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Aging and Retirement

RPEC Response to Comments on Pri-2012 Private Retirement Plans Mortality Tables Report

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RPEC Response to Comments on Pri-2012 Private Retirement Plans Mortality Tables Report

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Section 1: Overview

1.1 Background

In May 2019, the Society of Actuaries (SOA) Retirement Plans Experience Committee (RPEC or the Committee) released the Pri-2012 Private Retirement Plans Mortality Tables Report in exposure draft form. The SOA solicited comments on the exposure draft through the end of July 2019. This report summarizes the comments received on the Pri-2012 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 six individuals and organizations on the Pri-2012 exposure draft. Some of the comments were submitted via formal comment letters that addressed multiple topics, 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 Structure of Response to Comments

This document is organized into the following sections:

- Section 2: Separate Retiree and Contingent Survivor Tables
- Section 3: Contingent Survivor Mortality Rates
- Section 4: Top and Bottom Quartile Tables
- Section 5: Collar Type
- Section 6: Data Collection
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- Section 8: Miscellaneous
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Sections 1 through 6 are organized into the following four subsections:

1. A brief background of the subject of the comments
2. A summary of the comments received
3. RPEC's response to those comments
4. Changes, if any, made to the final Pri-2012 report

Sections 7 through 9 include comments that generally involve briefer responses.

Section 2: Separate Retiree and Contingent Survivor Tables

2.1 Background

The RP-2006 Mortality Tables included "Healthy Annuitant" tables that combined the experience for Retirees and Contingent Survivors. RPEC believes that the use of combined retiree and contingent survivor tables has been longstanding practice in the pension actuarial community. Nonetheless, for Pri-2012, RPEC decided to produce separate tables for Retirees and Contingent Survivors, with the intent that these would replace the RP-2006 Healthy Annuitant tables. For comparison purposes, the Committee produced "Nondisabled Annuitant" tables as an exposure-weighted blend of the final Retiree and Contingent Survivor tables.

2.2 Summary of Comments Received

RPEC received comments from two feedback providers regarding the separate Retiree and Contingent Survivor tables:

- Both of these feedback providers requested that the SOA publish a tool to assist practitioners with creating exposure-weighted blends of Retiree and Contingent Survivor tables
- One commenter asked for RPEC's guidance on what should be done when a plan's data does not differentiate between Retirees and Contingent Survivors
- One commenter requested that RPEC produce "Healthy Annuitant" tables derived from the underlying Pri-2012 study data
- One commenter requested that RPEC add wording to subsection 12.6 to allow the Pri-2012 Nondisabled Annuitant table to be used as an alternative annuitant table
- One commenter requested that apples-to-apples comparisons of RP-2006 Healthy Annuitants and Pri-2012 Nondisabled Annuitants be shown in Section 10

2.3 RPEC Response

As stated in subsection 4.5 of the Pri-2012 report, the multivariate analysis showed a clear pattern of higher mortality in the Contingent Survivor data when compared to the Retiree data. Given the volume of exposures and the significance of the impact observed for Contingent Survivors, RPEC decided to produce separate tables for Retirees and Contingent Survivors.

Because of the significance of the difference in mortality, RPEC believes that use of separate Retiree and Contingent Survivor tables is likely to produce a measurement of liability and other actuarial metrics (such as benefit payment streams and population forecasts) that is a more accurate reflection of the underlying mortality experience observed.

RPEC produced the Pri-2012 "Nondisabled Annuitant" tables for comparison purposes to the RP-2006 "Healthy Annuitant" tables. The Nondisabled Annuitant tables were weighted by RPEC in proportion to the exposures included in the Pri-2012 study on a simple weighted average basis between the Retiree and Contingent Survivor tables. Utilizing the blended Pri-2012 Nondisabled Annuitant tables implicitly assumes the same mix of retiree and beneficiary exposures as collected for the Pri-2012 study.

In certain circumstances such as the case for which a comment was received where the data have not historically tracked beneficiary status separate from retiree status, RPEC suggests that the actuary might consider the

information available regarding the plan's current population that could influence the mix of retiree and beneficiaries, including but not necessarily limited to the following: the gender mix of the current population, the prevalence of joint and survivor annuity elections, and information regarding participant marital status. Such information, along with other assumptions, could be used to identify an expected mix of future plan exposures for retirees and contingent survivors.

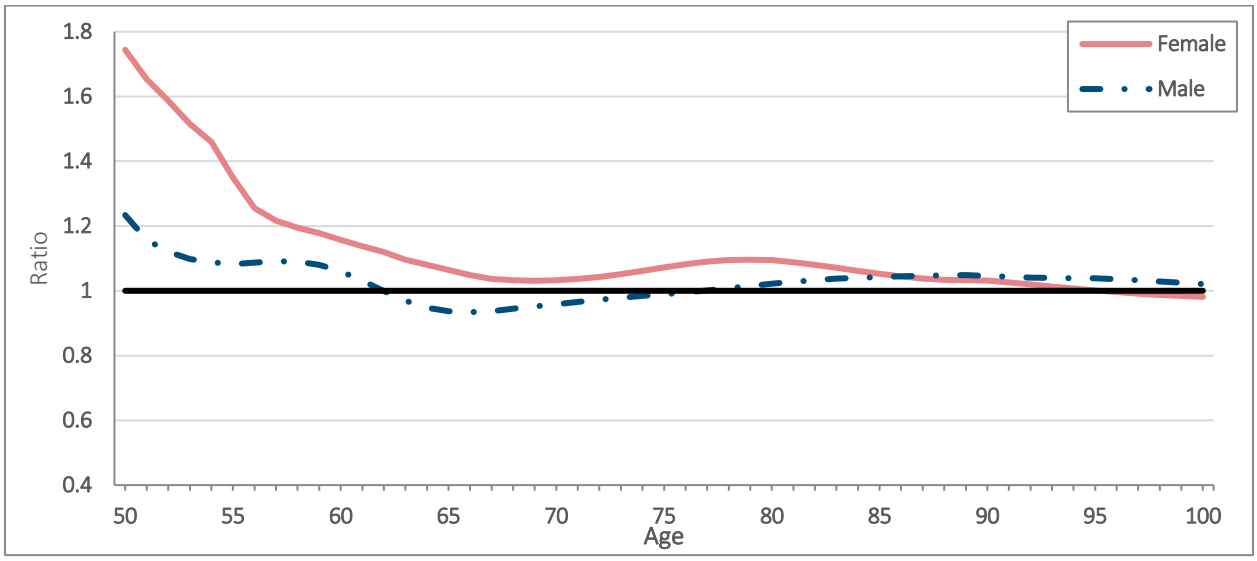
It should also be noted that in any valuation, the future mix of beneficiaries and retirees is a function of both existing retirees and beneficiaries as well as the future beneficiaries of current participants with death benefits. As such, even for a plan that has not historically tracked beneficiary status, the plan's individual demographics would be useful in forecasting the mix of future participants. Given the significant difference observed between retiree and beneficiary mortality, RPEC suggests that plans that have not tracked beneficiary status may want to begin such tracking.

RPEC does not intend, at this time, to produce a tool to assist with the blending of the Retiree and Contingent Survivor mortality tables. Most of the complication in performing such an analysis is plan-specific and, in the Committee's opinion, is likely to require significant actuarial assumptions and judgment. Once the actuary has performed that plan-specific analysis, weighting between the Retiree and Contingent Survivor tables is likely to be a straightforward arithmetic calculation easily accomplished in a spreadsheet.

As stated in Section 12.6 of the Pri-2012 report, the Pri-2012 Nondisabled Annuitant tables were produced primarily for purposes of comparison to the RP-2006 tables. RPEC believes that the tables produced using the exposure-weighted analysis are sufficient for the intended purpose and does not intend to produce graduated tables from the aggregated Nondisabled Annuitant data. In cases where sufficient information is not available to develop a tailored blend of the Retiree and Contingent Survivor tables, RPEC believes that the Pri-2012 Nondisabled Annuitant tables as constructed in the Pri-2012 report may serve as a reasonable proxy for the blended mortality, provided the actuary does not have information that would indicate that use of the Pri-2012 weightings would be inappropriate.

Figure 2.1 shows a comparison of the Pri-2012 Nondisabled Annuitant rates to the RP-2006 Healthy Annuitant rates as of January 1, 2019.

Figure 2.1
RATIO OF PRI-2012 NONDISABLED ANNUITANT TO RP-2006 HEALTHY ANNUITANT MORTALITY RATES PROJECTED TO 2019 WITH SCALE MP-2018



At the youngest ages in Figure 2.1, one sees a large difference from the prior study at the youngest female ages. A major source of this variance is the significantly increased concentration of contingent survivors at these ages in the Pri-2012 dataset (41%) compared with the prior study (30%). Another contributing factor is the use of the extension methodology described in the Pri-2012 report rather than the healthy annuitant graduation applied in the RP-2014 report. The difference at the youngest ages is likely not significant for most pension plan uses, but to the extent that mortality in the early 50s for annuitants has a significant effect on the valuation of a plan, the actuary should be aware of this potential impact when considering the use of the Nondisabled Annuitant tables.

2.4 Resulting Changes Reflected in Final Report

No changes were made to the final Pri-2012 report that resulted from the comments received on this topic.

Section 3: Contingent Survivor Mortality Rates

3.1 Background

The RP-2014 Mortality Tables Report discussed the possibility of creating separate tables for Retirees and Beneficiaries[1] but ultimately decided that the male Beneficiary dataset was too insufficient to perform any meaningful statistical analysis. Significant differences were found between the RP-2014 female Beneficiary and RP-2014 female Retiree datasets, but the Committee decided not to publish a Beneficiary table for females alone. A greater number of male Contingent Survivors was provided in the Pri-2012 dataset, so RPEC was able to produce mortality tables for Contingent Survivors. These mortality tables were based solely on experience for beneficiaries after the death of the primary Retiree.

3.2 Summary of Comments Received

Two commenters provided feedback related to the Pri-2012 Contingent Survivor tables:

- One commenter suggested that the observation in subsection 4.5 regarding the Committee's findings that modestly lower mortality at shorter durations was "somewhat inconsistent with past research indicating that widow(er) mortality is significantly higher in the first few years following a spouse's death" warrants further study.
- One commenter expressed concern that the Contingent Survivor rates are substantially higher than the Retiree rates at the younger annuitant ages and suggested that this might be partly because of the following:
    - The 10% of contingent survivor data excluded because of outlier actual-to-expected (A/E) ratios
    - Potential data cleanup of beneficiaries that died before the death or the primary Retiree
    - Cessation of temporary benefits being mistakenly reported as deaths
- One commenter questioned RPEC's decision to create a headcount-weighted table for male Contingent Survivors in place of amount-weighted tables and suggested that the link between pension annuity and socioeconomic status may be broken for retirees receiving benefits from multiple plans, which could justify amount-weighted rates that are higher than headcount-weighted rates.

3.3 RPEC Response

As noted in subsection 4.5 of the Exposure Draft, while the study's regression analysis indicated that Contingent Survivor mortality exhibited relatively modest differences when compared to Retiree mortality at shorter durations, RPEC recognized that past research on the short-term widower effect has shown more significant effects.

RPEC analyzed the data available with respect to duration's impact on Contingent Survivor mortality rates. This analyzed whether duration of less than five years versus more than five years represented a statistically significant indicator of mortality, but found only modest impact. RPEC analyzed the A/E mortality ratios for Contingent Survivors at individual durations and found that the duration-zero[2] A/E ratios were unexpectedly low. The Committee decided that the duration-zero data could have had a survivorship bias in that some Contingent Survivors who both began receiving payments and died between status snapshot dates were likely never reported.

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[1] "Beneficiary" was the nomenclature in the RP-2014 Report for those participants identified as "Contingent Survivors" in the Pri-2012 Report.
[2] For Contingent Survivors, duration was defined as calendar year of exposure minus calendar year of benefit commencement date.

Thus, Contingent Survivor exposures of duration zero were excluded from the study. RPEC recognizes this may have potentially muted some of this duration-related effect, especially if it is significant over a timeframe of less than one year.

Given the reliability of the information available and the potentially significant administrative burden that would be introduced from recommending select and ultimate rates for contingent survivors as a new standard, RPEC opted not to provide select mortality rates for contingent survivors. RPEC plans to consider enhancements to the data collection process in future studies to analyze the effect of duration.

RPEC does not believe that the 10% exclusion due to outlier A/E ratios is the source for the high Contingent Survivor rates at younger ages. RPEC reviewed any unusual data patterns on a month-to-month basis to identify potential mass data clean-ups, and these data were excluded. This accounts for much of the 10% of survivor data excluded.

It is possible that the commenter's concern about the termination of years-certain survivor payments being flagged as deaths is valid. RPEC has no way to determine the scope of this issue, if it exists, but contributors were asked to identify this situation in the data request. The certain period field was empty for most contributors.

RPEC opted to publish headcount-weighted Contingent Survivor rates for males rather than amounts-weighted rates because the rates developed on those two bases were extremely close; therefore, RPEC selected one table for both purposes.

While separate Beneficiary tables were not produced along with the RP-2014 study, RPEC did compare the relative levels of female Beneficiary mortality and female Retiree mortality. The findings were that the ratio of female Beneficiary mortality rates to female Healthy Retiree mortality rates decreased from approximately 2.5 at age 50 to approximately 0.9 at age 90, with the ratio of 1.0 occurring between ages 78 and 79. Thus, the observation that Pri-2012 Contingent Survivor mortality is significantly higher than Retiree mortality at the younger ages and closer to Retiree mortality at the older ages has some precedent in the RP-2014 dataset.

3.4 Resulting Changes Reflected in Final Report

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

Section 4: Top and Bottom Quartile Tables

4.1 Background

Similar to the RP-2006 Mortality Tables, the Pri-2012 Mortality Tables include Top Quartile and Bottom Quartile tables for Employees and Retirees. For Employees, the income quartiles were determined by salary, while for Retirees, the income quartiles were determined by pension benefit amount. Subsection 12.2.3 discusses the use of these Pri-2012 income quartile tables and observes that most of these income thresholds are lower in the Pri-2012 dataset than in the RP-2006 dataset. Furthermore, it was observed that the White Collar Pri-2012 tables exhibit lower mortality than the Top Quartile Pri-2012 tables, while the reverse was true for RP-2006.

4.2 Summary of Comments Received

RPEC received feedback from two commenters regarding the Top and Bottom Quartile tables:

- Both of these commenters questioned the continued usefulness of benefit quartile tables given the frozen status of many major single-employer plans.
- One commenter posited that retirement benefit levels may be relatively higher for multiemployer plans than actual socioeconomic status because single-employer plans are more likely to have been frozen than multiemployer plans, and this commenter requested a breakdown of the percentage of multiemployer data in the top income quartile.
- One commenter stated that one of the weaknesses of the study was the fact that ongoing benefit accrual status was not collected and reflected in the income quartile analysis.
- One commenter suggested that the income thresholds for the Top Quartile are significantly lower than typical income levels for nonqualified plans covering highly compensated individuals, which has been one important application of previous Top Quartile tables. This commenter suggested that a top decile table might better reflect the experience of a nonqualified plan than the Top Quartile tables.
- One commenter requested that the Top and Bottom Quartile tables be eliminated from the study.

4.3 RPEC Response

RPEC acknowledges in the Pri-2012 exposure draft that the income (and benefit) thresholds for Top Quartile may not reflect a typical high paid group covered by private sector nonqualified benefits. The frozen status of many single-employer plans likely diminishes the effectiveness of selecting a Pri-2012 mortality table based solely on retirement benefit amounts, because higher retirement benefit amounts may, in some cases, simply be an indicator of a plan with ongoing benefit accruals. RPEC did not collect ongoing benefit accrual status in the data request but will consider doing so in future studies.

Despite the absence of such an indicator, the effect of ongoing benefit accruals on the quartile distribution can be partially inferred by looking at the concentration of data from multiemployer plans, which are less likely to be frozen. To illustrate this, 8% of the Employee Top Quartile data comes from multiemployer plans, but 32% of the Retiree Top Quartile data comes from multiemployer plans. This may be indicative of the reduced correlation between socioeconomic status and retirement benefit amount from a particular plan.

Subsection 12.2.3 of the exposure draft discusses these limitations with the Top Quartile tables and states that "actuaries who are currently using RP-2006 Top Quartile as their base mortality benchmark may want to consider options other than an automatic switch to Pri-2012 Top Quartile tables." Despite this statement, the Committee

believes that the Top Quartile tables are important to illustrate the changing significance of plan benefit amount as a mortality predictor. RPEC will review the necessity of producing income quartile tables in future experience studies.

This raises the question of how else an actuary might adjust a mortality assumption for income level. A recent study[3] by the Social Security Administration (SSA) sheds additional light on the correlation between income and mortality. The authors studied mortality for different groupings of Average Indexed Monthly Earnings (AIME), which tracks earnings over a worker's career, indexed by US Average Wages, for use in calculating Social Security benefits. This lifetime average earnings should be fairly well correlated to retirement income—including Social Security benefits—and socioeconomic status.

The study included results for a Very High category for those who earned above or near the wage base[4] in all years. This turned out to be a top-10% interval of AIME. This Very High group has mortality about 20% lower than the Pri.H-2012 White Collar Retiree rates for ages 65-84. Actuaries can reference the SSA Actuarial Study No. 124 and the historical SSA mortality rates posted with each Social Security Trustees' Report to perform a more detailed analysis.

RPEC also reviewed the Pri-2012 data set to see if more select groupings by amount would be useful in evaluating mortality for highly paid (or high benefit) participants. The two subsets investigated were the Top Quartile of White Collar data (TQWC) and top decile (TD) of the aggregate data set. These are portions of the White Collar and Top Quartile groups, respectively. TQWC represents the top quartile (top 25%) by amount of the White Collar experience data. TD represents the top 10% (decile) by amount (i.e., more select with higher salary or benefit amounts than Top Quartile).

On a headcount basis, aggregate mortality levels for TQWC Retirees were approximately 78% of White Collar, and mortality levels for TD Retirees were about 88% of Top Quartile. On an amounts basis, aggregate mortality levels for TQWC Retirees were approximately 85% of White Collar, and mortality levels for TD Retirees were about 89% of Top Quartile. Employees showed similar differentials, though these subsets did not have enough deaths to be fully credible.

Retiree breakpoint amounts for TQWC were fairly comparable to the RP-2014 study's Top-Quartile Healthy Annuitant breakpoints, with TD being about 20% higher. For Employees, TD breakpoints were just above $100,000. TQWC Employee breakpoints were around $75,000 for females, and just over $100,000 for males.

These figures suggest that mortality for relatively select groups of high-income participants could be 10%–25% lower than the Top-Quartile or White-Collar Pri-2012 table rates. This is fairly consistent with the SSA Very High subset discussed above.

4.4 Resulting Changes Reflected in Final Report

Comments have been added to Section 1 and Section 12 of the Pri-2012 report indicating that mortality for relatively select groups of high-income participants could be significantly lower than Pri-2012 Top-Quartile or Pri-2012 White-Collar.

[3] See Tiffany Bosley, Michael Morris, and Karen Glenn, Mortality by Career-Average Earnings Level, Actuarial Study No. 124 (Washington, DC: Social Security Administration, Office of the Chief Actuary, 2014).
[4] The Social Security wage base was $118,500 for 2019; wage bases for historical years can be found at https://www.ssa.gov/oact/cola/cbb.html

Section 5: Collar Type

5.1 Background

RPEC requested that collar type be provided at the plan level. If at least 70 percent of the plan's participants are either hourly or union, the plan was to be reported as "Blue Collar." If at least 70 percent of the plan's participants are salaried and nonunion, the plan was to be reported as "White Collar." These criteria were unchanged from the RP-2006 data request. In addition to these classifications, an entire plan could be reported as "Mixed Collar" (the participant composition did not satisfy the criteria for Blue Collar or White Collar designations). However, a number of submissions were provided with a collar designation of "unknown" (the submitter did not know).

A new change for the Pri-2012 study requested that contributors provide participant-specific collar indicators where available. This participant-level indicator superseded the plan-level indicator when it was provided. However, despite this increased effort to collect information on collar type, a more substantial percentage of the Pri-2012 study data was ultimately classified as "Unknown Collar." Participant-level experience was classified as "Unknown Collar" if collar type was not provided at the participant level, and the plan was reported as either "Mixed Collar" or with an unknown collar type.

5.2 Summary of Comments Received

Two commenters provided feedback related to collar type identification:

- One commenter requested the breakdown of the Unknown Collar group into data included in plans reported as "Mixed Collar" versus plans reported with an unknown collar type.
- One commenter requested a breakdown of exposures between participants directly reported with a collar type and those with an assumed collar type based on the plan's designation.
- One commenter asked that the final report show a breakdown of what the collar assignments would have looked like in the absence of participant-specific indicators to facilitate comparison to RP-2006.
- One commenter asked whether an analysis was performed on why a greater concentration of Unknown Collar data was collected for Pri-2012 than RP-2006.

5.3 RPEC Response

Of the 4.1 million records in the final dataset classified as Unknown Collar, approximately 1.8 million (45%) came from plans reported as "Mixed Collar" and 2.3 million (55%) came from plans reported without a known collar type. A decision was made early in the study process to combine the Mixed Collar and unknown categories into a single Unknown Collar group, because RPEC decided that neither of these individual groupings could be used to construct a table that was either more useful or informative than those constructed from the total Pri-2012 dataset. Accordingly, the Pri-2012 exposure draft did not focus on the different types of Unknown Collar data, and Tables 3.1 and 3.2 will not be expanded to show the split of Mixed Collar data and data from plans with unknown collar type.

Slightly more than one-fourth of the final dataset had a collar type that was determined by participant-specific indicators. For White Collar participants, approximately 2.5 million (94%) were identified as White Collar at the participant level. For Blue Collar participants, approximately 1.8 million (20%) were identified as Blue Collar at the participant level. The remaining participants in each collar group were identified as such at the plan level.

RPEC does not believe it would be appropriate to indicate in the final report what the collar assignments would have been in the absence of participant-specific indicators in the data, because the Committee believes the participant-

specific indicators served only to increase the accuracy of the collar designation over the methodology used in the RP-2014 study. Given the strong correlation between collar type and mortality levels, RPEC continues to emphasize the use of collar-specific tables over the "total dataset" tables. RPEC also note that, although only 20% of the Blue Collar participants were identified as such at the participant level, a large portion of the Blue Collar participants came from multi-employer or other collectively bargained plans that necessarily consisted of participants that would have been identified as Blue Collar at the participant level.

While RPEC did not perform an exhaustive analysis on why a greater concentration of Unknown Collar was collected for Pri-2012 than RP-2006, the Committee notes that the Pri-2012 dataset contained approximately 820,000 records (20% of the Unknown Collar data) from insurance companies and that none of the insurance company contributors identified collar at the plan or participant level. The RP-2006 dataset did not include data from insurance company contributors. This fact alone explains a good portion of the increase.

5.4 Resulting Changes Reflected in Final Report

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

Section 6: Data Collection

6.1 Background

The SOA individually sent the study's data request package to large actuarial consulting firms and insurance companies that were known to have access to participant data for private-sector defined benefit pension plans. In addition to these individual requests, the SOA sent a blast e-mail with the data request to all members with retirement as an area of focus and published the study data request package on the SOA web site.

6.2 Summary of Comments Received

Three entities submitted comments regarding the SOA's data collection initiative and the data ultimately collected for the study:

- Two commenters expressed concern that the data might have a bias toward the experience of large plans.
- One commenter questioned why the data request letters were directly sent only to the large actuarial consulting firms and insurance companies and suggested that there was no known comparable effort to send a request letter to smaller actuarial firms or insurance companies.
- One commenter asked whether efforts were made to collect data from the Pension Benefit Guaranty Corporation (PBGC).
- One commenter noted that there was no discussion in the exposure draft related to RPEC's ability to link participant records across years, and that additional discussion would be helpful since it does not appear that data were excluded because of the inability to link records across years.
- One commenter cited the lack of data at younger ages as a weakness of the study, and asked what other efforts were made to obtain data for this group.
- One commenter asked whether there was any effort to solicit data from defined contribution plans and whether such data might have provided additional credibility to this study.

6.3 RPEC Response

RPEC agrees that more efforts could be made to directly distribute the data request to smaller actuarial firms and insurance companies. A blast e-mail was sent to inform all actuaries with retirement as an area of focus, and this effort was made to ensure that actuaries at firms of all sizes would be aware of the data collection effort. However, it is likely that individual distribution would have increased participation from smaller firms. Of the approximately 16.1 million life-years of exposure included in the Pri-2012 study, approximately 3.5 million (22%) came from entities to which the SOA did not send an individual data request letter.

RPEC does not believe that the study was inappropriately biased toward the experience of the largest plans. The five largest plans in the final dataset contributed approximately 4.5 million life-years of exposure (28% of the total in the study) over the five years of the study period. The exposure draft states that 242 of the 402 plans contributed fewer than 2,000 life-years of exposure to the study. Of these 242 plans, 153 of them contributed fewer than 500 life-years of exposure to the study. Furthermore, RPEC has no reason to believe that the size of the plan would affect mortality after adjusting for other factors such as collar type and income level. Plan size could be a consideration for multivariate analysis in future studies, but it may be a challenge to get sufficient credible data from very small plans.

The Committee's concerns about aggregating PBGC data with that of ongoing plans are mostly unchanged from those cited in the RP-2014 Response to Comments Document. Although the Pri-2012 data request was sent to the

PBGC and the PBGC indicated that it could provide data, RPEC recommended that this data be studied separately. This PBGC study was recently completed, and a brief report has been posted on the SOA web site that compares PBGC mortality experience to the RP-2006 dataset.

The RP-2014 report described a situation in which a large block of data were excluded because of a lack of provision of a consistent "Member ID" that would be used to link participant experience across provided snapshot dates. Although some issues in the data initially provided in the Pri-2012 study were related to unique identifiers (mostly involving duplicate IDs), the SOA was able to work with the data processor, Ruark, and the contributors to resolve these issues and process the data. No substantial blocks of data were excluded from the Pri-2012 study because of an inability to link participant experience across years.

RPEC disagrees with the comment indicating that a lack of data at the younger ages was a weakness of the study. The Pri-2012 dataset included more exposures for ages 20–29 than either the RP-2000 Mortality Tables or the RP-2006 Mortality Tables. Given the very low mortality rates and generally low pension liabilities for pension plan participants at these ages, it is unlikely that additional data at these ages would have led to substantially more robust tables for valuing pension obligations.

RPEC did not attempt to solicit data from defined contribution plans. Analysis of defined contribution plan mortality is both outside the scope of the Pri-2012 study and outside the scope of RPEC's purpose as defined in the committee charter.

6.4 Resulting Changes Reflected in Final Report

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

Section 7: Technical Issues

7.1 Exposure Tabulation by Month

One commenter pointed out that tabulating exposures on an age-last-birthday definition based on the age as of the beginning of each month of the observation period results in an average age that is 1/24th of a year greater than the appropriate age to apply the tables on an age-nearest-birthday basis.

7.1.1 RPEC Response

The first sentence of subsection 13.3 of the exposure draft reads, "Exposures and deaths were tabulated on an age-last-birthday basis for each month of the study's observation period." After reviewing this comment and the method used to tabulate exposure, RPEC determined that this sentence is misleading. The age for tabulating exposure was not determined for entire months based on the age-last-birthday at the beginning of the month. The age to which exposure was credited changed exactly on the person's birthday.

7.1.2 Resulting Changes to Final Report

The above quoted sentence was changed to remove the words "for each month of the study's observation period."

7.2 Exact Age Basis vs. Age-Nearest-Birthday Basis

One commenter pointed out that the exposure draft states that "the Pri-2012 mortality rates at each age, *x*, should be interpreted as one-year probabilities of death for a person exactly age *x* on January 1, 2012," while also stating that the Pri-2012 probabilities of death "are applicable on an age-nearest-birthday basis." This commenter stated that these definitions are not equivalent and that it would be beneficial for the explanation of the age definition to be more consistent than is currently found in the exposure draft.

7.2.1 RPEC Response

RPEC agrees that the "exact age" basis described is not directly equivalent to an "age-nearest-birthday" basis.

Generally, systems used for valuing pension plans typically assign integral ages to participants for purposes of computing pension obligations. The integral age used for each participant is typically determined on an age-last-birthday basis or an age-nearest-birthday basis. RPEC stated that the Pri-2012 probabilities of death "are applicable on an age-nearest-birthday basis" to contrast with an age-last-birthday basis. For example, it would be more accurate as a rule to apply a Pri-2012 age-60 mortality probability to participants who have an age on the measurement date between 59.5 and 60.5 than it would be to apply it to participants who have an age on the measurement date between 60.0 and 61.0.

7.2.2 Resulting Changes to Final Report

No changes were made to the final report as a result of this comment.

7.3 Questions on Exposure Tabulation Method

One commenter questioned whether a full year of exposure is extended to a deceased individual in the event that the end of the observation period is before their next birthday following the date of death. This commenter also asked how exposure is determined when observation of a participant begins at the same age that death occurs.

7.3.1 RPEC Response

Per the actuarial method, a full year of exposure was extended to a deceased individual in the event that the end of the observation period is before the participant's next birthday following the date of death. In the event that observation of a participant begins during the same age that death occurs (e.g., if a person is hired and then dies before their first birthday as an Employee), the amount of exposure generated is equal to the fraction of the year elapsed between the date observation begins (e.g. the hire date or date of benefit commencement) and the participant's next birthday following death.

7.3.2 Resulting Changes to Final Report

Subsection 13.3 ("Tabulation of Exposures and Deaths") now explicitly mentions that the actuarial method was used to compute exposures.

7.4 Missing Date Assumption

One commenter questioned RPEC's assumptions to impute a missing date of death on the participant's half-birthday and to impute other missing dates on the participant's birthday, stating that this method may introduce bias in some form and that a midyear assumption for all missing dates would have been more straightforward with a lower risk of bias.

7.4.1 RPEC Response

RPEC's process involved reviewing the number of deaths by month and year for each contributor for reasonableness purposes. Calendar year was also included as a variable in the multivariate analysis to determine whether significant mortality improvement existed over the course of the study period. For both of these reasons, the Committee wished to avoid a situation in which imputed death dates were clustered in the middle of the census year.

Some of the plans submitted for the study had a census date other than January 1 (or December 31), and the 12-month period between snapshot dates for these plans included portions of two calendar years. One of the reasons RPEC chose the half-birthday assumption for the date of death was to distribute the imputed deaths proportionally across the two calendar years in this situation, rather than allocating all of the deaths to the calendar year containing the midyear date and none to the other calendar year.

For example, consider a plan with an April 1 census date. There may be multiple participants with the following provided information:

- April 1, 2011 status: Retiree
- April 1, 2012 status: Deceased
- Date of Death: (blank)

A midyear assumption for the missing date of death for these participants would be October 1, 2011. All of the assumed dates of death for participants with these data would therefore fall in 2011 rather than 2012. By contrast, assuming dates of death on participants' half-birthdays within the 12-month period April 1, 2011, to March 31, 2012 assigned a date of death anywhere within the 12-month period (according to each participant's birth day and month plus six months) and would therefore place approximately three-quarters of them in 2011 and one-quarter of them in 2012.

7.4.2 Resulting Changes to Final Report

No changes were made to the final report as a result of this question.

7.5 Use of Mortality Probabilities for Graduation instead of Central Death Rates

One commenter suggested that for future mortality tables, RPEC should consider a move to working with central exposure and graduate central death rates rather than one-year mortality probabilities because it provides numerous advantages with very little additional effort.

7.5.1 RPEC Response

RPEC agrees that the use of central death rates for graduation is a potentially valid method and worth consideration in future studies. The Committee believes that the graduation method employed for this study was reasonable and sufficient for the purpose at hand.

7.5.2 Resulting Changes to Final Report

No changes were made to the final report as a result of this comment.

7.6 Reasoning for Use of Log Link Function

One commenter stated that the reasoning for using the log link function with the binomial distribution should be provided, and consideration should be given to whether the logit or cloglog link function would be a better choice when fitting mortality probabilities.

7.6.1 RPEC Response

The log function for the link was chosen for ease of explanation. The choice of link function is usually at the modeler's discretion, and in some cases, model fit is improved when choosing a link more appropriate to the data. On the other hand, choosing links other than canonical links can introduce bias and overstate parameter significance tests.

The generalized additive model (GAM) approach was deployed primarily for its curve-fitting prowess, and RPEC was comfortable with the resulting graduations. Each fitted model was compared to the data, and goodness-of-fit was found to be well within acceptable limits.

7.6.2 Resulting Changes to Final Report

No changes were made to the final report as a result of this comment.

7.7 Effective Degrees of Freedom in GAM Models

One commenter stated it would be useful for the effective degrees of freedom resulting from the gam calls to be disclosed. If the level of smoothing is too low, then perhaps the approach used to select the optimal level should be adjusted.

7.7.1 RPEC Response

The 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 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.

Table 7.1 shows the range and median of effective degrees of freedom (including the intercept term) in the graduations used to construct the Pri-2012 tables. In the table, "full population" refers to the full complement of data in each status-gender combination. For example, the amount-weighted full population table group includes six graduations:[5] female Employee, male Employee, female Contingent Survivor, male Disabled Retiree, female Retiree and male Retiree. "Subpopulations" refers to the collar and income quartile subgroups within each of the full populations. For example, in the headcount-weighted group, there were graduations performed for Blue Collar female Contingent Survivors and Top Quartile male Retirees.

Table 7.1
EFFECTIVE DEGREES OF FREEDOM IN GAM GRADUATIONS

Table Group	Effective Degrees of Freedom Range	Effective Degrees of Freedom Median
Full population, headcount-weighted	3.5–9.6	5.4
Full population, amount-weighted	2.0–9.2	5.6
Subpopulations, headcount-weighted	3.0–8.2	5.0
Subpopulations, amount-weighted	2.9–8.8	5.4

7.7.2 Resulting Changes to Final Report

No changes were made to the final report as a result of this comment.

7.8 Full Objective Function in Graduation Explanation

One commenter stated that the explanation of the graduation would be enhanced by including the full objective function with the binomial log-likelihood as above in place of the less meaningful weighted least-squares expression included in the Exposure Draft.

7.8.1 RPEC Response

RPEC showed the weighted least squares expression in the Pri-2012 report because it was utilized by the software package used for the graduations. The mathematics in this expression are closer to what actuaries are already familiar with than the full objective function and binomial log-likelihood. RPEC believes that the explanation of the graduation found in the Pri-2012 report is appropriate for the target audience.

7.8.2 Resulting Changes to Final Report

No changes were made to the final report as a result of this comment.

[5] As described in the Pri-2012 report, amount-weighted tables for male Contingent Survivors and female Disabled Retirees were not determined by GAM graduation.

7.9 Use of Individual Life Experience to Project Tables from Age 35 to Age 18

One commenter noted that RPEC used experience from individual life data to project the mortality tables down from age 35 to age 18 and stated that it would be helpful if RPEC could mention how this compares historically to pension experience for similar ages and indicate the anticipated impact of using this methodology.

7.9.1 RPEC Response

RPEC used the individual life data underlying the 2015 Valuation Basic Tables (VBT) to help develop the Employee mortality rates between the ages of 18 and 35. The following process is explained in the exposure draft:

> The 2015 VBT rates were first adjusted back to calendar year 2012 (the central year of the final Pri-2012 datasets) using the Scale MP-2018 mortality improvement rates. RPEC then developed gender-specific scaling factors based on a ratio of actual deaths to expected deaths between ages 18 and 35 calculated using the adjusted 2015 VBT rates. The scaling factors were then applied to the respective adjusted 2015 VBT rates for ages 18 through 25. Finally, RPEC completed the remaining rates between ages 25 and 35 using cubic polynomial interpolation that matched the gender-specific rates at ages 24, 25, 35 and 36.

Effectively, the 2015 VBT mortality rates were used to construct the shape of the curve between ages 18 and 25, but not the order of magnitude of the Pri-2012 mortality rates. The mortality curve taken from the 2015 VBT was adjusted to reflect the relative level of mortality in the Pri-2012 data compared to the 2015 VBT. The Committee believes that the impact on pension valuations resulting from using this methodology is minimal.

7.9.2 Resulting Changes to Final Report

No changes were made to the final report as a result of this comment.

7.10 Use of Actual Historical Mortality Improvement Rates

One commenter requested additional information be provided on the relative changes in mortality rates between the previous RP-2014 study and the Pri-2012 rates.

7.10.1 RPEC Response

The Committee acknowledges the limitation of the longitudinal consistency between the RP-2014 and Pri-2012 study data. Each study is based upon distinct data requests, and the information received is neither fully consistent nor traceable between studies for those submissions that are consistent. As such, a more detailed analysis of the relative changes in individual mortality rates between studies may not yield significant insight into mortality improvement given differences in the underlying data sets.

RPEC provided information on the relative change in mortality rates from the RP-2014 study to the Pri-2012 rates in Section 10 of the Pri-2012 report. Adjustments were made to the RP-2006 rates using the MP-2018 improvement scale to present mortality rates as of 2019. The Committee believes this information can inform an understanding of the likely impact on pension valuations and identify changes in the underlying shape of the mortality tables between studies.

Information on the characteristics of the underlying data set for the RP-2014 study was published in its Appendix C, and similar information is provided in Pri-2012 Appendix B. This information can identify the concentration of data by gender, collar-type, age bands etc., for each of the two studies. Furthermore, the relative changes in mortality

within a given age-collar-gender cohort could be identified by comparing the resulting mortality rates from comparable tables (after adjusting to a common base year using a mortality improvement scale).

7.10.2 Resulting Changes to Final Report

No changes were made to the final report as a result of this comment.

7.11 Alternative Approach for Computing Joint-and-Survivor Annuities

One commenter suggested a fourth approach to computing joint-and-survivor annuities in addition to the three presented in subsection 12.4 of the exposure draft. This fourth approach would involve using Approach 2 (Contingent Survivor mortality used for beneficiaries with a pre-deceased primary annuitant) for contingent beneficiaries who are already in pay status on the valuation date along with a modified Approach 1 (assumption of Nondisabled Annuitant mortality throughout the beneficiary's life) for situations when the primary annuitant is still alive on the valuation date. The rationale presented for this approach is that it produces results that are close to Approach 2 (if slightly higher) but may be more feasible from a systems perspective.

7.11.1 RPEC Response

RPEC's intent with respect to subsection 12.4 was to address the valuation of joint-and-survivor annuities. The Committee expects that most plans track retirees separately from beneficiaries and will apply the Contingent Survivor tables to known, surviving beneficiaries when utilizing the Pri-2012 tables for valuation.

While presenting three potential variations the Committee thought worthy of actuaries' consideration, the Pri-2012 report indicates that RPEC believes other approaches could be reasonable. In particular, RPEC believes the commenter's suggestion that the actuary might value beneficiaries in a joint-and-survivor annuity utilizing a table that is distinct from the table used to value either Retirees or Contingent Survivors is another potentially reasonable approach. In this approach, the actuary would select a mortality table to apply to beneficiaries that reflected an approximation of the aggregate mortality expected across beneficiaries' lifetimes both before and after the death of the retiree. In many cases, such a mortality table would likely produce a result that was between Options 1 and 3 described in the Pri-2012 report.

7.11.2 Resulting Changes to Final Report

The comment regarding the use of the beneficiary table for known, surviving beneficiaries indicated a lack of clarity with respect to RPEC's intent of Options 1 through 3 in Section 12.4 of the Pri-2012 report. As stated in this response, RPEC intended that actuaries would consider valuing known, surviving beneficiaries using the Pri-2012 Contingent Survivor tables regardless of which approach the actuary used to value joint-and-survivor annuities. Therefore, clarifying language was added to explicitly confirm that RPEC's intended scope for Options 1, 2 and 3 was limited to the valuation of joint-and-survivor annuities.

7.12 Changing Benefit Amounts

One commenter requested clarification on how benefit amounts were determined for participants with a mid-study change in benefit.

7.12.1 RPEC Response

Contributors were asked to provide a salary amount for each employee and a monthly pension amount for each annuitant at each snapshot date included in the study period. The value used to amount-weight the experience for a particular calendar year was the amount reported at the end of that year (e.g. the December 31, 2011 or January 1,

2012 value reported for the calendar year 2011). For plans that did not have a January 1 or December 31 snapshot date, amount-weightings were based on weighted averages computed based on the proximity of each snapshot date to year-end. Here is an example:

- Plan snapshot date: October 1
- October 1, 2011 Monthly Pension Benefit: $2,000
- October 1, 2012 Monthly Pension Benefit: $2,100
- Assumed December 31, 2011 Monthly Pension Benefit = $2,000 × (9/12) + $2,100 × (3/12) = $2,025

The pension benefit used for calendar year 2011 for this sample participant would therefore be $2,025.

7.12.2 Resulting Changes to Final Report

No changes were made to the final report as a result of this question.

Section 8: Miscellaneous

8.1 Use of Disabled Retiree Tables

One commenter noted that many plans either do not distinguish between Retirees and Disabled Retirees beyond a particular age or do not distinguish between them at all. This commenter stated that it would be helpful if the exposure draft stated that it is reasonable to not specifically apply the Disabled Retiree table for some situations because of many plans not tracking disability status and the definition of disability varying by plan.

8.1.1 RPEC Response

Because of the significance of the difference in mortality experience, RPEC believes that use of separate Disabled Retiree and Retiree tables is likely to produce a measurement of liability and other actuarial metrics (such as benefit payment streams and population forecasts) that is a more accurate reflection of the underlying mortality experience observed.

However, RPEC understands that there are challenges in tracking disabled retirements and applying disabled mortality tables, often because of the varying definitions of disability and the fact that some plan sponsors do not distinguish healthy retirees from disabled retirees. As noted in subsection 12.5, RPEC suggests that the actuary might consider the information available regarding the plan's current population that could influence the mix of healthy and disabled retirees, including whether the plan's disability retirement definition is particularly strict or broad. In accordance with ASOP 35, the actuary should use professional judgment when determining an appropriate mortality table assumption to use for disabled retirees.

Given the significant difference observed between healthy and disabled retiree mortality, RPEC suggests that plans that have not tracked disability status at retirement may want to begin such tracking.

8.1.2 Resulting Changes to Final Report

No changes were made to the final report as a result of this comment.

8.2 Geographic Region

One commenter questioned whether any analysis was performed on geographic region and if any conclusions resulted from this analysis.

8.2.1 RPEC Response

RPEC did not attempt to collect information by geographic region for the Pri-2012 study. The home or work state or ZIP code of participants are typically not included on many valuation systems, and it is likely that most contributors would have been unable to provide it. Sponsors of private pension plans often have multiple work facilities in different locations of the country, which makes it impossible to assume a particular geographic location for the entirety of a plan.

The recently-released Pub-2010 Public Retirement Plans Mortality Tables Report analyzed mortality by the four U.S. geographic regions defined by the Census Bureau, which was more feasible because contributing pension systems were generally confined to a particular state. Despite a considerably larger database and more reliable geographic information than what could feasibly have been collected for the Pri-2012 study, RPEC concluded that the predictive value of geographic region was too limited to be used in the development of the Pub-2010 mortality tables. Analysis

by more narrow geographic splits, such as states, counties, ZIP codes, or the nine divisions defined by the Census Bureau, would have been impractical because of a small amount of data in some (or all) categories.

For these reasons, RPEC did not pursue analysis of geographic region on the Pri-2012 dataset. However, RPEC would be interested in studying mortality by geographic region should a reliable source of these data become available.

8.2.2 Resulting Changes to Final Report

No changes were made to the final report as a result of this question.

8.3 Multiemployer Plan Data

One commenter noted that there is a high concentration of multiemployer data in the study, particularly for male blue collar retirees. This commenter questioned whether small differences between multiemployer data and other blue collar data related only to Employee mortality. This commenter also questioned whether the blue collar data were concentrated among a limited number of industries.

8.3.1 RPEC Response

Subsection 4.4.7 of the Pri-2012 exposure draft explains the multivariate analysis results by plan type for Retirees, specifically the comparison of multiemployer plan mortality to that of other plan types. This subsection reads as follows:

> RPEC also considered plan type (multiemployer, other) as a potential predictor of mortality level within the Blue Collar data. However, when income category was included in the model, the relative mortality for multiemployer plan type was within 3% (higher) and did not contribute materially to the likelihood ratio. As a result, subsequent analyses regarding Blue Collar Employee data did not distinguish between plan types.

After review, the word "Employee" in this subsection was incorrect and misleading. This analysis pertains to the Retiree group.

The multivariate analysis reviewed the effects of industry on mortality, but as noted in the exposure draft, a significant concentration of experience was seen in the two largest plans from each industry. Often these plans exhibited directionally opposite relative mortality coefficients or exhibited coefficients that were directionally opposite from the remainder of the data within that industry. RPEC therefore concluded that the study did not support industry category as a useful predictor of mortality. Because the analysis found the relationship between industry and mortality to be indeterminate, RPEC does not believe that mortality table construction was influenced by an undue concentration of data within particular industries. RPEC encourages actuaries to review plan-specific mortality experience to determine whether a particular Pri-2012 benchmark table is appropriate for use for a given plan.

8.3.2 Resulting Changes to Final Report

The word "Employee" in the quoted subsection 4.4.7 above has been changed to "Retiree."

8.4 Separate Public and Private Plan Tables

One commenter questioned whether there is a reason that mortality should differ between similarly situated public-sector and private-sector workers and whether future studies would need to separate the two sectors. This

commenter also asked, in light of the low mortality exhibited by the PubT-2010 (Teachers) tables relative to Pri-2012 White Collar, whether this might be the case for other educated professionals as well.

8.4.1 RPEC Response

The Committee believes there could well be significant parallels between certain groups of public-sector and private-sector pension plan participants. RPEC studies and tables are meant to be reference points or benchmarks to consider as part of an actuary's assumption-setting process. That process will take into account many aspects of the specific participant group in question and utilize (to the extent credible) experience data regarding employee and pensioner mortality.

However, significant structural reasons exist at this point for keeping the public and private studies separate. One reason is that public sector plans often cover public safety or teacher groups that have demonstrated unique mortality patterns, as employees, disabled former employees and retirees. Moreover, it is fairly common for a public sector plan to cover only one such group, for example, a program covering firefighters. Hence, the job category distinctions are useful in applications as well as available in separate experience data.

In addition, the public-sector dataset collected by RPEC was significantly larger than the private-sector response. This allowed for breakdowns by income level (above- or below-median) within job category. Most of the public sector valuations were not on a calendar year basis and had an "average" census date of close to July 1. Private sector data have been mostly calendar year (January 1 valuations).

In contrast, private sector pension plan valuation data do not generally distinguish between any widely recognized job categories. Some attributes may be applicable to employees (e.g., "engineer," "clerical," etc.), but these indicators are not typically available in valuation data. Even industry has proven to be challenging as a mortality predictor, after considering collar type. While there could be meaningful differences between industries, the data collected by RPEC have not supported separate tables or rates along those groupings.

Collar type has been the primary differentiator in the private sector and has been fairly reliable over the years. Attempting to collect public-sector data by collar type would be challenging, however. Unionization is typically one key indicator (along with hourly pay status) of a blue collar population in the private sector, whereas many unionized public-sector workers tend to have attributes typically associated with white-collar jobs.

In addition, many private sector plans have been frozen over the last 10–20 years, and the Pri-2012 dataset showed a decrease in the spread of income levels and especially benefit amounts compared to RP-2006. This is not typical among public sector plans, though many incremental plan changes (often called "tiers") have taken place within the public sector. In general, the public sector data seem more robust with respect to benefit amounts.

For all of these reasons, and others including volunteer "staffing" within RPEC, it does not seem advantageous to the Committee to consolidate public and private sector experience data and studies.

8.4.2 Resulting Changes to Final Report

No changes were made to the final report as a result of this comment.

8.5 Records with No Benefit Amount

One commenter questioned the inclusion of retiree records with no benefit amount provided. This commenter posited that because this should theoretically be one of the easier data items to collect, such records might

represent earlier deaths, annuity purchases or cash outs, and that there is no way for users to tell whether there was a material number of such records.

8.5.1 RPEC Response

The number of Retiree records with no benefit amount was shown in Appendix B of the exposure draft and can be viewed in the pivot table posted to the SOA web site. This affected less than 1% of the exposure. A correlation existed between missing amounts and a higher death rate. However, RPEC did not have any specific indication that these records should be discounted. Accordingly, the Committee retained these data to avoid potentially skewing the results by excluding these records.

8.5.2 Resulting Changes to Final Report

No changes were made to the final report as a result of this question.

8.6 Annuity Factors Using 2.0% Interest

One commenter mentioned that the provision of annuity factors at 0% interest is confusing, given that liabilities are rarely discounted at 0% interest, so factors at 0% interest are not optimal for use in interpolation or extrapolation. This commenter requested that RPEC provide life expectancies instead and separately provide sensitivity analysis using lower, nonzero interest rates such as 2.0%.

8.6.1 RPEC Response

Appendix D.7 of the Pri-2012 exposure draft displays cohort life expectancies for males and females over a range of ages. In addition to the deferral period for participants younger than age 62 (the assumed retirement age), these life expectancies differ from the annuity factors calculated with a 0.0% discount rate for the following reasons:

1. Use of headcount-weighted Pri.H-2012 mortality for life expectancies, as opposed to the amount-weighted Pri-2012 mortality used for annuity factors
2. The “minus 11/24ths” adjustment used in the standard approximation to Woolhouse’s formula used to calculate annuity factors is changed to “minus one-half” in the life expectancy calculation, because there is no need to adjust for beginning-of-month payments in the computation of life expectancy.

RPEC therefore believes that there is value in providing the 0.0% interest rate sensitivities in addition to the life expectancy table. However, RPEC agrees that showing sensitivities at a 2.0% interest rate would be informative and will consider this comment when deciding on interest rate sensitivities to display in future reports. Tables 8.1—8.4 display annuity factor comparisons at 2.0% interest.

Table 8.1

MONTHLY DEFERRED-TO-62 ANNUITY DUE VALUES AT 2.0% INTEREST AS OF JANUARY 1, 2019, PRI-2012 PROJECTED GENERATIONALLY WITH MP-2018

	Age	Total Dataset	Blue Collar	White Collar	Bottom Quartile	Top Quartile
Females	25	9.8951	9.5522	10.1288	9.6735	10.0570
	35	11.7915	11.3600	12.0877	11.5215	11.9914
	45	14.0742	13.5423	14.4459	13.7649	14.3112
	55	16.8683	16.2370	17.3294	16.5599	17.1275
	65	17.6986	17.0900	18.2109	17.5204	17.9207
	75	11.9733	11.6414	12.4584	11.8902	12.1574
	85	6.8710	6.6984	7.1004	6.8482	6.9771
	95	3.5771	3.5600	3.5990	3.5771	3.5821
Males	25	9.1679	8.8215	9.6427	8.4620	9.5319
	35	10.9256	10.4980	11.5178	10.0669	11.3722
	45	13.0425	12.5204	13.7747	12.0171	13.5833
	55	15.6409	15.0164	16.5307	14.4630	16.2785
	65	16.4078	15.7559	17.3369	15.3174	17.0757
	75	10.9216	10.4409	11.5388	10.2975	11.5041
	85	6.0305	5.8054	6.3017	5.8471	6.3480
	95	3.0573	3.0309	3.0946	3.0451	3.0936

Table 8.2

COMPARISON OF MONTHLY DEFERRED-TO-62 ANNUITY DUE VALUES AT 2.0% INTEREST AS OF JANUARY 1, 2019, PRI-2012 SUBPOPULATIONS TO PRI-2012 TOTAL DATASET

	Age	Total Dataset	Blue Collar	White Collar	Bottom Quartile	Top Quartile
Females	25	N/A	−3.5%	2.4%	−2.2%	1.6%
	35	N/A	−3.7%	2.5%	−2.3%	1.7%
	45	N/A	−3.8%	2.6%	−2.2%	1.7%
	55	N/A	−3.7%	2.7%	−1.8%	1.5%
	65	N/A	−3.4%	2.9%	−1.0%	1.3%
	75	N/A	−2.8%	4.1%	−0.7%	1.5%
	85	N/A	−2.5%	3.3%	−0.3%	1.5%
	95	N/A	−0.5%	0.6%	0.0%	0.1%
Males	25	N/A	−3.8%	5.2%	−7.7%	4.0%
	35	N/A	−3.9%	5.4%	−7.9%	4.1%
	45	N/A	−4.0%	5.6%	−7.9%	4.1%
	55	N/A	−4.0%	5.7%	−7.5%	4.1%
	65	N/A	−4.0%	5.7%	−6.6%	4.1%
	75	N/A	−4.4%	5.7%	−5.7%	5.3%
	85	N/A	−3.7%	4.5%	−3.0%	5.3%
	95	N/A	−0.9%	1.2%	−0.4%	1.2%

Table 8.3

MONTHLY DEFERRED-TO-62 ANNUITY DUE VALUES AT 2.0% INTEREST AS OF JANUARY 1, 2019, RP-2006 PROJECTED GENERATIONALLY WITH MP-2018

	Age	Total Dataset	Blue Collar	White Collar	Bottom Quartile	Top Quartile
Females	25	9.8750	9.6875	10.1905	9.6274	10.2498
	35	11.7641	11.5284	12.1640	11.4583	12.2243
	45	14.0375	13.7456	14.5387	13.6749	14.5883
	55	16.8406	16.4899	17.4548	16.4529	17.4619
	65	17.7172	17.3427	18.3713	17.3979	18.3516
	75	12.1276	11.7911	12.6320	11.8179	12.8211
	85	6.9703	6.7919	7.2379	6.8759	7.5364
	95	3.5496	3.5337	3.5945	3.5496	3.8432
Males	25	9.1249	8.7044	9.6899	8.5964	9.8728
	35	10.8536	10.3375	11.5591	10.1999	11.7791
	45	12.9328	12.3086	13.8038	12.1345	14.0605
	55	15.5380	14.8175	16.5774	14.6015	16.8482
	65	16.4075	15.6850	17.4186	15.5485	17.7361
	75	11.0482	10.4537	11.7238	10.4148	12.1405
	85	6.1950	5.8852	6.5072	5.8869	6.6817
	95	3.1422	3.0826	3.1893	3.1202	3.1492

Table 8.4

COMPARISON OF MONTHLY DEFERRED-TO-62 ANNUITY DUE VALUES AT 2.0% INTEREST AS OF JANUARY 1, 2019, PERCENTAGE CHANGE OF MOVING FROM RP-2006 TO PRI-2012

	Age	Total Dataset	Blue Collar	White Collar	Bottom Quartile	Top Quartile
Females	25	0.2%	−1.4%	−0.6%	0.5%	−1.9%
	35	0.2%	−1.5%	−0.6%	0.6%	−1.9%
	45	0.3%	−1.5%	−0.6%	0.7%	−1.9%
	55	0.2%	−1.5%	−0.7%	0.7%	−1.9%
	65	−0.1%	−1.5%	−0.9%	0.7%	−2.3%
	75	−1.3%	−1.3%	−1.4%	0.6%	−5.2%
	85	−1.4%	−1.4%	−1.9%	−0.4%	−7.4%
	95	0.8%	0.7%	0.1%	0.8%	−6.8%
Males	25	0.5%	1.3%	−0.5%	−1.6%	−3.5%
	35	0.7%	1.6%	−0.4%	−1.3%	−3.5%
	45	0.8%	1.7%	−0.2%	−1.0%	−3.4%
	55	0.7%	1.3%	−0.3%	−0.9%	−3.4%
	65	0.0%	0.5%	−0.5%	−1.5%	−3.7%
	75	−1.1%	−0.1%	−1.6%	−1.1%	−5.2%
	85	−2.7%	−1.4%	−3.2%	−0.7%	−5.0%
	95	−2.7%	−1.7%	−3.0%	−2.4%	−1.8%

8.6.2 Resulting Changes to Final Report

No changes were made to the final report as a result of this question.

8.7 Exposure Draft Comments Regarding ASOPs

One commenter questioned the appropriateness of the exposure draft including numerous comments about what an actuary should do to comply with various ASOPs.

8.7.1 RPEC Response

RPEC believes that it is well understood that the content and interpretation of Actuarial Standards of Practice are the responsibility of the Actuarial Standards Board and the Actuarial Board for Counseling and Discipline and that RPEC does not issue interpretations of ASOPs. When referring to ASOPs in the Pri-2012 exposure draft, RPEC's intent is to direct the reader to the ASOPs that may be relevant to mortality assumption setting. RPEC believes these references to the ASOPs are unlikely to lead an actuary with an appropriate level of familiarity with the ASOPs to make choices or recommendations that are inconsistent with their requirements.

8.7.2 Resulting Changes to Final Report

No changes were made to the final report as a result of this comment.

8.8 Demographics of Data

One commenter asked for a comparison of how the demographics of the data compare on average to those of employees covered by private retirement plans as a whole.

8.8.1 RPEC Response

RPEC is not aware of any other sufficiently large database of private retirement plan data that could be used for purposes of performing such a comparison.

8.8.2 Resulting Changes to Final Report

No changes were made to the final report as a result of this question.

Section 9: Editorial and Language Comments

9.1 Life Expectancies in Appendix D

One commenter suggested that Table D.20 should explicitly state that the life expectancies are based on Employee mortality up to age 62 and Retiree mortality thereafter.

9.1.1 RPEC Response and Resulting Changes to Final Report

RPEC agrees that this additional information would make the table clearer. A sentence has been added to explain this above the table.

9.2 Actuarial Method of Exposure Tabulation

One commenter pointed out that subsection 13.3 ("Tabulation of Exposures and Deaths") does not explicitly state that the actuarial method was used to compute exposures.

9.2.1 RPEC Response and Resulting Changes to Final Report

RPEC agrees that subsection 13.3 should clarify this. The actuarial method is now explicitly mentioned.

9.3 Meaning of "Annuity Values"

One commenter mentioned that the use of "annuity values" in subsection 10.1 to refer to pension benefit amounts is confusing, because "annuity values" could be interpreted as an annuity present value.

9.3.1 RPEC Response and Resulting Changes to Final Report

RPEC agrees that this could be confusing. The phrase "annuity values" has been changed to "benefit amounts" in subsection 10.1.

9.4 Use of Scale MP-2018

Regarding the use of Scale MP-2018, one commenter requested that the exposure draft acknowledge the universe of reasonable assumptions with respect to mortality improvement.

9.4.1 RPEC Response and Resulting Changes to Final Report

Scale MP-2018 was used in the Pri-2012 exposure draft to compare mortality rates from different time periods and to compute annuity factors. A footnote has been added near the beginning of subsection 1.4 that states that the use of Scale MP-2018 throughout the report is for illustrative purposes only and that other mortality improvement scales could also have been reasonable to use for this purpose.

9.5 Exclusion of Terminated Vested Participants

Two feedback providers commented on the exclusion of terminated vested participants. Both of these feedback providers requested that a rationale be provided for excluding terminated vested participants. One of the two commenters also asked for clarification about whether a record is dropped in the year of termination.

9.5.1 RPEC Response and Resulting Changes to Final Report

The exclusion of terminated vested participants was mentioned in a footnote at the beginning of subsection 3.4; however, no explanation was provided in the exposure draft. Mortality experience for terminated vested participants is often not tracked with precision. The Committee, thus, decided to exclude terminated vested participants from the Pri-2012 study. This exclusion is consistent with the approach taken in the RP-2000 and RP-2014 studies. In the year of termination, Employee exposure was tabulated and included up until the date of termination. The footnote at the beginning of subsection 3.4 has been expanded to include these details.

9.6 Income as a Mortality Predictor

A sentence in subsection 11.1.2 states that "income has declined as a mortality predictor compared to the RP-2006 study." One commenter expressed disagreement with this statement, citing that the income quartiles have shifted downward but that the information presented in the exposure draft does not support that income has become less important as a predictor of mortality experience.

9.6.1 RPEC Response and Resulting Changes to Final Report

RPEC agrees with this comment and has adjusted the wording in the sentence to change "income" to "plan benefit amount." A similar instance of the word "income" earlier in the subsection has also been changed to "plan benefit amount."

References

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