Segal Consulting

TEACHERS' RETIREMENT SYSTEM OF THE STATE OF ILLINOIS

Discussion of Valuation Results

Actuarial Valuation as of June 30, 2017

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October 27, 2017

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Discussion Topics

Segal

- Overview of Valuation Process
- Summary of Valuation Highlights
- Membership and Demographics
- Valuation Results
- Sensitivity Projections

Purposes of the Actuarial Valuation

- Report the System's actuarial assets
- Calculate the System's liabilities
- Determine the funding progress
- Calculate the Actuarially Determined Contribution
  - Actuarial Math 2.0
- Determine the contribution under the Statutory Funding Plan
- Explore reasons why the current valuation differs from prior valuations
- Provide information for annual financial statements

The Valuation Process

Input

Member Data

Asset Information

Benefit Provisions

Actuarial Assumptions

Funding Methodology

Results

Actuarial Value of Assets

Normal Cost and Actuarial Liability

Unfunded Liability and Funded Ratio

Statutory Contribution

Actuarially Determined Employer Contribution

Accounting Results

How is an Actuarial Valuation Performed?

- Gather data
  - Participant data as of the prior valuation date
  - Financial data as of the valuation date
- Project a benefit for each member, for each possible benefit
- Utilize actuarial assumptions
  - Economic (investment return, inflation, salary raises)
  - Demographic (death, disability, retirement, turnover)
- Apply assumptions to benefits to determine a total liability and assign liabilities to service
- Apply the Board's funding policy to determine Actuarially Determined Contribution (Actuarial Math 2.0)
- Project assets and liabilities to 2045 and determine the Statutory Contribution as a level percentage of payroll necessary to achieve 90% funded ratio by June 30, 2045
  - Mandated by the Illinois Pension Code

Actuarial Assumptions

Two types:

Demographic	Economic
• Retirement • Disability • Death in active service • Withdrawal • Death after retirement	• Inflation – 2.50% • Interest rate – 7.00%, net of investment expenses • Salary increases – 9.25% for members with one year of service to 3.25% for members with 20 or more years of service • Payroll growth – based on open group projection with a level active population and new entrants similar to newly hired employees

Economic assumptions are reviewed annually and demographic assumptions are reviewed every three years.

Actuarial Methods

Asset Valuation Method (Actuarial Assets)

- Investment gains and losses recognized over a number of years
  - TRS uses a five-year smoothing period

Cost Method

- Allocation of liability to past and future service
- Projected unit credit required for **Statutory Contribution**
  - Current year's cost based on value of benefit earned that year, using projected salary
  - Results in back loading of normal cost
- Entry age normal used for **Actuarial Math 2.0**
  - Allocates cost of member's benefit over expected career as a level % of salary
  - Most common cost method among public sector retirement systems
  - Required by GASB

Amortization Method

- **Statutory Contribution**
  - No explicit method to amortize the UAAL; the total contribution less the normal cost is the payment toward the UAAL
- **Actuarial Math 2.0**
  - Layered amortization with new UAAL amortized over 20 years
  - Amortization payments increase at the rate of future State revenue growth, assumed to be 2%

Actuarially Determined Contribution vs. Statutory Contribution

Actuarially Determined Contribution (Actuarial Math 2.0)

- Equal to the normal cost plus amortization of the unfunded actuarial accrued liability (UAAL)
- Benefits:
  - Entry age normal cost method
  - 100% funding target
  - Reflects appropriate tier of benefits of those in TRS, not those to be hired

Statutory Contribution under Illinois Funding Policy

- Equal to amount determined as a level percentage of payroll necessary to achieve a projected funded percentage of 90% by 2045
- Shortcomings:
  - Projected unit credit cost method
  - 90% funding target
  - Reflects effect of Tier II provisions for members who have not yet been hired

The Actuarially Determined Contribution is compared to the Statutory Contribution as measure of the inadequacy of the Statutory Contribution.

Changes Since Last Year's Valuation

- Public Act 100-0023 modified funding and benefit provisions:
  - Effective with the fiscal 2018 State contribution, the effect of changes in actuarial assumptions are retroactively phased in over a five-year period
  - Effective for plan years beginning on or after July 1, 2017, employers must contribute the employer normal cost rate on salaries above the Governor's salary
  - An optional Tier III hybrid benefit plan was established and consists of two parts:
    - A defined benefit plan similar in design to the current Tier II benefit except that benefit accruals are lower
    - A defined contribution plan with required member and employer contributions
    - Because the details of Tier III need to be clarified, this new Tier is not recognized in this year's valuation
- Public Act 100-0340 set the Federal Funds contribution rate equal to the employer normal cost rate. Previously, the Federal Funds contribution rate was equal to the State's contribution rate.
- Due to these Public Acts, the fiscal 2018 State contribution was revised from $4.56 billion to $4.10 billion

Summary of Valuation Highlights

- Required State contribution for fiscal 2019 is $4.47 billion, a 9% increase from the revised fiscal 2018 contribution of $4.10 billion
- The fiscal 2019 State contribution under Actuarial Math 2.0 is $7.37 billion
  - Statutory contribution is only 60% of the Board funding policy amount
  - The $2.90 billion contribution shortfall increases future contribution requirements
- Market value of assets returned 12.4% for year ending 6/30/17 (Segal calculation)
  - Gradual recognition of deferred gains and losses resulted in a 7.8% return on actuarial assets, compared to 7.0% expected
  - Gain on actuarial value of assets is $384 million
- Demographic and liability experience resulted in a loss of $604 million
- Funded ratio based on the actuarial value of assets increased from 39.8% in 2016 to 40.2% in 2017
- The actuarial accrued liability increased from $118.6 billion (as of June 30, 2016) to $122.9 billion (as of June 30, 2017)
- The unfunded actuarial accrued liability (UAAL) increased from $71.4 billion to $73.4 billion
  - $2.0 billion increase results from net experience loss ($0.2 billion) and inadequate State contributions ($1.8 billion)

Membership

Active membership statistics

	June 30, 2017	June 30, 2016	Change
Number			
Tier I	128,262	133,498	-3.9%
Tier II	31,323	26,186	+19.6%
Total	159,585	159,684	-0.1%
Average Salary (full-time/regular part-time)	$70,789	$69,576	+1.7%
Average Age	42.2 years	42.1 years	
Average Total Service	11.1 years	11.0 years	

Member data used in the valuation is as of the prior valuation date.

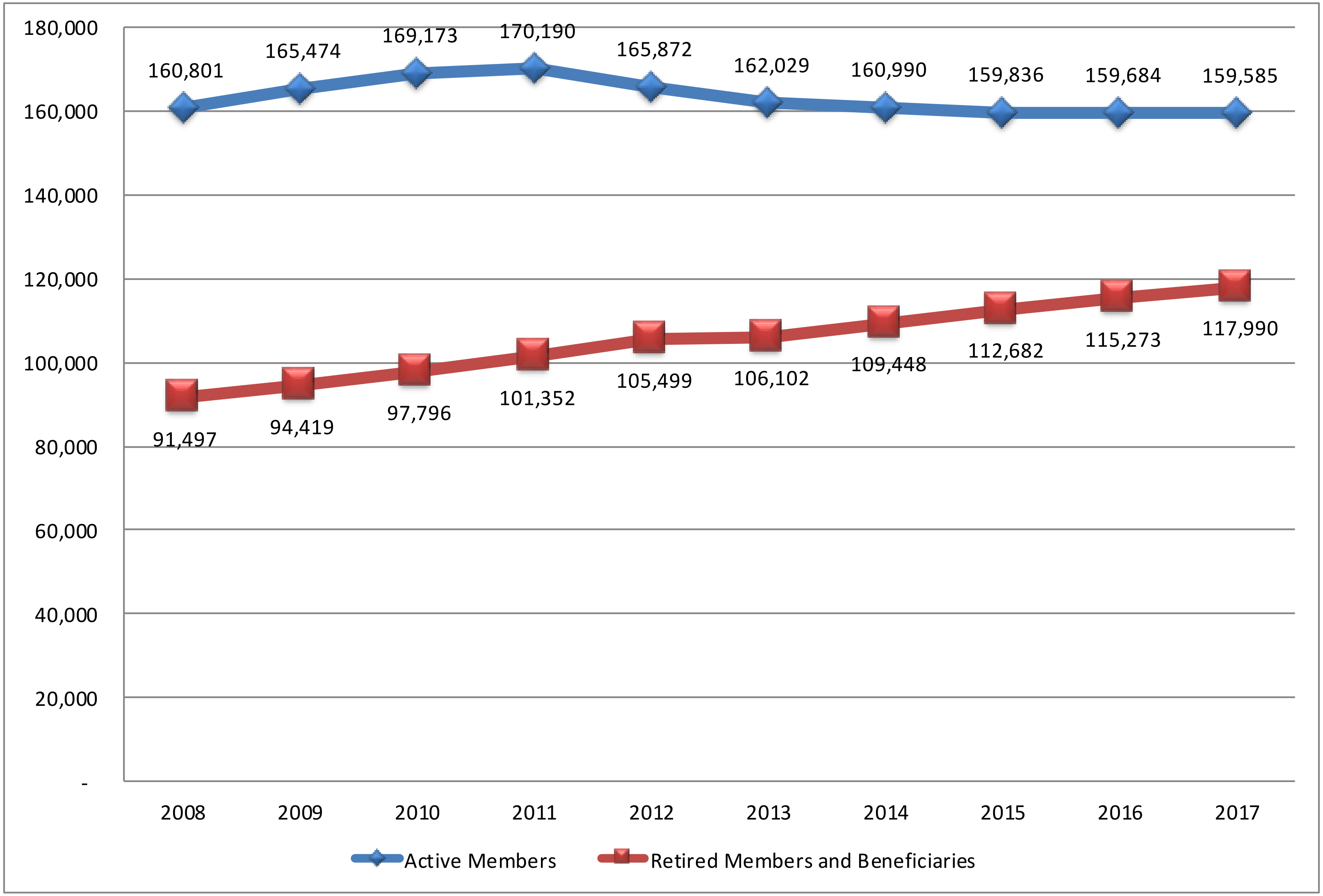
Membership

Retiree and beneficiary statistics

	June 30, 2017	June 30, 2016	Change
Number	117,990	115,273	+2.4%
Annual Annuities	$6.033 billion	$5.728 billion	+5.3%
Average Age	71.8 years	71.5 years	
Average Monthly Benefit	$4,261	$4,141	+2.9%

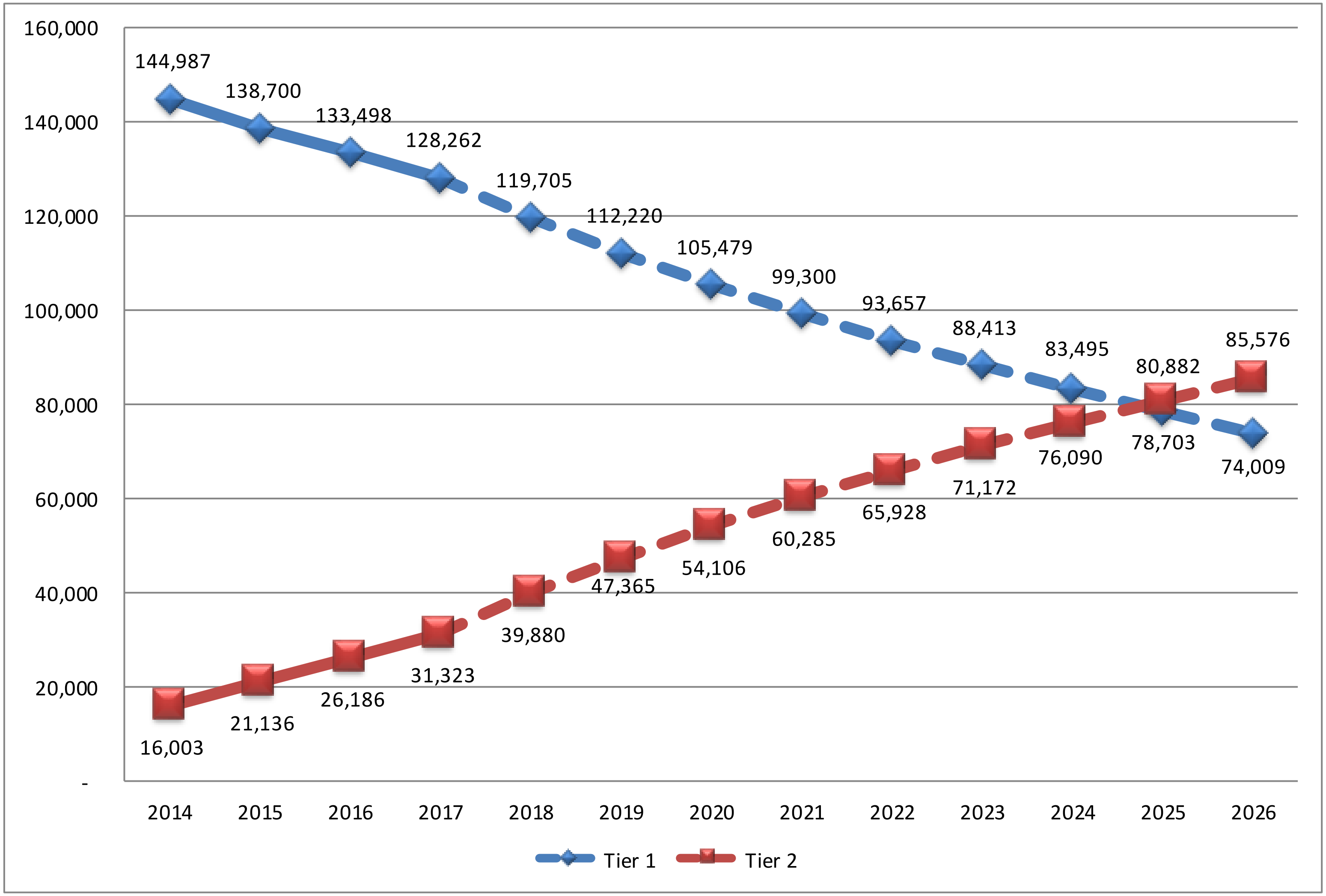
Member data used in the valuation is as of the prior valuation date.

Active and Retired Membership



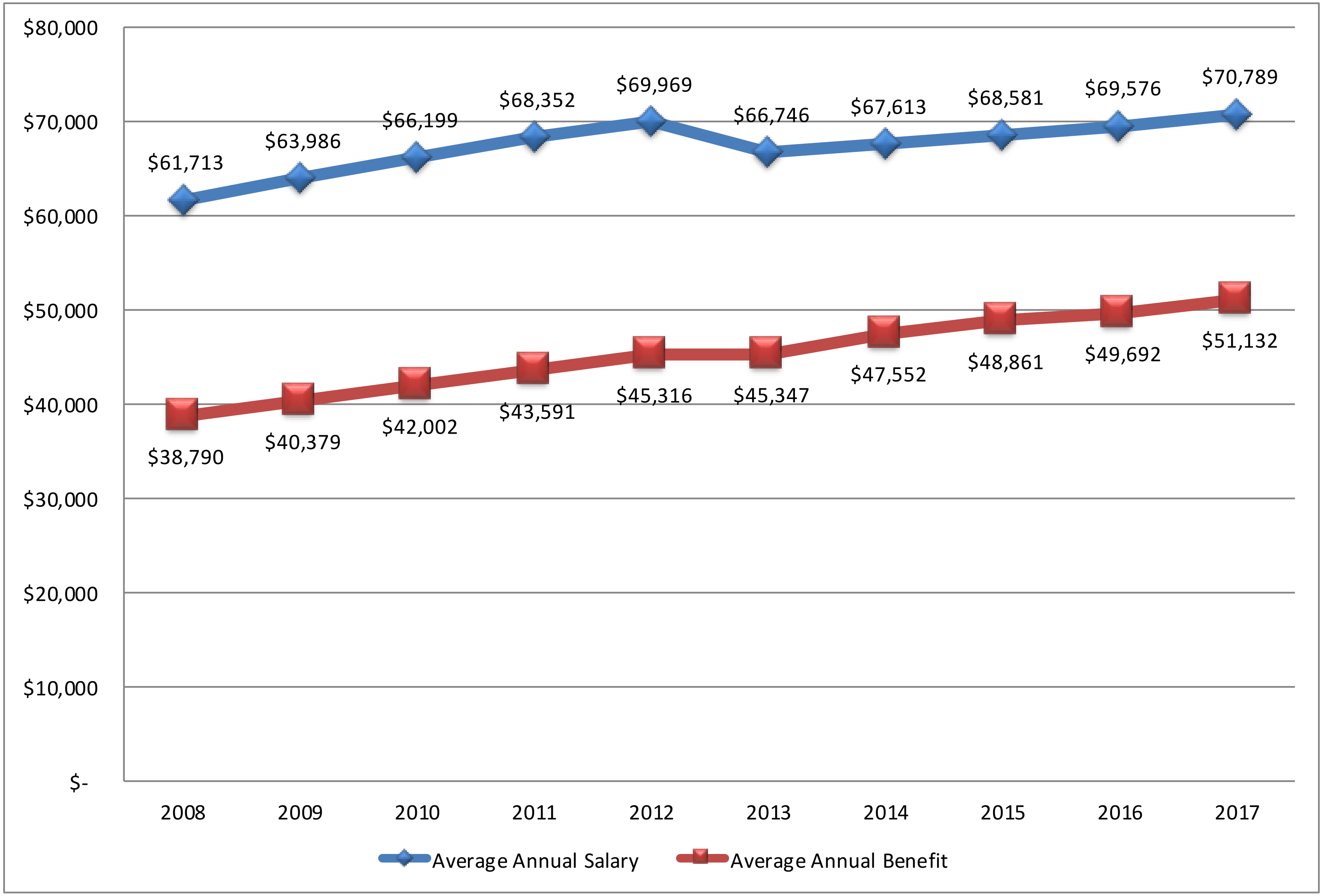
Active member and annuitant data used in the valuation is as of the prior valuation date. Prior to 2013, annuitant data used in the valuation was as of the valuation date.

Projection of Active Membership by Tier



Active member data used in the valuation is as of the prior valuation date.
Dashed lines represent a projection of membership.

Average Salary and Average Benefit



The average annual benefit has increased by 3.5% per year.
Starting in 2013, salaries were revised to reflect the reported rate of pensionable salary.

Assets

- The market value of assets increased from $45.3 billion (as of June 30, 2016) to $49.4 billion (as of June 30, 2017)
  - Segal determined the investment return was +12.4%, net of investment expenses
- The actuarial value of assets – which smoothes investment gains and losses over five years – increased from $47.2 billion (as of June 30, 2016) to $49.5 billion (as of June 30, 2017)
  - Return of +7.8%, net of investment expenses
  - Actuarial value is 100.2% of market value
  - There is a total of $92 million of deferred investment losses that will be recognized in future years
- The average annual return on <u>market</u> assets:
  - Past 10 years is 4.7%
  - Past 15 years is 7.2%
  - Past 20 years is 6.9%
- The average annual return on <u>actuarial</u> assets:
  - Past 10 years is 4.6%
  - Past 15 years is 7.2%
  - Past 20 years is 6.8%

Assets

Market Value of Assets (in millions)

	June 30, 2017	June 30, 2016
Beginning of Year	$45,251	$46,407
Contributions		
➢ State	$3,986	$3,742
➢ Employers	150	148
➢ Members	929	952
➢ Total	$5,065	$4,842
Benefits Paid	(6,438)	(5,931)
Administrative Expenses	(23)	(23)
Investment Income (net)	5,521	(44)
End of Year	$49,376	$45,251
Rate of Return	+12.39%	-0.10%

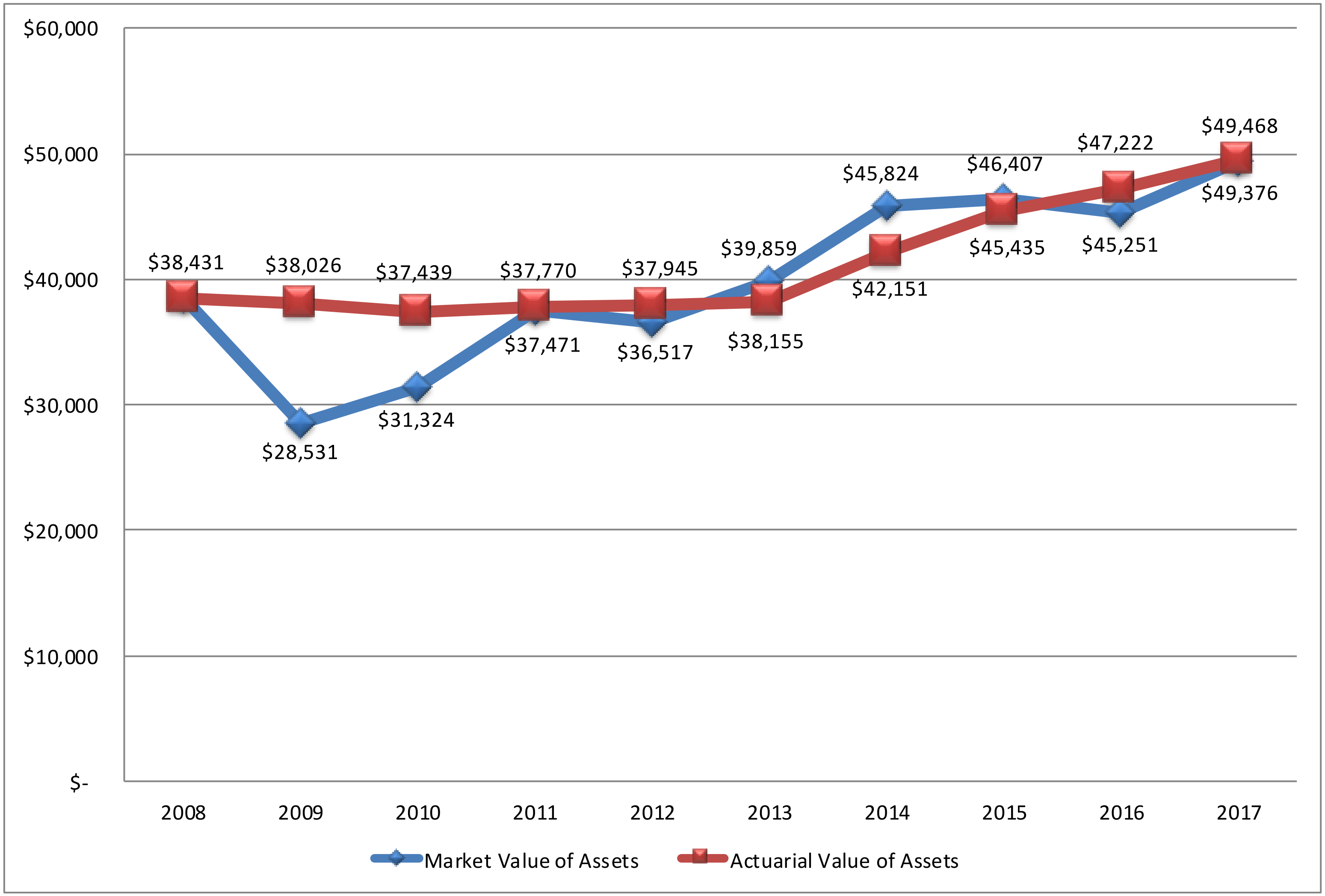
Assets

Actuarial Value of Pension Assets (in millions)

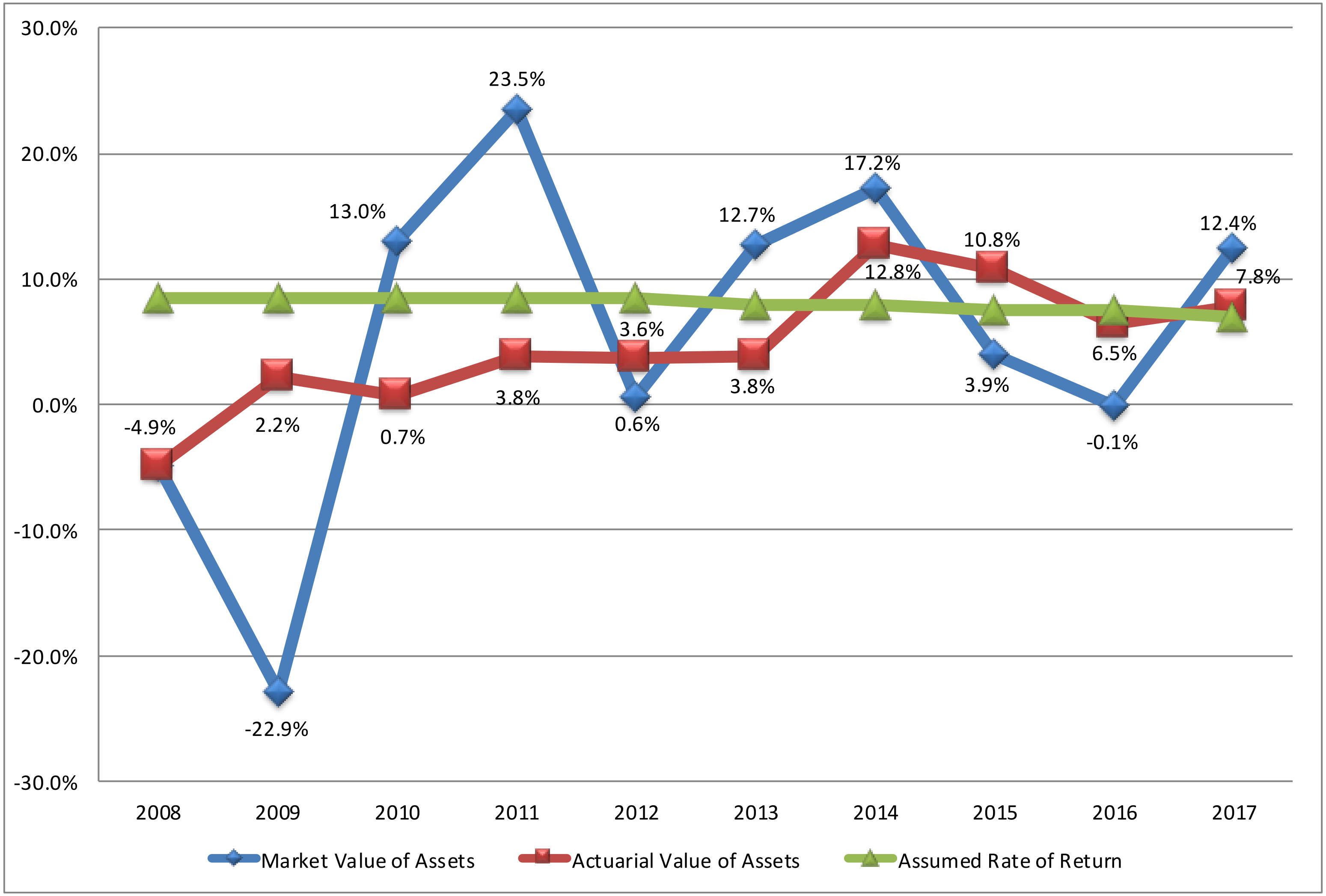
Market Value of Pension Assets as of June 30, 2017			$49,376
Gain or (Loss) on Assets	Original Amount	% Deferred	Deferred Amount
Year ended June 30, 2017	$2,402	80%	$1,922
Year ended June 30, 2016	(3,483)	60%	(2,090)
Year ended June 30, 2015	(1,622)	40%	(649)
Year ended June 30, 2014	3,626	20%	725
Year ended June 30, 2013	1,689	0%	0
Total			($92)
Actuarial Value as of June 30, 2017			$49,468
Actuarial Value as a Percent of Market Value			100.2%
Rate of Return			7.83%

Market and Actuarial Values of Assets

$ Millions

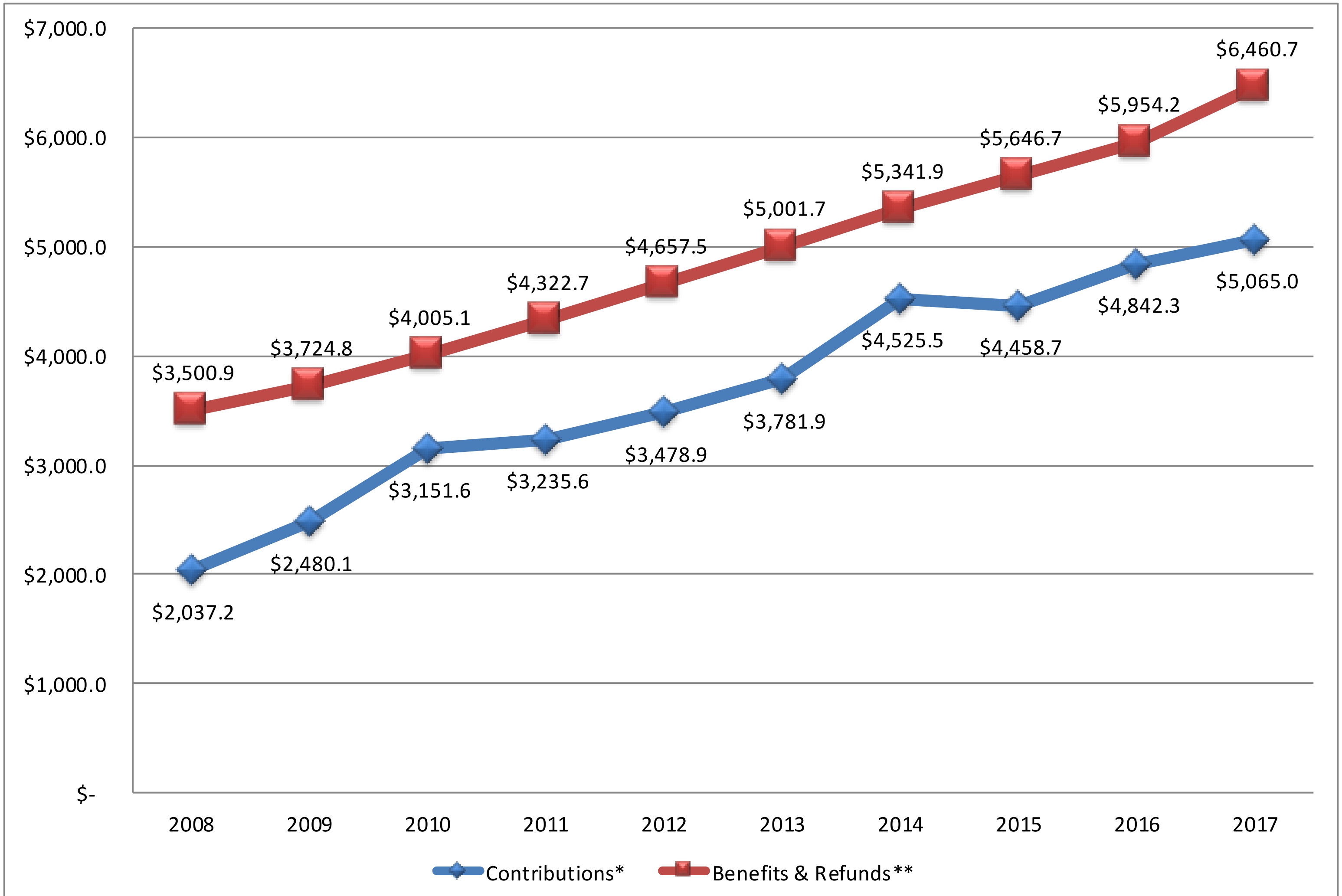


Asset Returns



Contributions vs Disbursements

$ Millions



* Includes member, employer and state contributions

** Includes benefit payments, refunds and administrative expenses

Valuation Results

Comparison of current year to prior year (in millions)

	June 30, 2017	June 30, 2016
Actuarial Accrued Liability:		
• Active Members	$38,620	$37,681
• Retirees and Beneficiaries	80,882	77,688
• Inactive Members with Deferred Benefits	3,402	3,261
Total	**$122,904**	**$118,630**
Actuarial Assets	49,468	47,222
Unfunded Accrued Liability	$73,436	$71,408
Funded Ratio	40.2%	39.8%

Valuation Results

Summary of State Contribution for Fiscal Year (in millions)

	FY 2019	FY 2018*
Based on Statutory Funding Plan	$4,466	$4,095
Based on Actuarial Math 2.0	7,371	6,993
Difference Between Statutory Amount and Actuarial Math 2.0	$2,905	$2,898

* Revised to reflect Public Acts 100-0023 and 100-0340

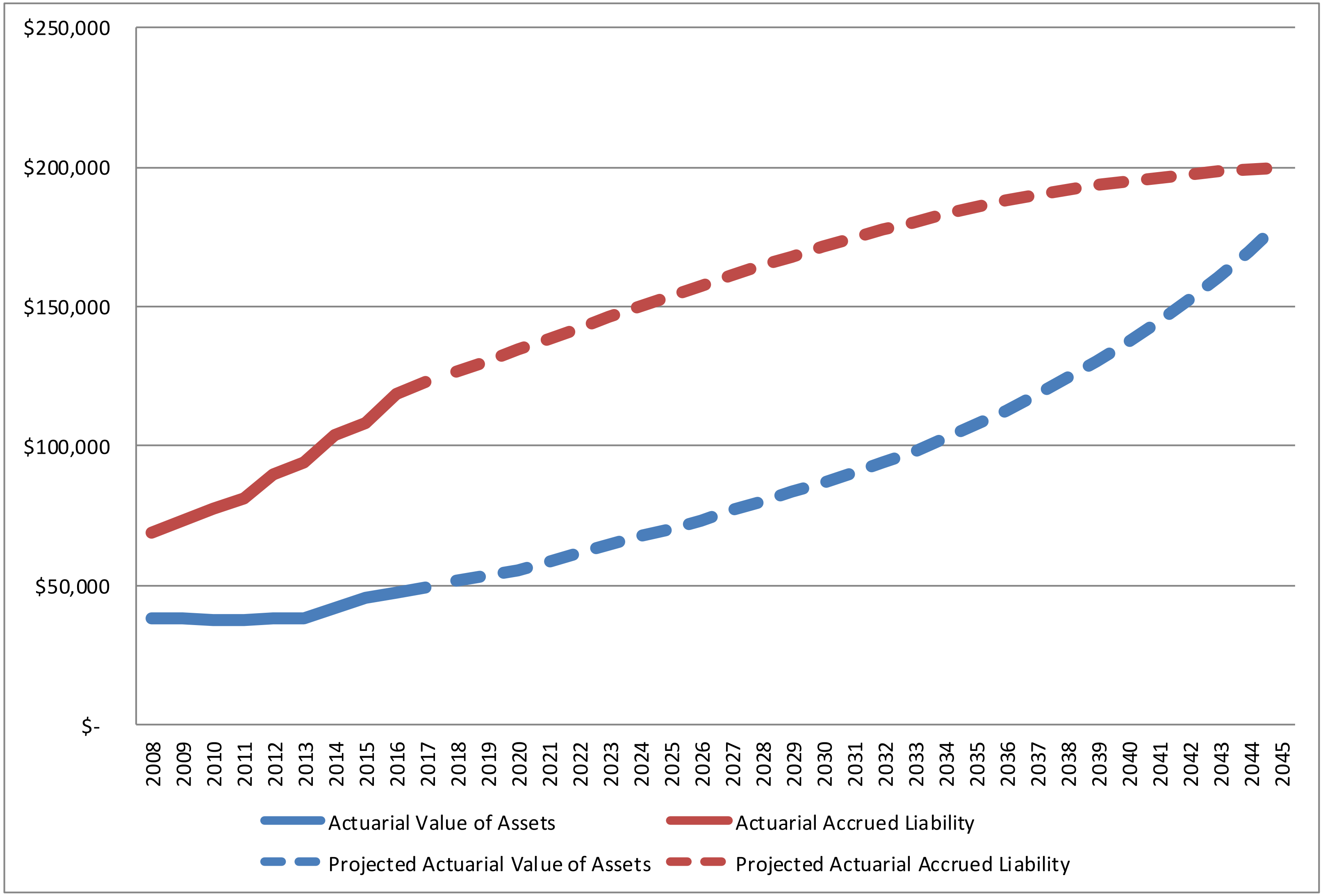
Valuation Results

Reconciliation of State Statutory Funding Plan Contribution
from Fiscal Year 2018 to 2019 (in millions)

	Statutory Funding Contribution
FY 2018 State Contribution	$4,095
Expected Increase	357
Investment Gain	-28
All Other Net Actuarial Losses	42
FY 2019 State Contribution	$4,466

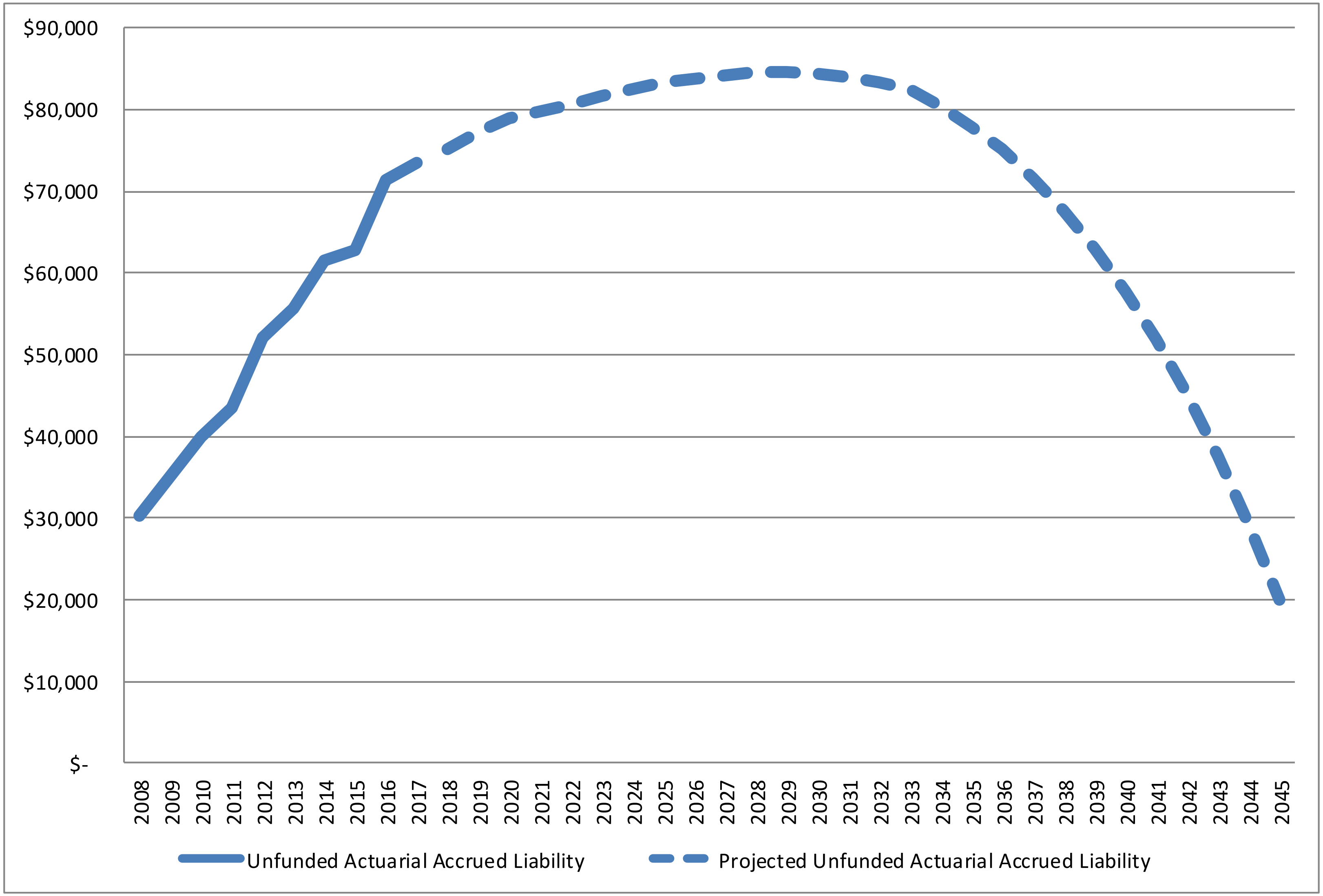
Assets and Liabilities

$ Millions

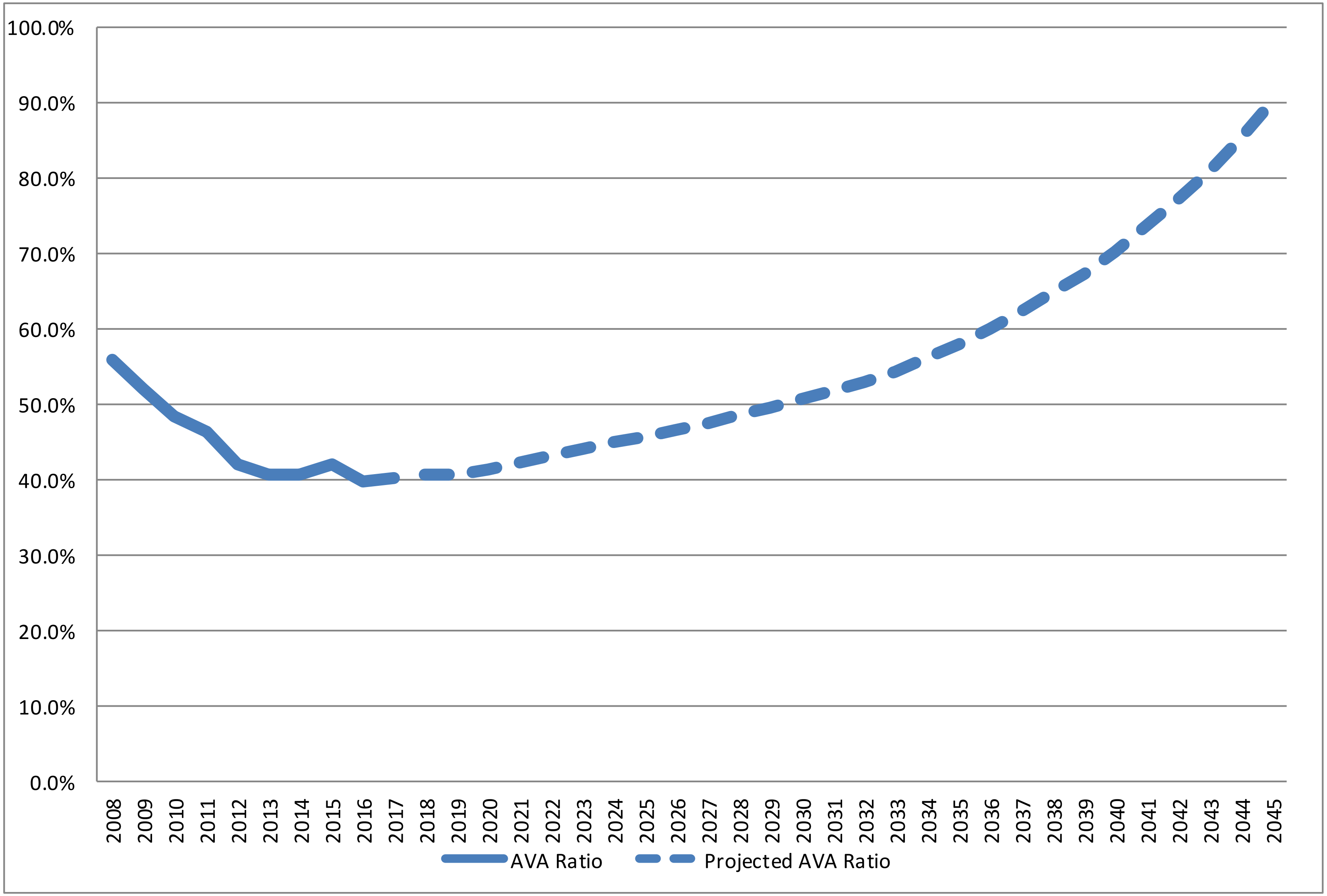


Unfunded Actuarial Accrued Liability

$ Millions

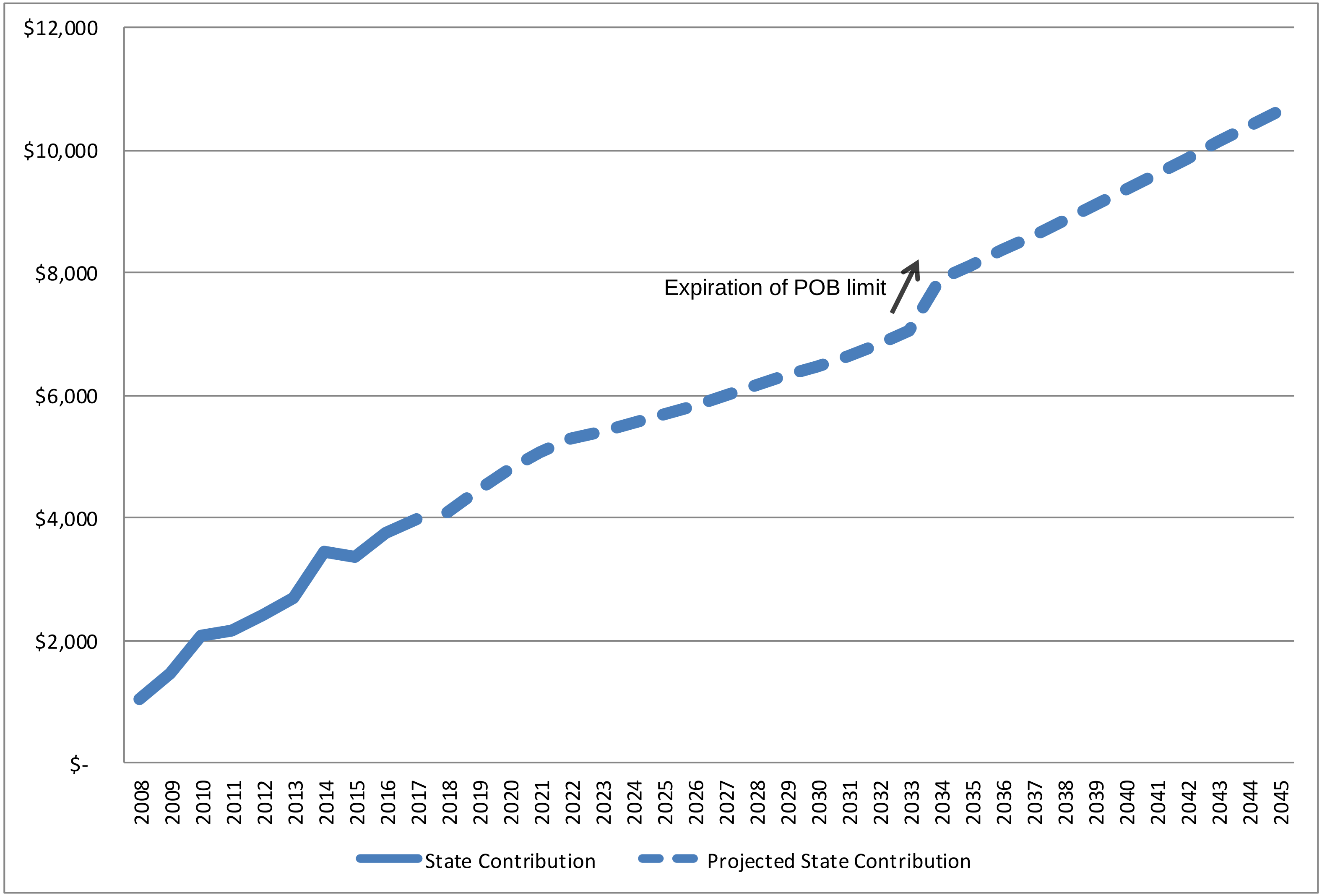


Funded Ratio



State Contributions

$ Millions



Summary of GASB Accounting Results

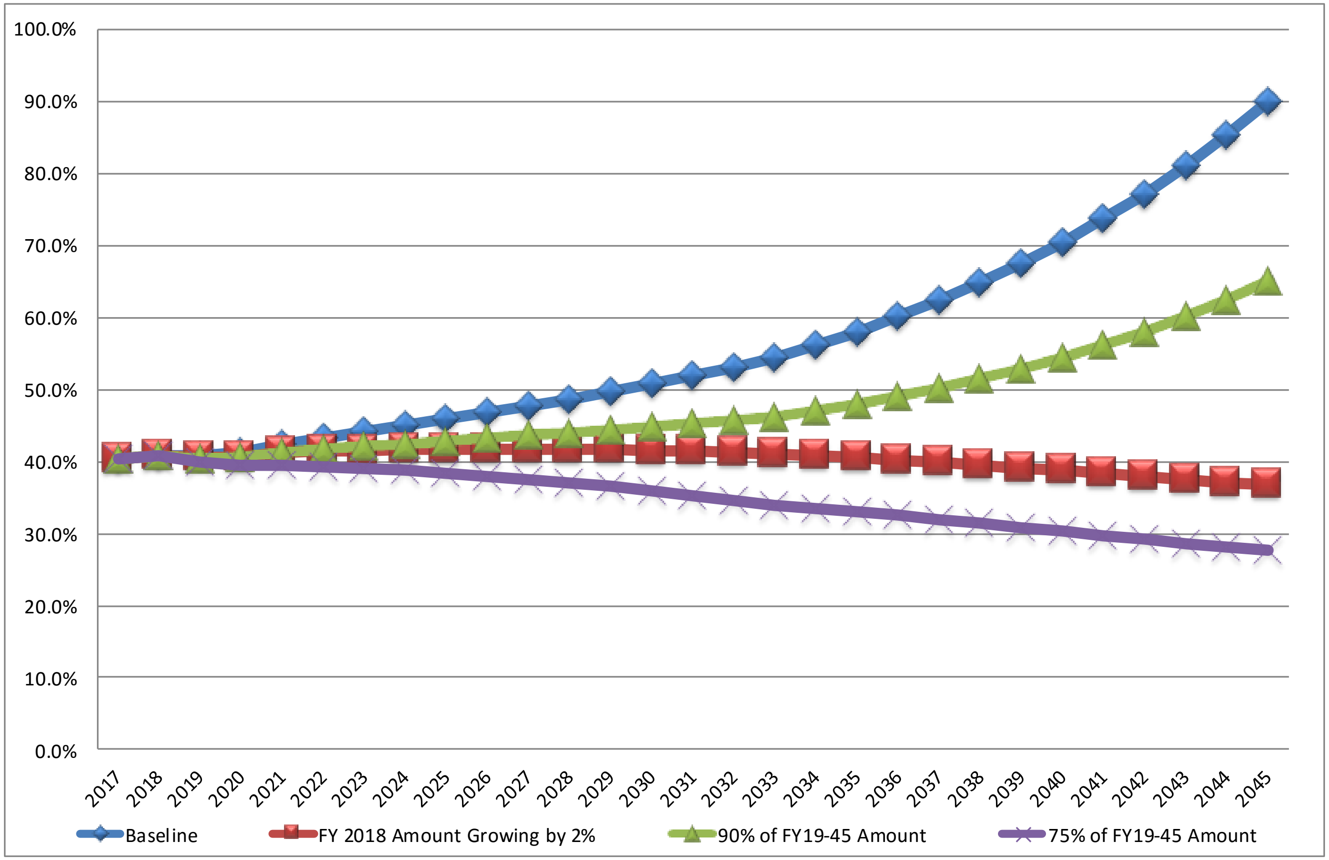
GASB Information ($ in millions)

	June 30, 2017	June 30, 2016
Long-term Expected Rate of Return	7.00%	7.00%
Municipal Bond Index	3.58%	2.85%
Single Equivalent Discount Rate	7.00%	6.83%
Total Pension Liability	$125,774	$124,187
Plan Fiduciary Net Position	49,376	45,251
Net Pension Liability	$76,398	$78,936
Plan Fiduciary Net Position as a Percentage of Total Pension Liability	39.3%	36.4%
Total Pension Expense	$7,387	$7,639

Sensitivity Projections

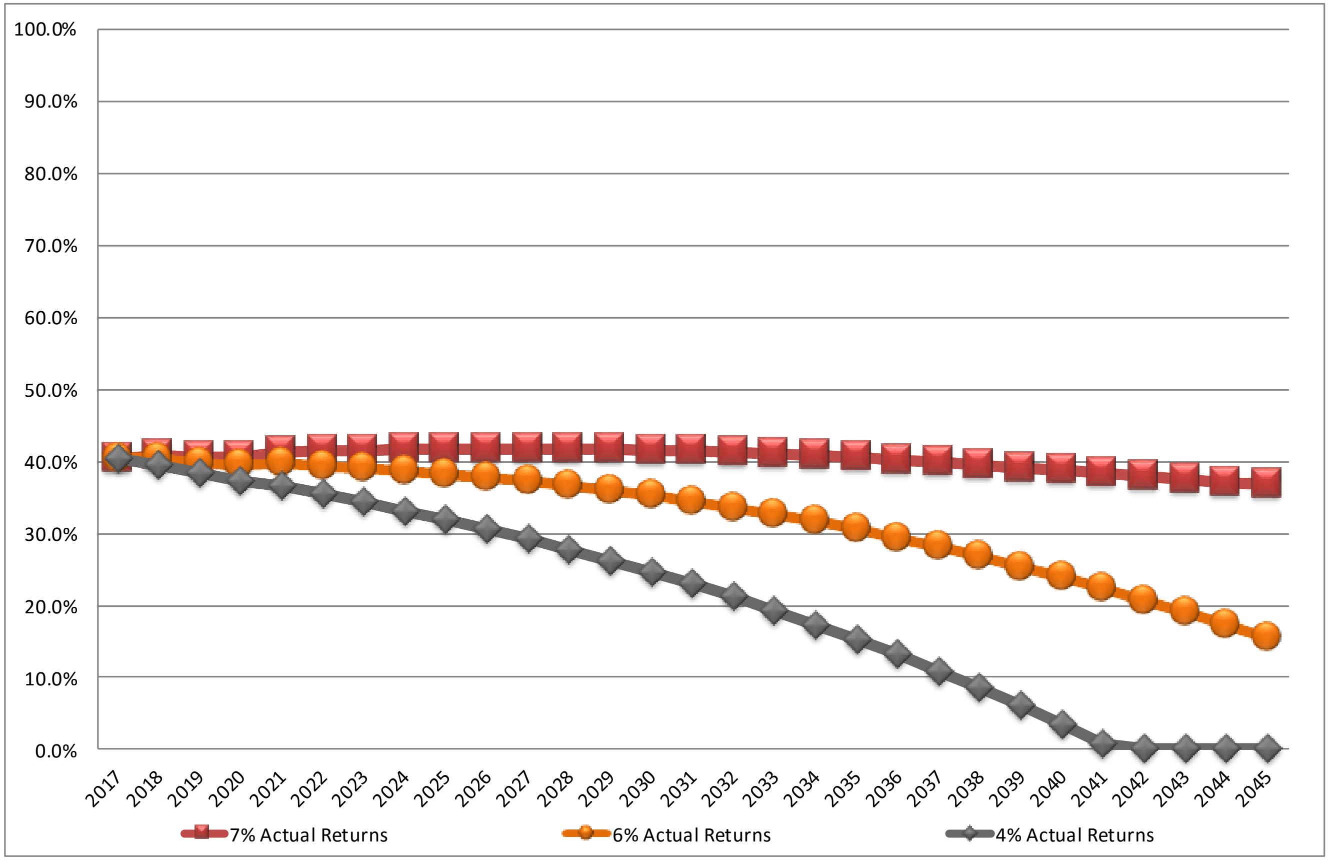
- Included in the determination of the statutorily-required State contribution is an assumption that the annual State contribution will increase by 3.6% per year, on average
- To test the sensitivity of this assumption, we created projections based on the following contribution scenarios:
  - The FY 2018 amount is contributed, and future contributions increase by 2%
  - 90% of the FY 2019-2045 amounts are contributed
  - 75% of the FY 2019-2045 amounts are contributed
- We have also tested the sensitivity of the 7% return assumption by creating projections based on the State contribution scenario of the FY 2018 amount increasing by 2% using the following actual investment returns in each future year:
  - Actual returns of 6% per year
  - Actual returns of 4% per year

Sensitivity Projection #1



- If the FY 2018 State contribution is made, and future contributions increase by 2%, TRS is projected to remain solvent, but the funded ratio is projected to be 37% in 2045
- If 90% of the FY 2019-2045 State contributions are made, the funded ratio is projected to be 65% in 2045
- If 75% of the FY 2019-2045 State contributions are made, the funded ratio is projected to be 28% in 2045

Sensitivity Projection #2



- If the FY 2018 State contribution is made, future contributions increase by 2%, and actual investment returns are 6% rather than 7%, the funded ratio is projected to be 15% in 2045
- If the FY 2018 State contribution is made, future contributions increase by 2%, and actual investment returns are 4% rather than 7%, TRS is projected to become insolvent in 2041

Appendix

Segal

- Revised FY 2018 State Contribution Certification Exhibit A
- FY 2019 State Contribution Certification Exhibit A
- FY 2019 THIS Fund Certification Exhibit B

Exhibit A - Revised to Reflect Public Acts 100-0023 and 100-0340

This exhibit reflects school districts paying the employer normal cost rate on salaries above the Governor's salary, a five-year phase in of the effect of changes in actuarial assumptions (applied retroactively), and the federal contribution rate being equal to the employer normal cost rate.

Summary of State Contributions under Illinois Pension Code and Actuarial Math 2.0	**Fiscal Year 2018**
1. Based on Statutory Funding Plan	
Total State Contribution for fiscal year 2018:	
a. Benefit Trust Reserve*:	
i. 45.23% of membership payroll:	$ 4,722,255,992
ii. Minus School Districts Contribution	
(0.58% of membership payroll)	(60,559,679)
(6% FAS cap increases)	(4,295,624)
(10.10% of membership payroll above the Governor's salary)	(2,477,050)
iii. Minus Federal Funds Contribution	
(10.10% of membership payroll from federal funds)	(21,091,475)
iv. Minus phase-in of the effect of assumption changes	(539,216,018)
iv. State Contribution	$ 4,094,616,146
b. Guaranteed Minimum Annuity Reserve	700,000
c. Total State Contribution (current law)	$ 4,095,316,146
2. Based on Actuarial Math 2.0**	
a. Benefit Trust Reserve*:	
i. Normal cost plus amortization	$ 7,080,756,356
ii. Minus School Districts Contribution	
(0.58% of membership payroll)	(60,559,679)
(6% FAS cap increases)	(4,295,624)
(10.10% of membership payroll above the Governor's salary)	(2,477,050)
iii. Minus Federal Funds Contribution	
(10.10% of membership payroll from federal funds)	(21,091,475)
iv. State Contribution	$ 6,992,332,528
b. Guaranteed Minimum Annuity Reserve	700,000
c. Total State Contribution	$ 6,993,032,528
3. Total Normal Cost and Employer Normal Cost Rate for Fiscal Year 2018	
a. Total Normal Cost Rate (including administrative expenses):	19.10%
b. Member Rate	(9.00%)
c. Employer Normal Cost Rate	10.10%
4. Federal Contribution Rate (Employer Normal Cost Rate, per PA 100-0340)	10.10%

* Expected fiscal year 2018 membership payroll is $10,441,324,011

** Actuarial Math 2.0 is based on the entry age normal actuarial cost method, current asset valuation method and an amortization policy as follows:
- 20-year closed amortization of Unfunded Actuarial Accrued Liability (UAAL) beginning with Fiscal Year 2017
- Use layered amortization, with new UAAL after Fiscal Year 2017 being amortized over 20 years regardless of source
- Amortization payment increase at the rate of future State revenue growth (assumed to be 2.0%)
- Minimum total contribution is no less than the normal cost in any given year

Exhibit A

Summary of State Contributions under Illinois Pension Code and Actuarial Math 2.0	Fiscal Year 2019
1. Based on Statutory Funding Plan	
Total State Contribution for fiscal year 2019:	
a. Benefit Trust Reserve*:	
i. 46.11% of membership payroll:	$ 4,910,722,093
ii. Minus School Districts Contributions	
(0.58% of membership payroll)	(61,768,232)
(6% FAS cap increases)	(4,150,160)
(9.85% of membership payroll above the Governor's salary)	(2,385,898)
iii. Minus Federal Funds Contribution	
(9.85% of membership payroll from federal funds)	(20,979,899)
iv. Minus phase-in of the effect of assumption changes	(355,859,795)
v. State Contribution	$ 4,465,578,109
b. Guaranteed Minimum Annuity Reserve	600,000
c. Total State Contribution (current law)	$ 4,466,178,109
2. Based on Actuarial Math 2.0**	
a. Benefit Trust Reserve*:	
i. Normal cost plus amortization	$ 7,459,614,673
ii. Minus School Districts Contributions	
(0.58% of membership payroll)	(61,768,232)
(6% FAS cap increases)	(4,150,160)
(9.85% of membership payroll above the Governor's salary)	(2,385,898)
iii. Minus Federal Funds Contribution	
(9.85% of membership payroll from federal funds)	(20,979,899)
iv. State Contribution	$ 7,370,330,484
b. Guaranteed Minimum Annuity Reserve	600,000
c. Total State Contribution	$ 7,370,930,484
3. Total Normal Cost and Employer Normal Cost Rate for Fiscal Year 2019	
a. Total Normal Cost Rate (including administrative expenses):	18.85%
b. Member Rate	(9.00%)
c. Employer Normal Cost Rate	9.85%
4. Federal Contribution Rate (Employer Normal Cost Rate, per PA 100-0340)	9.85%

* Expected fiscal year 2019 membership payroll is $10,649,695,100

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- 20-year closed amortization of Unfunded Actuarial Accrued Liability (UAAL) beginning with Fiscal Year 2017
- Use layered amortization, with new UAAL after Fiscal Year 2017 being amortized over 20 years regardless of source
- Amortization payment increase at the rate of future State revenue growth (assumed to be 2.0%)
- Minimum total contribution is no less than the normal cost in any given year

Exhibit B

Teacher Health Insurance Security Fund Contribution Amount to be Certified by the Board for Fiscal Year 2019	Fiscal Year 2019
Expected State Contribution for Fiscal Year 2019 to THIS Fund:	
1. Fiscal Year 2019 membership payroll:	
a. Total:	$ 10,649,695,100
b. Minus members who do not contribute to THIS Fund	(48,223,855)
c. Members who do contribute to THIS Fund	$ 10,601,471,245
2. Member contribution rate (assumed)	1.24%
3. Matching State contribution: 1.c. x 2.	$ 131,458,243
4. Adjustment to THIS Fund for overestimating fiscal year 2017 member THIS Fund contributions	(6,196,282)
5. Total THIS Fund State contribution*	$ 125,261,961

* This certification does not include other State contributions to THIS Fund, which are not part of the statutory certification requirement.

- Illinois Statute requires the TRS Board to certify the THIS Fund State contribution amount by November 15 each year
- State contribution amount is based on the projected fiscal 2019 payroll from the June 30, 2017 valuation