

State Universities Retirement System of Illinois

2021 Experience Review Covering the Period
June 30, 2017, to June 30, 2020





March 2, 2021

Board of Trustees
State Universities Retirement System of Illinois
1901 Fox Drive
Champaign, Illinois 61820

Subject: Experience Review Covering the Period June 30, 2017, to June 30, 2020

Dear Members of the Board:

At your request, we have performed a review of the actuarial assumptions used in the annual actuarial valuation of the State Universities Retirement System of Illinois ("SURS"). The primary purpose of the study is to determine the continued appropriateness of the current actuarial assumptions by comparing actual experience to expected experience. Our study was based on census information for the period from June 30, 2017, to June 30, 2020, as provided by SURS Staff.

Our study includes a review of the experience associated with the following actuarial assumptions:

- Mortality,
- Disability,
- Withdrawal, and
- Retirement.

The following actuarial assumptions will be reviewed later this spring:

- Price Inflation,
- Investment Return,
- Salary Increases,
- Wage Inflation (based on uncapped pay), and
- Effective Rate of Interest.

The results of this analysis are set forth in Section II of this report. Section III contains the cost impact on the alternate policy contribution and funded status of the plan as a result of the assumption modifications.

Amy Williams and Brian B. Murphy are Members of the American Academy of Actuaries (“MAAA”) and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions herein.

The signing actuaries are independent of the plan sponsor.

This report should not be relied on for any purpose other than the purpose stated. This report may be provided to parties other than SURS only in its entirety and only with the permission of SURS. GRS is not responsible for unauthorized use of this report.

This report was prepared using our proprietary valuation model and related software which in our professional judgment has the capability to provide results that are consistent with the purposes of the valuation. We performed tests to ensure that the model reasonably represents that which is intended to be modeled.

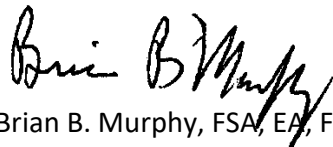
This report is based upon information, furnished to us by SURS, concerning retirement and ancillary benefits, active members, deferred vested members, retirees and beneficiaries, and financial data. If your understanding of this information is different, please let us know. This information was checked for internal consistency, but it was not audited.

The results of the experience study and recommended assumptions set forth in this report are based on the data and actuarial techniques and methods described above, and upon the provisions of SURS as of the most recent valuation date, June 30, 2020. To the best of our knowledge the information contained in this report is accurate and fairly presents the experience of members participating in the SURS defined benefit plans for the period June 30, 2017, through June 30, 2020. All calculations have been made in conformity with generally accepted actuarial principles and practices, and with the Actuarial Standards of Practice issued by the Actuarial Standards Board.

Respectfully submitted,



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SECTION I

EXPERIENCE REVIEW SUMMARY

Experience Review Summary

Background

For any pension plan, actuarial assumptions are selected that are intended to provide reasonable estimates of future expected events, such as System investment returns, interest crediting, and patterns of retirement, turnover and mortality. These assumptions, along with an actuarial cost method, the employee census data and the plan's provisions are used to determine the actuarial liabilities and overall actuarially determined funding requirements for the plan. The true cost to the plan over time will be the actual benefit payments and expenses required by the plan's provisions for the participant group under the plan. To the extent the actual experience deviates from the assumptions, experience gains and losses will occur. These gains (losses) then serve to reduce (increase) future actuarially determined contributions and increase (reduce) the funded ratio. The actuarial assumptions should be individually reasonable and consistent in the aggregate. They should also be reviewed periodically to ensure that they remain appropriate. The actuarial cost method, for plan sponsors that use actuarially based funding policies, automatically adjusts contributions over time for differences between what is assumed and the actual experience under the plan.

Actuarial Standards of Practice ("ASOPs")

The Actuarial Standards Board ("ASB") provides guidance on measuring the costs of financing a retirement program through the following Actuarial Standards of Practices ("ASOPs"):

- (1) ASOP No. 4, *Measuring Pension Obligations and Determining Pension Plan Costs or Contributions*;
- (2) ASOP No. 27, *Selection of Economic Assumptions for Measuring Pension Obligations*;
- (3) ASOP No. 35, *Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations*;
- (4) ASOP No. 44, *Selection and Use of Asset Valuation Methods for Pension Valuations*; and
- (5) ASOP No. 51, *Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions*.

The recommendations provided in this report are consistent with the preceding actuarial standards of practice.

Assumptions Reviewed

The actuarial assumptions are usually divided into two categories:

- (1) Economic assumptions, which include:
 - Assumed rate of price inflation (as measured by the change in the Consumer Price Index for all urban consumers)
 - Underlies all other economic assumptions
 - Basis for cost-of-living increases for members hired on or after January 1, 2011
 - Assumed long-term rate of return on investments (prescribed rate as defined in statute)
 - Rate at which projected benefits are reduced to present value
 - Basis for money purchase annuity factors



Experience Review Summary

- Assumed effective rate of interest (rate at which member contributions are accumulated to generate benefits under the Money Purchase Benefit formula – Rule 2)
- General wage increases
 - Reflects inflationary forces on increases in pay for all members
- Rate of payroll growth
 - Reflects expectation of growth in total payroll and affects level percent of pay statutory contribution

The economic assumptions are generally chosen on the basis of the actuary's expectations as to the effect of future economic conditions on the operation of the plan, with input from Staff, the Board and other investment advisors.

The economic assumptions will be reviewed later this spring. This study includes review of the demographic assumptions.

(2) Demographic assumptions, which include the following rates:

- Mortality,
- Retirement,
- Disablement, and
- Withdrawal (other termination of employment).

Demographic assumptions are generally based on the plan's own experience, taking into account emerging trends. Rates of salary increase due to promotion and longevity are also related to the plan's experience.

The accuracy and extent of the data is an important consideration in assessing demographic experience. The accuracy of the data for this study was generally good, but a very large amount of data is required to develop a credible mortality table. The approach we have taken to recommending a mortality assumption for the SURS actuarial valuation is based on the model described by the Society of Actuaries (SOA). In effect, we select a base mortality table from the Pub-2010 mortality tables and a mortality improvement scale. We then use what is termed "the limited fluctuation credibility procedure" to determine the appropriate scaling factor of the base mortality tables for each gender and each member classification.

(3) Other methods and assumptions including the following:

- a. Cost method,
- b. Amortization method,
- c. Asset smoothing method,
- d. Dependent assumptions,
- e. Assumptions on reciprocal service and service purchases,
- f. Assumptions on refund of contributions vs. deferred annuity,
- g. Pay increase and decrement timing assumptions, and
- h. Plan election assumptions (Traditional/Portable vs. Retirement Savings Plan).

Experience Review Summary

Key Findings and Recommendations

Gabriel, Roeder, Smith & Company (“GRS”) has performed an experience study of the State Universities Retirement System of Illinois (“SURS”) for the period from June 30, 2017, to June 30, 2020. The primary purpose of the study was to compare the SURS plan experience and future expectations for experience against the actuarial assumptions used in the actuarial valuation. Our study was based on the information used to perform the annual actuarial valuations for the period from June 30, 2017, to June 30, 2020.

Following are the current economic assumptions. We will review these assumptions and make recommendations this spring.

- **Price inflation:** The rate of assumed price inflation is 2.25 percent.
- **Investment return:** The investment return assumption is 6.75 percent. This reflects an assumed real rate of return of 4.50 percent and an underlying assumed price inflation of 2.25 percent. We recommend monitoring the assumption for continued reasonableness in the future.
- **Salary increase:** The current salary increase rates are service-based and grade down from 12.25 percent to 3.25 percent at 35 or more years of service.
- **Payroll growth assumption:** The general payroll growth assumption is 3.25 percent. This reflects the assumed rate for productivity increases of 1.00 percent and an underlying assumed price inflation of 2.25 percent.
- **Effective rate of interest assumption:** The long-term assumption for the ERI for crediting the money purchase accounts is 6.75 percent per year.

Following is a summary of the key findings and recommendations:

- **Normal retirement rates:** We recommend separate rates for members in Academic positions than for members in Non-Academic positions. The overall rates for Academic members are lower and the overall rates for Non-Academic members are higher than under our current assumptions based on the observed experience.
- **Early retirement rates:** We recommend separate rates for members in Academic positions than for members in Non-Academic positions. The overall rates for Academic members are lower and the overall rates for Non-Academic members are higher than under our current assumptions based on the observed experience.
- **Turnover rates:** We recommend separate rates for members in Academic positions than for members in Non-Academic positions. In total, the proposed turnover rates produce fewer expected number of terminations than the current turnover rates for both Academic and Non-Academic members.
- **Mortality rates:** We recommend:
 - Using the Pub-2010 Mortality tables that are based on public sector pension plan experience;
 - Using the Pub-2010 Mortality tables for Teachers for the Academic non-disabled members and using the Pub-2010 Mortality tables for General Employees for the Non-Academic non-disabled members;

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- Using the Pub-2010 Disabled Mortality table for Non-Safety Employees for both Academic and Non-Academic disabled members;
- Updating the projection scale from the MP-2017 to the MP-2020 scale;
- Maintaining the MP-2020 projection scale until the assumptions are studied with the next experience study; and
- Applying certain scaling factors to the base tables based on the actual experience and the credibility that can be applied to that experience.

The specific mortality table recommendations and a more detailed description of the new mortality tables can be found in Section II.

- **Disability rates:** We recommend separate rates for members in Academic positions than for members in Non-Academic positions and maintaining separate rates for males and females. We recommend decreasing the current disability rates for Academic members and increasing the current disability rates for Non-Academic members based on observed experience. We recommend including a small load on projected benefit payments to reflect the disability benefits expected to be paid to members who do not receive benefits on a long-term basis.
- **Money purchase conversion factor assumptions:** By statute, the money purchase conversion factors are to be updated when the investment return assumption and/or the mortality assumption are updated. Therefore, the recommended changes will result in updates to the money purchase conversion factors. We recommend a blended mortality assumption be used for purposes of the money purchase conversion factors that would apply to both Academic and Non-Academic members.
- **Cost Method:** The actuarial cost method is Projected Unit Credit, which is required to be used by State Statute.
- **Amortization Method:** The State Statute requires that the plan be funded at a level such that the funded ratio reaches 90% in the year 2045. There is no separate amortization of the unfunded accrued liability that leads to a 100% funding of the accrued liability. This funding method does not comply with generally accepted actuarial principles for the funding of a retirement system because the funding method targets 90% instead of 100%.
- **Asset Smoothing Method:** The asset smoothing method is also defined by State Statute. Gains and losses (the difference between the actual investment return and the expected investment return) are smoothed in over a five-year period at a rate of 20 percent per year. There is currently no asset corridor. An asset corridor limits the amount that the actuarial (smoothed) value of assets can deviate from the market value of assets. Because the statutory funding policy defers contributions, we recommend that an asset corridor of 80 percent to 120 percent of market value of assets be implemented. However, our understanding is that this change could require legislative action.
- **Plan Election:** We recommend changing the plan election assumptions to 75 percent elect Tier 2 and 25 percent elect to participate in the Retirement Savings Plan (RSP) for the Non-Academic members and changing to 55 percent elect Tier 2 and 45 percent elect to participate in the Retirement Savings Plan (RSP) for the Academic members.

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- **Load for reciprocal benefits, service purchases and refunds of excess contributions:** We recommend maintaining the liability load of 10 percent on the liabilities for service retirees whose benefits have not been finalized and a “best formula” benefit has not been provided and a 5.00 percent load if a “best formula” benefit has been provided.
- **Pay increases during the final rate of earnings period (used for 6% employer billing contributions):** We recommend that no assumption be made for either the contributions received or the liability losses generated by members receiving pay increases in excess of 6.00 percent during the final average earnings period.
- **Buyout election assumptions:** We recommend maintaining the buyout election assumption of 0% until the buyout experience suggest a different assumption. This means that the savings from the buyout program will be recognized each year as they occur – a common approach for this type of program.

Section III contains the cost impact on the alternate funding policy contribution requirement and funded status of the plan as a result of the assumption modifications. The recommended demographic assumptions decrease the actuarial liability and alternate policy (normal cost plus amortization of the unfunded liability) contribution requirement and increase the funded ratio.

In order to maintain the fiscal health of SURS, and to comply with the Actuarial Standards of Practice (applicable to all actuaries who practice in the United States), it is important to (1) select actuarial assumptions that reflect realistic estimates of future investment returns and (2) not be unnecessarily swayed by alternative actuarial assumptions that result in the more favorable contribution levels and/or accounting disclosures.

One factor to keep in mind is that Public Act 100-0023 requires any change in an actuarial assumption that increases or decreases the required State contribution to be implemented in equal annual amounts over a five-year period beginning in the state fiscal year in which the change first applies to the required state contribution. For changes that first applied in FY 2014, FY 2015, FY 2016 or FY 2017, the impact is calculated based on a five-year period and the applicable portion is recognized during the remaining fiscal years in that five-year period. Any contribution increases attributable to changes in actuarial assumptions first effective in the June 30, 2021, actuarial valuation will be recognized over five years beginning with the fiscal year 2023 Statutory contribution.

SECTION II

EXPERIENCE ANALYSIS

Demographic Assumptions

The following pages present the analysis of the demographic assumptions. These assumptions include assumed rates of mortality among active and retired members, retirement patterns, disability incidence and turnover patterns. These patterns generally take the form of tables of rates of incidence based on age and/or years of service.

Absent any significant changes in benefit provisions, these assumptions generally exhibit relative consistency over periods of time. As a result, each demographic assumption is normally reviewed by relating actual experience to that assumed over the recent past.

Actuarial Standard of Practice No. 35 - Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations

ASOP 35 applies to actuaries when they are selecting demographic and all other assumptions not covered by ASOP No. 27, Selection of Economic Assumptions for Measuring Pension Obligations, to measure obligations under any defined benefit pension plan that is not a social insurance program as described in section 1.2, Scope, of ASOP No. 32, Social Insurance.

The actuary should identify the types of demographic assumptions to use for a specific measurement. In doing so, the actuary should determine the following:

- (a) The purpose and nature of the measurement;
- (b) The plan provisions or benefits and factors that will affect the timing and value of any potential benefit payments;
- (c) The characteristics of the obligation to be measured (such as measurement period, pattern of plan payments over time, open or closed group, and volatility);
- (d) The contingencies that give rise to benefits or result in loss of benefits;
- (e) The significance of each assumption; and
- (f) The characteristics of the covered group.

Not every contingency requires a separate assumption. For example, for a plan that is expected to provide benefits of equal value to employees who voluntarily terminate employment or become disabled, retire, or die, the actuary may use an assumption that reflects some or all of the above contingencies in combination rather than selecting a separate assumption for each.

Analysis Approach

The analysis of demographic experience is conducted for each assumption using a measure known as the “Actual to Expected (A/E) Ratio.” The A/E Ratio is simply the ratio of the actual number of occurrences of the event to which the assumption applies (e.g., deaths or retirements) to the number expected to occur in accordance with the assumption. An A/E Ratio of 1.00 indicates that the assumption precisely predicted the number of occurrences. An A/E Ratio exceeding 1.00 indicates that the assumption underestimated actual experience. Conversely, an A/E Ratio lower than 1.00 indicates that the assumption overestimated actual experience.

These are statistical analyses. As a result, there are several considerations we must keep in mind as we analyze these ratios:

Demographic Assumptions

- (1) An actuarial assumption is designed to reflect average experience over long periods of time (30 - 50 years). As a result:
 - (a) A deviation between actual experience and that expected from our assumptions for one or two years does not necessarily mean that the assumption should be changed.
 - (b) A change in actuarial assumption should result if the experience indicates a consistent pattern which is different from that assumed over a period of years.
- (2) The larger the amount of data available, the more reliable the statistics used in the analysis. As a result:
 - (a) Events that occur with great frequency (e.g., general employment turnover) are more credibly predictable than those occurring less frequently (e.g., active member death).
 - (b) In all cases, data covering the entire study period produce more credible results than data for a single year.
 - (c) Year by year experience is helpful only in identifying trends and determining whether the three-year data is truly reflective of the entire period.

This analysis is based on the actuarial valuation data for the three-year period from June 30, 2017, to June 30, 2020.

In addition to analyzing experience based on headcounts, we also analyzed experience on a liability-weighted basis (and a benefits weighted basis for postretirement non-disabled mortality). Analyzing experience on a liability-weighted basis gives additional credibility to decrements that occur to members with a higher liability (due to higher pays, more service or younger ages). The liability amounts shown in the experience tables are total liability amounts divided by \$100,000.

We reviewed experience separately based on employment classifications (Academic and Non-Academic). Following is a summary of the membership as of June 30, 2020 based on these classifications.

	Full-Time Active Member Counts			FY 2020 Payroll (\$ in Millions)		
	SURS	RSP	Total	SURS	RSP	Total
Academic	20,586	5,558	26,144	\$1,389	\$553	\$1,942
Non-Academic	39,003	7,168	46,171	2,113	499	2,613
Total	59,589	12,726	72,315	3,502	1,052	4,554

FY 2020 Annualized Benefits

	Retiree and Beneficiary Counts		(\$ in Millions)
	SURS		SURS
Academic	30,968		\$1,443
Non-Academic	38,204		1,224
Total	69,172		2,667

Retirement Assumption

Retirement

The Plan provisions establish the minimum eligibility requirements for retirement. Participants of the plan who became members before January 1, 2011¹, are eligible for immediate normal retirement benefits at the earlier of 30 years of service at any age, age 60 with eight years of service, or age 62 with five years of service. (Police officers and firefighters are eligible at age 50 with 25 years of service or age 55 with 20 years of service.) Participants of the plan who became members before January 1, 2011¹, are eligible for early (reduced) retirement benefits on or after the attainment of age 55 with eight years of service.

Retirement cost, however, is determined not by the minimum eligibility requirements but by the ages at which members actually retire. The actuarial valuation does not assume that everyone retires at earliest eligibility. The assumption about the timing of retirement once eligibility has been established is a major component in cost calculations. Note that higher rates of retirement at earlier retirement ages or years of service upon attaining retirement eligibility generally result in higher actuarially determined contributions, and vice versa.

Experience during the last three years was considered in the analysis shown on the following pages. The “Exposure” column shows the number of employees eligible to retire at various years of service or ages throughout the experience period. An individual could potentially be counted up to three times if eligible each year in the period. By tabulating employees in this fashion we are able to answer the question “For all employees eligible at condition X, how many retired?”

The table below shows the number of actual retirements during each year of the experience study period compared with the number expected under the current assumptions. There were fewer retirements during FY 2020 than during the other two years of the experience study period.

Fiscal Year End	Normal Retirement			Early Retirement		
	Actual	Current Assumption	Actual/Expected	Actual	Current Assumption	Actual/Expected
2018	1,892	1,799	1.1	268	324	0.8
2019	2,041	1,770	1.2	271	309	0.9
2020	1,698	1,723	1.0	212	284	0.7
Total	5,632	5,292	1.1	751	917	0.8

¹ Participants who become members of the plan on or after January 1, 2011, are eligible for retirement at age 67 with 10 years of service. Police officers and firefighters who become members of the plan on or after January 1, 2011, are also eligible for unreduced retirement at age 60 with 20 years of service. Assumed retirement rates for these members will differ from current members.

Retirement Assumption

Normal Retirement Experience

Current and past experience has shown that retirement rates under this plan are correlated with age. Currently, the Plan uses age-based rates with higher rates at key ages, with 100 percent retirement at age 80. In addition, the experience showed differences in retirement patterns between members classified as Academic and not classified as Academic in the census data. Based on the retirement experience, we recommend the following changes to the Tier 1 retirement rates:

- Applying separate rates to members classified as Academic and not classified as Academic
- Decrease most rates for ages younger than 60
- Increase most rates for ages 60 and older
- Decrease rates for members with 40 or more years of service and younger than age 80
 - If the member has 40 or more years of service and is younger than age 80 change the rate from 50 percent to 1.5 times the rate applicable to members with less than 40 years of service.

The recommended changes to the retirement rates reflect the actual experience on a liability weighted basis over the past three years from the current experience study and different patterns for members classified as Academic and not classified as Academic.

Applying the proposed Tier 1 retirement rates to historical data generates the following liability weighted retirements by age at retirement:

Nearest Age	Liability Weighted Retirements					
	Actual	Academic		Actual	Non-Academic	
		Current Assumption	Proposed Assumption		Current Assumption	Proposed Assumption
Under 50	0	0	0	216	173	191
50-54	316	332	304	2,018	2,487	2,020
55-59	1,060	1,510	1,131	2,767	3,036	2,678
60-64	4,705	4,210	4,681	4,948	3,649	4,887
65-69	4,047	3,839	4,067	3,259	2,242	3,419
70-74	1,676	2,145	1,628	767	705	781
75-79	468	880	535	171	186	191
80+	333	1,200	1,200	40	326	326
Total	12,605	14,116	13,546	14,186	12,804	14,493
Under 80	12,272	12,916	12,346	14,146	12,478	14,167

Early Retirement Experience

Fewer Academic participants retired under Tier 1 early retirement eligibility than expected under the current assumptions and more non-Academic participants retired under Tier 1 early retirement eligibility than expected under the current assumptions. We recommend changes in rates for most Tier 1 early retirement eligibility ages (55-59) to reflect these differences.

Retirement Assumption

Liability Weighted Retirements						
Nearest Age	Academic			Non-Academic		
	Actual	Current Assumption	Proposed Assumption	Actual	Current Assumption	Proposed Assumption
55	247	439	251	556	446	510
56	190	348	253	354	329	329
57	252	250	250	327	234	321
58	250	306	244	304	293	322
59	245	336	244	411	321	408
Total	1,184	1,679	1,242	1,951	1,623	1,890

Retirement Experience and Recommendations

The tables and graphs on the following pages show experience for Tier 1 normal and early retirement.

- Table and Graph II(a)(i) – Normal Retirement Experience – Academic
- Table and Graph II(a)(ii) – Normal Retirement Experience – Non-Academic
- Table and Graph II(b)(i) – Early Retirement Experience – Academic
- Table and Graph II(b)(ii) – Early Retirement Experience – Non-Academic
- Table II(c)(i) – Summary of Tier 1 Retirement Rates
- Table II(c)(ii) – Summary of Tier 2 Retirement Rates

There is currently no retirement experience for Tier 2 members. However, we need to make assumptions on the retirement patterns for members under Tier 2. The table on page 34 shows the current and recommended retirement rates applicable to members in Tier 2. The retirement rates are based on the Tier 1 rates and reflect that a higher number of members are expected to retire at first eligibility (because first eligibility for retirement under Tier 2 is about seven years later than under Tier 1).

Retirement Assumption

Table II(a)(i)

Academic

Nearest Age @ Retirement	Actual Experience				Current Assumptions - Liability Weighted				Proposed Assumptions - Liability Weighted					
	Population Weighted		Liability Weighted		Rates Weighted by		Expected	Blended	Under 40 Years	Actual /	Expected	Blended	Under 40 Years	Actual /
	Exposures	Retirements	Exposures	Retirements	Population	Liabilities	Retirements	Assumed Rate	Proposed Rate	Expected	Retirements	Proposed Rate	Proposed Rate	Expected
Under 50	0	1	0	0			0		50.0%		0		55.0%	
50	4	2	38	21	50.0%	54.2%	19	50.1%	50.0%	1.1	21	55.3%	55.0%	1.0
51	9	3	86	30	33.3%	34.7%	34	39.7%	40.0%	0.9	34	39.7%	40.0%	0.9
52	15	7	165	74	46.7%	44.9%	66	40.0%	40.0%	1.1	66	40.0%	40.0%	1.1
53	18	7	213	68	38.9%	32.1%	74	34.8%	35.0%	0.9	64	30.1%	30.0%	1.1
54	34	14	397	123	41.2%	31.0%	139	35.0%	35.0%	0.9	119	30.0%	30.0%	1.0
55	39	9	493	72	23.1%	14.6%	172	34.9%	35.0%	0.4	99	20.1%	20.0%	0.7
56	68	13	939	147	19.1%	15.7%	282	30.0%	30.0%	0.5	188	20.0%	20.0%	0.8
57	92	20	1,147	262	21.7%	22.9%	287	25.0%	25.0%	0.9	229	20.0%	20.0%	1.1
58	111	24	1,316	256	21.6%	19.5%	329	25.0%	25.0%	0.8	263	20.0%	20.0%	1.0
59	131	29	1,759	322	22.1%	18.3%	440	25.0%	25.0%	0.7	352	20.0%	20.0%	0.9
60	1,457	154	8,018	1,004	10.6%	12.5%	882	11.0%	11.0%	1.1	1,042	13.0%	13.0%	1.0
61	1,384	162	7,287	934	11.7%	12.8%	802	11.0%	11.0%	1.2	947	13.0%	13.0%	1.0
62	1,443	158	7,175	751	10.9%	10.5%	869	12.1%	12.0%	0.9	934	13.0%	13.0%	0.8
63	1,371	171	6,847	917	12.5%	13.4%	838	12.2%	12.0%	1.1	893	13.0%	13.0%	1.0
64	1,335	181	6,619	1,100	13.6%	16.6%	819	12.4%	12.0%	1.3	865	13.1%	13.0%	1.3
65	1,361	191	6,205	1,011	14.0%	16.3%	966	15.6%	15.0%	1.0	1,064	17.1%	17.0%	1.0
66	1,253	205	5,614	980	16.4%	17.5%	894	15.9%	15.0%	1.1	968	17.2%	17.0%	1.0
67	1,078	161	4,708	787	14.9%	16.7%	804	17.1%	15.0%	1.0	825	17.5%	17.0%	1.0
68	906	133	3,775	633	14.7%	16.8%	636	16.8%	15.0%	1.0	660	17.5%	17.0%	1.0
69	795	139	3,129	635	17.5%	20.3%	539	17.2%	15.0%	1.2	550	17.6%	17.0%	1.2
70	670	121	2,651	460	18.1%	17.3%	505	19.1%	15.0%	0.9	478	18.0%	17.0%	1.0
71	582	97	2,294	429	16.7%	18.7%	495	21.6%	15.0%	0.9	376	16.4%	15.0%	1.1
72	451	82	1,790	328	18.2%	18.3%	418	23.4%	15.0%	0.8	300	16.8%	15.0%	1.1
73	344	58	1,544	281	16.9%	18.2%	420	27.2%	15.0%	0.7	272	17.6%	15.0%	1.0
74	255	40	1,154	178	15.7%	15.4%	307	26.6%	15.0%	0.6	202	17.5%	15.0%	0.9
75	219	33	970	149	15.1%	15.3%	273	28.2%	15.0%	0.5	173	17.8%	15.0%	0.9
76	176	32	740	179	18.2%	24.2%	208	28.1%	15.0%	0.9	132	17.8%	15.0%	1.4
77	134	20	473	64	14.9%	13.4%	154	32.5%	15.0%	0.4	89	18.8%	15.0%	0.7
78	104	19	401	56	18.3%	13.9%	128	31.9%	15.0%	0.4	75	18.7%	15.0%	0.7
79	69	9	350	21	13.0%	6.0%	117	33.4%	15.0%	0.2	66	18.8%	15.0%	0.3
80+	209	41	1,200	333	19.6%	27.8%	1,200	100.0%	100.0%	0.3	1,200	100.0%	100.0%	0.3
Totals:	16,117	2,336	79,497	12,605	13.0%	15.9%	14,116	17.8%		0.9	13,546	17.0%	17.0%	0.9
Excluding 80+:	15,908	2,295	78,297	12,272	19.6%	15.7%	12,916	16.5%		1.0	12,346	15.8%	15.8%	1.0

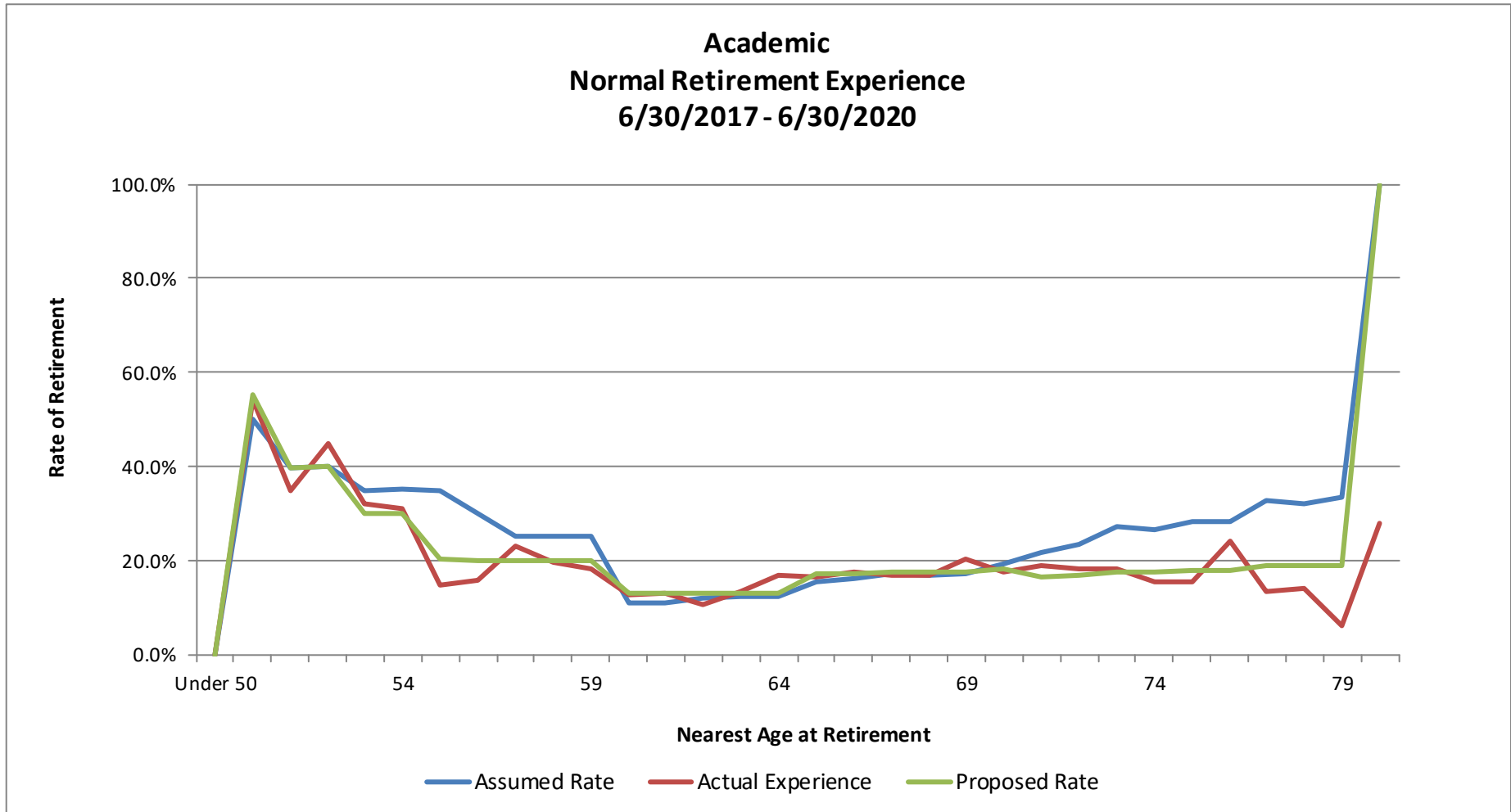
Rates are for Tier 1 members only. There is not current retirement experience for Tier 2 members who have different eligibility conditions. Separate retirement rates apply for Tier 2 members. Expected retirements for a member who has 40 or more years of service:

- 50 percent under the current assumptions (younger than age 80)
- 1.5 times the rate for under 40 years of service under the proposed assumptions (younger than age 80)



Retirement Assumption

Graph II(a)(i)



Rates are for Tier 1 members only. There is not current retirement experience for Tier 2 members who have different eligibility conditions.

Separate retirement rates apply for Tier 2 members. Expected retirements for a member who has 40 or more years of service:

- 50 percent under the current assumptions (younger than age 80)
- 1.5 times the rate for under 40 years of service under the proposed assumptions (younger than age 80)



Retirement Assumption

Table II(a)(ii)

Non-Academic

Nearest Age @ Retirement	Actual Experience						Current Assumptions - Liability Weighted				Proposed Assumptions - Liability Weighted			
	Population Weighted		Liability Weighted		Rates Weighted by		Expected	Blended	Under 40 Years	Actual /	Expected	Blended	Under 40 Years	Actual /
	Exposures	Retirements	Exposures	Retirements	Population	Liabilities	Retirements	Assumed Rate	Proposed Rate	Expected	Retirements	Proposed Rate	Proposed Rate	Expected
Under 50	46	27	347	216	1	62.3%	173	49.9%	50.0%	1.2	191	55.1%	55.0%	1.1
50	75	29	654	259	38.7%	39.6%	327	50.0%	50.0%	0.8	262	40.0%	40.0%	1.0
51	106	36	911	278	34.0%	30.5%	364	40.0%	40.0%	0.8	273	30.0%	30.0%	1.0
52	149	42	1,280	314	28.2%	24.6%	512	40.0%	40.0%	0.6	384	30.0%	30.0%	0.8
53	198	61	1,659	508	30.8%	30.6%	581	35.0%	35.0%	0.9	498	30.0%	30.0%	1.0
54	230	79	2,010	659	34.3%	32.8%	703	35.0%	35.0%	0.9	603	30.0%	30.0%	1.1
55	264	79	2,285	623	29.9%	27.3%	800	35.0%	35.0%	0.8	571	25.0%	25.0%	1.1
56	271	83	2,326	673	30.6%	29.0%	698	30.0%	30.0%	1.0	582	25.0%	25.0%	1.2
57	248	66	2,083	516	26.6%	24.8%	521	25.0%	25.0%	1.0	521	25.0%	25.0%	1.0
58	235	59	1,971	438	25.1%	22.2%	501	25.4%	25.0%	0.9	497	25.2%	25.0%	0.9
59	247	62	1,996	516	25.1%	25.8%	516	25.9%	25.0%	1.0	507	25.4%	25.0%	1.0
60	2,065	313	7,366	1,400	15.2%	19.0%	845	11.5%	11.0%	1.7	1,482	20.1%	20.0%	0.9
61	1,911	236	6,731	1,016	12.3%	15.1%	769	11.4%	11.0%	1.3	1,015	15.1%	15.0%	1.0
62	1,798	248	5,942	895	13.8%	15.1%	749	12.6%	12.0%	1.2	898	15.1%	15.0%	1.0
63	1,626	231	5,355	954	14.2%	17.8%	707	13.2%	12.0%	1.3	816	15.2%	15.0%	1.2
64	1,424	195	4,445	683	13.7%	15.4%	579	13.0%	12.0%	1.2	676	15.2%	15.0%	1.0
65	1,343	279	3,991	1,049	20.8%	26.3%	647	16.2%	15.0%	1.6	1,015	25.4%	25.0%	1.0
66	1,091	249	3,205	757	22.8%	23.6%	520	16.2%	15.0%	1.5	815	25.4%	25.0%	0.9
67	851	174	2,671	706	20.4%	26.4%	461	17.3%	15.0%	1.5	689	25.8%	25.0%	1.0
68	651	130	1,981	502	20.0%	25.4%	352	17.8%	15.0%	1.4	515	26.0%	25.0%	1.0
69	530	96	1,483	244	18.1%	16.5%	262	17.7%	15.0%	0.9	385	26.0%	25.0%	0.6
70	440	76	1,221	256	17.3%	21.0%	241	19.7%	15.0%	1.1	261	21.4%	20.0%	1.0
71	360	58	929	176	16.1%	18.9%	178	19.2%	15.0%	1.0	197	21.2%	20.0%	0.9
72	276	47	709	147	17.0%	20.8%	134	18.9%	15.0%	1.1	150	21.2%	20.0%	1.0
73	193	31	493	148	16.1%	30.0%	91	18.5%	15.0%	1.6	104	21.1%	20.0%	1.4
74	138	19	329	40	13.8%	12.1%	61	18.6%	15.0%	0.7	69	21.0%	20.0%	0.6
75	135	25	324	74	18.5%	22.9%	50	15.4%	15.0%	1.5	65	20.0%	20.0%	1.1
76	91	12	202	34	13.2%	16.7%	37	18.3%	15.0%	0.9	42	20.8%	20.0%	0.8
77	65	16	137	35	24.6%	25.6%	26	19.0%	15.0%	1.3	29	21.2%	20.0%	1.2
78	31	7	113	18	22.6%	16.2%	35	31.0%	15.0%	0.5	28	24.8%	20.0%	0.7
79	31	5	103	10	16.1%	9.8%	38	36.9%	15.0%	0.3	27	26.2%	20.0%	0.4
80+	114	21	326	40	18.4%	12.3%	326	99.9%	100.0%	0.1	326	99.9%	100.0%	0.1
Totals:	17,233	3,091	65,577	14,186	16.1%	21.6%	12,804	19.5%		1.1	14,493	22.1%	17.0%	1.0
Excluding 80+:	17,119	3,070	65,250	14,146	18.4%	21.7%	12,478	19.1%		1.1	14,167	21.7%	15.8%	1.0

Rates are for Tier 1 members only. There is not current retirement experience for Tier 2 members who have different eligibility conditions.

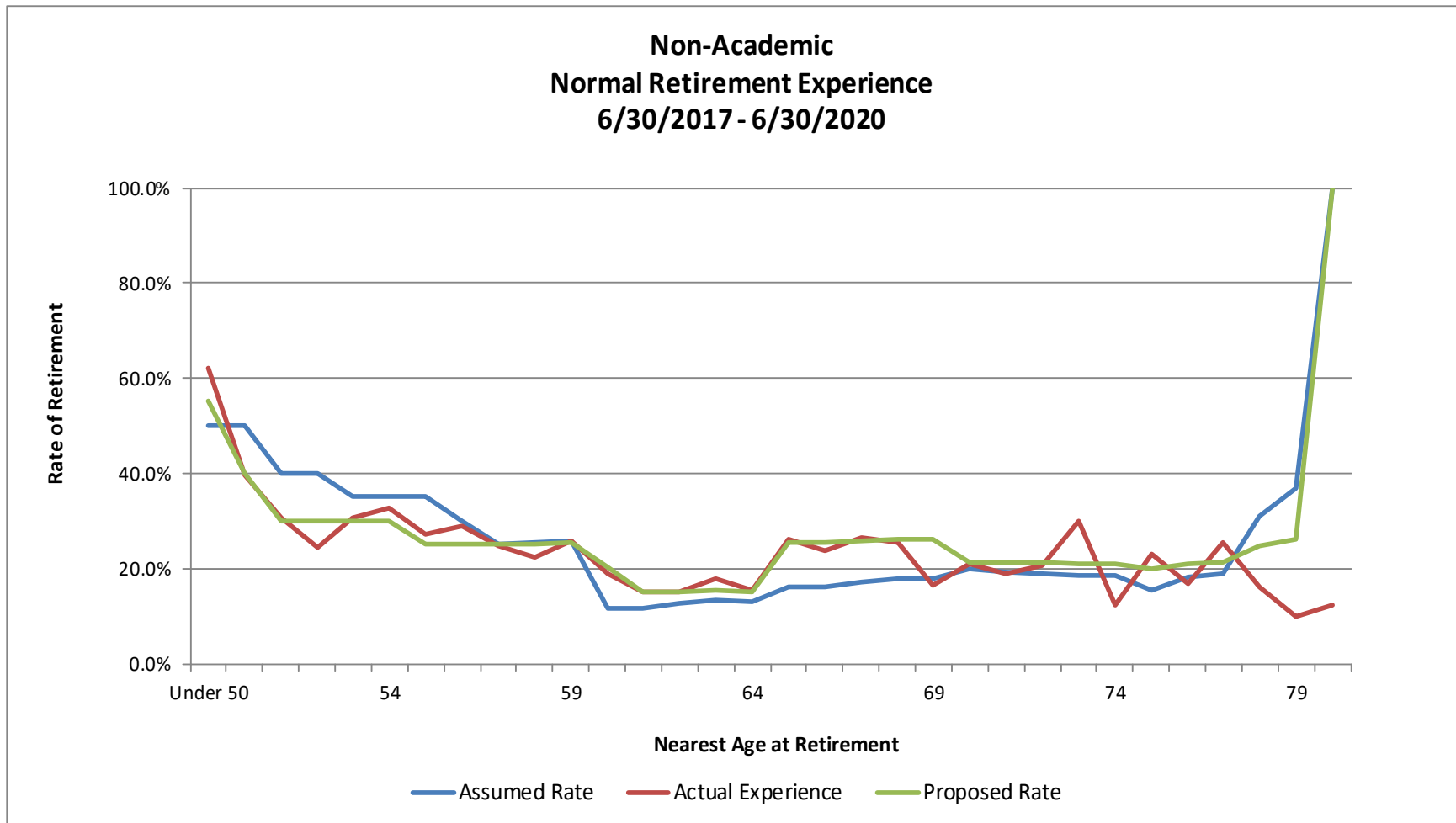
Separate retirement rates apply for Tier 2 members. Expected retirements for a member who has 40 or more years of service:

- 50 percent under the current assumptions (younger than age 80)
- 1.5 times the rate for under 40 years of service under the proposed assumptions (younger than age 80)



Retirement Assumption

Graph II(a)(ii)



Rates are for Tier 1 members only. There is not current retirement experience for Tier 2 members who have different eligibility conditions.

Separate retirement rates apply for Tier 2 members. Expected retirements for a member who has 40 or more years of service:

- 50 percent under the current assumptions (younger than age 80)
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Early Retirement Assumption

Academic

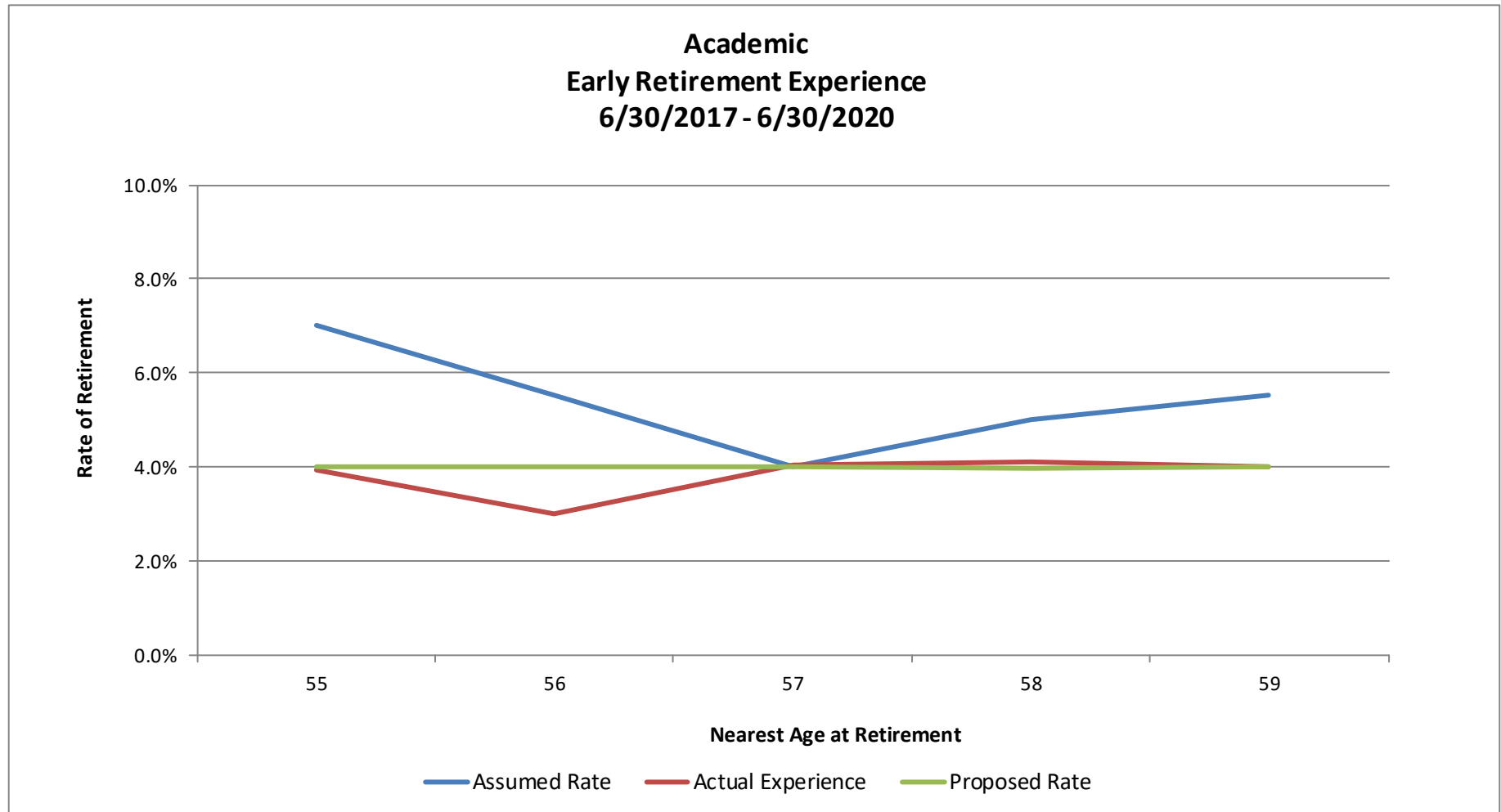
Table II(b)(i)

Nearest Age @ Retirement	Actual Experience						Current Assumptions - LW			Proposed Assumptions - LW		
	Population Weighted		Liability Weighted (LW)		Rates Weighted by		Expected Retirements	Assumed Rate	Actual / Expected	Expected Retirements	Proposed Rate	Actual / Expected
	Exposures	Retirements	Exposures	Retirements	Population	Liabilities						
55	1,475	52	6,278	247	3.5%	3.9%	439	7.0%	0.6	251	4.0%	1.0
56	1,452	41	6,319	190	2.8%	3.0%	348	5.5%	0.5	253	4.0%	0.8
57	1,384	42	6,252	252	3.0%	4.0%	250	4.0%	1.0	250	4.0%	1.0
58	1,352	45	6,112	250	3.3%	4.1%	306	5.0%	0.8	244	4.0%	1.0
59	1,359	57	6,105	245	4.2%	4.0%	336	5.5%	0.7	244	4.0%	1.0
Totals:	7,022	237	31,066	1,184	3.4%	3.8%	1,679	5.4%	0.7	1,242	4.0%	1.0

Rates are for Tier 1 members only. There is not current retirement experience for Tier 2 members who have different eligibility conditions. Separate retirement rates apply for Tier 2 members. Current assumptions and proposed assumptions are based on liability weighting.

Early Retirement Assumption

Graph II(b)(i)



Current assumptions and proposed assumptions are based on liability weighting.

Early Retirement Assumption

Non-Academic

Table II(b)(ii)

Nearest Age @ Retirement	Actual Experience						Current Assumptions - LW			Proposed Assumptions - LW		
	Population Weighted		Liability Weighted (LW)		Rates Weighted by		Expected Retirements	Assumed Rate	Actual / Expected	Expected Retirements	Proposed Rate	Actual / Expected
	Exposures	Retirements	Exposures	Retirements	Population	Liabilities						
55	2,065	139	6,374	556	6.7%	8.7%	446	7.0%	1.2	510	8.0%	1.1
56	1,994	104	5,981	354	5.2%	5.9%	329	5.5%	1.1	329	5.5%	1.1
57	1,928	83	5,845	327	4.3%	5.6%	234	4.0%	1.4	321	5.5%	1.0
58	1,926	85	5,861	304	4.4%	5.2%	293	5.0%	1.0	322	5.5%	0.9
59	1,905	102	5,835	411	5.4%	7.0%	321	5.5%	1.3	408	7.0%	1.0
Totals:	9,818	513	29,896	1,951	5.2%	6.5%	1,623	5.4%	1.2	1,890	6.3%	1.0

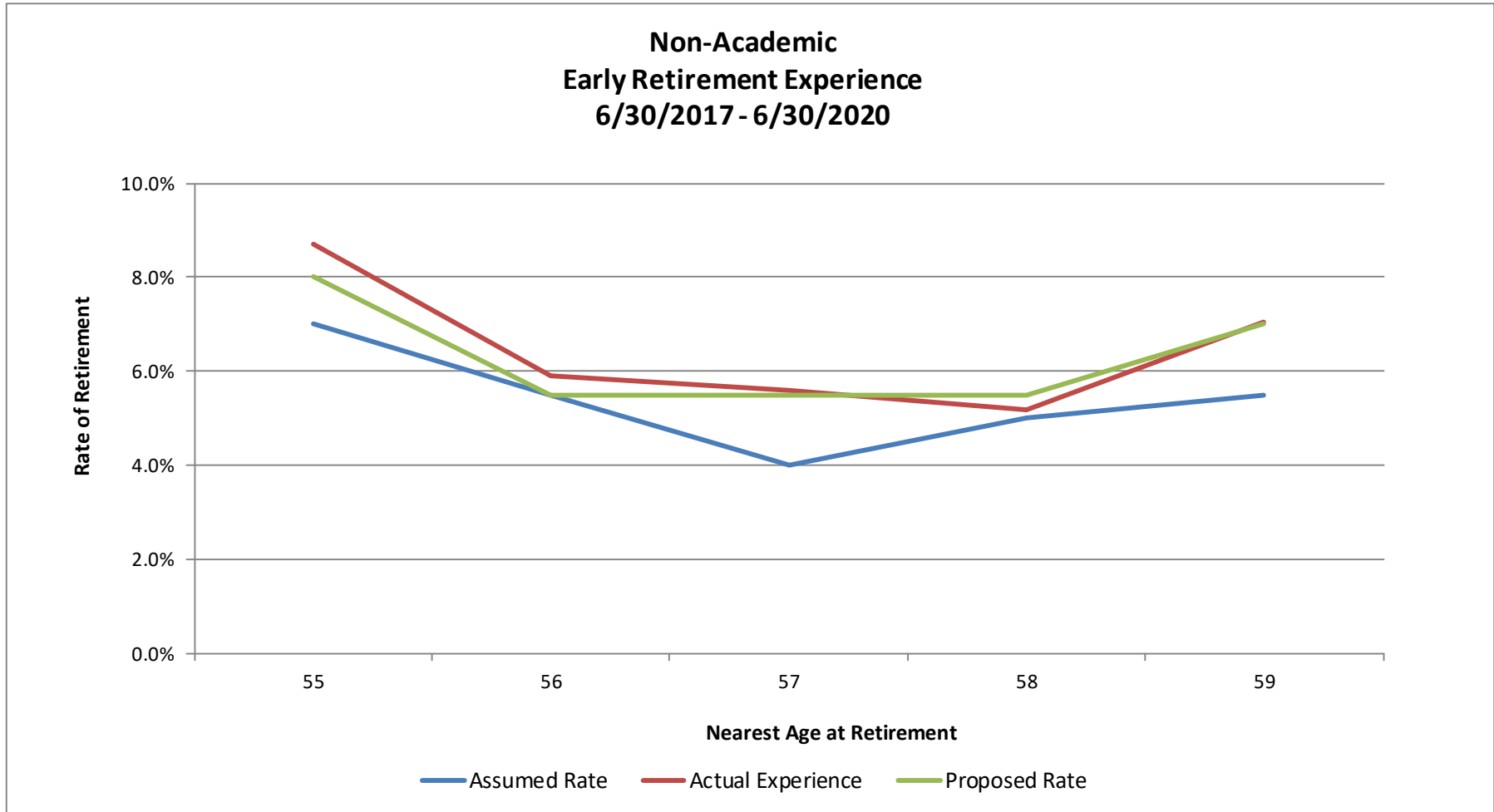
Rates are for Tier 1 members only. There is not current retirement experience for Tier 2 members who have different eligibility conditions.

Separate retirement rates apply for Tier 2 members.

Current assumptions and proposed assumptions are based on liability weighting.

Early Retirement Assumption

Graph II(b)(ii)



Current assumptions and proposed assumptions are based on liability weighting.

Tier 1 Retirement Assumption Summary

Table II(c)(i)

Nearest Age @ Retirement	Tier 1 - Normal (Unreduced) Retirement						Tier 1 - Early (Reduced) Retirement		
	Current Rates		Proposed Rates				Current Rates	Proposed Rates	
	Under 40 Years	40+ Years	Academic		Non-Academic			Academic	Non-Academic
	Under 40 Years	40+ Years	Under 40 Years	40+ Years	Under 40 Years	40+ Years			
Under 50	50.0%	50.0%	55.0%		55.0%				
50	50.0%	50.0%	55.0%		40.0%				
51	40.0%	50.0%	40.0%		30.0%				
52	40.0%	50.0%	40.0%		30.0%				
53	35.0%	50.0%	30.0%		30.0%				
54	35.0%	50.0%	30.0%		30.0%				
55	35.0%	50.0%	20.0%	30.0%	25.0%	37.5%	7.0%	4.0%	8.0%
56	30.0%	50.0%	20.0%	30.0%	25.0%	37.5%	5.5%	4.0%	5.5%
57	25.0%	50.0%	20.0%	30.0%	25.0%	37.5%	4.0%	4.0%	5.5%
58	25.0%	50.0%	20.0%	30.0%	25.0%	37.5%	5.0%	4.0%	5.5%
59	25.0%	50.0%	20.0%	30.0%	25.0%	37.5%	5.5%	4.0%	7.0%
60	11.0%	50.0%	13.0%	19.5%	20.0%	30.0%			
61	11.0%	50.0%	13.0%	19.5%	15.0%	22.5%			
62	12.0%	50.0%	13.0%	19.5%	15.0%	22.5%			
63	12.0%	50.0%	13.0%	19.5%	15.0%	22.5%			
64	12.0%	50.0%	13.0%	19.5%	15.0%	22.5%			
65	15.0%	50.0%	17.0%	25.5%	25.0%	37.5%			
66	15.0%	50.0%	17.0%	25.5%	25.0%	37.5%			
67	15.0%	50.0%	17.0%	25.5%	25.0%	37.5%			
68	15.0%	50.0%	17.0%	25.5%	25.0%	37.5%			
69	15.0%	50.0%	17.0%	25.5%	25.0%	37.5%			
70	15.0%	50.0%	17.0%	25.5%	20.0%	30.0%			
71-79	15.0%	50.0%	15.0%	22.5%	20.0%	30.0%			
80+	100.0%	50.0%	100.0%	100.0%	100.0%	100.0%			

Non-Academic rates are used for members who are Police and Firefighters.



Tier 2 Retirement Assumption

Table II(c)(ii)

Nearest Age @ Retirement	Tier 2 - Normal Retirement				Tier 2 - Early Retirement			
	Current Rate	Proposed Rate		Current Rate	Proposed Rate	Current Rate	Proposed Rate	
	Non Police	Academic	Non-Academic	Police	Police	All	Academic	Non- Academic
60				60.0%	60.0%			
61				25.0%	25.0%			
62				25.0%	25.0%	25.0%	25.0%	35.0%
63				25.0%	25.0%	10.0%	10.0%	15.0%
64				25.0%	25.0%	10.0%	10.0%	15.0%
65				15.0%	15.0%	10.0%	10.0%	15.0%
66				15.0%	15.0%	10.0%	10.0%	15.0%
67	35.0%	35.0%	35.0%	15.0%	15.0%			
68	15.0%	17.0%	25.0%	15.0%	25.0%			
69	15.0%	17.0%	25.0%	15.0%	25.0%			
70	15.0%	17.0%	20.0%	15.0%	20.0%			
71	15.0%	15.0%	20.0%	15.0%	20.0%			
72	15.0%	15.0%	20.0%	15.0%	20.0%			
73	15.0%	15.0%	20.0%	15.0%	20.0%			
74	15.0%	15.0%	20.0%	15.0%	20.0%			
75	15.0%	15.0%	20.0%	15.0%	20.0%			
76	15.0%	15.0%	20.0%	15.0%	20.0%			
77	15.0%	15.0%	20.0%	15.0%	20.0%			
78	15.0%	15.0%	20.0%	15.0%	20.0%			
79	15.0%	15.0%	20.0%	15.0%	20.0%			
80+	100.0%	100.0%	100.0%	100.0%	100.0%			

Retirement rates for a member who has 40 or more years of service:

- 50 percent under the current assumptions (younger than age 80)
- 1.5 times the rate for under 40 years of service under the proposed assumptions (younger than age 80)



Turnover Assumption

Turnover

Turnover experience during the last three years was considered in the analysis shown on the following pages. The “Exposure” column shows the number of employees at various years of service throughout the experience period.

The “Turnover” column shows the number of employees at various years of service who have gone from active status for reasons other than retirement and death. This includes members moving to inactive status as well as members terminating and receiving a refund of contributions.

Typically, we would consider a status change from active to inactive a termination in developing turnover rates. However, because some of these participants return to active status and accrue additional benefits, we have considered this in our analysis of turnover experience. The “Net Turnover” column shows the number of employees, by years of service, who went from inactive to active status between the experience study period of June 30, 2017, and June 30, 2020. While these participants are not necessarily the same exact participants who went to inactive status during the experience study period, we believe that using this data helps us develop proposed net effective turnover rates.

There were more terminations than expected under the current assumptions. Based on our analysis, we recommend maintaining service-based rates and making the following changes to the turnover rates:

- Slight decrease in rates at most ages; and
- Maintain a pattern of decreasing termination rates by years of service.

In addition, we recommend continuing to assume that members who are eligible for a deferred benefit elect the option that is more valuable – return of contributions or a deferred benefit. This will provide a level of conservatism in the actuarial valuation.

The tables and graphs on the following pages show termination experience by service, including the impact of members returning from inactive to active status.

- Table III(a) and Graph III(a) – Termination Experience by Service – Academic
- Table III(b) and Graph III(b) – Termination Experience by Service – Non-Academic

Turnover Assumption

Table III(a)

Academic

Service BOY	Actual Experience				Actual Experience			Current Assumptions			Proposed Assumptions		
	Population Weighted				Liability Weighted			Liability Weighted			Liability Weighted		
	Exposures	Turnover	Net Turnover ¹	Actual Rate	Exposures	Net Turnover ¹	Actual Rate	Expected Turnover	Assumed Rate	Actual / Expected ¹	Expected Turnover	Proposed Rate	Actual / Expected ²
0	427	178	37	8.67%	30	2	6.05%	6	20.00%	0.3	5	15.00%	0.4
1	2,318	650	535	23.08%	147	19	13.15%	29	20.00%	0.7	22	15.00%	0.9
2	2,322	273	91	3.92%	291	28	9.76%	44	15.00%	0.6	35	12.00%	0.8
3	3,485	611	422	12.11%	534	54	10.19%	75	14.00%	0.7	59	11.00%	0.9
4	3,778	596	458	12.12%	766	71	9.30%	100	13.00%	0.7	77	10.00%	0.9
5	3,413	478	367	10.75%	1,006	76	7.57%	121	12.00%	0.6	91	9.00%	0.8
6	3,010	363	278	9.24%	1,214	84	6.88%	121	10.00%	0.7	97	8.00%	0.9
7	2,713	261	200	7.37%	1,578	81	5.12%	142	9.00%	0.6	110	7.00%	0.7
8	2,464	200	147	5.97%	1,933	89	4.62%	155	8.00%	0.6	116	6.00%	0.8
9	2,255	201	158	7.01%	2,392	104	4.33%	167	7.00%	0.6	120	5.00%	0.9
10	2,195	161	117	5.33%	2,803	95	3.38%	168	6.00%	0.6	112	4.00%	0.8
11	2,064	149	116	5.62%	3,208	127	3.94%	160	5.00%	0.8	128	4.00%	1.0
12	1,899	111	86	4.53%	3,340	93	2.80%	150	4.50%	0.6	100	3.00%	0.9
13	1,767	96	68	3.85%	3,680	75	2.05%	147	4.00%	0.5	110	3.00%	0.7
14	1,662	80	61	3.67%	4,050	97	2.39%	162	4.00%	0.6	121	3.00%	0.8
15	1,568	62	43	2.74%	4,480	101	2.24%	179	4.00%	0.6	112	2.50%	0.9
16	1,515	45	32	2.11%	4,799	75	1.57%	168	3.50%	0.4	120	2.50%	0.6
17	1,358	44	32	2.36%	4,792	62	1.29%	168	3.50%	0.4	120	2.50%	0.5
18	1,201	28	24	2.00%	4,440	48	1.08%	155	3.50%	0.3	111	2.50%	0.4
19	1,042	22	16	1.54%	4,261	44	1.02%	128	3.00%	0.3	107	2.50%	0.4
20	906	40	33	3.64%	4,058	82	2.03%	122	3.00%	0.7	81	2.00%	1.0
21	772	20	16	2.07%	4,028	60	1.50%	121	3.00%	0.5	81	2.00%	0.7
22	694	18	13	1.87%	3,918	59	1.50%	98	2.50%	0.6	78	2.00%	0.8
23	622	16	12	1.93%	4,011	55	1.37%	100	2.50%	0.6	80	2.00%	0.7
24	603	16	11	1.82%	4,250	48	1.14%	106	2.50%	0.5	85	2.00%	0.6
25	552	16	12	2.17%	4,200	62	1.49%	84	2.00%	0.7	63	1.50%	1.0
26	494	9	8	1.62%	4,053	36	0.89%	81	2.00%	0.4	61	1.50%	0.6
27	428	5	5	1.17%	3,921	26	0.67%	78	2.00%	0.3	59	1.50%	0.4
28	330	9	9	2.73%	3,486	47	1.35%	70	2.00%	0.7	52	1.50%	0.9
29	60	3	2	3.33%	628	24	3.84%	13	2.00%	1.9	9	1.50%	2.7
Totals:	47,917	4,761	3,409	7.11%	86,298	1,926	2.23%	3,418	7.13%	0.6	2,522	2.92%	0.8

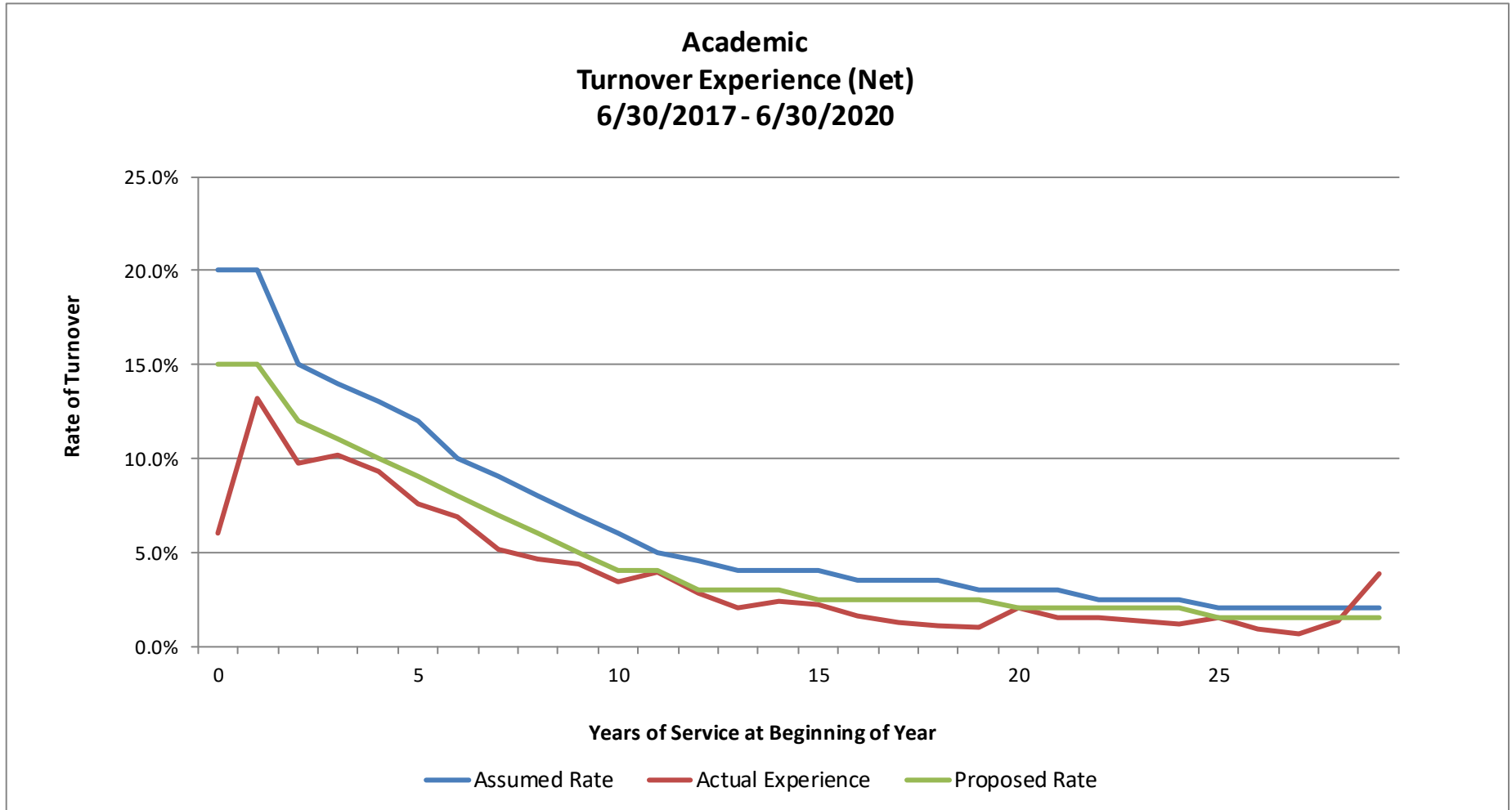
¹ Reflects actual turnover net of inactive members who returned to active service.

² Actual to expected ratio based on net turnover.



Turnover Assumption

Graph III(a)



Turnover Assumption

Table III(b)

Non-Academic

Service BOY	Actual Experience				Actual Experience			Current Assumptions			Proposed Assumptions		
	Population Weighted				Liability Weighted			Liability Weighted			Liability Weighted		
	Exposures	Turnover	Net Turnover ¹	Actual Rate	Exposures	Net Turnover ¹	Actual Rate	Expected Turnover	Assumed Rate	Actual / Expected ¹	Expected Turnover	Proposed Rate	Actual / Expected ²
0	3,511	914	567	16.15%	232	13	5.78%	46	20.00%	0.3	35	15.00%	0.4
1	9,706	2,127	1,932	19.91%	578	63	10.94%	116	20.00%	0.5	87	15.00%	0.7
2	8,791	1,531	1,363	15.50%	873	119	13.59%	131	15.00%	0.9	131	15.00%	0.9
3	7,915	1,375	1,246	15.74%	1,262	177	14.04%	177	14.00%	1.0	177	14.00%	1.0
4	6,918	1,057	969	14.01%	1,605	181	11.30%	209	13.00%	0.9	193	12.00%	0.9
5	6,314	778	694	10.99%	2,072	188	9.07%	249	12.00%	0.8	207	10.00%	0.9
6	5,617	521	454	8.08%	2,410	176	7.31%	241	10.00%	0.7	217	9.00%	0.8
7	4,793	407	361	7.53%	2,682	169	6.31%	241	9.00%	0.7	215	8.00%	0.8
8	3,620	281	237	6.55%	2,692	174	6.48%	215	8.00%	0.8	188	7.00%	0.9
9	3,144	222	175	5.57%	3,087	159	5.15%	216	7.00%	0.7	185	6.00%	0.9
10	3,298	205	174	5.28%	3,844	183	4.76%	231	6.00%	0.8	192	5.00%	1.0
11	3,430	165	137	3.99%	4,513	166	3.69%	226	5.00%	0.7	226	5.00%	0.7
12	3,318	138	114	3.44%	5,120	165	3.22%	230	4.50%	0.7	179	3.50%	0.9
13	2,880	114	89	3.09%	5,125	148	2.88%	205	4.00%	0.7	179	3.50%	0.8
14	2,487	102	77	3.10%	5,029	137	2.72%	201	4.00%	0.7	176	3.50%	0.8
15	2,164	74	59	2.73%	4,920	127	2.57%	197	4.00%	0.6	148	3.00%	0.9
16	2,212	67	48	2.17%	5,599	119	2.13%	196	3.50%	0.6	168	3.00%	0.7
17	2,354	74	57	2.42%	6,495	154	2.37%	227	3.50%	0.7	195	3.00%	0.8
18	2,199	55	41	1.86%	6,505	122	1.88%	228	3.50%	0.5	195	3.00%	0.6
19	1,948	45	32	1.64%	6,089	100	1.65%	183	3.00%	0.5	183	3.00%	0.5
20	1,596	38	25	1.57%	5,456	93	1.71%	164	3.00%	0.6	109	2.00%	0.9
21	1,358	41	33	2.43%	4,998	121	2.42%	150	3.00%	0.8	100	2.00%	1.2
22	1,220	23	16	1.31%	5,017	76	1.52%	125	2.50%	0.6	100	2.00%	0.8
23	1,196	23	21	1.76%	5,458	79	1.44%	136	2.50%	0.6	109	2.00%	0.7
24	1,075	13	7	0.65%	5,414	56	1.03%	135	2.50%	0.4	108	2.00%	0.5
25	928	14	13	1.40%	4,953	54	1.09%	99	2.00%	0.5	74	1.50%	0.7
26	789	10	7	0.89%	4,476	57	1.27%	90	2.00%	0.6	67	1.50%	0.9
27	806	11	9	1.12%	5,007	49	0.98%	100	2.00%	0.5	75	1.50%	0.7
28	792	19	18	2.27%	5,453	115	2.11%	109	2.00%	1.1	82	1.50%	1.4
29	221	8	7	3.17%	1,574	38	2.40%	31	2.00%	1.2	24	1.50%	1.6
Totals:	96,600	10,452	8,982	9.30%	118,539	3,579	3.02%	5,104	5.28%	0.7	4,324	3.65%	0.8

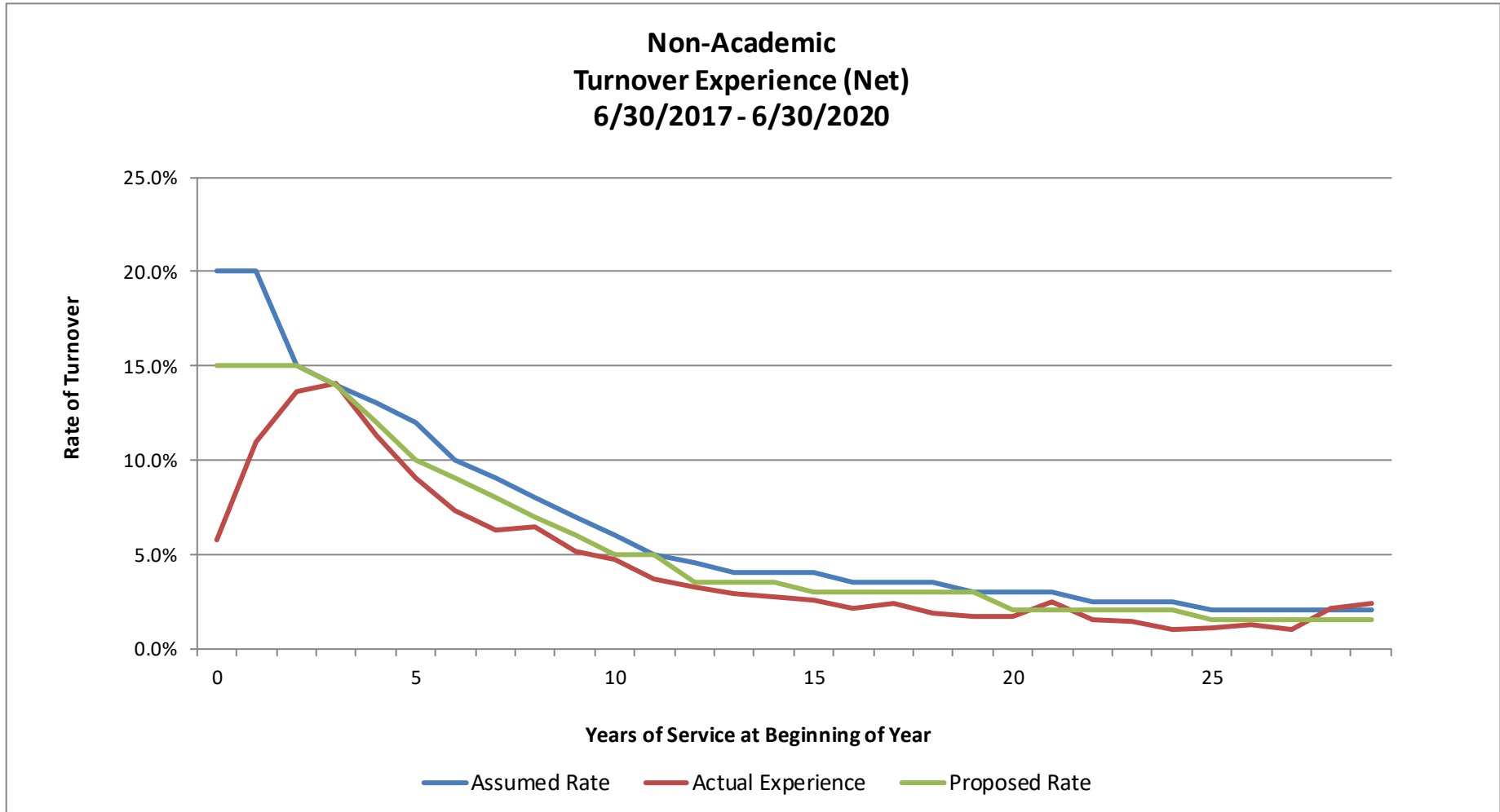
¹ Reflects actual turnover net of inactive members who returned to active service.

² Actual to expected ratio based on net turnover.



Turnover Assumption

Graph III(a)



Disability Assumption

Disability

Disability experience during the last three years was considered in the analysis shown on the following pages. The “Exposure” column shows the number of employees in five-year age bands throughout the experience period.

We reviewed historical disability experience over the past eight years and found that a high percentage of members receiving disability benefits cease receiving disability benefits and either return to active status or are classified as inactive status. Therefore, in addition to reviewing the number of new disabilities each year from active status, we reviewed the number of “net disabilities” each year. “Net disabilities” are disabilities that are expected to be long-term and exclude the incidences of disability where the benefits ceased. In addition, there are members who start receiving disability benefits who were classified as either active members or inactive members in the previous actuarial valuation. Therefore, we considered this in recommending disability rates. Approximately 50 percent of disabled members (on average) do not maintain their disabled status and return to active or inactive status. Therefore, we recommend maintaining proposed rates that are 60 percent of the recommended rates we would have proposed based on actual disability experience (without consideration of disabilities that cease). The rate of 60 percent is slightly higher than the actual rate of 53 percent to account for the short-term cost for the disabled members who subsequently change from disabled status after receiving disability benefits.

	2013	2014	2015	2016	2017	2018	2019	2020	Total		
									8-Year	13-17	18-20
New Disabilities from Active Status	126	95	114	137	96	102	73	69	812	568	244
Return to Active Status	39	32	28	17	45	35	34	24	254	161	93
Change to Terminated Status	51	53	35	43	33	25	30	21	291	215	76
Net Disabilities	36	10	51	77	18	42	9	24	267	192	75
Net Disabilities as % of New Disabilities from Active	29%	11%	45%	56%	19%	41%	12%	35%	33%	34%	31%
New Disabilities from Inactive Status	47	41	42	47	39	56	34	47	353	216	137
Net Disabilities from Active and Inactive Status	83	51	93	124	57	98	43	71	620	408	212
Net Disabilities as % of New Disabilities from Active and Inactive	48%	38%	60%	67%	42%	62%	40%	61%	53%	52%	56%

Annualized disability benefits for new disability recipients from active status as of June 30, 2020, were approximately \$1.8 million. The recommended disability rates and methodology would account for the 60 percent of payments that are expected to be long term. We recommend adding a small load to the projected benefit payments to account for the short-term cost of the projected disability benefits that are expected to cease. The projected additional amount is \$0.7 million for the year ending June 30, 2021.

The tables and graphs on the following pages show experience for disability.



Disability Assumption

- Table and Graph IV(a) – Male Disability Experience – Academic
- Table and Graph IV(b) – Female Disability Experience – Academic
- Table and Graph IV(c) – Male Disability Experience – Non-Academic
- Table and Graph IV(d) – Female Disability Experience – Non-Academic

The disability experience reflected on the following pages does not include disability experience for the RSP. The RSP disability assumption was separately studied and a separate report was issued.

Disability Assumption

Table IV(a)

Academic – Male

Age @ Disablement	Actual Experience							Current Assumptions - LW			Proposed Assumptions - LW			
	Population Weighted			Liability Weighted (LW)			Net Rates Weighted by		Expected Disabilities	Assumed Rate	Actual (Net)/ Expected	Expected Disabilities	Proposed Rate	Actual (Net)/ Expected
	Exposures	Disabilities	Net Disabilities	Exposures	Disabilities	Net Disabilities	Population	Liabilities						
Under 20	1	0	0	0	0	0	0.0000%	0.0000%	0	0.0247%	0.0	0	0.0074%	0.0
20-25	28	0	0	1	0	0	0.0000%	0.0000%	0	0.0264%	0.0	0	0.0079%	0.0
25-29	402	0	0	33	0	0	0.0000%	0.0000%	0	0.0295%	0.0	0	0.0088%	0.0
30-34	1,524	0	0	340	0	0	0.0000%	0.0000%	0	0.0355%	0.0	0	0.0106%	0.0
35-39	2,919	0	0	1,568	0	0	0.0000%	0.0000%	1	0.0447%	0.0	0	0.0134%	0.0
40-44	3,485	1	1	4,181	1	0	0.0172%	0.0109%	3	0.0672%	0.2	1	0.0202%	0.5
45-49	3,838	0	0	7,940	0	0	0.0000%	0.0000%	8	0.1014%	0.0	2	0.0304%	0.0
50-54	4,044	1	1	12,951	0	0	0.0148%	0.0011%	18	0.1373%	0.0	5	0.0412%	0.0
55-59	4,394	2	1	20,662	11	7	0.0273%	0.0328%	32	0.1552%	0.2	10	0.0466%	0.7
60-64	4,105	1	1	21,545	3	2	0.0146%	0.0074%	33	0.1552%	0.0	10	0.0466%	0.2
65+	4,920	0	0	23,797	0	0	0.0000%	0.0000%	37	0.1552%	0.0	11	0.0466%	0.0
Totals:	29,660	5	3	93,018	15	9	0.0101%	0.0096%	132	0.1418%	0.1	40	0.0425%	0.2
Under 40	4,874	0	0	1,942	0	0	0.0000%	0.0000%	1	0.0429%	0.0	0	0.0129%	0.0
40-59	15,761	4	2	45,734	12	7	0.0152%	0.0161%	61	0.1327%	0.1	18	0.0398%	0.4
60+	9,025	1	1	45,342	3	2	0.0066%	0.0035%	70	0.1552%	0.0	21	0.0466%	0.1

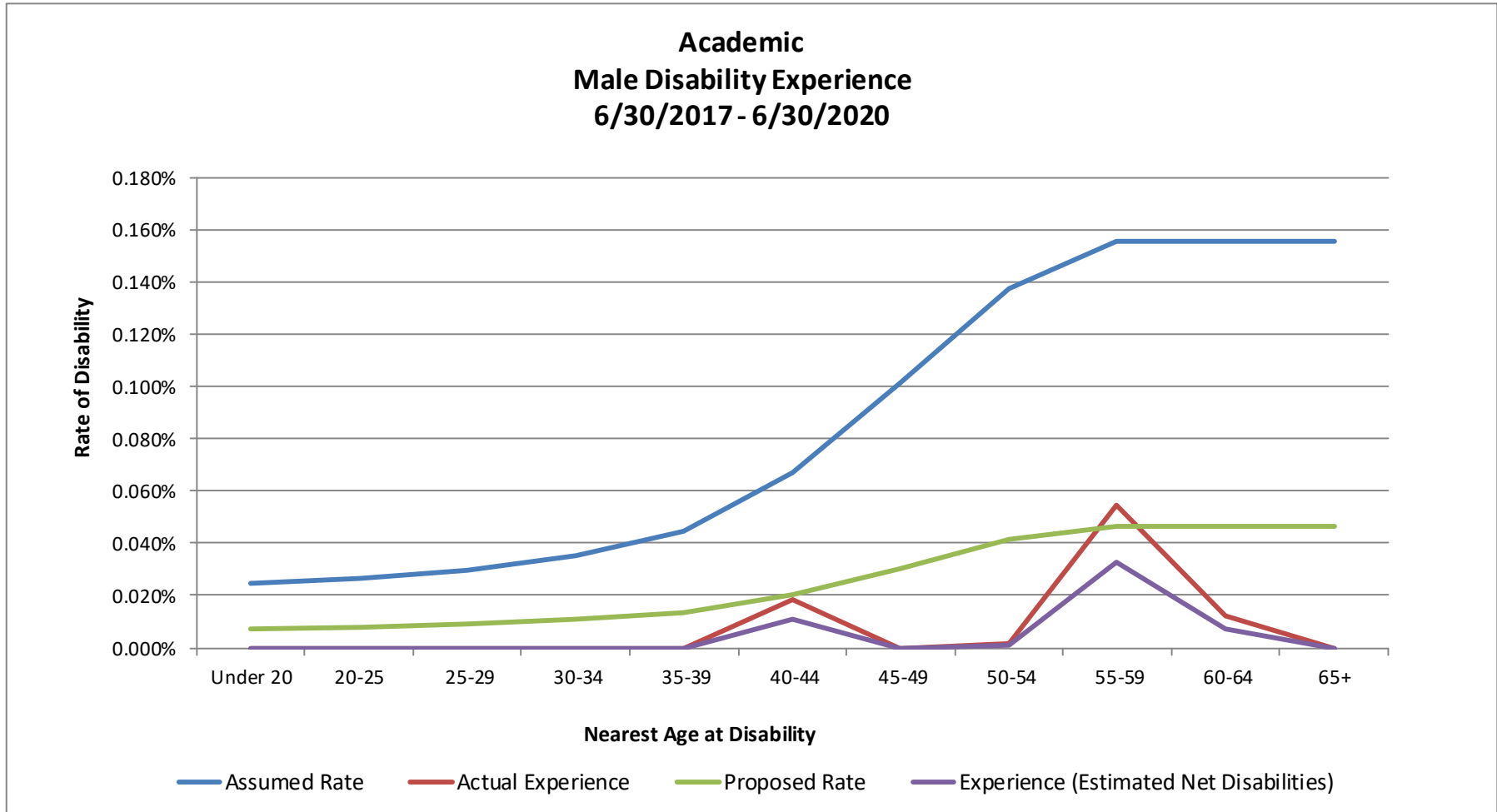
Disability rates vary by age. Average rates for the five-year age bands are shown in the table above.

Current assumptions and proposed assumptions are based on liability weighting.

Actual to expected ratios for the proposed rates are based on estimated net disabilities (60 percent of actual disabilities).

Disability Assumption

Graph IV(a)



Experience (Estimated Net Disabilities) is equal to 60 percent of actual disabilities.

Disability Assumption

Table IV(b)

Academic - Female

Age @ Disablement	Actual Experience						Current Assumptions - LW			Proposed Assumptions - LW				
	Population Weighted			Liability Weighted (LW)			Net Rates Weighted by		Expected Disabilities	Assumed Rate	Actual (Net)/ Expected	Expected Disabilities	Proposed Rate	Actual (Net)/ Expected
	Exposures	Disabilities	Net Disabilities	Exposures	Disabilities	Net Disabilities	Population	Liabilities						
Under 20	0	0	0	0	0	0			0			0		
20-25	28	0	0	1	0	0	0.0000%	0.0000%	0	0.0394%	0.0	0	0.0197%	0.0
25-29	544	0	0	45	0	0	0.0000%	0.0000%	0	0.0483%	0.0	0	0.0242%	0.0
30-34	2,065	0	0	455	0	0	0.0000%	0.0000%	0	0.0652%	0.0	0	0.0326%	0.0
35-39	3,826	1	1	2,081	1	1	0.0157%	0.0361%	2	0.0843%	0.4	1	0.0422%	0.9
40-44	4,460	3	2	4,894	5	3	0.0404%	0.0595%	5	0.1044%	0.6	3	0.0522%	1.1
45-49	4,687	0	0	8,396	0	0	0.0000%	0.0000%	10	0.1245%	0.0	5	0.0622%	0.0
50-54	4,684	2	1	12,150	1	1	0.0256%	0.0060%	18	0.1451%	0.0	9	0.0725%	0.1
55-59	4,769	4	2	16,597	24	14	0.0503%	0.0866%	26	0.1565%	0.6	13	0.0783%	1.1
60-64	4,048	1	1	14,759	4	2	0.0148%	0.0144%	23	0.1565%	0.1	12	0.0783%	0.2
65+	4,092	0	0	12,136	0	0	0.0000%	0.0000%	19	0.1565%	0.0	9	0.0783%	0.0
Totals:	33,203	11	7	71,514	35	21	0.0199%	0.0292%	103	0.1445%	0.2	52	0.0722%	0.4
Under 40	6,463	1	1	2,582	1	1	0.0093%	0.0291%	2	0.0803%	0.4	1	0.0402%	0.7
40-59	18,600	9	5	42,037	30	18	0.0290%	0.0429%	59	0.1407%	0.3	30	0.0704%	0.6
60+	8,140	1	1	26,896	4	2	0.0074%	0.0079%	42	0.1565%	0.1	21	0.0783%	0.1

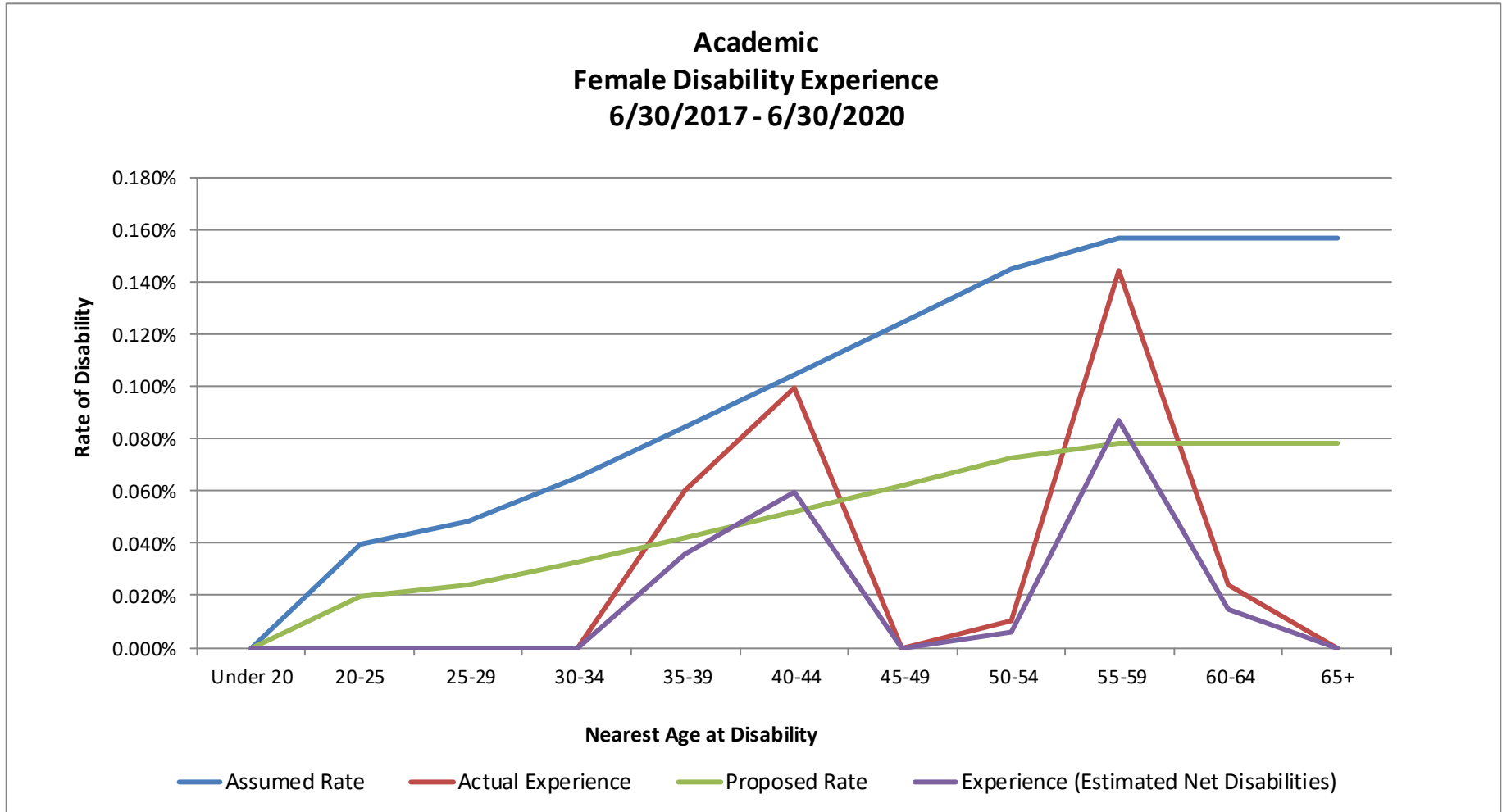
Disability rates vary by age. Average rates for the five-year age bands are shown in the table above.

Current assumptions and proposed assumptions are based on liability weighting.

Actual to expected ratios for the proposed rates are based on estimated net disabilities (60 percent of actual disabilities).

Disability Assumption

Graph IV(b)



Experience (Estimated Net Disabilities) is equal to 60 percent of actual disabilities.

Disability Assumption

Table IV(c)

Non-Academic - Male

Age @ Disablement	Actual Experience						Current Assumptions - LW			Proposed Assumptions - LW				
	Population Weighted			Liability Weighted (LW)			Net Rates Weighted by		Expected Disabilities	Assumed Rate	Actual (Net)/ Expected	Expected Disabilities	Proposed Rate	Actual (Net)/ Expected
	Exposures	Disabilities	Net Disabilities	Exposures	Disabilities	Net Disabilities	Population	Liabilities						
Under 20	1	0	0	0	0	0	0.0000%	0.0000%	0	0.0247%	0.0	0	0.0272%	0.0
20-25	418	0	0	17	0	0	0.0000%	0.0000%	0	0.0267%	0.0	0	0.0293%	0.0
25-29	2,579	2	1	272	0	0	0.0465%	0.0573%	0	0.0293%	2.0	0	0.0323%	1.8
30-34	4,917	0	0	1,488	0	0	0.0000%	0.0000%	1	0.0352%	0.0	1	0.0387%	0.0
35-39	5,079	4	2	3,661	2	1	0.0473%	0.0316%	2	0.0442%	0.7	2	0.0486%	0.7
40-44	5,030	6	4	6,561	6	3	0.0716%	0.0524%	4	0.0661%	0.8	5	0.0727%	0.7
45-49	5,392	12	7	11,347	25	15	0.1335%	0.1338%	11	0.1012%	1.3	13	0.1113%	1.2
50-54	5,619	15	9	16,225	39	23	0.1602%	0.1429%	22	0.1369%	1.0	24	0.1506%	0.9
55-59	5,555	19	11	17,449	51	31	0.2052%	0.1757%	27	0.1552%	1.1	30	0.1707%	1.0
60-64	4,045	17	10	12,301	35	21	0.2522%	0.1700%	19	0.1552%	1.1	21	0.1707%	1.0
65+	2,851	4	2	7,476	7	4	0.0842%	0.0549%	12	0.1552%	0.4	13	0.1707%	0.3
Totals:	41,486	79	47	76,797	165	99	0.1143%	0.1286%	98	0.1276%	1.0	108	0.1404%	0.9
Under 40	12,994	6	4	5,439	2	1	0.0277%	0.0241%	2	0.0409%	0.6	2	0.0450%	0.5
40-59	21,596	52	31	51,582	121	72	0.1445%	0.1405%	65	0.1262%	1.1	72	0.1388%	1.0
60+	6,896	21	13	19,777	42	25	0.1827%	0.1265%	31	0.1552%	0.8	34	0.1707%	0.7

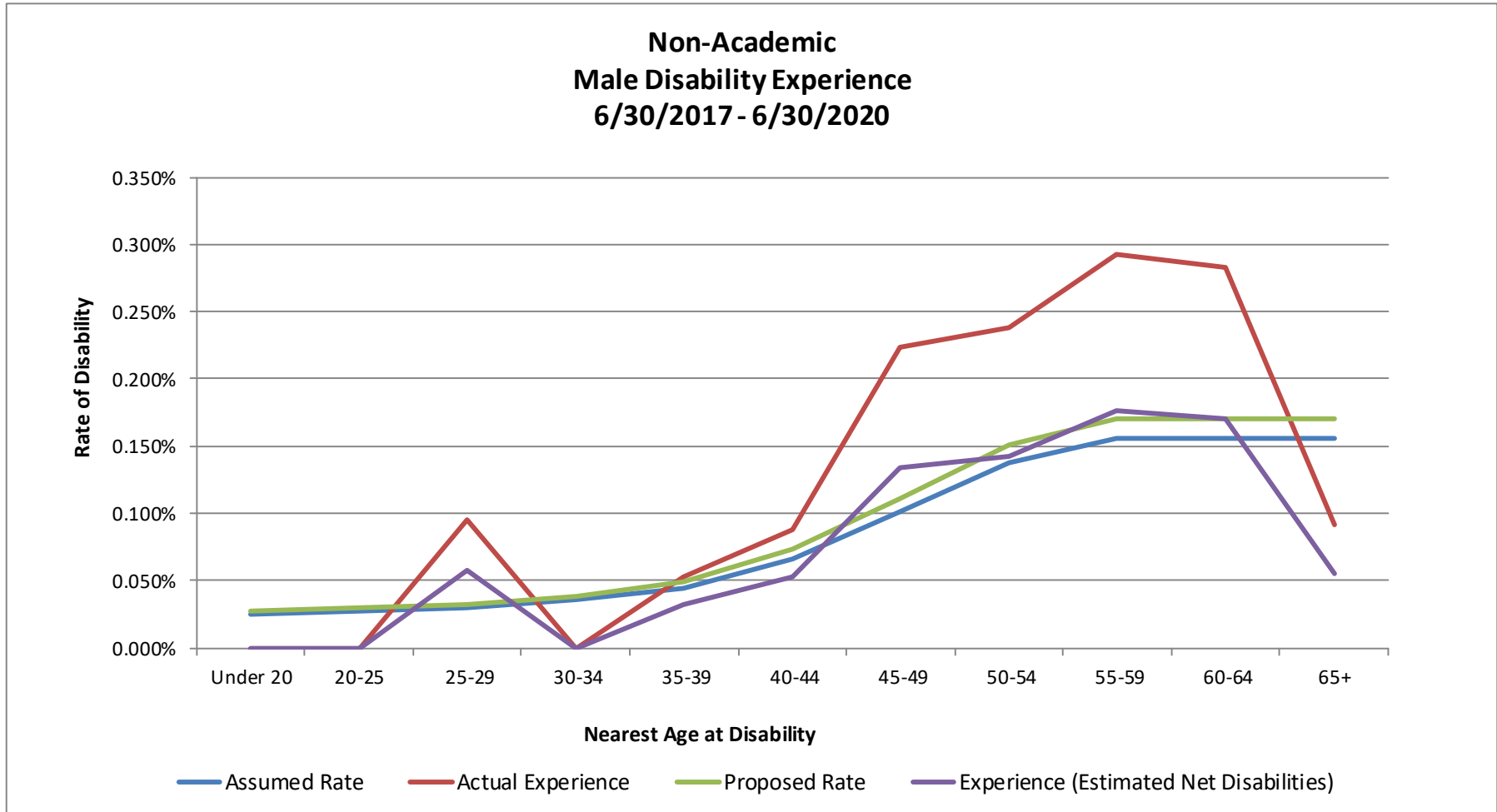
Disability rates vary by age. Average rates for the five-year age bands are shown in the table above.

Current assumptions and proposed assumptions are based on liability weighting.

Actual to expected ratios for the proposed rates are based on estimated net disabilities (60 percent of actual disabilities).

Disability Assumption

Graph IV(c)



Experience (Estimated Net Disabilities) is equal to 60 percent of actual disabilities.

Disability Assumption

Table IV(d)

Non-Academic - Female

Age @ Disablement	Actual Experience						Current Assumptions - LW			Proposed Assumptions - LW				
	Population Weighted			Liability Weighted (LW)			Net Rates Weighted by		Expected	Assumed	Actual (Net)/	Expected	Proposed	Actual (Net)/
	Exposures	Disabilities	Net Disabilities	Exposures	Disabilities	Net Disabilities	Population	Liabilities	Disabilities	Rate	Expected	Disabilities	Rate	Expected
Under 20	2	0	0	0	0	0	0.0000%	0.0000%	0	0.0328%	0.0	0	0.0377%	0.0
20-25	514	1	1	19	0	0	0.1167%	0.3353%	0	0.0392%	8.5	0	0.0451%	7.4
25-29	4,272	0	0	417	0	0	0.0000%	0.0000%	0	0.0476%	0.0	0	0.0548%	0.0
30-34	7,015	5	3	1,869	2	1	0.0428%	0.0773%	1	0.0643%	1.2	1	0.0739%	1.0
35-39	7,857	7	4	5,116	5	3	0.0535%	0.0636%	4	0.0839%	0.8	5	0.0965%	0.7
40-44	7,757	16	10	8,666	14	8	0.1238%	0.0947%	9	0.1038%	0.9	10	0.1194%	0.8
45-49	8,137	21	13	14,389	43	26	0.1548%	0.1778%	18	0.1248%	1.4	21	0.1435%	1.2
50-54	9,230	29	17	22,304	46	28	0.1885%	0.1240%	32	0.1447%	0.9	37	0.1664%	0.7
55-59	9,313	28	17	24,676	64	38	0.1804%	0.1552%	39	0.1565%	1.0	44	0.1800%	0.9
60-64	7,001	25	15	18,394	73	44	0.2143%	0.2377%	29	0.1565%	1.5	33	0.1800%	1.3
65+	4,174	17	10	10,660	24	14	0.2444%	0.1351%	17	0.1565%	0.9	19	0.1800%	0.8
Totals:	65,272	149	89	106,512	271	163	0.1370%	0.1527%	149	0.1399%	1.1	171	0.1609%	0.9
Under 40	19,660	13	8	7,421	8	5	0.0397%	0.0642%	6	0.0768%	0.8	7	0.0883%	0.7
40-59	34,437	94	56	70,037	166	100	0.1638%	0.1424%	98	0.1397%	1.0	113	0.1607%	0.9
60+	11,175	42	25	29,054	97	58	0.2255%	0.2001%	45	0.1565%	1.3	52	0.1800%	1.1

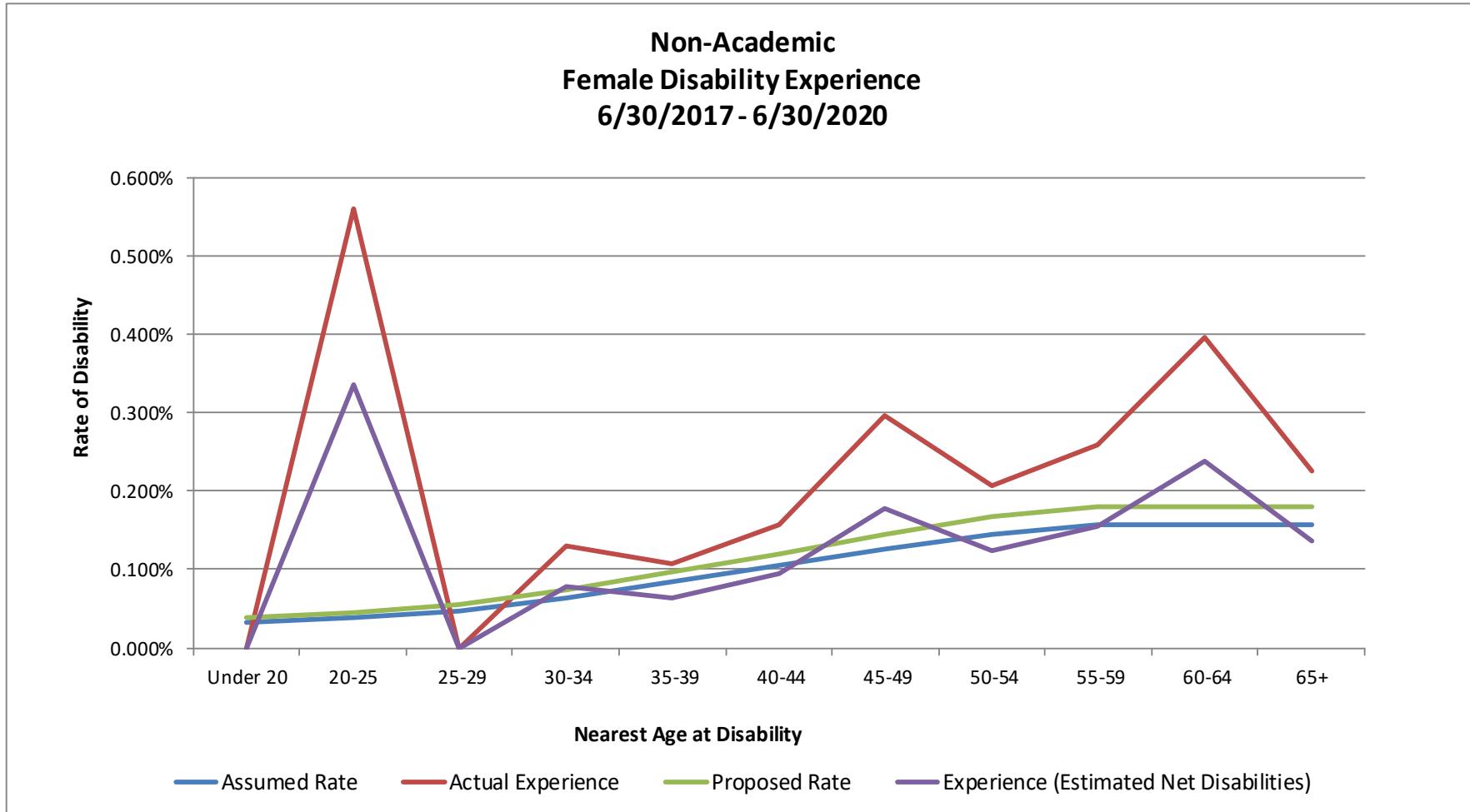
Disability rates vary by age. Average rates for the five-year age bands are shown in the table above.

Current assumptions and proposed assumptions are based on liability weighting.

Actual to expected ratios for the proposed rates are based on estimated net disabilities (60 percent of actual disabilities).

Disability Assumption

Graph IV(d)



Experience (Estimated Net Disabilities) is equal to 60 percent of actual disabilities.

Mortality Assumptions

Mortality

Post-retirement mortality is an important component in cost calculations and should be updated from time to time to reflect current and expected future longevity improvements. Pre-retirement mortality is a relatively minor component in cost calculations. The frequency of pre-retirement deaths is so low that mortality assumptions based on actual experience can only be produced for very large retirement systems.

Actuarial Standards of Practice

Actuarial Standards of Practice (ASOP) No. 35 Disclosure Section 4.1.1 states, “The disclosure of the mortality assumption should contain sufficient detail to permit another qualified actuary to understand the provision made for future mortality improvement. If the actuary assumes zero mortality improvement after the measurement date, the actuary should state that no provision was made for future mortality improvement.” The current mortality rates used in the valuation include a provision for future mortality improvement.

The Pub-2010 Mortality Tables

The Society of Actuaries (SOA) and Retirement Plans Experience Committee (RPEC) initiated a study in January 2015 with the primary focus of a comprehensive review of recent mortality experience of public retirement plans in the United States. The previous study for the RP-2014 Mortality Tables only included data from private pension plans. The main objectives of the study were to develop mortality tables based exclusively on public sector pension plan experience, and provide new insights into the composition of gender-specific pension mortality by factors such as job category (e.g., Teachers, Public Safety, General), salary/benefit amount, health status (i.e., healthy or disabled), geographic region and duration since event. Additional information on the background, data, and process is available in the Pub-2010 Public Retirement Plans Mortality Tables Report published by the SOA and RPEC.

Partial Credibility

We use what is termed “the limited fluctuation credibility procedure” to determine the appropriate scaling factor of the base mortality tables for each gender and each member classification. We used a benefits weighted basis for post-retirement non-disabled mortality and used a headcount basis for pre-retirement and post-retirement disabled mortality. In each case, the partial credibility factor (or “Z-factor”) is computed based on the experience of the specific group being studied. This Z-factor is a measure of the credibility of the pertinent group.

The Best Fit is the ratio of actual to expected deaths using the base table. The final scale is then determined as the weighted average of the Best Fit and 100% based on the Z-factor. For example, the Z-factor for Academic Male Active Members is 17%, suggesting that the data for this group is 17% credible (there were not enough deaths among active members to be completely credible). The Best Fit for this group would be to scale the base tables by 107%. The final scale of 101% is the credibility-weighted average ($101\% = 17\% \times 107\% + 83\% \times 100\%$). Factors for other groups are determined similarly. For retired males, there were enough deaths (on a benefits basis) to warrant full credibility on a lives basis. Therefore, the Best Fit is used as the final scale.

Mortality Assumptions

	Benefits or Liability Needed For Full Credibility	Observed Deaths	Z-Factor	Best Fit	Final Scale Factor
Academic					
Healthy Male Retirees	\$1,172	\$821	84%	99%	99%
Healthy Female Retirees	\$899	\$250	53%	110%	105%
Non-Academic					
Healthy Male Retirees	\$707	\$376	73%	99%	99%
Healthy Female Retirees	\$444	\$313	84%	108%	107%
Disabled Male Retirees	\$9,711	\$262	16%	172%	112%
Disabled Female Retirees	\$6,935	\$282	20%	152%	110%
Academic					
Male Active Members	\$10,594	\$316	17%	107%	101%
Female Active Members	\$8,534	\$81	10%	68%	97%
Non-Academic					
Male Active Members	\$7,534	\$317	21%	169%	114%
Female Active Members	\$5,508	\$196	19%	124%	105%

Disabled and active member experience is based on liability amounts and healthy retiree experience is based on benefit amounts (total benefit amounts and liability amounts divided by 100,000). Disabled member experience is for six years (the current and previous experience study). The other experience is for the three years of the experience study.

Recommendations

We reviewed the mortality experience separately for active members, service retirees and disabled members during the three-year study period. The results are shown on the following pages.

Following is a summary of the current mortality assumptions:

Applicable Group	Base Table Mortality Table	Male Scaling Factor	Female Scaling Factor
Pre-retirement	RP-2014 White Collar Employee, sex distinct	93%	100%
Post-retirement (non-disabled)	RP-2014 White Collar Healthy Annuitant, sex distinct	96%	93%
Post-retirement (disabled)	RP-2014 Disabled Annuitant, sex distinct	112%	123%

Future mortality improvements are reflected by projecting the base mortality tables back from the year 2014 to the year 2006 using the MP-2014 projection scale and projecting from 2006 using the MP-2017 projection scale.



Mortality Assumptions

Following is summary of the recommended mortality assumptions for members classified as an employee type of academic:

Academic Applicable Group	Base Table Mortality Table	Male Scaling Factor	Female Scaling Factor
Pre-retirement	Pub-2010 Employee Mortality Table (for Teachers)	101%	97%
Post-retirement (non-disabled)	Pub-2010 Healthy Retiree Mortality Table (for Teachers)	99%	105%
Post-retirement (disabled)	Pub-2010 Disabled Retiree Mortality Table (for Non-Safety Employees)	112%	110%

Following is summary of the recommended mortality assumptions for members classified as an employee type of non-academic:

Non-Academic Applicable Group	Base Table Mortality Table	Male Scaling Factor	Female Scaling Factor
Pre-retirement	Pub-2010 Employee Mortality Table (for General Employees)	114%	105%
Post-retirement (non-disabled)	Pub-2010 Healthy Retiree Mortality Table (for General Employees)	99%	107%
Post-retirement (disabled)	Pub-2010 Disabled Retiree Mortality Table (for Non-Safety Employees)	112%	110%

Future mortality improvements are reflected by projecting the base mortality tables from 2010 using the MP-2020 projection scale.

The following tables and graphs contain the mortality experience for the experience study period:

- Table and Graph V(a)(i) – Post-Retirement Mortality Experience – Academic
- Table and Graph V(a)(ii) – Post-Retirement Mortality Experience – Non-Academic
- Table and Graph V(b)(i) – Pre-Retirement Mortality Experience - Academic
- Table and Graph V(b)(ii) – Pre-Retirement Mortality Experience – Non-Academic
- Table and Graph V(c) – Disabled Mortality Experience – Combined Academic and Non-Academic

Mortality Assumptions

Academic – Post-Retirement Mortality (non-disabled)

Table V(a)(i)

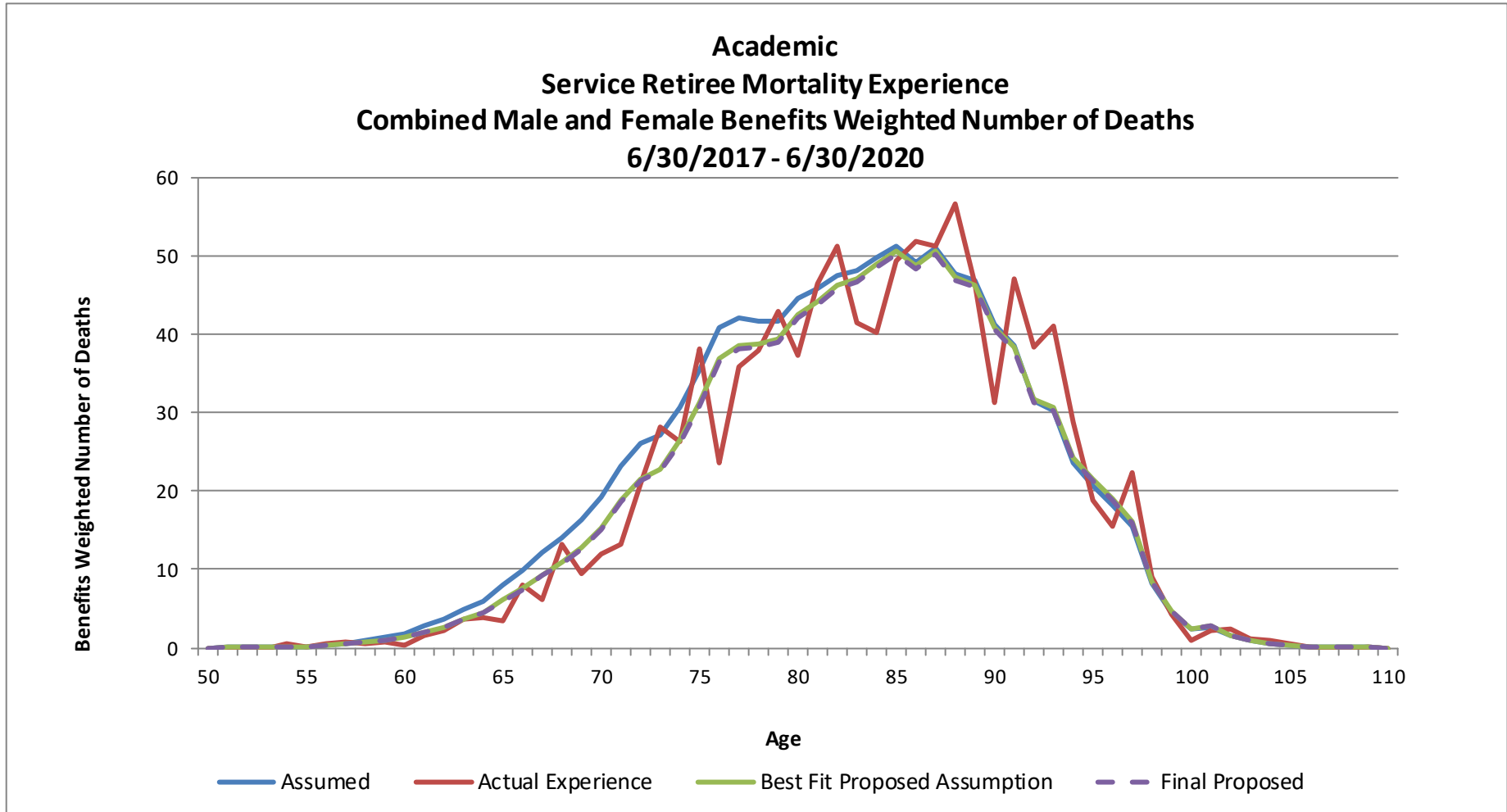
Male Service Retiree Mortality Experience															
Age	Actual Experience					Current Assumptions - BW			Best Fit Proposed Assumptions - BW			Final Proposed Assumptions - BW			
	Population Weighted		Benefits Weighted (BW)		Actual Rates Weighted by		Expected	Assumed	Actual /	Expected	Proposed	Actual /	Expected	Proposed	Actual /
	Exposures	Deaths	Exposures	Deaths	Population	Benefits	Deaths	Rate	Expected	Deaths	Rate	Expected	Deaths	Rate	Expected
Under 50	27	0	16	0	0.000%	0.000%	0	0.330%	0.00	0	0.161%	0.00	0	0.161%	0.00
50-54	1,060	2	433	1	0.189%	0.195%	2	0.451%	0.43	1	0.292%	0.67	1	0.292%	0.67
55-59	3,663	17	1,713	6	0.464%	0.375%	11	0.635%	0.59	8	0.468%	0.80	8	0.468%	0.80
60-64	7,623	60	3,942	25	0.787%	0.644%	37	0.951%	0.68	29	0.747%	0.86	29	0.747%	0.86
65-69	9,728	114	5,674	67	1.172%	1.174%	88	1.546%	0.76	74	1.297%	0.90	74	1.297%	0.90
70-74	8,388	202	5,769	129	2.408%	2.234%	152	2.635%	0.85	139	2.403%	0.93	139	2.403%	0.93
75-79	5,691	260	3,986	178	4.569%	4.462%	189	4.753%	0.94	182	4.570%	0.98	182	4.570%	0.98
80-84	3,474	328	2,351	212	9.442%	9.038%	205	8.739%	1.03	201	8.550%	1.06	201	8.550%	1.06
85-89	1,372	223	852	148	16.254%	17.372%	130	15.229%	1.14	128	15.010%	1.16	128	15.010%	1.16
90-94	373	85	226	51	22.788%	22.674%	53	23.288%	0.97	53	23.620%	0.96	53	23.620%	0.96
95-99	27	7	13	2	25.926%	19.974%	4	32.621%	0.61	4	33.122%	0.60	4	33.122%	0.60
100+	1	1	1	1	100.000%	100.000%	0	40.152%	2.49	0	40.962%	2.44	0	40.962%	2.44
Totals:	41,427	1,299	24,975	821	3.136%	3.287%	872	3.491%	0.94	820	3.283%	1.00	820	3.283%	1.00
Female Service Retiree Mortality Experience															
Under 50	44	1	28	1	2.273%	1.868%	0	0.235%	7.96	0	0.159%	11.73	0	0.152%	12.29
50-54	1,245	6	417	2	0.482%	0.451%	1	0.335%	1.34	1	0.280%	1.61	1	0.267%	1.69
55-59	4,714	19	1,576	5	0.403%	0.322%	8	0.514%	0.63	6	0.392%	0.82	6	0.374%	0.86
60-64	8,774	42	2,974	15	0.479%	0.500%	23	0.773%	0.65	17	0.573%	0.87	16	0.547%	0.91
65-69	8,459	94	3,118	34	1.111%	1.094%	38	1.230%	0.89	31	1.005%	1.09	30	0.960%	1.14
70-74	5,697	109	2,373	50	1.913%	2.087%	50	2.093%	1.00	46	1.946%	1.07	44	1.858%	1.12
75-79	3,051	98	1,225	39	3.212%	3.166%	46	3.760%	0.84	46	3.794%	0.83	44	3.621%	0.87
80-84	1,571	110	585	43	7.002%	7.296%	40	6.891%	1.06	42	7.184%	1.02	40	6.858%	1.06
85-89	785	107	284	38	13.631%	13.441%	35	12.414%	1.08	38	13.283%	1.01	36	12.680%	1.06
90-94	238	58	75	19	24.370%	25.065%	15	19.415%	1.29	16	21.712%	1.15	15	20.725%	1.21
95-99	44	17	13	5	38.636%	39.247%	4	29.404%	1.33	4	33.740%	1.16	4	32.206%	1.22
100+	4	2	1	0	50.000%	40.317%	0	40.567%	0.99	0	47.796%	0.84	0	45.625%	0.88
Totals:	34,626	663	12,668	250	1.915%	1.970%	261	2.058%	0.96	249	1.966%	1.00	238	1.876%	1.05
Grand Totals:	76,053	1,962	25,308	499	2.580%	1.970%	521	2.060%	0.96	498	1.968%	1.00	475	1.878%	1.05

Expected deaths under the current and proposed assumptions are on a benefits weighted basis.



Mortality Assumptions

Graph V(a)(i)



Mortality Assumptions

Non-Academic – Post-Retirement Mortality (non-disabled)

Table V(a)(ii)

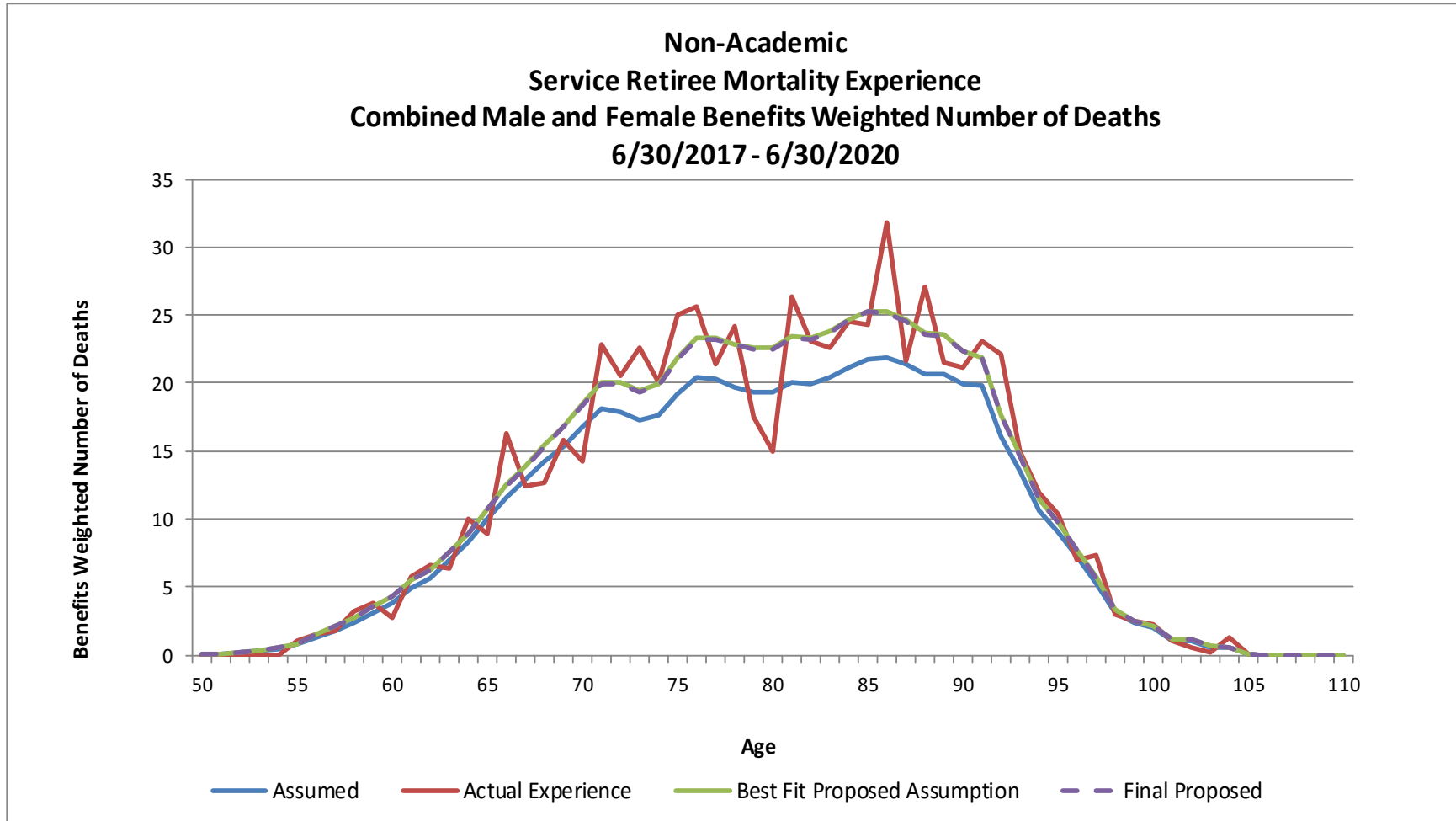
Male Service Retiree Mortality Experience																
Age	Actual Experience					Current Assumptions - BW			Best Fit Proposed Assumptions - BW			Final Proposed Assumptions - BW				
	Population Weighted		Benefits Weighted		Actual Rates Weighted by		Expected	Assumed	Actual /	Expected	Proposed	Actual /	Expected	Expected	Proposed	Actual /
	Exposures	Deaths	Exposures	Deaths	Population	Benefits	Deaths	Rate	Expected	Deaths	Rate	Expected	Deaths	Rate	Expected	
Under 50	256	0	143	0	0.000%	0.000%	0	0.330%	0.00	1	0.353%	0.00	1	0.353%	0.00	
50-54	2,237	14	1,002	8	0.626%	0.766%	4	0.445%	1.72	5	0.522%	1.47	5	0.522%	1.47	
55-59	5,028	45	2,188	15	0.895%	0.707%	14	0.626%	1.13	16	0.750%	0.94	16	0.750%	0.94	
60-64	7,876	90	3,264	33	1.143%	1.012%	31	0.935%	1.08	36	1.091%	0.93	36	1.091%	0.93	
65-69	7,279	140	2,991	56	1.923%	1.870%	45	1.511%	1.24	52	1.742%	1.07	52	1.742%	1.07	
70-74	4,718	157	2,018	59	3.328%	2.947%	53	2.624%	1.12	62	3.061%	0.96	62	3.061%	0.96	
75-79	3,074	180	1,239	65	5.856%	5.249%	59	4.748%	1.11	69	5.572%	0.94	69	5.572%	0.94	
80-84	1,860	218	725	75	11.720%	10.398%	63	8.697%	1.20	71	9.850%	1.06	71	9.850%	1.06	
85-89	778	143	306	50	18.380%	16.320%	46	15.141%	1.08	49	16.070%	1.02	49	16.070%	1.02	
90-94	152	41	55	13	26.974%	23.382%	13	23.103%	1.01	13	23.786%	0.98	13	23.786%	0.98	
95-99	16	5	5	1	31.250%	27.659%	2	31.819%	0.87	2	32.291%	0.86	2	32.291%	0.86	
100+	0	0	0	0			0			0			0			
Totals:	33,274	1,033	13,936	376	3.105%	2.700%	330	2.368%	1.14	376	2.699%	1.00	376	2.699%	1.00	
Female Service Retiree Mortality Experience																
Under 50	487	0	225	0	0.000%	0.000%	1	0.230%	0.00	1	0.280%	0.00	1	0.278%	0.00	
50-54	4,004	11	1,446	4	0.275%	0.256%	5	0.331%	0.77	5	0.376%	0.68	5	0.373%	0.69	
55-59	9,836	56	3,163	16	0.569%	0.504%	16	0.504%	1.00	16	0.511%	0.98	16	0.507%	0.99	
60-64	14,469	100	4,337	33	0.691%	0.763%	33	0.770%	0.99	34	0.778%	0.98	33	0.770%	0.99	
65-69	12,490	155	3,498	44	1.241%	1.263%	42	1.212%	1.04	46	1.306%	0.97	45	1.294%	0.98	
70-74	8,467	209	2,218	54	2.468%	2.440%	46	2.072%	1.18	52	2.354%	1.04	52	2.332%	1.05	
75-79	5,047	210	1,114	47	4.161%	4.179%	42	3.769%	1.11	49	4.376%	0.95	48	4.335%	0.96	
80-84	2,842	242	617	51	8.515%	8.247%	43	7.007%	1.18	51	8.246%	1.00	50	8.170%	1.01	
85-89	1,532	231	272	43	15.078%	15.904%	33	12.277%	1.30	39	14.282%	1.11	38	14.150%	1.12	
90-94	483	112	72	17	23.188%	23.698%	14	19.545%	1.21	16	22.007%	1.08	16	21.804%	1.09	
95-99	66	19	12	4	28.788%	31.834%	4	29.376%	1.08	4	33.095%	0.96	4	32.789%	0.97	
100+	1	1	0	0	100.000%	100.000%	0	35.821%	2.79	0	40.987%	2.44	0	40.607%	2.46	
Totals:	59,724	1,346	16,974	313	2.254%	1.843%	279	1.646%	1.12	312	1.840%	1.00	309	1.823%	1.01	
Grand Totals:	92,998	2,379	33,724	626	2.558%	1.855%	558	1.655%	1.12	624	1.850%	1.00	618	1.833%	1.01	

Expected deaths under the current and proposed assumptions are on a benefits weighted basis.



Mortality Assumptions

Graph V(a)(ii)



Mortality Assumptions

Academic – Pre-Retirement Mortality

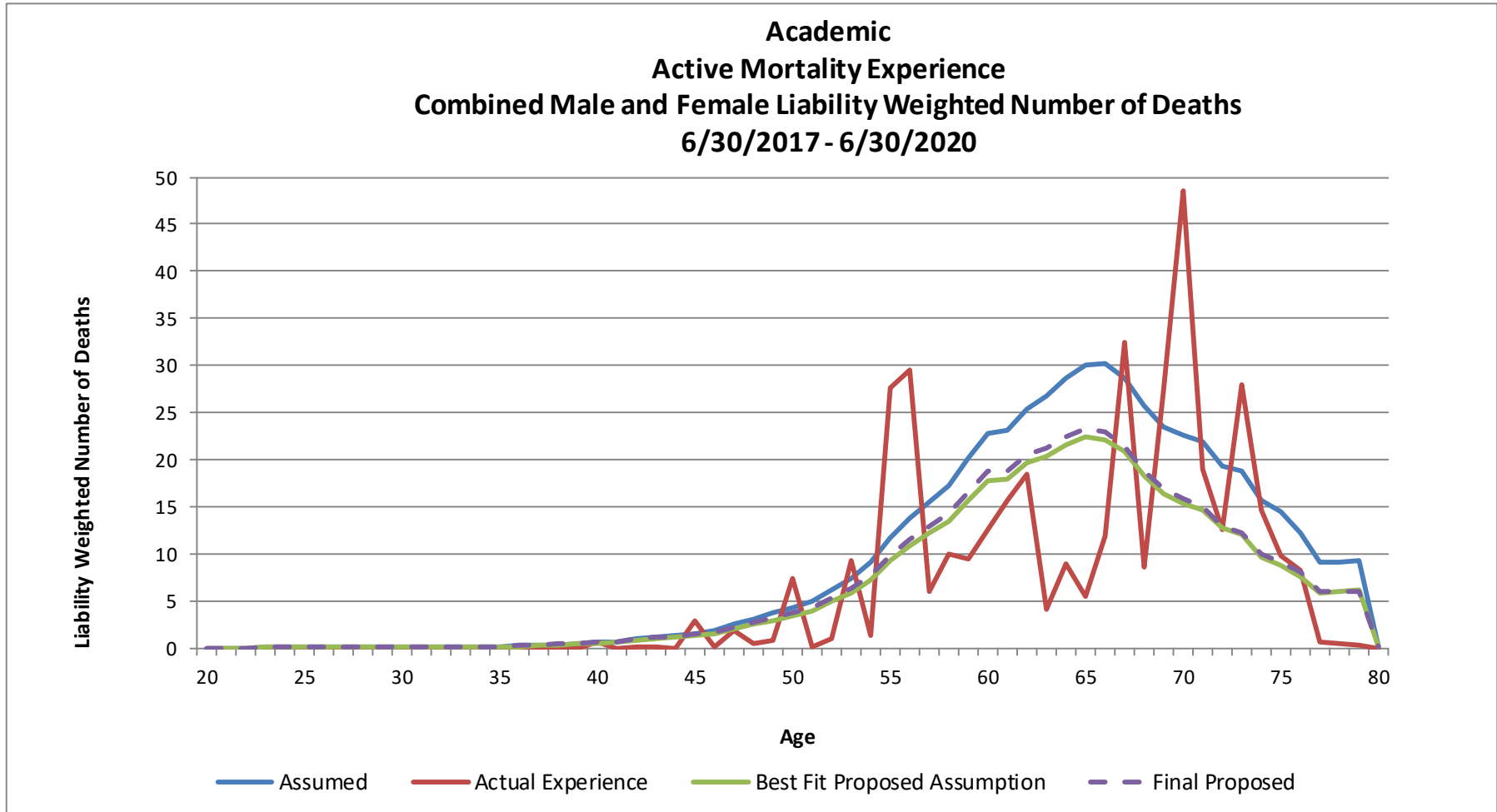
Table V(b)(i)

Male Active Mortality Experience															
Age	Actual Experience					Current Assumptions - LW			Best Fit Proposed Assumptions - LW			Final Proposed Assumptions - LW			
	Population Weighted		Liability Weighted (LW)		Actual Rates Weighted by		Expected Deaths	Assumed Rate	Actual / Expected	Expected Deaths	Proposed Rate	Actual / Expected	Expected Deaths	Proposed Rate	Actual / Expected
	Exposures	Deaths	Exposures	Deaths	Population	Liability									
Under 30	521	0	38	0	0.000%	0.000%	0	0.031%	0.00	0	0.026%	0.00	0	0.025%	0.00
30-39	4,610	0	1,921	0	0.000%	0.000%	1	0.041%	0.00	1	0.048%	0.00	1	0.045%	0.00
40-49	7,409	7	12,129	6	0.094%	0.049%	9	0.072%	0.67	10	0.079%	0.62	9	0.075%	0.65
50-59	8,498	19	33,619	65	0.224%	0.192%	66	0.196%	0.98	64	0.191%	1.01	61	0.180%	1.07
60-69	7,157	26	36,614	117	0.363%	0.321%	193	0.526%	0.61	160	0.436%	0.74	151	0.412%	0.78
70-79	1,897	20	8,731	127	1.054%	1.451%	124	1.419%	1.02	82	0.944%	1.54	78	0.891%	1.63
Totals:	30,092	72	93,052	315	0.239%	0.338%	392	0.421%	0.80	317	0.340%	0.99	299	0.321%	1.05
Less than 60:	21,038	26	47,707	71	0.124%	0.148%	75	0.158%	0.94	75	0.157%	0.94	71	0.148%	1.00
Female Active Mortality Experience															
Age	Population Weighted		Liability Weighted		Actual Rates Weighted by		Expected Deaths	Assumed Rate	Actual / Expected	Expected Deaths	Proposed Rate	Actual / Expected	Expected Deaths	Proposed Rate	Actual / Expected
	Exposures	Deaths	Exposures	Deaths	Population	Liability									
Under 30	668	0	50	0	0.000%	0.000%	0	0.018%	0.00	0	0.010%	0.00	0	0.014%	0.00
30-39	6,095	0	2,549	0	0.000%	0.000%	1	0.031%	0.00	1	0.020%	0.00	1	0.028%	0.00
40-49	9,258	3	13,299	1	0.032%	0.007%	8	0.061%	0.11	5	0.034%	0.20	6	0.049%	0.14
50-59	9,534	12	28,753	37	0.126%	0.128%	44	0.153%	0.84	22	0.077%	1.66	32	0.110%	1.17
60-69	6,840	13	23,226	28	0.190%	0.119%	72	0.309%	0.39	38	0.162%	0.74	54	0.232%	0.52
70-79	1,336	4	3,672	15	0.299%	0.417%	28	0.760%	0.55	16	0.440%	0.95	23	0.628%	0.66
Totals:	33,731	32	71,549	81	0.095%	0.113%	153	0.213%	0.53	81	0.113%	1.00	116	0.162%	0.70
Less than 60:	25,555	15	44,651	38	0.059%	0.085%	53	0.118%	0.72	27	0.061%	1.39	39	0.087%	0.97
Grand Totals:	63,823	104	164,601	396	0.163%	0.240%	544	0.331%	0.73	398	0.242%	0.99	415	0.252%	0.95
Less than 60:	46,593	41	92,358	108	0.088%	0.117%	128	0.139%	0.85	102	0.110%	1.06	109	0.118%	0.99

Expected deaths under the current and proposed assumptions are on a liability weighted basis.

Mortality Assumptions

Graph V(b)(i)



Mortality Assumptions

Non-Academic – Pre-Retirement Mortality

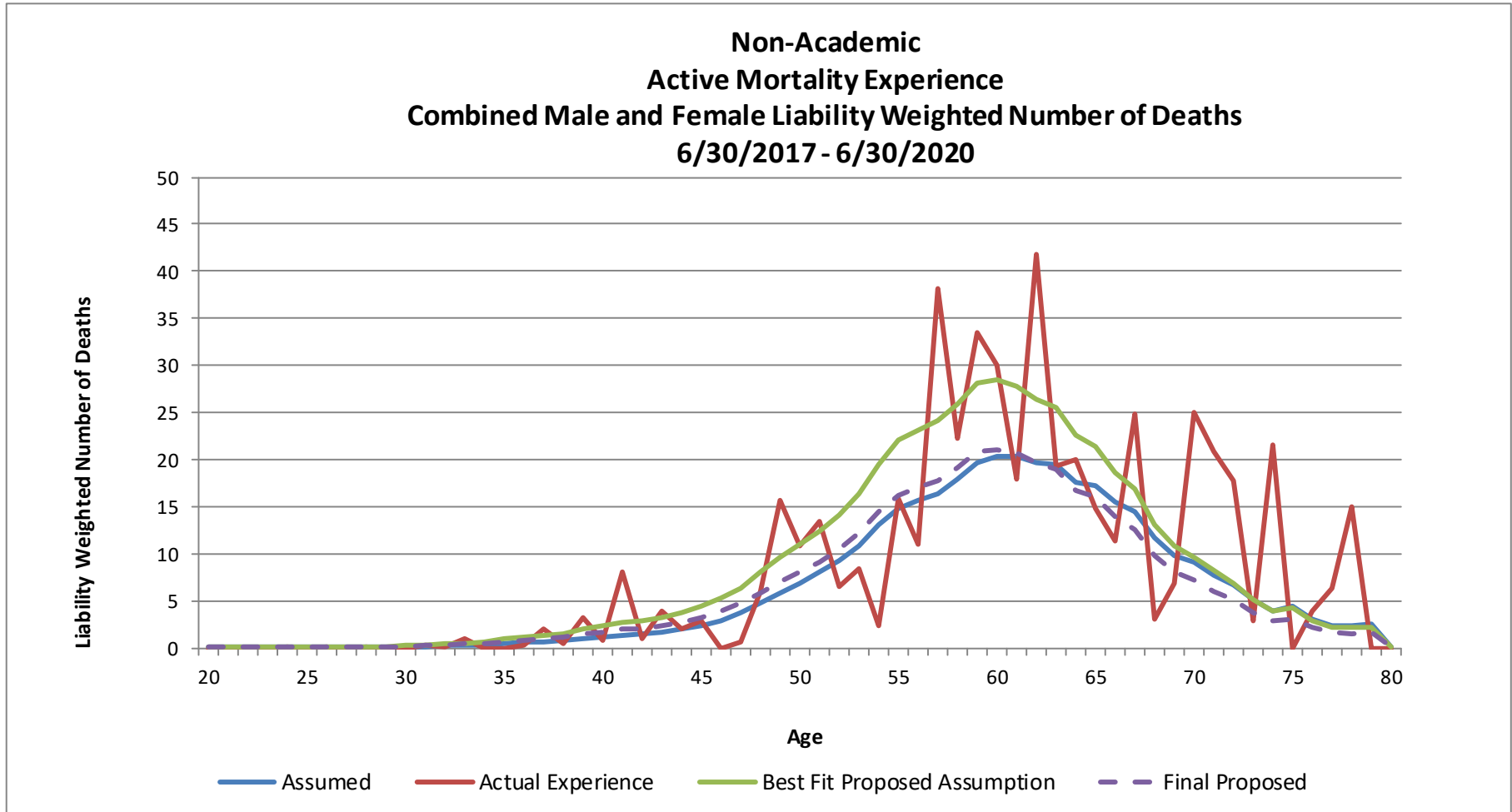
Table V(b)(ii)

Male Active Mortality Experience															
Age	Actual Experience					Current Assumptions - LW			Best Fit Proposed Assumptions - LW			Final Proposed Assumptions - LW			
	Population Weighted		Liability Weighted (LW)		Actual Rates Weighted by		Expected Deaths	Assumed Rate	Actual / Expected	Expected Deaths	Proposed Rate	Actual / Expected	Expected Deaths	Proposed Rate	Actual / Expected
	Exposures	Deaths	Exposures	Deaths	Population	Liability									
Under 30	3,767	2	324	0	0.053%	0.065%	0	0.031%	2.07	0	0.068%	0.95	0	0.046%	1.40
30-39	10,922	8	5,212	4	0.073%	0.070%	2	0.040%	1.73	6	0.114%	0.61	4	0.077%	0.91
40-49	10,902	14	17,950	23	0.128%	0.129%	13	0.071%	1.81	32	0.178%	0.72	22	0.120%	1.07
50-59	11,476	38	33,712	100	0.331%	0.296%	62	0.184%	1.60	123	0.363%	0.81	83	0.245%	1.21
60-69	6,171	42	17,744	107	0.681%	0.602%	86	0.486%	1.24	128	0.719%	0.84	86	0.485%	1.24
70-79	854	12	2,047	84	1.405%	4.085%	28	1.380%	2.96	29	1.422%	2.87	20	0.959%	4.26
Totals:	44,092	116	76,990	317	0.263%	0.412%	192	0.249%	1.65	317	0.412%	1.00	214	0.278%	1.48
Less than 60:	37,067	62	57,199	127	0.167%	0.222%	77	0.135%	1.64	161	0.281%	0.79	108	0.189%	1.17
Female Active Mortality Experience															
Age	Population Weighted		Liability Weighted		Actual Rates Weighted by		Expected Deaths	Assumed Rate	Actual / Expected	Expected Deaths	Proposed Rate	Actual / Expected	Expected Deaths	Proposed Rate	Actual / Expected
	Exposures	Deaths	Exposures	Deaths	Population	Liability									
Under 30	6,157	1	499	0	0.016%	0.005%	0	0.017%	0.31	0	0.018%	0.29	0	0.015%	0.34
30-39	16,272	3	7,077	3	0.018%	0.049%	2	0.030%	1.66	3	0.040%	1.24	2	0.034%	1.46
40-49	16,728	14	23,126	18	0.084%	0.076%	14	0.061%	1.25	16	0.071%	1.07	14	0.060%	1.27
50-59	19,139	26	47,039	62	0.136%	0.133%	70	0.148%	0.90	74	0.157%	0.84	63	0.133%	1.00
60-69	10,211	31	26,514	83	0.304%	0.313%	79	0.299%	1.05	84	0.317%	0.99	71	0.268%	1.17
70-79	1,111	7	2,554	29	0.630%	1.154%	19	0.726%	1.59	18	0.707%	1.63	15	0.598%	1.93
Totals:	69,618	82	106,809	196	0.118%	0.184%	184	0.172%	1.07	195	0.183%	1.00	165	0.155%	1.19
Less than 60:	58,296	44	77,742	84	0.075%	0.108%	86	0.111%	0.97	93	0.120%	0.90	79	0.102%	1.06
Grand Totals:	113,710	198	183,799	513	0.174%	0.279%	375	0.204%	1.37	513	0.279%	1.00	379	0.206%	1.35
Less than 60:	95,363	106	134,940	210	0.111%	0.156%	163	0.121%	1.29	254	0.188%	0.83	187	0.139%	1.12

Expected deaths under the current and proposed assumptions are on a liability weighted basis.

Mortality Assumptions

Graph V(b)(ii)



Mortality Assumptions

Combined Academic and Non-Academic – Post-Retirement Mortality disabled)

Table V(c)

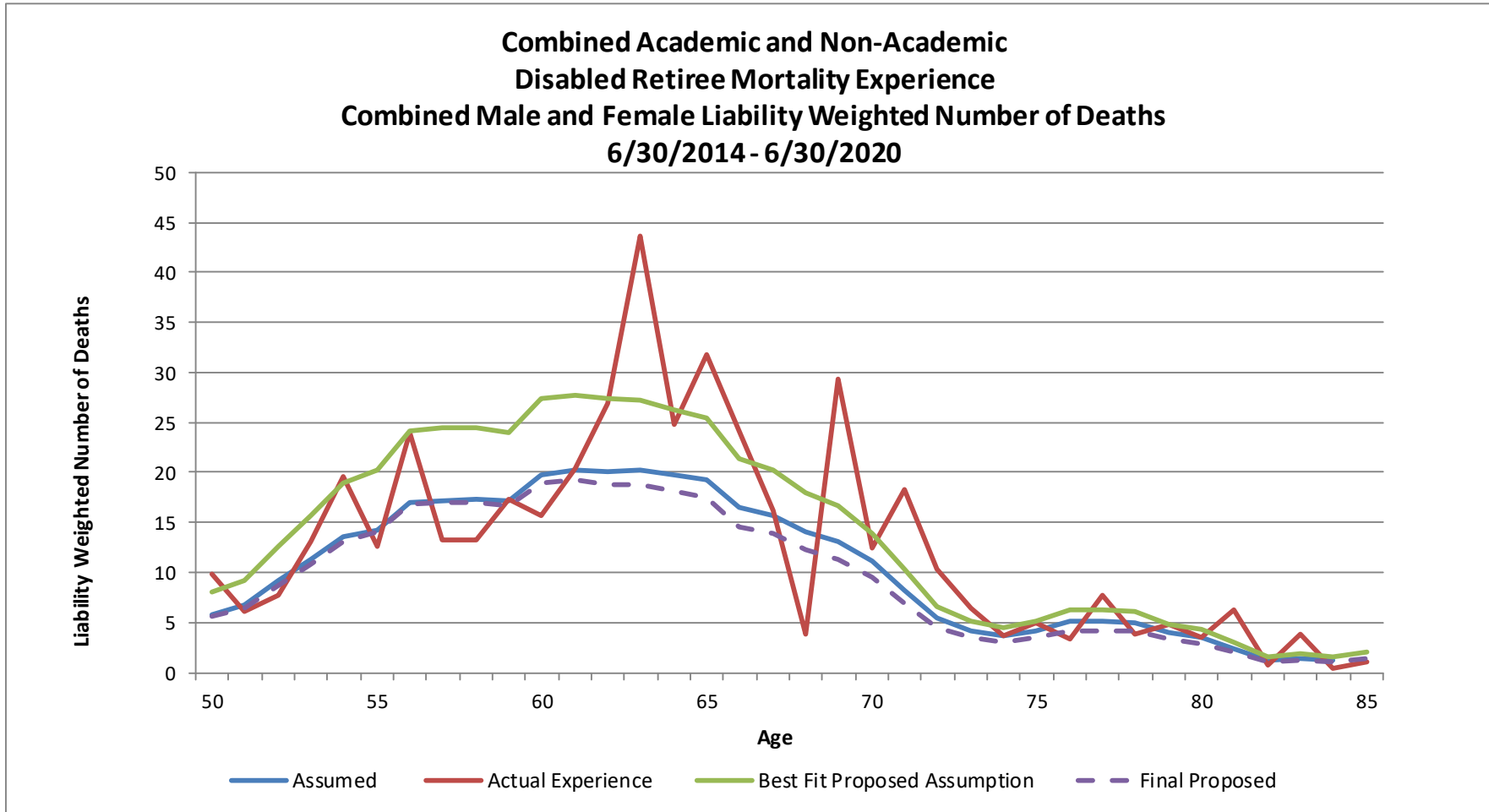
Male Disabled Retiree Mortality Experience																
Age	Actual Experience					Current Assumptions - LW				Best Fit Proposed Assumptions - LW			Final Proposed Assumptions - LW			
	Population Weighted		Liability Weighted (LW)		Actual Rates Weighted by		Expected	Assumed	Actual /	Expected	Proposed	Actual /	Expected	Expected	Proposed	Actual /
	Exposures	Deaths	Exposures	Deaths	Population	Liability	Deaths	Rate	Expected	Deaths	Rate	Expected	Deaths	Rate	Expected	
25-29	3	0	8	0	0.349%	0.000%	0	0.391%	0.00	0	0.670%	0.00	0	0.436%	0.00	
30-34	16	1	51	5	0.822%	9.814%	0	0.831%	11.80	0	0.937%	10.47	0	0.610%	16.08	
35-39	33	0	105	0	1.333%	0.000%	1	1.340%	0.00	1	1.210%	0.00	1	0.788%	0.00	
40-44	85	1	271	2	1.745%	0.645%	5	1.743%	0.37	4	1.515%	0.43	3	0.986%	0.65	
45-49	133	6	411	21	2.059%	5.223%	8	2.060%	2.53	9	2.080%	2.51	6	1.354%	3.86	
50-54	258	5	835	19	2.446%	2.327%	20	2.448%	0.95	26	3.065%	0.76	17	1.996%	1.17	
55-59	390	12	1,174	24	2.818%	2.006%	33	2.812%	0.71	47	3.968%	0.51	30	2.584%	0.78	
60-64	568	29	1,593	85	2.808%	5.339%	45	2.816%	1.90	64	4.027%	1.33	42	2.622%	2.04	
65-69	356	22	899	51	4.475%	5.724%	41	4.592%	1.25	57	6.382%	0.90	37	4.156%	1.38	
70-74	158	16	266	27	6.123%	10.084%	18	6.852%	1.47	24	9.195%	1.10	16	5.988%	1.68	
75-79	94	11	195	17	8.019%	8.706%	15	7.690%	1.13	20	10.104%	0.86	13	6.580%	1.32	
80-84	33	7	39	8	12.232%	19.542%	6	14.538%	1.34	8	19.173%	1.02	5	12.485%	1.57	
Other	25	2	21	3	3.451%	12.919%	1	5.108%	2.53	1	6.732%	1.92	1	4.383%	2.95	
Totals:	2,152	112	5,867	262	3.536%	4.463%	195	3.317%	1.35	261	4.453%	1.00	170	2.899%	1.54	
Female Disabled Retiree Mortality Experience																
25-29	4	0	10	0	0.228%	0.000%	0	0.231%	0.00	0	0.436%	0.00	0	0.316%	0.00	
30-34	31	0	109	0	0.457%	0.000%	1	0.468%	0.00	1	0.681%	0.00	1	0.493%	0.00	
35-39	85	3	313	11	0.741%	3.506%	2	0.746%	4.70	3	0.916%	3.83	2	0.663%	5.29	
40-44	150	4	523	8	1.032%	1.622%	5	1.026%	1.58	6	1.219%	1.33	5	0.882%	1.84	
45-49	298	8	940	24	1.273%	2.600%	12	1.276%	2.04	16	1.738%	1.50	12	1.258%	2.07	
50-54	498	13	1,610	37	1.633%	2.284%	26	1.624%	1.41	39	2.408%	0.95	28	1.743%	1.31	
55-59	864	21	2,408	57	2.069%	2.368%	50	2.066%	1.15	71	2.941%	0.81	51	2.128%	1.11	
60-64	1073	36	2,606	78	2.079%	2.999%	55	2.121%	1.41	72	2.761%	1.09	52	1.998%	1.50	
65-69	572	18	1,059	34	3.385%	3.242%	37	3.537%	0.92	44	4.179%	0.78	32	3.024%	1.07	
70-74	209	12	270	17	4.825%	6.215%	14	5.323%	1.17	16	5.896%	1.05	12	4.267%	1.46	
75-79	128	7	119	6	6.717%	5.113%	8	6.823%	0.75	9	7.422%	0.69	6	5.371%	0.95	
80-84	63	7	37	5	9.744%	12.678%	4	11.073%	1.14	5	12.269%	1.03	3	8.879%	1.43	
Other	44	12	19	5	3.965%	24.992%	1	4.986%	5.01	1	6.077%	4.11	1	4.398%	5.68	
Totals:	4,019	141	10,024	282	2.497%	2.818%	216	2.159%	1.31	283	2.819%	1.00	205	2.040%	1.38	
Grand Totals:	6,171	253	15,892	544	2.860%	3.425%	411	2.586%	1.32	544	3.422%	1.00	375	2.358%	1.45	

Expected deaths under the current and proposed assumptions are on a liability weighted basis.



Mortality Assumptions

Graph V(c)



Other Valuation Assumptions

Plan Election Percentage

Historically, members have been able to elect to participate in one of the two defined benefit plans, the Traditional Plan and the Portable Plan, or a defined contribution plan, the Retirement Savings Plan (RSP), which prior to September 1, 2020 was called the Self-Managed Plan (SMP).

Below is a summary of the election percentage for the RSP over the current and prior experience study period for all new members. The RSP election rate has been increasing since the implementation of Tier 2. In addition, the RSP election rate by payroll is higher than the RSP election rate by member count. This means that higher paid members are electing RSP in higher rates than lower paid members.

Fiscal Year End	RSP		RSP % of			
	Election	Total	Total	RSP Payroll	Total Payroll	RSP % of Total
2011	576	4,999	12%	\$26,313,040	\$158,945,724	17%
2012	905	5,980	15%	49,647,414	219,476,815	23%
2013	1,182	6,490	18%	63,653,331	226,530,240	28%
2014	1,206	6,062	20%	61,439,095	198,297,074	31%
2011-2014	3,869	23,531	16%	201,052,880	803,249,854	25%
2015	1,104	6,112	18%	63,337,720	213,701,866	30%
2016	906	5,019	18%	52,500,782	180,444,525	29%
2017	907	4,894	19%	50,705,974	176,714,628	29%
2015-2017	2,917	16,025	18%	166,544,476	570,861,019	29%
2018	1,082	5,563	19%	58,726,642	200,290,628	29%
2019	1,206	6,483	19%	65,619,059	237,130,015	28%
2020	1,279	6,440	20%	83,833,790	263,480,540	32%
2018-2020	3,567	18,486	19%	208,179,491	700,901,183	30%
2015-2020	6,484	34,511	19%	374,723,967	1,271,762,203	29%
Total	10,353	58,042	18%	575,776,847	2,075,012,056	28%

Below is a summary of the election percentage for the RSP over the experience study period for new members with salaries greater than or equal to \$100,000.

Fiscal Year End	RSP		RSP % of	
	Election	Total	Total	Total
2011	49	146	34%	
2012	90	204	44%	
2013	112	188	60%	
2014	125	177	71%	
2011-2014	376	715	53%	
2015	126	204	62%	
2016	112	186	60%	
2017	103	184	56%	
2015-2017	341	574	59%	
2018	112	189	59%	
2019	132	233	57%	
2020	207	295	70%	
2018-2020	451	717	63%	
2015-2020	792	1,291	61%	
Total	1,168	2,006	58%	

Other Valuation Assumptions

Below is a summary of the election percentage for the RSP over the experience study period for new Tier 2 members shown separately for Academic and Non-Academic member classifications.

Fiscal Year End	RSP		RSP % of			RSP % of
	Election	Total	Total	RSP Payroll	Total Payroll	Total
Academic						
2018	293	1,010	29%	\$23,262,613	\$53,407,543	44%
2019	348	1,151	30%	27,129,037	62,541,124	43%
2020	350	1,133	31%	29,262,190	62,737,682	47%
2018-2020	991	3,294	30%	\$79,653,840	\$178,686,350	45%
Non-Academic						
2018	722	4,029	18%	\$32,695,185	\$129,188,942	25%
2019	791	4,715	17%	35,930,155	153,238,612	23%
2020	879	4,800	18%	52,056,369	182,377,957	29%
2018-2020	2,392	13,544	18%	\$120,681,709	\$464,805,511	26%
Total	3,383	16,838	20%	\$200,335,549	\$643,491,860	31%

Totals for 2018-2020 differ from prior page due to only including Tier 2 members. Certain members who are new actives may be eligible to participate in Tier 1.

We recommend using the following assumptions for plan elections, which are different for Academic and Non-Academic member classifications.

Plan Election Assumptions for Future New Hires			
	Current	Proposed	
		Academic	Non-Academic
Retirement Savings Plan (RSP)	30%	45%	25%
Tier 2 Plan	70%	55%	75%

Other Valuation Assumptions

Money Purchase Factors

The money purchase factors, which apply by statute to Rule 2 benefit calculations, are to be updated each time there is a change in the investment return assumption or the post-retirement mortality assumption. The current money purchase factors are based on an investment return assumption of 6.75 percent and a mortality assumption based on the RP-2014 White Collar Annuitant mortality tables.

Based on the recommendations in this experience study, GRS is recommending a change in the post-retirement mortality assumption to be first effective with the next valuation as of June 30, 2021. In the past when the factors have changed, the Board has adopted an effective date for implementation of the new money purchase factors. These factors will apply only to members hired before July 1, 2005, who are eligible for the money purchase benefit formula.

Following is the language from the Illinois Pension Code regarding actuarial assumptions used for benefit administration, including the calculation of money purchase factors.

(40 ILCS 5/15-124) (from Ch. 108 1/2, par. 15-124)

Sec. 15-124. Actuarial tables.

"Actuarial tables": Such tabular listings of assumed rates of decrement such as death, disability, retirement and withdrawal from service, according to age and sex, including mathematical functions derived from the rates of probability, combined with an interest discount factor, as are adopted by the board based upon the experience of the system.

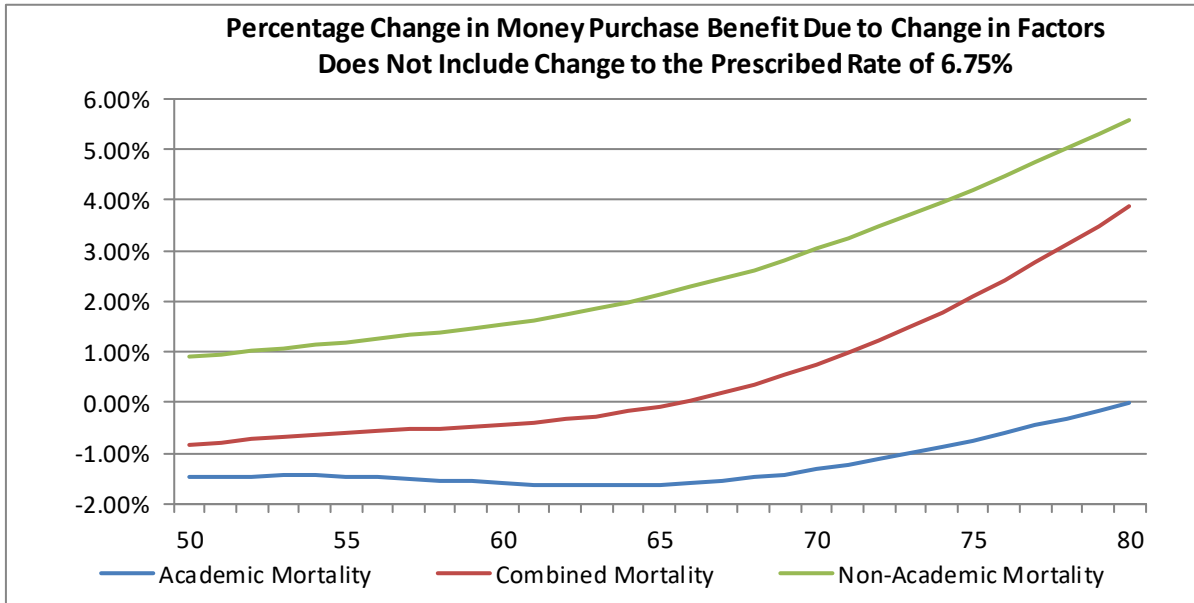
For actuarial valuation purposes, GRS is recommending separate mortality rates for members for Academic and non-Academic employment types. However, for purposes of money purchase factors and other administrative purposes, we would recommend a combined mortality assumption that applies to all SURS members. The table below summarizes the separate assumptions recommended for actuarial valuation purposes and the combined mortality assumption recommended for administrative purposes. The money purchase factors are based on a unisex blend of 45% of the male rates and 55% of the female rates. There are other reasonable methods that could be used for a single mortality assumption for the money purchase factors other than the assumption shown in the table below, such as calculating separate money purchase factors based on Academic mortality and Non-Academic mortality and then blending the separate sets of money purchase factors.

Post-retirement (non-disabled) for Applicable Group	Base Table Mortality Table	Male Scaling Factor	Female Scaling Factor
Academic	Pub-2010 Healthy Retiree Mortality Table (for Teachers)	99%	105%
Non-Academic	Pub-2010 Healthy Retiree Mortality Table (for General Employees)	99%	107%
Combined Academic and Non-Academic	Pub-2010 Healthy Retiree Mortality Table (for Teachers)	106%	121%

Other Valuation Assumptions

Following is a graph illustrating the impact of the change in a member's benefit as a result to the change in the money purchase factors based on the proposed assumptions. Please note that this does not reflect a change to the investment return assumption of 6.75 percent. The investment return assumption will be studied in May/June of 2021 and recommendations will be made then.

The money purchase benefit is calculated such that the money purchase balance is sufficient to pay benefits for the assumed lifetime of the retiree based on assumed future investment earnings.



Following is a table summarizing the money purchase benefit under the current factors and the factors using the proposed assumptions. In addition, the table shows the benefit under each set of factors if the member continued working for one additional year and retired with a higher money purchase balance. Although a member may have a lower benefit under the updated money purchase factors, a member would still accrue a higher benefit by working one additional year compared to retiring immediately before the change in the money purchase factors.

Immediate Monthly Benefit			Monthly Benefit 1 Year Later			Inc in Monthly Benefit 1 Year	
Age	Current	Proposed	Age	Current	Proposed	Current to Current	Current to Proposed
50	\$1,202	\$1,192	51	\$1,367	\$1,357	\$165	\$155
55	\$1,254	\$1,247	56	\$1,431	\$1,423	\$176	\$168
60	\$1,329	\$1,323	61	\$1,521	\$1,515	\$192	\$186
65	\$1,435	\$1,434	66	\$1,650	\$1,651	\$215	\$216
70	\$1,592	\$1,604	71	\$1,843	\$1,861	\$251	\$269
75	\$1,833	\$1,872	76	\$2,140	\$2,192	\$307	\$359

In addition, a member eligible for the money purchase formula will receive the greater of the money purchase formula benefit and the general formula benefit. Therefore, not all money purchase eligible members will be affected and the impact for a member may be less than the example shown above.

Other Valuation Assumptions

The annuity factors are based on member ages in the year 2024. Because the proposed mortality assumption is a generational mortality table, each cohort of retirees based on birth year would have a slightly different factor. In order to have one set of factors that will apply until the next experience study, we have calculated factors based on the mid-point of the expected timeframe in which the factors are expected to be effective.

Following is an age and service schedule for active members from the actuarial valuation as of June 30, 2020, who are eligible for benefits under the money purchase formula. Approximately 10,000 to 11,000 members are eligible to retire immediately under early or normal retirement eligibility conditions and the money purchase formula.

Service - Academic							
Age	< 10	10-14	15-19	20-24	25-29	30+	Total
<50	130	173	853	283	28	0	1,467
50-54	89	108	555	453	230	16	1,451
55-59	79	84	525	489	412	97	1,686
60-64	86	76	428	383	365	197	1,535
65-69	49	76	288	228	252	195	1,088
70-74	26	39	140	93	87	95	480
75+	2	13	53	39	44	51	202
Total	461	569	2,842	1,968	1,418	651	7,909
Service - Non-Academic							
Age	< 10	10-14	15-19	20-24	25-29	30+	Total
<50	82	105	1,507	906	221	6	2,827
50-54	55	60	696	704	516	168	2,199
55-59	48	43	707	654	474	296	2,222
60-64	43	44	571	514	334	260	1,766
65-69	14	24	256	241	160	111	806
70-74	1	12	78	70	76	37	274
75+	0	0	27	34	18	26	105
Total	243	288	3,842	3,123	1,799	904	10,199
Service - Total							
Age	< 10	10-14	15-19	20-24	25-29	30+	Total
<50	212	278	2,360	1,189	249	6	4,294
50-54	144	168	1,251	1,157	746	184	3,650
55-59	127	127	1,232	1,143	886	393	3,908
60-64	129	120	999	897	699	457	3,301
65-69	63	100	544	469	412	306	1,894
70-74	27	51	218	163	163	132	754
75+	2	13	80	73	62	77	307
Total	704	857	6,684	5,091	3,217	1,555	18,108

Other Valuation Assumptions

Load on Liabilities for Service Retirees with Non-finalized Benefits

Prior to 2013, there had been liability losses for recent retired members due to finalized benefits that were higher than the preliminary estimates. Therefore, an additional 10 percent load on the estimated benefits had been assumed. Beginning with the 2013 actuarial valuation, SURS provided additional data for members whose benefits had not been finalized to help improve the liability measurement. A “best formula” benefit was provided which was higher than the benefits which had originally been provided. In the 2014 valuation, the losses generated for these members were significantly reduced.

Beginning with the June 30, 2015, actuarial valuation, the assumption was changed to the following:

- (1) A load of 10 percent on liabilities is assumed for service retirees whose benefits have not been finalized as of the valuation date and a “best formula” benefit **was not** provided in the data by Staff
 - (a) The assumption accounts for finalized benefits are on average about 10 percent higher than 100 percent of the preliminary estimated benefit
- (2) A load of 5 percent on liabilities is assumed for service retirees whose benefits have not been finalized as of the valuation date and a “best formula” benefit **was** provided in the data by Staff
 - (a) The assumption accounts for finalized benefits are on average about 5 percent higher than the “best formula” benefit

On the following page is a comparison of the ratio of the finalized benefits to the estimated benefits based on the current assumptions and data from the 2019 and 2020 valuations. The ratio is calculated in accordance with the following example:

- (1) Best formula monthly benefit provided for 2019 actuarial valuation: \$4,000
- (2) Projected benefit in 2020: $\$4,000 * 1.03$ (COLA increase) $* 1.05$ (5% load) = \$4,326
- (3) Finalized benefit provided for the 2020 actuarial valuation: \$4,200
- (4) Ratio of the finalized benefit to the estimated benefit: $\$4,200 / \$4,326 - 1 = -3\%$

Following is the ratio of the total estimated to finalized benefits as of June 30, 2020 based on the current assumptions:

Total Finalized Benefits	\$3,774,529
Total Estimated Benefits	3,800,593
Ratio (Finalized to Estimated)	-0.7%

The current assumptions resulted in estimated benefits that were slightly higher than the finalized benefits and is a slightly conservative assumption. We recommend no changes to the current assumptions.

Other Valuation Assumptions

Ratio of Finalized Benefits to Estimated Benefits (Based on Current Assumptions)

	General Formula	Money Purchase	Police/ Fire	Total	% of Total 2020	% of Total 2019	% of Total 2018
< -50%	4	2	-	-	0%	0%	0%
-50% - -41%	1	1	-	2	0%	0%	0%
-40% - -31%	2	1	-	3	0%	0%	0%
-30% - -21%	8	2	-	10	1%	1%	1%
-20% - -11%	47	66	-	113	9%	7%	7%
-10% - -1%	354	475	5	834	65%	62%	62%
0% - 9%	194	55	1	250	19%	22%	21%
10% - 19%	18	5	2	25	2%	4%	3%
20% - 29%	7	5	-	12	1%	2%	1%
30% - 39%	2	3	-	5	0%	0%	0%
40% - 49%	-	1	-	1	0%	0%	0%
>= 50%	28	4	-	32	2%	2%	4%
Totals	665	620	8	1,287	100%	100%	100%

Other Valuation Assumptions

Ratio of Finalized Benefits to Estimated Benefits (Based on Current Assumptions)

	General Formula	Money Purchase	Police/ Fire	Total	% of Total	% of Grand Total	General Formula	Money Purchase	Police/ Fire
-10%	16	9	0	25	2%	2%	2%	1%	0%
-9%	14	19	0	33	3%	3%	2%	3%	0%
-8%	17	25	0	42	4%	3%	3%	4%	0%
-7%	11	9	0	20	2%	2%	2%	1%	0%
-6%	30	33	0	63	6%	5%	5%	5%	0%
-5%	109	200	0	309	28%	24%	16%	32%	0%
-4%	37	94	1	132	12%	10%	6%	15%	13%
-3%	50	60	2	112	10%	9%	8%	10%	25%
-2%	44	18	0	62	6%	5%	7%	3%	0%
-1%	26	8	2	36	3%	3%	4%	1%	25%
0%	27	12	0	39	4%	3%	4%	2%	0%
1%	31	16	0	47	4%	4%	5%	3%	0%
2%	27	8	1	36	3%	3%	4%	1%	13%
3%	31	8	0	39	4%	3%	5%	1%	0%
4%	14	4	0	18	2%	1%	2%	1%	0%
5%	21	1	0	22	2%	2%	3%	0%	0%
6%	12	3	0	15	1%	1%	2%	0%	0%
7%	10	2	0	12	1%	1%	2%	0%	0%
8%	11	1	0	12	1%	1%	2%	0%	0%
9%	10	0	0	10	1%	1%	2%	0%	0%
10%	7	2	0	9	1%	1%	1%	0%	0%
Totals	555	532	6	1,093	100%	85%	83%	86%	75%

Other Valuation Assumptions

Increase in Pensionable Earnings Greater than 6% during the Final Average Compensation Period (6% Employer Billing Contributions)

Under Section 15-155(g) of the Illinois Compiled Statutes, a participant's employer is required to fund the value of increases in pensionable earnings greater than 6% that would be used in the determination of the final rate of earnings. No additional assumption is currently being made for earnings used in the calculation of the final rate of earnings.

Following is a history of the contributions received from employers due to this provision and the amount as a percentage of projected payroll (from the actuarial valuation used to determine the applicable fiscal year statutory contribution):

\$ in Millions				
Fiscal Year	Number of Participants	Amount from Employers	Projected Payroll	Amount as % of Payroll
2014	226	\$1.9	\$4,274.0	0.04%
2015	357	2.5	4,435.6	0.06%
2016	336	2.2	4,499.7	0.05%
2017	379	3.1	4,610.0	0.07%
2018	290	2.4	4,587.7	0.05%
2019	318	2.4	4,593.5	0.05%
2020	241	2.3	4,551.0	0.05%
Average	307	2.4	4,507.4	0.05%

Based on SURS experience, the proposed salary increase assumption is 5.00 percent (4.25 percent for age 50 and older) grading down to an ultimate assumed rate of increase of 3.50 percent (3.00 percent for age 50 and older) for members with 10 or more years of service. Therefore, the actuarial valuation does not assume that members will receive pay increases in excess of 6.00 percent during the period used for the final rate of earnings. To the extent that members do receive increases in excess of 6.00 percent during the period used for the final rate of earnings, there will be a liability loss that will be partially offset by the employer contributions required by statute.

Due to the relatively small amount of contributions that are received to this provision, we recommend that no assumption be made for either the contributions received or the liability losses generated by members receiving pay increases in excess of 6.00 percent during the final average earnings period. In addition, we expect that the pay cap under Tier 2 will result is a decrease in the 6% employer billing contributions as a percentage of payroll in the future.

Other Valuation Assumptions

Buyout Election Assumptions

Under Public Act (PA) 100-0587, the State Universities Retirement System of Illinois (“SURS”) shall offer an accelerated pension benefit payment to eligible members beginning on the implementation date and until June 30, 2021. (Public Act 101-0010 extended the buyout period from June 30, 2021 through June 30, 2024 for both accelerated pension benefit options.) Assumptions are made and used in the actuarial valuations for these provisions.

There are two accelerated pension benefit payment options that are being offered: (1) for vested inactive members, a payment equal to 60% of the present value of the member’s pension benefit in lieu of receiving any pension benefit; and (2) for active Tier 1 members eligible for retirement, a payment equal to 70% of the difference between (i) the present value of the automatic annual increases (AAI) to a Tier 1 member's retirement annuity under the current AAI provisions and (ii) the present value of the automatic annual increases to the Tier 1 member's retirement annuity under revised AAI provisions.

The accelerated pension benefit payments are to be paid from the State Pension Obligation Acceleration Bond Fund after SURS submits vouchers for the payments to the State Comptroller. The funds do not come from SURS assets.

GRS issued a letter dated August 8, 2018 with the rationale for using buyout election assumptions of 0% in the actuarial valuation as of June 30, 2018. An assumption of 0% was also used in the actuarial valuation as of June 30, 2019. Through September 30, 2019 no members had elected either buyout.

Following are the buyout statistics for the automatic annual increase (AAI) buyout and the vested inactive member buyout (VIB) from June 10, 2019 (when the buyout was first offered) through May 31, 2020 as provided by the Retirement System and supported the rationale for using the 0% assumption in the actuarial valuation as of June 30, 2020.

	6/10/2019 through 5/31/2020	
	<u>AAI</u>	<u>VIB</u>
Number Eligible for the buyout*	2,454	23,669
Buyout applications received	80	59
Buyout election forms sent	22	31
Buyout election forms approved	14	19
Application %	3.3%	0.2%
Approved %	0.6%	0.1%
Approved buyout amount**	\$1,369,244	\$2,951,402

* Number eligible for the VIB buyout is the number of vested Tier 1 inactive members included in the actuarial valuation as of June 30, 2019 who are in the Traditional or Portable Plan.

**Includes amounts attributable to benefits that would have been payable from the Excess Benefit Arrangement (EBA).

The current buyout election assumption of 0% is a reasonable and modestly conservative assumption. Increasing this assumption would reduce the Statutory contribution below the amount that can be justified by actual experience. Doing so based upon so little data would risk underfunding the System if



Other Valuation Assumptions

the increase turned out to be too aggressive. Therefore, we recommend maintaining the buyout election assumption of 0% until the buyout experience suggest a different assumption. This means that the savings from the buyout program will be recognized each year as they occur – a common approach for this type of program.

Assumed Marital Status during Active Employment

An assumption is made in the actuarial valuation on the percentage of active members who are married for purposes of estimating pre-retirement survivor benefits and estimating the percentage of Traditional Plan members who will have a postretirement beneficiary.

Following is a table with statistics on marital status for active SURS members as provided by SURS staff. Based on the information provided, we are recommending changes to the current assumptions.

Age	Male				Female			
	% No Information	% Married	Current Assumption	Proposed Assumption	% No Information	% Married	Current Assumption	Proposed Assumption
20-24	56%	5%	25%	10%	61%	15%	40%	25%
25-29	60%	22%	48%	35%	53%	37%	58%	45%
30-34	47%	47%	70%	60%	42%	57%	75%	65%
35-39	36%	63%	76%	70%	32%	64%	78%	70%
40-44	27%	70%	80%	75%	26%	69%	80%	75%
45-49	23%	75%	83%	80%	21%	70%	80%	75%
50-54	19%	78%	85%	80%	20%	73%	80%	75%
55-59	17%	80%	85%	80%	17%	72%	75%	75%
60-64	18%	80%	85%	80%	17%	69%	70%	70%
65-69	16%	81%	85%	80%	17%	62%	70%	70%
70-74	17%	82%	85%	80%	20%	65%	70%	70%
75-79	17%	79%	85%	80%	29%	54%	70%	70%
80-84	34%	85%	85%	80%	20%	46%	70%	70%
85-89	9%	80%	85%	80%	0%	25%	70%	70%

SECTION III

COST IMPACT OF RECOMMENDED CHANGES

Cost Impact of Recommended Changes

The impact of adopting the recommended assumptions is summarized in the table below. The recommended assumptions decrease the actuarial liability and alternate policy* contribution requirements and increase the funded ratio.

Dollars in Millions				
	Actuarial Valuation as of 6/30/20	Proposed Assumptions	Total Change	% Increase (Decrease)
Actuarial Accrued Liability				
1. Active Members	\$ 11,755.1	\$ 11,774.5	\$ 19.4	0.17%
2. Benefit Recipients				
a. Retirement	\$ 30,762.3	\$ 30,093.7	\$ (668.6)	-2.17%
b. Survivor	1,829.5	1,780.0	(49.50)	-2.71%
c. Disability	270.2	278.3	8.1	3.00%
Total - Benefit Recipients	\$ 32,862.0	\$ 32,152.0	\$ (710.0)	-2.16%
3. Other Inactive	\$ 2,963.4	\$ 2,937.1	\$ (26.3)	-0.89%
4. Grand Total	\$ 47,580.5	\$ 46,863.6	\$ (716.9)	-1.51%
Actuarial Results				
Actuarial Value of Assets	\$ 20,091.7	\$ 20,091.7	\$ 0.0	0.00%
Unfunded Actuarial Accrued	\$ 27,488.8	\$ 26,771.9	\$ (716.9)	-2.61%
Funded Ratio	42.23%	42.87%	0.65%	0.65%
Alternate Policy Contribution*	\$ 2,499.4	\$ 2,448.0	\$ (51.4)	-2.06%

*Based on normal cost plus 30-year closed period amortization (24 years remaining)