ILLINOIS POLICE OFFICERS' PENSION INVESTMENT FUND

ACTUARIAL EXPERIENCE STUDY

March 4, 2022

FOSTER & FOSTER
ACTUARIES AND CONSULTANTS

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Board of Trustees
Illinois Police Officers' Pension Investment Fund

Re: Actuarial Experience Study

Dear Board of Trustees:

We are pleased to present to the Board of Trustees (Board) this report of the results of an actuarial experience study analyzing the assumptions used for actuarial valuation purposes for valuation reports produced on behalf of the Illinois Police Officers' Pension Investment Fund beginning on and after July 2022. We have compiled plan experience from 2017 through 2020. While we cannot verify the accuracy of all the information provided, the supplied information was reviewed for consistency and reasonableness. As a result of this review, we have no reason to doubt the substantial accuracy of the information and believe it has produced appropriate results.

The report includes a review of demographic and economic experience, a comparison of this experience to current actuarial assumptions, our recommendations for consideration regarding changes in assumptions or methods to be effective for actuarial valuations performed on or after July 1, 2022. We believe implementing the recommend changes will assist in achieving the objective of developing costs that are stable, predictable, and represent our best estimate of anticipated experience.

It is important to remember that the ultimate cost of the retirement plan is independent of any actuarial assumptions or methods used throughout the valuation process. This cost will be the sum of the benefits paid from the fund and the administrative expenses incurred, less any net investment gains received. Future actuarial measurements may differ significantly from current measurements due to such factors as: plan experience differing from that anticipated by assumptions; changes in assumptions; increases or decreases expected as part of the natural operation of the methodology used; changes in plan provisions or applicable law.

Foster & Foster does not provide legal, investment or accounting advice. Thus, the information in this report is not intended to supersede or supplant the advice or the interpretations of the plan or its affiliated legal, investing or accounting partners.

In performing the analysis, we used third-party software to model (calculate) the underlying liabilities and costs. These results are reviewed in the aggregate and for individual sample lives. The output from the software is either used directly or input into internally developed models to generate the costs. All internally developed models are reviewed as part of the process. As a result of this review, we believe that the models have produced reasonable results. We do not believe there are any material inconsistencies among assumptions or unreasonable output produced due to the aggregation of assumptions.

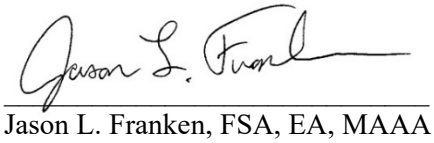
The undersigned are familiar with the immediate and long-term aspects of pension valuations and meet the Qualification Standards of the American Academy of Actuaries necessary to render the actuarial opinions contained herein. All sections of this report are considered an integral part of the actuarial opinions.

To our knowledge, no associate of Foster & Foster, Inc. working on valuations of the program has any direct financial interest or indirect material interest in the Illinois Police Officer's Pension Investment Fund, nor does anyone at Foster & Foster, Inc. act as a member of the Board of Trustees of the Illinois Police Officer's Pension Investment Fund. Thus, there is no relationship existing that might affect our capacity to prepare and certify this actuarial report.

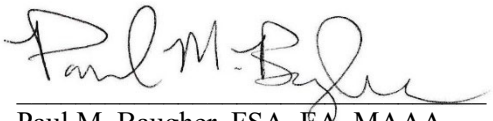
If there are any questions, concerns, or comments about any of the items contained in this report, please contact us at 630-320-0200.

Respectfully submitted,

FOSTER & FOSTER INC.



Jason L. Franken, FSA, EA, MAAA



Paul M. Baugher, FSA, EA, MAAA

ACTUARIAL STANDARDS OF PRACTICE

The Actuarial Standards Board (ASB) is responsible for determining which actuarial activities are the best representations of generally accepted actuarial principles and is also responsible for issuing guidance in the form of Actuarial Standards of Practice (ASOPs) to help actuaries in various practice areas deliver results and recommendations that are consistent with those representations. Generally speaking, ASOPs identify what the actuary should consider, document, and disclose when performing actuarial assignments.

The experience study and related measurements of benefit obligations for the plan are subject to the "coordinated guidance" provided in various ASOPs, including but not limited to:

- ASOP No. 4, *Measuring Pension Obligations and Determining Pension Plan Costs or Contributions*, which ties together the standards shown below, provides guidance on actuarial cost methods, and addresses overall considerations for measuring pension obligations and determining plan costs or contributions
- ASOP No. 23, *Data Quality*
- ASOP No. 25, *Credibility Procedures*
- ASOP No. 27, *Selection of Economic Assumptions for Measuring Pension Obligations*
- ASOP No. 35, *Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations*
- ASOP No. 41, *Actuarial Communications*
- ASOP No. 44, *Selection and Use of Asset Valuation Methods for Pension Valuations*
- ASOP No. 51, *Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions*
- ASOP No. 56, *Modeling*

This report refers to ASOPs by number (e.g. ASOP No. 4) throughout. It is important to keep in mind that this experience study report only reflects the guidance provided in the final releases of the above-mentioned ASOPs issued by the ASB on or before the date of this report. The results provided in this report reflect the requirements of, and are consistent with, the applicable above-mentioned Actuarial Standards of Practice. When applicable, details from the relevant ASOP will be provided in the report section associated with a particular analysis or topic.

RECOMMENDATIONS

Below is a summary of the recommended assumption changes resulting from the study. These changes are in relation to the current assumptions utilized by the Illinois Department of Insurance. A detailed list of recommended assumptions is at the end of the report.

ECONOMIC ASSUMPTIONS

- Investment Return: Based on our analysis and discussion with staff and the Board's investment consultant, a 6.75% rate is recommended.

- Inflation: We recommend keeping the current 2.50% inflation assumption.

- Salary Increases: We recommend minor adjustments, especially for lower service members, to blend in recent experience.

- Payroll Growth: We recommend decreasing the assumed payroll growth assumption from the current 3.50% assumption to 3.00%.

DEMOGRAPHIC AND OTHER ASSUMPTIONS

- Retirement Rates: We recommend minor adjustments, largely at older ages, to blend in recent experience.

- Withdrawal/Termination Rates: We recommend changing from an age-based table to a service-related table to better capture the experience for Tier 1 versus Tier 2 members.

- Disability Incidence Rates: We recommend adjusting the current rates by a factor of 0.95.

- Mortality Rates: We recommend updating to the Pub-2010 Public Safety mortality tables, with adjustments for the credibility of the fund's actual experience.

- Other Demographic Assumptions: We analyzed the current assumptions for marital status, spousal age difference and the proportion of deaths that are duty-related and recommend no changes.

- Assumed Expenses: We recommend adding a load to normal cost to account for administrative expenses paid from the trust.

IMPACT OF ASSUMPTION CHANGES

As part of the Consolidation legislation, a provision was added to the Illinois Pension Code that requires a change in an actuarial or investment assumption that increases or decreases the actuarially required contribution to be implemented in equal amounts over a 3-year period. This implementation begins in the fiscal year of the pension fund in which the change first occurs. As a result, we will begin the implementation of any changes adopted by the Board in the 2022 fiscal year actuarial valuations.

We have not explicitly measured the impact of these changes but would anticipate that the impact could be mixed across the funds when compared to the prior Department of Insurance calculations. Most of the smaller plans will see a significant decrease in their contribution amount since they were previously using an investment return assumption of less than 6.00%. Larger funds could potentially see an increase to their actuarially required contributions due to the net impact of improved mortality and a lower payroll growth assumption offset by a higher interest rate.

We can work with the Board to isolate a subset of plans to review the impact of the recommended changes, if you so desire.

REVIEW OF ECONOMIC ASSUMPTIONS

ASOP No. 27, *Selection of Economic Assumptions for Measuring Pension Obligations*, provides guidance to actuaries in selecting (including giving advice on selecting) economic assumptions – primarily investment return, discount rate, post-retirement benefit increases, inflation, and compensation increases – for measuring obligations under defined benefit pension plans.

Throughout the remainder of this section, we have used the standards set forth in ASOP No. 27 as a guideline for reviewing and if applicable, selecting recommended changes to the following economic actuarial assumptions and methods:

- Investment Return
- Inflation
- Salary Increases
- Payroll Growth

Please keep in mind that ASOP No. 27 (and ASOP No. 35) recognizes a range of reasonable assumptions and states "the actuary should recognize the uncertain nature of the items for which assumptions are selected and, as a result, may consider several different assumptions reasonable for a given measurement. The actuary should also recognize that different actuaries will apply different professional judgment and may choose different reasonable assumptions. As a result, a range of reasonable assumptions may develop both for an individual actuary and across actuarial practice."

INVESTMENT RETURN

The investment return assumption is critical in the actuarial valuation since it determines the portion of assets that will come from investment income rather than contributions from the plan sponsor and its participants. The investment return assumption should be determined based on the long-term rate of return (net of investment-related fees) the plan expects to earn over the life of the plan. The assumed rate of investment return currently being used by the Illinois Department of Insurance (IDOI) for most plans with over $10 million in assets is 6.50% per year compounded annually, net of both investment-related expenses and administrative expenses. Plans with less than $10 million use an investment return assumption ranging from 5.00% to 6.25% depending on the asset level of each plan. In addition, these are the highest rates currently in use by funds of these sizes. If the funded ratio or liquidity ratio does not meet a specific threshold, it will result in a lower investment return under the current set of IDOI assumptions. It is important to note that prior restrictions in the Illinois Pension Code on the types of investments available to these funds limited the expected returns. With the elimination of the investment restrictions and movement to a "prudent person" investment philosophy, a higher rate is supportable.

We recognize that there may be a future need to adjust the interest rate for funds with low funded ratios and liquidity ratios due to the greater fraction of cash withholding as a percent of their assets, thereby reducing their potential fund return. At this point, it is too early to collect data on this; however, we believe that it will be prudent to add a data collection point annually that provides information on where each fund stands with respect to this metric.

We believe that the decision to set the investment return assumption shall be made based upon input from your investment professionals, reflecting any significant changes to the asset allocation, and their judgment of capital market returns. Keep in mind, however, that this assumption should reflect the best estimate of investment returns expected to be realized over the next several decades.

ASOP No. 27 provides that in developing a reasonable assumption, the actuary may consider a broad range of data and other inputs, including the judgment of investment professionals. The data that may be considered includes: current yields to maturity of fixed income securities; forecasts of inflation, GDP growth, and total returns for each asset class; historical and current investment data (including real and nominal returns); the inflation and inflation risk components implicit in the yield of inflation-protected securities; dividend yields, earnings yields, and real estate capitalization rates; and historical plan performance.

For purposes of reviewing the investment return assumption, a building block approach is often used, whereby the actuary determines the weighted average expected real rate of return for the plan's target investment portfolio and then adjusts for inflation and expenses not reflected in the real rates of return. Foster & Foster is an actuarial firm, and we do not have the required expertise to produce our own capital market assumptions. For this reason, ASOP No. 27 addresses that the actuary will often collect capital market assumptions from external sources to determine the forward-looking expected geometric returns. The capital market assumptions can be broadly classified into the following categories: expected returns by asset class; standard deviation by asset class; and correlation coefficients between asset classes.

For this analysis, we relied on data collected as part of the "Survey of Capital Market Assumptions: 2021 Edition" released by Horizon Actuarial Services (Horizon). This survey collects the capital market assumptions from 39 different investment advisors from across the country, including Verus Investments (Verus). The purpose of this survey is to provide a broad range of opinions on future expectations rather than relying on a single source. This survey has been conducted annually since 2012. There has been a trend of declining expectations in most of the asset classes. For example, many of the long-term

expectations (20-year horizon) decreased by more than 40 basis points in 2021 from where they were in 2020. This is driven by the expectation of increased inflation and lower equity returns.

As part of our analysis, we reviewed the short-term and long-term asset allocations adopted by the Board earlier this year. These policies are as follows:

IPOPIF Asset Allocation	Short-term				Long-term
	Target	Rebalancing Range			Target
Asset Classes	Allocation	Lower	Upper		Allocation
Growth	**50.0%**	**45.0%**	**55.0%**		**65.0%**
US Large	18.0%	16.0%	20.0%		23.0%
US Small	5.0%	4.0%	6.0%		5.0%
International Developed	15.0%	13.0%	17.0%		18.0%
International Developed Small	5.0%	4.0%	6.0%		5.0%
Emerging Markets	7.0%	6.0%	8.0%		7.0%
Private Equity (Direct)	0.0%	N/A	N/A		7.0%
Income	**16.0%**	**14.0%**	**18.0%**		**14.0%**
Bank Loans	0.0%	N/A	N/A		3.0%
High Yield Corp. Credit	10.0%	9.0%	11.0%		3.0%
Emerging Market Debt	6.0%	5.0%	7.0%		3.0%
Private Credit	0.0%	N/A	N/A		5.0%
Inflation Protection	**9.0%**	**7.0%**	**11.0%**		**11.0%**
US TIPS	3.0%	2.5%	3.5%		3.0%
REITs	4.0%	3.5%	4.5%		0.0%
Real Estate/Infrastructure	2.0%	N/A	N/A		8.0%
Risk Mitigation	**25.0%**	**5.0%**	**7.0%**		**10.0%**
Cash	3.0%	0.0%	2.0%		1.0%
Short-Term Gov't/Credit	15.0%	14.0%	16.0%		3.0%
US Treasury	0.0%	N/A	N/A		3.0%
Core Fixed Income	7.0%	6.0%	8.0%		0.0%
Core Plus Fixed Income	0.0%	N/A	N/A		3.0%
Total	**100.0%**				**100.0%**

While we expect the long-term asset allocation would earn 100+ basis points per year more than the short-term allocation over a 20-year period, the relatively short transition period will not adversely affect the Board's ability to achieve its long-term goals. As a result, we recommend adopting a single investment return rate based on the Board's long-term investment policy. Should the transition period lengthen, the Fund could have difficulty attaining their long-term expectation.

Below, we have calculated various expected returns based on the long-term investment policy and the Horizon assumptions. We believe the 40th to 60th percentiles are a reasonable range for the assumption; however, we prefer the assumption to be within the 45th to 55th percentile range. The 50th percentile is the midpoint, with half of the results expected to exceed and half the results expected to fall short of that level.

Distribution of Geometric Returns - Horizon

	10-Year	20-Year
40th Percentile	5.32%	6.25%
45th Percentile	5.84%	6.62%
50th Percentile	6.34%	6.97%
55th Percentile	6.85%	7.33%
60th Percentile	7.36%	7.69%

Verus provided similar returns based on the long-term investment policy and their custom 2021 capital market assumptions. We have not attempted to reconcile the expectations provided by Verus. The table is intended to provide a broad view of current expectations.

Distribution of Geometric Returns - Verus

	10-Year	30-Year
40th Percentile	4.51%	4.78%
45th Percentile	5.04%	5.30%
50th Percentile	5.56%	5.85%
55th Percentile	6.08%	6.35%
60th Percentile	6.61%	6.88%

The following table provides the probability of exceeding various assumptions:

Probability of Exceeding Assumption

Investment Return Assumption	Horizon (20-Year)	Verus (30-Year)
5.75%	67%	51%
6.00%	63%	48%
6.25%	60%	46%
6.50%	57%	44%
6.75%	53%	41%
7.00%	50%	39%
7.25%	46%	37%

Finally, we should consider the trend in the investment return assumptions of other similarly situated pension plans across the country. Each year, the National Association of State Retirement Administrators (NASRA) releases a survey of the investment return assumptions used by about 130 of the largest public pension systems in the country. The most recent full survey was as of January 2021. This information is summarized below. Figure 1, taken from NASRA's website, shows that an assumption of at least 7.00% but less than 7.50% is the most common range of assumptions among the respondents. Figure 2 shows how discount rates are trending down over the last 20 years, with the median assumption falling from 8.00% to 7.23% over that 20-year period.

Figure 1

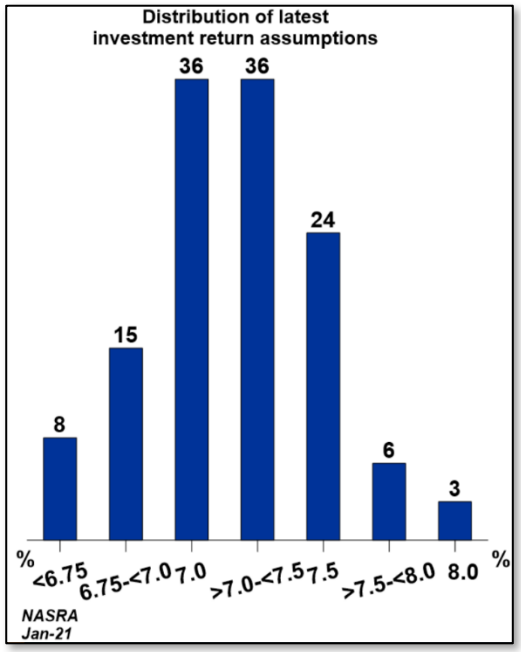
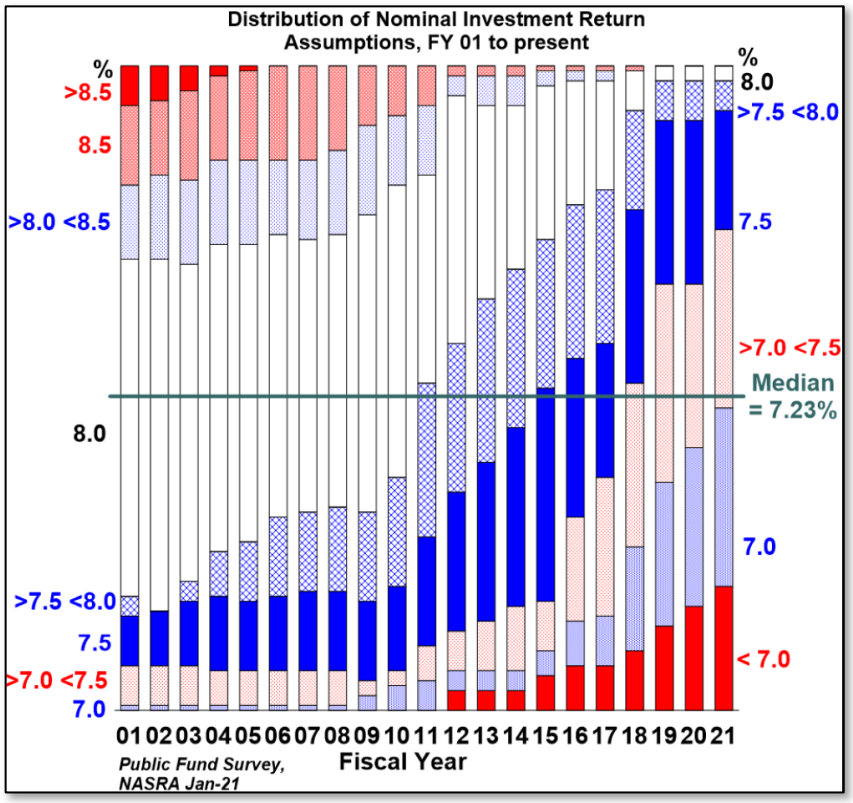


Figure 2



NASRA has updated some survey information on their website to include information as of November 2021. If you compare these tables to the tables above, you can see the continued downward trend in rates. This is consistent with the downward trend observed in the investment advisor expectations by asset class in the "Survey of Capital Market Assumptions: 2021 Edition" performed by Horizon Actuarial Services where they state the following:

> *"For illustration, this report also constructs an asset allocation for a hypothetical multiemployer pension plan and uses the results from the survey to develop a range of reasonably expected returns for the plan. Driven by lower expectations across most asset classes, the expected returns for this 2021 edition were 46 basis points lower over a 10-year horizon than they were last year, and 104 basis points lower than they were a mere five years ago. Over a 20-year horizon, the expected returns are 41 basis points lower than last year, and 118 basis points lower than they were five years ago in the 2016 edition of the survey."*

Figure 3

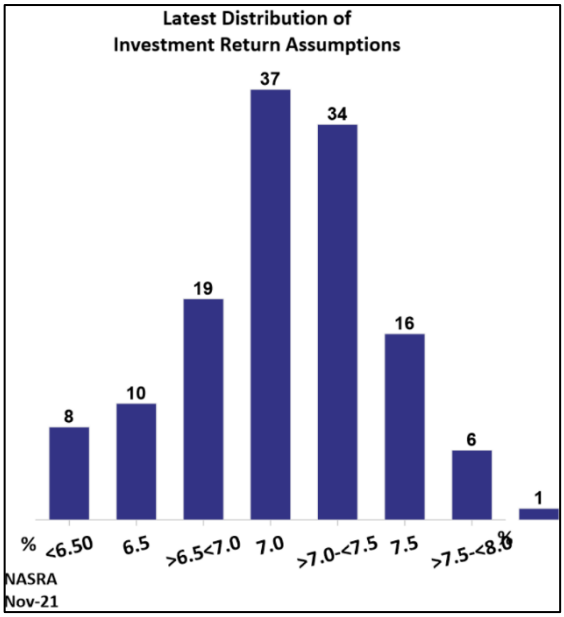
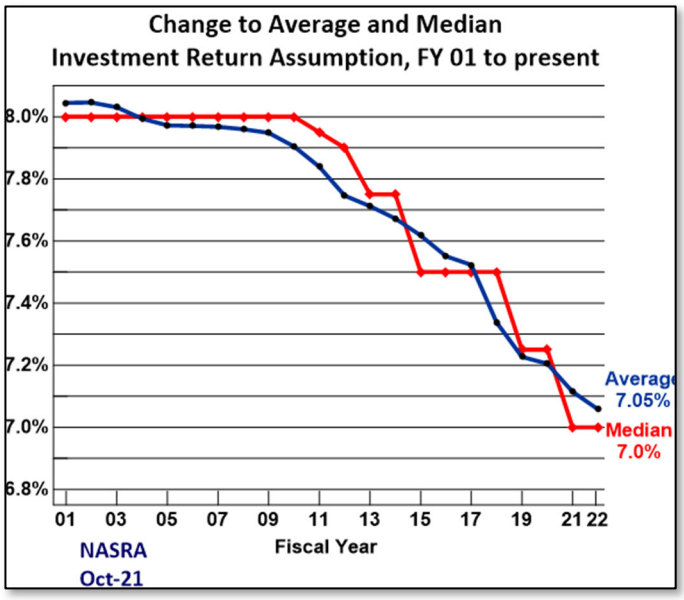


Figure 4



As part of this survey, the following Illinois public pension funds are included. Below is a summary of their recently published interest rate assumptions based on an updated NASRA survey:

- Illinois Municipal Retirement Fund 7.25%
- Illinois State Employees' Retirement System 6.75% (recently lowered from 7.00%)
- Teachers' Retirement System of Illinois 7.00%
- State Universities Retirement System 6.50% (recently lowered from 6.75%)

When setting any assumption, it is important to consider the concept of intergenerational equity. If you are too aggressive in your assumption setting, you are giving current taxpayers a break relative to their future counterparts. Similarly, if you are too conservative, you are asking current taxpayers to bear an unreasonable burden of the expense so that future taxpayers pay less. This is why it is so critical to set this assumption based actual expectations, given the data available. You want the burden to be shared equally among current and future taxpayers, and the best way to do this is to set an assumption that is the best expectation of future experience.

Recommendation

Based on the data provided above and discussion with the staff and the Board's investment consultant, a rate of 6.75% is recommended.

INFLATION

Inflation refers to general economic inflation, defined as price changes over the whole of the economy. The assumed inflation rate is the basis for the other economic assumptions, such as assumed investment returns, the discount rate, and salary increase assumptions.

In order to assess the reasonableness of the inflation assumption, we review historical inflation, applicable inflation forecasts to the extent available, inflation assumptions used by the system's investment consultant and other investment consultants, and assumptions currently used by similar plans.

Following ASOP No. 27, which provides guidance on the selection of economic assumptions, such as inflation, our determination of an appropriate inflation assumption includes a review of recent and long-term historical inflation, without giving undue weight to recent experience. We note that, long-term historical experience, beyond 35 or so years, is less meaningful given that the Federal Reserve Board's monetary policy changed in the 1980's toward more vigilance in preventing high inflation.

Historical Inflation

Inflation has been relatively low over the past 20 years, and particularly over the last five years. The table below shows the average historical change in the annual CPI-U, over various periods. The average increase shown reflects the annual average rates for the year.

Periods Ending 2020	Average Annual Increase in CPI-U
Last 5 years	1.8%
Last 10 years	1.7%
Last 20 years	2.1%
Last 30 years	2.3%
Last 40 years	2.9%

Source: Bureau of Labor Statistics, CPI-U, all items, not seasonally adjusted

The current assumption of 2.50% appears to be high based on recent increases and the average increase over the last 20-30 years. However, inflation took a dramatic upturn in 2021, with an annual increase in December rates of 7.0%. Reflecting 2021 experience in the table above would increase the five-year average to 2.5% and the ten-year average to 1.9%.

Yields on Government Securities of Various Maturities

The spread between the nominal yield on treasury securities and the inflation indexed nominal yield on inflation protected treasury bills (TIPS) of the same maturity is referred to as the "breakeven rate of inflation" and represents the bond market's expectation of inflation over the period to maturity. Current estimates reported at Bloomberg.com on March 1, 2022 are as follows:

Years to Maturity	Bond Nominal Yield	TIPS Nominal Yield	Breakeven Rate of Inflation
10 Years	1.71%	-0.99%	2.70%
30 Years	2.10%	-0.22%	2.32%

The current assumption is in-between the two market data points, which would lend support to the assumption being appropriate.

Forecasts of Inflation

The Federal Reserve Bank of Philadelphia conducts a quarterly survey of the Society of Professional Forecasters and publishes a mid-term expectation. Their most recent forecast (first quarter of 2022) predicts average inflation over the next ten years (2022-2031) will be 2.50%. The Philadelphia Fed's Livingston Survey summarizes the forecasts of economists from industry, government, banking, and academia. The December 2021 report shows an average 10-year inflation expectation of 2.44%. The report does not provide a forecast beyond 10 years.

The Social Security Administration's 2021 Trustees Report includes the Office of the Chief Actuary's projection of ultimate long-term (75 year) average annual inflation. The intermediate cost assumption is 2.40%. The report provides a low-to-high range of 1.80% to 3.00%.

Forecasts from Investment Consulting Firms

Horizon Actuarial Services, LLC, compiles and summarizes expected returns and volatility by asset class for 34 different investment advisors. The results of the survey are provided in a report titled "Survey of Capital Market Assumptions: 2021 Edition." The report defines the short-term horizon as 10 years and the long-term horizon as 20-years. All 39 advisors provided short-term assumptions, while only 24 provided both short-term and long-term assumptions. The average short-term (10-year) inflation assumption for all advisors is 2.12%, with a range of 2.0% to 2.8%. Of the 24 advisors providing both short-term and long-term assumptions, the short-term inflation assumption is 2.14% and the long-term inflation assumption is 2.23%, with a range from 1.8% to 2.9%. It should be noted that this study is based on capital market assumptions that we largely developed before recent significant increases in annual inflation rates.

Verus, who was included in the Horizon study, did provide their 2022 capital market assumptions for our review. Their assumptions included an increase in the inflation assumption from 2.0% to 2.5%.

Recommendation

Based on the information shown above, which either supports the current assumption or was published before recent significant increases in annual inflation rates, we see no compelling factors to change the current assumption of 2.50% at this time. Given the recent increases, this assumption may need to be monitored more closely over the next few years to make sure that the hopefully short-term impacts are properly reflected in our long-term measurements. Based on these determinations, we recommend keeping the long-term inflation assumption at 2.50%.

SALARY AND REAL WAGE GROWTH

The salary increase assumption is used to project a member's annual salary each year from the valuation date through the assumed retirement age. This assumption plays an important role in measuring individual pension costs and obligations. The sum of inflation and the real wage growth components comprise the recommended salary increase assumption. The real rate of wage increase includes increases due to promotion and longevity, often called merit increases, which are generally service related.

We previously addressed the inflation assumption, which we recommend keeping at 2.50%. We address the real wage growth assumption below.

Experience and Recommended Assumptions

To assess the current assumed annual increases and provide a basis for updated assumptions, we reviewed the actual salary experience over the study period. Salary increases across all service levels were slightly lower than expected. It is important to keep in mind that salary increase assumptions are used to project a member's salary from the valuation date until the assumed retirement age. For newly hired members, this projection could be for 40 or more years. Therefore, the recent past should not be considered in isolation. In addition to recent experience, we reviewed the experience from the two prior experience studies and long-term wage growth assumptions used by the Social Security Administration.

Actual Aggregate Salary Increase Experience			
	Actual Inflation	**Real**	**Total**
2004-2011	2.53%	3.32%	5.85%
2011-2016	1.32%	2.90%	4.22%
2017-2020	1.83%	2.88%	4.71%

Salary Increase Assumptions – Current and Proposed			
	Assumed Inflation	**Real**	**Total**
Current Aggregate Assumed Annual Increase	2.50%	2.69%	5.19%
Proposed Aggregate Assumed Annual Increase	2.50%	2.50%	5.00%

Social Security Administration

The Social Security Administration's (SSA) 2021 Trustees Report includes the Office of the Chief Actuary's projections of real wage inflation, which are used in their 75-year projections. These assumptions are based on data derived predominantly from the private sector and should therefore not be considered in isolation. However, this can provide a basis to help determine the reasonableness of the recommended long-term real increases shown above.

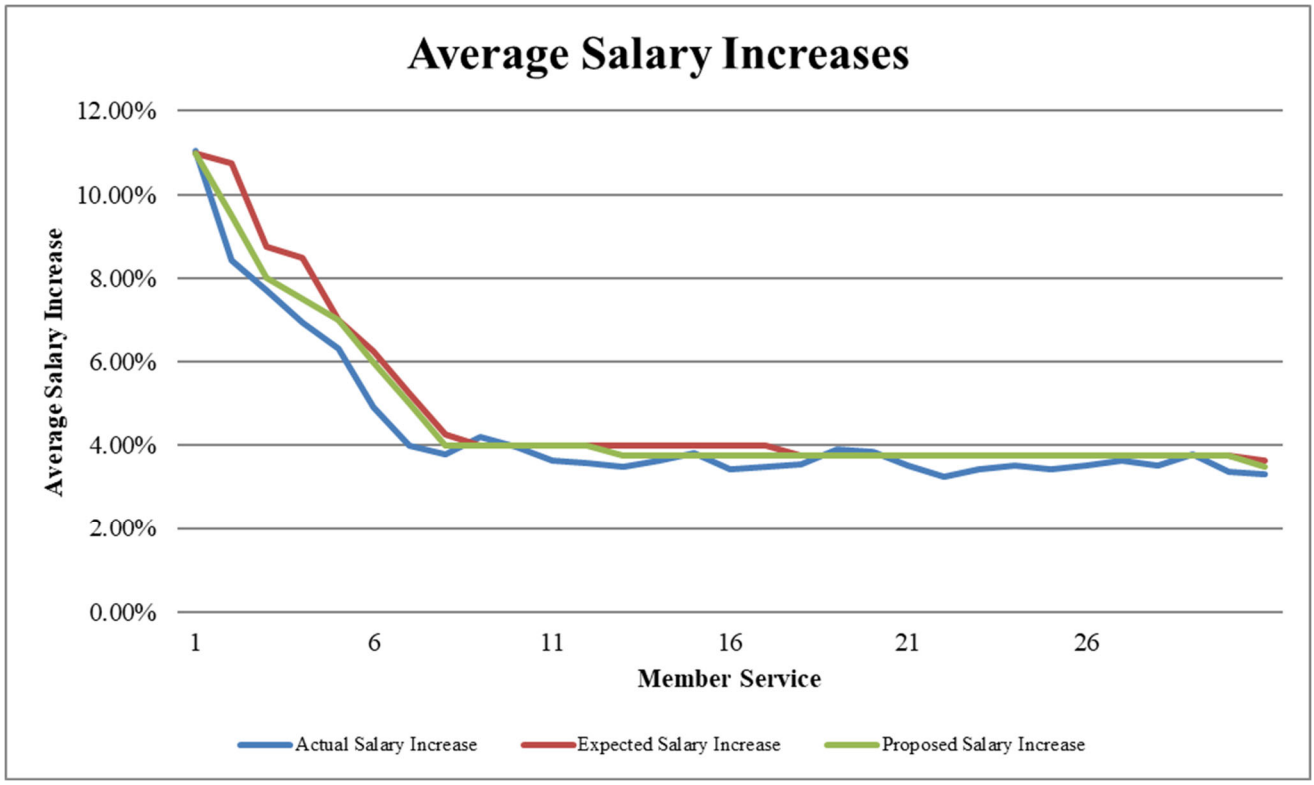
The annual increase in the National Average Wage Index under the intermediate cost assumption (best estimate) was 3.55%, with a range from 2.33% to 4.77%. After netting the SSA's inflation assumptions, the SSA's best estimate of the current long-term real wage inflation is 1.15%, with a range of 0.53% to 1.77% per year.

The proposed salary increase rates by duration of service are provided in the following table. Following the table is a graph which provides a visual representation of the actual and proposed salary increase rates compared to the current assumption.

Illinois Police Officers' Pension Investment Fund
2017 - 2020 Salary Increase Experience

Service	Eligible Members	Prior Year Salaries[1]	Actual Salaries[1]	Expected Salaries Current Assumption[1]	Actual Salary Increase	Expected Salary Increase	Proposed Salary Increase[2]
0	3,280	203,971	226,514	226,408	11.05%	11.00%	11.00%
1	1,806	124,335	134,797	137,701	8.41%	10.75%	9.50%
2	1,620	118,895	128,049	129,298	7.70%	8.75%	8.00%
3	1,576	122,273	130,757	132,666	6.94%	8.50%	7.50%
4	1,444	116,466	123,821	124,619	6.32%	7.00%	7.00%
5	1,177	98,332	103,172	104,478	4.92%	6.25%	6.00%
6	912	77,508	80,607	81,577	4.00%	5.25%	5.00%
7	767	64,185	66,610	66,912	3.78%	4.25%	4.00%
8	972	81,286	84,700	84,537	4.20%	4.00%	4.00%
9	1,322	113,177	117,664	117,705	3.96%	4.00%	4.00%
10	1,557	136,818	141,776	142,290	3.62%	4.00%	4.00%
11	1,596	143,229	148,342	148,958	3.57%	4.00%	4.00%
12	1,460	132,868	137,486	138,183	3.48%	4.00%	3.75%
13	1,381	127,397	132,038	132,493	3.64%	4.00%	3.75%
14	1,326	123,311	128,016	128,243	3.82%	4.00%	3.75%
15	1,404	131,357	135,878	136,611	3.44%	4.00%	3.75%
16	1,522	143,212	148,227	148,941	3.50%	4.00%	3.75%
17	1,555	147,910	153,146	153,456	3.54%	3.75%	3.75%
18	1,464	142,031	147,589	147,357	3.91%	3.75%	3.75%
19	1,296	127,985	132,896	132,784	3.84%	3.75%	3.75%
20	1,172	118,389	122,563	122,829	3.53%	3.75%	3.75%
21	1,114	113,394	117,094	117,646	3.26%	3.75%	3.75%
22	976	101,254	104,720	105,051	3.42%	3.75%	3.75%
23	818	85,805	88,814	89,023	3.51%	3.75%	3.75%
24	644	69,357	71,734	71,958	3.43%	3.75%	3.75%
25	575	61,779	63,954	64,096	3.52%	3.75%	3.75%
26	481	51,454	53,329	53,384	3.64%	3.75%	3.75%
27	384	41,354	42,814	42,905	3.53%	3.75%	3.75%
28	251	27,312	28,345	28,337	3.78%	3.75%	3.75%
29	119	13,060	13,499	13,549	3.36%	3.74%	3.75%
30+	244	29,035	29,995	30,095	3.31%	3.65%	3.50%
Total	**36,215**	**3,188,739**	**3,338,946**	**3,354,090**	**4.71%**	**5.19%**	**5.00%**

[1] All salary figures are shown as 1,000's.
[2] Inclusive of 2.50% inflation assumption.


Average Salary Increases
12.00%
10.00%
8.00%
6.00%
4.00%
2.00%
0.00%
Average Salary Increase
1
6
11
16
21
26
Member Service
Actual Salary Increase
Expected Salary Increase
Proposed Salary Increase

PAYROLL GROWTH

The payroll growth assumption is used as part of the unfunded liability amortization calculation, allowing for the amortization rate to remain level as a percentage of payroll over time, assuming all assumptions are met. This is different from the salary increase assumption, since it is looking at the payroll for the entire membership, rather than any individual member. Total payroll growth includes an inflationary component and an additional increase for productivity gains.

Current Assumption

Currently, the valuation assumes that payroll will increase 3.50% each year.

Experience and Recommendation

We reviewed the payroll increases for each plan over the study period (2017 – 2020). In addition, we considered the payroll increases from the prior experience study period (2012 – 2016). The results of this review are summarized below.

	Total Wage Inflation	Inflation	Productivity
2012-2016	2.46%	1.32%	1.14%
2017-2020	2.45%	1.83%	0.62%
Current Assumption	3.50%	2.50%	1.00%
Proposed Assumption	3.00%	2.50%	0.50%

While we have made the recommendation to use a 3.00% payroll growth assumption, the Board should consider modifying this assumption for each individual fund based on their specific experience. The experience can vary dramatically from one fund to another, so it is difficult to provide a one size fits all payroll growth assumption. While the payroll may grow at 3% or 4% each year in some places, it might remain flat in other locations. If a fund with little or no growth in payroll uses a 3.00% assumption, their contribution will continue to become a much larger percentage of the total future payroll and potentially make it difficult for the municipality to keep up with the growth in future contribution requirements.

An alternate approach would be to use the average growth in payroll over a specified period, for example over 10 years. This approach is used in some other states to help better align the assumption used by each fund with the reality of their situation. Under this approach, the funds with little or no payroll growth would use a smaller payroll growth assumption, resulting in an increase of in their actuarial required contribution. Like every other assumption change, the impact of this change would be implemented over the required 3-year period.

REVIEW OF DEMOGRAPHIC ASSUMPTIONS

ASOP No. 35, *Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations*, provides guidance to actuaries in selecting (including giving advice on selecting) demographic and other noneconomic assumptions for measuring obligations under defined benefit pension plans.

Over the following pages, the following demographic assumptions will be reviewed:

- Retirement Rates
- Withdrawal/Termination Rates
- Disability Incidence Rates
- Mortality Rates
- Other Demographic Assumptions

Generally, demographic assumptions are based on actual plan experience with additional considerations for current trends. ASOP No. 35 states "the actuary should use professional judgment to estimate possible future outcomes based on past experience and future expectations, and select assumptions based upon application of that professional judgment." ASOP No. 35 also states that "a reasonable assumption is one that is expected to appropriately model the contingency being measured and is not anticipated to produce significant cumulative actuarial gains or losses…the actuary should not give undue weight to past experience when selecting demographic assumptions."

Demographic assumptions generally remain consistent over time, absent significant changes in plan provisions or economic conditions. Therefore, the best true indicator of future experience is often past experience. For each assumption, the study compares actual experience for that time period to assumptions used in the valuations.

Note that actuarial assumptions reflect average experience over long periods of time. A change in actuarial assumptions generally results when experience over a period of years indicates a consistent pattern. Proposed changes to the demographic assumptions are made to better reflect actual plan experience over the studied time period. The proposed changes also meet the objective of developing costs that are stable, predictable, and represent the best estimate of anticipated future experience.

RETIREMENT RATES

Retirement rates represent the probability that a member will retire at a given age and/or service level if they have attained the eligibility requirements. Higher rates of retirement at earlier ages generally result in higher costs to the plan but may be offset by the impacts of actuarially equivalent early retirement reductions.

The current retirement eligibility requirements are as follows:

Tier	Normal Retirement	Early Retirement
Tier 1	Age 50 and 20 years of Credited Service	Age 60 and 8 years of Credited Service
Tier 2	Age 55 and 10 years of Credited Service	Age 50 and 10 years of Credited Service

Experience and Proposed Assumptions

The chart and graph on the following pages illustrate the actual retirement experience over the last three years. The rates illustrated are unisex and represent the probability of retirement, given the member had met the eligibility requirements. If the member did not meet the eligibility requirements at a given age, the member's exposure was excluded for that age. Because the Tier 2 experience for the study period includes only a handful of exposures (members eligible to retire), the experience was not split between Tiers.

The current retirement rate assumption reflects age-related rates that vary by benefit Tier. Given the different benefit structures and retirement eligibilities, it is reasonable to assume that retirement patterns will vary between the two groups. Tier 2 members are assumed to retire at lower rates from age 50 to age 54 because benefits payable at those ages are reduced to reflect earlier payment.

In general, actual retirement rates were heavier than expected. The proposed rates reflect slight increases for ages 50 and 51 and 64 to 69.

The actual, expected, and proposed retirement rates by age are displayed in the following table. Following the table is a graph which provides a visual representation of the actual and proposed retirement rates compared to the current assumptions.

Illinois Police Officers' Pension Investment Fund
2017 - 2020 Retirement Experience

Age	Eligible Members	Actual Retirements	Expected Retirements Current Rates	Expected Retirements Proposed Rates	Actual Retirement Rates	Expected Current Rates Tier 1	Expected Current Rates Tier 2	Actual / Expected	Proposed Rates Tier 1	Proposed Rates Tier 2
50	1,480	366	222	295	24.7%	15%	5%	1.652	20%	5%
51	765	158	115	153	20.7%	15%	5%	1.379	20%	5%
52	676	160	135	135	23.7%	20%	5%	1.185	20%	5%
53	552	151	110	110	27.4%	20%	5%	1.370	20%	5%
54	455	99	91	91	21.8%	20%	5%	1.090	20%	5%
55	371	102	93	93	27.5%	25%	40%	1.098	25%	40%
56	288	81	72	72	28.1%	25%	25%	1.125	25%	25%
57	200	60	50	50	30.0%	25%	25%	1.200	25%	25%
58	146	32	37	37	21.9%	25%	25%	0.877	25%	25%
59	145	33	36	36	22.8%	25%	25%	0.910	25%	25%
60	131	36	33	33	27.5%	25%	25%	1.099	25%	25%
61	101	26	25	25	25.7%	25%	25%	1.030	25%	25%
62	70	19	18	18	27.1%	25%	25%	1.086	25%	25%
63	52	17	13	17	32.7%	25%	25%	1.308	33%	33%
64	47	18	12	19	38.3%	25%	25%	1.532	40%	40%
65	31	18	12	17	58.1%	40%	40%	1.452	55%	55%
66	15	4	6	8	26.7%	40%	40%	0.667	55%	55%
67	8	5	3	4	62.5%	40%	40%	1.563	55%	55%
68	1	0	0	1	0.0%	40%	40%	0.000	55%	55%
69	1	0	0	1	0.0%	40%	40%	0.000	55%	55%
70+	14	1	14	14	7.1%	100%	100%	0.071	100%	100%
Total	**5,549**	**1,386**	**1,097**	**1,228**	**25.0%**	**19.8%**	**16.6%**	**1.264**	**22.1%**	**18.0%**


Retirement Experience
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
Retirement Rates
50
55
60
65
70+
Member Age
Actual Retirement Rates
Current Retirement Rates
Proposed Retirement Rate

TERMINATION RATES

The termination rate is the probability that a member will separate employment from a cause other than disability, death, or retirement.

Members who terminate before earning 8 years (10 years for Tier 2 members) of service are eligible for a refund of member contributions. Members who terminate after earning 8 (10) years are eligible to receive a deferred vested retirement benefit upon reaching the age-requirements for retirement.

Current Assumption

The current termination assumption is an age-based table with rates starting at 14.00% and grading to 1.50% by age 42.

Experience and Proposed Assumptions

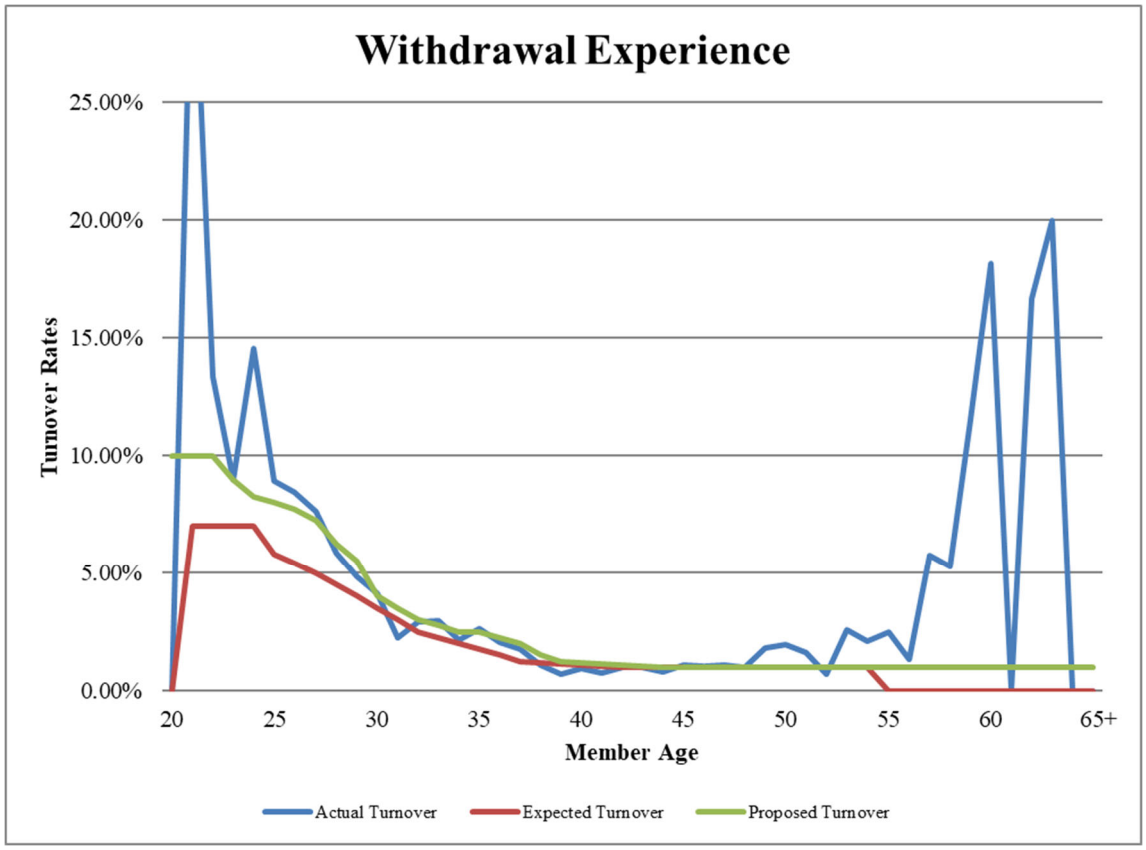
All active members during the observation period were included in the exposures unless the member had met the retirement eligibility requirements. If a member was eligible for retirement at a given age, the member's exposure was excluded for that age.

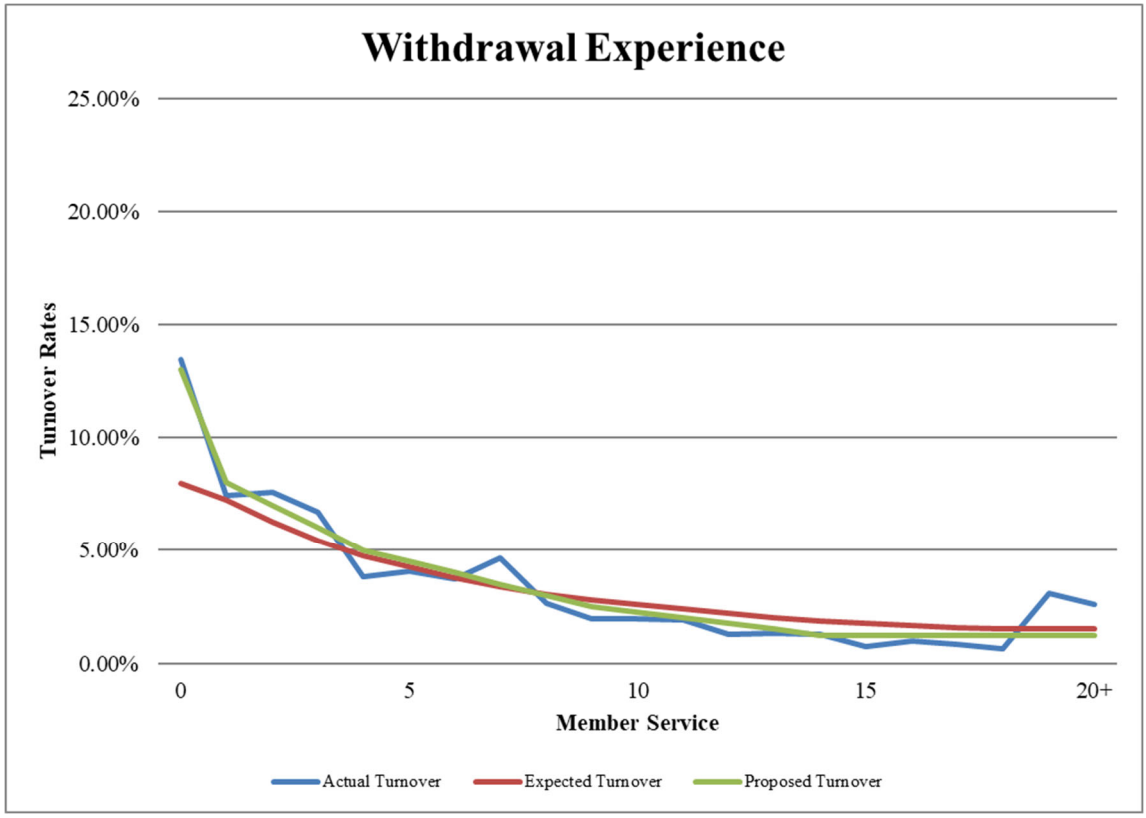
Actual termination experience was higher than expected in total, with experience differing by age. The funds did experience terminations after age 55. Additionally, experience for younger, lower-service Tier 2 members differed widely from termination experience for older, higher service Tier 1 members. We propose a table with rates that vary by service.

The actual, expected, and proposed termination rates by age are provided on the following page. Following the table is a graph which provides a visual representation of the actual and proposed withdrawal rates compared to the current assumption. The first graph shows experience based on termination experience by age and the second graph shows the experience by service.

Illinois Police Officers' Pension Investment Fund
2017 - 2020 Termination Experience

Service	Eligible Members	Eligible Tier 1	Eligible Tier 2	Actual Terminations	Expected Terminations Current Rates	Expected Terminations Proposed Rates	Actual Termination Rates	Expected Termination Rates	Actual / Expected	Proposed Rates
0	2,595	92	2,503	349	207	337	13.45%	7.99%	1.684	13.00%
1	2,045	54	1,991	152	148	164	7.43%	7.23%	1.028	8.00%
2	1,830	58	1,772	139	115	128	7.60%	6.28%	1.209	7.00%
3	1,711	78	1,633	115	93	103	6.72%	5.43%	1.238	6.00%
4	1,622	87	1,535	62	77	81	3.82%	4.77%	0.801	5.00%
5	1,406	82	1,324	57	60	63	4.05%	4.27%	0.950	4.50%
6	1,076	149	927	40	41	43	3.72%	3.77%	0.986	4.00%
7	837	364	473	39	28	29	4.66%	3.37%	1.382	3.50%
8	835	663	172	22	26	25	2.63%	3.05%	0.863	3.00%
9	1,181	1,173	8	23	33	30	1.95%	2.81%	0.692	2.50%
10	1,484	1,469	15	29	39	33	1.95%	2.60%	0.753	2.25%
11	1,669	1,662	7	32	40	33	1.92%	2.38%	0.806	2.00%
12	1,557	1,551	6	20	34	27	1.28%	2.20%	0.585	1.75%
13	1,453	1,449	4	19	29	22	1.31%	2.01%	0.651	1.50%
14	1,320	1,315	5	17	25	17	1.29%	1.88%	0.684	1.25%
15	1,346	1,342	4	10	24	17	0.74%	1.76%	0.423	1.25%
16	1,445	1,442	3	14	24	18	0.97%	1.67%	0.581	1.25%
17	1,593	1,590	3	13	25	20	0.82%	1.57%	0.520	1.25%
18	1,596	1,593	3	10	24	20	0.63%	1.52%	0.412	1.25%
19	1,135	1,134	1	35	17	14	3.08%	1.52%	2.035	1.25%
20+	3,786	3,780	6	98	57	47	2.59%	1.50%	1.725	1.25%
Total	**33,522**	**21,127**	**12,395**	**1,295**	**1,165**	**1,272**	**3.86%**	**3.48%**	**1.111**	**3.79%**


Withdrawal Experience
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
Turnover Rates
20
25
30
35
40
45
50
55
60
65+
Member Age
Actual Turnover
Expected Turnover
Proposed Turnover


Withdrawal Experience
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
Turnover Rates
0
5
10
15
20+
Member Service
Actual Turnover
Expected Turnover
Proposed Turnover

DISABILITY INCIDENCE RATES

The disability incidence assumption is the probability that a member will become disabled while actively participating in the plan. A review of past experience compared to the current assumption will provide the basis for examining the assumption.

The overall cost due to disability depends on the plan's disability provisions. For Article 3 members, the benefits for separating due to disability can be more valuable than retirement benefits. It is possible that an active member, who is already eligible to retire, becomes disabled and is entitled to receive a larger immediate benefit than if he or she had retired.

It is also important to note that the level of disability benefits received depends on whether the disability was service-related or non-service-related. To be eligible for non-service-related disability benefits, a member must have earned seven years of service, whereas members are eligible for service-related disability benefits immediately upon disability. Therefore, an additional assumption for the proportion of disablements that are service-related is necessary.

Current Assumption

The current disability incidence assumption is a unisex age-related table. Currently, 60% of disabilities are assumed to be service-related.

Experience and Proposed Assumptions

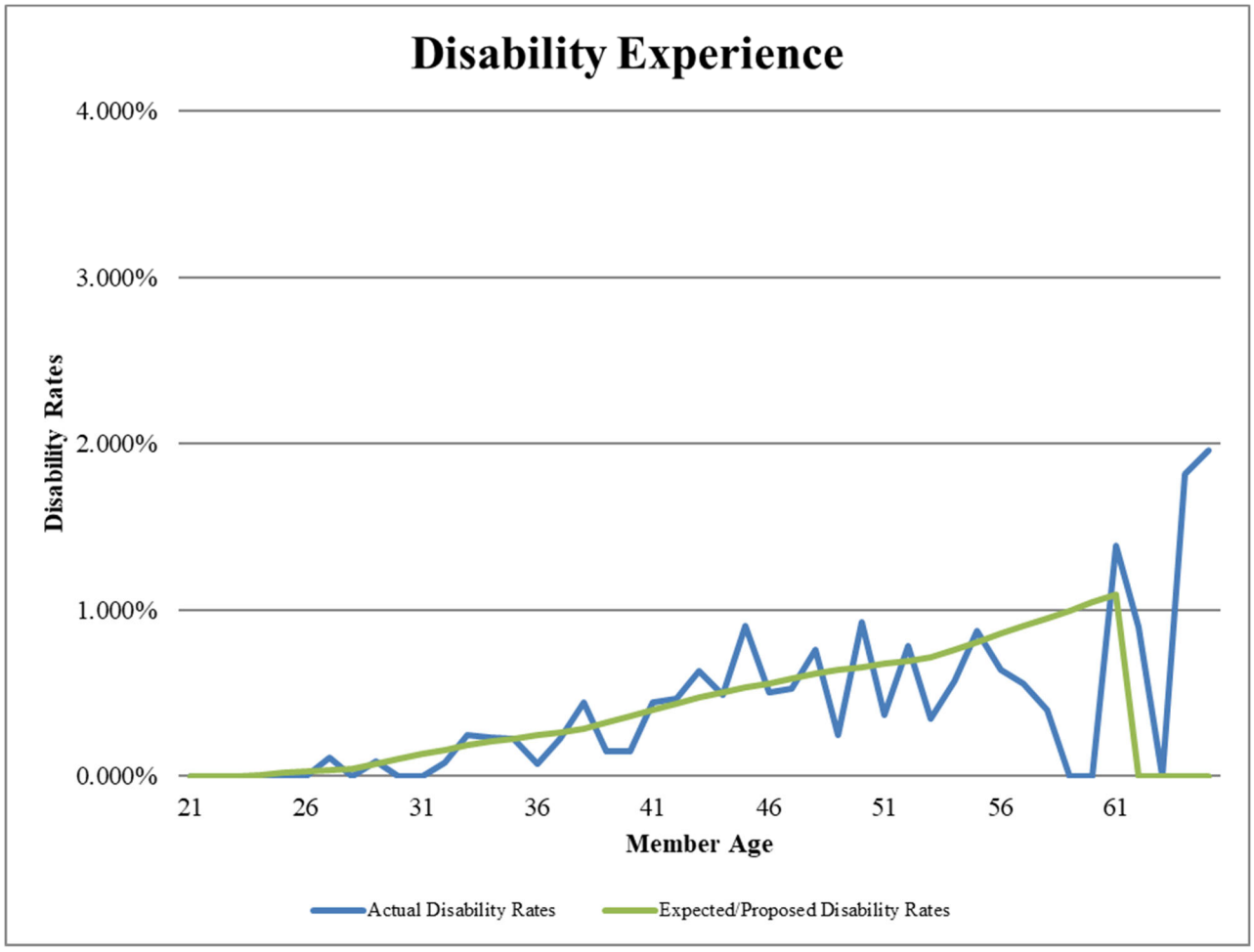
In total, over the studied period, there were fewer disablements than assumed. For some ages, the actual rate was higher than expected and for other ages, the actual rate was lower. We propose adjusting the current table of rates by a factor of 0.95 (reducing rates by 5%).

We also reviewed the incidence of service-related disabilities versus non-service-related disabilities. Approximately 66% of the disabilities were service-related. We propose no change to the current 60% assumption.

The actual, expected, and proposed rates of disability are provided in the following table. Following the table is a graph which provides a visual representation of the actual and proposed disability rates compared to the current assumption.

Illinois Police Officers' Pension Investment Fund
2017 - 2020 Disability Experience

Age	Exposures	Actual Disabilities	Expected Disabilities Current Rates	Actual Disability Rates	Expected Disability Rates	Actual / Expected	Proposed Disability Rates
20	5	0	0.0	0.000%	0.000%	0.000	0.000%
21	10	0	0.0	0.000%	0.000%	0.000	0.000%
22	83	0	0.0	0.000%	0.000%	0.000	0.000%
23	255	0	0.0	0.000%	0.010%	0.000	0.010%
24	506	0	0.1	0.000%	0.020%	0.000	0.019%
25	677	0	0.2	0.000%	0.030%	0.000	0.029%
26	873	1	0.4	0.115%	0.040%	2.863	0.038%
27	974	0	0.5	0.000%	0.050%	0.000	0.048%
28	1,097	1	0.9	0.091%	0.080%	1.140	0.076%
29	1,163	0	1.3	0.000%	0.110%	0.000	0.105%
30	1,143	0	1.6	0.000%	0.140%	0.000	0.133%
31	1,165	1	2.0	0.086%	0.170%	0.505	0.162%
32	1,222	3	2.4	0.246%	0.200%	1.228	0.190%
33	1,271	3	2.8	0.236%	0.220%	1.073	0.209%
34	1,326	3	3.2	0.226%	0.240%	0.943	0.228%
35	1,350	1	3.5	0.074%	0.260%	0.285	0.247%
36	1,338	3	3.8	0.224%	0.280%	0.801	0.266%
37	1,355	6	4.1	0.443%	0.300%	1.476	0.285%
38	1,351	2	4.6	0.148%	0.340%	0.435	0.323%
39	1,358	2	5.2	0.147%	0.380%	0.388	0.361%
40	1,343	6	5.6	0.447%	0.420%	1.064	0.399%
41	1,292	6	5.9	0.464%	0.460%	1.010	0.437%
42	1,259	8	6.3	0.635%	0.500%	1.271	0.475%
43	1,225	6	6.5	0.490%	0.530%	0.924	0.504%
44	1,332	12	7.5	0.901%	0.560%	1.609	0.532%
45	1,378	7	8.1	0.508%	0.590%	0.861	0.561%
46	1,523	8	9.4	0.525%	0.620%	0.847	0.589%
47	1,585	12	10.3	0.757%	0.650%	1.165	0.618%
48	1,634	4	11.0	0.245%	0.670%	0.365	0.637%
49	1,508	14	10.4	0.928%	0.690%	1.346	0.656%
50	1,344	5	9.5	0.372%	0.710%	0.524	0.675%
51	1,025	8	7.5	0.781%	0.730%	1.069	0.694%
52	875	3	6.6	0.343%	0.750%	0.457	0.713%
53	699	4	5.6	0.572%	0.800%	0.715	0.760%
54	571	5	4.9	0.876%	0.850%	1.030	0.808%
55	468	3	4.2	0.641%	0.900%	0.712	0.855%
56	358	2	3.4	0.559%	0.950%	0.588	0.903%
57	251	1	2.5	0.398%	1.000%	0.398	0.950%
58	190	0	2.0	0.000%	1.050%	0.000	0.998%
59	172	0	1.9	0.000%	1.100%	0.000	1.045%
60	144	2	1.7	1.389%	1.150%	1.208	1.093%
61	112	1	0.0	0.893%	0.000%	0.000	0.000%
62	73	0	0.0	0.000%	0.000%	0.000	0.000%
63	55	1	0.0	1.818%	0.000%	0.000	0.000%
64	51	1	0.0	1.961%	0.000%	0.000	0.000%
65+	82	1	0.0	1.220%	0.000%	0.000	0.000%
Total	**39,071**	**146**	**167.2**	**0.374%**	**0.428%**	**0.873**	**0.406%**


Disability Experience
4.000%
3.000%
2.000%
1.000%
0.000%
Disability Rates
21
26
31
36
41
46
51
56
61
Member Age
Actual Disability Rates
Expected/Proposed Disability Rates

MORTALITY RATES

A plan's normal cost and actuarial accrued liabilities depend in part on how long retirees will live. If retirees live longer than anticipated by the assumptions, benefits will be paid longer than expected and experience losses will develop. If retirees do not live as long as anticipated by the assumptions, experience gains will develop. Mortality rates represent the probability of death at a given age. The choice of mortality rates impacts active member and retiree costs and liabilities and has the greatest impact on the liabilities for retirees.

The actuarial profession has increasingly become more focused on the issue of future mortality improvement. Mortality rates have declined over time as advances in medical care have evolved. The extent of future mortality improvement will impact the magnitude of pension costs and liabilities for future benefit commitments. ASOP No. 35 discusses the importance of actuaries considering mortality improvements when measuring pension obligations. Specifically, an actuary should make and disclose a specific recommendation with respect to future mortality improvement after the measurement date. Mortality improvement can be accounted for with static or generational mortality tables. A static table includes a projection of the base mortality rates to a specific date or equivalently for a specific number of years. The same mortality rates at any given age apply to everyone. A generational table anticipates future improvements in mortality by using a different static mortality table for each year of birth, with the tables for later years of birth assuming lower mortality than the tables of earlier years of birth.

Our analysis employs a credibility procedure which uses a statistical approach to combine actual mortality experience with standard mortality tables to improve the estimate of future mortality.

Current Assumption

Healthy Lives: RP-2014 Blue Collar Total Healthy Annuitant mortality table, sex distinct with generational mortality improvement using scale MP-2016 and a base year of 2013.

Disabled Lives: RP-2014 Blue Collar Total Healthy Annuitant mortality table, sex distinct, with rates increased by 15 percent, and generational mortality improvement using scale MP-2016 and a base year of 2013.

Standard Mortality Tables

In 2019, the Society of Actuaries (SOA) released its report of a comprehensive study of public sector mortality experience. Included in this report are gender-specific mortality tables for public safety employees, including separate tables for active members, retirees, disabled members and contingent survivor tables for beneficiaries. These tables are collectively named the Pub-2010 Mortality Tables.

In preparing this study, we compared the Article 3 funds' actual plan experience to the current assumption and to the applicable Pub-2010 Mortality Tables.

For a plan to develop a mortality table based solely on its own experience, it must have hundreds of thousands of lives and thousands of deaths at each age and gender. However, many plans provide enough fully credible experience to develop a custom mortality table by multiplying the mortality rates in a published table by the ratio of actual to expected deaths. We employed this methodology by first identifying a standard table with mortality rates that are similar to those shown by the actual plan membership. Since the rate at each age in the custom mortality table will be a multiple of the rate at that age from the standard table, close attention was given to the shape of the standard table in making the selection.

Once the appropriate standard table was selected, we determined the multiple using the limited fluctuation approach to credibility, as described in the Society of Actuaries Credibility Educational Resource for Pension Actuaries, issued in August 2017. Using this approach, 1082 deaths are needed to provide full credibility based on a 90% confidence level and a 5% margin of error. If the experience data is fully credible, then the rates from

the standard table are multiplied by the ratio of the actual to expected deaths from the standard table. Where there are fewer than the deaths than needed for full credibility, the limited fluctuations approach allows some of the plan's actual experience to be used to adjust the standard table.

Experience and Recommended Assumptions

Active Members:

The low number of active public safety member deaths results in an insufficient number of deaths needed to provide fully credible experience on which to develop the appropriate mortality rates. With only 29 total active deaths over the studied period, we found that experience was only about 16% credible.

In selecting a standard table, we considered the Pub-2010 Public Safety Employee table for males and females. We found that this table provided a reasonable match to the experience pattern of current active members for both males and females. We used the limited fluctuation approach described above to determine the appropriate adjustment factor for each table. Based on this analysis, we recommend using Pub-2010 Public Safety Employee tables for males and females with no adjustment.

Retirees and Survivors:

Using the credibility approach described above, we found that the mortality experience was 69.7% credible for male retirees and 49.7% credible for female survivors. There was not sufficient experience for female retirees and male survivors to be considered credible. We compared the experience to the Pub-2010 Public Safety Healthy Retiree and the Pub-2010 Public Safety Survivor tables.

These tables provided a reasonable fit to the actual experience. Because the actual experience is somewhat credible, we recommend adjusting the Pub-2010 Public Safety Healthy Retiree and the Pub-2010 Public Safety Survivor tables with some of the actual experience. The recommended adjustment factor is 1.15 for male retirees and for female survivors. We recommend no adjustment for female retirees and male survivors.

Disability Retirees:

Mortality rates for disability retirees are generally higher than for regular retirees.

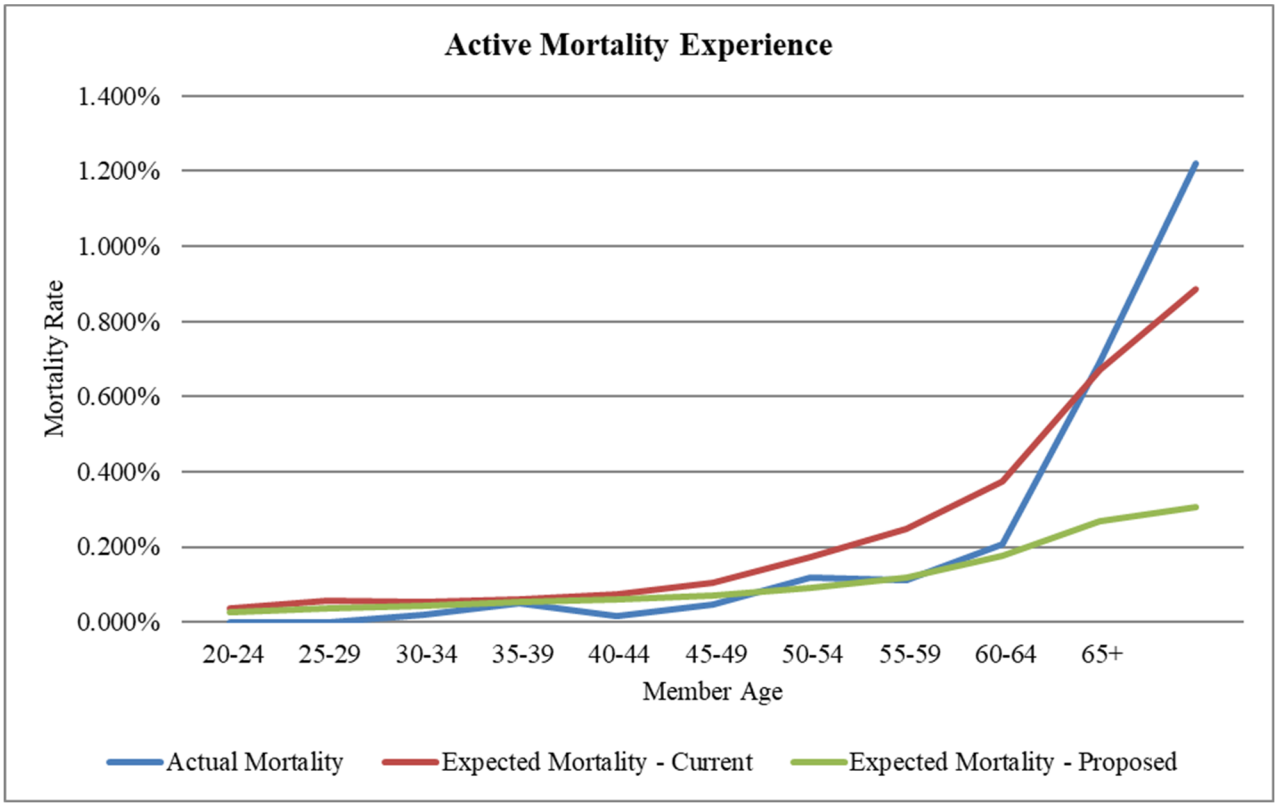
Using the credibility approach identified above, with 57 male deaths and two female deaths, the experience was 23.0% credible for males and 4.3% credible for females. In selecting a standard table, actual mortality experience was heavier than experience suggested by the Pub-2010 table. Based on our analysis using the limited fluctuation approach, we recommend an adjustment factor of 1.08 to male rates and no adjustment to female rates.

Future Mortality Improvement:

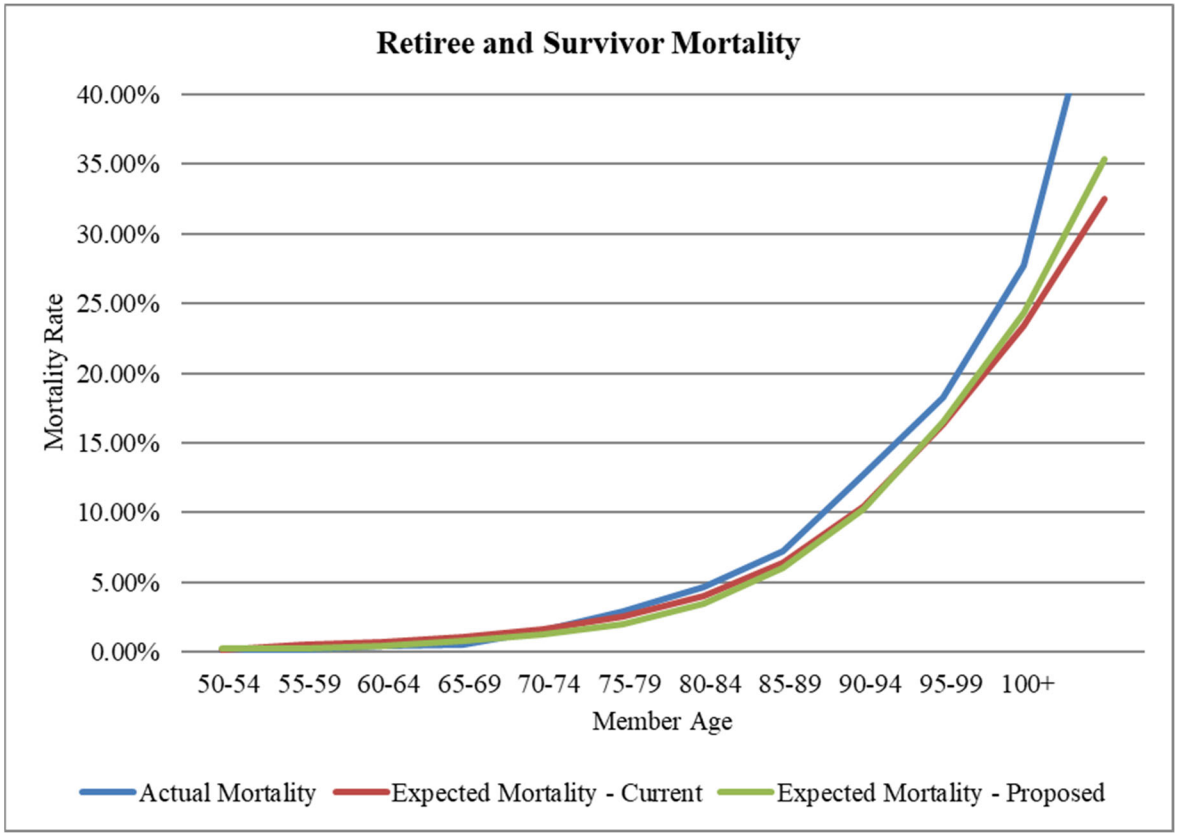
Currently, the mortality tables reflect generational improvements using Scale MP-2016. We continued use of the generational improvements, updated to reflect the most current projection scale available (currently MP-2021). This scale would be updated with each valuation using the projection scale available as of January 1 of the valuation year.

The actual, expected, and proposed mortality rates for active members, healthy retirees and survivors, and disabled members are provided on the following tables. Following the tables are graphs which provide a visual representation of the actual and proposed mortality rates compared to the current assumptions.

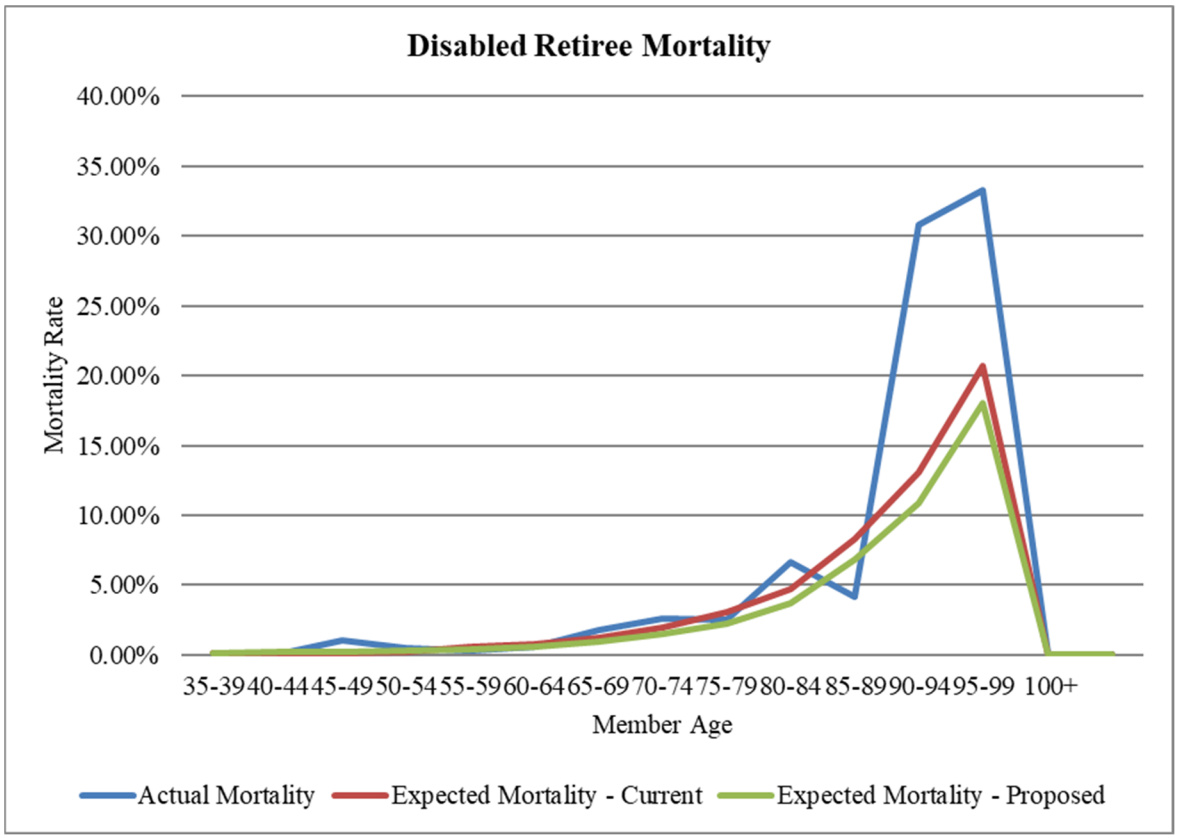
Illinois Police Officers' Pension Investment Fund 2017 - 2020 Mortality Experience Active Members						
Age	Exposures	Actual Deaths	Expected Deaths	Actual Mortality Rates	Expected Mortality Rates	Proposed Mortality Rates
<20	2	0	0	0.000%	0.035%	0.026%
20-24	857	0	0	0.000%	0.056%	0.035%
25-29	4,784	1	2	0.021%	0.052%	0.042%
30-34	6,127	3	4	0.049%	0.059%	0.053%
35-39	6,752	1	5	0.015%	0.075%	0.062%
40-44	6,451	3	7	0.047%	0.106%	0.071%
45-49	7,628	9	13	0.118%	0.172%	0.090%
50-54	4,514	5	11	0.111%	0.248%	0.118%
55-59	1,439	3	5	0.209%	0.375%	0.175%
60-64	435	3	3	0.690%	0.670%	0.270%
65+	82	1	1	1.220%	0.887%	0.307%
Total	**39,071**	**29**	**52**	**0.074%**	**0.133%**	**0.078%**



Illinois Police Officers' Pension Investment Fund 2017 - 2020 Mortality Experience Retirees and Survivors						
Age	Exposures	Actual Deaths	Expected Deaths	Actual Mortality Rates	Expected Mortality Rates	Proposed Mortality Rates
<50	168	0	0	0.00%	0.14%	0.27%
50-54	3,077	6	15	0.19%	0.49%	0.27%
55-59	4,124	17	28	0.41%	0.68%	0.45%
60-64	5,261	30	55	0.57%	1.04%	0.76%
65-69	5,434	82	90	1.51%	1.65%	1.23%
70-74	4,613	135	118	2.93%	2.56%	2.01%
75-79	3,031	141	121	4.65%	4.01%	3.44%
80-84	1,913	138	123	7.21%	6.45%	6.00%
85-89	1,017	130	106	12.78%	10.45%	10.30%
90-94	465	85	76	18.28%	16.32%	16.54%
95-99	83	23	19	27.71%	23.40%	24.35%
100+	8	4	3	50.00%	32.50%	35.38%
Total	**29,194**	**791**	**755**	**2.71%**	**2.59%**	**2.23%**



Illinois Police Officers' Pension Investment Fund 2017 - 2020 Mortality Experience Disabled Retirees						
Age	Exposures	Actual Deaths	Expected Deaths	Actual Mortality Rates	Expected Mortality Rates	Proposed Mortality Rates
<35	36	0	0	0.00%	0.08%	0.17%
35-39	127	0	0	0.00%	0.09%	0.20%
40-44	293	3	0	1.02%	0.12%	0.23%
45-49	601	3	1	0.50%	0.19%	0.29%
50-54	623	2	3	0.32%	0.55%	0.40%
55-59	532	3	4	0.56%	0.77%	0.61%
60-64	569	10	7	1.76%	1.19%	0.97%
65-69	542	14	11	2.58%	1.96%	1.49%
70-74	356	9	11	2.53%	3.04%	2.24%
75-79	120	8	6	6.67%	4.76%	3.72%
80-84	48	2	4	4.17%	8.33%	6.79%
85-89	13	4	2	30.77%	13.08%	10.85%
90-94	3	1	1	33.33%	20.67%	18.00%
95-99	0	0	0	0.00%	0.00%	0.00%
100+	0	0	0	0.00%	0.00%	0.00%
Total	**3,863**	**59**	**49**	**1.53%**	**1.28%**	**1.03%**



OTHER DEMOGRAPHIC ASSUMPTIONS

Dependent/minor children: The funds do provide temporary dependent/minor child benefits. However, because the benefits are immaterial, no assumptions are made with regard to dependent minor children.

Spouse's age: Male spouses are assumed to be 3 years older. Correspondingly, female spouses are assumed to be three years younger. Based on available spousal data for current retirees, male spouses are about 2.3 years older and female spouses are about 3.0 years younger. We recommend no changes to this assumption.

Marital status: The current valuation assumes that 80% of active members are married. This statistic is used to determine the probability that spousal benefits will be payable in the event of an active member's death. Based on the spousal data for current retirees, 79% of male members are married and 52% of female retirees are married. Because the current retiree population has a limited number of female retirees (about 280), we recommend no change to the current 80% assumption for both males and females.

Duty-related deaths: Currently, 20% of active deaths are assumed to be in the line of duty. Given the small incidence of active deaths, we recommend no changes to this assumption.

Administrative expenses: While pension plans exist to pay benefits to members in retirement, an overlooked liability of the plan is the payment of administrative expenses from the trust. If the expenses are not considered in the development of the annual required contribution, the amount being contributed is insufficient. As a result, we recommend including an estimate of administrative expenses in the development of the annual contribution.

There are a variety of different approaches used by actuaries to build in administrative expenses into the contribution including a load to the normal cost, a reduction to the investment return assumption or the inclusion of an average of prior years' administrative expenses. Based on Foster & Foster's experience with Article 3 funds, the administrative expenses typically are 2-3% of normal cost. For purposes of IPOPIF's actuarial statements, we recommend including a load of 2.0% of the total normal cost. This approach is the simplest and will be consistent from one plan to another.

RECOMMENDED ASSUMPTIONS

Interest Rate	6.75% per year compounded annually, net of investment related expenses.
Mortality Rate	***Active Lives:*** PubS-2010 Employee mortality, unadjusted, with generational improvements with most recent projection scale (currently Scale MP-2021). 10% of active deaths are assumed to be in the line of duty. ***Inactive Lives:*** PubS-2010 Healthy Retiree mortality, adjusted by a factor of 1.15 for male retirees and unadjusted for female retirees, with generational improvements with most recent projection scale (currently Scale MP-2021). ***Beneficiaries:*** PubS-2010 Survivor mortality, unadjusted for male beneficiaries and adjusted by a factor of 1.15 for female beneficiaries, with generational improvements with most recent projection scale (currently Scale MP-2021). ***Disabled Lives:*** PubS-2010 Disabled mortality, adjusted by a factor of 1.08 for male disabled members and unadjusted for female disabled members, with generational improvements with most recent projection scale (currently Scale MP-2021).
Retirement Age	See full tables at end of this section.
Disability Rate	See full tables at end of this section. 60% of the disabilities are assumed to be in the line of duty.
Termination Rate	See full tables at end of this section.
Salary Increases	See table below.

Salary Scale

Service	Rate
0	11.00%
1	9.50%
2	8.00%
3	7.50%
4	7.00%
5	6.00%
6	5.00%
7 - 11	4.00%
12 - 29	3.75%
30+	3.50%

Inflation 2.50%.

Tier 2 Cost-of-Living Adjustment	1.25% per year after the later of attainment of age 60 or first anniversary of retirement. The increase is the lesser of 3.00% and one-half of the increase in CPI-U.
Marital Status	80% of Members are assumed to be married.
Spouse's Age	Males are assumed to be three years older than females.
Payroll Growth	3.00% per year.
Administrative Expenses	Administrative expenses will be estimated as 2% of the fund's total normal cost.

% Terminating During the Year	
Service	Rate
0	13.00%
1	8.00%
2	7.00%
3	6.00%
4	5.00%
5	4.50%
6	4.00%
7	3.50%
8	3.00%
9	2.50%
10	2.25%
11	2.00%
12	1.75%
13	1.50%
14+	1.25%

% Becoming Disabled During the Year	
Age	Rate
<=22	0.000%
23	0.010%
24	0.019%
25	0.029%
26	0.038%
27	0.048%
28	0.076%
29	0.105%
30	0.133%
31	0.162%
32	0.190%
33	0.209%
34	0.228%
35	0.247%
36	0.266%
37	0.285%
38	0.323%
39	0.361%
40	0.399%
41	0.437%
42	0.475%
43	0.504%
44	0.532%
45	0.561%
46	0.589%
47	0.618%
48	0.637%
49	0.656%
50	0.675%
51	0.694%
52	0.713%
53	0.760%
54	0.808%
55	0.855%
56	0.903%
57	0.950%
58	0.998%
59	1.045%
60	1.093%
61+	0.000%

% Retiring During the Year (Tier 1)	
Age	Rate
50 - 54	20%
55 - 62	25%
63	33%
64	40%
65 - 69	55%
70+	100%

% Retiring During the Year (Tier 2)	
Age	Rate
50 - 54	5%
55	40%
56 - 62	25%
63	33%
64	40%
65 - 69	55%
70+	100%