

United States Department of the Treasury District of Columbia Pensions Program

**Actuarial Experience Study
July 1, 2008 through May 31, 2013**



Date of Report: April 18, 2014

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April 18, 2014

Paul Cicchetti
Department of the Treasury
Departmental Offices
Office of DC Pensions
655 15th Street N.W.
Washington, DC 20220

Dear Mr. Cicchetti,

The following sets forth the results of the actuarial experience study of the United States Department of the Treasury District of Columbia Pensions Program covering the period July 1, 2008 through May 31, 2013.

Please call if you have any questions.

Respectfully submitted,

BOLTON PARTNERS, INC.

A handwritten signature in cursive script that reads "Colin England".

Colin England, FSA, EA

A handwritten signature in cursive script that reads "Thomas Lowman".

Thomas Lowman, FSA, EA

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1. Executive Summary

Purpose

The purpose of this Actuarial Experience Study is to review the actuarial experience of the United States Department of the Treasury (Treasury) District of Columbia Pensions Program during the period from July 1, 2008 through May 31, 2013 in order to recommend appropriate changes (if any) in the actuarial assumptions used to prepare annual valuations of the Plan's liabilities and required contributions.

However, the actual long-term cost of the Plan is not based on the assumptions used. The actual cost is based on the actual benefits paid, the actual investment return and the actual administrative expenses paid. In order to set aside money to prefund benefits, (as well as to determine the future plan liability) assumptions must be made about future events. To determine the current expense to prefund the pension plan requires that a number of assumptions be made about future events. As actual experience differs from these assumptions, the cost of the plan will gradually change. Ideally, the assumptions used will be close to this experience. In reality some assumptions (e.g., investment return) will commonly vary materially from year to year.

While the expense of the plan will "self adjust" to reflect actual experience, it is important to review and reset the assumptions from time to time to minimize experience gains and losses and fluctuations in required contributions.

We compare the demographic experience – observed rates of retirement, termination, disability, and death – of each group to the experience expected under the actuarial assumptions used to determine Plan liabilities and cost. We recommend revisions to the assumptions as appropriate. Current non-economic assumptions are based on the most recent experience study conducted in 2009.

Not all assumptions are equal materially to the results of the annual valuation. Except for the Judges plan, almost 90% of the liabilities are for individuals in pay (retired members). Therefore, the most material assumptions being reviewed in this study are the mortality assumptions and the percent of Police Officers and Firefighters who are married. Some of the other assumptions will have no significance once all members are retired. For example, the "termination" assumption already applies to a very small group who are not yet eligible to retire.

Where feasible, experience has been examined separately for male and female members. In some cases, experience has been combined when male and female experience is similar or when there is insufficient data to produce reliable analyses by gender.

In preparing this study, we have relied primarily upon annual actuarial valuation data provided to us by Treasury. However, we discovered that some of the Teachers should not have been included in the valuation data files. We removed about 20 from the active and terminated vested data files.

The purpose of this Section is to provide the reader a summary of our major conclusions. Details are presented in later sections of this Report.

1. Executive Summary (cont.)

Scope of Report

Demographic assumptions relate to all behavioral characteristics of the group. Behavioral characteristics do not include the assumptions concerning future inflation, the real rates of return of the investments in the trust funds, or the anticipated growth in the underlying payroll of the members (i.e. economic assumptions are not within the scope of this report).

Demographic assumptions include the following:

- Rates of mortality among active employees,
- Rates of mortality among retired and disabled members and their beneficiaries,
- Percent of members who are married for all active and retired Police Officers and Firefighters,
- Probability of retirement from active service,
- Probability of termination of employment prior to retirement,
- Probability of disability among active employees, and
- Probability of terminated vested members electing a lump sum distribution.

In addition, demographic assumptions include the merit (longevity and promotion) component of individual pay increases.

Please note that economic assumptions are not part of this experience study as the economic assumptions are based on government accounting standards.

Retirement Rates

Retirement rates remain a material assumption. The retirement experience for Firefighters was very similar to the assumed retirement rates and we recommend no changes. The retirement experience for Police Officers and Teachers was significantly higher than assumed and we recommend a net increase in the rates. The retirement experience for Judges was lower than assumed. We recommend changes that decrease the Judges' rates under age 70.

Termination Rates

We analyze the experience so that the new assumption reflects recent experience. Later in this report we recommend not reviewing this assumption in the next experience study since it will no longer be material.

The termination experience for Firefighters was sufficiently similar to the assumption that we recommend no changes. The termination experience for Police Officers was that members left at only about half of the rate assumed and we recommend a decrease in the rates. The experience for Teachers was that members left at a somewhat higher rate than assumed and we recommend an increase in the rates. The termination experience for Judges was that none left employment and only one did; so we are recommending no change for the Judges. No changes were made to the rates that apply before age 40 as very few members are that young.

1. Executive Summary (cont.)

Disability Rates

Disability rates have limited materiality due to the low level of the Federal benefit provided by this plan. The experience for all groups was that members became disabled less often than assumed (47% for Police Officers, 50% for Firefighters and 81% for Teachers). We recommend reduction in some Police Officer and Firefighter disability rates, however we recommend an increase between ages 50-59 for Teachers. No changes were made to the rates that apply before age 40 as very few members are that young.

Longevity and Promotion Pay Increases

There were no general (across the board) pay increases for Police Officers and Firefighters during this study period. All increases for these two groups were related to longevity and promotional increases. We compared the actual pay increases with our current assumption for longevity and promotional increases.

There were general pay increases for Teachers which resulted in a 15.85% increase during FY2011 and a 5% increase in FY2012. We backed out these increases for the teachers who received them to determine the longevity and promotional increases. We compared these actual net pay increases with our current assumption for longevity and promotional increases.

The assumptions are based on an employee's years of service. The recommended changes are a combination of increases and decreases.

Mortality Rates

The mortality experience did vary from the assumptions used in several ways. The number of employee deaths was about half of the expected number and we recommend lowering the assumption. The number of disabled members dying was almost 50% more than assumed and we recommend increasing that assumption. For other retirees and beneficiaries, the experience was very close to the assumption and no change in the base assumption is needed. We do recommend changing to "generational" tables.

Cost Impact

Proposed assumption changes are expected to increase liabilities approximately 1.06% for the Teachers, Police Officers and Firefighters plan and decrease liabilities approximately 1.14% for the Judges' plan. The proposed changes are expected to increase Federal contributions by approximately 1.52% for the Teachers, Police Officers and Firefighters plan and decrease the Federal contribution by approximately 8.33% for the Judges' plan. A more complete analysis of the effect on normal cost, liabilities and contributions is shown on page 26 at the end of this report.

1. Executive Summary (cont.)

Actuarial Certification

The report has been prepared in accordance with generally accepted actuarial methods and procedures as described in Actuarial Standard of Practice (ASOP) 35 (Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations). Bolton Partners, Inc. will answer any questions from Treasury staff regarding its methodology or conclusions.

The undersigned are Fellows of the Society of Actuaries, Fellows of the Conference of Consulting Actuaries and Enrolled Actuaries under ERISA. We meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained within this report.



Thomas Lowman, FSA, EA, MAAA



Colin England, FSA, EA

2. Active Decrements

Service Retirement

Current Assumptions

The retirement rates are applicable when an active member is eligible to retire. The assumed rates generally vary only by age (once a member has the age and service to retire) except for the Firefighters for whom the rates also vary between those with more or less than 30 years of service. The decision to retire is tied to the entire benefit (not just the Federal portion), but in our valuations the rates used are applied just to determine the Federal share of the benefit.

Below is the age and service based experience of Firefighters followed by the age based experience of all groups.

Summary of Experience versus Current Assumptions

Firefighters	Actual		Expected	
	Service			
Age	<30	≥30	<30	≥30
50	27	1	12.3	0.9
51	14	2	16.0	1.0
52	13	2	18.2	3.1
53	11	8	21.2	5.4
54	16	10	18.2	7.6
55	13	7	14.5	6.4
56	10	9	8.4	6.3
57	4	1	4.4	4.4
58	1	4	1.9	4.6
59	1	3	0.7	3.8
60	0	2	0.0	5.0
61	0	1	0.0	2.0
62	0	0	0.0	1.0
63	0	1	0.0	1.0
64	0	0	0.0	0.0
≥65	0	0	0.0	0.0
Totals	110	51	115.7	52.5
	161		168.2	

	Actual Retirements	Expected Retirements	Actual to Expected Ratio
Firefighters	161	168	96%
Police Officers	355	246	144%
Teachers	902	686	131%
Total	1,418	1,100	129%

2. Active Decrements (cont.)

Service Retirement (cont.)

	Actual Average Age	Expected Average Age
Firefighters	53.5	54.1
Police Officers	52.5	57.2
Teachers	61.8	64.3

- There is a small number of pre-1980 Police Officers and Firefighters remaining in the Plan. This group can retire at any age after 20 years of service. However, all of them are now over age 50. We expect to see nearly all retirements between the ages of 50 and 60 in the future based on the eligibility requirements whether they are pre or post 1980 hires.
- The data shown above represents ages 50-60 for Police Officers and Firefighters, and ages 55-69 for Teachers.
- The actual number of retirements is higher than expected for Police Officers and Teachers, and slightly lower than expected for Firefighters. Only the Police Officers and Teachers seem to require any adjustment.
- While not shown, we did look at retirement experience for Police Officers and Teachers at individual ages as is shown above for Firefighters.

Recommendations

Summary of Experience versus Proposed Assumptions

	Actual Retirements	Expected Retirements	Actual to Expected Ratio
Firefighters	161	168	96%
Police Officers	355	295	120%
Teachers	902	884	102%
Total	1,418	1,347	105%

	Actual Average Age	Expected Average Age
Firefighters	53.5	54.1
Police Officers	52.5	55.6
Teachers	61.8	63.4

- The experience of Firefighters is close to the assumption. Looking at the experience separately for those over and under 30 years of service, the experience was also close to the assumption. Therefore we, recommend no change in the Firefighters assumption.

2. Active Decrements (cont.)

Service Retirement (cont.)

- New rates for Police Officers are proposed which reflect a higher number of expected retirements, in line with recent experience. We recommended increasing the rates between ages 50 and 55 and delaying the 100% retirement assumption from age 60 to age 62 since not all members are retiring at age 60.
- There are more retirements than expected and at younger ages among Teachers. We recommend increasing the 20% per year assumption to 35% between ages 55 and 59 and to 25% from age 60 to 69.

Retirement Rates – Current Assumed Rates

Age	Teachers	Police Officers	
	Unisex	Male	Female
45-49	N/A	10%	10%
50	N/A	16%	24%
51	N/A	17%	25%
52	N/A	18%	26%
53	N/A	19%	27%
54	N/A	20%	28%
55	20%	21%	29%
56	20%	22%	30%
57	20%	22%	31%
58	20%	22%	32%
59	20%	22%	33%
60-69	20%	100%	100%
≥70	100%	100%	100%

Retirement Rates – Proposed Rates

Age	Teachers	Police Officers	
	Unisex	Male	Female
45-49	N/A	10%	10%
50	N/A	40%	40%
51	N/A	25%	30%
52	N/A	25%	30%
53	N/A	25%	30%
54	N/A	25%	30%
55	35%	25%	30%
56	35%	22%	30%
57	35%	22%	31%
58	35%	22%	32%
59	35%	22%	33%
60	25%	22%	33%
61	25%	22%	33%
62-69	25%	100%	100%
≥70	100%	100%	100%

No change in assumed retirement rates is recommended for Firefighters.

2. Active Decrements (cont.)

Termination

Current Assumptions

The turnover assumption applies until a member is eligible to retire. The assumptions are tied solely to age. The assumption is no longer a material assumption since most members are retired or eligible to retire and the rates that apply for the remaining members are low. At the youngest ages, there are not currently any members and no experience to measure. Additionally, the current assumption is that 70% of terminations result in the withdrawal of contributions, with no further benefits payable.

Summary of Experience versus Current Assumptions

	Actual Terminations	Expected Terminations	Actual to Expected Ratio
Firefighters	26	24	108%
Police Officers	72	146	49%
Teachers	224	133	168%
Total	322	303	106%

	Actual Average Age¹	Expected Average Age
Firefighters	45.5	43.4
Police Officers	45.9	45.0
Teachers	53.4	54.0

- The significance of this assumption continues to decline as members of the closed plans reach retirement eligibility. There is no material experience below age 40.
- Actual termination rates among Police Officers and Firefighters were relatively low.
- The actual number of terminations was lower than expected for Police Officers and Firefighters.
- Actual termination rates among Teachers have been higher than expectations. However, this may have been influenced by the movement to Charter Schools and management changes.

Recommendation

Summary of Experience versus Proposed Assumptions

	Actual Terminations	Expected Terminations	Actual to Expected Ratio
Firefighters	26	24	108%
Police Officers	72	87	83%
Teachers	224	174	129%
Total	322	285	113%

¹ This is based on the average age of those who terminated

2. Active Decrements (cont.)

Termination (cont.)

Summary of Experience versus Proposed Assumptions (cont.)

	Actual Average Age	Expected Average Age
Firefighters	45.5	43.4
Police Officers	45.9	44.5
Teachers	53.4	54.3

- Actual termination rates among Teachers have been higher than expected but we recommend only a 20% increase at age 40 and above. The reason for not recommending more of a change is that the Charter School growth and management changes which occurred during the study period may have caused a temporary impact on experience.
- For Police Officers we propose decreasing the 1.6% per year assumption to 0.9% between ages 40 and 59. Both are relatively low rates of turnover.
- We recommend no change in the assumption for Firefighters.
- We recommend that future experience studies no longer review this assumption as its significance has declined materially since the rates are very low for even the declining few still not yet eligible to retire.
- We reviewed the number of employees and separated participants who elected withdrawal of contributions, either at termination (employees) or afterwards (separated vested participants). Roughly 70% of all terminated participants elected to withdraw their contributions. Therefore, we recommend no change in the current assumption that 70% of terminations result in the withdrawal of contributions, with no further benefits payable.

Termination Rates – Current Representative Rates

Age	Firefighters	Police Officers	Teachers	
			Male	Female
30	1.50%	1.60%	15.83%	7.92%
35	1.25%	1.60%	13.70%	6.85%
40	1.00%	1.60%	11.25%	5.63%
45	0.75%	1.60%	8.43%	4.22%
50	0.50%	1.60%	5.06%	2.53%
55	0.25%	1.60%	3.00%	1.80%
60	0.00%	0.00%	3.00%	1.80%

No terminations are assumed for those who are eligible to retire.

2. Active Decrements (cont.)

Termination (cont.)

Termination Rates – Proposed Rates

Age	Firefighters	Police Officers	Teachers	
			Male	Female
30	1.50%	1.60%	15.83%	7.92%
35	1.25%	1.60%	13.70%	6.85%
40	1.00%	0.90%	13.50%	6.76%
45	0.75%	0.90%	10.12%	5.06%
50	0.50%	0.90%	6.07%	3.04%
55	0.25%	0.90%	3.60%	2.16%
60	0.00%	0.00%	3.60%	2.16%

No terminations are assumed for those who are eligible to retire.

2. Active Decrements (cont.)

Disability

Current Assumptions

The current assumptions vary solely by age and continue as long as a member is active.

Summary of Experience versus Current Assumptions

	Actual Disabilities	Expected Disabilities	Actual to Expected Ratio
Firefighters	14	28	50%
Police Officers	42	89	47%
Teachers	25	31	81%
Total	81	148	55%

	Actual Average Age	Expected Average Age
Firefighters	46.9	46.2
Police Officers	46.2	45.7
Teachers	53.3	56.1

- Overall, the number of disabilities was lower than expected, consistent with the past two experience studies.
- 75% of disabilities among Police Officers and Firefighters are assumed to occur in the line of duty. The actual proportion was 77%.
- At age 55 and older there was only one Police Officer and one Firefighter who received disability retirement. Ten of the 24 Teacher disabilities occurred between ages 55 and 59, and none above age 60.

Recommendation

Summary of Experience versus Proposed Assumptions

	Actual Disabilities	Expected Disabilities	Actual to Expected Ratio
Firefighters	14	13	108%
Police Officers	42	39	108%
Teachers	25	30	83%
Total	81	82	99%

	Actual Average Age	Expected Average Age
Firefighters	46.9	45.7
Police Officers	46.2	45.4
Teachers	53.3	54.4

2. Active Decrements (cont.)

Disability (cont.)

Summary of Experience versus Proposed Assumptions (cont.)

- We propose reducing rates by 55% for Police Officers and 50% for Firefighters at ages 40-54, while eliminating disability rates for ages 55 and above.
- We propose reducing rates by 20% for Teachers at ages 40-49, while also increasing rates from 50-59 and eliminating rates at ages 60+ to better match recent experience.
- We recommend no change in the assumption that 75% of Police Officer and Firefighter disabilities are line of duty.

Disability Rates – Current Representative Rates

Age	Firefighters	Police Officers	Teachers
30	0.750%	0.900%	0.070%
35	0.750%	0.900%	0.120%
40	0.750%	0.900%	0.160%
45	0.750%	0.900%	0.260%
50	0.750%	0.900%	0.360%
55	0.750%	0.900%	0.460%
60	0.750%	0.900%	0.560%

Disability Rates – Proposed Representative Rates

Age	Firefighters	Police Officers	Teachers
30	0.750%	0.900%	0.070%
35	0.750%	0.900%	0.120%
40	0.375%	0.405%	0.128%
45	0.375%	0.405%	0.208%
50	0.375%	0.405%	0.500%
55	0.000%	0.000%	0.800%
60	0.000%	0.000%	0.000%

2. Active Decrements (cont.)

Judges' Decrements

Current Assumptions

	Actual	Expected	Actual to Expected
Retirements	17	33.4	51%
Terminations	1	0	N/A
Disabilities	1	0	N/A

The current demographic assumptions for Judges include the following:

- All Judges are assumed to retire at the rate of 20% per year for ages 58-69 and 100% beginning with age 70, provided they have at least 10 years of judicial service.
- No disabilities or terminations are assumed.

Based on an analysis of recent experience, summarized in the table above, we can conclude the following:

- Judges are retiring at a rate well below the 20% assumed rate.
- Only two active judges left for reasons other than retirement (one due to a disability and one due to promotion to a federal court) during the past five years.

Recommendation

	Actual	Expected	Actual to Expected
Retirements	17	21.7	78%
Terminations	1	0	N/A
Disabilities	1	0	N/A

- We recommend reducing pre-age 70 retirement rates by 50% to 10% for ages 58 through 69.
- No changes in assumed disability or terminations are recommended.

3. Pay Increases

Longevity and Promotion Pay Increases

Pay increases consist of three components:

- Increases due to cost of living (typically included in collective bargaining agreements)
- Increases due to productivity (which are difficult to quantify, particularly for public servants such as Police Officers, Firefighters and Teachers)
- Increases due to merit, promotion and longevity.

We understand that the only increases which were part of collective bargaining agreements (CBAs) were increases for Teachers of 15.85% in fiscal year ending in 2011 and 5% in fiscal year ending in 2012. Thus, we analyzed the increases in all other years as being due to merit, promotion and longevity. In FYE 2011 and 2012, we determined that all increases above those required in the collective bargaining agreement were for merit, promotion and longevity. However, some employees in the Teachers plan are not covered by the CBAs. For these employees (who we identified based on their salary increases being less than 15.85% or 5%, in FYE 2011 and FYE 2012, respectively), we assumed that any increase was due to merit, promotion and longevity.

Recommendation

We propose using the salary scales as shown in the tables below, in addition to any general cost-of-living increase (or, once collective bargaining agreements exist for Police Officers and Firefighters, the amounts of increases specified in the contracts). Please note that the proposed rates reflect longevity increases separately for Police Officers, while the longevity increases for Firefighters, as shown below, are simply included with the increases at 20, 25 and 30 years of service. This is because the longevity pay data provided for Police Officers is provided separately from the base pay, while the longevity pay is included with the base pay in the data reported for Firefighters. Please note that the Firefighter's longevity increases in the data show up at 19 and 20 years of service, 24 and 25 years of service and 29 and 30 years of service. This is because we used completed years of service as of the valuation date to determine the year in which to credit the pay increase. Since longevity pay increases often occur on or near the anniversary of employment, this means that the increases show up in the year granted, which, for example, could mean either the year when the member started with 19 years of service or the year in which the member started with 20 years of service. However, we adjusted the proposed pay increases to be in the 20th, 25th and 30th years, to be consistent with the application of longevity increases for Police Officers.

3. Pay Increases (cont.)

Longevity and Promotion Pay Increases (cont.)

Recommendation (cont.)

Teachers

Service	Current Rates	Actual Increases	Proposed Rates
16	1.50%	2.14%	1.85%
17	1.40%	1.63%	1.85%
18	1.30%	1.22%	1.85%
19	1.20%	0.96%	1.85%
20	1.10%	0.89%	0.75%
21	1.00%	1.00%	0.75%
22	0.90%	0.70%	0.75%
23	0.80%	0.49%	0.75%
24	0.70%	0.74%	0.75%
25	0.60%	0.45%	0.60%
26	0.50%	0.48%	0.60%
27	0.40%	1.11%	0.60%
28	0.30%	0.65%	0.60%
29	0.20%	0.86%	0.60%
30	0.10%	0.16%	0.40%
31+	0.00%	0.53%	0.40%

3. Pay Increases (cont.)

Longevity and Promotion Pay Increases (cont.)

Recommendation (cont.)

Police Officers

Service	Current Rates	Actual Increases	Proposed Base Rates	Longevity Pay Increase	Total Proposed Rate
16	2.00%	2.06%	2.00%		2.00%
17	1.80%	0.98%	2.00%		2.00%
18	1.60%	0.72%	2.00%		2.00%
19	1.40%	4.46%	2.00%		2.00%
20	6.26%	1.39%	5.50%	3.30%	8.80%
21	1.00%	0.37%	0.50%		0.50%
22	0.80%	0.33%	0.50%		0.50%
23	0.60%	0.30%	0.50%		0.50%
24	0.40%	0.30%	0.50%		0.50%
25	11.32%	0.22%	0.50%	3.10%	3.60%
26	0.00%	0.20%	0.25%		0.25%
27	0.00%	0.24%	0.25%		0.25%
28	0.00%	0.00%	0.25%		0.25%
29	0.00%	0.70%	0.25%		0.25%
30	2.79%	0.07%	0.25%	3.10%	3.35%
31+	0.00%	0.07%	0.25%		0.25%

Firefighters

Service	Current Rates	Actual Increases	Proposed Rates
16	2.00%	1.44%	1.60%
17	2.00%	1.92%	1.60%
18	2.00%	1.35%	1.60%
19	2.00%	3.57%	1.60%
20	6.33%	2.81%	4.70%
21	1.50%	2.69%	1.50%
22	1.50%	1.35%	1.50%
23	1.50%	1.23%	1.50%
24	1.50%	3.51%	1.50%
25	5.59%	1.75%	3.75%
26	1.00%	0.59%	1.20%
27	1.00%	1.28%	1.20%
28	1.00%	1.67%	1.20%
29	1.00%	4.92%	1.20%
30	4.87%	3.98%	7.90%
31+	0.50%	2.31%	1.30%

4. Mortality and Beneficiary Analysis

Police Officers' and Firefighters' Mortality

Current Assumption

The current mortality assumptions vary by age and gender. The same table is used for service retirements and disability retirements. There currently is no future mortality improvement assumed and there is a major (five years) set back to a standard table for males only. The same assumption is used for active members and retirees but the table is an aggregation of an RP2000 employee and healthy annuitant table with a discontinuity in the rates at age 55. The term "Active & Retired" used in this section excludes disabled retirees. Disabled retirees are shown separately.

Summary of Experience versus Current Assumptions

Active	Actual Deaths	Expected Deaths	Actual to Expected Ratio
Males	10	18	56%
Females	2	4	50%
Combined	12	22	55%

Retirees & Beneficiaries	Actual Deaths	Expected Deaths	Actual to Expected Ratio
Males	357	300	119%
Females	331	373	89%
Combined	688	673	102%

Active & Retired	Actual Deaths	Expected Deaths	Actual to Expected Ratio
Males	367	318	116%
Females	333	377	88%
Combined	700	695	101%

Disabled	Actual Deaths	Expected Deaths	Actual to Expected Ratio
Males	282	191	148%
Females	7	4	175%
Combined	289	195	148%

Overall, the experience is close to the assumption except for active members and disabled retirees. The active members' mortality assumption is not a material assumption in terms of its impact on the plan's liabilities.

4. Mortality and Beneficiary Analysis (cont.)

Police Officers' and Firefighters' Mortality (cont.)

Recommendation

Summary of Experience versus Proposed Assumptions

Active	Actual Deaths	Expected Deaths	Actual to Expected Ratio
Males	10	17	59%
Females	2	3	67%
Combined	12	20	60%

Retirees & Beneficiaries	Actual Deaths	Expected Deaths	Actual to Expected Ratio
Males	357	360	99%
Females	331	351	94%
Combined	688	711	97%

Disabled	Actual Deaths	Expected Deaths	Actual to Expected Ratio
Males	282	278	102%
Females	7	4	175%
Combined	289	282	103%

- As noted above the currently assumed rates of mortality for healthy and disabled members are based on the aggregation of an RP2000 employee and healthy annuitant tables with a five-year setback for males. We recommend replacing this hybrid table to avoid the discontinuities associated with the current assumption.
- We recommend the RP2000 Blue Collar Combined Healthy table with a one-year age setback for healthy male and no setback for healthy female Police Officer and Firefighter inactive members.
- For active mortality (pre decrement), we recommend using 80% multiplied by the RP2000 Retired Pensioners Blue Collar Combined Healthy table with a one-year age setback for healthy male and no setback for healthy female Firefighters and Police members.
- For disabled mortality, we recommend the RP2000 Blue Collar Combined Healthy table with no age setback for male members and a one-year set forward for female members (i.e., a one year set forward relative to the retiree mortality assumption).
- For both the healthy and disabled mortality tables, we also recommend using scale AA and a generational projection from 2011 (the approximate midpoint of the study period).
- For the next experience study we suggest looking at newer Society of Actuaries tables (RP2014) that are expected to be finalized after our study is complete.

4. Mortality and Beneficiary Analysis (cont.)

Teachers' Mortality

Current Assumption

The current assumptions vary by age and gender. There currently is no future mortality improvement assumed. The same assumption is used for active members and retirees but the table is an aggregation of RP2000 active and retiree Blue Collar tables with a discontinuity in the rates around age 53.

Summary of Experience versus Current Assumptions

Active	Actual Deaths	Expected Deaths	Actual to Expected Ratio
Males	3	9	33%
Females	9	21	43%
Combined	12	30	40%

Retirees & Beneficiaries	Actual Deaths	Expected Deaths	Actual to Expected Ratio
Males	184	183	101%
Females	597	731	82%
Combined	781	914	85%

Active & Retired	Actual Deaths	Expected Deaths	Actual to Expected Ratio
Males	187	192	97%
Females	606	752	81%
Combined	793	944	84%

Disabled	Actual Deaths	Expected Deaths	Actual to Expected Ratio
Males	23	12	192%
Females	75	58	129%
Combined	98	70	140%

4. Mortality and Beneficiary Analysis (cont.)

Teachers' Mortality (cont.)

Recommendation

Summary of Experience versus Proposed Assumptions

Active	Actual Deaths	Expected Deaths	Actual to Expected Ratio
Males	3	3	100%
Females	9	13	69%
Combined	12	16	75%

Retirees & Beneficiaries	Actual Deaths	Expected Deaths	Actual to Expected Ratio
Males	184	142	130%
Females	597	622	96%
Combined	781	764	102%

Disabled	Actual Deaths	Expected Deaths	Actual to Expected Ratio
Males	23	16	144%
Females	75	79	95%
Combined	98	95	103%

- The currently assumed rates of mortality for healthy and disabled members are based on an aggregation of an RP2000 employee and healthy annuitant tables with a three year setback for males and a two year setback for females. We recommend replacing this hybrid table to avoid the discontinuities associated with the current assumption.
- Current assumed mortality rates have underestimated male deaths and overestimated female deaths among disabled participants.
- We recommend use of the RP2000 White Collar Combined Healthy table with a four-year age setback for healthy male members and a three-year setback for healthy female inactive members, bringing expectations more closely in line with actual experience. We also recommend using scale AA and a generational projection from 2011.
- For active mortality (pre decrement), we recommend use of 80% multiplied by the RP2000 table with White Collar adjustment and a four-year age setback for healthy male members and a three-year setback for healthy female members, bringing expectations more closely in line with actual experience. We also recommend using scale AA and a generational projection from 2011.
- For disabled mortality we recommend use of the RP2000 White Collar Combined Healthy table with a one-year age set forward for male members and two-year set forward for female members (i.e. a 5 year set forward relative to the retiree mortality assumptions), bringing expectations more closely in line with actual experience. We also recommend using scale AA and a generational projection from 2011.

4. Mortality and Beneficiary Analysis (cont.)

Judges' Mortality

Current Assumption

Summary of Experience versus Current Assumptions

Active	Actual Deaths	Expected Deaths	Actual to Expected Ratio
Males	0	1.41	0%
Females	0	0.58	0%
Combined	0	1.99	0%

Retirees & Beneficiaries	Actual Deaths	Expected Deaths	Actual to Expected Ratio
Males	5	10.51	48%
Females	1	6.67	15%
Combined	6	17.18	35%

Active & Retired	Actual Deaths	Expected Deaths	Actual to Expected Ratio
Males	5	11.92	42%
Females	1	7.25	14%
Combined	6	19.17	47%

Disabled	Actual Deaths	Expected Deaths	Actual to Expected Ratio
Males	0	0.4	0%
Females	0	0	N/A
Combined	0	0.4	0%

Recommendation

- The currently assumed rates of mortality for healthy and disabled members are based on the RP2000 Combined Healthy tables for males and females.
- Current assumed mortality rates have been too high but the number of deaths is very small, so the experience is not credible for purposes of recommending changes.
- We recommend using a White Collar adjustment along with using scale AA and a generational projection from 2011.

4. Mortality and Beneficiary Analysis (cont.)

Beneficiaries

Current Assumptions

Rates of Marriage

- A portion of each population is assumed to be married for the purpose of determining pre-retirement and post-retirement death benefit obligations.
- For Teachers, the current assumption is that 50% are married; for Police Officers and Firefighters, this rate is 80%.
- The actual proportion of Police Officers and Firefighters who currently have spouses is approximately 70% and we have no data for Teachers. The assumption for Police Officers and Firefighters is more material due to the automatic post-retirement survivor benefits for the spouses (as noted below).
- For Judges, those who have elected to contribute towards beneficiary benefits are assumed to have an eligible beneficiary upon death. The current proportion of the Judges' population that has elected this benefit is approximately 40% for active members and 57% for retired members.

Survivor Benefits

- Active Teachers are assumed to receive a life annuity with no survivor continuance upon retirement.
- Teachers may elect survivor benefits upon retirement. A benefit reduction applies in these cases. Currently, about 25% of Teacher retirees appear to have survivor benefits.
- Police Officer and Firefighter retirees are entitled to a survivor continuance benefit equal to 40% of their final average pay, adjusted for COLAs.
- Currently, it is assumed that this 40% of final average pay benefit will result in a 57% joint and survivor benefit.

Recommendation

- We recommend lowering the 80% married assumption for Police Officers and Firefighters to 70% and maintaining all of the other current marriage and survivor benefits assumptions.
- We believe it is reasonable to continue to assume that Teacher retirements will result in life annuity benefits because the value of the survivor benefit for those who elect it is approximately offset by the reduced pension benefit, thereby resulting in nearly the same present value.
- We conclude that the Police Officers' and Firefighters' survivor continuance rate of 57% continues to be valid based on the following:
 - The average benefit rate for recent retirees was 72.5% of final average pay.
 - A 40% of final average pay survivor benefit equates to 55% of the benefit itself ($40\% \div 72.5\%$).
 - The survivor benefit was about 59% among a small sample of surviving spouses who recently commenced benefits.

5. Participant Data Adjustment Method Change

Currently, the October 1st valuation reflects member census data collected as of May 31st. The Department of the Treasury has chosen to do this so that the actuarial valuations can be completed in a timely manner, allowing for timely completion of the annual financial report. Currently, while we effectively adjust the data for employees, by assuming that they will earn an additional four months of service, we do not adjust the data for inactive participants. We suggest the following changes to the participant data adjustment method to more accurately reflect the liability for inactive participants:

Police Officers, Firefighters & Teachers Plan

Retirees and Beneficiaries:

Currently we assume that there are no changes to the inactive participant data between May 31st and October 1st. Said another way, we are assuming that there will be no deaths during this four month period. However, our mortality assumption for the group as a whole reflects an average monthly mortality rate of just less than 0.25%. However, simply reducing liabilities for four months worth of death ($4 \times 0.25\% = 1\%$) would overstate the reduction in liability because:

- Mortality rates are higher for older participants, and consequently, the present value of benefit for older participants is smaller. Thus, assuming that the effect of mortality on retirees is simply the same as the decrease in the number of retirees, overstates the effect.
- Many retirees will have survivor benefits paid after their death, so the decrease in liability when they die is less than 100%. The benefit to beneficiaries mostly ends with the death of the beneficiary. (The exceptions are for situations where a benefit is being paid to surviving children. However, these are temporary benefits, so the effect is relatively minor.)

We have considered each retiree's and beneficiary's liability, probability of death and approximate survivor benefit liability (based on actual elections for Teachers and on assumed marital and surviving children factors for Police Officers and Firefighters) and concluded that a reduction factor of 0.1225%/month applied to the liability is a better approximation. We recommend that the liability for retirees and beneficiaries be reduced by this percentage for each month the retiree data is projected. Our understanding is that the assets that the Department of the Treasury provides us are projected to October 1st, and already include the actual or expected benefit payments for the period between the data collection date and the valuation date. We propose that this adjustment factor remain constant until the next experience study.

Active and Separated Vested Members:

Currently we value as of the valuation date (October 1st) the data we receive. Thus, we are assuming no deaths, termination, disabilities or service retirements between the data collection date and the valuation date. We are assuming employees earn an extra four months of service credit from the census collection date to the valuation date. Because employees and separated vested participants are a relatively small portion of the total liability (around 10%), and the relatively small potential for actuarial losses due to these events, we recommend no changes be made to the current adjustment of employee data other than the additional months of service earned between the census collection date and the valuation date. We also recommend no changes in the method of adjusting separated vested members data, for the same reasons.

5. Participant Data Adjustment Method Change (cont.)

Judges Plan

Retirees and Beneficiaries:

We currently use the data collected as of May 31st, as if the data was as of the valuation date. Said another way, we are assuming that there will be no deaths during this four month period. However, our mortality assumption for the group as a whole reflects an average monthly mortality rate of about 0.40%. Simply reducing liabilities for four months worth of death ($4 \times 0.40\% = 1.60\%$) would be, as explained above, an over correction for mortality. Please note that the adjustment for retired Judges is substantially higher than for other retirees, because the retired Judges are substantially older, on average, than the Police Officers, Firefighters and Teachers.

We have considered each retiree's and beneficiary's liability, probability of death and approximate survivor benefit liability (based on actual elections) and concluded that a reduction factor of 0.1900%/month applied to the liability is a better approximation. We have expressed this as a monthly factor since, with such a small group, it may be possible to receive updates for recently retired or deceased Judges at a date closer to the valuation date, reducing the need for adjusting the data.

Active Members:

Currently we value as of the valuation date (October 1st) the data we receive. Thus, we are assuming no deaths, terminations, disabilities or service retirements between the data collection date and the valuation date. We are assuming judges earn an extra four months of service credit from the census collection date to the valuation date. We recommend no changes be made to the current adjustment of employee data, other than, as noted immediately above, potentially receiving additional information for changes in the data through a point closer to the valuation date.

As there are not currently any separated vested judges, we do not suggest any changes for the data adjustments that could apply to separated vested members in the future.

6. Impact of Changes

In this section, we look at the impact of the assumption changes had they been applied to the 2013 valuations. The recommended changes are not expected to start until used with the 2014 valuation so the information below is provided simply for illustration. The amortization period used below was 20 years and is based on the data and methods used in the 2013 valuation, along with the assumption changes proposed in this report.

	Police Officers, Firefighters & Teachers	Judges
Actuarial Liability before Changes	\$9,025,479,061	\$192,755,138
Change in Mortality Assumption	128,083,379	6,918,112
Change in All Other Assumptions	(32,214,825)	(9,119,017)
Actuarial Liability after Changes	9,121,347,615	190,554,233
Percent Increase (Decrease)	1.06%	(1.14%)
Normal Cost before Changes	N/A	5,800,000
Change in Mortality Assumption	N/A	300,000
Change in All Other Assumptions	N/A	(900,000)
Normal Cost after Changes	N/A	5,200,000
Percent Increase (Decrease)	N/A	(10.34%)
Federal Contribution before Changes	455,300,000	9,600,000
Change in Mortality Assumption	9,200,000	800,000
Change in All Other Assumptions	(2,300,000)	(1,600,000)
Federal Contribution after Changes	462,200,000	8,800,000
Percent Increase (Decrease)	1.52%	(8.33%)