



New York State and Local  
Employees' Retirement System  
Police and Fire Retirement System  
Public Employees' Group Life Insurance Plan

**Thomas P. DiNapoli, Comptroller**

**ANNUAL REPORT  
TO THE COMPTROLLER  
ON  
ACTUARIAL ASSUMPTIONS**

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## **I. Executive Summary**

Fiscal year 2018 (FY 2018) was the third in the current five year experience study cycle. The August 2015 report based on experience studies for the period April 1, 2010 through March 31, 2015 recommended changes in virtually all of the assumptions. This year's report displays the FY 2018 experience and recommends that the current assumptions be maintained with the exception of the salary scale.

### **Summary of Assumptions and Methods**

<b>Assumption or Method</b>	<b>Recommendation</b>
<b>Inflation / COLA</b>	2.5 % / 1.3%
<b>Investment Return</b>	7.0 %
<b>ERS Salary Scale</b>	3.8 % average (using FY 2015 data) Indexed by Service <b>each service value to be increased by 10%</b>
<b>PFRS Salary Scale</b>	4.5 % average (using FY 2015 data) Indexed by Service <b>each service value to be increased by 10%</b>
<b>Asset Valuation Method</b>	5 year level smoothing of gains or losses above or below the assumed return applied to all assets and cash flows
<b>Pensioner Mortality</b>	Gender/Collar specific tables based upon FY 2011-2015 experience with Society Of Actuaries Scale MP-2014 loading for mortality improvement.
<b>Active Member Decrements</b>	Based upon FY 2011-2015 experience

This recommendation has been shared with the Systems' Actuarial Advisory Committee (AAC) for their review and comment. This Committee is composed of current or retired senior actuaries from major insurance companies or pension plans.

In addition to oversight provided by the AAC, the work of the Systems' actuaries is periodically reviewed by a number of organizations, including the Systems' financial statement auditors, internal auditors of the Office of the State Comptroller, examiners from the New York State Department of Financial Services (DFS), and a quinquennial review by an independent actuarial firm. The most recent review by an independent actuarial firm was completed in July 2018 by Grant Thornton, LLP.

The reviewed and finalized actuarial assumptions will be presented to Comptroller Thomas P. DiNapoli for certification for the purpose of developing employer contribution rates, payable on 2/1/2020, for the many different plans covered by the Employees' Retirement System (ERS) and the Police and Fire Retirement System (PFRS).

It is customary to avoid assumption changes between quinquennial experience studies (conducted in years divisible by five), where the five most recent years of system experience are combined and used as a basis for new assumptions.

However, members of the committee have expressed concern that the salary scale reduction in 2015 was too aggressive. Three years into the five year period, the salary experience validates this concern. Therefore I am recommending a 10% increase to the salary scales for both systems.

## II. Economic Assumptions

### A. Inflation (CPI-U) and the Cost of Living Adjustment (COLA)

The table below displays the applicable CPI-U data:

	CPI-U	Increase	COLA
3/31/2018	249.554	2.36%	1.2%
3/31/2017	243.801	2.38%	1.2%
3/31/2016	238.132	0.85%	1.0%
3/31/2015	236.119		

As a result, there will be a  $\frac{2.36\%}{2} = 1.18\%$  rounded up to 1.2% COLA applied in September of 2018, which is 0.1% less than the current assumption. (Note that COLA applies to the first \$18,000 of the pensioner's single-life pension. Spousal beneficiaries are entitled to one-half of the pensioner's COLA.)

### B. Investment Rate of Return (Discount Rate)

The FY 2018 investment rate of return, as reported by the Division of Pension Investment and Cash Management, is 11.35%. The 3, 5, 10, and 20 year returns are 7.54%, 8.54%, 6.46% and 6.81% respectively.

The data below is taken from the National Association of State Retirement Administrators (NASRA) website and represents the investment return assumption distribution for public systems in their database.

<i>i</i>	Number of Public Systems		
	June 2018	May 2015	March 2010
< 7.00	14	4	0
7.00	21	4	1
7.01-7.50	69	43	21
7.51-7.99	17	36	16
8.00	7	34	51
8.01-8.49	0	3	16
8.50	0	2	19
Median	7.46	7.75	7.97

C. Salary Scales

The tables below display the actual and expected salary increases for full-time employees, under the current assumptions (set in 2015) and the same assumption increased by a factor of 110%.

Current	FY 2016			FY 2017			FY 2018		
	Actual	Expected	A/E	Actual	Expected	A/E	Actual	Expected	A/E
ERS	3.696%	3.844%	0.9616	4.848%	3.916%	1.2381	4.348%	3.946%	1.1017
PFRS	7.202%	4.692%	1.5350	5.104%	4.723%	1.0805	4.706%	4.752%	0.9902
Combined	4.168%	3.958%	1.0531	4.883%	4.026%	1.2128	4.396%	4.056%	1.0839

Current	FY 2016-FY2018		
	Actual	Expected	A/E
ERS	4.301%	3.902%	1.1022
PFRS	5.651%	4.723%	1.1966
Combined	4.484%	4.014%	1.1170

110% Adjusted	FY 2016			FY 2017			FY 2018		
	Actual	Expected	A/E	Actual	Expected	A/E	Actual	Expected	A/E
ERS	3.696%	4.228%	0.8742	4.848%	4.307%	1.1255	4.348%	4.341%	1.0016
PFRS	7.202%	5.161%	1.3954	5.104%	5.196%	0.9823	4.706%	5.227%	0.9002
Combined	4.168%	4.354%	0.9571	4.883%	4.430%	1.1023	4.396%	4.462%	0.9853

110% Adjusted	FY 2016-FY2018		
	Actual	Expected	A/E
ERS	4.301%	4.293%	1.0020
PFRS	5.651%	5.195%	1.0878
Combined	4.484%	4.416%	1.0155

For PFRS, the increase of 10% falls short of the actual 3-year experience, which is attributed to FY 2016 salary scale experience that looks to be an anomaly. The 110% factor was more than sufficient for FYs 2017 and 2018.

Note that the expected salary experience using the current assumptions do not perfectly match the aggregated figures (using FY 2015 data) of 3.8% in ERS and 4.5% in PFRS. The implemented salary scale assumptions are indexed by years of service. Aggregating a service indexed salary scale will not yield the same result each year as the demographics of the valuation cohort (service, age, and plan) changes from year to year.

### III. Asset Valuation Method

The values since FY 2000 are given below (in billions):

#### Market Value (MVA) v. Actuarial Value of Assets (AVA)

FY	<sup>a</sup> MVA	AVA	AL <sub>EAN</sub>	UAL <sub>EAN</sub>	GASB 25 Ratio AVA/ AL <sub>EAN</sub>	<sup>b</sup> TPL <sub>EAN</sub>	GASB 67 Ratio MVA/ TPL <sub>EAN</sub>
2000	\$128.9	\$110.6	\$90.6	\$-20.0	122.1%	Use AL <sub>EAN</sub> as a proxy	142.3%
2001	114.0	119.4	98.0	-21.4	121.9		116.3
2002	112.7	125.1	103.9	-21.2	120.4		108.5
2003	97.3	106.6	107.3	0.6	99.4		90.7
2004 <sup>c</sup>	120.8	117.4	116.2	-1.2	101.0		104.0
2005	128.0	123.7	120.0	-3.7	103.1		106.7
2006	142.6	132.0	126.6	-5.4	104.3		112.6
2007	156.5	142.5	134.6	-7.9	105.9		116.3
2008	155.8	151.7	141.3	-10.4	107.4		110.3
2009	110.9	148.9	146.7	-2.1	101.5		75.6
2010	134.2	147.7	156.6	8.9	94.3		85.7
2011	149.5	148.6	164.3	15.7	90.5		91.0
2012	153.3	147.8	169.3	21.5	87.3		90.5
2013	164.1	155.3	175.1	19.8	88.7		93.7
2014	181.2	171.6	186.1	14.6	92.2	97.4	
2015	189.3	184.2	196.5	12.4	93.7	\$193.1	98.0
2016	183.5	190.6	203.0	12.4	93.9	202.7	90.6
2017	197.5	198.0	210.1	12.1	94.2	209.1	94.5
2018	212.0	206.7	217.6	10.9	95.0	216.3	98.0
2019						223.9	

a) Financial Statement Plan Net Position (i.e. Invested Assets + Receivables)  
[both the MVA & AVA exclude funds for group term life insurance]

b) Entry Age Normal Total Pension Liability (TPL<sub>EAN</sub>) is similar to Accrued Liability (AL<sub>EAN</sub>), the chief difference being that TPL is projected from the valuation one year earlier to allow sufficient time for financial statement auditors to audit the data and calculations

c) The equity smoothing was 'restarted'; MVA > AVA  
as the market value of the fixed income portfolio exceeded the amortized cost.

## IV. Demographic Assumptions

### A. Pensioner Mortality Experience (annual option 0 in millions)

System	Retirement	Retiree	FY 2018			FY 2016-2018		
			Actual	Expected	A/E	Actual	Expected	A/E
ERS	Service	Male Clerk*	71.024	73.051	0.972	213.124	209.181	1.019
		Male Laborer*	40.158	40.298	0.997	117.803	115.485	1.020
		Female Clerk*	61.357	62.367	0.984	181.759	177.070	1.026
		Female Laborer*	8.264	7.734	1.069	23.647	22.187	1.066
	Disability	Male	6.917	7.881	0.878	20.542	22.927	0.896
		Female	4.259	4.559	0.934	12.904	13.441	0.960
PFRS	Service	All	19.080	19.739	0.967	56.252	55.801	1.008
	Disability	All	4.227	3.305	1.279	10.658	9.265	1.150
ERS & PFRS	Beneficiary**	Male	2.063	1.693	1.218	6.511	4.638	1.404
		Female	14.205	14.484	0.981	42.944	40.928	1.049
<b>All Pensioner Mortality</b>			<b>231.554</b>	<b>235.111</b>	<b>0.985</b>	<b>686.143</b>	<b>670.923</b>	<b>1.023</b>
* Clerk refers to White Collar while Laborer refers to Blue Collar ** Beneficiary dollars reflect actual pension received								

### B. Mortality Improvement

NYSLRS actuarial valuations use Society of Actuaries (SOA) Mortality Improvement Scale MP-2014.

C. Active Member Decrement Experience

Decrement			FY 2018				FY 2016-2018			
			Exposures	Actual	Expected	A/E *	Exposures	Actual	Expected	A/E *
<b>Withdrawal</b>			<b>362,282</b>	<b>22,905</b>	<b>25,325</b>	<b>0.904</b>	<b>1,070,171</b>	<b>68,188</b>	<b>71,634</b>	<b>0.952</b>
ERS	Regular Plan	0 ≤ Srv < 2	86,871	12,864	15,098	0.852	239,824	36,557	41,669	0.877
		2 ≤ Srv < 3	26,171	2,466	2,891	0.853	71,541	7,395	7,898	0.936
		3 ≤ Srv < 4	20,190	1,601	1,667	0.960	57,053	4,717	4,692	1.005
		4 ≤ Srv < 5	17,426	1,079	1,090	0.990	48,956	3,381	3,037	1.113
		5 ≤ Srv < 10	62,123	2,673	2,338	1.143	199,971	8,842	7,609	1.162
		10 ≤ Service	125,658	1,827	1,833	0.997	383,086	6,224	5,563	1.119
PFRS	All Plans	All Service	23,845	395	408	0.968	69,740	1,072	1,166	0.920
<b>ERS Service Retirement</b>			<b>121,638</b>	<b>15,017</b>	<b>15,796</b>	<b>0.951</b>	<b>375,168</b>	<b>44,402</b>	<b>48,194</b>	<b>0.921</b>
Regular Plan	Tier 1	0 ≤ Srv < 20	427	103	83	1.246	1,822	331	343	0.964
		20 ≤ Srv < 30	287	77	83	0.932	1,256	332	357	0.930
		30 ≤ Service	590	176	137	1.281	2,484	690	599	1.151
	Tiers 2,3,4,5,6	0 ≤ Srv < 20	62,664	4,981	4,931	1.010	193,625	14,826	15,026	0.987
		20 ≤ Srv < 30	35,573	4,774	5,247	0.910	108,863	14,131	15,741	0.898
		30 ≤ Service	17,697	3,971	4,540	0.875	51,861	10,829	13,333	0.812
State CO	Tiers 1,2	All Service	6	3	1	2.320	38	19	9	2.137
	Tiers 3,5,6	All Service	3,277	704	571	1.232	11,574	2,424	2,100	1.154
County CO	All Tiers	All Service	1,120	228	203	1.125	3,649	820	685	1.196
<b>PFRS Service Retirement</b>			<b>8,191</b>	<b>1,189</b>	<b>964</b>	<b>1.234</b>	<b>25,168</b>	<b>3,104</b>	<b>2,877</b>	<b>1.079</b>
20 Year Plans	No additions	All Service	1,899	268	233	1.149	5,770	794	684	1.161
	with add'l 60ths	All Service	5,087	713	574	1.242	15,623	1,783	1,709	1.044
	State Police	All Service	1,206	208	157	1.328	3,776	527	485	1.088
<b>Disability Retirements and Deaths</b>										
Disability Retirement	ERS	Accidental	227,137	4	7	0.593	673,974	14	21	0.673
		Ordinary	125,771	213	334	0.638	386,909	841	1,032	0.815
	PFRS	Accidental	32,303	62	73	0.846	95,723	160	221	0.723
		Ordinary	11,317	2	6	0.342	33,217	8	17	0.471
Deaths	ERS	Accidental	455,673	0	5	0.000	1,360,339	3	15	0.203
		Ordinary	455,673	615	641	0.959	1,360,339	1,894	1,926	0.983
	PFRS	Accidental	32,303	1	2	0.404	95,723	2	7	0.272
		Ordinary	32,303	18	23	0.787	95,723	56	68	0.823

\* reflects quotient of unrounded Actual and Expected counts

## V. Effect on Contributions

The table below summarizes the projected average employer contribution rates for the most recent valuations.

Valuation 4/1	Local Employer Billing Date 2/1	ERS (reg plan GLIP)	PFRS (GLIP)	Total Employer Contributions (billions)	Contribution Stabilization Program (CSP) Mitigated Rates (does not apply to GLIP, <del>strikerthrough</del> => no amortizing)				CSP Balance (billions)
					ERS		PFRS		
2005	2007	10.7%	17.0%	\$2.7					
2006	2008	9.6	16.6	2.6					
2007	2009	8.5	15.8	2.5					
2008	2010	7.3	15.1	2.3	Original		Original		
2009	2011	11.9 (0.4)	18.2 (0.1)	3.6	9.5%		17.5%		
2010	2012	16.3 (0.4)	21.6 (0.0)	4.9	10.5		18.5		
2011	2013	18.9 (0.4)	25.8 (0.1)	5.5	11.5	Alternate	19.5	Alternate	\$0.3
2012	2014	20.9 (0.4)	28.9 (0.0)	6.2	12.5	12.0%	20.5	20.0%	1.1
2013	2015	20.1 (0.4)	27.6 (0.1)	6.1	13.5	12.0	21.5	20.0	2.1
2014	2016	18.2 (0.5)	24.7 (0.0)	5.5	14.5	12.5	22.5	20.5	3.3
2015	2017	15.5 (0.4)	24.3 (0.0)	4.8	<del>15.1</del>	13.0	23.5	21.0	4.1
2016	2018	15.3 (0.4)	24.4 (0.1)	4.9	<del>14.9</del>	13.5	<del>24.3</del>	21.5	4.2
2017	2019	14.9 (0.5)	23.5 (0.0)	4.9	<del>14.4</del>	14.0	<del>23.5</del>	22.0	3.8
2018	<b>2020</b>	<b>14.6 (0.4)</b>	<b>23.5 (0.0)</b>	<b>4.9</b>	<b>14.2</b>	<b>14.2</b>	<b>23.5</b>	<b>22.5</b>	<b>3.3</b>

The 3/31/2018 CSP amortization balance is \$2.18b state + \$1.13b local = \$3.31b total.

In ERS the associated new entrant rate for the valuation cohort is 12.0%, and  $14.6\%/12.0\% = 122\%$ .

In PFRS the associated new entrant rate for the valuation cohort is 20.4%, and  $23.5\%/20.4\% = 115\%$ .

Note that the average new entrant rates for the valuation cohort increased from 3/31/2017 (ERS 11.6% and PFRS 19.7%) due to the 10% increase in the salary scale.

The associated new entrant contribution is \$4.0b. The additional \$0.9b is 8.3% of the  $UAE_{AN}$  of \$10.9b.

The new entrant rate for the tier 6 valuation cohort is 8.0% in ERS and 13.3% in PFRS.

## VI. Gain/Loss Analysis

	<b>ERS</b>	<b>PFRS</b>
<b>2019 Estimated Contributions (2/1/19 Payment)</b>	14.9%	23.5%
<b>Changes Due to Gains/Losses In:</b>		
FY 2014 Investment Performance (13.0% v 7.5%)	-0.7%	-0.8%
FY 2015 Investment Performance (7.2% v 7.5%)	0.1%	0.1%
FY 2016 Investment Performance (0.2% v 7.0%)	1.1%	1.2%
FY 2017 Investment Performance (11.4% v 7.0%)	-0.6%	-0.7%
FY 2018 Investment Performance (11.4% v 7.0%)	-0.6%	-0.7%
10% Increase in Salary Scale	0.9%	1.0%
Non-Investment Assumptions (Demographic, Salary Scale, COLA)	0.2%	0.2%
New Entrant	-0.6%	-0.8%
GLIP, Administrative Contributions	0.1%	0.2%
Miscellaneous	-0.2%	0.3%
<b>Net Change</b>	-0.3%	0.0%
<b>2020 Estimated Contributions (2/1/20 Payment)</b>	14.6%	23.5%

In a nutshell, the 5 year investment return of 8.54% results in modest net investment gains over the smoothing period (rate impact of -0.7% in ERS, -0.9% in PFRS). New tier 6 members with less lucrative benefits continue exerting a downward pressure on the system average rates. These rate reducing forces were largely offset by the 10% salary scale increase recommendation.

## VII. Summary of Recommendations

I recommend that the salary scale assumptions be increased by 10% and all other assumptions be maintained. I am a Member of the American Academy of Actuaries and meet the Academy's Qualification Standards to issue this Statement of Actuarial Opinion.

This recommendation was reviewed by the Actuarial Advisory Committee (AAC) in a meeting on August 8, 2018.

## VIII. Historical Employer Contribution Average Rate

Average Rate			Average Rate			Average Rate		
Year	ERS	PFRS	Year	ERS	PFRS	Year	ERS	PFRS
1972	21.9	28.8	1989	3.7	8.5	2006	11.3	16.3
1973	20.3	31.4	1990	3.6	8.3	2007	10.7	17.0
1974	21.3	32.4	1991	0.3	7.8	2008	9.6	16.6
1975	20.4	32.9	1992	0.4	11.5	2009	8.5	15.8
1976	19.7	32.3	1993	0.6	14.0	2010	7.4	15.1
1977	19.6	33.3	1994	0.7	11.3	2011	11.9	18.2
1978	19.8	34.9	1995	0.7	13.9	2012	16.3	21.6
1979	18.8	35.1	1996	2.2	13.0	2013	18.9	25.8
1980	18.1	34.2	1997	3.7	9.8	2014	20.9	28.9
1981	17.0	33.1	1998	1.7	7.0	2015	20.1	27.6
1982	15.5	29.6	1999	1.3	2.4	2016	18.2	24.7
1983	15.1	28.7	2000	0.9	1.9	2017	15.5	24.3
1984	14.4	27.3	2001	0.9	1.6	2018	15.3	24.4
1985	14.2	26.5	2002	1.2	1.6	2019	14.9	23.5
1986	10.4	19.8	2003	1.5	1.4	2020	14.6	23.5
1987	9.4	13.3	2004	5.9	5.8			
1988	9.7	14.8	2005	12.9	17.6			

