

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 2022 (FY 2022) was the second in the current five-year experience study cycle. The August 2020 report recommended changes in virtually all the demographic assumptions. The August 2021 report recommended changes in the economic assumptions and a market restart in the smoothing method. This year's report recommends that the current assumptions be maintained, except for a 0.2% increase in the CPI-U assumption, replacing MP-2020 with MP-2021, and a return to asset smoothing, but over an 8-year period instead of a 5-year period.

Summary of Assumptions and Methods

Assumption or Method	Recommendation
Inflation / COLA	2.9% / 1.5% (from 2.7% / 1.4%)
Investment Return	5.9%
ERS Salary Scale	4.4% average (using FY 2021 data) Indexed by Service
PFRS Salary Scale	6.2% average (using FY 2021 data) Indexed by Service
Asset Valuation Method	8 -year level smoothing of gains or losses above or below the assumed return applied to all assets and cash flows
Pensioner Mortality	Gender/Collar specific tables based upon FY 2016-2020 experience with Society of Actuaries Scale MP-2021 loading for mortality improvement (from MP-2020).
Active Member Decrements	Based upon FY 2016-2020 experience

This recommendation has been shared with the Systems' Actuarial Advisory Committee (AAC) for review and comment. The AAC 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 several 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 and will be used in developing employer contribution rates, payable on 2/1/2024, for the different plans covered by the Employees' Retirement System (ERS) and the Police and Fire Retirement System (PFRS).

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
3/31/2022	287.504	8.54%	3.0%
3/31/2021	264.877	2.62%	1.4%
3/31/2020	258.115		

The law requires that COLA payments be calculated based on 50 percent of the annual rate of inflation, measured at the end of the State fiscal year (March 31). The increase cannot be less than 1 percent or greater than 3 percent. Thus, there will be a $\frac{8.54\%}{2} = 4.27\%$ capped to 3.0% COLA applied in September of 2022, which is 1.6% more 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.)

Last year we increased the CPI-U assumption from 2.5% to 2.7%.

I recommend that we increase the assumption again, from 2.7% to 2.9%.

This is likely to be too low in the short-term, but the assumption is for the long-term, and the recent Federal Reserve rate increases (March 16: 0.25%, May 4: 0.50%, June 15: 0.75%, July 27: 0.75%) demonstrate a resolve to bring inflation "under control."

B. Investment Rate of Return (Discount Rate)

The FY 2022 investment rate of return, as reported by the Division of Pension Investment and Cash Management (PICM), is 9.51%. The 3, 5, 10, and 20-year returns are 12.49%, 10.77%, 9.55% and 7.99% respectively.

Every calendar year, PICM consultant RVK creates long-term forward-looking expectations of asset class return, risk and correlation assumptions through a rigorous multi-step process. The RVK 2022 capital market assumptions (CMAs) indicate a slight increase in the expected arithmetic return relative to the 2021 CMAs (5.97% vs. 5.82%). The expected geometric return increased to 5.40%. Thus, our assumption of 5.90% lies in the range between the expected geometric return and the expected arithmetic return.

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. NYSLRS is in the group in bold in each column below. Funds continue to lower their return assumption.

<i>i</i>	Number of Public Systems			
	July 2022	July 2020	May 2015	March 2010
< 6.50	12	2	4	0
6.50	8	5		0
6.51-6.99	23	17		0
7.00	48	32	4	1
7.01-7.49	32	38	43	21
7.50	4	26		
7.51-7.99	1	7	36	16
8.00	0	3	34	51
8.01-8.49	0	0	3	16
8.50	0	0	2	19
Median	7.00	7.25	7.75	7.97

According to NASRA, only the much smaller Kentucky Employees Retirement System has an assumed return lower than NYSLRS (5.25% with < \$5b in assets). Of the dozen largest retirement systems in the United States, the next lowest assumed return is 6.5% for the North Carolina Teachers and State Employees Retirement System. NYSLRS manages considerably more assets than the 11 other systems under 6.50% combined.

I recommend that we maintain the investment return assumption at 5.9%.

C. Salary Scales

The table below displays the actual and expected salary increases for full-time employees.

	FY 2021			FY 2022			FY 2021 – 2022 Combined		
	Actual	Expected	A/E	Actual	Expected	A/E	Actual	Expected	A/E
ERS	2.301%	4.484%	0.5131	7.571%	4.356%	1.7380	4.874%	4.422%	1.1023
PFRS	3.971%	5.865%	0.6770	8.532%	5.570%	1.5319	6.232%	5.719%	1.0897

Note that the expected system salary increases for FY 2022 full-time employees were a bit lower than FY 2021, even though the same salary scale was used. The assumed salary scales employ indexing by service credit and there is a large range in the salary increase assumptions over the service range (e.g. 28% for new PFRS members decreasing to 3% for members with more than 25 years of service). When reducing a service indexed salary scale to one number for convenience of display, the year-to-year expectations for the valuation cohort are constant only insofar as the demographics (full-time member salary at each service level) of the cohort remains constant. Cohort demographics do not stay constant, and the full-time employees averaged more service in the FY 2022 cohort than they did in the FY 2021 cohort, so the FY 2022 expectation is lower than the FY 2021.

Salary experience has been erratic during the COVID period and FY 2022 featured some retroactive pay increases to make up for FY 2021. The two-year period A/E is much closer to 1 than the individual years.

I recommend that the salary scales remain unchanged.

III. Asset Valuation Method

Pension fund trustee(s) could direct all assets to be invested in a fixed income portfolio. While this would greatly reduce investment income volatility, it would also increase the expected employer contribution rates.

In general, one expects to profit more as an owner (i.e. an investor in equities) than as a lender (i.e. an investor in bonds), especially if the equity ownership can be diversified and held. Thus, pension funds typically invest in equities. Unfortunately, this introduces volatility in investment income.

The basic equation governing pension funding is: **C + I = B + E**

Contributions (both employer and employee) + **I**nvestment Income = **B**enefits + **E**xpenses*

** In NYSLRS, administrative expenses are funded independently of the benefits.*

The equation shows that volatility in investment income translates into volatility in employer contributions.

Asset valuation methods “smooth” the investment income volatility by phasing in “unexpected” gains and losses, where the amount of “unexpected” and the period of smoothing are defined by the method.

The NYSLRS asset valuation method from 2013 to 2020 had the following features:

- 1) expect a gain of the assumed rate of return on the plan net position and fiscal year cash flows,
- 2) recognize (smooth) the unexpected gain (= actual gain – expected gain)
over 5 years in equal annual portions, beginning immediately,
- 3) do not apply a market value corridor.

In 2021, I recommended that we suspend asset smoothing for the 4/1/2021 valuation and restart it with the 4/1/2022 valuation. Following through with that recommendation, **I now recommend a smoothing method with the following features:**

- 1) expect a gain of the assumed rate of return on the plan net position and fiscal year cash flows,**
- 2) recognize (smooth) the unexpected gain (= actual gain – expected gain)
over 8 (eight) years in equal annual portions, beginning immediately,**
- 3) do not apply a market value corridor.**

The new recommendation differs from the method applied from 2013 to 2020 by smoothing over an 8-year period instead of a 5-year period. Five-year smoothing may be something of an industry standard, but I contend that as a pension system matures, which I define to mean asset leverage ratio increases, the smoothing period should be extended. Please see page 16 for information on the smoothed asset leverage ratio.

The asset values since FY 2015 are given below (in billions):

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

FY	MVA ^a	AVA	AL _{LEAN}	UAL _{LEAN}	Rollforward TPL _{LEAN}	GASB 67 Ratio
2015	189.3	184.2	196.5	12.4	\$193.1	98.0
2016	183.5	190.6	203.0	12.4	202.7	90.6
2017	197.5	198.0	210.1	12.1	209.1	94.5
2018	212.0	206.7	217.6	10.9	216.3	98.0
2019	215.2	212.8	224.0	11.2	223.9	96.1
2020	198.1	214.1	231.9	17.8	229.9	86.2
2021 ^b	260.1	260.1	260.4	0.3	237.9 261.9	99.3
2022	273.7	267.2	270.9	2.8	266.1	102.9
2023					276.5	
a) Financial Statement Plan Net Position (i.e. Invested Assets + Receivables) [both the MVA & AVA exclude funds for group term life insurance]						
b) The smoothing was 'restarted' and the TPL _{LEAN} was recomputed under new assumptions.						

An astute observer may note that the increase in TPL_{LEAN} from 2021 to 2022 was \$4.2b while the increase from 2022 to 2023 is \$10.4b. Thus, the denominator in this year's GASB 67 ratio looks "a little light" ("shading" the ratio upward), while next year's denominator looks "a little stout" ("shading" the next ratio downward). The increase in liability growth is due to FY 2022

- 1) benefit improvements (5 year vesting in the newer tiers),
- 2) salary experience (A/E >> 1, page 6 and 7th column),
- 3) retirement experience (A/E >> 1, page 10 and 7th column – last two bold rows),
- 4) COLA experience (3.0% in September 2022 vs. the assumed 1.4%),
- 5) new assumptions (CPI-U 2.9% vs. 2.7%, MP-2021 vs. MP-2020).

Each of these exert upward pressure on employer contribution rates (see page 12). The increase in the GASB 67 ratio to a FY 2022 value of 102.9%, counterintuitively coinciding with an increase in employer contribution rates, should be understood in this context.

IV. Demographic Assumptions

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

System	Retirement	Retiree	FY 2022			FY 2021-2022		
			Actual	Expected	A/E	Actual	Expected	A/E
ERS	Service	Male Clerk*	112.443	94.888	1.185	227.179	184.690	1.230
		Male Laborer*	37.477	50.880	0.737	77.565	99.476	0.780
		Female Clerk*	89.021	85.878	1.037	180.120	166.579	1.081
		Female Laborer*	10.651	10.586	1.006	21.369	20.744	1.030
	Disability	Male	9.027	8.002	1.128	17.709	16.004	1.106
		Female	4.551	4.848	0.939	9.534	9.717	0.981
PFRS	Service	All	25.201	25.092	1.004	48.253	48.811	0.989
	Disability	All	5.275	4.725	1.116	9.312	9.277	1.004
ERS & PFRS	Beneficiary**	Male	2.462	3.155	0.780	5.374	5.946	0.904
		Female	18.340	19.987	0.918	36.986	38.511	0.960
All Pensioner Mortality			314.448	308.043	1.021	633.401	599.755	1.056
* Clerk refers to White Collar while Laborer refers to Blue Collar ** Beneficiary dollars reflect actual pension received								

Actual pension terminations by dollar are a bit more than expected, perhaps in part due to COVID. (The experience study underlying the assumptions was for the period 4/1/15 to 3/31/20, basically ending when COVID's significant impact was beginning.)

I recommend that NYSLRS actuarial valuations maintain the current pensioner mortality assumptions.

B. Mortality Improvement

I recommend that NYSLRS actuarial valuations update Society of Actuaries' Mortality Improvement Scale MP-2020 to MP-2021, the most recently available.

C. Active Member Decrement Experience

Decrement			FY 2022				FY 2021-2022			
			Exposures	Actual	Expected	A/E *	Exposures	Actual	Expected	A/E *
Withdrawal			309,161	20,056	15,412	1.301	642,578	54,839	34,686	1.581
ERS	Regular Plan	0 ≤ Srv < 2	20,560	8,431	3,461	2.436	59,874	29,228	10,126	2.887
		2 ≤ Srv < 3	23,823	3,976	2,435	1.633	61,378	7,757	6,219	1.247
		3 ≤ Srv < 4	32,222	2,066	2,542	0.813	59,815	4,412	4,703	0.938
		4 ≤ Srv < 5	24,813	1,272	1,655	0.768	48,570	2,874	3,237	0.888
		5 ≤ Srv < 10	76,969	2,621	3,305	0.793	145,801	5,895	6,252	0.943
		10 ≤ Service	108,279	1,381	1,800	0.767	221,218	3,748	3,672	1.021
PFRS	All Plans	All Service	22,497	309	213	1.448	45,924	925	476	1.941
ERS Service Retirement			104,404	19,764	13,660	1.447	215,071	38,557	28,152	1.370
Regular Plan	Tier 1	0 ≤ Srv < 20	59	13	11	1.158	161	36	31	1.154
		20 ≤ Srv < 30	49	18	14	1.289	136	39	39	0.988
		30 ≤ Service	84	32	18	1.786	227	72	50	1.451
	Tiers 2,3,4,5,6	0 ≤ Srv < 20	49,479	5,204	3,975	1.309	102,941	10,226	8,229	1.243
		20 ≤ Srv < 30	35,364	6,413	4,999	1.283	70,571	12,172	9,940	1.225
		30 ≤ Service	16,552	6,998	3,971	1.762	35,021	14,010	8,411	1.666
State CO	Tiers 1,2	All Service	0	0	0	N/A	0	0	0	N/A
	Tiers 3,5,6	All Service	1,876	806	454	1.777	8,298	1,720	1,529	1.125
County CO	All Tiers	All Service	943	280	219	1.277	4,055	1,437	979	1.468
PFRS Service Retirement			6,609	1,451	872	1.664	13,751	2,902	1,830	1.586
20 Year Plans	No additions	All Service	1,630	429	238	1.801	3,424	851	503	1.693
	with add'l 60ths	All Service	3,937	764	495	1.544	8,241	1,547	1,037	1.492
	State Police	All Service	1,042	258	139	1.859	2,087	504	290	1.737
Disability Retirements and Deaths										
Disability Retirement	ERS	Accidental	181,002	0	5	0.000	381,985	0	10	0.000
		Ordinary	105,357	49	197	0.249	215,176	73	404	0.181
	PFRS	Accidental	29,339	60	49	1.229	60,131	96	100	0.961
		Ordinary	10,465	2	3	0.785	21,232	7	5	1.364
		IPOD	29,339	41	49	0.840	60,131	59	100	0.591
Deaths	ERS Regular Plan	Accidental	388,249	3	4	0.685	805,710	9	9	0.997
		Ordinary	388,249	728	562	1.295	805,710	1,526	1,157	1.319
	PFRS	Accidental	29,339	0	1	0.000	60,131	0	1	0.000
		Ordinary	29,339	28	13	2.116	60,131	47	27	1.736

* reflects quotient of unrounded Actual and Expected counts

The large decrement categories (withdrawal and service retirement) have significantly higher actuals than expected, probably in part due to COVID, and perhaps in part in PFRS due to adjustments in law enforcement practices. COVID may also be a factor in the higher ordinary death A/Es.

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/ FY Benefits (billions)	Contribution Stabilization Program (CSP) Mitigated Rates (does not apply to GLIP, strikerthrough => no amortizing)				CSP Balance (billions)
					ERS		PFRS		
2005	2007	10.7%	17.0%	\$2.7 / 6.4					
2006	2008	9.6	16.6	2.6 / 6.8					
2007	2009	8.5	15.8	2.5 / 7.2					
2008	2010	7.3	15.1	2.3 / 7.7	Original		Original		
2009	2011	11.9 (0.4)	18.2 (0.1)	3.6 / 8.5	9.5%		17.5%		
2010	2012	16.3 (0.4)	21.6 (0.0)	4.9 / 8.9	10.5		18.5		
2011	2013	18.9 (0.4)	25.8 (0.1)	5.5 / 9.5	11.5	Alternate	19.5	Alternate	\$0.3
2012	2014	20.9 (0.4)	28.9 (0.0)	6.2 / 10.0	12.5	12.0%	20.5	20.0%	1.1
2013	2015	20.1 (0.4)	27.6 (0.1)	6.1 / 10.5	13.5	12.0	21.5	20.0	2.1
2014	2016	18.2 (0.5)	24.7 (0.0)	5.5 / 11.1	14.5	12.5	22.5	20.5	3.3
2015	2017	15.5 (0.4)	24.3 (0.0)	4.8 / 11.5	15.1	13.0	23.5	21.0	4.1
2016	2018	15.3 (0.4)	24.4 (0.1)	4.9 / 12.1	14.9	13.5	24.3	21.5	4.2
2017	2019	14.9 (0.5)	23.5 (0.0)	4.9 / 12.8	14.4	14.0	23.5	22.0	3.8
2018	2020	14.6 (0.4)	23.5 (0.0)	4.9 / 13.4	14.2	14.2	23.5	22.5	3.3
2019	2021	14.6 (0.5)	24.4 (0.0)	5.1 / 14.0	14.1	14.1	24.4	23.0	2.9
2020	2022	16.2 (0.4)	28.3 (0.0)	5.9 / 14.7	15.1	14.6	25.4	23.5	2.3
2021	2023	11.6 (0.2)	27.0 (0.0)	4.4 / 15.4	14.1	14.1	26.4	24.0	0.82
2022	2024	13.1 (0.7)	27.8 (0.1)	5.1 / 16.2	13.1	13.6	27.4	24.5	0.47

The new entrant rate:

for the ERS tier 6 A15 plan is 9.3% (10.4% including GLIP and administrative expenses).

for the PFRS tier 6 384D contributory plan is 18.0% (18.5% inc. GLIP and administrative expenses).

for the tier 6 valuation cohort is 11.0% in ERS and 18.9% in PFRS (inc. GLIP & admin. expenses).

The 3/31/2022 CSP amortization balance is \$0.47b, all held by local employers.

Employers participating in the Contribution Stabilization Program are always required to pay their graded rate (plus GLIP and amortization payments). For FY 2024, the Original CSP graded rate and the ERS average rate are equal so employers will not be required to make an additional graded payment and most will not be eligible to amortize. For FY 2024, the Alternate CSP graded rate exceeds the ERS average rate so most employers will be required to make an additional graded payment. Contributions exceeding the employer's regular contribution will be applied towards outstanding amortizations first. If there are no outstanding amortizations, the additional contributions will be set aside in a reserve account for the ERS employer and made available if employer contribution rates should rise above the graded rate by more than 1% (original program) or 0.5% (alternate program).

VI. Gain/Loss Analysis

	ERS	PFRS
FY 2023 Estimated Contributions (2/1/23 Payment)	11.6%	27.0%
Changes Due to Gains/Losses In:		
FY 2022 Benefit Improvements (e.g. 5 yr vesting)	0.2%	0.1%
FY 2022 Investment Performance (9.51% v 5.9%)	-0.3%	-0.3%
FY 2022 Cohort Experience (Salary)	0.7%	0.9%
FY 2022 Cohort Experience (Decrements, etc.)	0.1%	0.3%
3.0% COLA in September 2022	0.5%	0.4%
New CPI-U Assumption	0.2%	0.2%
Mortality Improvement Scale MP-2020 to MP-2021	0.1%	0.1%
New Entrant	-0.3%	-0.7%
GLIP, Administrative Contributions	0.3%	-0.2%
Miscellaneous	0.0%	0.0%
Net Change	1.5%	0.8%
FY 2024 Estimated Contributions (2/1/24 Payment)	13.1%	27.8%

In a nutshell, the FY 2022 investment return of 9.51% results in investment gains over the smoothing period (rate impact of -0.3% in ERS, -0.3% 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 offset by salary increases, service retirement rates, and a September 2022 COLA that exceeded the expected value in both systems. It's intuitive that higher than expected salary increases and COLAs exert an upward pressure on employer contribution rates. As to service retirements, those who linger after having attained the milestones required for an unreduced benefit typically generate gains as pension improvements do not compensate for a reduced retirement period. On the other hand, when a larger than expected percentage of those retirement eligible without reduction immediately retire, the system suffers losses that generate an upward pressure on employer contribution rates.

VII. Summary of Recommendations

I recommend that the current assumptions be maintained, except for a 0.2% increase in the CPI-U assumption, replacing MP-2020 with MP-2021, and a return to asset smoothing, but over an 8-year period instead of a 5-year period. I am a member of the American Academy of Actuaries and meet the Academy's Qualification Standards to issue this Statement of Actuarial Opinion.

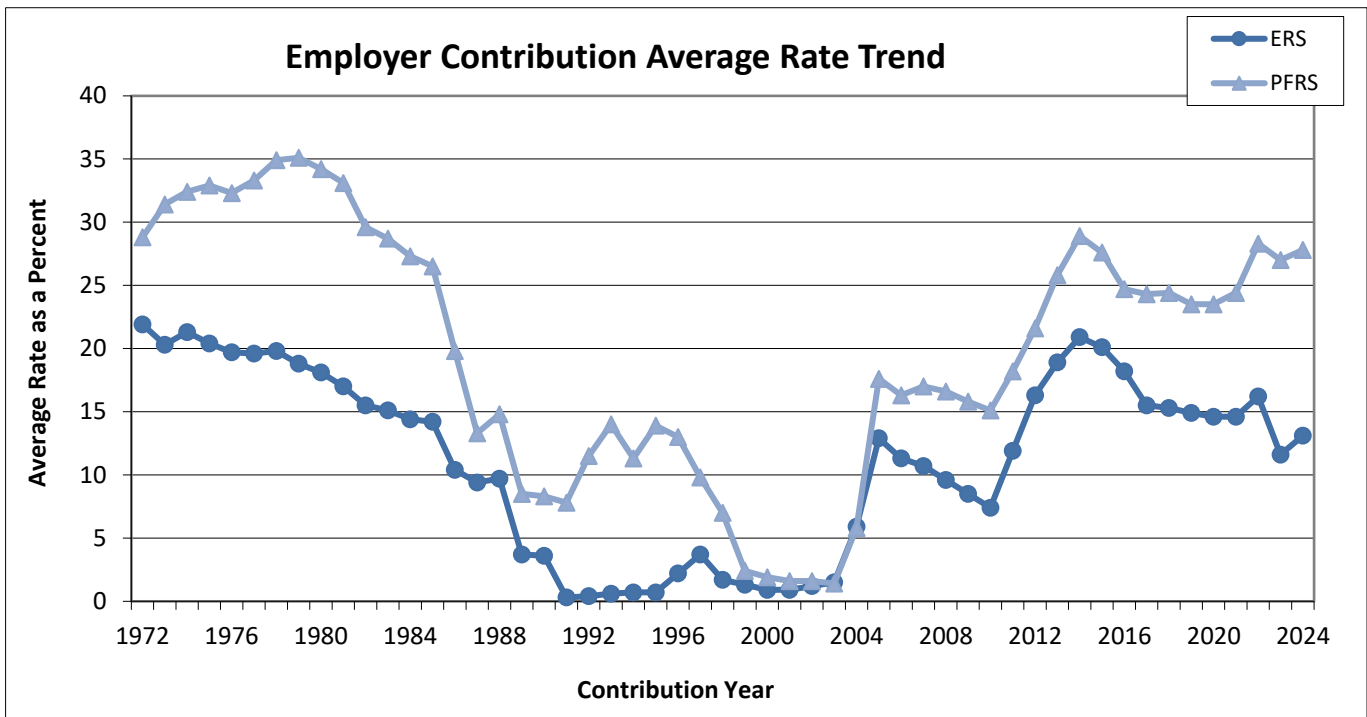
This recommendation was reviewed by the Actuarial Advisory Committee (AAC) in a meeting on August 11, 2022.

VIII. Historical Employer Contribution Average Rate

Average Rate		
Year	ERS	PFRS
1972	21.9	28.8
1973	20.3	31.4
1974	21.3	32.4
1975	20.4	32.9
1976	19.7	32.3
1977	19.6	33.3
1978	19.8	34.9
1979	18.8	35.1
1980	18.1	34.2
1981	17.0	33.1
1982	15.5	29.6
1983	15.1	28.7
1984	14.4	27.3
1985	14.2	26.5
1986	10.4	19.8
1987	9.4	13.3
1988	9.7	14.8
1989	3.7	8.5
1990	3.6	8.3

Average Rate		
Year	ERS	PFRS
1991	0.3	7.8
1992	0.4	11.5
1993	0.6	14.0
1994	0.7	11.3
1995	0.7	13.9
1996	2.2	13.0
1997	3.7	9.8
1998	1.7	7.0
1999	1.3	2.4
2000	0.9	1.9
2001	0.9	1.6
2002	1.2	1.6
2003	1.5	1.4
2004	5.9	5.8
2005	12.9	17.6
2006	11.3	16.3
2007	10.7	17.0
2008	9.6	16.6
2009	8.5	15.8

Average Rate		
Year	ERS	PFRS
2010	7.4	15.1
2011	11.9	18.2
2012	16.3	21.6
2013	18.9	25.8
2014	20.9	28.9
2015	20.1	27.6
2016	18.2	24.7
2017	15.5	24.3
2018	15.3	24.4
2019	14.9	23.5
2020	14.6	23.5
2021	14.6	24.4
2022	16.2	28.3
2023	11.6	27.0
2024	13.1	27.8



IX. Risk Disclosures

Why should a governmental entity take on defined benefit (DB) pension risk? DB plans are an economically efficient means of attracting and retaining employees. For example, in the matter of public safety, special plans that offer half-pay at 20 or 25 years of service guarantee income in later middle age when physicality may wane while tasks remain grueling. During the career, disability and death benefits provide income protection to those who risk their lives in service to the public.

Optimizing the economic efficiencies of a DB plan requires prefunding the benefit promises, ideally by way of smooth employer contribution rates. Actuarial Standard of Practice No. 51 (ASOP 51 “Assessment and Disclosure of Risk Associated with measuring Pension Obligations and Determining Pension Plan Contributions”) requires assessment and disclosure of risks inherent in the funding of DB plans. The two primary forms of risk are (1) insufficient employer contributions to fund the benefits, and (2) intolerable volatility in the employer contribution rate.

Employer Contribution Sufficiency Risk

Contribution Fulfillment Risk

In New York State, employers are required to pay the actuarially determined contribution. Employers who are delinquent are pursued and interest is charged on any late payments. Thus, there is very little risk that employer contributions will not be paid. This is the most significant component of a well-funded DB plan. Poorly funded DB plans invariably have a stretch of time when employer contributions are neglected.

Actuarial Assumptions

Actuarial assumptions and methods determine the allocation of benefit costs over time; they do not, however, determine the ultimate benefit costs. The ultimate cost of benefits is based on the lucrativeness of the promises and the performance of the assets.

The expected long-term employer contribution rate is the rate that would be charged if all assumptions were met annually. As experience deviates from what was assumed, the employer contribution rates deviate from the expected long-term rate. When billing rates are greater than the expected long-term rates, the current taxpayer is funding benefits earned in prior years. When billing rates are less than the expected long-term rates, the current taxpayer is benefiting from contributions collected in prior years. The more conservative a set of assumptions, the more quickly contributions are collected, possibly levying too great a cost to current taxpayers. The less conservative a set of assumptions, the more likely contributions will increase, possibly levying too great a cost to future taxpayers. The best assumptions decrease the likelihood of deviations in one direction persisting over long periods. In so doing, governmental services are compensated by the taxpayers benefitting from those services (that is, there is intergenerational equity).

New York State Retirement and Social Security Law (NYS RSSL) requires a review of all assumptions at least once every five years. To comply, the New York State and Local Retirement System (NYSLRS) undertakes a quinquennial comprehensive experience study and update of assumptions with a reasonableness review every year. Any emerging trends that are believed to continue in the future may warrant an assumption adjustment between quinquennial studies. Assumptions are reviewed annually by the Comptroller’s Actuarial Advisory Committee and quinquennially by a consulting firm. The annual online publishing of the actuarial assumptions provides transparency to interested parties.

Assumed Investment Return Expectation Risk

Employer contribution rates are most sensitive to the assumed investment return. The FY 2021 report recommended decreasing this assumption from 6.8% to 5.9% beginning with the 4/1/2021 actuarial valuations. The following table shows the FY 2023 system average billing rates and tier 6 expected long-term billing rate (known as the new entrant rate) for various assumed investment returns using the 4/1/2022 valuation cohort. The exceedance column shows the probability of exceeding the assumed return over a 30-year period using the capital market (CAPM) assumptions and policy asset allocation approved by Pension and Investment Cash Management (PICM) in 2020, the year of the most recently provided comprehensive asset/liability analysis.

Assumed Rate	Employees' Retirement System		Police and Fire Retirement System		2020 CAPM Assumptions
	FY 2024 System Average Billing Rate	Tier 6 New Entrant Rate	FY 2024 System Average Billing Rate	Tier 6 New Entrant Rate	Probability of Assumed Rate Exceedance
5.00%	26.0%	14.2%	44.9%	24.0%	69.8%
5.25%	22.3%	13.2%	40.0%	22.4%	65.9%
5.50%	18.7%	12.3%	35.2%	21.0%	61.5%
5.80%	14.5%	11.3%	29.6%	19.4%	56.1%
5.90%	13.1%	11.0%	27.8%	18.9%	54.3%
6.00%	11.7%	10.7%	25.9%	18.4%	52.5%

Inflation and Salary Scale Expectation Risk

The inflation assumption is used to compute COLA payments to retirees and beneficiaries. The COLA program provides payments equal to one half of the inflation rate based on the first \$18,000 of the single life allowance. There is a floor of 1% and a cap of 3% so there is little risk of significant long-term gains or losses in this valuation component unless the Federal Reserve abandons inflation targeting.

The salary scale assumption is used to project future increases in a member's salary to estimate the final average salary at retirement as well as determine billable salary over a member's career. If members receive greater salary increases than assumed, greater benefits will be paid out in the future than expected, requiring an increase in employer contributions to make up for the shortfall. Annualized salary increases vary within a relatively narrow range, so there is minor risk of significant long-term gains or losses.

Demographic Expectation Risks

Demographic assumptions estimate member behavior regarding decrements (i.e. change in status) such as retiring, withdrawing or dying. Since NYSLRS is large (over 1.1 million participants), these assumptions are developed with a high degree of credibility using NYSLRS own experience. Actual/Expected (A/E) ratios are displayed on pages 9 and 10 earlier in this report to show how actual pensioner mortality and active member decrements track expectations. Decrement generally vary within a relatively narrow range, so there is minor risk of significant long-term gains or losses in this valuation component.

NYSLRS is not large enough to develop in-house mortality improvement assumptions and thus relies on mortality improvement scales based on nationwide experience derived from data collected from the Social Security Administration by the Society of Actuaries (SOA). This report recommends using scale MP-2021 for the 4/1/2022 valuation. Over the past several years, updated tables vary within a relatively narrow range so there is minor risk of significant gains or losses in this valuation component.

Employer Contribution Volatility Risk

Investment Volatility Risk

Employer contribution rate smoothness is most sensitive to the investment return experience. We can evaluate exposure to investment volatility risk using the following Asset Leverage Ratio:

$$\text{Asset Leverage Ratio} = \frac{\text{Market Value of Assets (MVA)}}{\text{Present Value of Valuation Cohort Billable Salary (PVBS)}}$$

The following table displays the ratio and its components in the middle of the last four decades and for the most recent year (dollar amounts in billions).

	FYE	1985	1995	2005	2015	2022
ERS	MVA	\$22.8	\$53.3	\$108.7	\$161.2	\$232.0
	PVBS	\$102.0	\$158.2	\$176.1	\$203.1	\$268.9
	Asset Leverage Ratio	22%	34%	62%	79%	86%
	Smoothing Period	5	5	5	5	8
	Smoothed Asset Leverage Ratio	4.5%	6.7%	12.3%	15.9%	10.8%
PFRS	MVA	\$4.1	\$9.8	\$19.3	\$28.2	\$41.7
	PVBS	\$11.9	\$16.5	\$27.0	\$30.9	\$44.1
	Asset Leverage Ratio	34%	59%	71%	91%	95%
	Smoothing Period	5	5	5	5	8
	Smoothed Asset Leverage Ratio	6.9%	11.9%	14.3%	18.3%	11.8%

The ratio is zero at plan inception but increases as assets accumulate. Poor investment performance in a new plan is not problematic as there was not much to lose and plenty of billable salary to collect contributions and accumulate assets before benefits become due. In a more mature fund with a high asset leverage ratio, investment volatility has a greater impact on the employer contribution rate. NYSLRS is now a mature plan with the associated significant exposure to investment volatility risk.

Mitigating Employer Contribution Volatility Risk

NYSLRS currently employs two methods to reduce employer contribution rate volatility. An eight-year asset smoothing method is used to dampen annual investment return volatility. Any deviations from the current expected return of 5.9% are recognized in equal increments over a period of eight years. Note that 8-year smoothing in 2022 has the same impact as 5 year smoothing in 1995 for PFRS, and perhaps ~2001 in ERS.

The Contribution Stabilization Program (CSP signed into law in 2010 - the Alternate Program was signed in 2014 and had a one-year opt-in window) provides an optional additional layer of employer contribution rate smoothing. Under the CSP, on the billing date, a participating employer is required to remit a graded rate contribution and permitted to amortize over a 10-year period the balance between the actuarial contribution and the graded contribution (12-year period for the Alternate Program). The graded rate increases or decreases up to 1% each year (0.5% for the Alternate Program) in the direction of the system average contribution rate. During “ordinary” investment periods, the actuarial and graded rates converge. Large deviations may occur when there is extraordinary asset performance, such as after the Global Financial Crisis of 2008.