



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 2014 (FY 2014) was the fourth in the current five year experience study cycle. The August 2010 report based on experience studies for the period April 1, 2005 through March 31, 2010 recommended changes in virtually all of the assumptions. This year's report displays the FY 2014 experience and recommends that the current assumptions be maintained, with the exception of the mortality improvement table (MP-2014 instead of Scale AA), active valuation implementation of mortality improvement (generational instead of static), and two technical corrections to the asset valuation method (compute ERS and PFRS independently and separate employer and employee contributions).

### Summary of Assumptions and Methods

<b>Assumption or Method</b>	<b>Recommendation</b>
<b>Inflation / COLA</b>	2.7 % / 1.4%
<b>Investment Return</b>	7.5 %
<b>ERS Salary Scale</b>	4.9 % average (using FY 2010 data) Indexed by Service
<b>PFRS Salary Scale</b>	6.0 % average (using FY 2010 data) Indexed by Service
<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 2006-2010 experience with Society Of Actuaries Scale <b>MP2014</b> loading for mortality improvement (fully generational in both the inactive <b>and active valuations</b> ).
<b>Active Member Decrements</b>	Based upon FY 2006-2010 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 August 2013 by Buck Consultants, LLC. The report provides support for the change in mortality improvement table and active valuation method (pgs. 9-11 & 24-26).

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 2/1/2016, 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. Assumptions or methods that are not founded upon system experience are more sensible candidates for potential revision, and so last year the asset smoothing method was revised, and this year I am recommending a revision in the mortality improvement assumption and its implementation in the active valuation.

Simply put, I am recommending that we replace mortality improvement Scale AA with mortality improvement scale MP-2014, and that the active valuation implementation of mortality improvement be upgraded from static to generational. This is described in detail beginning on page 8.

Finally, I am recommending two minor technical revisions to the asset smoothing method to align the method with the new GASB disclosure requirements.

The current method computes gains for the combined assets and cash flows of the two retirement systems and then uses a system's market value proportion to compute the system's smoothing adjustment. Further, employer and employee contributions are combined and assigned (i.e. credited with interest from) an average contribution date of 2/1.

The new method computes a smoothing adjustment for each system separately. Further, employer and employee contributions are treated separately, with employee contributions assigned an average contribution date of 10/1 (midway through the fiscal year) and employer contributions assigned an average contribution date of 2/1 (the local employer standard billing date).

These two minor technical revisions will result in a perfect match between the actuarial asset smoothing method's expected gain and GASB's projected earnings on plan investments, which is desirable as they represent the same quantity.

The revision is described as minor as the vast majority of rates, which are rounded to the nearest 0.1%, do not vary with the revision. Any that did vary were nudged from rounding in one direction to rounding in the other direction.

## 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
3/31/2014	236.293	1.51%	1.0%
3/31/2013	232.773	1.47%	1.0%
3/31/2012	229.392	2.65%	1.4%
3/31/2011	223.467	2.68%	1.4%
3/31/2010	217.631		

As a result, there will be a  $\frac{1.51\%}{2} = 0.76\%$  rounded up to 1.0% COLA applied in September of 2014, which is 0.4% 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 2014 investment rate of return, as reported by the Division of Investment and Cash Management, is 13.02%. This is well above the 7.50% assumption. The 3, 5, 10, and 20 year returns are 9.75%, 13.78%, 7.26% and 8.77% respectively.

The high cost of oil (averaging \$91.17 per barrel in 2013<sup>1</sup>) and government (averaging 32.3% of GDP in 2013<sup>2</sup>) continue to create headwinds, potentially prolonged, that the markets must overcome.

<sup>1</sup> [http://inflationdata.com/inflation/inflation\\_rate/historical\\_oil\\_prices\\_table.asp](http://inflationdata.com/inflation/inflation_rate/historical_oil_prices_table.asp)

<sup>2</sup> <http://www.gpo.gov/fdsys/pkg/BUDGET-2015-TAB/xls/BUDGET-2015-TAB-15-3.xls>

On the other hand, there is reason to suspect that Federal Reserve policy has support of asset prices as one of its goals, creating a tailwind supporting the strong market performance of FY 2014.

The Chief Investment Officer is conducting an asset allocation study to be completed before the 2015 quinquennial actuarial experience study. The completed asset allocation study and resulting long term asset allocation policy will be foundational to any recommended revision in the rate of return.

### C. Salary Scales

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

	FY2011			FY2012			FY2013		
	Actual	Expected	A/E	Actual	Expected	A/E	Actual	Expected	A/E
ERS	4.279%	4.860%	0.8804	2.762%	4.847%	0.5698	2.537%	4.767%	0.5322
PFRS	6.411%	5.745%	1.1161	3.928%	5.421%	0.7246	3.713%	5.376%	0.6907
Combined	4.533%	4.966%	0.9129	2.927%	4.928%	0.5938	2.712%	4.858%	0.5582
	FY2014								
ERS	3.405%	4.796%	0.7100						
PFRS	5.065%	5.393%	0.9392						
Combined	3.642%	4.881%	0.7462						

Note that the expected salary scale for FY 2014 in PFRS was 5.393% (which differs from the stated assumed value of 6.0%). This is because there was a shift in the demographics of the PFRS population, namely a smaller percentage of employees at the lower service levels, which have the higher salary growth assumptions.

When reducing an indexed salary scale to one number, the result is only a constant insofar as the demographics of the group remain constant. Indexing by service is more sensitive to demographic shifts than indexing by age as the former has a larger range in salary growth assumptions.

### **III. Asset Valuation Method**

The values since FY2000 are given below (in billions):

#### **Market Value v. Actuarial Value of Assets**

FY	MVA <sup>a</sup>	AVA	AL <sub>EAN</sub>	Ratio	UAL <sub>EAN</sub>	FY	MVA <sup>a</sup>	AVA	AL <sub>EAN</sub>	Ratio	UAL <sub>EAN</sub>
2000	\$128.9	\$110.6	\$90.6	122.1%	\$-20.0	2007	\$156.5	\$142.5	\$134.6	105.9%	\$-7.9
2001	114.0	119.4	98.0	121.9	-21.4	2008	155.8	151.7	141.3	107.4	-10.4
2002	112.7	125.1	103.9	120.4	-21.2	2009	110.9	148.9	146.7	101.5	-2.1
2003	97.3	106.6	107.3	99.4	0.6	2010	134.2	147.7	156.6	94.3	8.9
2004 <sup>b</sup>	120.8	117.4	116.2	101.0	-1.2	2011	149.5	148.6	164.3	90.5	15.7
2005	128.0	123.7	120.0	103.1	-3.7	2012	153.3	147.8	169.3	87.3	21.5
2006	142.6	132.0	126.6	104.3	-5.4	2013	164.1	155.3	175.1	88.7	19.8
						2014	181.2	171.6	186.1	92.2	14.6

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

b) 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)

	Male (ERS & Benes) - Service (PFRS)					Female (ERS & Benes) - Disability (PFRS)				
	FY2014		FYs11-14			FY2014		FYs11-14		
	Actual	Expected	Actual	Expected	A/E	Actual	Expected	Actual	Expected	A/E
ERS Clerk (White Collar) Service Retirements	63.747	60.310	227.051	221.400	1.026	53.377	53.893	184.931	193.383	0.956
ERS Laborer (Blue Collar) Service Retirements	34.940	34.038	124.938	125.960	0.992	6.996	6.596	24.019	23.953	1.003
ERS Disability Retirements	6.532	6.737	26.621	25.487	1.044	4.409	4.103	16.269	15.644	1.040
Beneficiaries (uses actual pension received)	1.514	1.149	5.222	3.984	1.311	12.062	11.359	41.185	40.358	1.021
PFRS Retirements	15.856	17.201	57.349	62.421	0.919	2.641	2.910	9.818	10.522	0.933
<b>All Pensioner Mortality for FYs 2011-2014</b>								<b>717.403</b>	<b>723.110</b>	<b>0.992</b>

### B. Active Member Decrement Experience

Decrement	FY2014			FYs11-14			
	Exposures	Actual	Expected	Exposures	Actual	Expected	A/E
ERS Withdrawals 0 < Srv < 2 Age 55 Plan	60,964	10,296	9,458	245,354	41,875	37,813	1.107
ERS Withdrawals 2 < Srv < 3 “	20,327	2,390	1,903	97,511	10,454	9,075	1.152
ERS Withdrawals 3 < Srv < 4 “	18,922	1,721	1,438	95,608	7,485	7,245	1.033
ERS Withdrawals 4 < Srv < 5 “	18,645	1,410	1,125	93,515	5,557	5,664	0.981
ERS Withdrawals 5 < Srv < 10 “	78,093	3,187	3,066	301,479	11,548	11,766	0.982
ERS Withdrawals 10 < Service “	138,364	2,110	2,032	578,288	8,233	8,496	0.969
PFRS Withdrawals	22,096	343	310	89,210	1,169	1,137	1.028
<b>All Withdrawals</b>	<b>357,410</b>	<b>21,457</b>	<b>19,333</b>	<b>1,500,963</b>	<b>86,321</b>	<b>81,197</b>	<b>1.063</b>
ERS T-1 Reg Plan Srv Ret 0 < Srv < 20	1,153	215	196	6,533	1,036	996	1.040
ERS T-1 Reg Plan Srv Ret 20 < Srv < 30	953	231	242	5,467	1,369	1,280	1.070
ERS T-1 Reg Plan Srv Ret 30 < Service	1,933	444	474	12,068	4,556	3,055	1.492
ERS T-2,3,4,5,6 Reg Plan Srv Ret 0 < Srv < 20	64,328	4,650	4,841	239,502	17,956	17,916	1.002
ERS T-2,3,4,5,6 Reg Plan Srv Ret 20 < Srv < 30	36,209	4,383	4,703	138,200	19,444	17,689	1.099
ERS T-2,3,4,5,6 Reg Plan Srv Ret 30 < Service	14,547	1,985	4,128	53,651	15,464	15,577	0.993
ERS State T-1,2 Correction Officer Srv Ret	53	17	~13	415	130	110	1.183
ERS State T-3 Correction Officer Srv Ret	4,017	780	823	13,607	2,598	2,618	0.992
ERS County Correction Officer Srv Ret	1,154	227	174	4,087	792	618	1.282
<b>All ERS Service Retirements</b>	<b>124,344</b>	<b>12,932</b>	<b>15,594</b>	<b>473,528</b>	<b>63,345</b>	<b>59,859</b>	<b>1.058</b>
PFRS 20 Year Plan Srv Ret	2,024	248	264	8,241	987	1,067	0.925
PFRS 20 Year Plan w add'l 60ths Srv Ret	5,186	459	480	20,604	2,050	1,858	1.103
PFRS State Police 20 Year Plan Srv Ret	1,322	164	117	5,735	649	464	1.399
<b>All PFRS Service Retirements</b>	<b>8,532</b>	<b>871</b>	<b>860</b>	<b>34,580</b>	<b>3,686</b>	<b>3,389</b>	<b>1.088</b>
ERS Accidental Deaths Age 55 Plan	454,435	1	~5	1,867,025	4	~20	0.200
ERS Ordinary Deaths Age 55 Plan	454,435	611	735	1,867,025	2,632	3,009	0.875
PFRS Accidental Deaths	30,931	1	~2	125,077	11	~10	1.127
PFRS Ordinary Deaths	30,931	17	~21	125,077	93	~85	1.089
ERS Accidental Disability	224,762	9	~10	955,591	25	~46	0.549
ERS Ordinary Disability	144,011	356	430	613,065	1,643	1,796	0.915
PFRS Accidental Disability	30,931	75	~95	125,077	300	384	0.781
PFRS Ordinary Disability	10,840	4	~6	43,419	22	~22	0.991
PFRS IPOD Disability	30,931	69	~61	125,077	291	244	1.192

\* The FY 2011 ERS retirement incentive resulted in an earlier harvest of near-term retirees (12,207).

### C. Mortality Improvement

NYSLRS actuarial valuations project an initial cohort into the future, applying an estimated percentage of benefit dollars that will not survive each future year (i.e. mortality rates) until the cohort is exhausted. The mortality rates used are based on the system experience from the most recent quinquennial study (i.e. a base table), adjusted to reflect the expectation that mortality rates will continue to decline as they have over recent generations (i.e. a mortality improvement table).

For example, the 4/1/2014 valuation needs an age 70 mortality rate for pension benefits to participants age 60 on 4/1/2014. The base table (built from experience from 4/1/2005 through 3/31/2010, and thus centered on 10/1/2007) says that age 70 pension benefits terminate over the following year at a rate of 1.35%. The mortality improvement table says that age 70 individuals are expected to enjoy a mortality improvement of 1% per year. NYSLRS valuations assume that all terminations take place in the middle of the fiscal year, and that by-life mortality improvement rates are a reasonable proxy to adjust a by-dollar mortality base table.

Participants age 60 on 4/1/2014 will be age 70 on 4/1/2024. The ensuing year's terminations are assigned to 10/1/2024, which is 17 years after 10/1/2007. Thus the desired mortality rate is

$$1.35\% * 99\% ^ 17 = 1.35\% * 84.3\% = 1.14\%$$

A full grasp of the math is not critical. What needs to be understood is that mortality assumptions involve a base assumption and a mortality improvement assumption. Failure to include a reasonable mortality improvement assumption when mortality improvement is a current and recent reality risks understating the liabilities and therefore underfunding the benefits.

Through FY 2009, NYSLRS used a 20% load to reflect expected mortality improvement. Using the numbers above, if experience indicates that age 70 pension benefits terminate over the following year at a rate of 1.35%, the rate used in the valuation was  $1.35\% * (1 - 20\%) = 1.08\%$ .

The pros of using a 20% load were that it provided a reasonable increase in liabilities, it was easy to implement, and it resulted in a fixed set of annuity values. The major con was that its impact on liabilities, and therefore employer contribution rates, was sudden rather than smooth.



As technology developed, the actuarial profession began exploring more sophisticated methods of implementing mortality improvement, and the adoption of such methods was encouraged by the external actuarial consultant.

Therefore, in FY2010 I recommended replacing the 20% load with Society of Actuaries (SOA) Scale AA, which has mortality improvements by gender and age (two, one-dimensional tables). NYSLRS actuarial valuation software was developed in house and had to be revised to use Scale AA. This was more easily done in the inactive valuation than the active valuation as the latter involves far more unknowns, and thus more annuity values.

Therefore, our inactive valuation implemented Scale AA with generational projections (which is to say, in the manner intended, generating a unique set of mortality rates for each year of birth cohort), while our active valuation implemented Scale AA with a static projection (which is to say, an approximation of the manner intended, generating a modified base table that is applied to all years in the valuation, somewhat akin to the 20% load technique).

The most recent report by the external actuarial consultant described these changes as “very reasonable and an improvement”. However, the same report states that “it would be ideal for the active and inactive mortality to be projected in the same way”, and that the SOA was developing a mortality improvement scale indexed by both age and year of birth (thus two dimensional) which would become “best practice for reflecting future mortality improvement”.

This new table is now labeled MP-2014. While developing MP-2014, the SOA discovered that Scale AA’s mortality improvement was falling short of reality for most ages above 55, and released a Scale BB to serve as a transition from AA to MP-2014.

Over the last year, we have modified the active valuation process from being restricted to applying mortality improvement via static projection to 2-D generational projections, and have modified the inactive valuation from being restricted to applying 1-D generational projections to 2-D generational projections. In so doing we can fully implement MP-2014 in the manner intended and it is my recommendation that we do so.

There is no reason to wait until the completion of next year's quinquennial study to make this change as MP-2014 is not developed from NYSLRS historical experience, but from national experience. NYSLRS is large enough to have sufficient data to create a mortality base table, but the data required to develop a quality mortality improvement table is significantly more than NYSLRS can provide.

In the interest of full disclosure, I must point out that MP-2014 is not without its critics from within the actuarial community. The criticisms must be read carefully as some of them apply to RP-2014, which is the base table the SOA released with MP-2014, the mortality improvement table. I am not recommending that we adopt RP-2014, but that we continue to use the base tables generated by the previous quinquennial study.

The concerns relevant to MP-2014 include the data selection, the firmness and rigidity of the language the SOA is using in setting forth the table, the complexity of implementation and explanation of 2-D tables, and the use of a 20 year transition to an ultimate improvement rate of 1%, with both the transition period and ultimate rate being challenged.

These concerns are apt to take a while to resolve and it may be that an adjusted MP-2014 will emerge in time. However, of the three options, Scale AA, Scale BB, and MP-2014, I believe that the case for the last is the strongest.

## V. Effect on Contributions

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

Valuation	Local Employer Billing Date	ERS (GLIP)	PFRS (GLIP)	Total Employer Contributions	Contribution Stabilization Program (CSP) Mitigated Rates (does not apply to GLIP)			
					ERS		PFRS	
4/1/2005	2/1/2007	10.7%	17.0%	\$2.7b				
4/1/2006	2/1/2008	9.6	16.6	2.6b				
4/1/2007	2/1/2009	8.5	15.8	2.5b				
4/1/2008	2/1/2010	7.3	15.1	2.3b	Original		Original	
4/1/2009	2/1/2011	11.9 (0.4)	18.2 (0.1)	3.6b	9.5%		17.5%	
4/1/2010	2/1/2012	16.3 (0.4)	21.6 (0.0)	4.9b	10.5		18.5	
4/1/2011	2/1/2013	18.9 (0.4)	25.8 (0.1)	5.5b	11.5	Alternate	19.5	Alternate
4/1/2012	2/1/2014	20.9 (0.4)	28.9 (0.0)	6.2b	12.5	12.0%	20.5	20.0%
4/1/2013	2/1/2015	20.1 (0.4)	27.6 (0.1)	6.1b	13.5	12.0	21.5	20.0
4/1/2014	<b>2/1/2016</b>	<b>18.2 (0.5)</b>	<b>24.7 (0.0)</b>	<b>5.5b</b>	<b>14.5</b>	<b>12.5</b>	<b>22.5</b>	<b>20.5</b>

The 3/31/2014 CSP amortization balance is \$2.3b state + \$1.0b local = \$3.3b total.

In ERS the associated new entrant rate is 12.1%, and  $18.2\%/12.1\% = 150\%$ .

In PFRS the associated new entrant rate is 19.3%, and  $24.7\%/19.3\% = 128\%$ .

The associated new entrant contribution is \$3.7b. The additional \$1.8b is 12.3% of the  $UAL_{EAN}$  of \$14.6b.

The new funded ratios are 92.0% in ERS and 93.1% in PFRS, up from 88.5% and 89.5% respectively.

## VI. Summary of Recommendations

I recommend that the current assumptions be maintained, with the exception of the mortality improvement table (replace Scale AA with MP-2014), active valuation implementation of mortality improvement (generational instead of static), and two technical corrections to the asset valuation method (compute ERS and PFRS independently and separate employer and employee contributions). 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 7, 2014.

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

