RPEC Response to Comments on Pub-2010 Public Retirement Plans Mortality Tables Exposure Draft

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Caveat and Disclaimer

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Section 1: Overview

1.1 Background

In August 2018, the Society of Actuaries (SOA) Retirement Plans Experience Committee (RPEC or "the Committee") released the Pub-2010 Public Retirement Plans Mortality Tables Report in exposure draft form. The SOA solicited comments on the exposure draft through the end of October 2018. This report summarizes the comments received on the Pub-2010 exposure draft, presents the Committee's formal responses to those comments, and identifies any resulting changes reflected in the final report.

The SOA received comments from eight individuals and organizations on the Pub-2010 exposure draft. Some of the comments were submitted via formal comment letters that addressed multiple topics, some were raised on phone calls or at meetings with committee members, and some were in the form of e-mail messages that focused on one specific topic. RPEC would like to thank those individuals and organizations that took the time to review the report and submit their feedback.

1.2 The Use of Pub-2010 Tables as Benchmarks

Several of the comments submitted to the Committee during the exposure period dealt with practical issues related to the selection and application of appropriate Pub-2010 tables. Although not explicitly emphasized in the exposure draft, RPEC believes that regarding the published Pub-2010 tables as "benchmarks" provides a useful paradigm for addressing many of those comments. For example, covered populations that are not large enough to support fully credible mortality results might use suitably selected Pub-2010 tables as benchmark starting points (i.e., tables that in conjunction with a recent mortality experience study could be used with appropriate adjustments or as reference tables for credibility-weighted blended mortality rates).

Subsections 1.5 (Application of Pub-2010 Tables) and 12.2 (Selecting Appropriate Benchmark Tables) have been updated in the final report to reflect the Committee's increased emphasis on the benchmark nature of the Pub-2010 tables.

1.3 Structure of Response to Comments

This document is organized into the following sections:

- Section 2: Treatment of Geographic Region
- Section 3: Treatment of Social Security Benefits
- Section 4: Application of Above- and Below-Median Income Tables
- Section 5: Documentation of GAM Graduation Process
- Section 6: Contingent Survivor Tables
- Section 7: Further Splits Within Job Categories
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Each section is organized into four subsections:

1. A short background paragraph
2. A summary of the comments received
3. RPEC's response to those comments
4. Changes, if any, made to the final Pub-2010 report

Section 2: Treatment of Geographic Region

2.1 Background

Data were collected from public pension systems from across the country, which allowed the Committee an opportunity to investigate whether geographic region[1] is an effective predictor of relative mortality experience. Although some subsets of the data exhibited some variation in mortality by geographic region, RPEC's multivariate analysis showed that the explanatory power of geography was considerably lower than that of both the job category and amount-based quartile covariates. Based on those results and the fact that the data submitted for the study were not uniform across broad geographies, the Committee decided that it would not develop separate mortality tables or adjustment factors based on geographic region.

2.2 Summary of Comments Received

RPEC received comments from two feedback providers on the treatment of geographic region.

One commenter suggested that if publishing full mortality tables by region is impractical, RPEC should publish level adjustments based on geography, stating that the geographic effect could be determined via a modeling approach that controls for other factors. This commenter also suggested estimating a priori adjustments to the exposures based on publicly available state and county-level life expectancy data. This commenter stated that such adjustments could help ensure that the Pub-2010 tables are geographically neutral.

A second commenter inquired about the above- and below-median income tables and whether RPEC could provide any additional commentary about the dispersion of mortality results around these averages by geographic region.

2.3 RPEC Response

Because of certain data confidentiality issues discussed more fully below and considering the results of the multivariate analysis highlighted in subsection 2.1, the Committee continues to have concerns that potential geographical differences in mortality could be accurately identified and incorporated (e.g., through adjustment factors) into the Pub-2010 rates as currently published.

The only parties that had direct access to mortality results by contributor were those on the outside data processing firm's team and specific SOA staff members. Strict confidentiality requirements restricted the distribution to other parties of details of the submitted data, including geographic information at the state level. As a result, no state-specific information was included in the final datasets that were used in the study's multivariate analysis and in the production of the final Pub-2010 mortality tables.

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[1] The determination of "geographic region" was based on the four broad regions (Northeast, Midwest, South and West) defined by the U.S. Census Bureau in the 2010 U.S. Census.

Without knowledge of the state-specific distribution of exposures within each geographical region, it would have been impossible for RPEC to develop adjustments that reflect the relative concentration of exposures from low-mortality states and high-mortality states within the region. Therefore, the Committee could not create adjustments that could have made the Pub-2010 tables more geographically neutral.

It is also important to remember that the existing Pub-2010 mortality rates already reflect variations due to job category and (possibly) above- or below-median levels. So, even if such relative state-specific concentrations of exposures were available, it is not clear how geographical adjustments could be developed in a way that would not potentially double count the impact of those covariates for a given state.

With respect to the comment regarding the dispersion of mortality rates by geographic region, section 11.2 of the exposure draft presented comparisons of above- and below-median deferred-to-62 annuity values to the corresponding full subpopulation annuity values for all three job categories. That analysis showed the following:

- The annuity impact for males in each of the three job categories was considerably larger than that for females, most dramatically for General members, and

- The annuity impact of income was considerably smaller for Teachers (especially females) than for Safety or General members.

Consistent with the first bullet point above, further analysis performed by the Committee has shown that the overall dispersion of mortality rates by geographical region was consistently smaller for females than for males. Consistent with the second bullet point, the overall dispersion level between geographical regions was strongly correlated with the relative distribution of job categories within that region. In particular, the region that exhibited the largest degree of mortality rate dispersion had the lowest relative percentage of Teacher exposure and the highest relative percentage of General Employee exposure.

2.4 Resulting Changes Reflected in Final Report
No changes were made to the final report as a result of these comments.

Section 3: Treatment of Social Security Benefits

3.1 Background

The Pub-2010 tables have been prepared to allow income levels of annuitant populations to be taken into account. However, the income levels measured did not include Social Security benefits.

3.2 Summary of Comments Received

Three commenters provided feedback related to the impact of Social Security benefits on retirement income analysis.

The comments included an inquiry of whether the median benefit amounts include applicable Social Security benefits, with one commenter suggesting that separate median income thresholds should be developed for members who participate in Social Security and members who do not participate in Social Security. A request was made for RPEC to adjust the benefits-weighted analysis to account for Social Security coverage or for RPEC to collect data on Social Security coverage for future studies if this information was not received for this study.

3.3 RPEC Response

Although RPEC agrees that analysis of the effects of income on mortality would ideally take Social Security into consideration, the Committee was unable to do that, because information on the Social Security benefits of annuitants was not collected. RPEC believes that it would be difficult, if not impossible, to gather such data, because the Committee is not aware of any public retirement systems that have access to information about the Social Security benefit amounts received by their participants. Although it is known that public-sector employees in some states tend to be covered by Social Security and those (or some of those) in other states tend not to be, this does not allow RPEC to distinguish reliably between annuitants within the exposure data who receive Social Security benefits and those who do not. Some states in which workers are now covered by Social Security did not elect coverage for their workers until decades after Social Security was established, which raises the possibility that some annuitants in these "Social Security states" do not receive Social Security benefits. At the same time, public workers in "non-Social Security states" have often spent some time in private-sector employment, which raises the possibility that public-sector retirees in these states are receiving Social Security benefits.

As a result of these comments, RPEC performed a high-level analysis to examine whether the presence of Social Security benefits might have had an impact on the study's mortality results. Using publicly available indicators of Social Security participation by state and job category,[2] RPEC assigned to each plan in the study either a "probable Social Security" code or a "probable non-Social Security" code. Actual-to-expected (A/E) mortality ratios were computed for both groups using the appropriate Pub-2010 table[3] as the expected basis for each member. RPEC compared the A/E ratios for the Social Security and non-Social

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[2] The indicator used was a state-by-state map sourced by the National Association of State Retirement Administrators with general qualifiers on job category. A summary can be found in the New York Times archive here.
[3] The table chosen depended on each member's gender, job category and income level. For example, the male PubT-2010(B) table was used for the expected mortality for male Teachers with below-median incomes.

Security groups and did not observe a consistent pattern. For some subpopulations, the A/E ratios for plans without probable Social Security benefits were slightly higher, whereas for other subpopulations, the A/E ratios for plans with probable Social Security benefits were slightly higher.

3.4 Resulting Changes Reflected in Final Report

No changes were made to the final report as a result of these comments.

Section 4: Application of Above- and Below-Median Income Tables

4.1 Background

Subsection 3.8 of the exposure draft describes how the above- or below-median characterization of nondisabled members[4] was derived from quartiles determined separately within each job category by gender and status (except in the case of Contingent Survivors, for whom job category was not utilized). The top two quartiles by amount (pay for Employees, benefit for Retirees and Contingent Survivors) were combined into Above-Median, and the bottom two quartiles combined into Below-Median. Table 3.2 in the exposure draft summarized those median amounts by gender, job category and status.

The Pub-2010 study provides Above-Median and Below-Median versions of mortality rates for Employees and Retirees of each job category and for Contingent Survivors. Section 1.4 of the Executive Summary notes, "Multivariate analysis indicated that salary (for Employees) and benefit amount (for Nondisabled Annuitants) were the most statistically significant predictors of mortality differences within individual gender/job classifications." Section 1.5 further indicates, "The statistical analyses summarized in this report confirm that members with higher amounts (salary for Employees and benefit amount for Nondisabled Annuitants) tend to have lower rates of mortality than those with lower amounts. Consistent with the principles of ASOP 35, the Above-Median and Below-Median tables developed in this report should be considered as alternative benchmarks to the corresponding 'total population' table, whenever appropriate."

4.2 Summary of Comments Received

Three feedback providers made comments regarding the application of the Above- and Below-Median income tables.

One commenter, citing the 70% threshold for collar type in the RP-2014 Mortality Tables Report, asked whether there is a specific numerical threshold for determining when the Above- or Below-Median income tables should be used.

Another commenter asked whether the Above- and Below-Median income tables are meant to be applied on a by-participant basis or a full-plan basis.

A third commenter stated that the Above- and Below-Median tables were developed from broad populations and questioned whether these tables would be applicable to different populations, given that testing was not performed on subsets of the data. Further, it was stated that it is difficult to justify that either (1) splitting a plan's population at the median income or (2) blending the tables based on the plan's population establishes an effective method for improving accuracy. The third commenter also noted that since the median amounts presented in the exposure draft were as of the central date of the study,

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[4] In contrast to the plan-by-plan assignment of collar designations in the RP-2014 study, the characterization of above- or below-median status within in the Pub-2010 study was performed on a member-by-member basis.

practitioners might need to adjust those breakpoints to be more temporally consistent with the underlying dataset.

4.3 RPEC Response

4.3.1 No Bright-Line Thresholds

There are no bright-line thresholds based exclusively on the above- or below-median concentrations within a population that would indicate the potential appropriateness of the Above- or Below-Median tables. In fact, even the 70% threshold described in the RP-2014 report was utilized as a mechanism for RPEC to categorize plans in the study rather than a clear-cut test for application.

4.3.2 Amount-Based Quartiles

To further assist users in identifying the most appropriate benchmark tables (or potentially a weighted average of more than one set of Pub-2010 rates), an expanded version of Table 3.2 that includes the 25th and 75th percentile amounts in addition to the median (50th percentile) amounts is shown in Table 4.1. The 25th percentile can be viewed as the median of the below-median subpopulation, and similarly the 75th percentile represents the median of the above-median subpopulation.

| Job Category | Percentile | Income Percentile Amounts ($) by Gender, Job Category and Status | | | | | |
| | | Females | | | Males | | |
		Employees	Retirees	Contingent Survivors*	Employees	Retirees	Contingent Survivors*
Teachers	25th	41,308	13,967	5,197	44,929	22,225	3,252
	50th	58,385	28,536	11,036	62,660	37,789	7,282
	75th	74,530	46,536	20,710	79,960	55,424	14,651
Safety	25th	44,027	13,429	5,197	53,536	23,511	3,252
	50th	61,775	29,243	11,036	72,154	36,909	7,282
	75th	86,380	43,912	20,710	95,673	53,973	14,651
General	25th	20,228	5,139	5,197	30,218	9,069	3,252
	50th	34,686	11,872	11,036	45,773	21,239	7,282
	75th	50,161	23,846	20,710	65,651	35,912	14,651

*The Pub-2010 tables distinguish Contingent Survivor mortality only by benefit amounts, not job category. The percentiles shown for Contingent Survivors are for the entire Contingent Survivor population for each gender.

Table 4.1: Expanded Version of Table 3.2 from Pub-2010 Exposure Draft

For example,[5] if a specific plan's male General Retiree population has median benefit amount over $35,000, one might expect that the Above-Median (benefit amount) rates would be a relevant benchmark, because the median of the above-median study population, that is, the 75th percentile, was $35,912. The total General Retiree median was $21,239, and the median of the below-median General Retirees, that is, the 25th percentile, was $9,069. A General plan with male Retiree median benefit over $35,000 seems, at least a priori, similar to the above-median Pub-2010 General population.

[5] The examples in this and the following paragraph are illustrative and not meant to endorse any specific approach.

As another example, if a specific plan's male General Retiree population has median benefit amount around $25,000, one might construct a relevant benchmark somewhere in between the "total subpopulation" General table rates and the Above-Median table rates. The plan's $25,000 median benefit falls between the 50th and 75th Pub-2010 percentiles, closer to the 50th percentile. Either the total General table or a weighted average of the total and Above-Median General Tables would seem to represent plausible benchmarks.

It must be noted that this sample methodology has not been tested empirically. It is given as a possible approach for utilizing above- and below-median mortality information to stimulate further investigation by practicing actuaries. As always, the actuary should use professional judgment to assess whether information that is available is in fact relevant and, if relevant, the extent to which it should be utilized or relied upon for any particular purpose.

4.3.3 Application to Populations

Members from many different plans were represented in each of the above- and below-median populations, and as is typical for large-scale mortality studies, this pooling was used to generate sufficient sample sizes for quantifying the frequency of events with small probabilities. Multivariate analysis in Section 4 of the exposure draft helped the Committee formulate which factors were most significantly correlated with mortality, such as pay and benefit amounts. It is true that RPEC did not back-test individual plans against the rate tables indicated by a plan's characteristics.

The fact that the Above- and Below-Median tables were based on the mortality experience from a broad cross section of public retirement systems is one of the main reasons why the Committee is encouraging users to treat these (and the other Pub-2010) tables as starting benchmarks, rather than sets of mortality rates that could be automatically applied as published without further testing for appropriateness. For example, starting with one or more relevant Pub-2010 benchmark tables (based on the job category and amount-based characteristics of the covered group) and, ideally, supplemented by results from a recent mortality experience study, the user should be able to determine which Pub-2010 tables (possibly blended, adjusted or credibility-weighted) represent the best fit relative to their population.

Most plans to which the Pub-2010 tables could be relevant will have actual mortality experience for comparison. Some plans will be large enough for mortality experience to be fully credible, whereas the experience of other plans will be only partially credible. Even small programs may be able to calculate simple A/E ratios relative to potential Pub-2010 benchmark tables to help select an appropriate basis.

RPEC originally anticipated that the Pub-2010 Above- and Below-Median tables would be applied on a plan-wide basis. Although it would be theoretically possible to split the covered group into two separate above- or below-median subgroups, such a bifurcation could become problematic, for example, with mortality gains and losses generated by members who shift between subgroups. However, subgroups such as exempt (salaried) versus nonexempt (hourly) might, depending on pay and benefits, be used as an appropriate distinction for the selection of reference mortality applicable to each.

RPEC welcomes feedback from practitioners regarding successful and appropriate approaches for utilizing the Pub-2010 tables.

4.3.4 Adjusting Quartile and Median Breakpoints

The determination of quartile and median breakpoint amounts were averaged over the years in the study and hence are generally representative of values as of the study's central year of July 1, 2010, to June 30, 2011. As correctly noted by the third commenter, these values might need to be adjusted to reflect changes in pay and benefit amounts between that study's central year and the "as of" date of the dataset being used in the particular application. In the case of salary, adjustments reflecting changes in U.S. average wages might provide an acceptable adjustment factor. Given the extent and wide variety of cost-of-living adjustment (COLA) practices in public sector retirement plans, however, reflecting appropriate temporal quartile adjustments to those in payment status would likely require specific knowledge about the system's COLA eligibility criteria and COLA methodology.

4.4 Resulting Changes Reflected in Final Report

The final Pub-2010 report includes an expanded version of Table 3.2, one that now includes all quartile breakpoints for pay and benefit amounts averaged over the study period (central year July 1, 2010, to June 30, 2011). The effective date of the values in Table 3.2 has been given further emphasis, along with a statement that the user might consider adjusting those values to the date of their application. Feedback on practitioners' experiences with these tables will help shape the scope and objectives of future SOA public-sector mortality studies.

No other changes were made to the final report as a result of these comments.

Section 5: Documentation of GAM Graduation Process

5.1 Background

Although generalized additive models (GAMs) have many theoretical advantages, the Committee was drawn mostly to their practical advantages. Prior RPEC studies applied Whittaker-Henderson graduation to a dataset after analysis revealed relevant and credible predictors. The process was manual, iterative and subject to significant judgment. RPEC faced the daunting task of manually fitting nearly 100 tables using Whittaker-Henderson graduation. GAM offered the Committee the opportunity to let an algorithm find the optimal smoothing parameter, and doing so in R allowed the Committee to fit many models simultaneously. Since the fitted rates were very close between the two methods, the Committee opted to use GAM.

The Committee nonetheless reviewed the modeled rates for reasonableness and goodness-of-fit, and in most cases, the model rates were satisfactory. In other low-credibility cases, other approaches were used to develop vectors of rates as described in Sections 6 through 9 of the exposure draft.

5.2 Summary of Comments Received

One commenter provided feedback and requested additional detail regarding the statistical aspects of the GAM methodology used in the study.

In a paper or report of a primarily statistical focus, it is customary to provide plots for goodness-of-fit and to disclose statistics computed from the model, such as the final smoothness parameter and effective degrees of freedom. The commenter requested the following:

1. Plots of raw versus graduated rates, with residual plots and associated statistical tests

2. The levels of smoothness obtained from the model fits

3. Additional information regarding the distributional assumption used in the fitting process and

4. Clarification on the link function used in the fitting process.

5.3 RPEC Response

RPEC agrees that for a statistical audience, details of the GAM are customarily included in a report. For the intended audience and usage of the tables, the Committee felt that including those items in this report would not have improved the audience's understanding of the overall process and outcomes.

That said, sample plots of observed versus fitted rates and Pearson residuals are presented in Figure 5.1 and Figure 5.2.
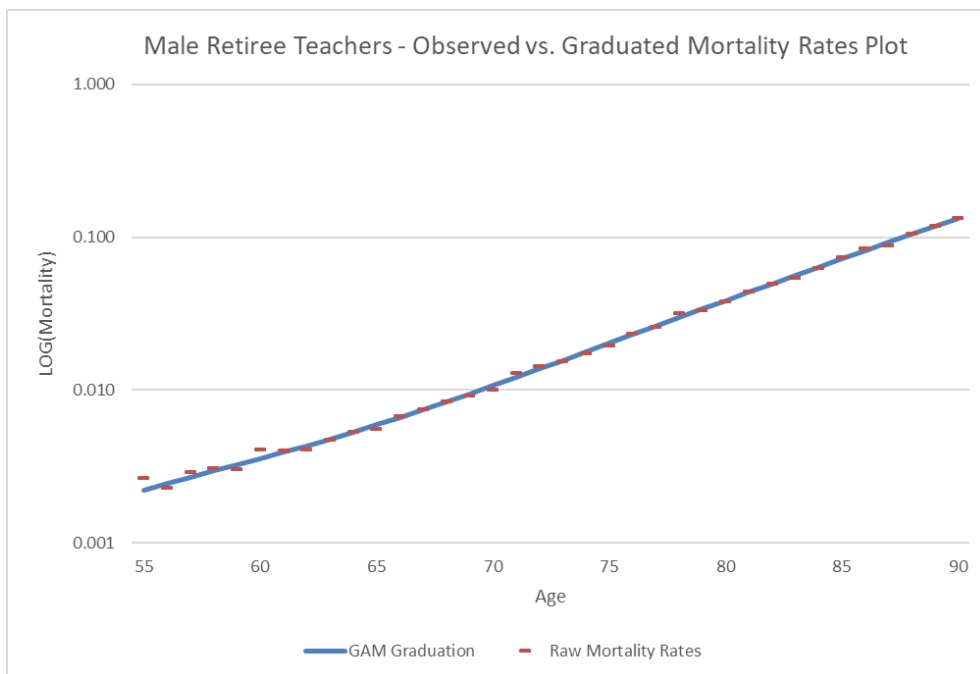
Figure 5.1: Sample Observed Versus Graduated Mortality Rates Plot: Male Retiree Teachers

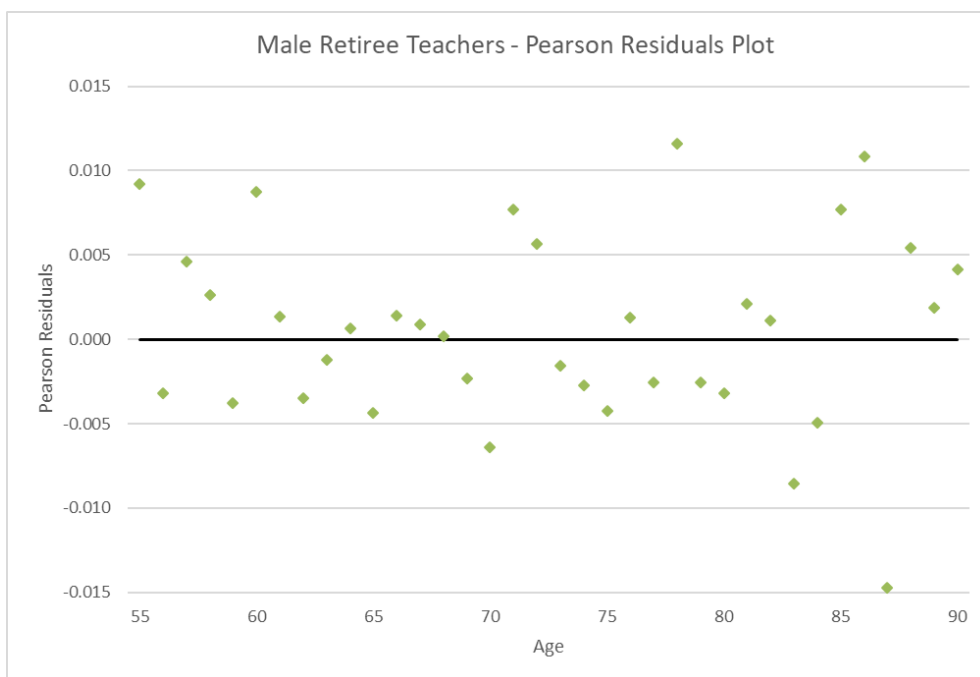
Figure 5.2: Sample Pearson Residuals Plot: Male Retiree Teachers[6]

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[6] The Pearson residual is the residual after subtracting the model mean and dividing by the model standard deviation: $(q_x - \hat{q}_x)/\sqrt{\hat{q}_x(1 - \hat{q}_x)}$.

The smoothness parameters and effective degrees of freedom for each GAM graduation tended to depend on whether the model was headcount-weighted or benefit-weighted and on the number of deaths underlying the model. Although the relationships were not ironclad, higher death counts tended to be associated with lower smoothing parameters and higher effective degrees of freedom. Higher death counts were associated with lower noise, and the reduction in noise meant that variation was more significant and credible. Therefore, more of the underlying spline functions were needed to capture the variation in the data. The benefit-weighted models had higher smoothing parameter estimates than their headcount-weighted counterparts, and the ratio of these for a given combination of variables correlated with the average benefit per annuitant.

Table 5.1 summarizes the ranges and median values for the smoothing parameters and effective degrees of freedom for datasets without regard to income level ("total subpopulation" tables) and for above- or below-median datasets ("income-specific" tables).

Table Group	Smoothing Parameter Range	Smoothing Parameter Median	Effective Degree of Freedom Range	Effective Degree of Freedom Median
Total subpopulation, headcount-weighted	14.2–10,567.5	2,100.5	2.7–8.2	4.7
Total subpopulation, amount-weighted	1.2×10^7–2.5×10^9	1.2×10^8	3.4–7.3	4.8
Income-specific, headcount-weighted	72.3–46,562.0	2,654.2	1.5–7.9	5.0
Income-specific, amount-weighted	5.5×10^6–3.3×10^7	1.1×10^8	1.3–7.7	4.5

Note: Values are for datasets without regard to income level ("total subpopulation" tables) and for above- or below-median datasets ("income-specific" tables).

Table 5.1: Ranges and Median Values for Smoothing Parameters and Effective Degrees of Freedom

The ranges excluded certain cases for which the smoothing parameter was several orders of magnitude higher than the others. In all such cases, the associated effective degree of freedom was 1, which means that the GAM model was equivalent to a log-linear model. Additionally, such cases were those with low death counts (100s to low 1,000s). These included the following: female Safety Employees, female Safety Retirees, female Safety Disabled Retirees and female Teacher Employees with below-median income. Also included in the list of extreme cases were the above- and below-median versions of the female Safety Employees, female Safety Retirees and male Teacher Employees.

5.4 Resulting Changes Reflected in Final Report

For the third and fourth items requested by the commenter, RPEC added clarifying footnotes where needed for the likelihood function (the binomial likelihood) and the link function (the log link). No other changes were made to the final report as a result of this commenter's questions.

Section 6: Contingent Survivor Tables

6.1 Background

The Pub-2010 Mortality Tables include separate tables for Contingent Survivors (beneficiaries of formerly deceased members) and Retirees. Previous SOA-published tables generally combined these two types of annuitants into a "healthy annuitant" category. In contrast to previous studies, the Pub-2010 mortality study contained a deep enough database of Contingent Survivors such that statistically significant differences could be observed between the mortality patterns of Contingent Survivors and Retirees. RPEC elected to reflect these differences in the published tables.

Subsection 12.4 of the exposure draft describes the nature of the Contingent Survivor tables and explains that the tables are built only using experience from beneficiaries that had survived deceased plan members. It is also stated that the tables could be appropriate for Contingent Survivors currently in receipt of payment. Although there is no single recommendation on how to apply the tables for joint-and-survivor annuities for which the primary member is still alive, this subsection contains three different possible approaches for using the Contingent Survivor tables that actuaries might consider.

6.2 Summary of Comments Received

One commenter expressed concern that the Contingent Survivor tables may be misused given the limitation of the data used to develop the table and the exposure draft's statements of caution on its use. This commenter recommended that the SOA either reconsider publication of the Contingent Survivor tables along with the final Pub-2010 tables or have the accompanying documentation clearly delineate their limitations.

6.3 RPEC Response

RPEC agrees that it is important to take further precaution to ensure that the Contingent Survivor tables are not misused. In particular, there are currently no limitations or definitions of the Contingent Survivor tables found within the Excel file in which the rates were published. RPEC believes that the file should be revised to clearly indicate that the Contingent Survivor rates were developed solely from data for surviving beneficiaries after the death of the corresponding plan member.

The multivariate analysis conducted by the research team at Northern Illinois University determined that there were significant differences in the mortality characteristics between Contingent Survivors and Retirees. RPEC believes that this observation has value and should be reflected via the publication of separate rates for the two groups.

Some actuaries might prefer to use a "healthy annuitant" table for the entire Nondisabled Annuitant population rather than using separate Retiree and Contingent Survivor tables. One possible alternative would be for actuaries to create customized "healthy annuitant" tables by blending the Retiree and Contingent Survivor tables using a particular plan's concentration of each annuitant type by age and gender. Alternatively, practitioners could develop blended tables based on the Pub-2010 dataset using the pivot tables made available by the SOA in conjunction with this study. However, it must be cautioned that the resultant tables would implicitly assume the same concentration of Contingent Survivors as the

Pub-2010 dataset, and actuaries should review whether such an assumption would be appropriate for use for a given plan.

6.4 Resulting Changes Reflected in Final Report

An asterisk has been added to the "Contingent Survivor" column of the Pub-2010 Mortality Tables Excel file with a note explaining that Contingent Survivor rates were developed solely from experience data for surviving beneficiaries after the death of the corresponding plan member.

Section 7: Further Splits Within Job Categories

7.1 Background

RPEC requested data on job category at both the plan level and the participant level (if available) using a list of 11 codes. Ultimately, the 11 specific classifications were divided up into three general job categories as follows:

General
- General employees
- Education: nonfaculty employees
- Judiciary
- Military
- Executive officers
- Miscellaneous

Public Safety ("Safety")
- Police officers
- Firefighters
- Correctional officers
- Other public safety

Teachers
- Education: faculty employees

Because of the relatively small amount of data received for some subcategories, RPEC focused analysis on the three broad job categories (General, Safety and Teachers) and used that breakdown to develop mortality tables.

7.2 Summary of Comments Received

Two commenters asked whether there were significant differences observed between police and firefighters, citing a perception that firefighters do not live as long as police officers.

One commenter inquired whether there were significant differences observed between higher education and K-12 teachers, suggesting that there is a perception that higher education teachers live longer.

One commenter suggested that RPEC collect information on education level as a mortality predictor.

7.3 RPEC Response

RPEC requested follow-up multivariate analysis from the research team at Northern Illinois University to address whether there was an observable difference between firefighter and police officer mortality. The analysis was performed on active Employees and Retirees. The mortality differences between the two groups were not statistically significant given the size of the respective datasets.

RPEC did not request that data providers separately label K-12 teachers and university professors. This could be a consideration for a future study, though splitting the data further might lead to difficulties with identifying statistically significant differences.

Finally, although RPEC recognizes that the education level of public pension members may be a useful indicator of mortality, this is not typically a data field that is maintained on public pension administration systems. It would be challenging to collect reliable information on member education level.

7.4 Resulting Changes Reflected in Final Report

No changes were made to the final report as a result of these comments.

Section 8: Definition of Salary

8.1 Background

The data request for the Pub-2010 study included an item for salary for active Employees. At the plan level, RPEC requested that contributors define the types of compensation included in the salary information provided. In particular, RPEC asked for an indication of whether the earnings include overtime pay, bonuses (actual or expected) or any other special pay structure in addition to regular earnings.

8.2 Summary of Comments Received

One commenter asked for a description of the elements included in salary, mentioning that this was one of the items included in the Pub-2010 data request but that the exposure draft was silent on the responses.

8.3 RPEC Response

RPEC collected and logged the compensation definitions for each plan in the study to determine if any adjustments would need to be made to the salary information provided to ensure all of the data was on a consistent basis. However, it quickly became clear that the definitions were very customized and did not lend themselves to quantifiable comparisons between systems. The majority of systems indicated that "pensionable earnings" were provided, but the elements included in pensionable earnings were not consistent. For example, seven plans explicitly stated that overtime was included, five plans stated that it was not included, and the rest of the plans either stated that it varied by member or were silent with regards to overtime pay. The most common special elements included were overtime, bonuses, allowances, expenses, holiday pay and severance pay, but none of these elements were represented in a large number of plans. Further, some plans included extremely specific compensation types that were not mentioned by any other systems.

Had the universe of salary definitions been less diverse, it might have been more feasible for RPEC to attempt to adjust salaries for consistency. However, this exercise would have presented its own challenges, as the amount of each type of special compensation likely varied by plan and by participant, and RPEC would have needed to make a quantitative adjustment with incomplete information that might have given rise to inaccuracies.

Ultimately, RPEC decided to process the salary information received with no adjustments.

8.4 Resulting Changes Reflected in Final Report

A footnote was added to subsection 3.4 of the report stating that RPEC was unable to reflect the collected definitions of salary in its analysis, along with a brief explanation.

Section 9: Timing of Future Updates

9.1 Background

The Pub-2010 Mortality Tables Report is the SOA's first large-scale experience study on public-sector mortality. There was no mention of a timeline for updating the Pub-2010 Mortality Tables in the exposure draft.

9.2 Summary of Comments Received

One commenter inquired about the timing of future updates to the Pub-2010 Mortality Tables.

A number of other commenters implied anticipation of future releases or provided suggestions for the next study.

9.3 RPEC Response

It is currently the SOA's tentative plan to update the Pub-2010 Mortality Tables on a five-year cycle. Although there is some uncertainty in scheduling releases this far in advance, the SOA is targeting 2023 as the timing for the next update of public plan mortality tables.

9.4 Resulting Changes Reflected in Final Report

There were no changes to the final report as a result of this question.

About The Society of Actuaries

The Society of Actuaries (SOA), formed in 1949, is one of the largest actuarial professional organizations in the world dedicated to serving 32,000 actuarial members and the public in the United States, Canada and worldwide. In line with the SOA Vision Statement, actuaries act as business leaders who develop and use mathematical models to measure and manage risk in support of financial security for individuals, organizations and the public.

The SOA supports actuaries and advances knowledge through research and education. As part of its work, the SOA seeks to inform public policy development and public understanding through research. The SOA aspires to be a trusted source of objective, data-driven research and analysis with an actuarial perspective for its members, industry, policymakers and the public. This distinct perspective comes from the SOA as an association of actuaries, who have a rigorous formal education and direct experience as practitioners as they perform applied research. The SOA also welcomes the opportunity to partner with other organizations in our work where appropriate.

The SOA has a history of working with public policymakers and regulators in developing historical experience studies and projection techniques as well as individual reports on health care, retirement, and other topics. The SOA's research is intended to aid the work of policymakers and regulators and follow certain core principles:

Objectivity: The SOA's research informs and provides analysis that can be relied upon by other individuals or organizations involved in public policy discussions. The SOA does not take advocacy positions or lobby specific policy proposals.

Quality: The SOA aspires to the highest ethical and quality standards in all of its research and analysis. Our research process is overseen by experienced actuaries and non-actuaries from a range of industry sectors and organizations. A rigorous peer-review process ensures the quality and integrity of our work.

Relevance: The SOA provides timely research on public policy issues. Our research advances actuarial knowledge while providing critical insights on key policy issues, and thereby provides value to stakeholders and decision makers.

Quantification: The SOA leverages the diverse skill sets of actuaries to provide research and findings that are driven by the best available data and methods. Actuaries use detailed modeling to analyze financial risk and provide distinct insight and quantification. Further, actuarial standards require transparency and the disclosure of the assumptions and analytic approach underlying the work.

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