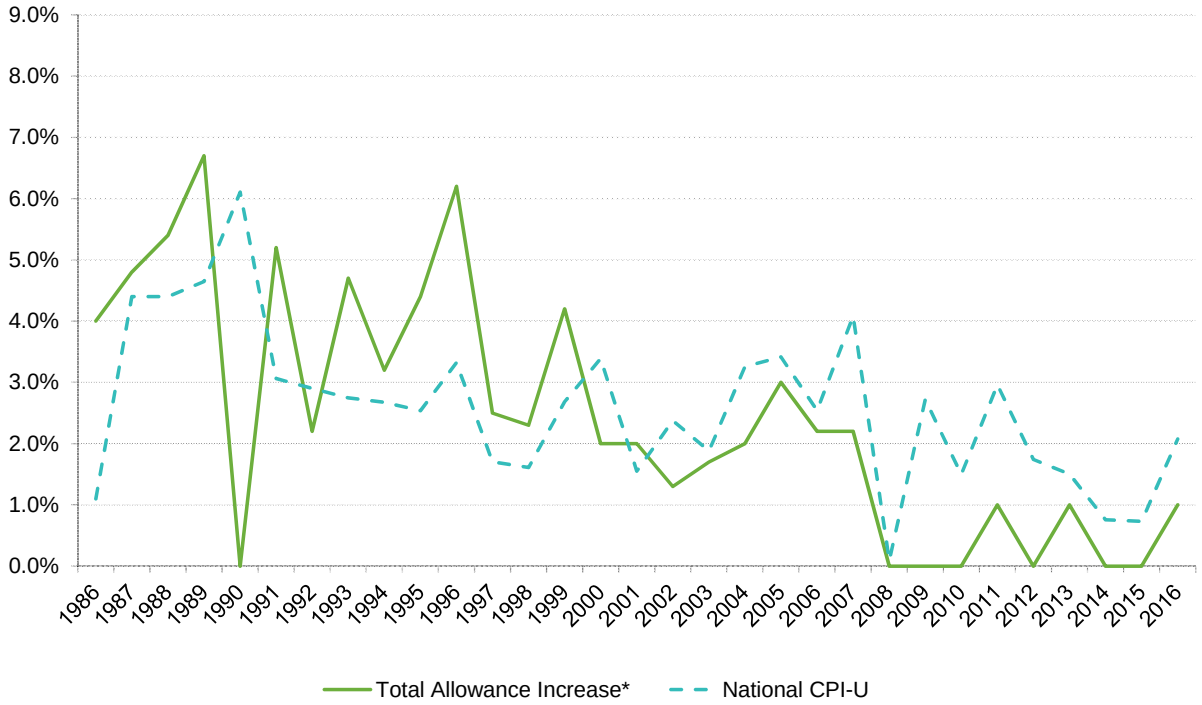
Many Public Sector Retirement Systems in the United States have undergone pension reform where the benefits of members (active or future members) have been reduced.

Because of the well-funded status of TSERS due to the legislature contributing the actuarially determined employer contribution, benefit cuts have not been needed in North Carolina as they have been in most other states. Instead, we have seen a modest expansion of benefits in recent years based on sound plan design. However, if North Carolina's investment policy shifts substantively, the system should review likely impacts of the shift and consider corresponding changes to actuarial assumptions, funding policy and/or benefit levels.

A detailed summary of the benefit provisions is provided in Appendix C of the actuarial report.

Valuation Input

Benefit Provisions: Cost-of-Living Allowance Increase and CPI-U History



Generally the ad-hoc retirement allowance increase policy has helped retirees maintain purchasing power while helping to moderate contribution increases during times of down markets.

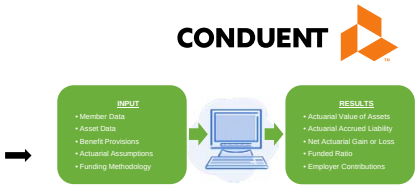
N.C.G.S 135-5 appears to allow for the possibility of a COLA tied to the Consumer Price Index when "the additional liabilities on account of such increase do not require an increase in the total rate of employer contributions." A careful reading of the report appears to preclude that condition from being met. The statute also appears to provide that the General Assembly must approve COLA increases.

*Allowance increases are effective July 1 of the following year.

A detailed summary of the benefit provisions is provided in Appendix C of the actuarial report.

Valuation Input

Actuarial Assumptions



- Demographic (future events that relate to people)
  - Retirement
  - Termination
  - Disability
  - Death
- Economic (future events that relate to money)
  - Interest rate – 7.20% per year
  - Salary increase (individual, varies by service)
  - Inflation – 3.00%
  - Real wage growth – 0.50%
- The interest rate was decreased from 7.25% to 7.20% as adopted by the Board of Trustees on April 20, 2017

The assumptions used for the December 31, 2016 actuarial valuation are based on the experience study prepared as of December 31, 2014 and adopted by the Board of Trustees on January 21, 2016, and an interest rate of 7.20% as adopted by the Board of Trustees on April 20, 2017.

A detailed summary of the actuarial assumptions and methods is provided in Appendix D of the actuarial report.

Valuation Input

Funding Methodology

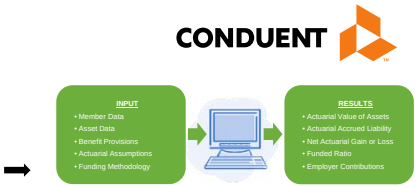
The Funding Methodology is the payment plan for TSERS and is composed of the following three components:

- Actuarial Cost Methods allocate costs to the actuarial accrued liability (i.e. the amount of money that should be in the fund) for past service and normal cost (i.e. the cost of benefits accruing during the year) for current service.
  - The Board of Trustees has adopted Entry Age Normal as its actuarial cost method
  - Develops normal costs that stay level as a percent of payroll
- Asset Valuation Methods smooth or average the market value returns over time to alleviate contribution volatility that results from market returns.
  - Asset returns in excess of or less than the expected return on market value of assets reflected over a five-year period
  - Assets corridor: not greater than 120% of market value and not less than 80% of market value

A detailed summary of the actuarial assumptions and methods is provided in Appendix D of the actuarial report.

Valuation Input

Funding Methodology (continued)



- Amortization Methods determine the payment schedule for unfunded actuarial accrued liability (i.e. the difference between the actuarial accrued liability and actuarial value of assets)
  - Payment level: the payment is determined as a level dollar amount, similar to a mortgage payment
  - Payment period: a 12-year closed amortization period was adopted for fiscal year ending 2012. A new amortization base is created each year based on the prior years' experience.

When compared to other Public Sector Retirement Systems in the United States, the funding policy for TSERS is quite aggressive in that the policy pays down the pension debt over a much shorter period of time (12 years) compared to the national average of around 24 years. As such it is a best practice in the industry.

A detailed summary of the actuarial assumptions and methods is provided in Appendix D of the actuarial report.

Valuation Results

Actuarial Value of Assets

Asset Data as of	12/31/2016
Beginning of Year Market Value of Assets	$ 62,669,341,716
Contributions	2,237,806,330
Benefit Payments	(4,490,780,171)
Net Cash Flow	(2,252,973,841)
Expected Investment Return	4,461,856,973
Expected End of Year Market Value of Assets	64,878,224,848
End of Year Market Value of Assets	64,246,523,614
Excess of Market Value over Expected Market Value of Assets	(631,701,234)
80% of 2016 Asset Gain/(Loss)	(505,360,987)
60% of 2015 Asset Gain/(Loss)	(2,625,007,865)
40% of 2014 Asset Gain/(Loss)	N/A
20% of 2013 Asset Gain/(Loss)	N/A
Total Deferred Asset Gain/(Loss)	(3,130,368,852)
Preliminary End of Year Actuarial Value of Assets	67,376,892,466
Final End of Year Actuarial Value of Assets (not less than 80% and not greater than 120% of Market Value)	67,376,892,466
Estimated Net Investment Return on Actuarial Value	5.32%

CONDUENT

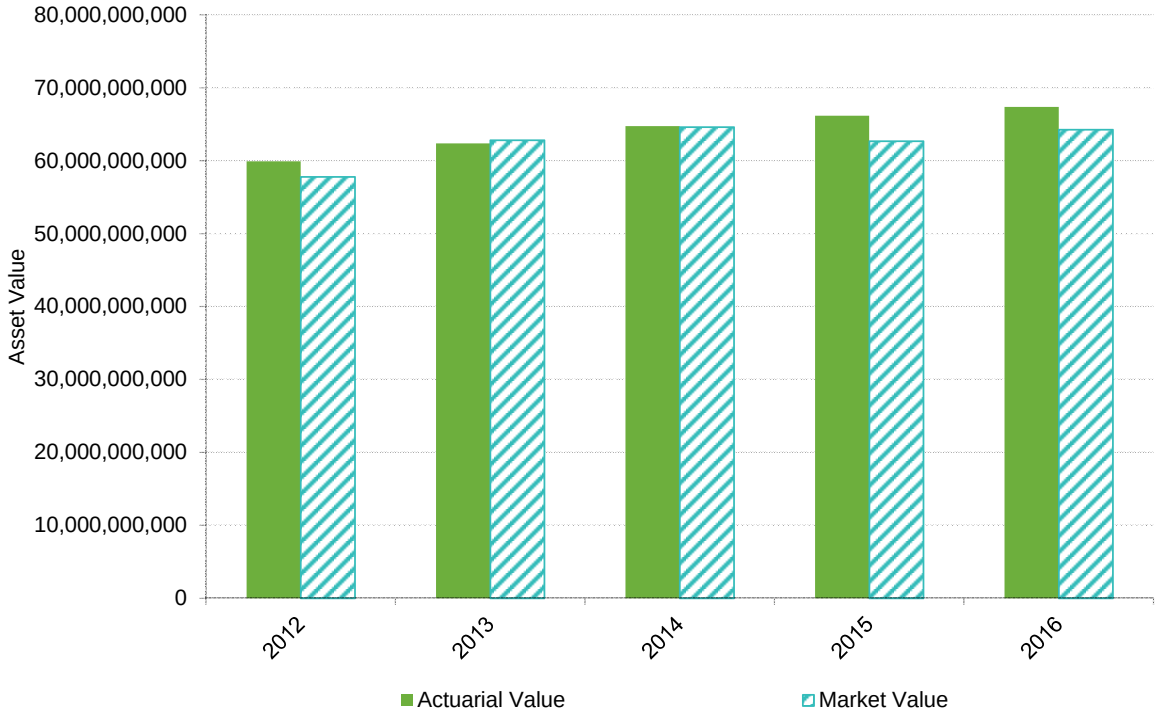
The actuarial value of assets smooths investment gains/ losses, resulting in less volatility in the employer contribution.

Lower than expected returns in 2015 and 2016 resulted in an actuarial value of asset return for calendar year 2016 of 5.32% and a recognized actuarial asset loss of $1.3 billion during 2016.

The actuarial value of assets is provided in Section 4 of the actuarial report.

Valuation Results

Actuarial Value of Assets: Compared to Market Value



The market value of assets is lower than the actuarial value of assets, which is used to determine employer contributions. This indicates that there are unrecognized asset losses to be recognized in future valuations.

A detailed summary of the actuarial value of assets is provided in Section 4 of the actuarial report.

Valuation Results

Historical Asset Returns

Calendar Year	Actuarial Value of Asset Return	Market Value of Asset Return
2006	8.94%	11.41%
2007	8.87%	8.38%
2008	2.89%	-19.50%
2009	4.74%	14.84%
2010	5.89%	11.47%
2011	5.15%	2.19%
2012	6.32%	11.82%
2013	7.43%	12.21%
2014	7.19%	6.21%
2015	5.87%	0.36%
2016	5.32%	6.22%
Average	6.22%	5.52%
Range	6.05%	34.34%

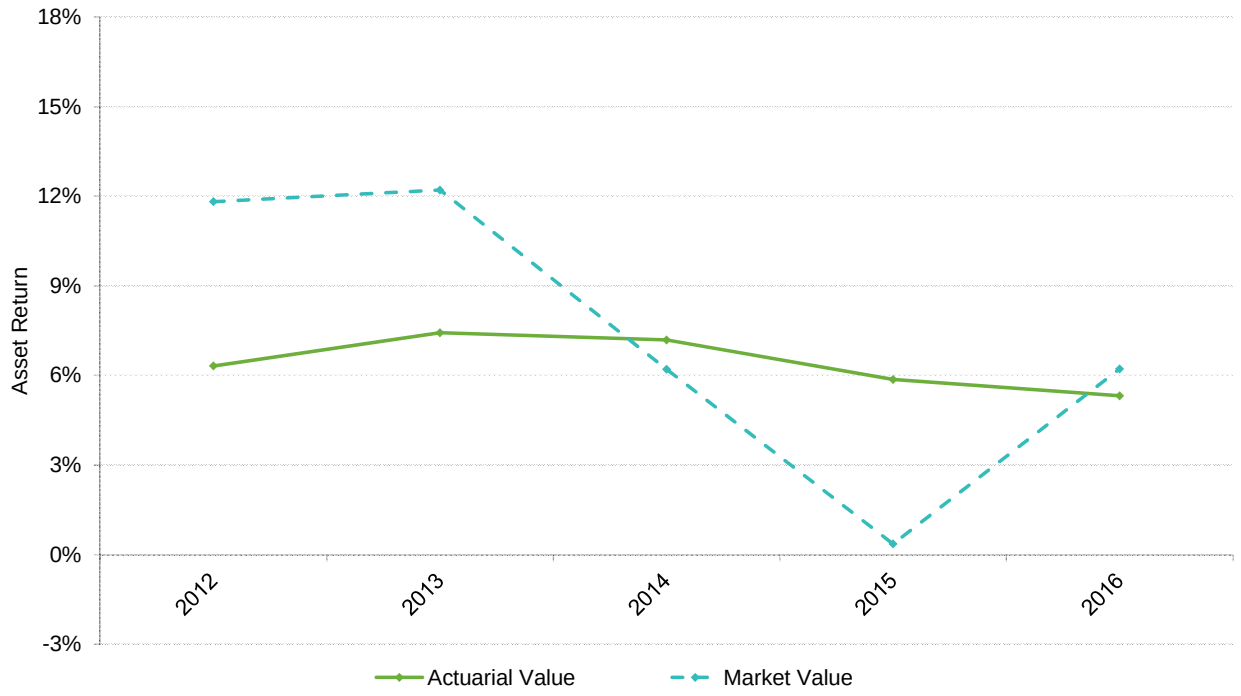
The average investment return recognized for purposes of determining the annual change in contribution each year is the actuarial value of assets return.

Currently, the average actuarial return of 6.22% tracks average market return of 5.52% relatively well. But the range of returns is markedly less – 6.05% versus 34.34%. This results in much lower employer contribution volatility using the actuarial value of assets versus market, while ensuring that the actuarial needs of TSERS are met.

The valuation assumes that the funds will earn a 7.20% asset return. This table provides a history of the actuarial value and market value of asset returns.

Valuation Results

Asset Returns: Actuarial Value and Market Value

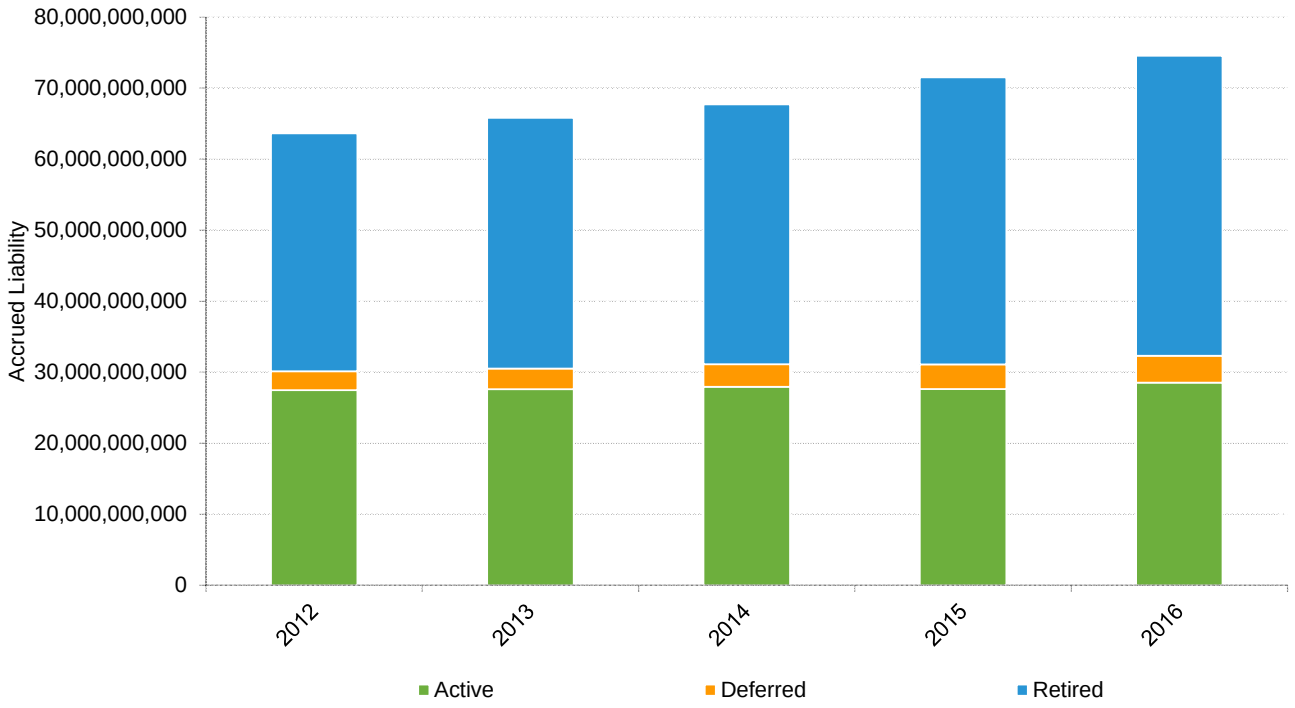


The actuarial value of assets smooths investment gains/losses, resulting in less volatility in the employer contribution.

A detailed summary of the actuarial value of assets is provided in Section 4 of the actuarial report.

Valuation Results

Actuarial Accrued Liability (AAL)



The AAL increased from $71.5 billion to $74.5 billion during 2016. TSERS is an open plan, which means that new members enter the plan each year. In an open plan, liabilities are expected to grow from one year to next as more benefits accrue and the membership approaches retirement.

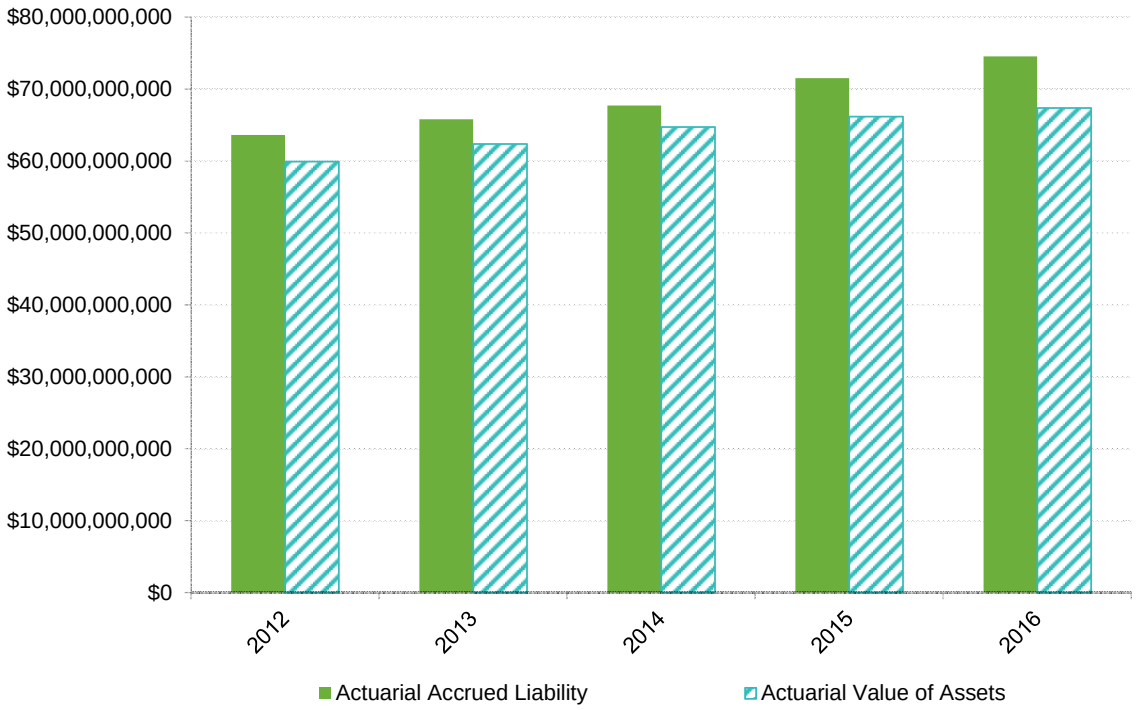
The AAL prior to assumption and legislative changes was $147 million higher than expected, which resulted in a demographic loss of $147 million during 2016.

Assumption changes increased the AAL by $377 million. Legislative changes increased the AAL by $433 million.

A detailed summary of the AAL is provided in Section 5 of the actuarial report.

Valuation Results

Actuarial Accrued Liability (AAL) and Actuarial Value of Assets (AVA)



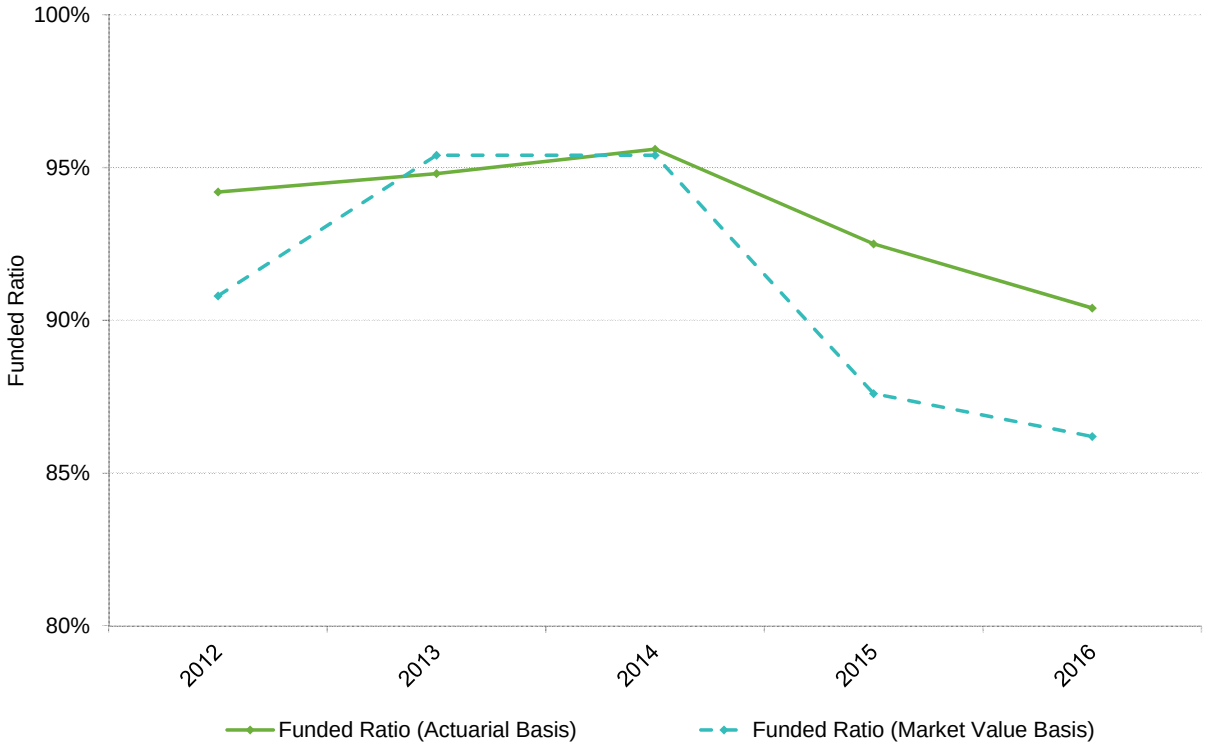
The AVA basis is used for computing contributions to alleviate contribution volatility.

The difference in the AAL and the AVA is the amount of pension debt to be paid off in 12 years.

A detailed summary of the AVA is provided in Section 4 of the actuarial report, and a detailed summary of the AAL is provided in Section 5 of the actuarial report.

Valuation Results

Funded Ratio: AAL Divided by AVA



The ratio of assets to liabilities shows the health of the plan on an accrued basis.

The funded ratio on an actuarial basis decreased from 92.5% at December 31, 2015 to 90.4% at December 31, 2016.

Valuation Results

Net Actuarial Gain or Loss: Reconciliation of Unfunded Actuarial Accrued Liability

(in millions)	
Unfunded Actuarial Accrued Liability (UAAL) as of 12/31/2015	$ 5,353
Normal Cost during 2016	1,433
Reduction due to Actual Contributions during 2016	(2,238)
Interest on UAAL, Normal Cost, and Contributions	411
Asset (Gain)/Loss	1,255
Actuarial Accrued Liability (Gain)/Loss	147
Impact of Assumption Changes	377
Impact of Legislative Changes	433
Unfunded Actuarial Accrued Liability (UAAL) as of 12/31/2016	$ 7,171

During 2016, the UAAL increased faster than expected primarily due to asset losses.

The asset loss of $1,255 million means that the asset valuation method resulted in a recognition of $1,255 million of asset losses from 2016.

The change in interest rate from 7.25% to 7.20% from the prior valuation increased the unfunded actuarial accrued liability (UAAL), or pension debt, by $377 million.

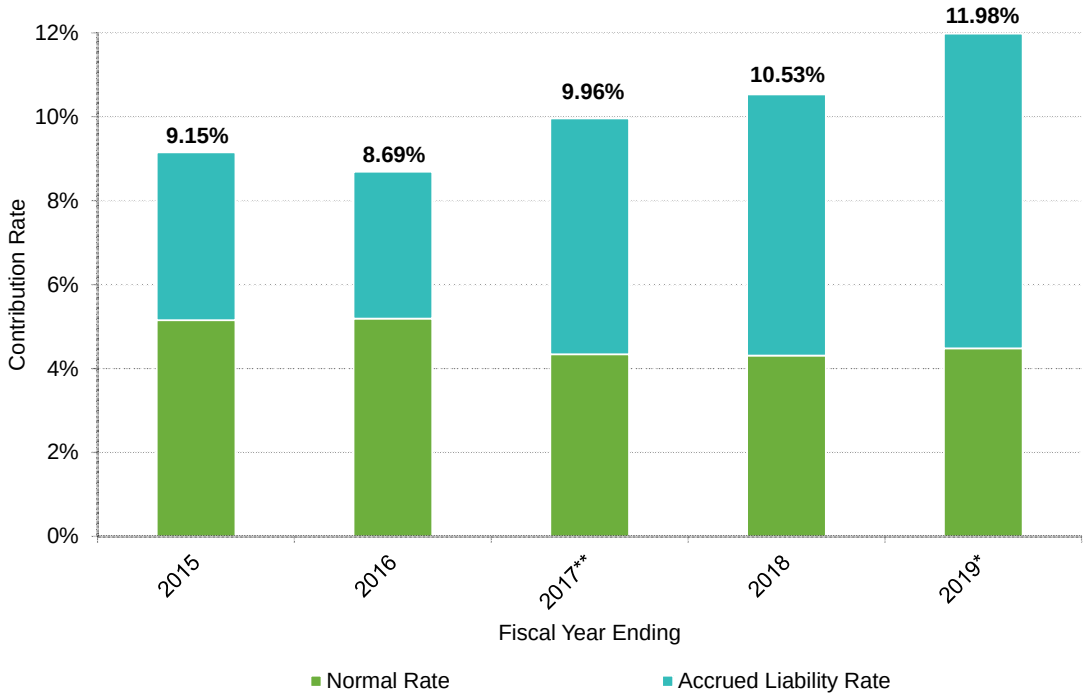
Changes in plan provisions increased the UAAL by $433 million.

The accrued liability loss of $147 million means that the actuarial accrued liability was $147 million higher than we would have expected based on the current assumptions.

The net actuarial gain/(loss) is provided in Section 5 of the actuarial report.

Valuation Results

Actuarially Determined Employer Contributions



The actuarially determined employer contribution rate is the amount needed to pay for the cost of the benefits accruing and to pay off the pension debt over 12 years, offset for the 6% of pay contribution the members make.

The 12-year period is a short period for Public Sector Retirement Systems in the United States, with most Systems using a period of 25 years or more to pay off the pension debt. The shorter period results in higher contributions and more benefit security.

* Subject to the impact of future legislative changes effective during that fiscal year.
** Includes impact of the experience study.

A detailed summary of the actuarially determined employer contribution rates is provided in Section 6 of the actuarial report.

Valuation Results

Employer Contribution Rate Stabilization Policy (ECRSP)

The ECRSP was adopted by the Board of Trustees on January 21, 2016.

- The ECRSP sets recommended employer contributions equal to 0.35% of payroll greater than the appropriated contribution during the prior year, with the following bounds:
  - Contributions may not be less than the actuarially determined employer contribution (ADEC); and
  - Contributions may not be greater than the contribution determined using the same assumptions used to calculate the ADEC but using a discount rate equal to the long-term Treasury bond yield
- The preliminary ADEC for fiscal year ending 2019 is 11.98% based on this valuation.
- The ECRSP would result in a recommended contribution rate of 11.98% of payroll for fiscal year ending 2019
  - 11.98% is the actuarially determined employer contribution calculated in this most recent valuation.
  - The minimum is 11.13% -- the appropriated contribution from last year of 10.78% (based on last year's final rate of 10.33% plus 0.45% for two legislative changes) plus 0.35%.
  - The maximum is approximately 64.12% -- the estimated actuarially determined employer contribution using a discount rate equal to the long-term Treasury bond yield (3.06%).

Valuation Results

Actuarially Determined Employer Contribution (ADEC) Rates

Valuation Date	Fiscal Year Ending	Normal Rate	Accrued Liability Rate	Change due to Legislation*	Final ADEC	Appropriated Rate
12/31/2016	6/30/2019	4.48%	7.50%	N/A	N/A	N/A
12/31/2015	6/30/2018	4.31%	5.77%	0.45%	10.53%	10.78%
12/31/2014	6/30/2017	5.21%	3.26%	1.49%	9.96%	9.98%
12/31/2013	6/30/2016	5.19%	3.50%	0.00%	8.69%	9.15%
12/31/2012	6/30/2015	5.15%	3.61%	0.39%	9.15%	9.15%

*The change due to legislation for the contribution for fiscal year ending 6/30/2018 includes a 0.43% increase in the ADEC due to the 1% COLA effective July 1, 2017 and a 0.02% increase in the ADEC due to the reclassification of probation/parole officers as law enforcement officers with respect to service rendered on or after July 1, 2017.

The appropriated rate for fiscal year ending 2018 is 10.78% of payroll. The preliminary ADEC for fiscal year ending 2019 is 11.98% of payroll.

Each 1% COLA is equivalent to 0.43% of payroll and each 0.01% increase in benefit rate is equal to 0.44% of payroll.

The actuarially determined employer contribution rates are provided in Section 6 of the actuarial report.

Valuation Results

Reconciliation of the Change in Actuarially Determined Employer Contribution

Fiscal year ending June 30, 2018 Preliminary ADEC (based on December 31, 2015 valuation)	10.08%
Impact of Legislative Changes*	0.45%
Fiscal year ending June 30, 2018 Final ADEC	10.53%
Change Due to Anticipated Reduction in UAAL	(0.31%)
Change Due to Demographic (Gain)/Loss	0.14%
Change Due to Investment (Gain)/Loss	1.19%
Change Due to Contributions Greater than ADEC	(0.03%)
Impact of Assumption Changes	0.46%
Fiscal year ending June 30, 2019 Preliminary ADEC (based on December 31, 2016 valuation)	11.98%

Investment loss is a recognition of asset losses from 2015 and 2016.

*The change due to legislative changes includes a 0.43% increase in the ADEC due to the 1% COLA effective July 1, 2017 and a 0.02% increase in the ADEC due to the reclassification of probation/parole officers as law enforcement officers with respect to service rendered on or after July 1, 2017.

A detailed summary of the actuarially determined employer contribution rates is provided in Section 6 of the actuarial report.

Valuation Results

Potential Cost-of-Living Adjustments

- Based on the actuarial losses recognized in this December 31, 2016, valuation, no Cost-of-Living Adjustment (COLA) effective July 1, 2018, could be funded by actuarial gains.
- Based on the methods and assumptions used for the projections discussed on Slide 30, we *estimate* that a potential COLA effective July 1, 2019, *may* be funded by actuarial *investment* gains following the December 31, 2017, valuation in the following circumstances:
  - If calendar year 2017 market value returns exceed 16.9% (or about $10.7B for TSERS), the plan is estimated to have an actuarial *investment* gain (rather than a loss) for 2017 and a COLA that would take effect on July 1, 2019, could be considered.
  - If calendar year 2017 market value returns exceed 20.7% (or about $13.1B for TSERS), the plan is estimated to have an actuarial *investment* gain (rather than a loss) for 2017 and such gain may be enough to consider providing a 1% COLA that would take effect on July 1, 2019.
    - Estimated actuarial investment gain of $481.2M
    - Estimated cost of 1% COLA payable to retirees effective July 1, 2019 of $481.2M
  - Estimates above assume no other offsetting actuarial losses in the December 31, 2017, valuation

Note: Conduent cannot provide legal advice. This slide should not be interpreted as legal advice as to the Board's ability to provide a COLA to retirees or recommend a COLA to the legislature.

Valuation Results

Additional Disclosures

Section 6(c) of Session Law 2016-108 requires that the actuarial valuation report provide the valuation results using a 30-year treasury rate as of December 31 of the year of the valuation as the discount rate.

- The 30-year treasury rate is 3.06% at December 31, 2016.

Discount Rate	3.06%	5.13%	7.20%	9.27%	11.34%
Market Value of Assets	$ 64,246,523,614	$ 64,246,523,614	$ 64,246,523,614	$ 64,246,523,614	$ 64,246,523,614
Actuarial Accrued Liability	$ 121,829,863,701	$ 93,571,487,855	$ 74,547,855,025	$ 61,310,054,606	$ 51,807,683,780
Unfunded Accrued Liability (UAL)	$ 57,583,340,087	$ 29,324,964,241	$ 10,301,331,411	$ (2,936,469,008)	$ (12,438,839,834)
Funded Ratio	52.7%	68.7%	86.2%	104.8%	124.0%
20-Year Amortization of UAL	$ 4,011,097,242	$ 2,501,156,482	$ 1,058,633,024	N/A	N/A
(as % of general state revenue)	13.8%	8.6%	3.6%	N/A	N/A

The table above illustrates the sensitivity of certain valuation results to changes in the discount rate on a market value of assets basis.

The difference between the UAL measured at 7.20% and 3.06% is $47.3 billion at December 31, 2016.

A detailed summary of the additional disclosures is provided in Appendix F of the actuarial report.

Valuation Results

Additional Disclosures

The table below provides an estimate of future market value of asset returns based on the current portfolio structure and summarized in our "TSERS Asset-Liability and Investment Strategy Project" report dated April 19th, 2016. The table shows the statistical likelihood of minimum future asset returns as of 12/31/2015 (i.e., the probability that annualized rates of return over each time horizon will be greater than or equal to the rates shown in the table).

Horizon	95% Chance (19 out of every 20 scenarios)	75% Chance (3 out of every 4 scenarios)	50% Chance (1 out of every 2 scenarios)	25% Chance (1 out of every 4 scenarios)	5% Chance (1 out of every 20 scenarios)
10 Years (2025)	0.2%	4.0%	5.9%	8.0%	11.5%
20 Years (2035)	2.2%	4.8%	6.7%	8.5%	11.8%
30 Years (2045)	3.1%	5.3%	7.1%	8.7%	12.0%

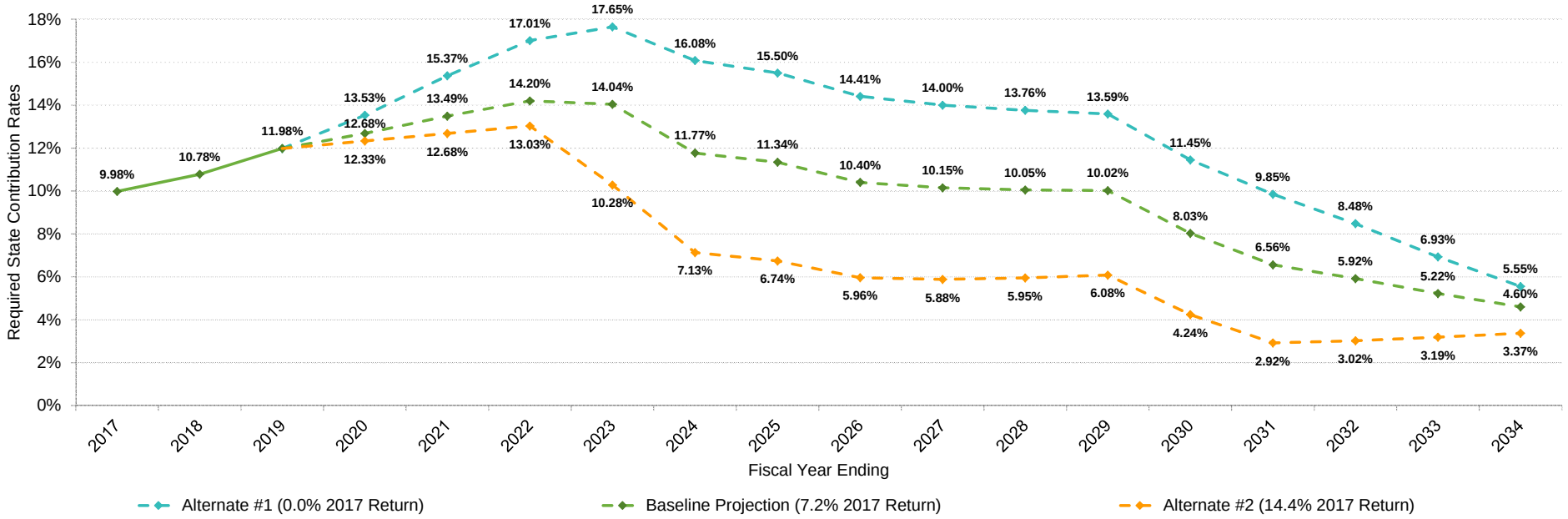
The lower bound of 3.06% falls slightly below the 5th percentile of estimated future 30-year returns. In other words, there is less than a 5% chance of seeing a 30-year return of 3.06% or lower based on the current portfolio structure.

A detailed summary of the additional disclosures is provided in Appendix F of the actuarial report.

Projections: Actuarially Determined Employer Contribution Rate and Funded Status

- Projections of actuarially determined employer contribution (ADEC) rates and funded status into the future can be helpful planning tools for stakeholders.
- Projections of the actuarial valuation are known as deterministic projections. Deterministic projections are based on one scenario in the future.
- Baseline deterministic projection is based on:
  - December 31, 2016 valuation results
  - December 31, 2016 valuation assumptions and methods to project future valuation results, including:
    - Valuation interest rate of 7.20% for all years
    - Investment return of 7.20% on market value of assets
  - The contribution rate under the Employer Contribution Rate Stabilization Policy is contributed until fiscal year ending 2022.
  - The ADEC is contributed for fiscal years ending 2023 and beyond.
  - 0% increase in total active member population
  - No cost-of-living adjustments granted
  - Future pay increases based on long-term salary increase assumptions
- Two alternate deterministic projections based on the same assumptions as the baseline deterministic projection, except
  - First alternate deterministic projection assumes a 0.0% asset return for calendar year 2017.
  - Second alternate deterministic projection assumes a 14.4% asset return for calendar year 2017.

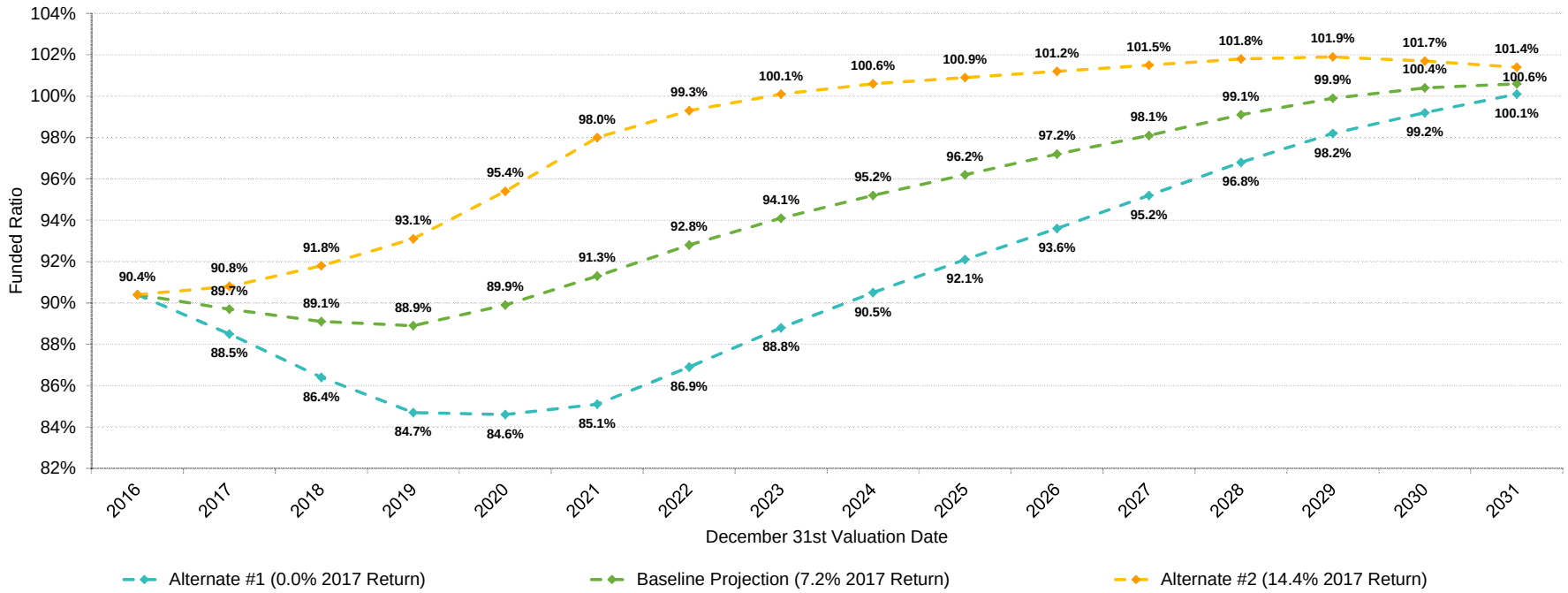
Projections: Projected Actuarially Determined Contribution Rates



The actuarially determined employer contribution rate trends to around 5%, which is the level of the cost of benefits accrued, or the long term employer cost of TSERS when there is no pension debt.

A detailed summary of the deterministic projections is provided in Section 9 of the actuarial report.

Projections: Projected Funded Ratio



Note that if the 7.20% return under the Baseline Projection is achieved, the funded ratio reaches the long term target of 100% within 15 years. This is a direct result of using a 12 year period to pay off the pension debt.

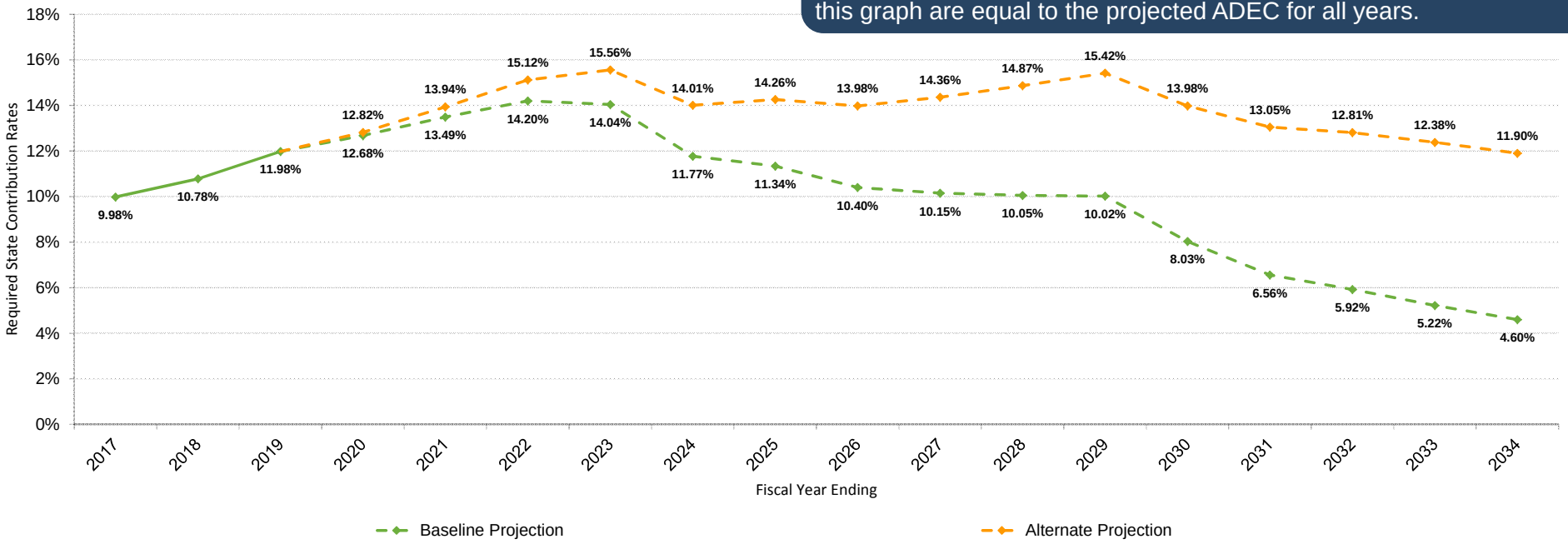
A detailed summary of the deterministic projections is provided in Section 9 of the actuarial report.

Projections: Actuarially Determined Employer Contribution Rate and Funded Status

- Projections of actuarially determined employer contribution (ADEC) rates and funded status into the future can be helpful planning tools for stakeholders.
- Projections of the actuarial valuation are known as deterministic projections. Deterministic projections are based on one scenario in the future.
- Baseline deterministic projection is based on:
  - December 31, 2016 valuation results
  - December 31, 2016 valuation assumptions and methods to project future valuation results, including:
    - Valuation interest rate of 7.20% for all years
    - Investment return of 7.20% on market value of assets
  - The contribution rate under the Employer Contribution Rate Stabilization Policy is contributed until fiscal year ending 2022.
  - The ADEC is contributed for fiscal years ending 2023 and beyond.
  - 0% increase in total active member population
  - No cost-of-living adjustments granted
  - Future pay increases based on long-term salary increase assumptions
- Alternate deterministic projection based on the same assumptions as the baseline deterministic projection, except
  - Assumes a 6.00% investment return on market value of assets for all calendar years starting in 2017

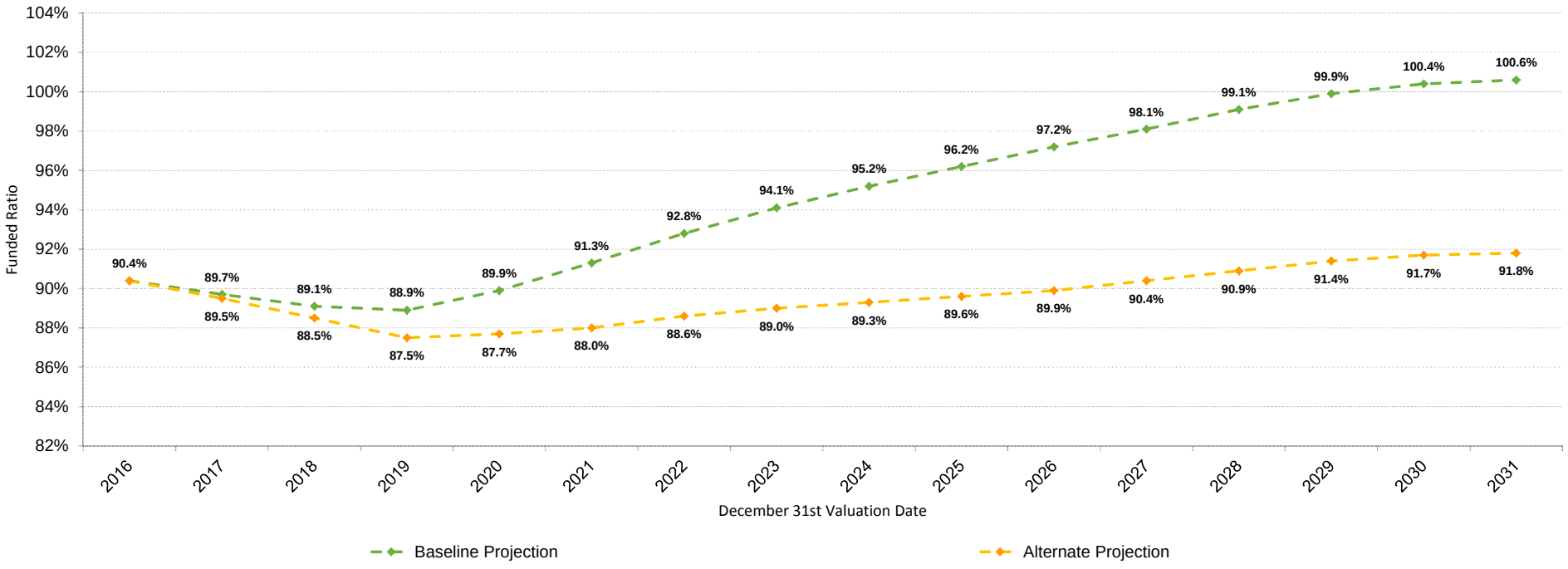
Projected Actuarially Determined Employer Contribution Rates

Under both projection scenarios, the ADEC is projected to be greater than the prior year's appropriation plus 0.35% for all years through fiscal year ending 2022; therefore, the projected employer contribution rates shown on this graph are equal to the projected ADEC for all years.



Alternate Projection assumes 6.00% asset returns every year starting in 2017 compared to the 7.20% assumption in the Baseline Projection. As a result, the unfunded accrued liability will be higher resulting in higher projected contributions.

Projected Funded Ratio



Alternate Projection assumes 6.00% asset returns every year starting in 2017 compared to the 7.20% assumption in the Baseline Projection. As a result, the unfunded accrued liability will be higher resulting in a lower projected funded ratio.

Key Takeaways

Key results of the December 31, 2016 valuation were:

- Market value returns of 6.22% compared to 7.25% assumed
- Increase in covered payroll of 2.7% compared to approximately 3% expected
- Recent legislation signed into law since the prior valuation
  - 1.0% cost-of-living adjustment effective July 1, 2017 for retired members and survivors of deceased members receiving benefits as of July 1, 2016 (and a prorated increase for those who retired after July 1, 2016 but before June 30, 2017)
  - Reclassification of probation/parole officers as law enforcement officers with respect to service rendered on or after July 1, 2017
- Change in discount rate from 7.25% to 7.20% as of December 31, 2016

Key Takeaways (continued)

When compared to the December 31, 2015 baseline projections, the above resulted in:

- A lower funded ratio as of December 31, 2016 (90.4% in the valuation compared to 91.8% in the baseline projection)
- A higher actuarially determined employer contribution rate for fiscal year ending June 30, 2019 (11.98% in the valuation compared to 10.79% in the baseline projection)
- Lower projected benefit amounts being accrued by active members

Key Takeaways (continued)

TSERS is well funded compared to its peers. This is due to:

- Stakeholders working together to keep TSERS well-funded since inception
- A history of appropriating and contributing the recommended contribution requirements
- Assumptions that in aggregate are more conservative than peers
- A funding policy that aggressively pays down unfunded liability over a 12-year period
- An ad hoc cost-of-living adjustment, which typically only provides benefit increases when certain financial conditions are met, supports the health of the system
- Modest changes in benefits when compared to peers

As has been done over the past 75 years, continued focus on these measures will be needed to maintain the sustainability of TSERS well into the future.

Certification

The assumptions, methods, and plan provisions used in the results presented in this presentation were provided in October 2017 in the “Report on the Seventy-Fourth Annual Valuation of the Teachers’ and State Employees’ Retirement System of North Carolina prepared as of December 31, 2016.”

The results were prepared under the direction of Michael Ribble and David Driscoll who meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein. These results have been prepared in accordance with all applicable Actuarial Standards of Practice, and we are available to answer questions about them.

Future actuarial measurements may differ significantly from current measurements due to plan experience differing from that anticipated by the economic and 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.

Michael A. Ribble, FSA, EA, MAAA
Principal, Consulting Actuary

David Driscoll, FSA, EA, MAAA, FCA
Principal, Consulting Actuary

Conduent Human Resource Service
Retirement Services

CONDUENT

Teachers' and State Employees' Retirement System of North Carolina

Report on the Seventy-Fourth Annual Valuation

Prepared as of December 31, 2016

October 2017

Document Version: 1.0 (November 2016).

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Dallas, TX 75254

P: 972.366.2011

October 12, 2017

Board of Trustees
Teachers' and State Employees'
Retirement System of North Carolina
3200 Atlantic Avenue
Raleigh, NC 27604

Members of the Board:

We submit herewith our report on the seventy-fourth annual valuation of the Teachers' and State Employees' Retirement System of North Carolina (referred to as “TSERS” or the “State Plan”) prepared as of December 31, 2016. The report has been prepared in accordance with North Carolina General Statute 135-6(o).

The primary purpose of the valuation report is to determine the required member and employer contribution rates, to describe the current financial condition of TSERS, and to analyze changes in such condition. In addition, the report provides information that the Office of the State Controller (OSC) requires for its Comprehensive Annual Financial Report (CAFR) and it summarizes census data. Use of this report for any other purposes or by anyone other than OSC and its auditors, or North Carolina Retirement System Division and Department of State Treasurer Staff may not be appropriate and may result in mistaken conclusions because of failure to understand applicable assumptions, methods, or inapplicability of the report for that purpose. The attached pages should not be provided without a copy of this cover letter. Because of the risk of misinterpretation of actuarial results, you should ask Conduent to review any statement you wish to make on the results contained in this report. Conduent will not accept any liability for any such statement made without prior review.

The valuation is based upon membership data and financial information as furnished by the Retirement Systems Division and the Financial Operations Division and as summarized in this report. Although reviewed for reasonableness and consistency with the prior valuation, these elements have not been audited by Conduent and we cannot certify as to the accuracy and completeness of the data supplied. The valuation is also based on benefit and contribution provisions as presented in this report. If you have reason to believe that the plan provisions are incorrectly described, that important plan provisions relevant to this valuation are not described, or that conditions have changed since the calculations were made, you should contact the authors of this actuarial report prior to relying on this information.

The valuation is further based on the actuarial valuation assumptions, approved by the Board of Trustees, as presented in this report. We believe that these assumptions are appropriate and reasonable and also comply with the requirements of GASB Statement No. 67. We prepared this valuation in accordance with the requirements of this standard and in accordance with all applicable ASOPs.

The assumptions used for the December 31, 2016 actuarial valuation are based on the experience study prepared as of December 31, 2014 and adopted by the Board of Trustees on January 21, 2016, and a discount rate of 7.20% as adopted by the Board of Trustees on April 20, 2017. The economic assumptions with respect to investment yield, salary increase and inflation have been based upon a review of the existing portfolio structure as well as recent and anticipated experience.

Where presented, references to “funded ratio” and “unfunded accrued liability” typically are measured on an actuarial value of assets basis. It should be noted that the same measurements using market value of assets would result in different funded ratios and unfunded accrued liabilities. Moreover, the funded ratio presented is appropriate for evaluating the need and level of future contributions but makes no assessment regarding the funded status of the plan if the plan were to settle (i.e. purchase annuities) for a portion or all of its liabilities. In various places in the report the results also show funded ratios and unfunded liabilities based upon varying sets of assumptions as well as market values of assets as that is required for certain disclosure information required per accounting rules or statutes. Where this has been done it has been clearly indicated.

Future actuarial measurements may differ significantly from current measurements due to plan experience differing from that anticipated by the economic and 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. Because of limited scope, Conduent performed no analysis of the potential range of such future differences, except for some limited analysis in financial projections or required disclosure information.

I meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained in this report. This report has been prepared in accordance with all applicable Actuarial Standards of Practice, and I am available to answer questions about it.

Respectfully submitted,

Michael A. Ribble, FSA, EA, MAAA

Principal, Consulting Actuary

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Table of Contents

Executive Summary

Overview

The North Carolina Retirement Systems Division (RSD) was established in 1941 to provide retirement benefits for public servants in the State of North Carolina. Today, under the management of the Department of State Treasurer, RSD administers seven public pension plans (defined benefit plans), three supplemental retirement plans (voluntary defined contributions plans), a health trust fund, a disability income plan, death benefit funds and a number of other benefit programs. As of December 31, 2016, the RSD defined benefit plans cover over one million current and prior public servants in the state of North Carolina. During the fiscal year ending June 30, 2017, RSD paid nearly $6.0 billion in pensions to more than 290,000 retirees. And as of June 30, 2017, RSD's assets were valued at almost $94 billion.

Under the supplemental retirement plans, the amount of contributions in any given year is defined by law. The amount of benefits derived is dependent on the investment returns the individual achieves. Conversely, under the pension plans, the amount of the benefit paid to a member upon retirement, termination, death or disability is defined by law. The amount of contributions needed to fund these benefits cannot be known with certainty. In North Carolina, like other states, these contributions are paid during a public servant's career so that upon retirement, termination, death, or disability, there are funds available to pay these benefits. These amounts are determined through an actuarial valuation. Actuarial valuations are performed for each of the pension plans administered by RSD and the results are contained in actuarial valuation reports like this.

In 1941, the Teachers' and State Employees' Retirement System (referred to as "TSERS" or the "State Plan") was established. TSERS provides benefits to all full-time teachers and state employees in all public school systems, universities, departments, institutions and agencies of the state. With over $64 billion in assets and over 670,000 members as of December 31, 2016, it is the largest pension plan within the System. This actuarial valuation report is our annual analysis of the financial health of TSERS. This report, prepared as of December 31, 2016, presents the results of the seventy-fourth annual valuation of TSERS.

Purpose

An actuarial valuation is performed on TSERS annually as of the end of the calendar year. The actuary determines the amount of contributions to be made to TSERS during each member's career that, when combined with investment return, will be sufficient to pay for retirement benefits.

In addition, the annual actuarial valuation is performed to:

- Determine the progress on funding TSERS,
- Explore why the results of the current valuation differ from the results of the valuation of the previous year, and
- Satisfy regulatory and accounting requirements.

A detailed summary of the valuation process and a glossary of actuarial terms are provided in Appendix A.

Executive Summary (continued)

Key Takeaways

The actuarial valuation is performed each year to replace the estimates the actuary assumed for the prior valuation with the actual events that happened. This past year, as expected, some of the assumptions used in the prior valuation were not realized. Key results of the December 31, 2016 valuation were:

- Market value returns of 6.22% compared to 7.25% assumed
- Increase in covered payroll of 2.7% compared to approximately 3% expected
- Recent legislation signed into law since the prior valuation:
  - 1.0% cost-of-living adjustment effective July 1, 2017 for retired members and survivors of deceased members receiving benefits as of July 1, 2016 (and a prorated increase for those who retired after July 1, 2016 but before June 30, 2017)
  - Reclassification of probation/parole officers as law enforcement officers with respect to service rendered on or after July 1, 2017
- Change in discount rate from 7.25% to 7.20% as of December 31, 2016

When compared to the December 31, 2015 projections, the above resulted in:

- A lower funded ratio as of December 31, 2016 (90.4% in the valuation compared to 91.8% in the baseline projection)
- Higher actuarially determined employer contribution rate for fiscal year ending June 30, 2019 (11.98% in the valuation compared to 10.79% in the baseline projection)
- Lower projected benefit amounts being accrued by active members

TSERS is well funded compared to its peers. This is due to:

- Stakeholders working together to keep TSERS well-funded since inception
- A history of appropriating and contributing the recommended contribution requirements
- Assumptions that in aggregate are more conservative than peers
- A funding policy that aggressively pays down unfunded liability over a 12-year period
- An ad hoc cost-of-living adjustment, which typically only provides benefit increases when certain financial conditions are met, supports the health of the system
- Modest changes in benefits when compared to peers

As has been done over the past 75 years, continued focus on these measures will be needed to maintain the solid status of TSERS well into the future.

More details can be found later in this report. We encourage readers to start with Sections 1 and 2 and refer to other sections for additional details as needed.

Section 1: Principal Results

This report, prepared as of December 31, 2016, presents the results of the seventy-fourth annual valuation of the system. The principal results of the valuation and a comparison with the preceding year's results are summarized below.

Table 1: Summary of Principal Results

Valuation results as of	12/31/2016	12/31/2015
Active Members		
Number	305,013	305,291
Reported Compensation	$13,497,815,754	$13,145,602,154
Valuation Compensation*	$14,282,093,846	$13,896,781,214
Retired Members and Survivors of Deceased Members Currently Receiving Benefits		
Number	208,443	201,522
Annual Allowances	$ 4,343,259,132	$ 4,202,371,724
Assets		
Actuarial Value (AVA)	$67,376,892,466	$66,169,352,203
Market Value	$64,246,523,614	$62,669,341,716
Actuarial Accrued Liability (AAL)	$74,547,855,025	$71,521,915,397
Unfunded Accrued Liability (AAL-AVA)	$ 7,170,962,559	$ 5,352,563,194
Funded Ratio (AVA/AAL)**	90.4%	92.5%
Results for Fiscal Year Ending	**6/30/2019**	**6/30/2018**
Actuarially Determined Employer Contribution (ADEC), as a percentage of payroll		
Normal Cost	4.48%	4.31%
Accrued Liability	7.50%	5.77%
Total	11.98%	10.08%
Impact of Legislative Changes	N/A	0.45%
Final ADEC	N/A	10.53%
Board of Trustees Recommended Contribution under the Employer Contribution Rate Stabilization Policy (ECRSP)	11.98%	10.78%
Appropriations Act for Fiscal Year Ending	**6/30/2018**	**6/30/2017**
Employer Contribution Rate as a percentage of payroll		
Normal Cost	4.48%	4.31%
Accrued Liability	6.30%	5.67%
Total	10.78%	9.98%
Preliminary Reserve for Undistributed Gains/(Losses)	(1.20)%	(0.10)%

* Reported compensation adjusted to reflect the assume rate of pay increase prior to the valuation date.

** The Funded Ratio on a Market Value of Assets basis is 86.2% at December 31, 2016.

Section 2: The Valuation Process

The following diagram summarizes the inputs and results of the actuarial valuation process.

A more detailed description of the valuation process is provided in Appendix A.

Valuation Input: Membership Data

As with any estimate, the actuary collects information that we know now. Under the actuarial valuation process, current information about TSERS members is collected annually by the Retirement Systems Division staff at the direction of the actuary. Membership data will assist the actuary in estimating benefits that could be paid in the future. Information about benefit provisions and assets held in the trust as of the valuation date is also collected.

The member information the actuary collects includes data elements such as current service, salary and benefit group identifier for members that have not separated service, and actual benefit amounts and form of payment for members that have separated service. Data elements such as gender and date of birth are used to determine when a benefit might be paid and for how long.

Section 2: The Valuation Process

Valuation Input: Membership Data (continued)

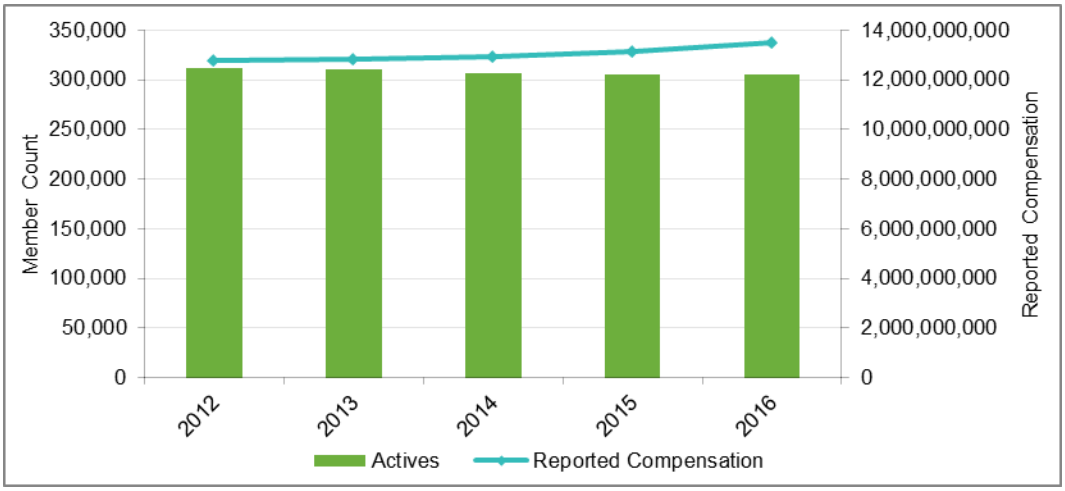
The table below provides a summary of the membership data used in this valuation compared to the prior valuation.

Number as of	12/31/2016	12/31/2015
Active members	305,013	305,291
Members currently receiving Disability Income Plan benefits	7,477	7,531
Terminated members and survivors of deceased members entitled to benefits but not yet receiving benefits	151,581	143,214
Retired members and survivors of deceased members currently receiving benefits	208,443	201,522
Total	672,514	657,558

Commentary: The number of active members decreased by 0.1% from the previous valuation date. The decrease in active members results in less benefits accruing, but also fewer contributions supporting the system. The number of retired members and survivors of deceased members currently receiving benefits increased by 3.4% from the previous valuation. The increase in retiree population is consistent with expectations.

Graph 1: Active Members

The graph below provides a history of the number of active members and reported compensation over the past five years.



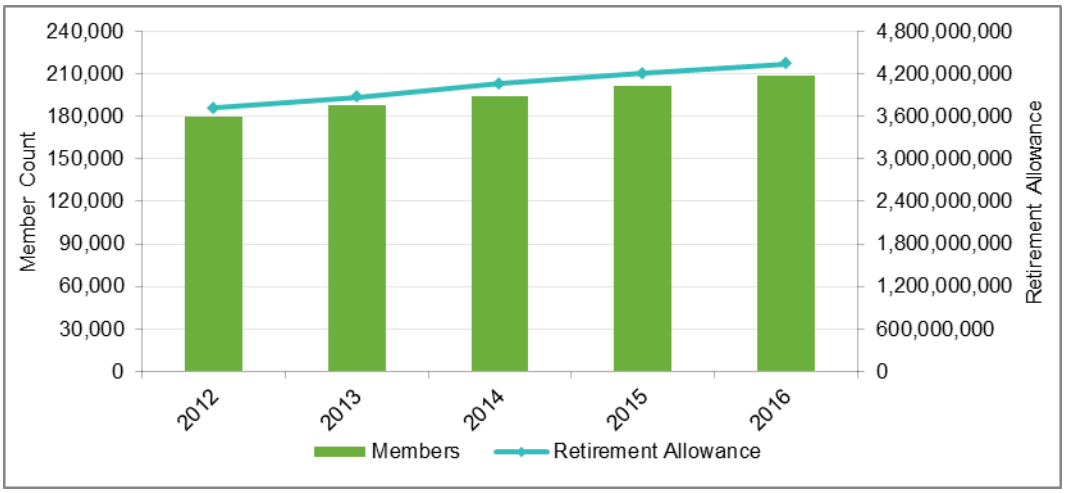
Commentary: Reported compensation has increased by 2.7% and has slightly grown over the past five years. Covered payroll is expected to increase by approximately 3% annually in the future. Payroll that is not increasing as fast as we assume results in less benefits accruing than we anticipate, but also fewer contributions supporting the system.

Section 2: The Valuation Process

Valuation Input: Membership Data (continued)

Graph 2: Retired Members and Survivors of Deceased Members

The graph below provides a history of the number of retired members and survivors of deceased members and benefit amounts payable over the past five years.



Commentary: The number of retired members and survivors of deceased members and the benefits paid to these members has been increasing steadily, as expected based on plan assumptions.

A detailed summary of the membership data used in this valuation is provided in Section 3 and Appendix B of this report.

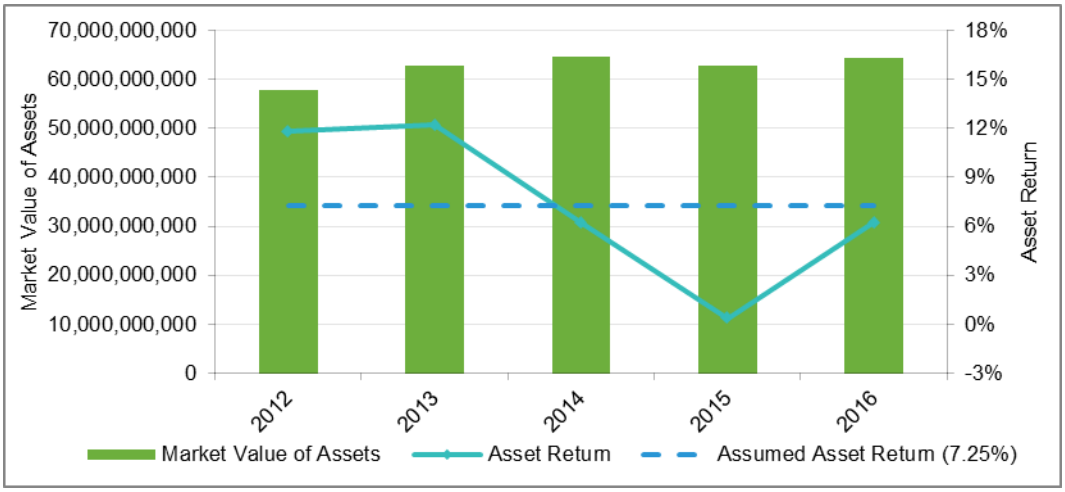
Section 2: The Valuation Process

Valuation Input: Asset Data

TSERS assets are held in trust and are invested for the exclusive benefit of plan members. The Market Value of Assets is $64.2 billion as of December 31, 2016 and was $62.7 billion as of December 31, 2015. The investment return for the market value of assets for calendar year 2016 was 6.22%.

Graph 3: Market Value of Assets and Asset Returns

The graph below provides a history of the market value of assets and asset returns over the past five years.



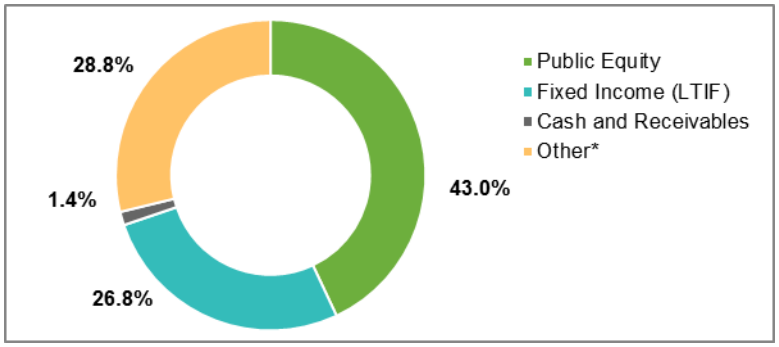
Commentary: Returns were less than the 7.25% assumed rate of return, resulting in a higher required contribution than anticipated as of the December 31, 2015 baseline projections presented in the December 31, 2015 actuarial report.

Section 2: The Valuation Process

Valuation Input: Asset Data (continued)

Graph 4: Allocation of Investments by Category

The graph below provides the breakdown of the market value of assets at December 31, 2016 by asset category.



* Real Estate, Alternatives, Inflation and Credit

Commentary: Based on historical market returns, the current asset allocation, the current investment policy, and the expectation of future asset returns, as reviewed in the last experience study, the 7.20% discount rate used in this valuation is reasonable and appropriate.

A detailed summary of the market value of assets is provided in Section 4 of this report.

Section 2: The Valuation Process

Valuation Input: Benefit Provisions

Benefit provisions are described in North Carolina General Statues, Chapter 135.

This valuation reflects the following changes in benefit provisions from the prior year's valuation:

- 1.0% cost-of-living adjustment effective July 1, 2017 for retired members and survivors of deceased members receiving benefits as of July 1, 2016 (and a prorated increase for those who retired after July 1, 2016 but before June 30, 2017)
- Reclassification of probation/parole officers as law enforcement officers with respect to service rendered on or after July 1, 2017

Highlights of the benefit provisions are described below.

- An unreduced retirement allowance is payable to non-law enforcement members who retire from service:
  - after attaining age 65 and five years of creditable service;
  - after attaining age 60 and 25 years of creditable service; or
  - after attaining 30 years of creditable service
- An unreduced retirement allowance is payable to law enforcement members who retire from service:
  - after attaining age 55 and five years of creditable service; or
  - after attaining 30 years of creditable service
- The unreduced retirement allowance is equal to 1.82% of a member's final average compensation multiplied by the number of years of creditable service.
- A reduced retirement allowance is payable to non-law enforcement members who retire from service:
  - after attaining age 60 and five years of membership service; or
  - after attaining age 50 and 20 years of creditable service.
- A reduced retirement allowance is payable to law enforcement members who retire from service after attaining age 50 and 15 years of creditable service.
- Ancillary benefits are also payable upon the death or disability of a member.
- TSERS does not provide for explicit cost of living increases as part of the benefit package. Instead, increases may be provided if certain financial conditions are met and/or the legislature passes a budget that provides for a cost-of-living adjustment. More details on cost-of-living increases are provided in Graph 5.

Commentary: Many Public Sector Retirement Systems in the United States have undergone pension reform where the benefits of members (active or future members) have been reduced. Because of the well-funded status of TSERS due to the legislature contributing the actuarially determined employer contribution, benefit cuts have not been needed in North Carolina as they have been in most other states. Instead, we have seen a modest expansion of benefits in recent years based on sound plan design. However, if North Carolina's investment policy shifts substantively, the system should review likely impacts of the shift and consider corresponding changes to actuarial assumptions, funding policy and/or benefit levels.

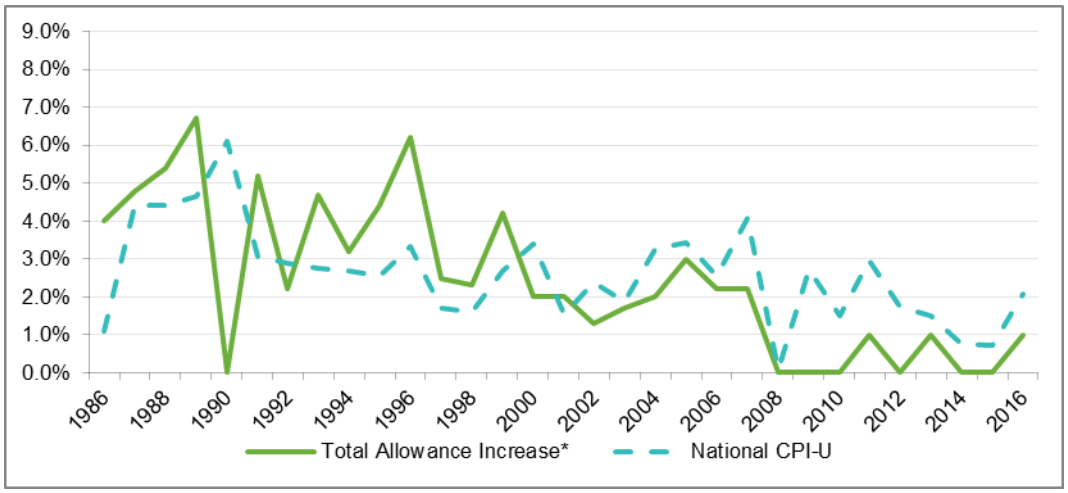
Section 2: The Valuation Process

Valuation Input: Benefit Provisions (continued)

As noted previously, cost-of-living increases are periodically considered to the extent that certain financial conditions are met and/or the legislature passes a budget that provides for a cost-of-living adjustment. Specifically, benefit allowance increases are generally considered when the employer contribution rate would not need to increase to pay for a cost-of-living adjustment (generally, limited to the lesser of the CPI increase year-over-year or 4%) Active member pay increases are also considered. In any case, the legislature makes the final decision. In addition to the legislature consistently appropriating the actuary's recommended contribution, this benefit increase policy has helped keep costs manageable when compared to other Public Sector Retirement Systems in the United States. That being said, it is important to provide a benefit in retirement that does not get eroded by inflation.

Graph 5: Cost-of-Living Increase and CPI-U History

The graph below provides a 30-year history of allowance increases for TSERS and the national CPI-U.



* Allowance increases are effective at July 1 the following year.

Commentary: Generally the ad-hoc retirement allowance increase policy has helped retirees maintain purchasing power while helping to moderate contribution increases during times of down markets.

A detailed summary of the benefit provisions is provided in Appendix C of this report.

Valuation Input: Actuarial Assumptions

Actuarial assumptions bridge the gap between the information that we know with certainty as of the valuation date (age, gender, service, pay, and benefits of the members) and what may happen in the future. The actuarial assumptions of TSERS are reviewed at least every five years. Based on this review, the actuary will make recommendations on the demographic and economic assumptions.

Section 2: The Valuation Process

Valuation Input: Actuarial Assumptions (continued)

Demographic assumptions describe future events that relate to people such as retirement rates, termination rates, disability rates, and mortality rates. Economic assumptions describe future events that relate to the assets of TSERS such as the interest rate, salary increases, the real return, and payroll growth.

The assumptions used for the December 31, 2016 actuarial valuation are based on the experience study prepared as of December 31, 2014 and adopted by the Board of Trustees on January 21, 2016. The discount rate was updated to be 7.20%, as adopted by the Board of Trustees on April 20, 2017.

Valuation Input: Funding Methodology

The Funding Methodology is the payment plan for TSERS and is composed of the following three components:

- Actuarial Cost Methods allocate costs to the actuarial accrued liability (i.e. the amount of money that should be in the fund) for past service and normal cost (i.e. the cost of benefits accruing during the year) for current service.
  - The Board of Trustees has adopted Entry Age Normal as its actuarial cost method
  - Develops normal costs that stays level as a percent of payroll
- Asset Valuation Methods smooth or average the market value returns over time to alleviate contribution volatility that results from market returns.
  - Asset returns in excess of or less than the expected return on market value of assets reflected over a five-year period
  - Assets corridor: not greater than 120% of market value and not less than 80% of market value
- Amortization Methods determine the payment schedule for unfunded actuarial accrued liability (i.e. the difference between the actuarial accrued liability and actuarial value of assets)
  - Payment level: the payment is determined as a level dollar amount, similar to a mortgage payment
  - Payment period: a 12-year closed amortization period was adopted for fiscal year ending 2012. A new amortization base is created each year based on the prior years' experience.

When compared to other Public Sector Retirement Systems in the United States, the funding policy for TSERS is quite aggressive in that the policy pays down the pension debt over a much shorter period of time (12 years) compared to the national average of around 24 years. As such it is a best practice in the industry.

A detailed summary of the actuarial assumptions and methods is provided in Appendix D of this report.

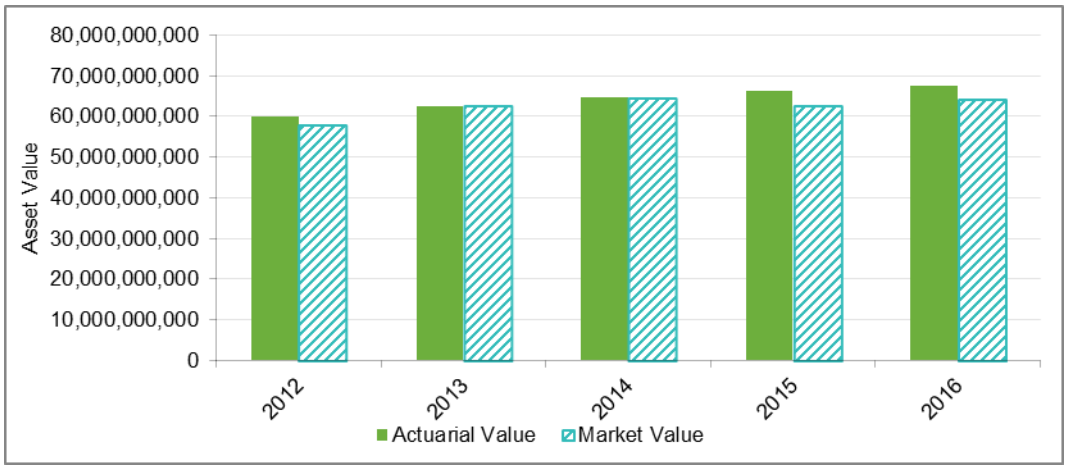
Section 2: The Valuation Process

Valuation Results: Actuarial Value of Assets

In order to reduce the volatility that investment gains and losses can have on required contributions and funded status of TSERS, the Board adopted an asset valuation method to determine the Actuarial Value of Assets used for funding purposes. The Actuarial Value of Assets is $67.4 billion as of December 31, 2016 and was $66.2 billion as of December 31, 2015.

Graph 6: Actuarial Value and Market Value of Assets

The graph below provides a history of the market value and actuarial value of assets over the past five years.



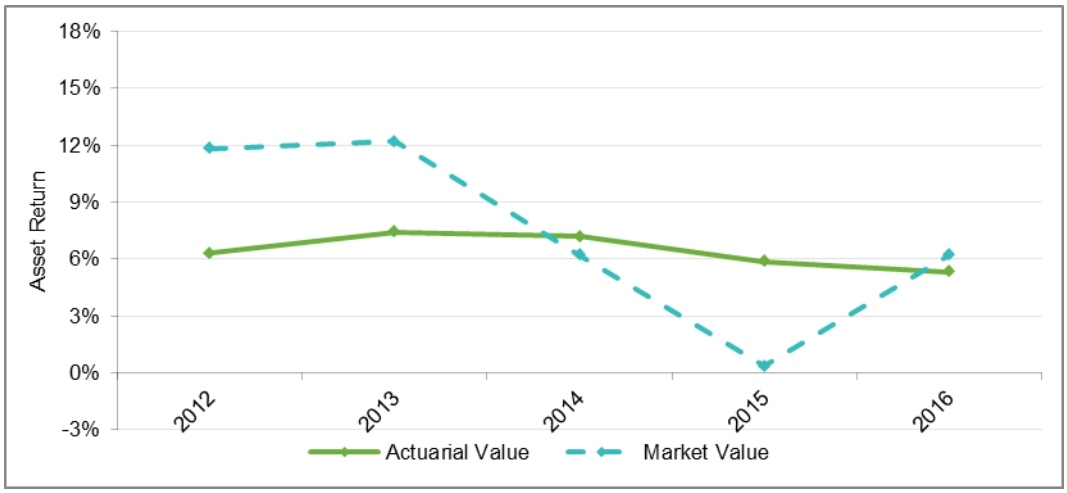
Commentary: The market value of assets is lower than the actuarial value of assets, which is used to determine employer contributions. This indicates that there are unrecognized asset losses to be recognized in future valuations.

Section 2: The Valuation Process

Valuation Results: Actuarial Value of Assets (continued)

Graph 7: Asset Returns

The graph below provides a history of the market value and actuarial value of asset returns over the past five years.



Commentary: The investment return for the market value of assets for calendar year 2016 was 6.22%. The actuarial value of assets smooths investment gains and losses. Lower than expected market returns in 2015 and 2016 resulted in an actuarial value of asset return for calendar year 2016 of 5.32% and a recognized actuarial asset loss of $1.3 billion during 2016.

A detailed summary of the Actuarial Value of Assets is provided in Section 4 of this report.

Section 2: The Valuation Process

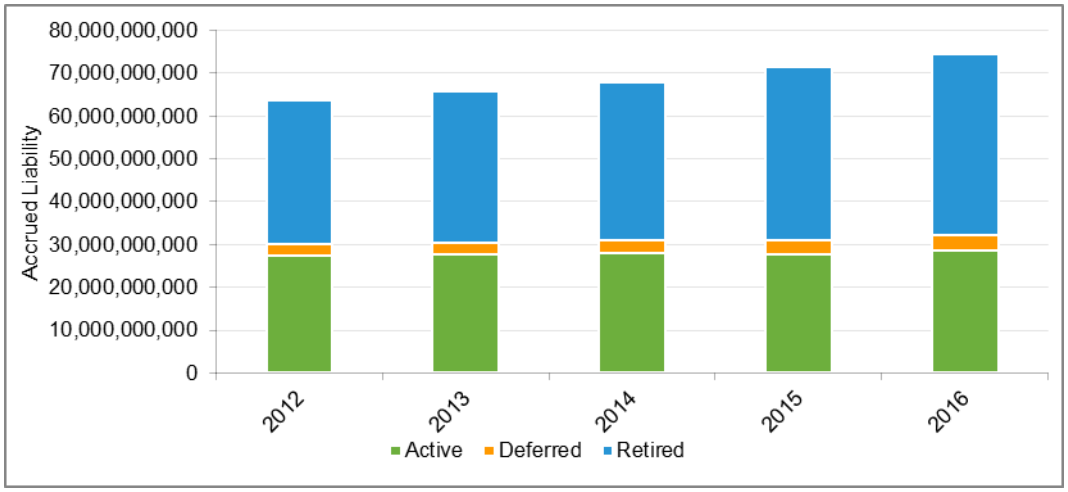
Valuation Results: Actuarial Accrued Liability

Using the provided membership data, benefit provisions, and actuarial assumptions, the future benefit payments of TSERS are estimated. These projected future benefit payments are discounted into today's dollars using the assumed rate of investment return assumption to determine the Present Value of Future Benefits (PVFB) of TSERS. The PVFB is an estimate of the current value of the benefits promised to all members as of a valuation date.

Once the PVFB is developed, an actuarial cost method is used to allocate the PVFB. Under the actuarial cost method, the PVFB is allocated to past, current and future service, respectively known as the actuarial accrued liability (AAL), normal cost (NC) and present value of future normal costs (PVFNC). The AAL is also referred to as the amount of money TSERS should ideally have in the trust. The NC is also referred to as the cost of benefits accruing during the year.

Graph 8: Actuarial Accrued Liability

The graph below provides a history of the actuarial accrued liability over the past five years.



Commentary: The AAL increased from $71.5 billion to $74.5 billion during 2016. The Retirement System is an open plan, which means that new members enter the plan each year. In an open plan, liabilities are expected to grow from one year to the next as more benefits accrue and the membership approaches retirement. The AAL prior to assumption and legislation changes was $147 million higher than expected, which resulted in a demographic loss of $147 million during 2016. Assumption changes increased the AAL by $377 million. Legislation changes increased the AAL by $433 million.

A detailed summary of the AAL is provided in Section 5 of this report.

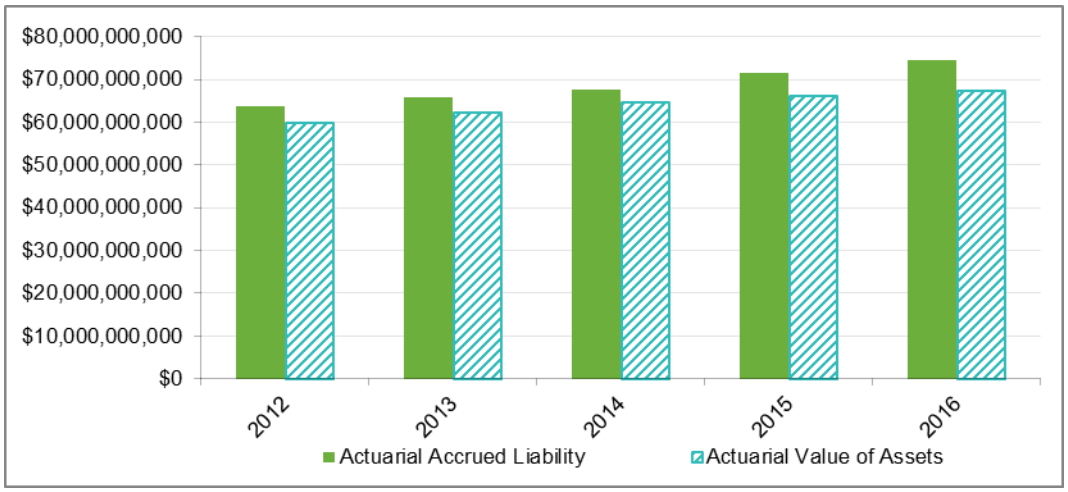
Section 2: The Valuation Process

Valuation Results: Funded Ratio

The funded ratio is a measure of the progress that has been made in funding the plan as of the valuation date. It is the ratio of how much money TSERS actually has in the fund to the amount TSERS should have in the fund.

Graph 9: Actuarial Accrued Liability and Actuarial Value of Assets

The graph below provides a history of the actuarial accrued liability and actuarial value of assets.



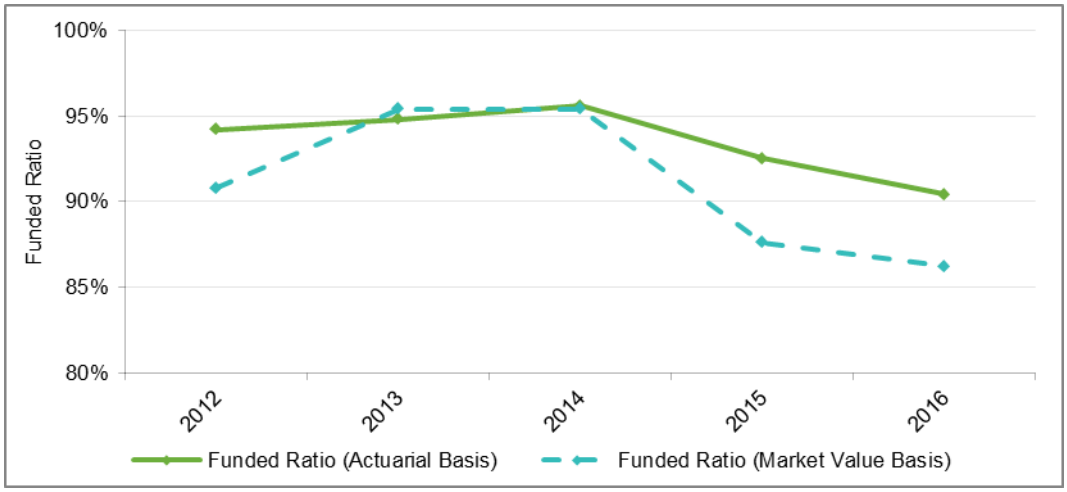
Commentary: The actuarial value of assets basis is used for computing contributions to alleviate contribution volatility. The difference in the actuarial accrued liability and the actuarial value of assets is the amount of pension debt to be paid off in 12 years.

Section 2: The Valuation Process

Valuation Results: Funded Ratio (continued)

Graph 10: Funded Ratios

The graph below provides a history of the funded ratio on a market and actuarial basis over the past five years.



Commentary: The ratio of assets to liabilities shows the health of the plan on an accrued basis. The funded ratio on an actuarial basis decreased from 92.5% at December 31, 2015 to 90.4% at December 31, 2016.

Section 2: The Valuation Process

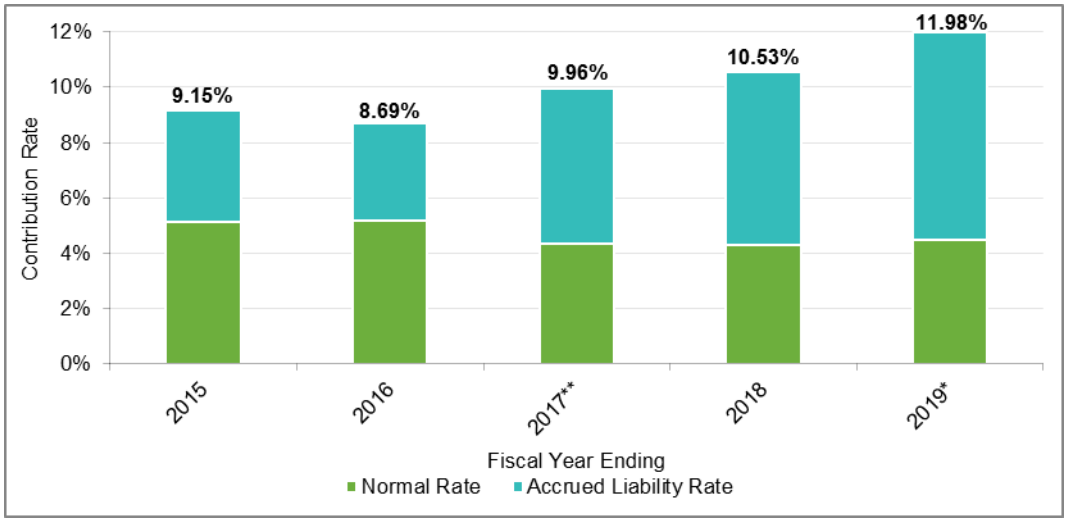
Valuation Results: Employer Contributions

The North Carolina General Statutes provide that the contributions of employers shall consist of a normal contribution and an accrued liability contribution. G.S. 135-8(g) allows for the Board of Trustees of TSERS to make changes to accounting methods and procedures that, in its opinion, are in the interest of sound and proper administration of TSERS.

The December 31, 2015 valuation suggested that the preliminary total employer contribution rate be set at 10.08% of payroll for the fiscal year ending June 30, 2018. Subsequently, the 2017 Appropriations Act (Session Law 2017-57) set contributions at 10.78% of payroll effective for the fiscal year ending June 30, 2018, in order to account for recent legislation passed into law and the Employer Contribution Rate Stabilization Policy. As a result of this December 31, 2016 valuation, the preliminary actuarially determined employer contribution rate is 11.98% of payroll for the fiscal year ending June 30, 2019, subject to the impact of any future legislative changes effective during that fiscal year. On this basis, there is no preliminary reserve from undistributed gains that could be used for a cost-of-living adjustment or other benefit improvements.

Graph 11: Actuarially Determined Employer Contribution Rates

The graph below provides a history of actuarially determined employer contribution rates over the past five years. The rates are split into the normal rate and the accrued liability rate. The normal rate is the employer's portion of the cost of benefits accruing after reducing for the member contribution. The accrued liability rate is the payment toward the unfunded liability.



***** Subject to the impact of future legislative changes effective during that fiscal year
** Includes impact of the experience study

Commentary: The actuarially determined employer contribution rate is the amount needed to pay for the cost of the benefits accruing and to pay off the pension debt over 12 years, offset for the 6% of pay contribution the members make. The 12-year period is a short period for Public Sector Retirement Systems in the United States, with most Systems using a period of 25 years or more to pay off the pension debt. The shorter period results in higher contributions and more benefit security. A detailed summary of the actuarially determined employer contribution rates is provided in Section 6 of this report.

Section 2: The Valuation Process

Valuation Results: Projections

Projections of contribution requirements and funded status into the future can be helpful planning tools for stakeholders. This section provides such projections. The projections of the actuarial valuation are known as deterministic projections. Deterministic projections are based on one scenario in the future. The baseline deterministic projection is based on December 31, 2016 valuation results as assumptions.

Key Projection Assumptions:

- Valuation interest rate of 7.20% for all years
- 7.20% investment return on market value of assets
- Actuarial assumptions and methods as described in Appendix D. All future demographic experience is assumed to be exactly realized.
- The contribution rate under the Employer Contribution Rate Stabilization Policy (ECRSP) is contributed until fiscal year ending 2022
- The actuarially determined employer contribution rate is contributed for fiscal years ending 2023 and beyond
- 0% increase in the total active member population
- No cost-of-living adjustments granted
- Future pay increases based on long-term salary increase assumptions

The ECRSP adopted by the Board of Trustees on January 21, 2016 requires that recommended contributions be 0.35% of payroll greater than the appropriated contribution during the prior year, with the following bounds: (1) contributions may not be less than the actuarially determined employer contribution (ADEC) rate and (2) contributions may not be greater than a contribution determined using the same assumptions used to calculate the ADEC but using a discount rate equal to the long-term Treasury bond yield.

In addition, we have provided two alternate deterministic projections. The first alternate deterministic projection is based on the same assumptions as the baseline deterministic projection except that it assumes a 0.0% asset return for calendar year 2017. The second alternate deterministic projection is based on the same assumptions as the baseline deterministic projection except that it assumes a 14.4% asset return for calendar year 2017.

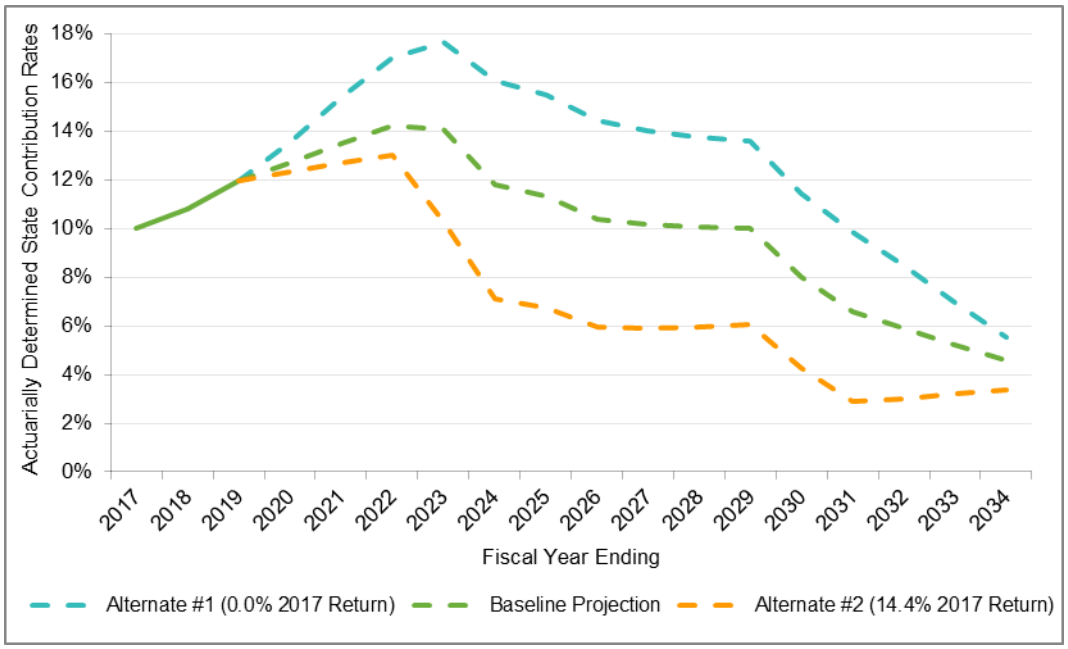
Finally, stochastic projections, where hundreds of projections based on varying rates of return are performed and results are ordered, are periodically performed by the Investment Management Division and shared with the Retirement Board and RSD staff.

Section 2: The Valuation Process

Valuation Results: Projections (continued)

Graph 12: Projected Actuarially Determined Employer Contribution Rates

The graph below provides the actuarially determined employer contribution rates projected for 15 years.



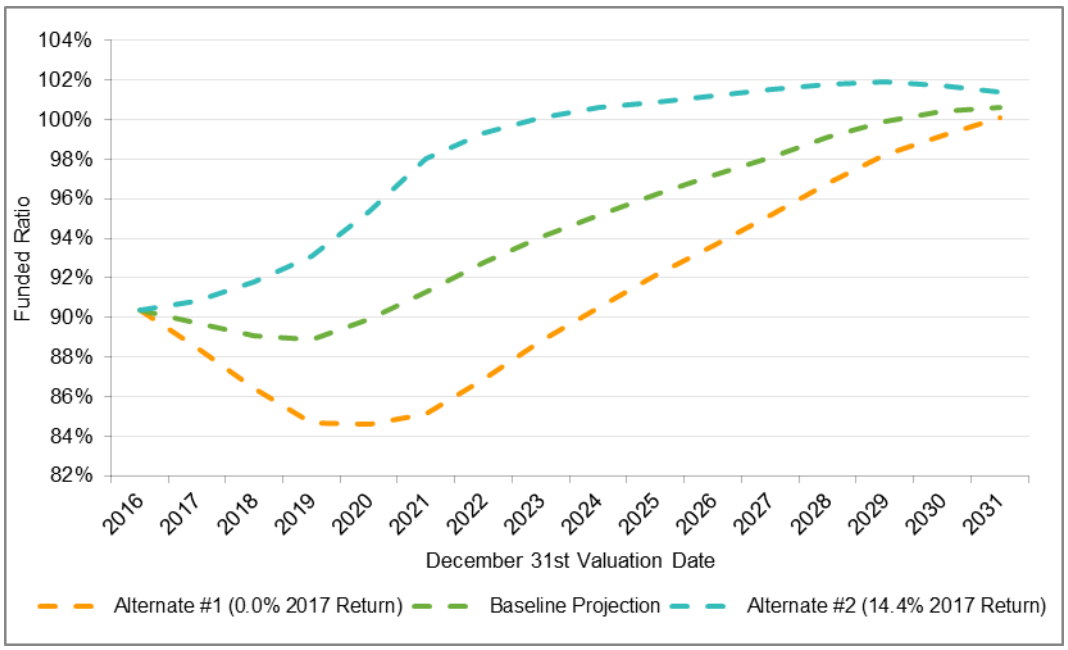
Commentary: The actuarially determined employer contribution rate trends to around 5%, which is the level of the cost of benefits accrued, or the long term employer cost of TSERS when there is no pension debt.

Section 2: The Valuation Process

Valuation Results: Projections (continued)

Graph 13: Projected Funded Ratio

The graph below provides the funded ratio projected for 15 years.



Commentary: Note that if the 7.20% return under the Baseline Projection is achieved, the funded ratio reaches the long term target of 100% within 15 years. This is a direct result of using a 12 year period to pay off the pension debt.

A detailed summary of the deterministic projections is provided in Section 9 of this report.

Valuation Results: Accounting Information

The Governmental Account Standards Board (GASB) issues statements which establish financial reporting standards for defined benefit pension plans and accounting for pension expenditures and expenses for governmental employers.

The valuation has been prepared in accordance with the parameters of Statement No. 67 of the GASB and all applicable Actuarial Standards of Practice. The Net Pension Liability (Asset) under GASB 67 for the fiscal year ending June 30, 2017, is $7,934,441,000 (compared to $9,191,033,000 for fiscal year ending June 30, 2016). The required financial reporting information for TSERS under GASB No. 67 can be found in Section 8 of this report.

Section 3: Membership Data

The Retirement Systems Division provided membership data as of the valuation date for each member of TSERS. The membership data assists the actuary in estimating benefits that could be paid in the future. The tables below provide a summary of the membership data used in this valuation. Detailed tabulations of data are provided in Appendix B.

Table 2: Active Member Data

	Member Count	Average Age	Average Service	Reported Compensation
Classroom Teachers	151,535	43.25	10.53	$ 6,669,898,512
Other Education	46,180	49.29	11.33	1,812,422,868
General Employees	103,872	46.55	10.70	4,821,074,622
Law Enforcement Officers	3,426	40.36	12.43	194,419,752
Total	305,013	45.26	10.73	$ 13,497,815,754

The table above includes members not in receipt of benefits who had reported compensation in 2016.

Table 3: Disabled Member Data

	Member Count	Average Age	Average Service	Valuation Compensation
Classroom Teachers	2,155	54.51	12.78	$ 75,641,445
Other Education	795	55.72	12.49	19,973,519
General Employees	4,488	55.53	11.96	149,107,429
Law Enforcement Officers	39	49.90	15.31	5,124,805
Total	7,477	55.23	12.27	$ 249,847,198

The table above includes members not in receipt of benefits who did not have reported compensation in 2016 and who were reported as disabled in the current or prior valuations and not subsequently reported as returned to work.

Section 3: Membership Data (continued)

Table 4: Terminated Vested Member Data

	Member Count	Average Age	Average Service	Accumulated Contributions
Classroom Teachers	55,811	40.45	4.32	$ 685,539,309
Other Education	12,929	45.79	4.32	149,145,547
General Employees	81,765	45.99	3.84	1,025,322,571
Law Enforcement Officers	1,076	42.23	5.79	22,100,726
Total	151,581	43.91	4.07	$ 1,882,108,153

The table above includes members not in receipt of benefits who did not have reported compensation in 2016 and who were not valued as disabled members.

Table 5: Data for Members Currently Receiving Benefits

	Member Count	Average Age	Annual Retirement Allowances
Retired Members (Healthy at Retirement)			
Classroom Teachers and Other Education	100,133	70.03	$ 2,441,481,285
General Employees	78,529	71.56	1,391,603,587
Law Enforcement Officers	2,803	65.37	88,606,276
Total	181,465	70.62	$ 3,921,691,148
Retired Members (Disabled at Retirement)*			
Classroom Teachers and Other Education	4,216	69.74	$ 84,311,277
General Employees	7,902	69.56	120,982,328
Law Enforcement Officers	175	68.11	4,299,218
Total	12,293	69.60	$ 209,592,823
Survivors of Deceased Members			
Classroom Teachers and Other Education	4,678	73.16	$ 84,757,895
General Employees	9,584	73.66	118,311,402
Law Enforcement Officers	423	71.87	8,905,864
Total	14,685	73.45	$ 211,975,161
Grand Total	208,443	70.76	$ 4,343,259,132

* Includes retired members reported as disabled in a prior valuation and not subsequently reported as returned to work.

Section 4: Asset Data

Assets are held in trust and are invested for the exclusive benefit of TSERS members. The tables below provide the details of the Market Value of Assets for the current and prior years' valuations.

Table 6: Market Value of Assets

Asset Data as of	12/31/2016	12/31/2015
Beginning of Year Market Value of Assets	$ 62,669,341,716	$ 64,587,417,979
Contributions	2,237,806,330	2,124,259,141
Benefit Payments	(4,490,780,171)	(4,272,052,586)
Investment Income	3,830,155,739	229,717,182
Net Increase/(Decrease)	1,577,181,898	(1,918,076,263)
End of Year Market Value of Assets	$ 64,246,523,614	$ 62,669,341,716
Estimated Net Investment Return on Market Value	6.22%	0.36%

Table 7: Allocation of Investments by Category of the Market Value of Assets

Asset Data as of	12/31/2016	12/31/2015
Allocation by Dollar Amount		
Public Equity	$ 27,649,326,323	$ 26,656,406,177
Fixed Income (LTIF)	17,194,764,771	17,660,343,988
Cash and Receivables	894,009,370	1,051,912,884
Other*	18,508,423,150	17,300,678,667
Total Market Value of Assets	$ 64,246,523,614	$ 62,669,341,716
Allocation by Percentage of Asset Value		
Public Equity	43.0%	42.5%
Fixed Income (LTIF)	26.8%	28.2%
Cash and Receivables	1.4%	1.7%
Other*	28.8%	27.6%
Total Market Value of Assets	100.0%	100.0%

***** Real Estate, Alternatives, Inflation and Credit

Section 4: Asset Data (continued)

In order to reduce the volatility that investment gains and losses can have on the required contributions and funded status of TSERS, the Board adopted an asset valuation method to determine the Actuarial Value of Assets used for funding purposes. The table below provides the calculation of the Actuarial Value of Assets at the valuation date.

Table 8: Actuarial Value of Assets

Asset Data as of	12/31/2016
Beginning of Year Market Value of Assets	$ 62,669,341,716
Contributions	2,237,806,330
Benefit Payments	(4,490,780,171)
Net Cash Flow	(2,252,973,841)
Expected Investment Return	4,461,856,973
Expected End of Year Market Value of Assets	64,878,224,848
End of Year Market Value of Assets	64,246,523,614
Excess of Market Value over Expected Market Value of Assets	(631,701,234)
80% of 2016 Asset Gain/(Loss)	(505,360,987)
60% of 2015 Asset Gain/(Loss)	(2,625,007,865)
40% of 2014 Asset Gain/(Loss)	N/A
20% of 2013 Asset Gain/(Loss)	N/A
Total Deferred Asset Gain/(Loss)	(3,130,368,852)
Preliminary End of Year Actuarial Value of Assets	67,376,892,466
Final End of Year Actuarial Value of Assets (not less than 80% and not greater than 120% of Market Value)	67,376,892,466
Estimated Net Investment Return on Actuarial Value	5.32%

Commentary: The actuarial value of assets smooths investment gains/losses, resulting in less volatility in the employer contribution. The asset valuation recognizes asset returns in excess of or less than the expected return on the market value of assets over a five-year period. Actuarial value of assets was reset to the market value of assets at December 31, 2014.

Lower than expected market returns in 2015 and 2016 resulted in an actuarial value of asset return for calendar year 2016 of 5.32% and a recognized actuarial asset loss of $1.3 billion during 2016.

Section 4: Asset Data (continued)

The valuation assumes that the funds will earn a 7.20% asset return. The table below provides a history of the Actuarial Value and Market Value of Asset returns.

Table 9: Historical Asset Returns

Calendar Year	Actuarial Value of Asset Return	Market Value of Asset Return
2006	8.94%	11.41%
2007	8.87%	8.38%
2008	2.89%	-19.50%
2009	4.74%	14.84%
2010	5.89%	11.47%
2011	5.15%	2.19%
2012	6.32%	11.82%
2013	7.43%	12.21%
2014	7.19%	6.21%
2015	5.87%	0.36%
2016	5.32%	6.22%
Average	6.22%	5.52%
Range	6.05%	34.34%

Commentary: The average investment return recognized for purposes of determining the annual change in contribution each year is the actuarial value of assets return. Currently, the average actuarial return of 6.22% tracks average market return of 5.52% relatively well. But the range of returns is markedly less – 6.05% versus 34.34%. This results in much lower employer contribution volatility using the actuarial value of assets versus market, while ensuring that the actuarial needs of TSERS are met.

Section 5: Liability Results

Using the provided membership data, benefit provisions, and actuarial assumptions, the future benefit payments of TSERS are estimated. These projected future benefit payments are discounted into today's dollars using the assumed rate of investment return assumption to determine the Present Value of Future Benefits. The Present Value of Future Benefits is allocated to past, current and future service, respectively known as the actuarial accrued liability, normal cost and present value of future normal costs. The table below provides these liability numbers for the current and prior year's valuations.

Table 10: Liability Summary

Valuation Results as of	12/31/2016	12/31/2015
(a) Present Value of Future Benefits		
(1) Active Members	$ 40,130,495,231	$ 38,687,207,018
(2) Terminated Members	3,764,216,305	3,482,641,054
(3) Members Currently Receiving Benefits	42,235,329,807	40,408,588,106
(4) Total	$ 86,130,041,343	$ 82,578,436,178
(b) Present Value of Future Normal Costs		
(1) Employee Future Normal Costs	$ 6,694,905,386	$ 6,497,465,689
(2) Employer Future Normal Costs	4,887,280,932	4,559,055,092
(3) Total	$ 11,582,186,318	$ 11,056,520,781
(c) Actuarial Accrued Liability: (a4) - (b3)	$ 74,547,855,025	$ 71,521,915,397
(d) Actuarial Value of Assets	$ 67,376,892,466	$ 66,169,352,203
(e) Unfunded Accrued Liability: (c) - (d)	$ 7,170,962,559	$ 5,352,563,194

Section 5: Liability Results (continued)

The table below provides a reconciliation of the prior year's unfunded actuarial accrued liability to the current year's unfunded actuarial accrued liability.

Table 11: Reconciliation of Unfunded Actuarial Accrued Liability

(in millions)	
Unfunded Actuarial Accrued Liability (UAAL) as of 12/31/2015	$ 5,353
Normal Cost during 2016	1,433
Reduction due to Actual Contributions during 2016	(2,238)
Interest on UAAL, Normal Cost, and Contributions	411
Asset (Gain)/Loss	1,255
Actuarial Accrued Liability (Gain)/Loss	147
Impact of Assumption Changes	377
Impact of Legislative Changes	433
Unfunded Actuarial Accrued Liability (UAAL) as of 12/31/2016	$ 7,171

Commentary: During 2016, the UAAL increased faster than expected primarily due to asset losses. The change in assumption reflects the change in interest rate from 7.25% to 7.20% and increased the unfunded actuarial accrued liability (UAAL), or pension debt, by $377 million. Additionally, changes in plan provisions increased the UAAL by $433 million.

Section 6: Actuarially Determined Employer Contribution

The actuarially determined employer contribution consists of a normal cost rate and an accrued liability rate. The normal cost rate is the employer's portion of the cost of benefits accruing during the year after reducing for the member contribution. The accrued liability rate is the payment toward the unfunded accrued liability in order to pay off the unfunded accrued liability over 12 years.

The table below provides the calculation of the actuarially determined employer contribution for the current and prior years' valuations.

The Employer Contribution Rate Stabilization Policy (ECRSP) adopted by the Board of Trustees on January 21, 2016 requires that recommended contributions be 0.35% of payroll greater than the appropriated contribution during the prior year, with the following bounds: (1) contributions may not be less than the actuarially determined employer contribution (ADEC) calculated below and (2) contributions may not be greater than a contribution determined using the same assumptions used to calculate the ADEC but using a discount rate equal to the long-term Treasury bond yield.

The ECRSP would result in a recommended contribution rate of 11.98% of payroll for fiscal year ending 2019.

- 11.98% is the actuarially determined employer contribution calculated in this most recent valuation.
- The minimum is 11.13%; the appropriated contribution from last year of 10.78% (based on last year's final rate of 10.33% plus 0.45% for the two legislative changes) plus 0.35%.
- The maximum is approximately 64.12%; the estimated actuarially determined employer contribution using a discount rate equal to the long-term Treasury bond yield (3.06%).

Table 12: Calculation of the Actuarially Determined Employer Contribution (ADEC)

Valuation Date ADEC for Fiscal Year Ending	12/31/2016 6/30/2019	12/31/2015 6/30/2018
Normal Cost Rate Calculation		
(a) Employer Future Normal Cost	$ 4,887,280,932	$ 4,559,055,092
(b) Present Value of Future Salary	111,581,756,430	108,291,094,820
(c) Normal Cost Rate: (a) / (b)	4.38%	4.21%
(d) Expenses Rate	0.10%	0.10%
(e) Total Normal Cost Rate: (c) + (d)	4.48%	4.31%
Accrued Liability Rate Calculation		
(f) Total Annual Amortization Payments*	$ 1,070,547,881	$ 801,521,301
(g) Valuation Compensation	14,282,093,846	13,896,781,214
(h) Accrued Liability Rate: (f) / (g)	7.50%	5.77%
Total ADEC (e) + (h)	11.98%	10.08%
Impact of Legislative Changes	N/A	0.45%
Final ADEC	N/A	10.53%

***** See Table 15 for more detail.

Section 6: Actuarially Determined Employer Contribution (continued)

The table below provides a reconciliation of the actuarially determined employer contribution.

Table 13: Reconciliation of the Change in the ADEC

Fiscal year ending June 30, 2018 Preliminary ADEC (based on December 31, 2015 valuation)	10.08%
Impact of Legislative Changes*	0.45%
Fiscal year ending June 30, 2018 Final ADEC	10.53%
Change Due to Anticipated Reduction in UAAL	(0.31%)
Change Due to Demographic (Gain)/Loss	0.14%
Change Due to Investment (Gain)/Loss	1.19%
Change Due to Contributions Greater than ADEC	(0.03%)
Impact of Assumption Changes	0.46%
Fiscal year ending June 30, 2019 Preliminary ADEC (based on December 31, 2016 valuation)	11.98%

*The change due to legislative changes includes a 0.43% increase in the ADEC due to the 1% COLA effective July 1, 2017 and a 0.02% increase in the ADEC due to the reclassification of probation/parole officers as law enforcement officers with respect to service rendered on or after July 1, 2017.

Section 6: Actuarially Determined Employer Contribution (continued)

Amortization methods determine the payment schedule for the unfunded actuarial accrued liability. TSERS adopted a 12-year closed amortization period for fiscal year ending 2012. A new amortization base is created each year based on the prior year's experience. The tables below provide the calculation of the new amortization base and the amortization schedule for the current year's valuation.

Table 14: Calculation of the New Amortization Base

Calculation as of	12/31/2016	12/31/2015
(a) Unfunded Actuarial Accrued Liability	$ 7,170,962,559	$ 5,282,566,938
(b) Prior Years' Outstanding Balances	$ 5,187,101,839	$ 2,695,985,915
(c) New Amortization Base: (a) - (b)	$ 1,983,860,720	$ 2,586,581,023
(d) New Amortization Payment	$ 270,613,120	$ 353,928,991

Table 15: Amortization Schedule for Unfunded Accrued Liability

Date Established	Original Balance	12/31/2016 Outstanding Balance	Annual Payment
December 31, 2009	$ 2,360,173,025	$ 1,686,205,583	$ 322,495,895
December 31, 2010	242,581,914	193,646,563	33,140,102
December 31, 2011	911,037,989	798,467,699	124,436,925
December 31, 2012	78,277,759	74,310,480	10,689,831
December 31, 2013	(114,027,863)	(115,997,337)	(15,569,166)
December 31, 2014	(206,952,282)	(223,639,296)	(28,251,967)
December 31, 2015	2,586,581,023	2,774,108,147	352,993,141
December 31, 2016	1,983,860,720	1,983,860,720	270,613,120
Total		$ 7,170,962,559	$ 1,070,547,881

Commentary: This is the payment schedule for the pension debt of TSERS.

Section 6: Actuarially Determined Employer Contribution (continued)

The table below provides a history of the actuarially determined employer contribution and the corresponding appropriated rate.

Table 16: History of Actuarially Determined Employer Contributions and Appropriated Rates

Valuation Date	Fiscal Year Ending	Normal Rate	Accrued Liability Rate	Change due to Legislation*	Final ADEC	Appropriated Rate
12/31/2016	6/30/2019	4.48%	7.50%	N/A	N/A	N/A
12/31/2015	6/30/2018	4.31%	5.77%	0.45%	10.53%	10.78%
12/31/2014	6/30/2017	5.21%	3.26%	1.49%	9.96%	9.98%
12/31/2013	6/30/2016	5.19%	3.50%	0.00%	8.69%	9.15%
12/31/2012	6/30/2015	5.15%	3.61%	0.39%	9.15%	9.15%

* The change due to legislation for the contribution for fiscal year ending 6/30/2018 includes a 0.43% increase in the ADEC due to the 1% COLA effective July 1, 2017 and a 0.02% increase in the ADEC due to the reclassification of probation/parole officers as law enforcement officers with respect to service rendered on or after July 1, 2017.

Table 17: Cost of Benefit Enhancements

Calculation as of	12/31/2016	12/31/2015
Increase in ADEC for a 1% COLA*	0.43%	0.43%
Increase in ADEC for a 0.01% Increase in the Defined Benefit Formula**	0.44%	0.44%

* The 1% COLA calculated at the December 31, 2016 valuation would be effective July 1, 2018. The COLA would be paid in full to retired members and survivors of deceased members on the retirement roll on July 1, 2017 and would be prorated for retired members and survivors of deceased members who commence benefits after July 1, 2017 but before June 30, 2018.

** A corresponding increase in retirement allowances would be paid in the event of an increase in the defined benefit formula.

Section 7: Valuation Balance Sheet

The valuation balance sheet shows the assets and liabilities of TSERS. The items shown in the balance sheet are present values actuarially determined as of the relevant valuation date. The table below provides the valuation balance sheet for the current year and prior year.

Table 18: Valuation Balance Sheet

Balance Sheet as of	12/31/2016	12/31/2015
Assets		
Current Actuarial Value of Assets		
Annuity Savings Fund	$ 12,563,041,657	$ 12,176,094,815
Pension Accumulation Fund	54,813,850,809	53,993,257,388
Total	$ 67,376,892,466	$ 66,169,352,203
Future Member Contributions to the Annuity Savings Fund	$ 6,694,905,386	$ 6,497,465,689
Prospective Contributions to the Pension Accumulation Fund		
Normal Contributions	$ 4,887,280,932	$ 4,559,055,092
Unfunded Accrued Liability Contributions	7,170,962,559	5,352,563,194
Undistributed Gain/(Loss) Contributions	(1,143,926,783)	(89,460,295)
Total	$ 10,914,316,708	$ 9,822,157,991
Total Assets	$ 84,986,114,560	$ 82,488,975,883
Liabilities		
Annuity Savings Fund		
Past Member Contributions	$ 12,563,041,657	$ 12,176,094,815
Future Member Contributions	6,694,905,386	6,497,465,689
Total Contributions	$ 19,257,947,043	$ 18,673,560,504
Pension Accumulation Fund		
Benefits Currently in Payment	$ 41,805,044,990	$ 40,338,591,850
Benefits to be Paid to Current Active Members	24,636,764,493	23,496,287,568
Reserve for Increases in Retirement Allowances* effective July 1, 2017 (July 1, 2016 for December 31, 2015)	430,284,817	69,996,256
Reserve for Undistributed Gains/(Losses)	(1,143,926,783)	(89,460,295)
Total Benefits Payable	$ 65,728,167,517	$ 63,815,415,379
Total Liabilities	$ 84,986,114,560	$ 82,488,975,883

* The reserve for the increase in retirement allowances at December 31, 2015 is the cost of one-time pension supplement to be paid on or before October 31, 2016.

Section 8: Accounting Results

The section contains the accounting information for Governmental Accounting Standards Board (GASB) Statement No. 67 for fiscal year ending June 30, 2017 based on a valuation date of December 31, 2016.

Please note that GASB Statement No. 67 (*Financial Reporting for Pension Plans) is applicable* for fiscal years ending 2014 and later.

The June 30, 2017 total pension liability presented in this section was determined by an actuarial valuation as of December 31, 2016, based on the assumptions, methods and plan provisions described in this report. The actuarial cost method used to develop the total pension liability is the Entry Age Normal Cost method, as required by GASB Statement No. 67.

GASB Statement No. 67 set forth certain items of information to be disclosed in the financial statements of the Plan. The tables below provide a distribution of the number of employees by type of membership.

Table 19: Number of Active and Retired Members as of December 31, 2016

Group	Number
Retired members and survivors of deceased members currently receiving benefits	208,443
Terminated members and survivors of deceased members entitled to benefits but not yet receiving benefits	151,581
Active members*	312,490
Total	672,514

* Includes current recipients of DIP benefits.

Section 8: Accounting Results (continued)

GASB Statement No. 67 set forth certain items of information to be disclosed in the financial statements of the Plan. The tables below provide the schedule of changes in Net Pension Liability (Asset).

Table 20: Schedule of Changes in Net Pension Liability (Asset)

Calculation as of	June 30, 2017
Total Pension Liability	
Service Cost	$ 1,469,395,000
Interest	5,195,104,000
Changes of Benefit Terms	449,563,000
Difference between Expected and Actual Experience	229,339,000
Change of Assumptions	381,934,000
Benefit Payments, including Refund of Member Contributions	(4,545,296,000)
Net Change in Total Pension Liability	$ 3,180,039,000
Total Pension Liability - Beginning of Year	$ 72,459,862,000
Total Pension Liability - End of Year	$ 75,639,901,000
Plan Fiduciary Net Position	
Employer Contributions	$ 1,441,194,000
Member Contributions	894,538,000
Net Investment Income	6,656,652,000
Benefit Payments, including Refund of Member Contributions	(4,545,296,000)
Administrative Expenses	(11,265,000)
Other	808,000
Net Change in Fiduciary Net Position	$ 4,436,631,000
Plan Fiduciary Net Position - Beginning of Year	$ 63,268,829,000
Plan Fiduciary Net Position - End of Year	$ 67,705,460,000

Table 21: Net Pension Liability (Asset)

Calculation as of	June 30, 2017	June 30, 2016
Total Pension Liability	$ 75,639,901,000	$ 72,459,862,000
Plan Fiduciary Net Position	67,705,460,000	63,268,829,000
Net Pension Liability (Asset)	$ 7,934,441,000	$ 9,191,033,000
Plan Fiduciary Net Position as a Percentage of the Total Pension Liability	89.51%	87.32%

Section 8: Accounting Results (continued)

The table below is the sensitivity of the net pension liability to changes in the discount rate.

Table 22: Sensitivity of the Net Pension Liability (Asset) at June 30, 2017 to Changes in the Discount Rate

	1% Decrease	Current	1% Increase
Discount Rate	6.20%	7.20%	8.20%
Net Pension Liability (Asset)	16,332,364,000	7,934,441,000	898,052,000

The discount rate used to measure the total pension liability was 7.20%. The projection of cash flows used to determine the discount rate assumed that for fiscal year ending 2018 to fiscal year ending 2022, System contributions will follow the Employer Contribution Rate Stabilization Policy as adopted by the Board of Trustees on January 21, 2016, and for fiscal years ending 2023 and beyond, System contributions will be based on the actuarially determined contribution rates. Based on those policies, the System's fiduciary net position was projected to be available to make all projected future benefit payments of current plan members. Please see Appendix E for additional details.

The table below provides the methods and assumptions used to calculate the actuarially determined contribution rate.

Table 23: Additional Information for GASB Statement No. 67

Valuation Date	12/31/2016
Actuarial Cost Method	Entry Age
Amortization Method	Level dollar closed
Amortization Period	12 years
Asset Valuation Method	Asset returns in excess of or less than the expected return on market value of assets reflected over a five-year period (not greater than 120% of market value and not less than 80% of market value)
Actuarial Assumptions	
Investment Rate of Return*	7.20%
Projected Salary Increases**	3.50% - 8.10%
*Includes Inflation of	3.00%
**Includes Inflation and Productivity of	3.50%
Cost-of-living Adjustments	N/A

Section 9: Projections

Projections of contribution requirements and funded status into the future can be helpful planning tools for stakeholders. This section provides such projections. The projections of the actuarial valuation are known as deterministic projections. Deterministic projections are based on one scenario in the future. The baseline deterministic projection is based on December 31, 2016 valuation results as assumptions.

Key Projection Assumptions

- Valuation interest rate of 7.20% for all years
- 7.20% investment return on market value of assets
- Actuarial assumptions and methods as described in Appendix D. All future demographic experience is assumed to be exactly realized.
- The contribution rate under the Employer Contribution Rate Stabilization Policy (ECRSP) is contributed until fiscal year ending 2022.
- The actuarially determined employer contribution rate is contributed for fiscal years ending 2023 and beyond.
- 0% increase in the total active member population
- No cost-of-living adjustments granted
- Future pay increases based on long-term salary increase assumptions

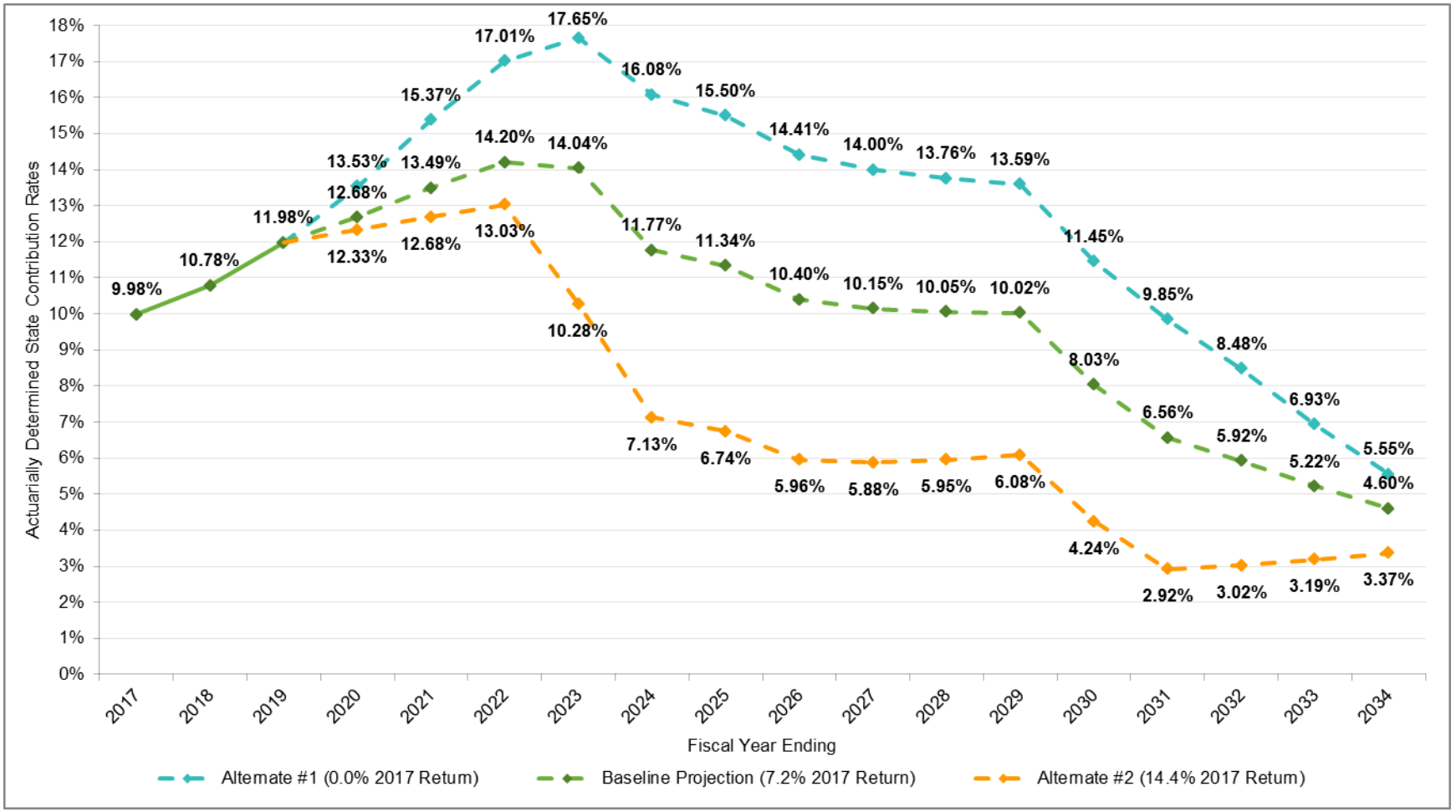
The ECRSP adopted by the Board of Trustees on January 21, 2016 requires that recommended contributions be 0.35% of payroll greater than the appropriated contribution during the prior year, with the following bounds: (1) contributions may not be less than the actuarially determined employer contribution (ADEC) rate and (2) contributions may not be greater than a contribution determined using the same assumptions used to calculate the ADEC but using a discount rate equal to the long-term Treasury bond yield.

In addition, we have provided two alternate deterministic projections. The first alternate deterministic projection is based on the same assumptions as the baseline deterministic projection except that it assumes a 0.0% asset return for calendar year 2017. The second alternate deterministic projection is based on the same assumptions as the baseline deterministic projection except that it assumes a 14.4% asset return for calendar year 2017.

Section 9: Projections (continued)

The graph below provides the actuarially determined employer contribution rates projected for 15 years.

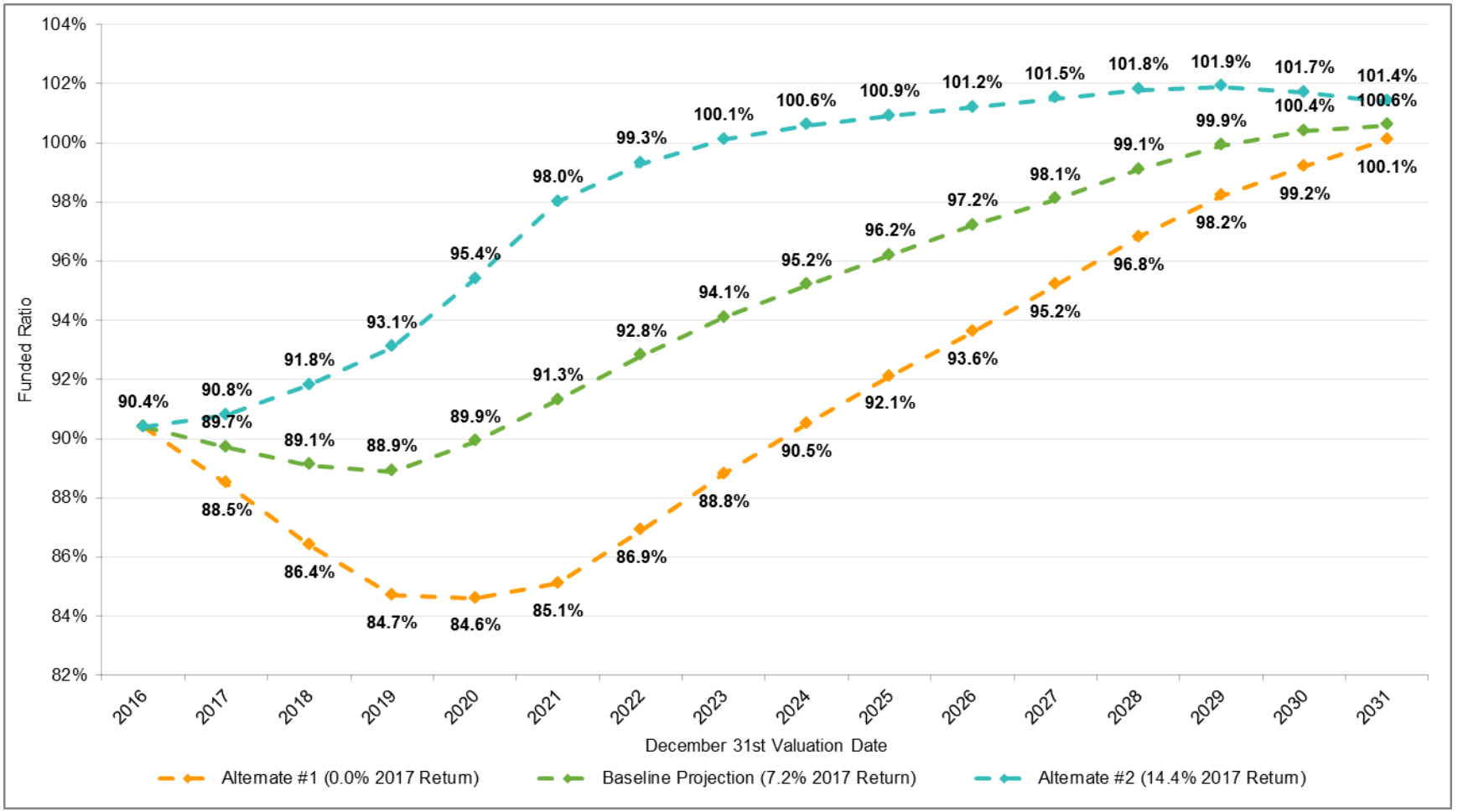
Projected Actuarially Determined Employer Contribution Rates



Section 9: Projections (continued)

The graph below provides the funded ratio projected for 15 years.

Projected Funded Ratio



Appendix A: Valuation Process and Glossary of Actuarial Terms

Purpose of an Actuarial Valuation

The majority of Public Sector Retirement Systems in the State of North Carolina are defined benefit (DB) retirement systems. Under a DB Retirement System, the amount of benefits payable to a member upon retirement, termination, death or disability is defined in various contracts and legal instruments and is based, in part, on the member's years of credited service and final compensation. The amount of contribution needed to fund these benefits cannot be known with certainty. A primary responsibility of the Board of Trustees of a Retirement System is to establish and monitor a funding policy for the contributions made to the Retirement System.

While somewhat uncommon, in some jurisdictions, contributions are made by the plan sponsor as benefits come due. This is known as pay-as-you-go financing. More commonly, contributions for benefits are made in advance during the course of active employment of the members. This is known as actuarial pre-funding. For example, the State of North Carolina mandates for the Teachers' and State Employees' Retirement System (the "State Plan") that "on account of each member there shall be paid into the pension accumulation fund by employers an amount equal to a certain percentage of the actual compensation of each member to be known as the 'normal contribution'…" and further "the normal rate of contribution shall be determined by the actuary after each valuation."

The Actuarial Valuation Process

The following diagram summarizes the inputs and results of the actuarial valuation process. A narrative of the process follows the diagram. The reader may find it worthwhile to refer to the diagram from time to time.

Under the actuarial valuation process, current information about Retirement System members is collected annually by staff at the direction of the actuary, namely member data, asset data and information on benefit provisions. Member data is collected for each member of the Retirement System. The member data will assist the actuary in estimating benefits that could be paid in the future. The member information the actuary collects to estimate the amount of benefit includes elements such as current service, salary and benefit group identifier for members that have not separated service; for those that have, the actual benefit amounts are collected. The actuary collects information such as gender and date of birth to determine when a benefit might be paid and for how long. The actuary collects summary information about assets as of the valuation date and information on cash flows for the year ending on the valuation date. Information about

Appendix A: Valuation Process and Glossary of Actuarial Terms (continued)

benefit provisions as of the valuation date is also collected. To bridge the gap between the information collected and potential benefits to be paid in the future, the actuary must make assumptions about future activities. These assumptions are recommended by the actuary to the Boards based on the results of an experience review. An experience review is a review of the Retirement System over a period of time, typically five years, where the actuary analyzes the demographic and economic assumptions of the Retirement System. Based on this review, the actuary will make recommendations on the demographic assumptions, such as when members will be projected to retire, terminate, become disabled and/or die in the future, as well as the economic assumptions, such as what rate of return is projected to be earned by the fund based on the Retirement System investment policy and what level of future salary increases is expected for members. To maintain the assumptions, the Board should adopt a prudent policy of having an experience review being performed every five years. The next experience review for the North Carolina Retirement Systems will be based on the five-year period ending on December 31, 2019 and will be presented during 2020. Using these assumptions, the actuary is able to use the member data, asset data and benefit provision information collected to project the benefits that will be paid from the Retirement System to current members. These projected future benefit payments are based not only on service and pay through the valuation date but includes future pay and service, which has not yet been earned by the members but is expected to be earned.

These projected future benefit payments are discounted into today's dollars using the assumed rate of investment return assumption to determine the Present Value of Future Benefits (PVFB) of the Retirement System. The PVFB is an estimate of the value of the benefits promised to all members as of a valuation date. If the Retirement System held assets equal to the PVFB and all the assumptions were realized, there would be sufficient funds to pay off all the benefits to be paid in the future for members in the Retirement System as of the valuation date.

The PVFB is a large sum of money, typically much larger than the amount of Retirement System assets held in the trust. The next step is for the actuary to apply the Funding Policy as adopted by the Board to determine the employer contributions to be made to the Retirement System so that the gap between the PVFB and assets is systematically paid off over time. The Funding Policy is adopted by the Board based on discussions with the actuary. When the Board develops a funding policy, a balance between contributions which are responsive to the needs of the Retirement System yet stable should be struck. There are many different funding policies for the Board to consider, and the actuary is responsible for discussing the various features of the funding policies under consideration. Funding Policies are generally reviewed during an experience review, but it is not uncommon to review a funding policy in between, particularly during period where large increases or decreases in contributions are expected. The Funding Policy is composed of three components: the actuarial cost method, the asset valuation method, and the amortization method.

Once the PVFB is developed, an actuarial cost method is used to allocate the PVFB. Under the actuarial cost method, the PVFB is allocated to past, current and future service, respectively known as the actuarial accrued liability (AAL), normal cost (NC) and present value of future normal costs (PVFNC). The actuary computes the liability components (PVFB, NC, AAL, and PVFNC) for each participant in the Retirement System at the valuation date. These liability components are then totaled for the Retirement System. There are many actuarial cost methods. Different actuarial

Appendix A: Valuation Process and Glossary of Actuarial Terms (continued)

methods will produce different contribution patterns, but do not change the ultimate cost of the benefits. The entry age normal cost method is the most prevalent method used for public sector plans in the United States, because the expected normal cost is calculated in such a way that it will tend to stay level as a percent of pay over a member's career. Most of the North Carolina Retirement Systems use the entry age normal cost method.

The actuarial accrued liability (AAL) is also referred to as the amount of money the Retirement System should ideally have in the trust. The unfunded actuarial accrued liability (UAAL) is the portion of actuarial accrued liability that is not covered by the assets of the Retirement System. The UAAL can be a negative number, which means that the Retirement System has more assets than actuarial accrued liability. We refer to this condition as overfunded liability in this summary. Having UAAL does not indicate that the Retirement System is in failing actuarial health. UAAL is a common occurrence. Currently, many Retirement Systems in the United States have UAAL as a result of the Great Recession of 2008. Another related statistic of the Retirement System is the funded ratio. The funded ratio is the percent of the actuarial accrued liabilities covered by the actuarial value of assets. The assets used for these purposes are an actuarial value of assets (AVA), not market. The actuarial value of assets is based on the asset valuation method as recommended by the actuary and adopted by the Board. An actuarial value of assets is a smoothed, or averaged, value of assets, which is used to limit employer contribution volatility. Typically, assets are smoothed, or averaged, over a period of 3 to 5 years, although longer periods are becoming more common. By averaging returns, the UAAL is not as volatile, which we will see later results in contributions that are not as volatile as well. The North Carolina Retirement Systems use an actuarial value of assets with a smoothing period of 5 years.

While having UAAL is common, it is acceptable only if it is systematically being paid off. The method by which the UAAL is paid off is known as the amortization method. The concept is similar to that of a mortgage payment. The Board adopts the amortization method used to pay off the UAAL over a period of time. The amortization method is composed of the amortization period, the amount of payment increase, whether the period is open or closed and by the amount of amortization schedules. The amortization period is the amount of time over which the UAAL will be paid off. This is generally a period of thirty years or less, but actuaries are beginning to recommend shorter periods. The payments can be developed to stay constant from year to year like a mortgage, but often they are developed to increase each year at the same level payroll increases. Amortization type can be closed or open. Under a closed period, the UAAL is expected to be paid off over the amortization period. This is similar to a typical mortgage. Under an open period, the amortization period remains unchanged year after year. The concept is similar to re-mortgaging annually. In many instances, an amortization schedule is developed, whereby the UAAL is amortized over a closed period from the point the UAAL is incurred. Finally, some amortization methods are defined by a schedule of payments, where a new schedule of payments is added with each valuation. Regardless of the amortization type or period, the funding policy should generate a contribution that pays off the UAAL, which results in the funded ratio trending to 100% over time. Caution should be used when an open method is used, because typically an open amortization policy does not result in the UAAL being paid off. North Carolina pays off a much larger amount of UAAL compared to other states. While many states struggle to pay a 30-year level percent of pay UAAL contribution, which doesn't even reduce the amount of UAAL, North Carolina pays down the UAAL with level dollar payments over 12 years. This aggressive payment of UAAL results in North Carolina being home to many of the best funded Public Retirement Systems in the United States.

Appendix A: Valuation Process and Glossary of Actuarial Terms (continued)

To satisfy the requirements of the State of North Carolina, the actuary calculates the total annual contribution to the Retirement System as the normal cost plus a contribution towards UAAL. Said another way, this contribution is sufficient to pay for the cost of benefits accruing during the year (normal cost) plus the mortgage payment (UAAL payment). The total contribution is reduced by the amount of member contributions, if any, to arrive at the employer contribution. For the aggressive North Carolina contribution policy to be effective, the amounts that Conduent calculates need to be contributed. With very limited exception, North Carolina has contributed the amounts that Conduent has calculated, which has resulted in the North Carolina Retirements Systems being among the best funded in the United States.

An actuarial valuation report is produced annually, which contains the contribution for the fiscal year as well as the funded ratio of the Retirement System. The primary purpose of performing an actuarial valuation annually is to replace the estimated activities from the previous valuation, which were based on assumptions, with the actual experience of the Retirement System for the prior year. The experience gain (loss) is the difference between the expected and the actual UAAL of the Retirement System. An experience loss can be thought of as the amount of additional UAAL over and above the amount that was expected from the prior year due to deviation of actual experience from the assumption. Similarly, an experience gain can be thought of as having less UAAL than that which was expected from the prior year assumptions. As an example, if the Retirement System achieves an asset return of 15% when the assumption was a 7.20% return, an actuarial gain is said to have happened, which typically results in lower contributions and higher funded ratio, all else being equal. Alternatively, a return of 2% under the same circumstances would result in an actuarial loss, requiring an increase in contributions and a funded ratio that is lower than anticipated. Experience gains and losses are common within the valuation process. Typically gains and losses offset each other over time. To the extent that does not occur, the reasons for the gains and losses should be understood, and appropriate recommendations should be made by the actuary after an experience review to adjust the assumptions.

The actuarial valuation report will contain histories of key statistics from prior actuarial valuation reports. In particular, a history of the funded ratio of the Retirement System is an important exhibit. Trustees should understand the reason for the trend of the funded ratio of the Retirement System over time. The actuary will discuss the reasons for changes in the funded ratio of the Retirement System with each valuation report. To the extent that there are unexplained changes in funded ratio corrective action should be explored and the actuary will make recommendations as to whether there should be changes in the assumptions, funding policy, or some other portion of the actuarial valuation process.

In addition to historical information, projections of contributions and funded ratio based on current assumptions can sometimes be found in an actuarial valuation report. Projections of contributions can allow the employer to plan their budget accordingly. Surprises in Retirement System contributions to be paid by the employer serve no one. A one-year projection based on "bad" asset returns can provide ample time for the employer to plan, or allow for a discussion of changing the funding policy to occur. Contribution surprises are a primary contributor to employers considering pension reform. It is important to keep the employer apprised of future contribution requirements. A projection of funded ratio can serve the Trustees by illustrating the trend of the funded ratio over time. The funded ratio, under a prudent funding policy, should trend to 100% over a period of less than 30 years. (It is worthwhile to note that while 30 years has served as an industry standard for the longest period over which 100% funding should be achieved, that period is coming under scrutiny by the actuarial community and will likely be shortened.) If a projection of funded ratio does not trend to 100% over time, consideration should be given to fixing the funding policy to

Appendix A: Valuation Process and Glossary of Actuarial Terms (continued)

achieve this goal. For the North Carolina Retirement Systems, projections are generally performed for the January Board meetings. While the projection period has tended to be limited to five years, a longer projection would show the funded ratio trend to 100% much faster than other Public Retirement Systems.

The actuarial report will contain schedules of information about the census, plan and asset information submitted by Retirement System staff upon which the actuarial valuation is based. It is important that the Board of Trustees review that information and determine if the information is consistent with their understanding of the Retirement System. If after questioning staff, the Board of Trustees is not comfortable that the information provided is correct, the actuary should be notified to determine if the actuarial valuation report should be corrected.

Finally, the valuation report and/or presentation should contain sufficient information in an understandable fashion to allow the Board to take action and adopt the contribution rate for the upcoming year. It should also allow stakeholders to understand key observations over the past year that resulted in contributions increasing (or decreasing) and where contributions are headed. The actuary is always open to making the results understandable. Conduent works with the North Carolina Retirement Division to make your reports and presentations understandable and actionable. If something doesn't make sense – speak up!!

Appendix A: Valuation Process and Glossary of Actuarial Terms (continued)

Glossary

Note that the first definitions given are the "official" definitions of the term. For some terms there is a second definition, in italics, which is the unofficial definition.

Actuarial Accrued Liability (AAL). The portion of the Present Value of Projected Benefits (PVFB) allocated to past service. Also difference between (i) the actuarial present value of future benefits, and (ii) the present value of future normal cost. Sometimes referred to as "accrued liability" or "past service liability." *The amount of money that should be in the Fund. The funding target.*

Actuarial Assumptions. Estimates of future plan experience with respect to rates of mortality, disability, retirement, investment income and salary increases. Demographic ("people") assumptions (rates of mortality, separation, and retirement) are generally based on past experience, often modified for projected changes in conditions. Economic ("money") assumptions (salary increases and investment income) consist of an underlying rate appropriate in an inflation-free environment plus a provision for a long-term average rate of inflation. *Estimates of future events used to project what we know now- current member data, assets, and benefit provisions – into an estimate of future benefits.*

Actuarial Cost Method. A mathematical budgeting procedure for allocating the dollar amount of the Present Value of Projected Benefits (PVFB) between the normal costs to be paid in the future and the actuarial accrued liability. Sometimes referred to as the "actuarial funding method."

Actuarial Methods. The collective term for the Actuarial Cost Method, the Amortization Payment for UAAL Method, and the Asset Valuation Method used to develop the contribution requirements for the Retirement System. *The Funding Policy*.

Actuarial Equivalent. Benefits whose actuarial present values are equal.

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 Value of Assets (AVA). A smoothed value of assets which is used to limit contribution volatility. Also known as the funding value of assets. *Smoothed value of assets.*

Appendix A: Valuation Process and Glossary of Actuarial Terms (continued)

Amortization Payment for UAAL. Payment of the unfunded actuarial accrued liability by means of periodic contributions of interest and principal, as opposed to a lump sum payment. The components of the amortization payment for UAAL includes:

- Amortization Period Length – Generally amortization periods of up to 15 to 20 years (and certainly not longer than 25) are allowed. Similar to a mortgage, the shorter the amortization period, the higher the payment and the faster the UAAL is paid off.
- Amortization payment increases – Future payments can be level dollar, like a mortgage, or as a level percent of pay. Most Retirement Systems amortize UAAL as a level percent of pay which when combined with the employer normal cost that is developed as a level percent of pay can result in contributions that are easier to budget.
- Amortization type Amortization schedule can be closed or open. A closed amortization schedule is similar to a mortgage – at the end of the amortization period the UAAL is designed to be paid off. An open amortization period is similar to refinancing the UAAL year after year.
- Amortization schedule UAAL can be amortized over a single amortization period, or it can be amortized over a schedule.

The amortization payment for UAAL can be thought of as the UAAL mortgage payment.

Asset Valuation Method. The components of how the actuarial value of assets is to be developed.

Experience Gain Loss. A measure of the difference between actual experience and experience anticipated by a set of actuarial assumptions during the period between two actuarial valuation dates, in accordance with the actuarial cost method being used. *The experience Gain (Loss) represents how much the actuary missed the mark in a given year.*

Funded Ratio. The percent of the actuarial accrued liabilities covered by the actuarial value of assets. Also known as the funded status. *The ratio of how much money you actually have in the fund to the amount you should have in the fund.*

Normal Cost. The annual cost assigned, under the actuarial funding method, to current and subsequent plan years. Sometimes referred to as "current service cost." An amortization payment toward the unfunded actuarial accrued liability is paid in addition to the normal cost to arrive at the total contribution in a given year. *The cost of benefits accruing during the year*.

Present Value of Future Normal Cost (PVFNC). The portion of the Present Value of Projected Benefits (PVFB) allocated to future service. *The value in today's dollars of the amount of contribution to be made in the future for benefits accruing for members in the Retirement System as of the valuation date. Note that in practice, this number is rarely discussed.*

Appendix A: Valuation Process and Glossary of Actuarial Terms (continued)

Present Value of Future Benefits (PVFB). The projected future benefit payments of the plan are discounted into today's dollars using an assumed rate of investment return assumption to determine the Present Value of Future Benefits (PVFB) of the Retirement System. The PVFB is the discounted value of the projected benefits promised to all members as of a valuation date, including future pay and service for members which has not yet been earned. *If the Retirement System held assets equal to the PVFB and all the assumptions were realized, there would be sufficient funds to pay off all the benefits to be paid in the future for members in the Retirement System as of the valuation date.*

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 (UAAL). The difference between the actuarial accrued liability (AAL) and actuarial value of assets (AVA). The UAAL is sometimes referred to as "unfunded accrued liability." *Funding shortfall, or prefunded amount if negative.*

Valuation Date. The date that the actuarial valuation calculations are performed as of. *Also known as the "snapshot date".*

Appendix B: Detailed Tabulations of Member Data

Table B-1: The Number and Average Reported Compensation of Active Members Distributed by Age and Service as of December 31, 2016

Age	Years of Service										
	Under 1	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 & Up	Total
Under 25	3,078	4,313	15	0	0	0	0	0	0	0	7,406
	12,898	32,466	30,932	0	0	0	0	0	0	0	24,330
25 to 29	3,490	19,364	4,446	29	0	0	0	0	0	0	27,329
	12,200	36,308	40,215	35,475	0	0	0	0	0	0	33,864
30 to 34	2,096	11,696	11,738	5,104	39	0	0	0	0	0	30,673
	11,866	37,775	43,080	45,288	36,738	0	0	0	0	0	39,284
35 to 39	1,780	9,228	7,962	11,881	4,062	19	0	0	0	0	34,932
	11,865	38,395	44,874	48,959	51,305	46,990	0	0	0	0	43,619
40 to 44	1,548	8,385	7,183	8,613	9,660	3,272	27	0	0	0	38,688
	12,026	37,740	44,751	48,200	53,924	56,371	43,193	0	0	0	45,962
45 to 49	1,461	8,345	7,978	9,450	8,308	8,874	2,933	31	0	0	47,380
	11,690	38,523	43,814	46,914	50,883	58,110	59,987	49,833	0	0	47,432
50 to 54	1,159	6,757	6,784	8,419	7,399	5,787	5,844	1,086	6	0	43,241
	11,647	37,802	43,485	44,161	47,331	53,769	60,971	63,726	54,773	0	46,783
55 to 59	875	5,384	5,894	7,865	7,399	5,607	4,278	1,977	346	10	39,635
	11,699	39,099	42,970	43,960	46,218	50,401	58,111	66,049	65,031	44,026	46,586
60 to 64	394	3,163	4,090	5,337	4,757	3,815	2,406	1,098	515	163	25,738
	12,515	40,830	44,907	45,435	48,079	51,963	57,571	67,885	74,692	69,159	48,565
65 to 69	122	924	1,461	1,794	1,241	888	521	294	186	161	7,592
	12,519	40,864	46,323	50,107	53,843	56,207	63,984	81,200	86,879	78,156	52,626
70 & Up	39	317	387	590	415	232	160	79	76	104	2,399
	8,795	37,790	41,292	44,183	45,073	59,070	63,400	76,901	89,613	89,392	49,648
Total	16,042	77,876	57,938	59,082	43,280	28,494	16,169	4,565	1,129	438	305,013
	12,124	37,521	43,647	46,517	49,905	54,630	59,621	66,991	74,638	76,696	44,253

Appendix B: Detailed Tabulations of Member Data (continued)

Table B-2: The Number and Reported Compensation of Active Members Distributed by Age as of December 31, 2016

	Men		Women	
Age	Number	Compensation	Number	Compensation
18	1	$ 2,676	3	$ 52,555
19	18	161,936	15	130,584
20	53	804,333	49	392,540
21	156	2,574,633	134	1,620,144
22	296	6,328,811	577	9,863,835
23	651	14,156,292	1,807	39,387,657
24	1,022	26,825,578	2,624	77,888,719
25	1,240	38,499,960	3,283	103,302,055
26	1,488	48,166,263	3,852	126,054,640
27	1,708	56,939,609	4,057	139,221,055
28	1,779	61,974,993	4,036	140,935,039
29	1,691	60,496,445	4,195	149,884,745
30	1,773	67,318,702	4,091	151,680,611
31	1,842	72,364,713	4,200	158,518,015
32	1,915	77,412,056	4,190	161,516,701
33	1,901	79,629,728	4,283	168,097,961
34	2,008	86,232,245	4,470	182,171,969
35	2,063	89,067,174	4,679	193,047,281
36	2,096	94,149,560	4,788	201,808,400
37	2,193	102,314,207	4,818	204,201,136
38	2,129	101,368,536	4,920	212,876,999
39	2,213	105,830,711	5,033	219,034,866
40	2,205	109,312,820	5,169	225,500,546
41	2,218	109,746,504	5,019	222,613,721
42	2,286	115,381,432	5,501	242,985,914
43	2,409	119,626,640	5,511	245,010,622
44	2,551	128,568,191	5,819	259,425,391
45	2,813	143,568,072	6,297	285,006,331
46	3,087	158,827,236	6,964	313,036,359
47	2,906	155,983,617	6,931	316,081,218
48	2,867	152,943,139	6,574	298,841,969
49	2,733	146,587,347	6,208	276,460,829
50	2,665	141,033,007	6,222	278,024,669
51	2,647	139,670,331	5,935	262,333,872
52	2,575	133,303,301	6,059	268,225,105
53	2,631	138,437,562	5,999	265,074,085
54	2,609	136,897,950	5,899	259,931,573
55	2,491	128,550,067	5,941	262,250,605
56	2,488	128,700,646	5,724	253,365,348
57	2,313	116,984,950	5,540	248,653,332

Appendix B: Detailed Tabulations of Member Data (continued)

Table B-2: The Number and Reported Compensation of Active Members Distributed by Age as of December 31, 2016
(continued)

	Men		Women	
Age	Number	Compensation	Number	Compensation
58	2,352	$ 119,760,561	5,288	$ 234,927,936
59	2,279	116,838,381	5,219	236,418,793
60	2,167	114,583,467	4,861	221,132,697
61	1,957	101,825,696	4,026	184,124,224
62	1,779	95,684,896	3,443	155,408,241
63	1,457	80,365,614	2,712	128,609,422
64	1,171	65,177,638	2,165	103,064,313
65	977	56,008,584	1,656	81,391,774
66	760	45,209,662	1,166	57,452,824
67	537	31,202,686	729	32,757,821
68	451	28,650,989	532	24,901,119
69	356	22,610,418	428	19,350,797
70	341	20,619,162	376	16,645,155
71	190	11,251,124	204	8,787,036
72	143	7,797,722	160	6,700,573
73	126	7,114,645	121	4,971,476
74	100	5,594,718	112	4,300,963
75	69	3,555,878	69	2,936,260
76	57	2,958,424	48	1,870,969
77	42	2,922,851	33	1,579,402
78	39	1,790,843	24	881,136
79	24	1,066,334	18	655,626
80	16	776,336	10	404,306
81	11	682,271	9	415,041
82	9	489,471	6	132,752
83	10	528,922	4	159,162
84	4	340,591	4	125,914
85	4	404,841	4	155,349
86	1	54,071	1	35,034
87	2	106,764	1	28,851
88	1	30,878	1	37,435
89	1	75,832		
90			2	79,924
91			1	21,414
92	1	20,776		
Total	94,164	$ 4,542,843,019	210,849	$ 8,954,972,735

Appendix B: Detailed Tabulations of Member Data (continued)

Table B-3: The Number and Reported Compensation of Active Members Distributed by Service as of December 31, 2016

	Men		Women	
Service	Number	Compensation	Number	Compensation
0	4,537	$ 54,112,057	11,505	$ 140,389,978
1	7,741	269,776,360	16,023	506,971,314
2	6,525	274,990,531	13,758	517,821,159
3	5,650	237,799,016	11,569	441,751,884
4	5,304	230,081,747	11,306	442,776,625
5	4,557	203,342,186	9,253	377,891,807
6	3,845	180,633,680	7,751	326,633,766
7	3,346	157,372,555	6,568	280,969,892
8	2,739	137,168,012	5,864	248,577,482
9	4,334	205,275,025	9,681	410,948,350
10	3,918	197,327,027	9,235	396,557,768
11	3,857	193,522,867	9,471	416,215,164
12	3,507	177,290,808	8,403	378,250,395
13	3,213	164,848,108	7,790	353,651,597
14	2,879	151,814,007	6,809	318,855,681
15	2,455	135,016,813	6,200	291,625,521
16	2,562	143,094,584	6,777	318,795,540
17	2,512	138,629,144	6,517	309,840,857
18	2,384	135,409,505	6,156	293,861,948
19	2,189	124,852,352	5,528	268,750,929
20	1,991	114,800,118	4,834	241,694,336
21	1,859	112,170,019	4,381	224,163,521
22	1,657	98,188,917	3,833	201,718,554
23	1,811	110,180,811	3,552	189,817,297
24	1,407	89,401,505	3,169	174,496,032
25	1,384	86,368,408	2,758	153,452,029
26	980	64,390,101	2,039	117,749,097
27	1,177	75,629,390	2,183	126,358,704
28	975	62,528,650	2,062	118,589,097
29	806	53,997,316	1,805	104,952,594
30	517	37,466,152	1,117	68,951,608
31	316	23,438,356	678	42,537,686
32	267	20,122,500	589	37,270,615
33	222	17,146,119	448	28,398,102
34	152	13,084,264	259	17,400,821
35	107	8,945,727	176	12,340,315
36	107	8,987,060	136	8,630,110
37	76	6,978,769	157	10,166,947
38	72	6,422,543	127	8,515,378
39	62	6,073,647	109	7,205,500

Appendix B: Detailed Tabulations of Member Data (continued)

Table B-3: The Number and Reported Compensation of Active Members Distributed by Service as of December 31, 2016
(continued)

	Men		Women	
Service	Number	Compensation	Number	Compensation
40	40	$ 3,031,877	79	$ 5,800,341
41	25	2,020,356	51	3,750,493
42	22	1,523,519	33	2,530,900
43	23	2,025,219	35	2,250,796
44	10	869,114	20	1,333,631
45	16	1,410,071	17	1,113,778
46	4	436,737	12	855,380
47	6	628,804	12	802,584
48	3	341,183	3	195,819
49	11	1,239,223	3	251,243
50	1	96,175		
51	2	351,490		
52			1	65,195
53	1	94,795		
54			3	247,381
55			1	40,954
56	1	97,700	1	49,765
57			1	65,533
58				
59				
60				
61			1	72,942
Total	94,164	$ 4,542,843,019	210,849	$ 8,954,972,735

Appendix B: Detailed Tabulations of Member Data (continued)

Table B-4: The Number and Valuation Compensation of Disabled Members Distributed by Age as of December 31, 2016

	Men		Women	
Age	Number	Compensation	Number	Compensation
28			4	$ 90,438
29	3	$ 33,578	1	$ 28,914
30	1	18,782		
31	3	77,430	3	53,575
32			5	122,185
33	5	107,871	12	313,629
34	3	82,594	17	487,905
35	5	158,513	22	678,472
36	9	246,291	13	385,261
37	6	197,665	26	738,373
38	13	368,541	31	975,772
39	14	461,464	36	1,095,446
40	17	463,677	49	1,563,629
41	17	563,708	60	2,062,238
42	24	839,624	57	1,857,015
43	31	1,157,548	52	1,548,699
44	31	1,082,409	67	2,234,701
45	30	977,886	100	3,170,703
46	33	1,096,650	110	3,454,539
47	47	1,502,180	142	4,596,584
48	59	2,087,326	126	4,225,531
49	78	2,727,605	150	5,099,042
50	71	5,624,970	158	5,308,301
51	85	3,160,681	191	6,196,096
52	95	3,305,365	223	7,419,669
53	88	3,211,294	227	7,063,902
54	122	4,107,015	228	7,548,750
55	108	3,614,417	261	8,043,111
56	106	3,506,803	329	10,066,017
57	121	4,407,281	289	9,531,372
58	151	5,058,114	308	9,805,899
59	149	5,227,304	324	10,394,373
60	170	5,949,434	285	9,020,302
61	118	4,054,356	268	8,833,448
62	121	4,187,337	265	8,549,693
63	119	4,216,449	279	9,449,508
64	113	4,100,432	232	8,207,330
65	61	2,094,891	140	4,559,824
66	12	306,079	16	507,468
67	9	281,677	17	530,619

Appendix B: Detailed Tabulations of Member Data (continued)

Table B-4: The Number and Valuation Compensation of Disabled Members Distributed by Age as of December 31, 2016
(continued)

	Men		Women	
Age	Number	Compensation	Number	Compensation
68	13	$ 359,617	14	$ 406,441
69	6	159,392	12	362,979
70	5	238,390	13	392,736
71	6	176,608	8	230,115
72	2	56,829	6	299,977
73			1	15,410
74	2	40,700	2	42,521
75	1	15,420	3	228,561
76			1	30,525
77	1	20,811	1	10,175
78	2	75,442		
79	1	30,525		
81	1	30,525		
82	1	30,525		
83	1	30,525	1	30,525
85	1	30,525		
91			1	17,825
Total	2,291	$ 81,961,075	5,186	$ 167,886,123

Appendix B: Detailed Tabulations of Member Data (continued)

Table B-5: The Number and Accumulated Contributions of Terminated Vested Members Distributed by Age as of December 31, 2016

	Men		Women	
Age	Number	Contributions	Number	Contributions
18	2	$ 1,888	7	$ 9,233
19	1	$ 111	7	2,903
20	13	8,532	13	9,064
21	40	57,471	23	18,580
22	84	94,253	84	78,039
23	155	236,353	178	226,059
24	294	499,878	448	832,233
25	438	950,069	885	2,239,809
26	604	1,506,710	1,354	4,154,847
27	717	2,320,948	1,744	6,607,898
28	832	2,854,950	2,096	9,117,464
29	936	3,632,341	2,296	11,487,850
30	1,107	4,861,457	2,409	13,479,636
31	1,156	5,866,785	2,839	18,251,760
32	1,313	7,432,698	3,214	22,144,469
33	1,224	7,805,575	3,447	27,257,935
34	1,443	9,975,727	3,567	30,044,823
35	1,398	11,123,823	3,786	34,540,586
36	1,386	12,005,303	3,679	36,722,391
37	1,429	12,538,707	3,743	37,799,160
38	1,374	13,639,074	3,562	37,979,160
39	1,359	14,632,594	3,450	38,923,386
40	1,385	15,145,810	3,363	39,034,567
41	1,215	15,928,014	3,124	38,039,060
42	1,349	18,151,203	3,150	39,424,571
43	1,283	18,129,942	2,938	39,241,919
44	1,316	19,012,572	2,969	40,949,459
45	1,353	21,541,310	3,000	41,932,724
46	1,496	23,422,702	3,250	48,301,963
47	1,380	23,596,519	3,137	44,923,435
48	1,233	20,740,632	2,900	44,584,134
49	1,184	21,524,657	2,677	42,598,943
50	1,157	21,642,864	2,494	39,832,606
51	1,119	19,074,542	2,383	38,055,331
52	1,093	20,027,437	2,469	36,742,234
53	1,021	19,301,139	2,402	38,800,767
54	1,015	18,963,766	2,347	38,272,288
55	947	18,236,239	2,321	38,612,590
56	998	19,378,481	2,266	39,786,876
57	908	19,508,225	2,105	38,491,815

Appendix B: Detailed Tabulations of Member Data (continued)

Table B-5: The Number and Accumulated Contributions of Terminated Vested Members Distributed by Age as of December 31, 2016
(continued)

	Men		Women	
Age	Number	Contributions	Number	Contributions
58	891	$ 20,106,264	2,098	$ 40,159,439
59	886	18,909,826	2,023	38,924,613
60	802	16,945,810	1,770	35,802,816
61	645	12,236,800	1,374	25,716,421
62	633	12,186,244	1,354	23,139,750
63	531	9,276,570	1,141	19,457,522
64	507	8,908,008	986	16,735,732
65	450	6,801,246	727	10,897,834
66	322	3,974,732	560	7,311,259
67	262	2,050,370	541	5,587,325
68	263	2,633,036	420	4,071,069
69	223	1,817,762	352	3,647,031
70	159	1,988,439	237	2,345,373
71	63	740,899	99	1,222,988
72	42	389,539	40	392,999
73	24	212,685	27	368,852
74	23	199,144	22	263,007
75	16	61,443	19	221,139
76	13	381,104	15	148,399
77	14	70,777	12	91,533
78	13	152,255	9	40,724
79	7	100,927	10	84,499
80	9	43,216	7	92,097
81	5	40,407	4	57,943
82	7	55,231	6	51,697
83	2	2,776		
84	4	24,903	2	300
85	3	1,253		
86	2	5,306	3	666
87	2	1,699		
88	2	6,352		
89	1			
90	1	17,074	2	6,055
91	1	33	1	3
93	1	2,078	1	5
94			1	87
95			2	242
96			1	345
97			1	250
98			1	57
100			1	5
Total	45,586	$ 585,715,509	105,995	$ 1,296,392,643

Appendix B: Detailed Tabulations of Member Data (continued)

Table B-6: The Number and Annual Retirement Allowances of Retired Members (Healthy at Retirement) and Survivors of Deceased Members Distributed by Age as of December 31, 2016

	Men		Women	
Age	Number	Allowances	Number	Allowances
18	2	$ 11,285	2	$ 14,889
19	2	38,125	1	2,439
20	2	7,968	1	15,365
21	3	36,282	2	53,948
22	3	32,765	2	35,301
23	3	19,808	1	35,074
24			5	73,985
25	1	34,815	3	17,984
26	4	36,009	5	64,817
27	5	66,812	6	55,849
28	8	73,104	5	65,860
29	8	114,229	8	118,689
30	4	41,662	9	114,077
31	6	34,890	10	94,817
32	8	107,578	9	125,248
33	9	94,671	9	93,479
34	10	131,538	13	156,697
35	16	128,877	17	246,161
36	16	262,462	14	79,350
37	5	69,404	11	131,415
38	7	54,329	12	142,596
39	11	116,921	20	246,893
40	20	284,408	18	175,226
41	13	186,153	22	313,516
42	17	173,280	20	243,382
43	18	198,574	20	172,287
44	19	207,136	25	276,207
45	22	234,826	32	320,085
46	26	260,235	37	430,541
47	36	463,136	36	452,641
48	38	641,977	58	682,022
49	52	1,076,037	49	600,577
50	105	2,629,813	104	1,814,185
51	205	5,423,815	224	4,708,881
52	300	8,505,045	396	9,489,152

Appendix B: Detailed Tabulations of Member Data (continued)

Table B-6: The Number and Annual Retirement Allowances of Retired Members (Healthy at Retirement) and Survivors of Deceased Members Distributed by Age as of December 31, 2016 (continued)

	Men		Women	
Age	Number	Allowances	Number	Allowances
53	430	$ 12,409,937	540	$ 13,710,255
54	525	15,565,581	750	20,362,392
55	624	19,369,661	966	26,937,414
56	680	20,949,736	1,243	35,044,863
57	741	23,359,293	1,424	40,435,108
58	805	25,408,142	1,631	46,132,035
59	894	28,704,256	2,026	61,110,519
60	1,087	33,236,061	2,690	78,376,876
61	1,396	40,282,669	3,676	97,462,813
62	1,709	45,061,361	4,388	108,246,127
63	2,059	47,758,626	5,553	118,496,181
64	2,387	56,744,066	6,212	132,825,903
65	2,706	63,471,966	6,588	138,208,244
66	2,912	65,009,785	6,822	141,404,891
67	2,996	68,203,409	6,961	139,624,829
68	3,174	72,197,746	7,005	136,921,273
69	3,257	73,767,809	6,990	133,922,855
70	3,557	81,837,631	7,447	143,223,973
71	2,471	56,178,263	5,162	95,491,844
72	2,480	55,957,489	4,842	88,503,261
73	2,266	51,557,312	4,872	89,475,853
74	2,332	55,671,601	4,821	87,199,519
75	1,925	44,560,771	3,983	70,916,507
76	1,748	40,693,991	3,670	64,267,838
77	1,604	37,366,691	3,354	57,748,873
78	1,521	35,719,627	3,071	52,577,928
79	1,391	32,163,940	2,972	49,809,056
80	1,237	30,574,073	2,697	45,414,001
81	1,190	28,043,642	2,622	43,231,997
82	1,046	24,985,058	2,588	42,170,983
83	977	23,322,522	2,098	32,970,209
84	862	20,267,022	2,028	32,522,952
85	797	18,800,770	1,887	29,145,513
86	724	17,837,333	1,761	28,230,362
87	649	16,150,552	1,545	24,328,001

Appendix B: Detailed Tabulations of Member Data (continued)

Table B-6: The Number and Annual Retirement Allowances of Retired Members (Healthy at Retirement) and Survivors of Deceased Members Distributed by Age as of December 31, 2016 (continued)

	Men		Women	
Age	Number	Allowances	Number	Allowances
88	489	$ 11,716,858	1,405	$ 21,352,952
89	428	10,066,806	1,224	18,266,003
90	349	8,084,111	1,011	15,375,317
91	253	5,659,086	905	13,009,908
92	218	4,596,942	734	10,062,876
93	145	3,150,948	595	8,101,844
94	126	2,560,765	456	5,796,275
95	63	2,072,898	374	5,034,375
96	85	1,781,017	299	3,719,557
97	23	464,860	202	2,642,594
98	27	593,251	150	1,838,018
99	14	278,264	112	1,401,386
100	21	434,544	188	2,503,610
Total	60,404	$ 1,456,446,711	135,746	$ 2,677,219,598

Appendix B: Detailed Tabulations of Member Data (continued)

Table B-7: The Number and Annual Retirement Allowances of Retired Members (Healthy at Retirement) and Survivors of Deceased Members Distributed by Annuity Type as of December 31, 2016

	Men		Women	
Annuity Type	Number	Allowances	Number	Allowances
Maximum	20,869	$ 482,238,719	74,244	$ 1,435,380,013
Option 1	864	23,828,160	3,578	57,593,080
Option 2	10,001	238,275,101	5,523	88,630,968
Option 3	3,357	98,436,422	3,000	60,384,370
Option 4	9,006	226,609,243	22,875	522,998,692
Option 5-2	156	4,753,870	65	679,306
Option 5-3	98	3,281,344	98	1,720,554
Option 6-2	8,646	213,829,237	8,114	166,749,763
Option 6-3	4,149	126,196,481	6,810	169,738,942
Other	8	280,062	4	86,821
Survivors of Deceased Members	3,250	38,718,072	11,435	173,257,089
Total	60,404	$ 1,456,446,711	135,746	$ 2,677,219,598

Appendix B: Detailed Tabulations of Member Data (continued)

Table B-8: The Number and Annual Retirement Allowances of Retired Members (Disabled at Retirement) Distributed by Age of December 31, 2016

	Men		Women	
Age	Number	Allowances	Number	Allowances
50	2	$ 49,079		
51	4	64,096		
52	13	238,959	8	$ 147,690
53	11	237,042	17	353,565
54	13	299,436	28	612,580
55	28	525,231	45	940,320
56	27	584,713	55	1,122,908
57	31	697,254	42	888,784
58	40	833,586	71	1,420,485
59	57	1,319,628	72	1,670,396
60	70	1,588,745	127	2,615,231
61	104	2,191,792	225	4,637,770
62	119	2,365,957	254	5,145,658
63	130	2,675,168	299	5,956,281
64	156	3,129,358	380	7,777,025
65	232	4,153,847	518	9,694,960
66	273	4,662,167	661	11,442,287
67	292	4,792,044	581	9,693,487
68	281	4,670,770	562	10,003,060
69	321	5,737,359	561	9,494,068
70	286	5,332,551	569	9,672,950
71	202	3,509,813	409	6,616,534
72	166	2,707,597	403	6,325,934
73	170	2,661,296	364	5,243,691
74	164	2,908,404	370	5,809,760
75	117	2,031,800	295	4,356,312
76	122	1,782,786	229	3,064,380
77	119	1,810,559	185	2,553,184
78	62	803,072	190	2,420,449
79	80	1,182,040	183	2,402,583
80	43	641,071	91	1,242,550
81	42	773,400	78	952,451
82	34	561,810	53	752,860
83	22	361,965	56	781,730
84	16	345,285	41	462,805
85	19	294,214	32	444,508
86	25	368,964	40	471,258
87	13	177,837	36	508,152
88	7	140,937	32	329,119

Appendix B: Detailed Tabulations of Member Data (continued)

Table B-8: The Number and Annual Retirement Allowances of Retired Members (Disabled at Retirement) Distributed by Age of December 31, 2016 (continued)

	Men		Women	
Age	Number	Allowances	Number	Allowances
89	6	$ 71,975	27	$ 256,093
90	8	115,553	42	439,511
91	9	135,590	24	292,887
92	8	98,590	14	82,121
93	4	39,831	20	222,468
94	10	152,802	15	137,744
95	1	6,737	2	11,537
96	1	16,258	6	66,899
97			11	79,259
98	1	19,046	3	66,196
99			4	36,486
100			2	5,843
Total	3,961	$ 69,868,014	8,332	$ 139,724,809

Appendix B: Detailed Tabulations of Member Data (continued)

Table B-9: The Number and Annual Retirement Allowances of Retired Members (Disabled at Retirement) Distributed by Annuity Type of December 31, 2016

	Men		Women	
Annuity Type	Number	Allowances	Number	Allowances
Maximum	2,082	$ 39,139,933	6,049	$ 104,362,114
Option 1	94	1,735,801	298	4,390,281
Option 2	659	8,764,491	499	6,255,725
Option 3	238	4,366,197	240	3,579,324
Option 4	151	3,444,323	404	7,374,936
Option 5-2	3	44,311	3	9,608
Option 5-3	1	14,500	1	15,927
Option 6-2	498	7,560,236	461	6,816,295
Option 6-3	235	4,798,222	376	6,899,845
Other			1	20,754
Total	3,961	$ 69,868,014	8,332	$ 139,724,809

Appendix C: Summary of Main Benefit and Contribution Provisions

A summary of the main benefit provisions of the Retirement System and of the sources of revenue from which benefits are paid is presented in the following digest. Items in parentheses in the text are the provisions applicable to law enforcement officers.

"Average final compensation" as used in the summary means the average annual compensation during the four consecutive years of membership service which afford the highest such average. "Membership service" means service represented by regular contributions. "Creditable service" means membership service and may also include certain special purchased service.

BENEFITS

Unreduced Retirement Allowance

Condition for Allowance

An unreduced retirement allowance is payable to any member who retires from service:

(a) after age 65 (55) and completion of five years of creditable service;

(b) after age 60 and completion of 25 years of creditable service (not applicable to law enforcement officers); or

(c) after completion of 30 years of creditable service.

Amount of Allowance

1.82% of average final compensation multiplied by the number of years of creditable service.

In no event will a member whose creditable service commenced on or before June 30, 1963 receive a smaller retirement allowance than he would have received under the benefit provisions of the system in effect on that date.

Appendix C: Summary of Main Benefit and Contribution Provisions (continued)

Reduced Retirement Allowance

Condition for Allowance	A reduced retirement allowance is payable to any member who retires from service prior to becoming eligible for an unreduced retirement allowance but after age 60 and completion of five years of membership service (age 55 and five years of creditable service).
Amount of Allowance	The member's reduced retirement allowance is equal to 1.82% of average final compensation multiplied by the number of years of creditable service at date of retirement reduced by 1/4 of 1% for each month by which the member's age at retirement is less than age 65. In no event will a member whose creditable service commenced on or before June 30, 1963 receive a smaller retirement allowance than he would have received under the benefit provisions of the system in effect on that date.
	OR
Condition for Allowance	A reduced retirement allowance is payable to any member who retires from service after age 50 and completion of 20 (15) years of creditable service but prior to becoming eligible for a reduced or unreduced retirement allowance.
Amount of Allowance	The member's reduced retirement allowance is equal to 1.82% of average final compensation multiplied by the number of years of creditable service at date of retirement reduced by the lesser of: (i) 5/12 (1/3) of 1% for each month by which his age is less than 60 (55), plus, if the member is not a law enforcement officer, 1/4 of 1% for each month by which his age is less than 65. (ii) 5% times the difference between 30 years and his creditable service at retirement.

Appendix C: Summary of Main Benefit and Contribution Provisions (continued)

Deferred Retirement Allowance	Any member who separates from service after completing five or more years of membership service prior to becoming eligible for an unreduced or reduced retirement allowance and who leaves his total accumulated contributions in the system may receive a deferred retirement allowance, beginning at age 60 (55), computed in the same way as a reduced retirement allowance, or, if the member has 20 or more years of service, at age 50 computed in the same way as a reduced service retirement allowance, on the basis of his creditable service and compensation to the date of separation.
Return of Contributions	Upon the withdrawal of a member without a retirement allowance and upon his request, the member's contributions are returned, together with accumulated regular interest. Upon the death of a member before retirement, his contributions, together with the full accumulated regular interest thereon, are paid to his estate or to person(s) designated by the member unless the designated beneficiary, if eligible, elects the survivor's alternate benefit described below. The current interest rate on member contributions is 4%.
Survivor's Alternate Benefit	Upon the death of a member in service who has met conditions (a) or (b) below, his designated beneficiary may elect to receive a benefit equal to that which would have been payable under the provisions of Option 2 had the member retired on the first day of the month following his death and elected such option, in lieu of the member's accumulated contributions, provided the member had not instructed the Board of Trustees in writing that he did not wish the alternate benefit to apply.

Appendix C: Summary of Main Benefit and Contribution Provisions (continued)

	(a) age 60 (55) and completion five years of membership (creditable) service; or (b) completion of 20 years of creditable service. Members receiving a benefit from the Disability Income Plan are eligible for this benefit.
Death After Retirement	Upon the death of a beneficiary who did not retire under an effective election of Option 2 or Option 3, an amount equal to the excess if any, of his accumulated contributions at retirement over the retirement allowance payments received is paid to a designated person or to the beneficiary's estate. Upon the death of the survivor of a beneficiary who retired under an effective election of Option 2 or Option 3, an amount equal to the excess, if any, of the beneficiary's accumulated contributions at retirement over the total retirement allowance payments received is paid to such other person designated by the beneficiary or to the beneficiary's estate. Upon the death of a beneficiary, a benefit may be provided by the Retirees' Contributory Death Benefit Plan.
Other Death Benefits	Upon the death of a member in service, other benefits may be provided by the Death Benefit Plan or Separate Insurance Benefit Plan for Law Enforcement Officers.
Optional Arrangements at Retirement	In lieu of the full retirement allowance, any member may elect to receive a reduced retirement allowance equal in value to the full allowance, with the provision that: Option 1 - A member retiring prior to July 1, 1993, may elect that at his death within 10 years from his retirement date, an amount equal to his accumulated contributions at retirement, less 1/120 for each month he has received a retirement allowance, is paid to his estate, or to a person(s) designated by the member, or

Appendix C: Summary of Main Benefit and Contribution Provisions (continued)

	Option 2 - At the death of the member his allowance shall be continued throughout the life of such other person as the member shall have designated at the time of his retirement, or Option 3 - At the death of the member one-half of his allowance shall be continued throughout the life of such other person as the member shall have designated at the time of his retirement. Option 4 - A member may elect to receive a retirement allowance in such amount that, together with his Social Security benefit, he will receive approximately the same income per annum before and after the earliest age at which he becomes eligible to receive the Social Security benefit. Option 5 - A member retiring prior to July 1, 1993 may elect to receive a reduced retirement allowance under the provisions of Option 2 or Option 3 in conjunction with the provisions of Option 1. Option 6 - A member may elect either Option 2 or Option 3 with the added provision that in the event the designated beneficiary predeceases the member, the retirement allowance payable to the member after the designated beneficiary's death shall be equal to the retirement allowance which would have been payable had the member not elected the option.
Post-Retirement Increases in Allowances	Future increases in allowances may be granted at the discretion of the State.
Service Reciprocity	For the purpose of determining eligibility for a deferred, reduced or unreduced service retirement allowance, the membership and creditable service of a member shall include such prior service earned as a member of the Local Governmental Employees' Retirement System (LGERS), the Consolidated Judicial Retirement System (CJRS), or the Legislative Retirement System (LRS). In addition, if the member's accumulated contributions and reserves are transferred from the prior System to this System, the creditable service earned as a member of the prior System may be included for purposes of determining the amount of benefits payable under this System.

Appendix C: Summary of Main Benefit and Contribution Provisions (continued)

Military Service	For periods of active duty in the United States military may be counted as creditable service if the member was an employee upon entering the military and returned to employment within two years of discharge or for a period of 10 additional years.
Service Purchases	Additional creditable service may include service that the member purchased to restore a period of service for which the member (1) received a refund of contributions, (2) had a leave of absence for educational purposes, extended illness or parental or maternity reasons, (3) had full-time temporary or part-time local or State government employment, (4) was in a probationary or waiting period with a unit of the LGERS, (5) had a leave of absence under Workers' Compensation, (6) performed service with a unit of local government not covered by LGERS, (7) performed service with the federal government not covered by any other retirement system, (8) performed service with a public community service entity funded entirely with federal funds, (9) performed service as a member of the General Assembly, (10) performed service as a member of a charter school not participating in the system, (11) was employed by The University of North Carolina and participated in the Optional Retirement Program but not eligible to receive any benefits from that program, or (12) performed service which was omitted by reason of error.
Unused Sick Leave	Unused sick leave counts as creditable service at retirement. Sick leave which was converted from unused vacation leave is also creditable. One month of credit is allowed for each 20 days of unused sick leave, plus an additional month for any part of 20 days left over.
Transfer of Defined Contribution Balances (Special Retirement Allowances)	A member may make a one-time election to transfer any portion of their eligible accumulated contributions to this plan on or after retirement. Eligible accumulated contributions are those from the Supplemental Retirement Income Plan or Public Employee Deferred Compensation Plan, not including Roth after-tax contributions. A member who became a member of the Supplemental Retirement Income Plan prior to retirement and who remains a retirement and who remains a member of the Supplemental Retirement Income Plan may also make a one-time election to transfer eligible balances, not including any Roth after-tax contributions, from any of the following plans to the Supplemental Retirement Income Plan, subject to the applicable requirements of the Supplemental Retirement Income Plan, and then through the Supplemental Retirement Income Plan to this Retirement System:

Appendix C: Summary of Main Benefit and Contribution Provisions (continued)

(1) A plan participating in the North Carolina Public School Teachers' and Professional Educators' Investment Plan.

(2) A plan described in section 403(b) of the Internal Revenue Code.

(3) A plan described in section 457(b) of the Internal Revenue Code that is maintained by a state, political subdivision of a state, or any agency or instrumentality of a state or political subdivision of a state.

(4) An individual retirement account or annuity described in Section 408(a) or 408(b) of the Internal Revenue Code that is eligible to be rolled over and would otherwise be includible in gross income.

(5) A tax-qualified plan described in section 401(a) or 403(a) of the Internal Revenue Code.

The member may elect to convert the accumulated contributions to a life annuity with or without annual increases equal to the annual increase in the U.S. Consumer Price Index. Any ad-hoc COLA increases granted will not apply to benefits under this section. A member may elect Options 2, 3, or 6 under the Plan and may also elect either a guaranteed number of months of payments or a guarantee of total payments at least equal to the amount of contributions transferred to the Plan.

Contributions	
Member Contributions	Each member contributes 6% of his compensation.
Employer Contributions	Employers make annual contributions consisting of a normal contribution and an accrued liability contribution. The normal contribution covers the liability on account of current service and is determined by the actuary after each valuation. The accrued liability contribution covers the liability on account of service rendered before the establishment of the retirement system and the liability on account of increases in benefits for service rendered prior to the effective date of any amendment.
Changes Since Prior Valuation	A 1.0% cost-of-living adjustment was granted effective July 1, 2017 for retired members and survivor of deceased members receiving benefits as of July 1, 2016 (and a prorated increase for those who retired after July 1, 2016 but before June 30, 2017). Probation/parole officers were reclassified as law enforcement officers with respect to service rendered on or after July 1, 2017. Both of these changes were made pursuant to Session Law 2017-57 (Appropriations Act of 2017).

Appendix D: Actuarial Assumptions and Methods

Assumptions are based on the experience investigation prepared as of December 31, 2014 and adopted by the Board of Trustees on January 21, 2016 for use beginning with the December 31, 2015 annual actuarial valuation. The interest rate of 7.20% was adopted by the Board of Trustees on April 20, 2017.

Interest Rate: 7.20% per annum, compounded annually.

Inflation: Both general and wage inflation are assumed to be 3.00% per annum.

Real Wage Growth: 0.50% per annum.

Separations From Active Service: Representative values of the assumed rates of separation from active service are as follows:

Annual Rates of Withdrawal

	General Employees		Classroom Teachers		Law Enforcement Officers		Other Education	
Service	Male	Female	Male	Female	Male	Female	Male	Female
0	.180	.195	.190	.170	.130	.130	0.190	0.165
1	.155	.170	.160	.145	.100	.100	0.160	0.135
2	.130	.145	.140	.135	.090	.090	0.130	0.120
3	.110	.115	.120	.120	.060	.060	0.115	0.100
4	.090	.100	.095	.100	.060	.060	0.100	0.085

General Employees

	Annual Rates of					
	Withdrawal and Vesting*		Base Mortality**		Disability	
Age	Male	Female	Male	Female	Male	Female
25	.0800	.1100	.0005	.0002	.0002	.0002
30	.0700	.0850	.0005	.0002	.0004	.0004
35	.0525	.0600	.0005	.0003	.0010	.0010
40	.0400	.0450	.0006	.0004	.0030	.0018
45	.0350	.0375	.0010	.0007	.0050	.0032
50	.0350	.0375	.0017	.0011	.0084	.0050
55	.0350	.0375	.0028	.0017	.0144	.0088
60	.0350	.0375	.0047	.0024	.0240	.0138
65			.0083	.0037		
69			.0125	.0057		

* These rates apply only after five years of membership in the system.
** Base mortality rates as of 2014.

Appendix D: Actuarial Assumptions and Methods (continued)

Classroom Teachers

Age	Annual Rates of Withdrawal and Vesting*		Base Mortality**		Disability	
	Male	Female	Male	Female	Male	Female
25	.0800	.0900	.0003	.0001	.0001	.0002
30	.0700	.0750	.0003	.0002	.0001	.0003
35	.0450	.0450	.0004	.0002	.0003	.0006
40	.0350	.0340	.0004	.0003	.0007	.0010
45	.0325	.0325	.0007	.0006	.0014	.0018
50	.0325	.0325	.0012	.0009	.0023	.0032
55	.0325	.0325	.0020	.0014	.0047	.0055
60	.0325	.0325	.0033	.0021	.0077	.0102
65			.0058	.0031		
69			.0092	.0049		

* These rates apply only after five years of membership in the system.
** Base mortality rates as of 2014.

Other Education Employees

Age	Annual Rates of Withdrawal and Vesting*		Base Mortality**		Disability	
	Male	Female	Male	Female	Male	Female
25	.0800	.1200	.0003	.0001	.0002	.0002
30	.0600	.0700	.0003	.0002	.0004	.0004
35	.0450	.0450	.0004	.0002	.0010	.0010
40	.0400	.0400	.0004	.0003	.0030	.0018
45	.0400	.0375	.0007	.0006	.0050	.0032
50	.0400	.0375	.0012	.0009	.0084	.0050
55	.0400	.0375	.0020	.0014	.0144	.0088
60	.0400	.0375	.0033	.0021	.0240	.0138
65			.0058	.0031		
69			.0092	.0049		

* These rates apply only after five years of membership in the system.
** Base mortality rates as of 2014.

Appendix D: Actuarial Assumptions and Methods (continued)

Law Enforcement Officers

Age	Annual Rates of Withdrawal and Vesting*		Base Mortality**		Disability	
	Male	Female	Male	Female	Male	Female
25	.0400	.0400	.0005	.0002	.0033	.0033
30	.0350	.0350	.0005	.0002	.0043	.0043
35	.0300	.0300	.0005	.0003	.0060	.0060
40	.0300	.0300	.0006	.0004	.0079	.0079
45	.0400	.0400	.0010	.0007	.0110	.0110
50	.0400	.0400	.0017	.0011	.0176	.0176
55	.0400	.0400	.0028	.0017		
60	.0400	.0400	.0047	.0024		
65			.0083	.0037		
69			.0125	.0057		

* These rates apply only after five years of membership in the system.
** Base mortality rates as of 2014.

RETIREMENTS: Representative values of the assumed rates of retirement from active service are as follows:

General Employees - Males

Age	Service 5	10	15	20	25	30	35
50				0.0350	0.0800	0.3500	0.2000
55				0.0500	0.1000	0.3500	0.2000
60	0.0850	0.0850	0.0850	0.0850	0.2750	0.3000	0.2250
65	0.2500	0.2750	0.2750	0.2750	0.2750	0.2750	0.2750
70	0.3250	0.2250	0.2250	0.2250	0.2250	0.2250	0.2250
75	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

General Employees - Females

Age	Service 5	10	15	20	25	30	35
50				0.0350	0.0600	0.4000	0.3000
55				0.0500	0.0800	0.3250	0.2250
60	0.0950	0.0950	0.0950	0.0950	0.2500	0.3000	0.2000
65	0.4000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
70	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
75	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Appendix D: Actuarial Assumptions and Methods (continued)

Classroom Teachers - Males

	Service						
Age	5	10	15	20	25	30	35
50				0.0250	0.0650	0.3000	0.3000
55				0.0450	0.0900	0.3250	0.2500
60	0.1200	0.1200	0.1200	0.1200	0.3000	0.2500	0.2500
65	0.3000	0.3250	0.3250	0.3250	0.2000	0.2000	0.2000
70	0.2250	0.2250	0.2250	0.2250	0.2250	0.2250	0.2250
75	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Classroom Teachers - Females

	Service						
Age	5	10	15	20	25	30	35
50				0.0350	0.0550	0.2750	0.2750
55				0.0600	0.0950	0.4000	0.3000
60	0.1350	0.1350	0.1350	0.1350	0.4500	0.5000	0.3250
65	0.3500	0.3750	0.3750	0.3750	0.3500	0.3500	0.3500
70	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
75	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Other Education Employees - Males

	Service						
Age	5	10	15	20	25	30	35
50				0.0350	0.0800	0.3000	0.1500
55				0.0400	0.1000	0.2500	0.2000
60	0.0900	0.0900	0.0900	0.0900	0.2250	0.2500	0.2500
65	0.2750	0.3000	0.3000	0.3000	0.2750	0.2750	0.2750
70	0.2250	0.2250	0.2250	0.2250	0.2250	0.2250	0.2250
75	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Other Education Employees - Females

	Service						
Age	5	10	15	20	25	30	35
50				0.0400	0.0550	0.3250	0.2250
55				0.0500	0.0900	0.2250	0.2250
60	0.1100	0.1100	0.1100	0.1100	0.2500	0.2500	0.2500
65	0.2500	0.2750	0.2750	0.2750	0.3500	0.3500	0.3500
70	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
75	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Appendix D: Actuarial Assumptions and Methods (continued)

Law Enforcement Officers

	Service						
Age	5	10	15	20	25	30	35
50			0.0900	0.0900	0.0900	0.6000	0.6000
55	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000
60	0.2000	0.2000	0.2000	0.2000	0.2000	0.5000	0.5000
65	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
70	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
75	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Salary Increases: Representative values of the assumed annual rates of salary increases are as follows:

	Annual Rate of Salary Increase			
ervice	Classroom Teachers	Other Education Employees	General Employees	Law Enforcement Officers
0	7.55%	7.00%	5.50%	8.10%
5	6.05	6.25	4.50	6.10
10	5.10	5.50	4.00	4.40
15	4.35	4.75	3.50	3.95
20	3.65	4.00	3.50	3.65
25	3.50	3.50	3.50	3.50
30	3.50	3.50	3.50	3.50
35	3.50	3.50	3.50	3.50
40	3.50	3.50	3.50	3.50
45	3.50	3.50	3.50	3.50
50	3.50	3.50	3.50	3.50

Appendix D: Actuarial Assumptions and Methods (continued)

Representative values of the assumed post-retirement mortality rates in 2014 prior to any mortality improvements are as follows:

Annual Rate of Death after Retirement
(Members Healthy at Retirement)

Age	Classroom Teachers & Other Education		General Employees		Law Enforcement Officers	
	Male	Female	Male	Female	Male	Female
55	.0036	.0021	0062	.0029	.0057	.0036
60	.0048	.0030	.0084	.0042	.0078	.0052
65	.0070	.0051	.0119	.0065	.0110	.0080
70	.0114	.0082	.0181	.0104	.0168	.0129
75	.0196	.0137	.0290	.0170	.0268	.0209
80	.0448	.0329	.0555	.0394	.0447	.0348

Annual Rate of Death after Retirement
(Survivors of Deceased Members and Members Disabled at Retirement)

Age	Male Survivors of Deceased Members	Female Survivors of Deceased Members	Male Retired Members Disabled at Retirement	Female Retired Members Disabled at Retirement
55	.0071	.0045	.0241	.0143
60	.0096	.0064	.0274	.0168
65	.0135	.0099	.0326	.0207
70	.0206	.0158	.0416	.0279
75	.0330	.0258	.0559	.0406
80	.0550	.0429	.0789	.0604

Deaths After Retirement (General Employees): Mortality rates are based on the RP-2014 Total Data Set for Healthy Annuitants Mortality Table. Rates for male members are multiplied by 108% for ages 50-78 and by 124% for ages greater than 78. Rates for female members are multiplied by 81% for ages 50-78 and by 113% for ages greater than 78. The RP-2014 annuitant tables have no rates prior to age 50. The RP-2014 Total Data Set Employee Mortality Table (with no adjustments) is used for ages less than 50.

Deaths After Retirement (Teachers and Other Education Employees): Mortality rates are based on the RP-2014 Total Data Set for Healthy Annuitants Mortality Table (with White-Collar Adjustment). Rates for male members are multiplied by 92% for ages 50-78 and by 120% for ages greater than 78. Rates for female members are multiplied by 78% for ages 50-78 and by 108% for ages greater than 78. The RP-2014 annuitant tables have no rates prior to age 50. The RP-2014 Total Data Set Employee Mortality Table (with White Collar Adjustment) is used for ages less than 50.

Appendix D: Actuarial Assumptions and Methods (continued)

Deaths After Retirement (Law Enforcement Officers): Mortality rates are based on the RP-2014 Total Data Set for Healthy Annuitants Mortality Table. The RP-2014 annuitant tables have no rates prior to age 50. The RP-2014 Total Data Set Employee Mortality Table (with no adjustments) is used for ages less than 50.

Deaths After Retirement (Survivors of Deceased Members): Mortality rates are based on the RP-2014 Total Data Set for Healthy Annuitants Mortality Table. Rates for all members are multiplied by 123% for ages greater than 50. The RP-2014 annuitant tables have no rates prior to age 50. The RP-2014 Total Data Set Employee Mortality Table (with no adjustments) is used for ages less than 50.

Death After Retirement (Disabled Members at Retirement): Mortality rates are based on the RP-2014 Total Data Set for Disabled Annuitants Mortality Table. Rates for male members are multiplied by 103% for all ages. Rates for female members are multiplied by 99% for all ages.

Deaths Prior to Retirement: Mortality Rates are based on the RP-2014 Total Data Set Employee Mortality Table for general employees and law enforcement officers. Mortality rates are based on the RP-2014 White Collar Employee Mortality Table for teachers and other education employees.

Mortality Projection: All mortality rates are projected from 2014 using generational improvement with Scale MP-2015.

Timing of Assumptions: All withdrawals, deaths, disabilities, retirements and salary increases are assumed to occur on July 1 of each year.

Leave Conversions: Sick leave can be converted to increase creditable service and used to meet the eligibility requirements for retirement. Unused vacation leave can be converted to increase creditable service or compensation, but does not add to the eligibility service. The assumed impact of these conversions is shown in the table below.

	Classroom Teachers		General		Law Enforcement		Other Education	
	Males	Females	Males	Females	Males	Females	Males	Females
Increase in AFC	2.00%	2.00%	2.50%	2.50%	1.75%	1.75%	1.75%	1.75%
Increase in Creditable Service (years)								
Credited	1.10	0.85	1.00	0.70	1.50	1.50	1.30	1.00
Eligibility	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Appendix D: Actuarial Assumptions and Methods (continued)

Liability for Inactive Members: The data provided for inactive members does not contain all the elements to calculate the member's deferred benefit. The liability for these members is estimated to be 200% of the member's accumulated contributions. The actuary is collecting data so that future members' deferred benefits can be estimated.

Administrative Expenses: 0.10% of payroll.

Marriage Assumption: 100% married with male spouses four years older than female spouses.

Reported Compensation: Calendar year compensation as furnished by the system's office.

Valuation Compensation: Reported compensation adjusted to reflect the assumed rate of pay as of the valuation date.

Actuarial Cost Method: Entry age normal cost method. Entry age is established on an individual basis.

Amortization Period: 12-year closed, level-dollar amount. The first amortization base was created for the contribution payable for fiscal year ending 2012.

Asset Valuation Method: Actuarial value, as developed in Table 8. Actuarial value of assets is based upon a smoothed market value method. Under this method, asset returns in excess of or less than the expected return on market value of assets will be reflected in the actuarial value of assets over a five-year period. The calculation of the Actuarial Value of Assets is based on the following formula:

$MV - 80\% \times G/(L)_1 - 60\% \times G/(L)_2 - 40\% \times G/(L)_3 - 20\% \times G/(L)_4$

MV = the market value of assets as of the valuation date

$G/(L)_i$ = the asset gain or (loss) for the i-th year preceding the valuation date

Changes Since Prior Valuation: The interest rate was changed from 7.25% to 7.20%.

Appendix E: GASB 67 Fiduciary Net Position Projection

Table E-1: Projection of Fiduciary Net Positions

(in thousands)

Calendar Year	Beginning Fiduciary Position	Member Contributions	Employer Contributions	Benefit Payments	Administrative Expenses	Investment Earnings	Ending Fiduciary Position
2017	$ 64,246,524	$ 856,926	$ 1,449,303	$ 4,738,254	$ 14,787	$ 4,539,195	$ 66,338,907
2018	66,338,907	810,812	1,609,956	4,865,354	13,992	4,689,432	68,569,761
2019	68,569,761	771,685	1,759,570	4,992,344	13,316	4,849,492	70,944,848
2020	70,944,848	736,409	1,870,208	5,119,242	12,708	5,018,697	73,438,212
2021	73,438,212	704,296	1,984,732	5,250,282	12,153	5,195,301	76,060,106
2022	76,060,106	673,805	1,770,527	5,396,304	11,627	5,371,401	78,467,908
2023	78,467,908	643,801	1,564,081	5,556,808	11,110	5,533,725	80,641,597
2024	80,641,597	613,542	1,600,389	5,721,011	10,587	5,681,793	82,805,723
2025	82,805,723	583,350	1,526,758	5,887,458	10,066	5,828,841	84,847,148
2026	84,847,148	553,083	1,449,429	6,057,237	9,544	5,965,317	86,748,196
2027	86,748,196	522,566	1,426,513	6,227,110	9,018	6,094,082	88,555,229
2028	88,555,229	492,259	1,423,273	6,399,281	8,495	6,216,819	90,279,804
2029	90,279,804	461,933	1,235,929	6,574,432	7,971	6,330,453	91,725,716
2030	91,725,716	431,545	908,025	6,749,916	7,447	6,414,822	92,722,745
2031	92,722,745	401,170	686,977	6,921,617	6,923	6,470,667	93,353,019
2032	93,353,019	371,149	519,968	7,086,576	6,405	6,503,311	93,654,466
2033	93,654,466	341,391	354,433	7,243,830	5,891	6,512,500	93,613,069
2034	93,613,069	312,174	257,904	7,391,176	5,387	6,498,750	93,285,334
2035	93,285,334	283,911	235,513	7,529,486	4,899	6,468,327	92,738,700
2036	92,738,700	256,398	204,665	7,654,985	4,424	6,422,807	91,963,161
2037	91,963,161	229,935	154,801	7,752,828	3,968	6,360,850	90,951,951
2038	90,951,951	204,476	121,643	7,815,668	3,528	6,283,478	89,742,352
2039	89,742,352	181,348	105,615	7,859,004	3,129	6,193,483	88,360,665
2040	88,360,665	159,596	90,056	7,890,811	2,754	6,091,570	86,808,322
2041	86,808,322	138,333	75,287	7,914,373	2,387	5,977,705	85,082,887
2042	85,082,887	117,752	61,390	7,928,062	2,032	5,851,784	83,183,719
2043	83,183,719	97,949	48,826	7,929,845	1,690	5,713,847	81,112,806
2044	81,112,806	79,502	37,379	7,915,832	1,372	5,564,191	78,876,674
2045	78,876,674	62,373	27,182	7,885,867	1,076	5,403,293	76,482,579
2046	76,482,579	46,716	18,921	7,834,239	806	5,231,908	73,945,079
2047	73,945,079	33,563	13,596	7,748,552	579	5,051,594	71,294,701
2048	71,294,701	24,446	9,959	7,629,166	422	4,864,544	68,564,062
2049	68,564,062	18,115	7,212	7,487,570	313	4,672,629	65,774,135
2050	65,774,135	13,379	5,193	7,331,399	231	4,477,044	62,938,121
2051	62,938,121	9,845	3,719	7,159,732	170	4,278,748	60,070,531
2052	60,070,531	7,212	2,639	6,973,434	124	4,078,741	57,185,565
2053	57,185,565	5,257	1,869	6,772,800	91	3,878,027	54,297,827
2054	54,297,827	3,820	1,318	6,557,932	66	3,677,639	51,422,606
2055	51,422,606	2,768	914	6,327,421	48	3,478,728	48,577,547
2056	48,577,547	1,996	638	6,090,310	34	3,282,235	45,772,072
2057	45,772,072	1,439	439	5,661,419	25	3,095,386	43,207,892
2058	43,207,892	1,036	296	5,429,344	18	2,918,956	40,698,818
2059	40,698,818	740	201	5,197,407	13	2,746,493	38,248,832
2060	38,248,832	526	129	4,966,278	9	2,578,260	35,861,460
2061	35,861,460	369	80	4,736,310	6	2,414,497	33,540,090
2062	33,540,090	255	46	4,507,910	4	2,255,433	31,287,910
2063	31,287,910	172	26	4,281,455	3	2,101,283	29,107,933
2064	29,107,933	114	10	4,057,342	2	1,952,249	27,002,962
2065	27,002,962	70	4	3,835,943	1	1,808,522	24,975,614
2066	24,975,614	39	2	3,617,634	1	1,670,275	23,028,295

Appendix E: GASB 67 Fiduciary Net Position Projection (continued)

Table E-1: Projection of Fiduciary Net Positions (continued)

(in thousands)

Calendar Year	Beginning Fiduciary Position	Member Contributions	Employer Contributions	Benefit Payments	Administrative Expenses	Investment Earnings	Ending Fiduciary Position
2067	$ 23,028,295	$ 19	$ 1	$ 3,402,812	$ 0	$ 1,537,665	$ 21,163,168
2068	21,163,168	8	0	3,191,883	0	1,410,839	19,382,132
2069	19,382,132	2	1	2,985,286	0	1,289,910	17,686,759
2070	17,686,759	1	0	2,783,505	0	1,174,982	16,078,237
2071	16,078,237	0	0	2,587,034	0	1,066,119	14,557,322
2072	14,557,322	0	0	2,396,330	0	963,359	13,124,351
2073	13,124,351	0	0	2,211,827	0	866,712	11,779,236
2074	11,779,236	0	0	2,033,902	0	776,157	10,521,491
2075	10,521,491	0	0	1,862,866	0	691,649	9,350,274
2076	9,350,274	0	0	1,698,979	0	613,120	8,264,415
2077	8,264,415	0	0	1,542,465	0	540,475	7,262,425
2078	7,262,425	0	0	1,393,523	0	473,599	6,342,501
2079	6,342,501	0	0	1,252,331	0	412,360	5,502,530
2080	5,502,530	0	0	1,119,051	0	356,596	4,740,075
2081	4,740,075	0	0	993,828	0	306,130	4,052,377
2082	4,052,377	0	0	876,785	0	260,755	3,436,347
2083	3,436,347	0	0	768,011	0	220,248	2,888,584
2084	2,888,584	0	0	667,549	0	184,365	2,405,400
2085	2,405,400	0	0	575,388	0	152,835	1,982,847
2086	1,982,847	0	0	491,460	0	125,380	1,616,767
2087	1,616,767	0	0	415,631	0	101,704	1,302,840
2088	1,302,840	0	0	347,713	0	81,505	1,036,632
2089	1,036,632	0	0	287,463	0	64,468	813,637
2090	813,637	0	0	234,591	0	50,284	629,330
2091	629,330	0	0	188,761	0	38,635	479,204
2092	479,204	0	0	149,584	0	29,211	358,831
2093	358,831	0	0	116,604	0	21,710	263,937
2094	263,937	0	0	89,306	0	15,845	190,476
2095	190,476	0	0	67,114	0	11,340	134,702
2096	134,702	0	0	49,422	0	7,950	93,230
2097	93,230	0	0	35,612	0	5,453	63,071
2098	63,071	0	0	25,073	0	3,654	41,652
2099	41,652	0	0	17,223	0	2,390	26,819
2100	26,819	0	0	11,524	0	1,523	16,818
2101	16,818	0	0	7,501	0	946	10,263
2102	10,263	0	0	4,744	0	571	6,090
2103	6,090	0	0	2,912	0	336	3,514
2104	3,514	0	0	1,733	0	191	1,972
2105	1,972	0	0	1,001	0	107	1,078
2106	1,078	0	0	561	0	58	575
2107	575	0	0	306	0	30	299
2108	299	0	0	163	0	16	152
2109	152	0	0	85	0	8	75
2110	75	0	0	43	0	4	36
2111	36	0	0	21	0	1	16
2112	16	0	0	10	0	1	7
2113	7	0	0	5	0	1	3
2114	3	0	0	2	0	0	1
2115	1	0	0	1	0	0	0
2116	0	0	0	0	0	0	0

Appendix E: GASB 67 Fiduciary Net Position Projection (continued)

Table E-2: Actuarial Present Value of Projected Benefit Payments

(in thousands)

Calendar Year	Beginning Fiduciary Position	Benefit Payments	Funded Benefit Payments	Unfunded Benefit Payments	Present Value of Benefit Payments		
					Funded Payments at 7.20%	Unfunded Payments at 3.13%	Using Single Discount Rate of 7.20%
2017	$ 64,246,524	$ 4,738,254	$ 4,738,254	$ 0	$ 4,576,368	$ 0	$ 4,576,368
2018	66,338,907	4,865,354	4,865,354	0	4,383,513	0	4,383,513
2019	68,569,761	4,992,344	4,992,344	0	4,195,827	0	4,195,827
2020	70,944,848	5,119,242	5,119,242	0	4,013,506	0	4,013,506
2021	73,438,212	5,250,282	5,250,282	0	3,839,778	0	3,839,778
2022	76,060,106	5,396,304	5,396,304	0	3,681,502	0	3,681,502
2023	78,467,908	5,556,808	5,556,808	0	3,536,383	0	3,536,383
2024	80,641,597	5,721,011	5,721,011	0	3,396,346	0	3,396,346
2025	82,805,723	5,887,458	5,887,458	0	3,260,409	0	3,260,409
2026	84,847,148	6,057,237	6,057,237	0	3,129,134	0	3,129,134
2027	86,748,196	6,227,110	6,227,110	0	3,000,829	0	3,000,829
2028	88,555,229	6,399,281	6,399,281	0	2,876,677	0	2,876,677
2029	90,279,804	6,574,432	6,574,432	0	2,756,915	0	2,756,915
2030	91,725,716	6,749,916	6,749,916	0	2,640,394	0	2,640,394
2031	92,722,745	6,921,617	6,921,617	0	2,525,708	0	2,525,708
2032	93,353,019	7,086,576	7,086,576	0	2,412,222	0	2,412,222
2033	93,654,466	7,243,830	7,243,830	0	2,300,140	0	2,300,140
2034	93,613,069	7,391,176	7,391,176	0	2,189,298	0	2,189,298
2035	93,285,334	7,529,486	7,529,486	0	2,080,472	0	2,080,472
2036	92,738,700	7,654,985	7,654,985	0	1,973,086	0	1,973,086
2037	91,963,161	7,752,828	7,752,828	0	1,864,091	0	1,864,091
2038	90,951,951	7,815,668	7,815,668	0	1,752,985	0	1,752,985
2039	89,742,352	7,859,004	7,859,004	0	1,644,314	0	1,644,314
2040	88,360,665	7,890,811	7,890,811	0	1,540,083	0	1,540,083
2041	86,808,322	7,914,373	7,914,373	0	1,440,935	0	1,440,935
2042	85,082,887	7,928,062	7,928,062	0	1,346,480	0	1,346,480
2043	83,183,719	7,929,845	7,929,845	0	1,256,328	0	1,256,328
2044	81,112,806	7,915,832	7,915,832	0	1,169,876	0	1,169,876
2045	78,876,674	7,885,867	7,885,867	0	1,087,172	0	1,087,172
2046	76,482,579	7,834,239	7,834,239	0	1,007,513	0	1,007,513
2047	73,945,079	7,748,552	7,748,552	0	929,565	0	929,565
2048	71,294,701	7,629,166	7,629,166	0	853,771	0	853,771
2049	68,564,062	7,487,570	7,487,570	0	781,646	0	781,646
2050	65,774,135	7,331,399	7,331,399	0	713,940	0	713,940
2051	62,938,121	7,159,732	7,159,732	0	650,394	0	650,394
2052	60,070,531	6,973,434	6,973,434	0	590,924	0	590,924
2053	57,185,565	6,772,800	6,772,800	0	535,376	0	535,376
2054	54,297,827	6,557,932	6,557,932	0	483,573	0	483,573
2055	51,422,606	6,327,421	6,327,421	0	435,239	0	435,239
2056	48,577,547	6,090,310	6,090,310	0	390,792	0	390,792
2057	45,772,072	5,661,419	5,661,419	0	338,873	0	338,873
2058	43,207,892	5,429,344	5,429,344	0	303,154	0	303,154
2059	40,698,818	5,197,407	5,197,407	0	270,713	0	270,713
2060	38,248,832	4,966,278	4,966,278	0	241,300	0	241,300
2061	35,861,460	4,736,310	4,736,310	0	214,670	0	214,670
2062	33,540,090	4,507,910	4,507,910	0	190,595	0	190,595
2063	31,287,910	4,281,455	4,281,455	0	168,863	0	168,863
2064	29,107,933	4,057,342	4,057,342	0	149,276	0	149,276
2065	27,002,962	3,835,943	3,835,943	0	131,651	0	131,651
2066	24,975,614	3,617,634	3,617,634	0	115,820	0	115,820

Appendix E: GASB 67 Fiduciary Net Position Projection (continued)

Table E-2: Actuarial Present Value of Projected Benefit Payments (continued)

(in thousands)

Calendar Year	Beginning Fiduciary Position	Benefit Payments	Funded Benefit Payments	Unfunded Benefit Payments	Present Value of Benefit Payments: Funded Payments at 7.20%	Present Value of Benefit Payments: Unfunded Payments at 3.13%	Present Value of Benefit Payments: Using Single Discount Rate of 7.20%
2067	$ 23,028,295	$ 3,402,812	$ 3,402,812	$ 0	$ 101,625	$ 0	$ 101,625
2068	21,163,168	3,191,883	3,191,883	0	88,923	0	88,923
2069	19,382,132	2,985,286	2,985,286	0	77,582	0	77,582
2070	17,686,759	2,783,505	2,783,505	0	67,479	0	67,479
2071	16,078,237	2,587,034	2,587,034	0	58,504	0	58,504
2072	14,557,322	2,396,330	2,396,330	0	50,552	0	50,552
2073	13,124,351	2,211,827	2,211,827	0	43,526	0	43,526
2074	11,779,236	2,033,902	2,033,902	0	37,336	0	37,336
2075	10,521,491	1,862,866	1,862,866	0	31,900	0	31,900
2076	9,350,274	1,698,979	1,698,979	0	27,139	0	27,139
2077	8,264,415	1,542,465	1,542,465	0	22,984	0	22,984
2078	7,262,425	1,393,523	1,393,523	0	19,370	0	19,370
2079	6,342,501	1,252,331	1,252,331	0	16,238	0	16,238
2080	5,502,530	1,119,051	1,119,051	0	13,536	0	13,536
2081	4,740,075	993,828	993,828	0	11,214	0	11,214
2082	4,052,377	876,785	876,785	0	9,229	0	9,229
2083	3,436,347	768,011	768,011	0	7,541	0	7,541
2084	2,888,584	667,549	667,549	0	6,114	0	6,114
2085	2,405,400	575,388	575,388	0	4,916	0	4,916
2086	1,982,847	491,460	491,460	0	3,917	0	3,917
2087	1,616,767	415,631	415,631	0	3,090	0	3,090
2088	1,302,840	347,713	347,713	0	2,412	0	2,412
2089	1,036,632	287,463	287,463	0	1,860	0	1,860
2090	813,637	234,591	234,591	0	1,416	0	1,416
2091	629,330	188,761	188,761	0	1,063	0	1,063
2092	479,204	149,584	149,584	0	786	0	786
2093	358,831	116,604	116,604	0	571	0	571
2094	263,937	89,306	89,306	0	408	0	408
2095	190,476	67,114	67,114	0	286	0	286
2096	134,702	49,422	49,422	0	197	0	197
2097	93,230	35,612	35,612	0	132	0	132
2098	63,071	25,073	25,073	0	87	0	87
2099	41,652	17,223	17,223	0	56	0	56
2100	26,819	11,524	11,524	0	35	0	35
2101	16,818	7,501	7,501	0	21	0	21
2102	10,263	4,744	4,744	0	12	0	12
2103	6,090	2,912	2,912	0	7	0	7
2104	3,514	1,733	1,733	0	4	0	4
2105	1,972	1,001	1,001	0	2	0	2
2106	1,078	561	561	0	1	0	1
2107	575	306	306	0	1	0	1
2108	299	163	163	0	0	0	0
2109	152	85	85	0	0	0	0
2110	75	43	43	0	0	0	0
2111	36	21	21	0	0	0	0
2112	16	10	10	0	0	0	0
2113	7	5	5	0	0	0	0
2114	3	2	2	0	0	0	0
2115	1	1	1	0	0	0	0
2116	0	0	0	0	0	0	0

Appendix F: Additional Disclosures

Table F-1 illustrates the sensitivity of certain valuation results to changes in the discount rate on a market value of assets basis. Table F-2 summarizes historical actuarial value and market value asset returns. Table F-3 provides an estimate of future market value of asset returns based on the current portfolio structure and summarized in our "TSERS Asset-Liability and Investment Strategy Project" report dated April 19th, 2016.

Section 6(c) of Session Law 2016-108 requires that the actuarial valuation report provide the valuation results using a 30-year treasury rate as of December 31 of the year of the valuation as the discount rate. This is 3.06% at December 31, 2016 and has been used as the lower bound of the sensitivity analysis presented. The range between the current discount rate (7.20%) and the 30-year treasury rate (3.06%) was used to establish an upper bound for sensitivity analysis (11.34%). The remaining rates illustrated represent mid-points between the selected rates. Table F-3 illustrates our best estimate of the plausibility of such rates. The lower bound of 3.06% falls below the 5th percentile of estimated future 30-year returns while the upper bound of 11.34% falls between the 75th and 95th percentiles of estimated future 30-year returns.

Table F-1: Sensitivity of Valuation Results as of December 31, 2016

Discount Rate	3.06%	5.13%	7.20%	9.27%	11.34%
Market Value of Assets	$ 64,246,523,614	$ 64,246,523,614	$ 64,246,523,614	$ 64,246,523,614	$ 64,246,523,614
Actuarial Accrued Liability	$ 121,829,863,701	$ 93,571,487,855	$ 74,547,855,025	$ 61,310,054,606	$ 51,807,683,780
Unfunded Accrued Liability (UAL)	$ 57,583,340,087	$ 29,324,964,241	$ 10,301,331,411	$ (2,936,469,008)	$ (12,438,839,834)
Funded Ratio	52.7%	68.7%	86.2%	104.8%	124.0%
20-Year Amortization of UAL	$ 4,011,097,242	$ 2,501,156,482	$ 1,058,633,024	N/A	N/A
(as % of general state revenue)	13.8%	8.6%	3.6%	N/A	N/A

Table F-2: Historical Asset Returns

Calendar Year	Actuarial Value of Asset Return	Market Value of Asset Return	Calendar Year	Actuarial Value of Asset Return	Market Value of Asset Return	Calendar Year	Actuarial Value of Asset Return	Market Value of Asset Return
1996	10.18%	9.39%	2003	7.98%	18.23%	2010	5.89%	11.47%
1997	10.18%	18.16%	2004	8.56%	10.73%	2011	5.15%	2.19%
1998	9.92%	16.66%	2005	8.26%	6.97%	2012	6.32%	11.82%
1999	10.60%	10.15%	2006	8.94%	11.41%	2013	7.43%	12.21%
2000	11.55%	2.50%	2007	8.87%	8.38%	2014	7.19%	6.21%
2001	8.51%	-1.87%	2008	2.89%	-19.50%	2015	5.87%	0.36%
2002	5.66%	-5.21%	2009	4.74%	14.84%	2016	5.32%	6.22%

The average investment return recognized for the purposes of determining the annual change in contribution each year is the Actuarial Value of Asset Return. The Actuarial Value of Assets smooths investment gains and losses over a five-year period and is used to reduce volatility that investment gains and losses can have on required contributions and the funded status of the Plan.

Appendix F: Additional Disclosures (continued)

Table F-3: Statistical Likelihood of Minimum Future Asset Returns as of 12/31/2015

Horizon	95% Chance (19 out of every 20 scenarios)	75% Chance (3 out of every 4 scenarios)	50% Chance (1 out of every 2 scenarios)	25% Chance (1 out of every 4 scenarios)	5% Chance (1 out of every 20 scenarios)
10 Years (2025)	0.2%	4.0%	5.9%	8.0%	11.5%
20 Years (2035)	2.2%	4.8%	6.7%	8.5%	11.8%
30 Years (2045)	3.1%	5.3%	7.1%	8.7%	12.0%

Other than the discount rate, these results are based on the other economic and demographic assumptions presented in the report. For purposes of simplicity in this disclosure, no adjustments to the valuation assumption for inflation were reflected in the sensitivities above. The statute also requires that the actuarial valuation report show the results using a market value of assets basis. The "funded ratio" and "unfunded accrued liability" in Table F-1 are based upon the market value of assets. In order to alleviate volatility, future employer contributions are determined based on the actuarial value of assets, which smooths market value returns.

None of the liability amounts shown are intended to imply the amount that might represent the cost of any settlement of the plan's obligations. The various caveats, constraints, and discussions presented earlier in the report apply to these results as well.

Appendix G: Data for Section 2 Graphs

The tables below provide the numbers associated with the graphs in Section 2 of this report.

Graph 1: Active Members

	Active Member Count	Reported Compensation
2012	312,512	$ 12,774,187,282
2013	310,370	12,834,121,020
2014	307,313	12,932,045,817
2015	305,291	13,145,602,154
2016	305,013	13,497,815,754

Graph 2: Retired Members and Survivors of Deceased Members

	Retired and Survivors of Deceased Member Count	Retirement Allowance
2012	179,908	$ 3,712,698,650
2013	187,448	3,870,867,895
2014	194,607	4,057,596,822
2015	201,522	4,202,371,724
2016	208,443	4,343,259,132

Graph 3: Market Value of Assets and Asset Returns

	Market Value of Assets	Asset Return
2012	$ 57,780,471,482	11.82%
2013	62,789,451,194	12.21%
2014	64,587,417,979	6.21%
2015	62,669,341,716	0.36%
2016	64,246,523,614	6.22%

Appendix G: Data for Section 2 Graphs (continued)

Graph 5: Cost-of-Living Increase and CPI-U History

	Total Allowance Increase*	National CPI-U
1986	4.0%	1.1%
1987	4.8%	4.4%
1988	5.4%	4.4%
1989	6.7%	4.6%
1990	0.0%	6.1%
1991	5.2%	3.1%
1992	2.2%	2.9%
1993	4.7%	2.7%
1994	3.2%	2.7%
1995	4.4%	2.5%
1996	6.2%	3.3%
1997	2.5%	1.7%
1998	2.3%	1.6%
1999	4.2%	2.7%
2000	2.0%	3.4%
2001	2.0%	1.6%
2002	1.3%	2.4%
2003	1.7%	1.9%
2004	2.0%	3.3%
2005	3.0%	3.4%
2006	2.2%	2.5%
2007	2.2%	4.1%
2008	0.0%	0.1%
2009	0.0%	2.7%
2010	0.0%	1.5%
2011	1.0%	3.0%
2012	0.0%	1.7%
2013	1.0%	1.5%
2014	0.0%	0.8%
2015	0.0%	0.7%
2016	1.0%	2.1%

* Allowance increases are effective at July 1 the following year.

Appendix G: Data for Section 2 Graphs (continued)

Graph 6: Actuarial Value and Market Value of Assets

	Actuarial Value of Assets	Market Value of Assets
2012	$ 59,911,833,028	$ 57,780,471,482
2013	62,363,807,168	62,789,451,194
2014	64,734,119,837	64,587,417,979
2015	66,169,352,203	62,669,341,716
2016	67,376,892,466	64,246,523,614

Graph 7: Asset Returns

	Actuarial Value	Market Value
2012	6.32%	11.82%
2013	7.43%	12.21%
2014	7.19%	6.21%
2015	5.87%	0.36%
2016	5.32%	6.22%

Graph 8: Actuarial Accrued Liability

	Liability for Active Members	Liability for Deferred Members	Liability for Retired Members	Total Liability
2012	$ 27,488,175,179	$ 2,637,640,588	$ 33,504,462,705	$ 63,630,278,472
2013	27,623,752,029	2,890,559,796	35,291,243,666	65,805,555,491
2014	27,948,998,177	3,188,560,504	36,577,507,863	67,715,066,544
2015	27,630,686,237	3,482,641,054	40,408,588,106	71,521,915,397
2016	28,548,308,913	3,764,216,305	42,235,329,807	74,547,855,025

Appendix G: Data for Section 2 Graphs (continued)

Graph 9: Actuarial Accrued Liability and Actuarial Value of Assets

	Actuarial Accrued Liability	Actuarial Value of Assets
2012	$ 63,630,278,472	$ 59,911,833,028
2013	65,805,555,491	62,363,807,168
2014	67,715,066,544	64,734,119,837
2015	71,521,915,397	66,169,352,203
2016	74,547,855,025	67,376,892,466

Graph 10: Funded Ratios

	Funded Ratio (Actuarial Basis)	Funded Ratio (Market Value Basis)
2012	94.2%	90.8%
2013	94.8%	95.4%
2014	95.6%	95.4%
2015	92.5%	87.6%
2016	90.4%	86.2%

Graph 11: Actuarially Determined Employer Contribution Rates

Fiscal Year Ending	Normal Rate	Accrued Liability Rate	Total Rate
2015	5.15%	4.00%	9.15%
2016	5.19%	3.50%	8.69%
2017**	4.34%	5.62%	9.96%
2018	4.31%	6.22%	10.53%
2019*	4.48%	7.50%	11.98%

* Subject to the impact of future legislative changes during that fiscal year
** Includes impact of the experience study

Appendix G: Data for Section 2 Graphs (continued)

Graph 12: Projected Actuarially Determined Employer Contribution Rates

	Alternate #1 (0.0% 2017 Return)	Baseline Projection	Alternate #2 (14.4% 2017 Return)
2017	9.98%	9.98%	9.98%
2018	10.78%	10.78%	10.78%
2019	11.98%	11.98%	11.98%
2020	13.53%	12.68%	12.33%
2021	15.37%	13.49%	12.68%
2022	17.01%	14.20%	13.03%
2023	17.65%	14.04%	10.28%
2024	16.08%	11.77%	7.13%
2025	15.50%	11.34%	6.74%
2026	14.41%	10.40%	5.96%
2027	14.00%	10.15%	5.88%
2028	13.76%	10.05%	5.95%
2029	13.59%	10.02%	6.08%
2030	11.45%	8.03%	4.24%
2031	9.85%	6.56%	2.92%
2032	8.48%	5.92%	3.02%
2033	6.93%	5.22%	3.19%
2034	5.55%	4.60%	3.37%

Graph 13: Projected Funded Ratio

	Alternate #1 (0.0% 2017 Return)	Baseline Projection	Alternate #2 (14.4% 2017 Return)
2016	90.4%	90.4%	90.4%
2017	88.5%	89.7%	90.8%
2018	86.4%	89.1%	91.8%
2019	84.7%	88.9%	93.1%
2020	84.6%	89.9%	95.4%
2021	85.1%	91.3%	98.0%
2022	86.9%	92.8%	99.3%
2023	88.8%	94.1%	100.1%
2024	90.5%	95.2%	100.6%
2025	92.1%	96.2%	100.9%
2026	93.6%	97.2%	101.2%
2027	95.2%	98.1%	101.5%
2028	96.8%	99.1%	101.8%
2029	98.2%	99.9%	101.9%
2030	99.2%	100.4%	101.7%
2031	100.1%	100.6%	101.4%

Appendix H: Participating Employers

Employer	Employer Code
A Childs Garden Charter (Aka Cross Creek Charter)	33501
Academy Of Moore County	36301
Administrative Office Of The Courts	10800
Alamance Community College	30105
Alamance County Schools	30100
Alexander County Schools	30200
Alleghany County Schools	30300
American Renaissance Middle Sch	34901
Anson County Schools	30400
Appalachian State University	20100
Arapahoe Charter School	36901
Arts Based Elementary Charter	33402
Ashe County Schools	30500
Asheboro City Schools	37610
Asheville City Schools	31110
Asheville-Buncombe Technical College	31105
Avery County Schools	30600
Barber Examiners, State Board Of	18600
Bear Grass Charter School	33206
Beaufort County Community College	30705
Beaufort County Schools	30700
Bertie County Schools	30800
Bethany Community Middle School	37901
Bladen Community College	30905
Bladen County Schools	30900
Blue Ridge Community College	34505
Brevard Academy Charter School	38801
Bridges Charter Schools	38601
Brunswick Community College	31005
Brunswick County Schools	31000
Buncombe County Schools	31100
Burke County Schools	31200
Cabarrus County Schools	31300
Caldwell Community College	31405
Caldwell County Schools	31400
Camden County Schools	31500
Cape Fear Community College	36505
Cape Fear Ctr For Inquiry	36501
Carolina International School	31301
Carteret Community College	31605
Carteret County Schools	31600
Casa Esperanza Montessori	39209
Caswell County Schools	31700
Catawba County Schools	31800
Catawba Valley Community College	31805
Central Carolina Community College	35305
Central Park Sch For Children	33202
Central Piedmont Community College	36005
Chapel Hill - Carboro City Schools	36810
Charlotte Secondary Charter	36009
Charlotte-Mecklenburg County Schools	36000
Chatham County Schools	31900
Cherokee County Schools	32000
Childrens Village Academy	35401
Clay County Schools	32200
Cleveland County Schools	32300
Cleveland Technical College	32305
Clinton City Schools	38210
Clover Garden Charter School	30102
Coastal Carolina Community College	36705
College Of The Albemarle	37005
Columbus County Schools	32400
Community Charter School	36001
Community Colleges Administration	19005
Community School Of Davidson	36003
Cornerstone Academy	33027
Corvian Community School	36004
Craven Community College	32505
Cumberland County Schools	32600
Currituck County Schools	32700
Dare County Schools	32800
Davidson County Community College	32905
Davidson County Schools	32900
Davie County Schools	33000
Department Of Administration	10900
Department Of Agriculture	18400
Department Of Commerce	12510
Department Of Cultural Resources	10700
Department Of Justice	10400
Department Of Public Instruction	22000

Appendix H: Participating Employers

Employer	Employer Code
Department Of Public Safety	19100
Duplin County Schools	33100
Durham Public Schools	33200
Durham Technical Institute	33205
East Carolina University	20300
East Wake Academy	39208
Edenton-Chowan County Schools	32100
Edgecombe County Schools	33300
Edgecombe Technical College	33305
Elizabeth City And Pasquotank County Schools	37000
Elizabeth City State University	20400
Elkin City Schools	38620
Endeavor Charter School	39201
Environment And Natural Resources	11300
Evergreen Community Charter School	31102
F Delany New School For Children	31101
Fayetteville State University	20600
Fayetteville Technical Community College	32605
Fernleaf Community Charter	36310
Forsyth Technical Institute	33405
Franklin County Schools	33500
Gaston College	33605
Gaston College Preparatory Charter	36601
Gaston County Schools	33600
Gates County Schools	33700
General Assembly	12160
Governor'S Office	12100
Graham County Schools	33800
Grandfather Academy	30601
Granville County Schools And Oxford Orphanage	33900
Gray Stone Day School	38402
Greene County Schools	34000
Guilford County Schools	34100
Guilford Technical Community College	34105
Halifax Community College	34205
Halifax County Schools	34200
Haliwa-Saponi Tribal Charter	39301
Harnett County Schools	34300
Haywood County Schools	34400
Haywood Technical College	34405

Employer	Employer Code
Health & Human Svcs	12220
Healthy Start Academy	33203
Henderson Collegiate Charter School	39401
Henderson County Schools	34500
Hertford County Schools	34600
Hickory City Schools	31810
Highway - Administrative	51000
Hoke County Schools	34700
Hyde County Schools	34800
Information Technology Services	10930
Insurance Department	12600
Invest Collegiate Charter (Buncombe)	33207
Invest Collegiate Charter School	32901
Iredell County Schools	34900
Isothermal Community College	38105
Jackson County Schools	35000
James Sprunt Technical College	33105
Johnston County Schools	35100
Johnston Technical College	35105
Jones County Schools	35200
Kannapolis City Schools	31320
Kipp Charlotte Charter	36102
Labor Department	12700
Lake Norman Charter School	36006
Lenoir County Community College	35405
Lenoir County Schools	35400
Lexington City Schools	32910
Lincoln County Schools	35500
Lt Governor'S Office	12150
Macon County Schools	35600
Madison County Schools	35700
Martin Community College	35805
Martin County Schools	35800
Mayland Technical College	36105
Mcdowell County Schools	35900
Mcdowell Technical College	35905
Millennium Charter Academy	38602
Mitchell Community College	34905
Mitchell County Schools	36100
Montgomery Community College	36205

Appendix H: Participating Employers

Employer	Employer Code
Montgomery County Schools	36200
Moore County Schools	36300
Mooresville City Schools	34910
Mount Airy City Schools	38610
Mountain Community School	34501
Mtn Discovery Charter	38701
N C Auctioneers Licensing Board	18740
N C Central University	20800
N C School Of Science & Mathematics	10950
N C School Of The Arts	20200
N C State Board Of Examiners Of Practicing Psychol	18780
N C State University	21300
N.E. Academy Of Aerospace & Adv.Tech	37001
N.E. Regional School For Biotechnology	33001
N.E. Academy Of Aerospace & Adv.Tech	37001
Nash-Rocky Mount Schools	36400
Nc A&T University	20700
Nc Housing Finance Agency	11310
Neuse Charter School	35106
New Bern/Craven County Board Of Education	32500
New Hanover County Schools	36500
Newton-Conover City Schools	31820
North Carolina Education Lottery	10200
Northampton County Schools	36600
Office Of Administrative Hearing	10850
Office Of State Budget & Management	10910
Office Of State Controller	10940
Onslow County Schools	36700
Orange Charter School	36802
Orange County Schools	36800
Pamlico Community College	36905
Pamlico County Schools	36900
Pender County Schools	37100
Perquimans County Schools	37200
Person County Schools	37300
Piedmont Community College	37305
Pine Lake Prep Charter	36008
Pinnacle Classical Academy	39703
Pioneer Springs Community Charter	33209
Pitt Community College	37405

Employer	Employer Code
Pitt County Schools	37400
Polk County Schools	37500
Randolph Community College	37605
Randolph County Schools	37600
Revenue Department	13500
Richmond County Schools	37700
Richmond Technical College	37705
River Mill Academy Charter	30103
Roanoke Rapids City Schools	34220
Roanoke-Chowan Community College	34605
Robeson Community College	37805
Robeson County Schools	37800
Rockingham Community College	37905
Rockingham County Schools	37900
Rowan-Cabarrus Community College	38005
Rowan-Salisbury School System	38000
Roxboro Community School	37301
Rutherford County Schools	38100
Sampson Community College	38205
Sampson County Schools	38200
Sandhills Community College	36305
Sanford-Lee County Board Of Education	35300
Scotland County Schools	38300
Secretary Of State	13700
Socrates Academy	36007
South Piedmont Community College	30405
Southeastern Academy Charter School	37801
Southeastern Community College	32405
Southern Wake Academy	39204
Southwestern Community College	35005
Stanly Community College	38405
Stanly County Schools	38400
Stars Charter School	36302
State Auditor	10500
State Board Of Elections	11900
State Division Of Health Services	12200
State Treasurer	14300
Stokes County Schools	38500
Success Institute	34903
Surry Community College	38605

Appendix H: Participating Employers

Employer	Employer Code
Surry County Schools	38600
Swain County Schools	38700
The Hawbridge School	30104
Thomasville City Schools	32920
Transylvania County Schools	38800
Tri-County Community College	32005
Two Rivers Comm School	39501
Tyrrell County Schools	38900
Unc - Pembroke	21200
Unc Health Care System	21550
Unc-Ch Cb 1260	21520
Unc-General Administration	21525
Union County Schools	39000
University Of North Carolina At Asheville	23000
University Of North Carolina At Charlotte	23100
University Of North Carolina At Greensboro	20900
University Of North Carolina At Wilmington	23200
University Of North Carolina Press	21570
Uwharrie Charter Academy	37601
Vance Charter School	39101
Vance County Schools	39100
Vance-Granville Community College	39105
Voyager Academy	33204
Wake County Schools	39200
Wake Technical College	39205

Employer	Employer Code
Warren County Schools	39300
Washington County Schools	39400
Watauga County Schools	39500
Wayne Community College	39605
Wayne County Schools	39600
Weldon City Schools	34230
Western Carolina University	21800
Western Piedmont Comm College	31205
Whiteville City Schools	32410
Wildlife Resources Commission	11600
Wilkes Community College	39705
Wilkes County Schools	39700
Wilmington Prep Academy	36502
Wilson Community College	39805
Wilson County Schools	39800
Winston-Salem State University	21900
Winston-Salem-Forsyth County Schools	33400
Yadkin County Schools	39900
Yancey County Schools	30000
Zeca School Of The Arts And Technology	36701