Session 124: Private Pension Mortality Study

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2019 ANNUAL MEETING & EXHIBIT

Session 124: Pri-2012 Private Retirement Plans Mortality Tables

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October 29, 2019

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Topics

- Quick Highlights
- Naming Conventions
- Data
- Multivariate Analysis
- Comparisons to RP-2006 Mortality Tables
- Other Observations and Comments
- Response to Comments on Pri-2012 Exposure Draft
- MP-2019 Projection Scale

Quick Highlights

- A total of 70 individual tables based on over 16 million life-years of exposure and 343,000 deaths
- Most plan sponsors that update from RP-2006* tables to Pri-2012 tables will experience a small change in pension liabilities, usually within plus or minus 1%
- Collar type and income level shown to be significant indicators of mortality
- After controlling for other factors, multiemployer plan participants did not exhibit significantly different mortality than single-employer plan participants

* Removing Scale MP-2014 mortality improvement for 2007-2014 from the RP-2014 rates yields the RP-2006 rates.

Naming Conventions

- RPEC considered the following subgroups in this study
  - Employee: A nondisabled plan participant who is actively employed (including those in plans that no longer have ongoing benefit accruals)
  - Retiree: A formerly active participant in benefit receipt who was not deemed disabled at the date of retirement
  - Contingent Survivor: A surviving beneficiary (of a formerly active or retired participant) who is older than age 17 and in benefit receipt
  - Disabled Retiree: A retired participant in benefit receipt who was deemed disabled as of the date of retirement
  - Juvenile: A participant's surviving beneficiary who is under the age of 18
- Terminated participants were excluded

Naming Conventions

- The full set of all private plan mortality tables produced in the study is denoted **Pri-2012**
- Headcount-weighted tables are indicated with an ".H"
- Collar- and income-specific subpopulation tables denoted with parenthetical letters at the end of the name:
  - Pri-2012(BC) = Amount-weighted blue collar tables
  - Pri.H-2012(WC) = Headcount-weighted white collar tables
  - Pri.H-2012(TQ) = Headcount-weighted top quartile tables
  - Pri-2012(BQ) = Amount-weighted bottom quartile tables

The Data

Data Collection

- Data request distributed to pension consulting firms and insurance companies with blocks of group annuity business
  - Three individual plan sponsors provided data as well
- Collected information for calendar years 2010-2014
- Collar type:
  - Requested collar type at the plan level and participant level (if available)
  - Plan designated as Blue Collar if at least 70% of participants are either hourly or union
  - Plan designated as White Collar if at least 70% of participants are both salaried and non-union

Data Collection

- Collected six-digit NAICS code to study data by industry
- Amount-weighting information
  - Salary (Employees)
  - Pension amount (Retirees, Disabled Retirees, Contingent Survivors)
- Lump sum availability
- Plan type (single-employer, multiemployer)
- Data collected from 18 different entities that submitted information for 402 plans

Data Processing

- Four primary stages of data processing:
  1. Initial review for reasonableness and completeness
  2. Validation of individual records
  3. Review of death counts by month
  4. Review of actual-to-expected (A/E) mortality experience by plan, status and collar type
- Each stage involved asking questions of contributors to attempt to correct or confirm the data provided
- At each stage of the process, some data was excluded when contributors could not resolve issues raised

Data Processing – Reconciliation of Excluded Data

		Life-Years of Exposure (in thousands)				
		Employees	Retirees	Contingent Survivors	Disabled Retirees	Total
(a)	**Total Beginning Exposures**	8,385	7,621	1,185	343	17,534
(b)	Estimated exposures for months with anomalous death counts that could not be confirmed by the contributor	144	64	24	2	234
(c)	Exposures for data subgroups with outlier A/E ratios that could not be confirmed by the contributor	1,015	-	116	2	1,133
(d)	Exposures with ages outside of age ranges	37	25	20	6	88
(e)	**Exposures in Final Dataset**	7,189	7,532	1,025	333	16,079

- Approximately 92% of data retained
- Most exclusions were of Employee groups with low A/E ratios, likely indicative of unreliable death reporting

Summary of Exposures/Deaths in Final Dataset

		Blue Collar		White Collar		Unknown Collar		Total	
		Exposures	Deaths	Exposures	Deaths	Exposures	Deaths	Exposures	Deaths
Employee	Female	1,222,258	1,724	522,076	454	883,507	825	2,627,841	3,003
	Male	3,272,188	6,060	474,419	603	815,043	1,172	4,561,650	7,835
	Total	4,494,446	7,784	996,495	1,057	1,698,551	1,997	7,189,492	10,838
Retiree	Female	773,240	25,588	533,781	13,126	947,152	30,296	2,254,173	69,010
	Male	3,099,213	121,624	916,660	30,946	1,261,959	45,939	5,277,831	198,509
	Total	3,872,453	147,212	1,450,441	44,072	2,209,111	76,235	7,532,004	267,519
Contingent Survivor	Female	625,826	29,105	146,598	7,191	176,774	9,382	949,197	45,678
	Male	35,185	2,146	20,573	1,643	19,765	1,114	75,523	4,903
	Total	661,011	31,251	167,171	8,834	196,539	10,496	1,024,720	50,581
Disabled Retiree	Female	41,388	1,354	3,935	114	3,808	134	49,131	1,602
	Male	275,435	11,777	2,053	93	6,034	273	283,523	12,143
	Total	316,824	13,131	5,988	207	9,843	407	332,654	13,745
Total	Female	2,662,711	57,771	1,206,389	20,885	2,011,242	40,637	5,880,342	119,293
	Male	6,682,022	141,607	1,413,704	33,285	2,102,801	48,498	10,198,528	223,390
	Total	9,344,733	199,378	2,620,094	54,170	4,114,043	89,135	16,078,870	342,683

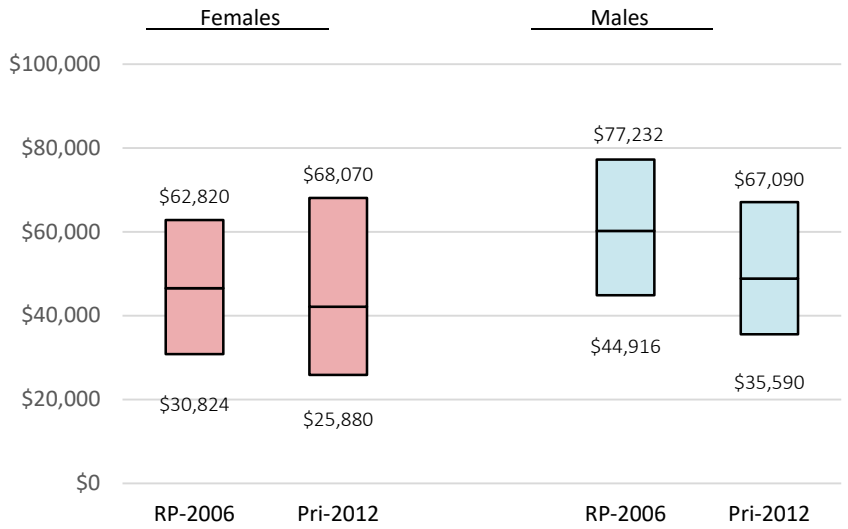
Summary of Collar Concentration

		Collar Concentration[1] (Life-Years of Exposure)					
		Females			Males		
		Blue	White	Unknown	Blue	White	Unknown
Employee	RP-2006	68.1%	27.8%	4.1%	61.3%	33.6%	5.1%
	Pri-2012	46.5%	19.9%	33.6%	71.7%	10.4%	17.9%
Retiree	RP-2006	56.1%	31.4%	12.5%	52.2%	27.6%	20.1%
	Pri-2012	34.3%	23.7%	42.0%	58.7%	17.4%	23.9%
Contingent Survivor	RP-2006	59.1%	28.5%	12.4%	56.3%	31.9%	11.9%
	Pri-2012	65.9%	15.4%	18.6%	46.6%	27.2%	26.2%
Disabled Retiree	RP-2006	73.3%	13.8%	12.9%	60.1%	11.9%	28.0%
	Pri-2012	84.2%	8.0%	7.8%	97.1%	0.7%	2.1%
Total	RP-2006	62.5%	28.7%	8.8%	56.4%	29.5%	14.1%
	Pri-2012	45.3%	20.5%	34.2%	65.5%	13.9%	20.6%

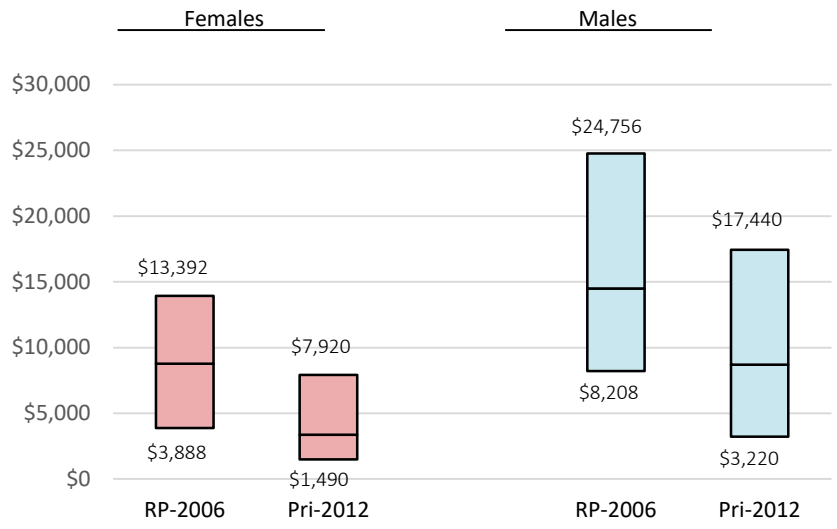
[1] The portion of the data labeled as “Unknown” collar for RP-2006 was designated as “Mixed” collar in the *RP-2014 Mortality Tables Report*.

Distribution of Income Quartiles

Employees



Retirees



- Charts show range of 25th, 50th, and 75th income percentiles
- Pri-2012 quartile breakpoints generally lower than RP-2006
  - Top Quartile a “less select” group than in the prior study

Multivariate Analysis

Multivariate Analysis[1]

- The main objective of the multivariate analysis was to assess the relative effectiveness of different factors in predicting variations in mortality patterns
- NIU team analyzed the following potentially predictive covariates
  - Collar type (Blue, White)
  - Income quartile (salary for Employees, benefit amount for annuitants)
  - Industry category
  - Duration (from hire for Employees and from benefit commencement for annuitants)
  - Lump sum availability (full, partial, none)
  - Plan type (single employer vs. multiemployer)
  - Primary Retiree vs. Contingent Survivor

[1] The multivariate analysis was performed by Michelle Xia, PhD and Lei Hua, ASA, PhD at Northern Illinois University (NIU)

Multivariate Analysis

- For Retirees and Contingent Survivors, **collar type** had the greatest predictive value, followed by **income quartile**
- For Employees, income quartile had the greatest predictive value
- After controlling for other factors, mortality differences between single employer and multiemployer plans were not significant
- Retiree mortality experience was determined to be significantly different from that of Contingent Survivors
- Data did not support separate tables or factors by duration, industry category, or lump sum availability

Multivariate Analysis

- The following tables were produced for each gender and "weighting" ($-weighted or #-weighted) combination

Status	Total Dataset	Blue Collar	White Collar	Top Quartile	Bottom Quartile
Employee	✓	✓	✓	✓	✓
Retiree	✓	✓	✓	✓	✓
Contingent Survivor	✓	✓	✓		
Disabled Retiree	✓				
Nondisabled Annuitant	✓	✓	✓		
Juvenile[1]	✓				

[1] Only one male and one female Juvenile table were produced; separate tables by weighting were not created.

Comparisons to RP-2006 Mortality Tables

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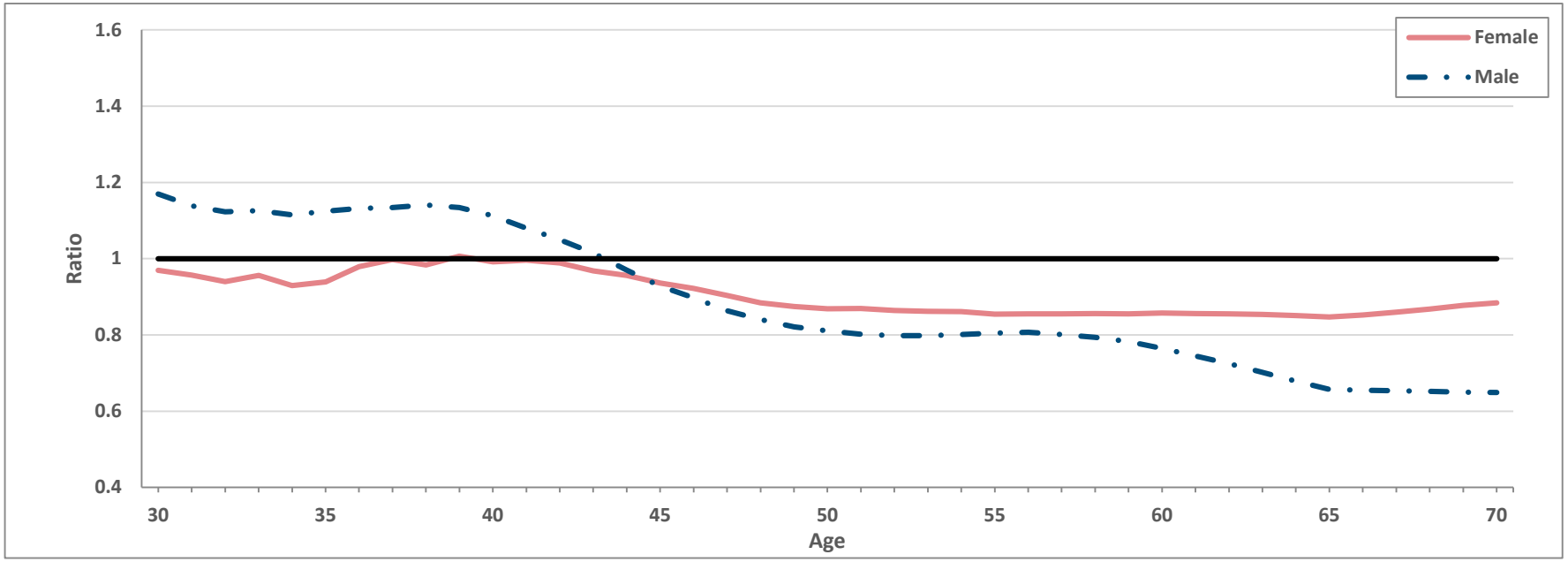
Comparison of Mortality Rates

- RPEC compared Pri-2012 to RP-2006, each projected to the year 2019 with Scale MP-2018
- An important difference between Pri-2012 annuitant mortality rates and prior SOA mortality studies is the treatment of beneficiaries
  - RP-2006 “Healthy Annuitant” tables were developed based on mortality experience of retirees and surviving beneficiaries
  - Pri-2012 “Retiree” tables were developed based on mortality experience of retirees only
  - Pri-2012 “Contingent Survivor” tables were developed based on mortality experience of surviving beneficiaries
  - This affects comparison of Pri-2012 to RP-2006 rates
- A ratio below 1.0 on the following charts means Pri-2012 rates are lower than the comparable rate in the previously published table

Comparison of Mortality Rates - Employees

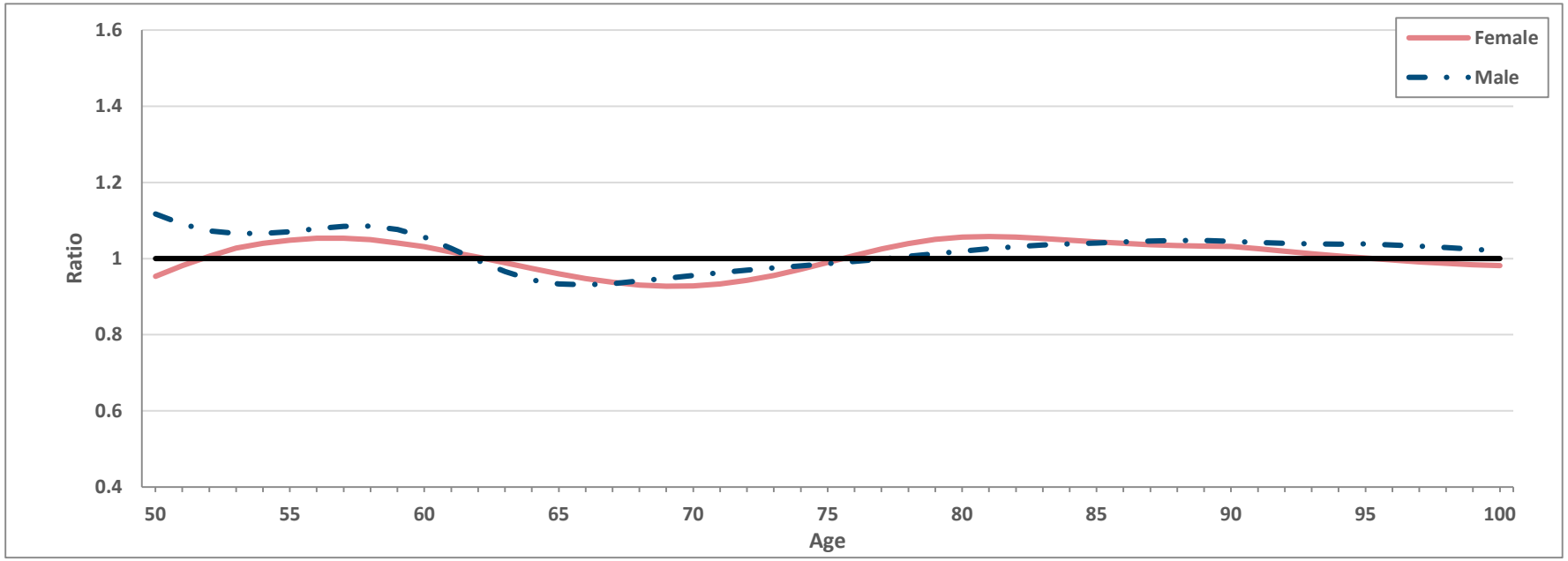
- Ratio of Pri-2012 Employee to RP-2006 Employee



- For females, Pri-2012 rates generally lower
- For males, Pri-2012 higher at younger ages, lower at older ages

Comparison of Mortality Rates - Retirees

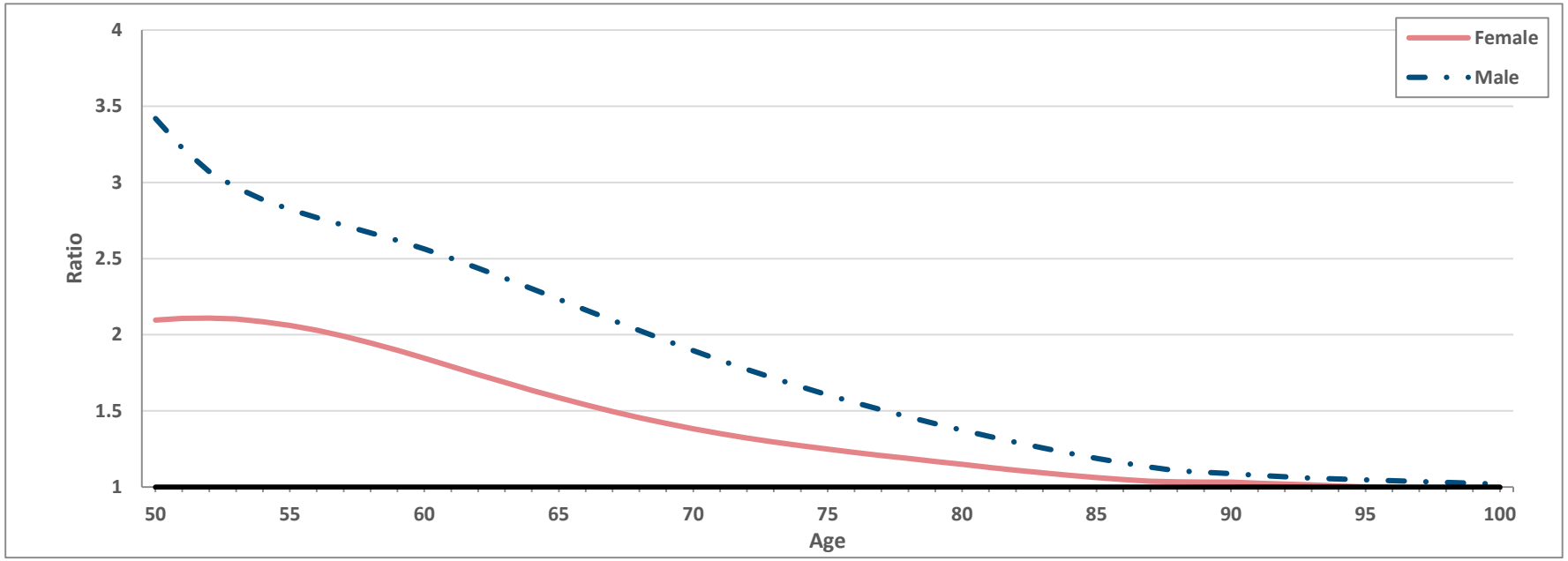
- Ratio of Pri-2012 Retiree to RP-2006 Healthy Annuitant



- RP-2006 and Pri-2012 are fairly close
- Pri-2012 higher except between ages 61-76

Comparison of Mortality Rates – Contingent Survivors

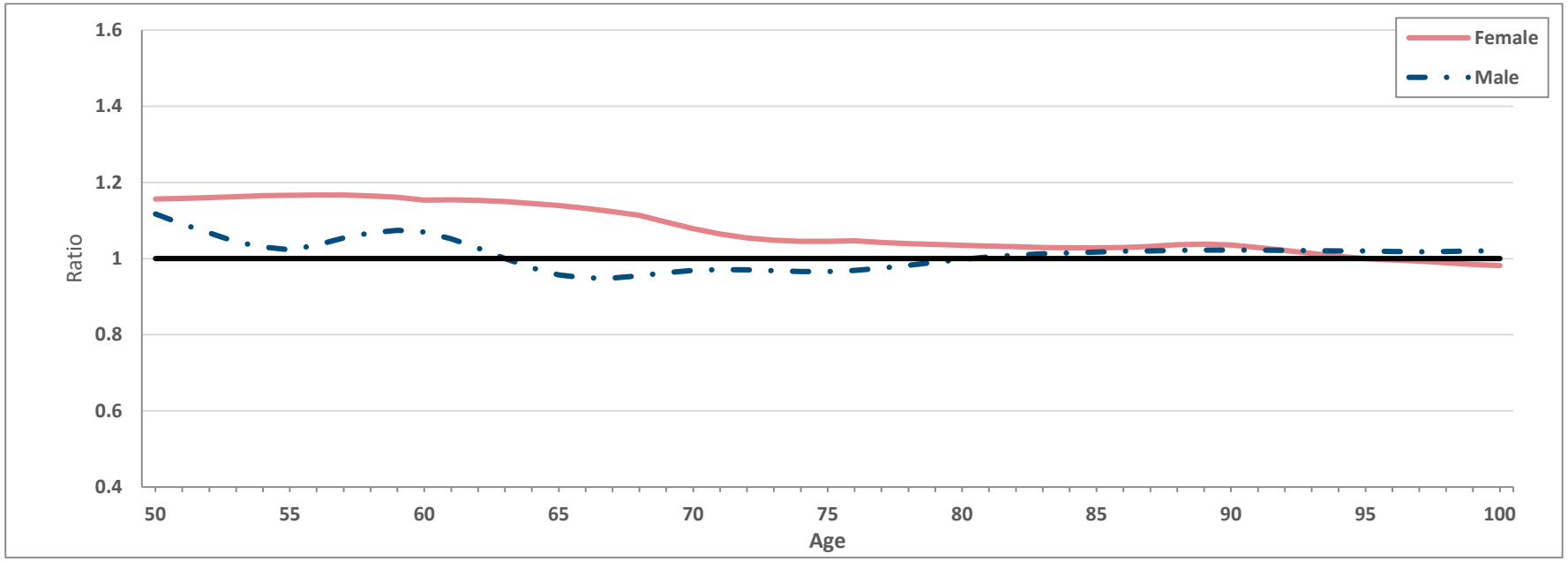
- Ratio of Pri-2012 Contingent Survivor to RP-2006 Healthy Annuitant



- Pri-2012 Contingent Survivor rates substantially higher, particularly for males

Comparison of Mortality Rates – Blue Collar Retirees

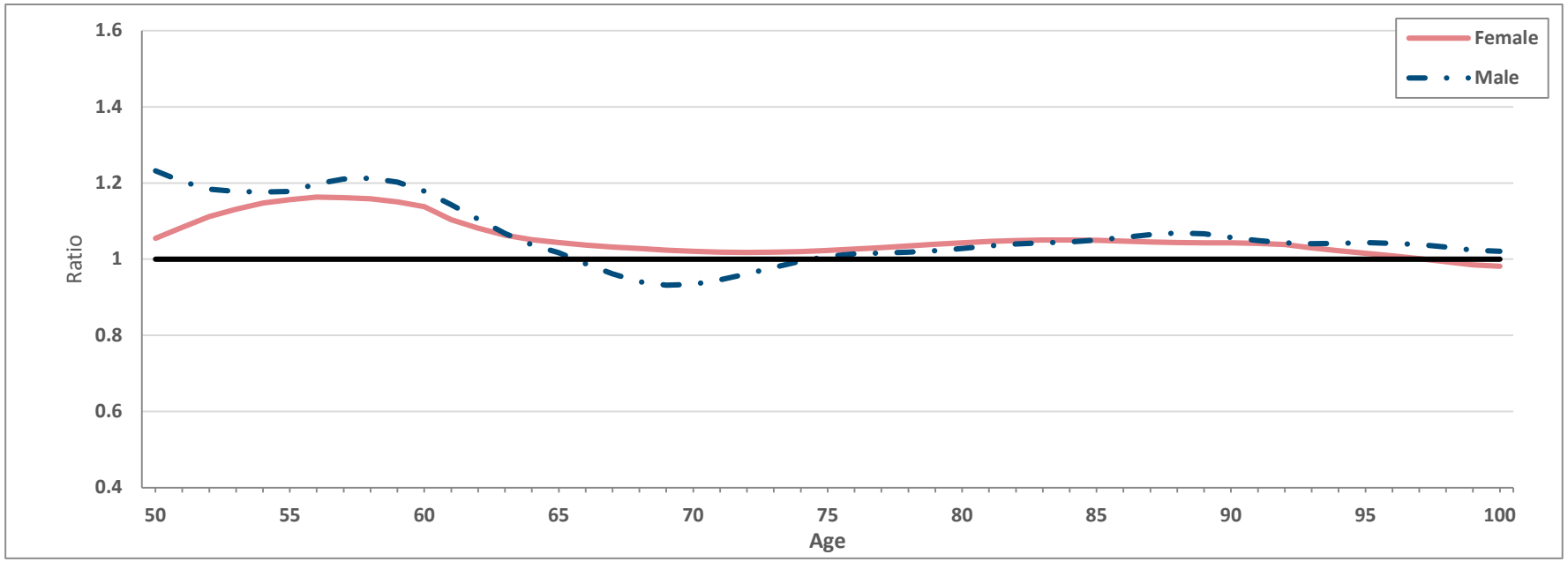
- Ratio of Pri-2012 Blue Collar Retiree to RP-2006 Blue Collar Healthy Annuitant



- Pri-2012 rates generally higher for females
- Male Pri-2012 rates track RP-2006 closely, higher at youngest ages

Comparison of Mortality Rates – White Collar Retirees

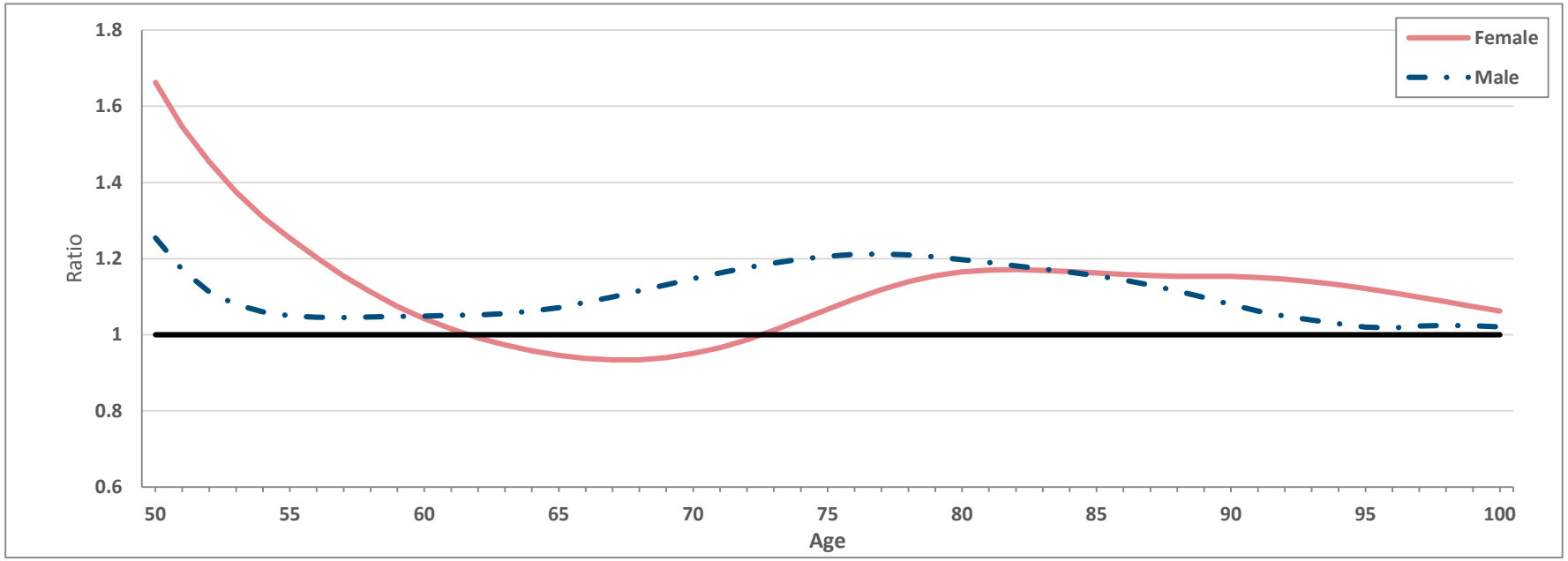
- Ratio of Pri-2012 White Collar Retiree to RP-2006 White Collar Healthy Annuitant



- Pri-2012 rates higher at most ages for both genders, particularly so at the youngest Retiree ages

Comparison of Mortality Rates – Top Quartile Retirees

- Ratio of Pri-2012 Top Quartile Retiree to RP-2006 Top Quartile Healthy Annuitant



- Pri-2012 shows higher mortality than RP-2006; possible that plan freezes have reduced correlation between plan benefit amount and socioeconomic status

Annuity Factors

- Monthly deferred-to-age-62 annuities
- Calculated as of January 1, 2019
- Employee rates for ages less than 62 and Annuitant rates (Retiree rates for Pri-2012, Healthy Annuitant rates for RP-2006) for ages 62 and older
- Discount rate of 4%
- Scale MP-2018 fully generational projections for Pri-2012 and RP-2006

Annuity Factors – Pri-2012

	Age	Total Dataset	Blue Collar	White Collar	Bottom Quartile	Top Quartile
Females	25	3.7443	3.6281	3.8175	3.6639	3.7992
	35	5.4463	5.2679	5.5596	5.3270	5.5288
	45	7.9356	7.6682	8.1092	7.7698	8.0543
	55	11.6119	11.2276	11.8737	11.4131	11.7673
	65	14.2767	13.8433	14.6208	14.1478	14.4279
	75	10.2859	10.0268	10.6620	10.2195	10.4278
	85	6.2450	6.0971	6.4424	6.2249	6.3364
	95	3.3856	3.3698	3.4059	3.3856	3.3903
Males	25	3.5116	3.3958	3.6700	3.2640	3.6310
	35	5.1095	4.9353	5.3503	4.7431	5.2878
	45	7.4480	7.1892	7.8102	6.9170	7.7100
	55	10.9073	10.5322	11.4416	10.1709	11.2805
	65	13.4072	12.9471	14.0645	12.6146	13.8647
	75	9.4920	9.1116	9.9790	8.9885	9.9471
	85	5.5376	5.3416	5.7730	5.3771	5.8127
	95	2.9144	2.8897	2.9492	2.9030	2.9482

Annuity Factor Comparison – Pri-2012

	Age	Total Dataset	Blue Collar	White Collar	Bottom Quartile	Top Quartile
Females	25	N/A	−3.1%	2.0%	−2.1%	1.5%
	35	N/A	−3.3%	2.1%	−2.2%	1.5%
	45	N/A	−3.4%	2.2%	−2.1%	1.5%
	55	N/A	−3.3%	2.3%	−1.7%	1.3%
	65	N/A	−3.0%	2.4%	−0.9%	1.1%
	75	N/A	−2.5%	3.7%	−0.6%	1.4%
	85	N/A	−2.4%	3.2%	−0.3%	1.5%
	95	N/A	−0.5%	0.6%	0.0%	0.1%
Males	25	N/A	−3.3%	4.5%	−7.1%	3.4%
	35	N/A	−3.4%	4.7%	−7.2%	3.5%
	45	N/A	−3.5%	4.9%	−7.1%	3.5%
	55	N/A	−3.4%	4.9%	−6.8%	3.4%
	65	N/A	−3.4%	4.9%	−5.9%	3.4%
	75	N/A	−4.0%	5.1%	−5.3%	4.8%
	85	N/A	−3.5%	4.3%	−2.9%	5.0%
	95	N/A	−0.8%	1.2%	−0.4%	1.2%

- White Collar annuity factors higher than Top Quartile

Annuity Factor Comparison – Pri-2012 vs. RP-2006

	Age	Total Dataset	Blue Collar	White Collar	Bottom Quartile	Top Quartile
Females	25	0.3%	−1.2%	−0.5%	0.4%	−1.3%
	35	0.3%	−1.3%	−0.5%	0.5%	−1.3%
	45	0.3%	−1.3%	−0.5%	0.6%	−1.3%
	55	0.3%	−1.3%	−0.6%	0.6%	−1.3%
	65	0.0%	−1.3%	−0.7%	0.6%	−1.7%
	75	−1.1%	−1.1%	−1.2%	0.6%	−4.5%
	85	−1.4%	−1.3%	−1.8%	−0.4%	−6.9%
	95	0.7%	0.7%	0.1%	0.7%	−6.5%
Males	25	0.6%	1.4%	−0.3%	−1.4%	−2.9%
	35	0.8%	1.6%	−0.2%	−1.1%	−2.9%
	45	1.0%	1.7%	0.0%	−0.8%	−2.8%
	55	0.8%	1.3%	−0.1%	−0.8%	−2.8%
	65	0.1%	0.5%	−0.3%	−1.3%	−3.1%
	75	−0.9%	0.0%	−1.3%	−1.0%	−4.7%
	85	−2.5%	−1.3%	−2.9%	−0.6%	−4.7%
	95	−2.6%	−1.6%	−2.9%	−2.3%	−1.7%

- Most populations see aggregate changes within +/- 1%
- Largest decrease for Top Quartile

Other Observations and Comments

Observations and Other Comments

- Impact of separate Retiree and Contingent Survivor (CS) tables
  - Apply Contingent Survivor rates to all beneficiaries after the death of the primary Retiree
  - A number of possible approaches for calculating joint-and-survivor annuities
- Nondisabled Annuitant tables
  - Constructed from an exposure-weighted average of Retiree and Contingent Survivor tables
  - Primarily created for comparison purposes
  - Use of these tables implicitly assumes the same concentration of Retirees and Contingent Survivors as the Pri-2012 dataset
    - Using separate Retiree / Contingent Survivor tables is likely more accurate

Observations and Other Comments

- Use of weighted rates
  - "… it would not necessarily be inappropriate–or inconsistent–to use amount-weighted tables to measure pension obligations and the corresponding headcount-weighted tables to measure most postretirement medical obligations, even when the two covered populations are identical."
- Use of Top Quartile tables
  - Pri-2012 White Collar rates generally lower than Top Quartile rates
  - Change is likely due to data received rather than a change in mortality for highly-compensated individuals
  - RP-2006 Top Quartile users may want to consider options besides an automatic switch to Pri-2012 Top Quartile

Response to Comments on Pri-2012 Exposure Draft

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Response to Comments – Separate Retiree and Contingent Survivor Tables

- Comments asked for guidance for situations in which plan data does not distinguish between Retirees and Contingent Survivors, including
  - Request for guidance on creating a blended table
  - Request that a statement be made in the final report that the Nondisabled Annuitant tables would be reasonable for use in these situations
- RPEC Response:
  - Mortality difference between Retirees and Contingent Survivors was deemed significant in the Pri-2012 data
  - Constructing a blended table is plan-specific and requires significant actuarial assumptions and judgement
    - Use of Nondisabled Annuitant tables implicitly assumes Pri-2012 dataset concentration of Retirees / Survivors
    - Nondisabled Annuitant tables could be a reasonable proxy if there is no information suggesting that the use of Pri-2012 weightings would be inappropriate

Response to Comments – Income Quartile Tables

- Commenters questioned the usefulness of benefit quartile tables given:
  - the frozen status of many major single-employer plans
  - the relatively low income thresholds for the Top Quartile in the Pri-2012 data
- RPEC Response:
  - The income and benefit thresholds for the Top Quartile may not reflect a typical high-paid group
  - More select subsets (top decile, top quartile of White Collar) suggest mortality for relatively select groups of high income participants could be 10%-25% lower than the Top Quartile or White Collar Pri-2012 tables
  - The Social Security Administration's Actuarial Study No. 124 provides additional insight on the correlation between income and mortality

Mortality Improvement: MP-2019 and RPEC_2014_v2019

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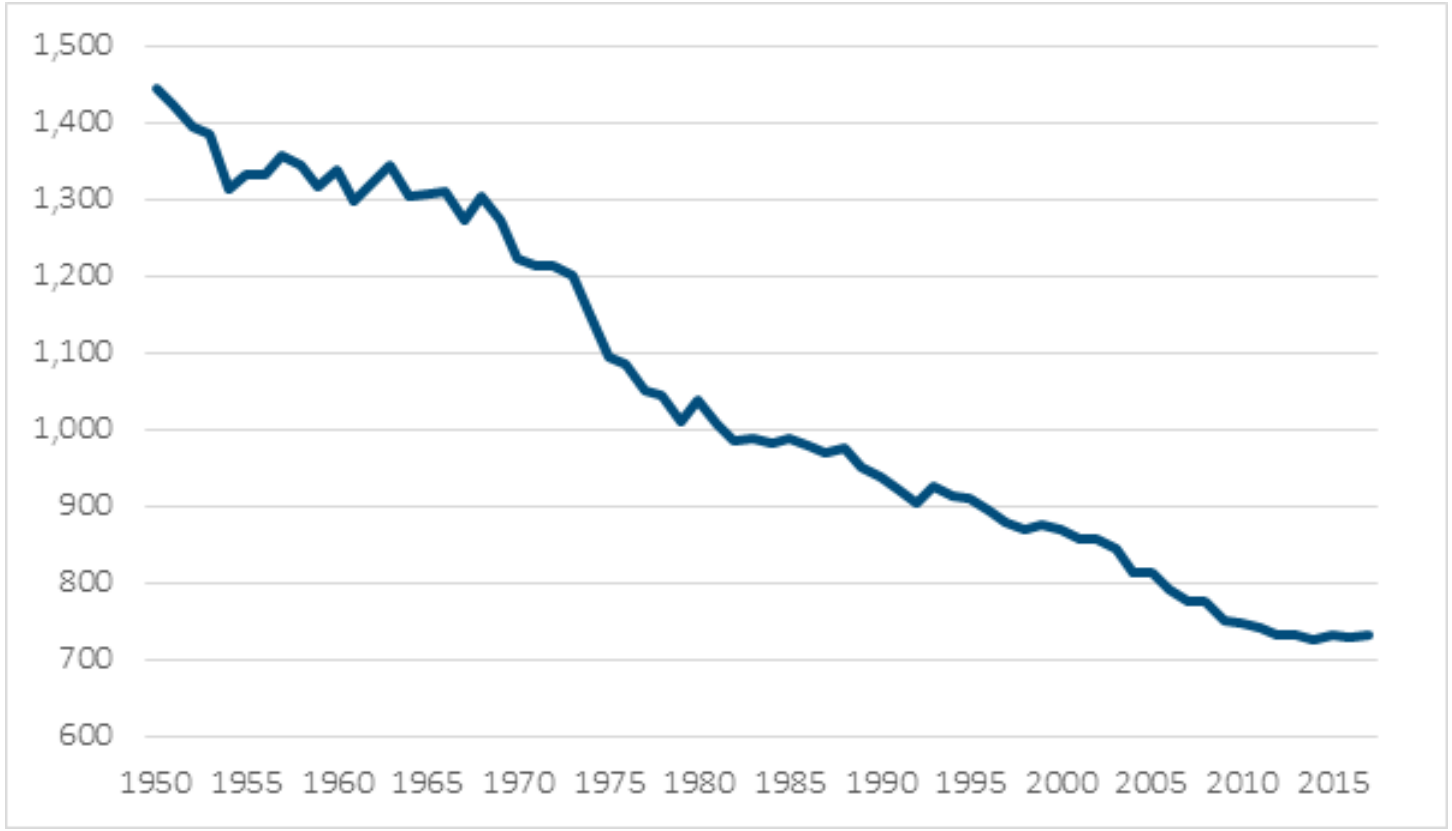
Age-Adjusted Death Rates

- Age-adjusted mortality rates increased by .4% to 731.9 during 2017
- The average age-adjusted mortality improvement rate for 2010 – 2017 was 0.3% per year
- The most recent 8-year period with lower improvement was 1962-1969 (0.2%)



Annuity Factors using MP-2019

	Age	Pri-2012	RP-2006	PubG-2010	PubT-2010	PubS-2010
Females	25	3.7304	3.7189	3.8662	3.9815	3.7706
	35	5.4274	5.4089	5.6347	5.8148	5.4944
	45	7.9105	7.8811	8.2273	8.5049	8.0201
	55	11.5757	11.5437	12.0532	12.4770	11.7357
	65	14.2366	14.2335	14.8289	15.3987	14.3710
	75	10.2340	10.3480	10.7953	11.3114	10.4008
	85	6.1966	6.2778	6.5444	6.9103	6.4000
	95	3.3519	3.3208	3.4822	3.5328	3.4740
Males	25	3.4911	3.4692	3.5921	3.7794	3.5850
	35	5.0845	5.0423	5.2266	5.5092	5.2221
	45	7.4199	7.3451	7.6310	8.0489	7.6203
	55	10.8739	10.7865	11.1990	11.8132	11.1553
	65	13.3744	13.3531	13.7562	14.5231	13.5949
	75	9.4371	9.5222	9.7424	10.3757	9.5071
	85	5.4813	5.6158	5.7349	6.0968	5.5236
	95	2.8874	2.9586	3.0692	3.0997	3.0165

MONTHLY DEFERRED-TO-62 ANNUITY-DUE VALUES AT 4.0% AS OF JANUARY 1, 2019

SOA MORTALITY TABLES PROJECTED WITH SCALE MP-2019

- RPEC intends the RPEC_2014 model to be applicable to many base tables
- The source data remains population-level information from CDC/CMS/SSA

Change in Annuity Factors when Adopting MP-2019

	Age	Pri-2012	RP-2006	PubG-2010	PubT-2010	PubS-2010
Females	25	-0.37%	-0.40%	-0.33%	-0.29%	-0.38%
	35	-0.35%	-0.38%	-0.31%	-0.28%	-0.34%
	45	-0.32%	-0.35%	-0.28%	-0.26%	-0.31%
	55	-0.31%	-0.34%	-0.28%	-0.25%	-0.30%
	65	-0.28%	-0.30%	-0.27%	-0.25%	-0.28%
	75	-0.50%	-0.53%	-0.48%	-0.45%	-0.51%
	85	-0.78%	-0.85%	-0.77%	-0.73%	-0.78%
	95	-1.00%	-1.22%	-1.07%	-1.04%	-1.07%
Males	25	-0.58%	-0.62%	-0.53%	-0.42%	-0.51%
	35	-0.49%	-0.55%	-0.46%	-0.38%	-0.43%
	45	-0.38%	-0.43%	-0.36%	-0.31%	-0.34%
	55	-0.31%	-0.35%	-0.29%	-0.27%	-0.29%
	65	-0.24%	-0.28%	-0.25%	-0.25%	-0.25%
	75	-0.58%	-0.64%	-0.59%	-0.55%	-0.60%
	85	-1.02%	-1.09%	-1.04%	-0.97%	-1.06%
	95	-0.93%	-1.12%	-1.02%	-1.01%	-1.03%

IMPACT OF UPDATING FROM SCALE MP-2018 TO MP-2019 USING VARIOUS BASE MORTALITY TABLES

COMPARISON OF MONTHLY DEFERRED-TO-62 ANNUITY-DUE VALUES AT 4.0% AS OF JANUARY 1, 2019

- MP-2019 continues the downtrend in improvement
- The rates of change are not heavily dependent on the underlying base table

History of Changes in Annuity Factors

	Age	MP-2015	MP-2016	MP-2017	MP-2018	MP-2019
Females	25	-1.4%	-1.3%	-0.7%	-0.4%	-0.4%
	35	-1.4%	-1.4%	-0.7%	-0.4%	-0.3%
	45	-1.5%	-1.5%	-0.7%	-0.4%	-0.3%
	55	-1.5%	-1.5%	-0.7%	-0.3%	-0.3%
	65	-1.7%	-1.3%	-0.6%	-0.2%	-0.3%
	75	-3.0%	-1.8%	-1.0%	-0.3%	-0.5%
	85	-4.5%	-3.2%	-1.5%	-0.2%	-0.8%
Males	25	-0.9%	-1.7%	-0.9%	-0.7%	-0.6%
	35	-1.0%	-1.8%	-0.8%	-0.7%	-0.5%
	45	-1.1%	-1.7%	-0.8%	-0.6%	-0.4%
	55	-1.2%	-1.6%	-0.8%	-0.5%	-0.3%
	65	-1.4%	-1.5%	-0.7%	-0.4%	-0.2%
	75	-2.7%	-1.7%	-1.0%	-0.3%	-0.6%
	85	-3.4%	-2.9%	-1.4%	-0.3%	-1.0%

- As improvement has slowed, annuity factors have consistently declined
- MP-2015 and MP-2016 rates reflect multiple years of new data

Long-Run Historical Rates of Improvement

HISTORICAL IMPROVEMENT IN AGE-ADJUSTED CENTRAL DEATH RATES BASED ON SSA 2019 TRUSTEES' REPORT, AGES 65-85

Year Range	Females	Males
1951 - 2016	1.12%	1.05%
1961 - 2016	1.14%	1.21%
1971 - 2016	1.03%	1.41%
1981 - 2016	0.84%	1.48%
1991 - 2016	0.81%	1.56%
2001 - 2016	1.30%	1.75%

- For most long-run historical periods, improvement has averaged in excess of 1.0% for those age 65 - 85
- Despite recent trends toward lower improvement rates, the period 2001 to 2016 shows the highest rate of improvement
- Male improvement has, generally, been higher than female improvement

Social Security Projected Improvement Rates

IMPROVEMENT IN AGE-ADJUSTED CENTRAL DEATH RATES BASED ON SSA 2019 TRUSTEES' REPORT INTERMEDIATE PROJECTION, AGES 65-85

Year Range	Females	Males
2025 – 2034	0.89%	0.97%
2030 - 2039	0.87%	0.94%
2035 - 2044	0.84%	0.92%
2040 - 2049	0.82%	0.89%
2045 - 2054	0.79%	0.86%
2050 - 2059	0.77%	0.84%

- Social Security improvement rates grade downward over time
- Female rates between 2025 and 2044 are generally forecast in the 0.8% to 0.9% per year range
- Male rates between 2025 and 2044 are forecast between 0.9% and 1.0%
- Even by 2060, the gradient does not take annual rates of improvement to 0.75%

Other Research on Mortality Improvement

- Social Security Administration Research
  - Report released in April 2018 analyzed mortality stratified by AIME quintiles
  - Research showed a slight widening of the spread between the top and bottom quintiles – implying somewhat better improvement for higher earners
  - https://www.ssa.gov/OACT/NOTES/pdf_studies/study124.pdf
- 2019 Social Security Technical Panel
  - Technical panels are convened quadrennially
  - Suggested that near-term aggregate improvement is likely to be depressed due to social factors
  - Observed that long-term improvement has generally been about 1% for the population with higher rates for younger groups and approximately 0.8% for those over age 65

Wrap-Up

- In accordance with ASOP 35, consider
  - All relevant covered population characteristics when selecting base mortality rates
  - The use of different mortality assumptions for different participant subgroups
  - Appropriate mortality projection scales
- Pri-2012 report and mortality tables can be found here:

(Will be released before meeting)

- MP-2019 report can be found:

(Will be released before meeting)

- Questions should be sent to Patrick Nolan at pnolan@soa.org