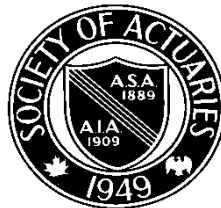


Society of Actuaries

2007-2010 Group Annuity Mortality Experience Report

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Overview

The Society of Actuaries' Group Annuity Experience Committee has performed biennial mortality studies of insurance company annuity experience under group pension contracts issued primarily in the United States. This experience is predominantly based on retired lives, which include benefit payments made under ongoing pension plans and/or terminated plans ("pension closeouts") and partially guaranteed arrangements, such as certain Immediate Participation Guarantee contracts and non-guaranteed arrangements.

These biennial studies have been using six year analytical periods (i.e., they use the data from the three most recent available biennial periods). As Actual-to-Expected mortality ratios have been showing greater variation in year by year results, this report has been expanded to reflect the eight year period 2003 – 2010. This reflects all of the available group annuity mortality experience with results by income group, which was first available in the 2003—2004 biennial study.

MIB's Actuarial and Statistical Research Group collects, validates, and summarizes the data for this report. Consistent with the 2003-06 Group Annuity Experience Report (hereafter referred to as the "Prior Study"), a database application was employed enabling access to more granular groupings. Ten insurance companies and their volunteers, who are listed at the end of this report, supported this effort. The majority of these companies were able to contribute their experience for the most recent four experience years in this report. However, since two significant blocks of experience in the first four years are not in the most recent four years, some care must be exercised in reviewing trends over the entire eight year period.

The following table summarizes mortality trends over 2003-2010. Actual-to-Expected (A/E) ratios and Annual Mortality Improvement rates by Expected Basis are as follows:

Expected Basis	Actual-to-Expected Ratios		Annual Mortality Improvement ¹	
	By Lives	By Income	By Lives	By Income
1983 GAM	99.1%	86.7%	0.7%	1.1%
1994 GAM Basic with Projection	110.4%	100.5%	0.3%	0.7%
1994 GAR	118.7%	108.0%	0.3%	0.7%

As shown by the mortality improvement results By Income, these A/E ratios have dropped 8.5%² from 92.3% in 2003 to 83.8% in 2010 based on the (unprojected) 1983 GAM table, which represents a 1.1% average annual mortality improvement rate.

Using the 1994 GAM Basic with Projection, these A/E ratios By Income have dropped 7.2% from 105.4% in 2003 to 98.1% in 2010. Mortality improvement increased 0.7% faster than provided for by Scale AA, as shown in the 94 GAM Basic with Projection and 94 GAR results.

¹ Results for mortality improvement are based on the Loglinear Regression of results over the eight-year period. Results using Arithmetic Average Improvement are also available in the Excel worksheet on the "MortImp" tabs.

² All percentage changes in A/E Ratios in this report are calculated as differences rather than ratios.

These rates of improvement are substantially lower than the 2.6% overall improvement and 2.0% improvement relative to projection Scale AA for the 2003-2006 period shown in the Prior Study. The largest decreases occurred in 2004 and 2006, which does reflect a consistent set of contributing companies, and in 2009. Although there were two blocks of business that were in the prior period of study but not the current one, this is likely not a significant factor in the decline in improvement, since the decline was observed separately for all but one of the companies that contributed to both periods.

Format of the Data

All experience is available by lives and by income. The data are available with the following breakdowns:

Experience Years (8):	2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010
Experience Periods (4):	2003-2004, 2005-2006, 2007-2008, 2009-2010
Gender:	Male, Female
Attained Age Groups ² :	0-54, 55-59, 60-64, . . . , 90-94, 95+
Income Groups:	<u>0-4,999</u> , <u>5,000-9999</u> , <u>10,000-24,999</u> , <u>25,000-49,999</u> , <u>50,000-99,999</u> , <u>100,000-249,999</u> , <u>250,000-499,999</u> , <u>500,000+</u>
Retirement Class:	Before Normal Retirement Date, on or after NRD, Other (Unknown Retirement Date)
Certain Option:	Life-Only, Life & Certain Period, Cash Refund, Unknown (includes Temporary Life Annuities)
Survivor Option:	0% (Single Life), 1-50% (Joint & Survivor), 51-75% (Joint & Survivor), 76-100% (Joint & Survivor), Unknown Joint Status
Guarantee Status:	Guaranteed, Non-Guaranteed
Duration:	0-1 years, 2-5 years, 6-10 years, Ultimate (11+)

To ensure the deaths are reliable, the data reflects annuitants who are receiving life contingent payments or, in some cases, are past normal retirement date but not currently receiving payments. For joint-and-survivor annuities, only the person in payment status is counted in the exposure and death statistics. Some companies did not include exposures and deaths for spouses, but those that did only included them to the extent that the spouses outlive the participants. Data from trustee/reimbursement contracts (where a Third Party Administrator maintains the benefit records) are included for some contributing companies but may not be for others.

The Committee believes that any lags in reporting of deaths are minimal at this point and that results are generally credible in the formats provided. Results at the very low and very high ages may not be credible. Users who create their own pivot tables from the data should be careful to ensure there is adequate exposure in the resulting cells.

Actual-to-Expected (A/E) ratios are available using the 1983 Group Annuitant Mortality Table (83 GAM and 1983 GAM Basic), both variants of the 1994 Group Annuitant Mortality Table (94 GAM Basic or 94 GAM Static) and the 1994 Group Annuity Reserving Table (94 GAR). All of these tables are applied on a sex-distinct basis. The 94 GAR tables are a combination of the 94 GAM Static Table and Projection Scale AA. Whenever reference is made to the use of the 94 GAR, it implies application of generational mortality techniques. These sets of tables represent the most recent group annuity valuation tables.

The 83 GAM and 94 GAM, with variants, along with Projection Scale AA may be downloaded from <http://mort.soa.org> (Table Identities 825-826, 832-835, and 923-924 respectively. Note that the “94 GAM Basic” tables are also referred to as the “UP-94” tables. The 94 GAM Basic tables were renamed “UP-94” when experience for uninsured pensioner mortality was collected by the Retirement Plans Experience Committee and found to be sufficiently close to the insured experience collected in conjunction with development of the new Group Annuity Mortality Valuation Standard). Note that IRS Revenue Ruling 2001-62 refers to a 94 GAR variant that is projected to 2002. This version of 94 GAR, “IRS 1994 GAR” is not present in the data.

The table below shows the five mortality bases that are available in the data.

Mortality Table	Valuation Margin	Projection
83 GAM	Included	None
94 GAM Basic (UP-94)	None	None
94 GAM Static	Included	None
94 GAM Basic with Projection	None	Scale AA
94 GAR	Included	Scale AA

The mortality tables shown in bold font above are already present in each of the pivot tables. The 83 GAM and 94 GAR were selected as they are prescribed valuation bases. The 94 GAM Basic with Projection was selected as a best-estimate version because a valuation margin is not included but mortality improvement projection is included. Other bases may easily be added to any pivot table by any user who wishes to see results on those bases.

Principal Observations

General Commentary

This section of the report will describe each of the pivot tables that have been provided and includes relevant observations. Each topic is referred to by the Tab Name and is generally discussed in the order that they appear in the accompanying Excel file.

This discussion uses the 1994 GAM Basic Table with Projection Scale AA as the primary basis for expected deaths.

A/E ratios provide simple reference values for comparison of mortality experience data with established mortality tables. The exact reference values are quantitatively significant only to the extent that underlying exposure is similar for the current experience data. The United States and Canadian population, workforce, and annuitant population have undergone significant demographic changes since the experience data was originally obtained to construct the 1983 GAM and 1994 GAR tables. In addition, as noted earlier, data reported in this study was derived primarily from blended populations of active workers and retirees (however, blending was not significant at the older ages). Interpretations of data in terms of the A/E ratios that follow should nevertheless be adopted only with these factors taken into consideration.

Mortality Improvement Tabs

There are two tabs for illustrating mortality improvement – one By Lives and one By Income. The values for Annual Mortality Improvement contained in the table on page 1 of this report come from these tabs. Results can be displayed differentiating by gender or on a combined basis. Annual rates of mortality improvement discussed below use the Log-linear Regression Slope of the results using the **1994 GAM Basic with Projection** table as the expected basis. For convenience, the Arithmetic Average of the mortality improvement is calculated and shown in the pivot tables as well on these tabs.

The mortality improvement factors provide an indication of how closely Projection Scale AA reflects the actual annual improvement in mortality. These factors show rates of improvement in actual mortality relative to improvement in the expected mortality basis. Factors that are positive indicate that actual mortality is improving faster than assumed by Projection Scale AA. Factors that are negative indicate that actual mortality is improving at a slower rate than assumed by Projection Scale AA.

- **By Lives**

For males and females combined, overall mortality improved 0.3% faster than Scale AA during 2003-2010 compared to the 2.6% mortality improvement seen during 2001-2006. Males improved by 0.3% and females improved by 0.4%. The rates of improvement generally decrease by attained age, with higher rates of improvement below age 75 for males and below age 70 for females.

- ***By Income***

For males and females combined, overall mortality improved by 0.7% faster than Scale AA during 2003-2010 compared to 2.0% during 2001-2006. Males improved by 0.9% and females improved by 0.3%. The rates of improvement generally decrease by attained age, with higher rates of improvement below age 80 for males and below age 70 for females.

Gender Tabs

There are two tabs for analyzing summary statistics by gender. The first gender tab, Summary – Gender & Exp Yr, contains two pivot tables, one for each year of the study period By Lives and another By Income. The second gender tab, Att Age & Gender, likewise has two pivot tables, one for attained age groups By Lives and another pivot table for attained age groups By Income. On the first tab, for ease of viewing, the two pivot tables are displayed sequentially while for the second gender tab the pivot tables are able to be displayed side-by-side. Exposures, actual deaths and A/E ratios are shown on each tab.

- **Experience Years**

As noted above, the two pivot tables on this tab are displayed sequentially with By Lives appearing first and By Income appearing second. Individual experience years are shown separately.

- ***By Lives***

Male exposures By Lives are relatively flat over the four-year period 2003-2006 and likewise flat over the four-year period 2007-2010. Female exposures By Lives are also flat over each year of the two respective four-year periods. The decrease in data submissions between 2006 and 2007 accounts for these patterns.

The distribution of exposures By Lives by gender remained roughly the same proportion; that is, 58% male and 42% female. These percentages were not impacted by the decline in submissions between 2006 and 2007. As shown in the table below, the average A/E ratios in the first four years is consistent with those in the later four years and the difference between female and male A/E ratios is consistent between periods.

Average A/E ratios	2003-06	2007-10
Females	113.7	113.4
Males	108.6	108.4

While the prior study showed generally declining A/E ratios over time, this report shows cyclical A/E results by calendar year. Following the significant drop in A/E ratios that occurred in 2006 (below 100%), A/E ratios exceeded 100% in both 2007 and 2008 and then returned to the 2006 level in 2009 and 2010. The Center for Disease Control and Prevention’s “National Vital Statistics Reports” for 2007³ showed decreases in crude,

³ Xu, Kochanek, Murphy, & Tejada Vera (2010, May 20). *Deaths: Final Data for 2007*, National Vital Statistics Reports Vol. 58. No. 19. Retrieved from <http://www.cdc.gov/nchs/nvss.htm>

age-adjusted mortality rates for the 65-74, 75-84, and 85 & up age bands, so these results may be impacted by the change in contributions that occurred in 2007. The CDC's decrease in A/E ratios for 2009 for crude, age-adjusted mortality rates for the 65-74 and 75-84 age bands⁴ (age 85 & up results were flat) is consistent with the Group Annuity Experience Committee experience for 2009.

- **By Income**

Patterns and trends By Income are comparable to those By Lives. Data that has A/E ratios By Income lower than those on a By Lives basis suggests individuals with higher incomes are experiencing increased longevity. The A/E ratios By Income are approximately 10% lower than those By Lives. However, this difference largely reflects male experience. For females, this impact is only about 2/3 that of males. The average difference in 2003 – 2006 is less than that in 2007 – 2010, but this may represent the different blocks of experience.

Whereas the proportion of exposures on a By Lives basis is relatively equal, with 58% male and 42% female, the proportion of exposures on a By Income basis is skewed dramatically towards males; on average males account for 70% and females only 30%. The significant difference in exposures By Income is indicative the pervasiveness of male-female income disparity and is further discussed under the Income Group tab portion of the report.

- **Attained Age Group**

As noted above, the two pivot tables on this tab are displayed side-by-side with By Lives on the left and By Income on the right. Results are shown for all eight years of the study period combined. Results for an individual experience year or group of experience years can be obtained by changing the Experience Year field of the pivot table.

- **By Lives**

Female A/E ratios tend to be higher than males. This disparity between male and female A/E ratios is consistent with prior studies. Results by gender do, however, display similar patterns by gender. A/E ratios for ages below 65 are noticeably higher than other age groups, presumably reflective of early retirement for health reasons. However, these results should be interpreted with caution due to the modest amount of exposure in these groups. A/E ratios for ages 65-95+ are fairly consistent.

- **By Income**

Results By Income are similar to those By Lives in all important respects.

⁴ Kochanek, Xu, Murphy, Miniño, & Kung (2011, December 29). *Deaths: Final Data for 2009*, National Vital Statistics Reports Vol. 60. No. 3. Retrieved from <http://www.cdc.gov/nchs/nvss.htm>

Income Group Tab

The Income Group tab shows the experience grouped according to the amount of income each annuitant receives based on attained age groupings. The dollar amounts shown may not be representative of the total income from all sources for any given annuitant but still provides some insight into the variation of results across different amounts of income.

As shown in the table below, the overall results show a consistent and marked pattern of declining A/E ratios as income amounts increase. The highest A/E ratio occurs for the lowest income group. The A/E ratios then decline for a given attained age grouping, as the dollar range of the income grouping rises. The same pattern occurs at almost every age group where there is a sufficient amount of exposure.

	\$0-4,999	\$5,000-9,999	\$10,000-24,999	\$25,000- 49,999	\$50,000 +
A/E Ratio	112.4%	106.6%	97.3%	83.4%	73.0%
% of Exposure	25.0%	21.2%	30.5%	15.9%	7.4%

Also of note, for attained ages 65-84, the A/E ratios are less than 100% for income groupings \$10,000 and above. This set of attained age groupings accounts for 36% of the exposures. Of the exposures above \$100,000, the bulk, 82%, is concentrated between ages 60 and 84. This data appears consistent with a salary-linkage element common to pension plans.

The pattern of declining A/E ratios as income amounts increase persists when looking at the data by gender. However, the percentage of exposures that females comprise relative to each income group's total is shown to steadily decline from 45% at the \$0-\$4,999 income group down to roughly 9% at each of the income groups at \$50,000 and above. The decline in exposures as income groupings rise underscores the male-female income disparity, or "gender earnings gap", statistic tracked by the United States Census Bureau in conjunction with population surveys.

Retirement Class Tabs

There are two tabs for analyzing statistics by Retirement Class. The first Retirement Class tab presents the data by Attained Age Grouping while the second tab presents data by Income Group. The first of these tabs essentially reflects retirement age decisions. Health-related conditions and corporate downsizing can influence retirement decisions. The second tab attempts to capture the impact of income on an annuitant's decision to retire. Results within each retirement class are generally consistent with the overall pattern of A/E ratios declining as income increases as highlighted earlier in the discussion of the Income Group tab results. Note that the category "Other" includes experience submitted without specification of retirement date status as well as data for which a retirement date is not applicable; for example, benefit payments to a surviving spouse.

Early retirements are a combination of voluntary and involuntary (i.e., non-elective) retirements. The voluntary retirements may be the result of personal/health reasons, existing subsidies or enhanced subsidies that might accompany an elective downsizing.

- By Attained Age Group
 - **Before Normal Retirement Date**

Approximately half of the annuitants (by income) retire early. Overall, those who retire early show an A/E ratio of 103.1% compared to 97.7% for those who retired on or after their retirement date. These ratios indicate that those who retire early show higher mortality than those who retire on or after their normal retirement date. Assuming large scale involuntary retirements (downsizings) would not reflect health status, these results suggest that employees opting for early retirement due to impaired health have a larger impact than healthy lives seeking to take advantage of existing or enhanced early retirement subsidies.
 - **Normal Retirement Date or After**

For the approximate 20% of individuals (by income) who retire on or after their normal retirement date, the overall A/E ratio was 97.7%. Consistent with the Prior Study, A/E ratios for ages 65-84 are less than 100% while the younger and older attained age groupings are higher than 100%.
 - **Other**

The A/E ratio for the 30% whose normal retirement age is unspecified is 99.8%, which is close to the overall A/E ratio of 100.5%. This suggests this group is similar to the aggregate of the Before NRD and NRD & After groups. Consistent with the Prior Study, younger attained age groups have significantly higher A/E ratios. However, only attained ages 65-84 have A/E ratios less than 100%. For attained ages 85 and above, the A/E ratios are higher than 100% and higher than the Prior Study.
- By Income Group
 - **Before Normal Retirement Date**

Of those who retire early (shown previously to be roughly half of all annuitants), 61% are in income groups above \$10,000 with the highest percentage, 33%, in the \$10,000-\$24,999 group. These percentages reflect that individuals who have a smaller pension benefit may be less likely to feel financially secure enough to retire early. Furthermore, recall the highest A/E ratios occur for the lowest income groups. Combined, these statistics suggests that those individuals with smaller benefits who are retiring early are possibly only doing so due to health impairments.
 - **Normal Retirement Date or After**

For those who retire on or after their normal retirement date, the overall pattern of A/E ratios declines as the dollar value of the income group increases. Likewise ratios decline below 100% beginning with incomes of \$10,000 or higher. Both patterns are consistent with the Prior Study.

- **Other**

Unlike the Prior Study, in which the A/E ratios of this category exhibited the same patterns as those in the **Normal Retirement Date and After** category, this category now looks more like the combination of **Before NRD** and **NRD & After**.

Certain Option Tabs

There are two tabs for analyzing the data by the benefit option selected upon retirement. Participants may have an option to receive their entire benefit, or the portion of the benefit that is not paid out as a lump sum, in the form of a single life annuity or in other actuarially equivalent forms of payment. Accordingly, the data is split as Life-Only, Life & Certain Period, Cash Refund, and Unknown. Note that each of these categories contains both single life and joint-and-survivor annuities; the breakdown only reflects the different certain options elected. Individuals who elected lump sum payments, if said option was available in their plan, are not part of the study data.

- A Life-Only annuity provides for a monthly benefit for the lifetime of a pensioner or a pensioner with a contingent annuitant. Income ceases at death of the pensioner or after the 2nd death of a pensioner and the co-annuitant in the case of a joint-and-survivor annuity. Payments are not guaranteed up to a certain dollar amount or specified number of payment years.
- A Life & Certain Period annuity pays benefits to the end of specified amount of time, called the “certain” period, and the life of the annuitant, whichever is later. Hence a stream of payments will be remitted to a beneficiary in the event the plan participant dies before the “certain” term ends.
- A Cash Refund annuity has a provision which stipulates that if the annuitant passes away before the annuity payments received equal the contributions made, the plan will pay the difference to a beneficiary. This option is typically associated with employee contributions.
- The “Unknown” category includes all annuity types that do not fall into one of the other categories. This category includes Temporary Life annuities, in which payments cease upon the death of the annuitant or upon the expiration of a period of time, whichever comes first.

The data by Certain Option must be interpreted with care as Life-Only Annuities represent 80% of the exposure. This is consistent with the Prior Study. Many pension plans use the Life Only option for unmarried participants. Some companies may report a Life & Certain Period annuity as Life Only after the certain period has expired. Likewise, a Cash Refund annuity may be reported as Life Only after the specified amount has been paid out. Surviving spouses may be classified as Life Only. Healthier lives may be selecting the benefit option with the highest monthly payments, namely a Life Only annuity. Married couples may elect a life-only annuity and then buy life insurance to protect their spouse, or they may choose a Survivor benefit option instead. There are numerous possibilities for why the Life Only option predominates. A better understanding of why the Life Only option constitutes such a large portion of the exposures would enable more accurate interpretation.

- By Attained Age Group

For males, the 102.0% A/E ratio for the Life and Certain Period exceeds the 98.4% for Life Only and 97.9% for Cash Refund benefits. Unhealthier lives appear to be valuing the death benefit

guarantees provided by the certain period. However, since the Life and Certain Period only represents 7.5% of the exposure, this experience may not be credible. For females, the A/E ratios are similar for all three options. Male A/E ratios fall below 100% for attained ages between 65 and 84 for both the Life Only option and Cash Refund option.

- By Income Group

When the data is segregated into income groups, A/E ratios decline as the income grouping rises. Starting with the \$10,000-24,999 band, overall A/E ratios fall below 100%. Consistent with the Prior Study, the A/E ratio by income group for Life & Certain is generally higher than Life Only for males and females, though this result may not be credible.

Survivor Option Tabs

There are two tabs for analyzing data by survivor option selected. Survivor benefits allow a spouse or designated beneficiary to receive all or part of a vested retirement benefit. The single life benefit pays the highest monthly benefit to the participant only. Election of a joint and survivor (“J&S”) benefit means the monthly benefits will be lower as the payments are no longer based on the participant’s lifetime alone but rather guarantees a steady stream of income for two lifetimes –the participant and his/her spouse. Per U.S. Law, a 50% joint and survivor benefit is mandated for married couples unless spousal consent is obtained. Other common percentages for joint and survivor annuities are 66.7% and 75%. The tables include an Unknown category which could indicate that either the survivor option or the joint continuation percent were uncertain. The results of that category look similar to the results of the J&S options, so it is presumed that the majority of the exposure elected J&S forms.

The following table shows the A/E ratios for each survivor option and the distribution of the total population, the population excluding unknown and the known J&S options.

	Single Life	1% -50% J&S	51%-75% J&S	76%-100% J&S	Unknown
A/E Ratio	105.2%	88.6%	98.8%	93.7%	96.6%
% of Exposure	50.7%	11.2%	9.1%	7.1%	21.9%
% Exposure Excl. Unknown	64.9%	14.3%	11.6%	9.1%	
J&S Choices		40.8%	33.2%	26.0%	

For all the joint options, total A/E ratios are below 100% for males and females. This result is consistent with other studies indicating greater longevity for married individuals. For example, work done at Duke University Medical Center in the U.S. that was published in 2013 found that single individuals and those without a consistent partner during middle age had an increased likelihood of early mortality.⁵

- By Attained Age Group

Consistent with other tabs that display data by attained ages, A/E ratios are quite high at ages less than 59, indicative of those with impaired health opting to retire early. The A/E ratios generally fall below 100% between ages 65 and 84 for all options other than Single Life. Given

⁵ Siegler IC et al (2012). *Consistency and Timing of Marital Transitions and Survival During Midlife: The Role of Personality and Health Risk Behaviors*. Annals of Behavioral Medicine; DOI 10.1007/s12160-012-9457-3.

the ratios for the Single Life option begin to deteriorate starting at age 70, the data further supports the belief that greater longevity exists for married lives, that is, those selecting a joint and survivor option experience better mortality. Further supporting the relationship status mortality phenomenon is that an analysis of the Single Life option by gender shows the data is split 60% male and 40% female, which is similar to the gender split for the data in aggregate. Hence the higher A/E ratios observed for the Single Life option is not explained by higher male mortality.

- **By Income Group**

Consistent with every other income grouping tab, when the survivor option data is segregated into income groupings, the A/E ratios decline as the income grouping rises. Likewise, regardless of the survivor option, all the A/E ratios are above 100% for incomes less than \$5,000. All but one A/E ratio are above 100% for incomes less than \$10,000.

For incomes under \$10,000, 28% of exposures fall under a Joint and Survivor option compared with 41% of incomes of at least \$10,000. For lower income levels, the reduction in benefits under a Joint and Survivor option, compared to the higher benefits of a Life Only option, may be too great to select. Additionally, there may be a correlation between income and marital status which results in higher Joint and Survivor option election rates at higher income levels.

Guaranteed and Non-Guaranteed Tabs

There are two tabs for analyzing data by guaranteed status. Guaranteed business includes single premium closeout business, which is usually non-participating, as well as some types of participating business. Single premium closeout business encompasses terminal funding, which occurs when a company purchases annuities to provide benefits earned under a qualified defined benefit pension plan. Single premium closeout also includes the purchase of annuities for accounting purposes in which a business entity wishes to curtail the pension liability of certain participant groups. Note that contracts with an immediate guarantee feature are considered as guaranteed by some insurers but as non-guaranteed by others.

There are two additional notes with respect to the data presented on these bases. Some contributors provide only guaranteed data to the experience study and do not monitor non-guaranteed mortality as reserves are not affected by the non-guaranteed block. Other insurers track the information but may not be as diligent about confirming survivorship for non-guaranteed benefits as the insurer has no obligation to do so.

For the period 2003-2010, about 66% of the exposures By Income are guaranteed business. This percentage was flat during 2007-2010. This proportion is up from 62% in the Prior Study in which percentages were trending downward by calendar year. This difference suggests that data submissions for the period 2003-2006 and 2007-2010 are not homogenous. The A/E ratio for all guaranteed annuitants is 97.0% and is comparable to that of the Prior Study which was 98.7%. However, the A/E ratio for non-guaranteed annuitants, 113.6%, is lower than the 117.3% of the Prior Study. This difference further supports that data from 2007-2010 is not homogenous with 2003-2006.

In the Prior Study, gender splits between guaranteed business and non-guaranteed business were quite similar at 73% male and 77% male, respectively. For the period 2007-2010, however, a shift is seen in the non-guaranteed block. Males still represent close to 72% of the guaranteed business but males now only account for 67% of the non-guaranteed business.

- By Attained Age Group

Consistent with other tabs that display data on an attained age grouping basis, A/E ratios are quite high at ages less than 60, indicative of those with impaired health opting to retire early. For guaranteed exposure, the A/E ratios generally fall below 100% between ages 65 and 84. 85% of the guaranteed exposure By Income is concentrated between attained age groupings 60-89 while 85% of the non-guaranteed exposure By Income are concentrated at a slightly lower grouping of attained ages, namely ages 55-79.

Similar to prior studies, guaranteed A/E results are lower than non-guaranteed A/E results. This indicates that pension plans have transferred risk on liabilities with higher longevity than the liabilities that they've chosen to retain.

Male A/E ratios for guaranteed annuitants fall below 100% at ages 60-89 and average 94.9% overall. In the Prior Study, the male A/E ratios were likewise below 100% for these attained age groupings. However, on a non-guaranteed basis, male A/E ratios are above 100% except for ages 65-69 and average 111.8% overall. In the Prior Study, male A/E ratios were below 100% for attained ages 65-79.

Female A/E ratios for guaranteed annuitants fall below 100% only at ages 65-69 and average 104.0% overall. On a non-guaranteed basis, female A/E ratios are all above 100% and average 119.9% overall.

- By Income Group

Consistent with every other income grouping tab, a similar pattern By Income is exhibited by the guaranteed and non-guaranteed splits of the data; specifically, the A/E ratios decline as the income grouping rises and the combined A/E ratios fall below 100% beginning with the \$10,000-\$24,999 income grouping.

The guaranteed A/E ratios for income amounts below \$100,000 are 12.0% to 24.7% less by income band than those of the non-guaranteed A/E ratios, suggesting that pension plans are selecting to transfer longevity risk on lives with the best longevity and retain mortality risk where mortality rates are high. On a non-guaranteed basis, females did show an increase in the proportion of annuitants falling in income groupings \$10,000-and-above between the 2003-2006 and 2007-2010 studies. In the former, the percentage was 46%, while for the 2007-2010 period, 53% of women fell into the \$10,000-and-above income groupings.

Duration Grouping Tabs

There are two tabs for analyzing the data by duration: one by attained age groupings and one by income groupings. The results on these tabs are subject to limitations. Duration is intended to be measured as years since retirement. However, significant portions of these liabilities were in payment

status prior to being purchased from the insurance company involved (for example, terminal funding arrangements for defined benefit plans). In these cases, the annuity commencement date is likely to be coded as the purchase date of the group annuity contract rather than the original retirement date of the annuitant.

- By Attained Age Group

- **Duration 0-1**

Overall for duration 0-1, the A/E ratio is 104.4%, well below the 114.4% of the Prior Study covering 2003-2006. However for attained ages less than 60, the A/E ratios of the initial year are quite high. Hence it is still likely true that younger participants are retiring early due to disability or health issues. It is probable that skewing of the A/E ratios for duration 0-1 is occurring due to the concentration of purchased liabilities. That is, those listed as being in duration 0-1 are in fact not in their first duration following retirement but rather their first year since being converted to a terminal funding arrangement. As noted above, the data cannot be separated by retirement date and purchase date to confirm or deny this conjecture. As food for thought though, in the prior study, attained ages less than 60 accounted for 37% of the total duration 0-1 exposures while for the 2007-2010 period, the grouping accounts for only 21%. Any interpretation of the overall A/E ratio must be tempered by the significant difference in submissions between the two study periods.

- **Durations 2-5**

The overall A/E ratio for durations 2-5 is 95.4% and is below the prior study's value of 99%. Like the Prior Study, the high A/E ratios for attained ages below 60 persist for durations 2-5. Similar to the data for duration 0-1, attained ages less than 60 only account for roughly 20% of the exposures in both the 2003-2006 and 2007-2010 study periods. Again, it is likely younger participants are retiring early due to disability or health issues.

- **Durations 6-10**

The overall A/E ratio for durations 6-10 is 92.7%. Consistent with the prior study, this duration grouping shows the lowest overall ratio.

- **Ultimate (11+)**

The overall A/E ratio is 101.9%.

- By Income Group

Consistent with every other income grouping tab, a similar pattern By Income is exhibited by the duration groupings. Specifically, the A/E ratios decline as the income grouping rises and the combined A/E ratios fall below 100% beginning with the \$10,000-\$24,999 income grouping. Duration grouping hence does not appear to be a significant factor when looking at the data by income grouping.

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Contributing Companies for the 2003-2010 Study Period

Aetna	AXA-Equitable	John Hancock Group
MetLife	Mutual of Omaha	Nationwide
New York Life	Principal Financial	Prudential

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