Marin County Employees' Retirement Association

Actuarial Experience Study
July 1, 2006 through June 30, 2008

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Contents

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Executive Summary

Purpose

The purpose of this Actuarial Experience Study is to review the actuarial experience of the Marin County Employees' Retirement Association (the Plan) during the period from July 1, 2006 through June 30, 2008.

The Plan's demographic experience – observed rates of retirement, withdrawal, vested termination, transfer, disability, and death – were compared with the experience expected under the actuarial assumptions adopted to determine Plan liabilities and cost, and revised assumptions are recommended as appropriate.

In addition, the plan's economic assumptions were reviewed. The economic assumptions include the assumed rates of inflation, COLA increases, investment return, and active payroll growth.

The purpose of this Section of the Study is to give the reader a quick summary of the major conclusions that have been reached. Details are presented in later sections of this Report.

Prior Experience Studies

The most recent Experience Study for the Plan was conducted by the prior actuary (GRS) in 2006, covering the calendar years 2004 through 2006. Based on that study, several demographic and economic assumption rates were updated for Miscellaneous and Safety members.

Retirement Rates

Over the past two years, actual rates of retirement have been somewhat lower than current actuarial assumptions would predict for the Miscellaneous and Safety members.

Therefore, new sets of assumed retirement rates are proposed for both groups, bringing assumptions into line with experience. For both groups, separate rates have been proposed for those with more than 30 years of service, with significantly higher rates proposed for those with more than 30 years of service.

Termination Rates

Overall, the number of terminations (including withdrawals, vested terminations and transfers) among Miscellaneous members was close to that expected. However, the assumed rates have not accurately predicted the number of terminations at many levels of service. We have proposed a reduction to the rates of termination in the first year of employment and an increase to the rates of termination from five to nine years of service. We have also proposed eliminating withdrawal rates after 15 years of service, and vested termination and transfer rates after 20 years of service.

Similar findings were made for the Safety members, though the current assumptions have overestimated the number of terminations that occurred. Again, we have proposed a reduction in the rate of terminations in the first year of employment. We have also proposed eliminating withdrawal rates after five years of service, and vested termination and transfer rates after 20 years of service.

Disability Rates

The disability data reported during this Study was extremely limited; there were only two reported disabilities among the Miscellaneous members and three among Safety members. However, some members currently reported as service retirements may have retired due to disability, but have not had their status updated to reflect approved disabilities. In addition, there are a large number of disability cases scheduled to be reviewed in the near future – many of which occurred during the Study period.

We have recommended that the current disability assumptions should be maintained until the current experience has been clarified. In addition, to improve the exposure and reliability of the disability analysis, we recommend aggregating the experience of the current period with that of the next study.

Longevity and Promotion Pay Increases

The current actuarial assumption for Miscellaneous and Safety members is that the pay for active members will increase by 4.0% per year from inflation. The pay for Miscellaneous members is assumed to increase by an additional 0.50% to 3.00% for merit, longevity and promotion, depending on the service of the member (higher increases in the first five years of service). The pay for Safety members is assumed to increase by an additional 0.75% to 8.00% for merit, longevity and promotion, depending on the service of the member (higher increases in the first four years of service).

An analysis of the average pay of active Miscellaneous and Safety members by service reveals that these general patterns of increases are still very much appropriate. We suggest slight increases in the rates for Miscellaneous members during the first five years of service. We suggest maintaining the current assumptions for Safety members.

Mortality Rates

Mortality experience among active and retired members and their survivors in this Study was in reasonable agreement with assumptions, with the number of deaths being slightly less than expected. Expectations are that mortality experience will continue to improve in the future. Therefore, we have proposed retaining the RP 2000 mortality tables and age adjustments, with

modifications to the tables using a Projection Scale that has been suggested by the Society of Actuaries for incorporating expected mortality improvements.

Economic Assumptions

The current inflation assumption of 4.0% could be considered high, based on the opinions of experts and information which can be discerned from the investment markets. Accordingly, we propose a reduction in the inflation assumption from 4.0% to 3.5%. We also propose a reduction in the nominal annual rate of return from 8.0% to 7.75%. This represents an increase in the real return assumption from 4.0% to 4.25%, but does not result in a significant change in actuarial cost.

We propose revised rates of expected COLA increases, which are based on the level of inflation and are below the levels of the COLA caps for each group. We propose maintaining the assumption that there will be no increase in the level of base pay beyond the level of inflation.

Impact on Plan Costs

Overall, the recommended assumption changes do not represent a significant departure from current assumptions. Therefore, Plan costs will not be greatly affected. Should all of the recommendations in this Report be adopted, a small increase in the overall cost of the Plan would result, although costs for individual employers may experience either increases or reductions in cost. The employee contributions will also be recomputed as a result of the revised assumptions.

Organization of Report

The first section of the Report deals with decrements among active members and also includes consideration of the merit component of pay increases.

The second section of the Report deals with mortality among active and inactive members.

The third section of the Report concerns economic assumptions.

A final section presents methodological details.

The report has been prepared in accordance with generally accepted actuarial methods and procedures. EFI will be happy to answer any questions from MCERA Board or staff regarding its methodology or conclusions.

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Active Decrements

Service Retirement (Miscellaneous)

Current Assumption

Summary of Experience versus Current Assumptions (Ages 50-70, 10+ Years of Service)

	Eligible Exposure	Actual Retirements	Expected Retirements	Actual to Expected Ratio
Males	475	33	49	67.4%
Females	634	79	91	86.5%
Combined	**1,109**	**112**	**140**	**79.8%**

	Actual Average Age	Expected Average Age
Males	59.6	59.8
Females	61.0	61.3
Combined	**60.6**	**60.8**

- Miscellaneous members are currently eligible to retire at age 50 with 10 years of membership or at any age with 30 or more years of Eligibility Service.
- There were 20% fewer retirements than expected. Most of the excess retirements were for those with at least 30 years of service. See Chart A-1 below for more details.
- There were several members who appeared to retire with 5-9 years of service; none have been assumed to retire in the past. These members may have had service with a reciprocal employer.
- We excluded the exposures and decrements for those above age 70 from this analysis. It is common practice within public sector plans to assume that all members over age 70 will retire immediately.

Recommendation

Summary of Experience versus Proposed Assumptions (Ages 50-70, 10+ Years of Service)

	Eligible Exposure	Actual Retirements	Expected Retirements	Actual to Expected Ratio
Males	475	33	47	74.8%
Females	3,362	79	75	105.3%
Combined	**5,155**	**112**	**116**	**96.3%**

	Actual Average Age	Expected Average Age
Males	59.0	59.1
Females	58.3	61.1
Combined	**60.6**	**60.3**

- Higher rates among those with more than 30 years of service warrant separate assumptions.
- We have adjusted the rates for those with 10-29 years of service. In particular, there has been a spike in rates observed at age 55 under both this study and the prior study.
- We have *not* proposed introducing rates for those less than age 70 with 5-9 years of service. We will continue to monitor the frequency and circumstances of these retirements.
- No change is recommended to the assumption that all members are assumed to retire immediately at age 70, regardless of service.
- The comparison of actual to expected retirement experience is closer under the proposed assumptions. See Charts A-1 and A-2.

Miscellaneous Retirement Rates – Current (with 10+ years of service)

Age	Rate
50	7.8%
51	2.6%
52	2.6%
53	2.6%
54	3.9%
55	5.2%
56	7.8%
57	10.4%
58	11.7%
59	15.6%
60	19.0%
61	16.0%
62	24.0%
63	20.0%
64	23.0%
65	44.0%
66	30.0%
67	31.0%
68	29.0%
69	34.0%
70+	100.0%

Miscellaneous Retirement Rates – Proposed

Age	10-29 Years of Service	30+ Years of Service
50	4.0%	4.0%
51	4.0%	4.0%
52	4.0%	4.0%
53	4.0%	4.0%
54	4.0%	4.0%
55	10.0%	25.0%
56	4.0%	25.0%
57	6.0%	25.0%
58	8.0%	25.0%
59	10.0%	25.0%
60	10.0%	35.0%
61	10.0%	35.0%
62	20.0%	35.0%
63	20.0%	35.0%
64	20.0%	35.0%
65	25.0%	35.0%
66	25.0%	35.0%
67	25.0%	35.0%
68	25.0%	35.0%
69	25.0%	35.0%
70+	100.0%	100.0%

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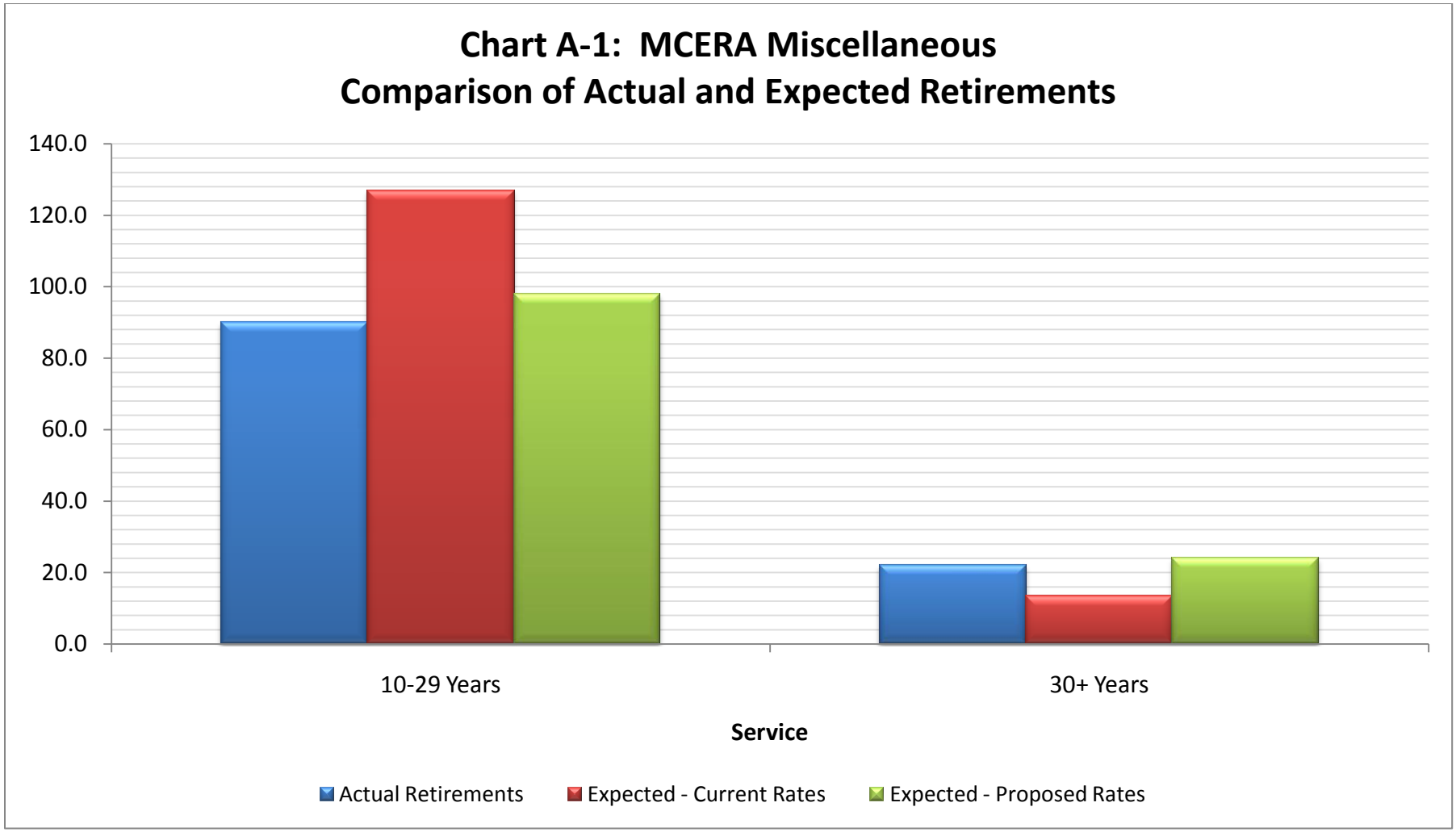
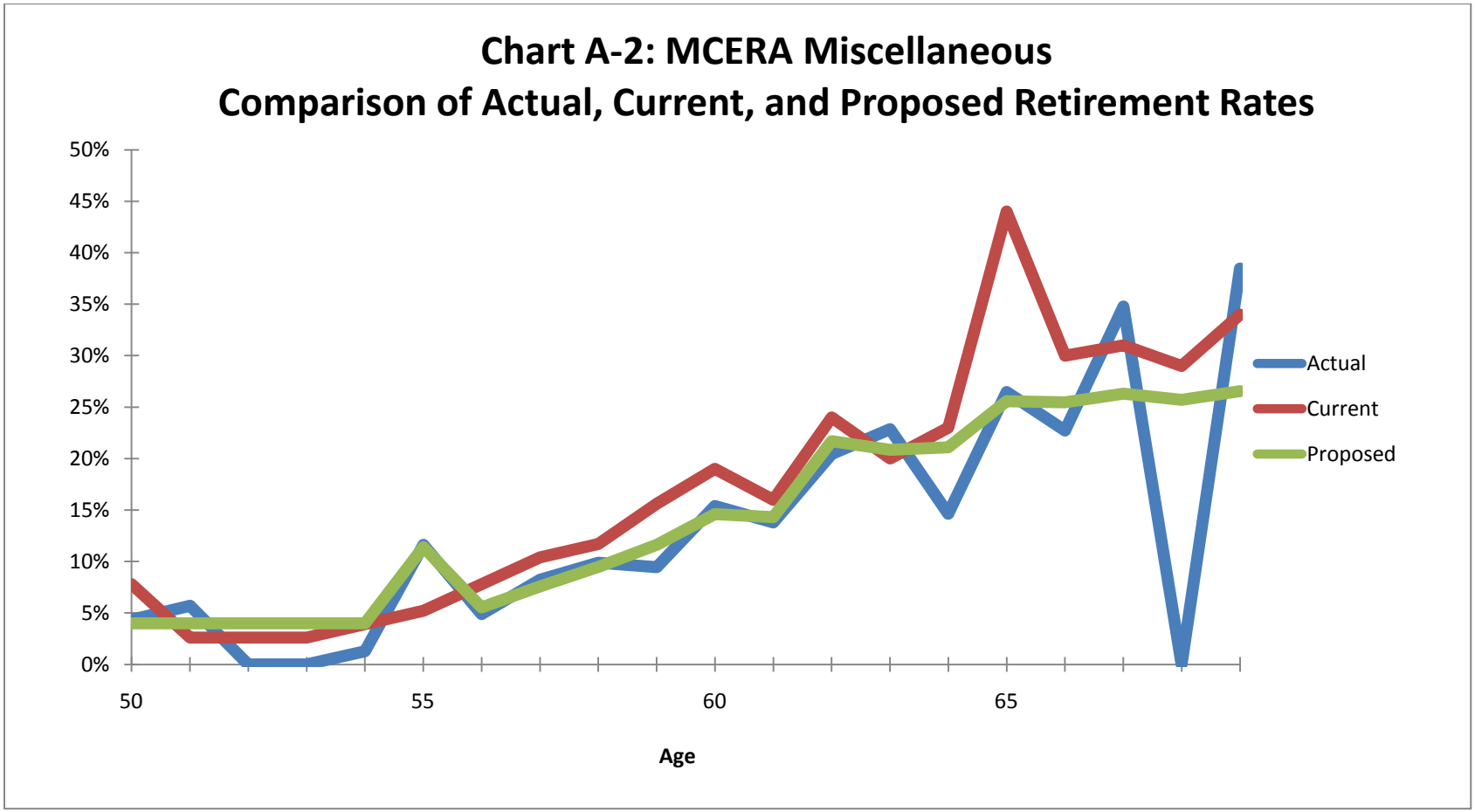


Chart A-1: MCERA Miscellaneous
Comparison of Actual and Expected Retirements
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
10-29 Years
30+ Years
Service
Actual Retirements
Expected - Current Rates
Expected - Proposed Rates



In reviewing Charts A-1 and A-2, we can see that the proposed assumptions match actual experience more closely than current assumptions for both age and service groupings.

Service Retirement (Safety)

Current Assumption

Summary of Experience versus Current Assumptions (Ages 50-59)

Benefit Formula	Eligible Exposure	Actual Retirements	Expected Retirements	Actual to Expected Ratio
3% @ 50	85	15	27	54.3%
3% @ 55	104	10	27	37.4%
Combined	**189**	**25**	**54**	**46.0%**

Benefit Formula	Actual Average Age	Expected Average Age
3% @ 50	52.3	53.1
3% @ 55	55.4	54.8
Combined	**53.5**	**54.0**

- Safety members are currently eligible to retire at age 50 with 10 years of service or at any age with 20 or more years of service.
- In both the current and prior study, the number of retirements was less than expected.
- We have combined the experience of the genders; the amount of female experience is small. Instead, we have split the experience by benefit formula, as the prior assumptions have done.
- We excluded the exposures and decrements for those younger than 50 and older than 60 years old; there have been very few retirements at these ages.

Recommendation

Summary of Experience versus Proposed Assumptions (Ages 50-59)

Benefit Formula	Eligible Exposure	Actual Retirements	Expected Retirements	Actual to Expected Ratio
3% @ 50	85	15	15	97.7%
3% @ 55	104	10	11	83.0%
Combined	**189**	**25**	**26**	**93.8%**

Benefit Formula	Actual Average Age	Expected Average Age
3% @ 50	52.3	53.2
3% @ 55	55.4	54.5
Combined	**53.5**	**53.8**

- For both the 3% @ 50 and 3% @ 55 benefits (31664.1 and 31664.2, respectively) lower rates are proposed for those with less than 30 years of service.
- Higher rates for those with at least 30 years of service are proposed.
- Maintaining a single set of rates for both males and females is recommended, due to the limited amount of female experience.
- We continue to assume all members with 10 years of service will retire at age 60.

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Safety Retirement Rates - Current

Age	3% @ 50	3% @ 55
50	33.0%	7.0%
51	25.0%	6.0%
52	25.0%	12.0%
53	33.0%	25.0%
54	33.0%	25.0%
55	50.0%	50.0%
56	50.0%	50.0%
57	50.0%	50.0%
58	50.0%	50.0%
59	50.0%	50.0%
60+	100.0%	100.0%

Safety Retirement Rates – Proposed

Service:	3% @ 50		3% @ 55	
Age	10-29 Years of Service	30+ Years of Service	10-29 Years of Service	30+ Years of Service
50	25.0%	50.0%	5.0%	25.0%
51	10.0%	20.0%	5.0%	25.0%
52	10.0%	20.0%	5.0%	25.0%
53	10.0%	20.0%	5.0%	25.0%
54	10.0%	20.0%	5.0%	25.0%
55	25.0%	50.0%	15.0%	30.0%
56	25.0%	50.0%	15.0%	30.0%
57	25.0%	50.0%	15.0%	30.0%
58	25.0%	50.0%	15.0%	30.0%
59	25.0%	50.0%	15.0%	30.0%
60+	100.0%	100.0%	100.0%	100.0%

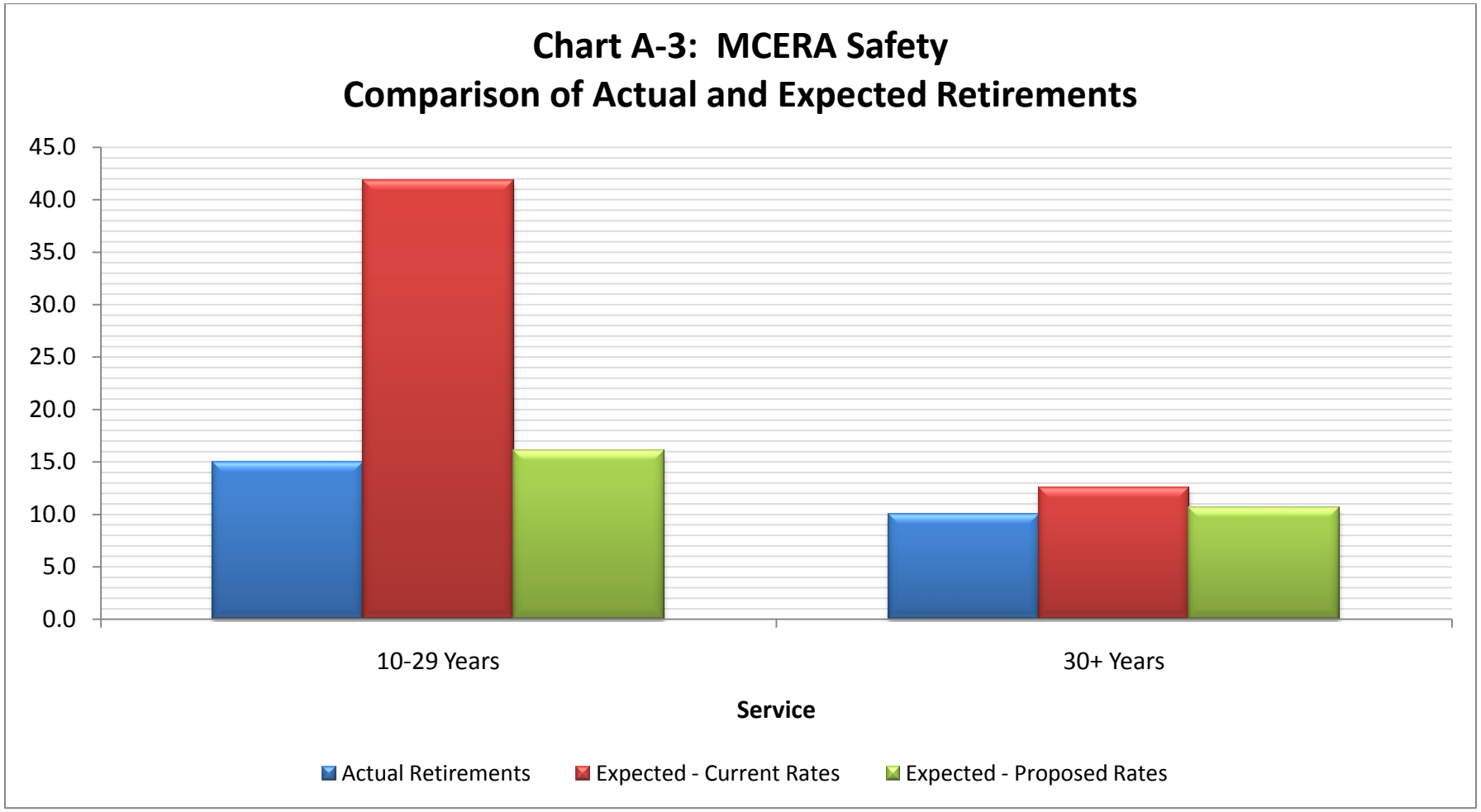
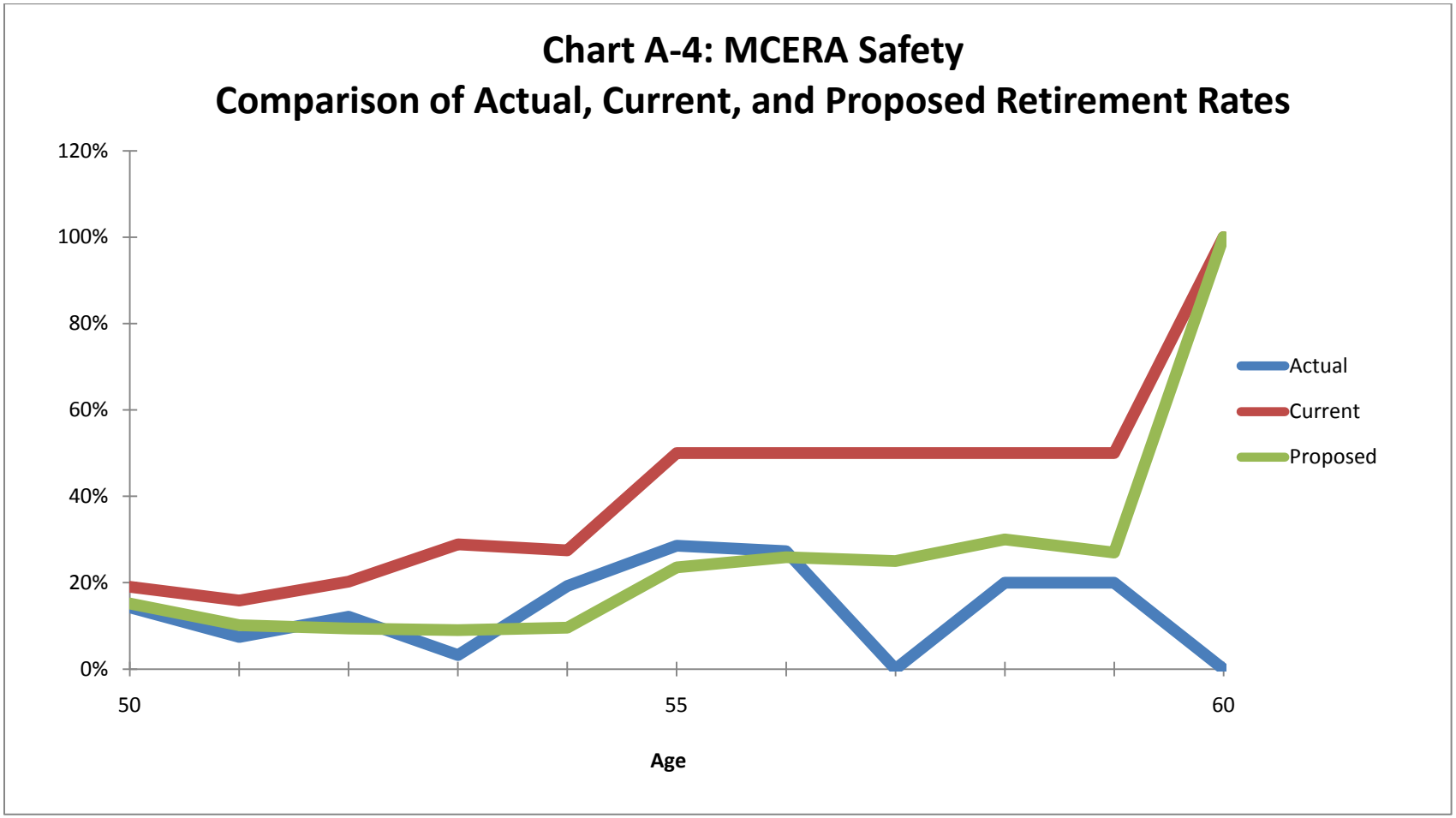


Chart A-3: MCERA Safety
Comparison of Actual and Expected Retirements
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
10-29 Years
30+ Years
Service
Actual Retirements
Expected - Current Rates
Expected - Proposed Rates



In reviewing Charts A-3 and A-4, we can again see that the proposed assumptions match actual experience better than the prior assumptions.

Termination – Vested Terminations, Transfers & Withdrawals (Miscellaneous)

Current Assumption

Summary of Experience versus Current Assumptions

Eligible Exposure	Actual Terminations	Expected Terminations	Actual to Expected Ratio
4,235	194	185	105%

Actual Average Age	Expected Average Age
40.7	42.6

- A withdrawal (or non-vested termination) occurs when a member terminates employment and withdraws his or her member contributions. Currently, service-based withdrawal rates are assumed for those with less than five years of service, and age based rates are assumed thereafter.
- Vested terminations apply to active members who terminate and leave their member contributions on deposit with the Plan. A transfer occurs if the member continues working with a reciprocal employer. No vested terminations or transfers are currently assumed to occur before five years of service. Age-based rates are assumed thereafter.
- Termination rates are strongly related to service, steadily decreasing as service increases. Male and female rates were similar.
- In the past, a member needed five years of service (including service with reciprocal employers) in order to leave contributions on deposit and receive a deferred vested benefit. However, now any member who reaches age 70 can receive a benefit from the Plan if they have left their contributions on deposit.

Recommendation

Summary of Experience versus Proposed Assumptions

Eligible Exposure	Actual Terminations	Expected Terminations	Actual to Expected Ratio
4,235	194	176	110%

Actual Average Age	Expected Average Age
40.7	41.9

- We have maintained the assumption that all terminations with less than five years of service will result in withdrawals. Although there may be some who terminate and/or transfer and receive a vested benefit, it will have little impact on Plan costs if these are assumed to be withdrawals.
- We have proposed adjustments to the withdrawal rates below five years of service to better match experience.
- We recommend increasing the current vested termination/transfer and withdrawal rates by 50% for members with five to nine years of service.
- We recommend maintaining the current vested termination/rates from 10 to 19 years of service and the current withdrawal rates from 10 to 15 years of service.
- We recommend assuming that no withdrawals occur once a member reaches 15 years of service and that no vested terminations/withdrawals occur once a member reaches 20 years of service.
- We recommend maintaining the assumption that 40% of vested terminations are assumed to be reciprocal transfers.

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• Approximately 67% of the vested terminations for Miscellaneous members and 55% of the vested terminations for Safety members were reported to be reciprocal transfers. • The reporting of vested terminations and transfers versus withdrawals is unreliable – most terminations with less than five years of service have been recorded as vested terminations, even though many of these will ultimately result in contribution withdrawals. • The current assumptions predicted the overall number of terminations reasonably well (within 5%), but there were significant differences between the assumed and actual rates at several levels of service.	• The proposed assumptions maintain the experience within 10% of that expected. In addition, there is much stronger agreement between actual and expected behavior at each level of service [see Chart A-5].

Miscellaneous Withdrawal Rates – Current Representative Rates

Service	All Ages
0	21.0%
1	9.0%
2	7.0%
3	6.0%
4	6.0%

Representative Rates for 5 or More Years of Service

Age	Withdrawal	Vested Termination / Transfer
22	2.3%	3.0%
27	2.3%	3.0%
32	2.3%	3.0%
37	2.0%	2.5%
42	1.2%	2.0%
47	0.8%	1.6%
52	0.0%	1.2%
57	0.0%	0.8%
62	0.0%	0.8%
65+	0.0%	0.0%

Miscellaneous Withdrawal Rates – Proposed Rates

Service	All Ages
0	15.0%
1	9.0%
2	7.0%
3	7.0%
4	7.0%

Representative Rates for 5 or More Years of Service

Age	Withdrawal		Vested Termination / Transfer	
	5 – 9 Years of Service	10 – 14 Years of Service	5 – 9 Years of Service	10 – 19 Years of Service
22	3.5%	2.3%	4.5%	3.0%
27	3.5%	2.3%	4.5%	3.0%
32	3.5%	2.3%	4.5%	3.0%
37	3.0%	2.0%	3.8%	2.5%
42	1.8%	1.2%	3.0%	2.0%
47	1.2%	0.8%	2.4%	1.6%
52	0.0%	0.0%	1.8%	0.0%
57	0.0%	0.0%	1.2%	0.0%
62	0.0%	0.0%	1.2%	0.0%
65+	0.0%	0.0%	0.0%	0.0%

No withdrawals are assumed for participants with 15 or more years of service, and no vested terminations or withdrawals are assumed for members with 20 or more years of service.

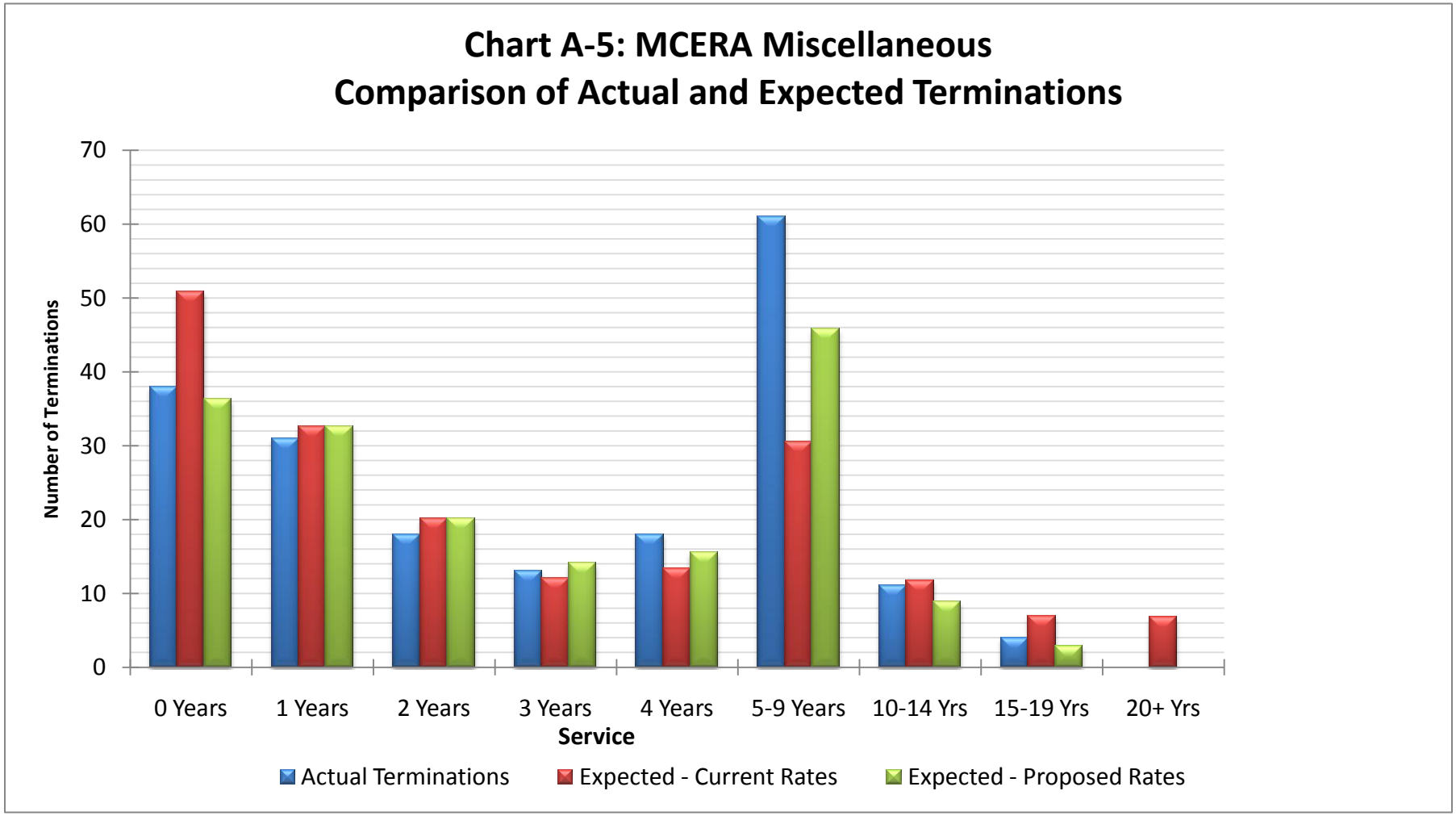

Chart A-5 shows the number of actual and expected terminations (including vested terminations, reciprocal transfers and withdrawals) by service level for Miscellaneous members.

Termination – Vested Terminations, Transfers & Withdrawals (Safety)

Current Assumption

Summary of Experience versus Current Assumptions

Eligible Exposure	Actual Terminations	Expected Terminations	Actual to Expected Ratio
1,224	22	35	62%

Actual Average Age	Expected Average Age
35.0	35.4

- A withdrawal (or non-vested termination) occurs when a member terminates employment and withdraws his or her member contributions. Currently, service-based withdrawal rates are assumed for those with less than five years of service, and age based rates are assumed thereafter.
- Vested terminations apply to active members who terminate and leave their member contributions on deposit with the Plan. A transfer occurs if the member continues working with a reciprocal employer. No vested terminations or transfers are currently assumed to occur before five years of service. Age-based rates are assumed thereafter.
- Termination rates are strongly related to service, steadily decreasing as service increases. Unisex rates are used.
- The reporting of vested terminations and transfers versus withdrawals is unreliable – in the current study period all terminations were reported as vested terminations or withdrawals.
- The number of actual terminations was significantly lower than the number expected.

Recommendation

Summary of Experience versus Proposed Assumptions

Eligible Exposure	Actual Terminations	Expected Terminations	Actual to Expected Ratio
1,224	22	27	80%

Actual Average Age	Expected Average Age
35.0	34.7

- We have maintained the assumption that all terminations with less than five years of service will result in withdrawals. We have proposed a reduction in the number assumed to terminate in the first year.
- We recommend assuming that no withdrawals occur once a member reaches five years of service.
- We recommend maintain the current vested termination and transfer rates from 5 – 19 years of service.
- We recommend that no terminations are assumed to occur once a member is eligible for service retirement (age 50 with 10 years of service, or 20 years of service).
- We recommend maintaining the assumption that 40% of vested terminations are assumed to be reciprocal transfers. This assumption agrees reasonably well with the data.
- The proposed assumptions improve the match between the actual and expected experience. In addition, there is stronger agreement between actual and expected behavior at each level of service [see Chart A-6].

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- In the prior two studies, the rate of withdrawal was higher than expected for those with less than five years of service. As a result, the assumed rate of withdrawal in the first year was increased in the last year.

Safety Withdrawal Rates – Current Representative Rates

Service	All Ages
0	14.0%
1	5.0%
2	4.0%
3	4.0%
4	4.0%

Representative Rates for 5 or More Years of Service

Age	Withdrawal	Vested Termination / Transfer
22	1.13%	1.90%
27	1.13%	2.37%
32	0.75%	3.99%
37	0.56%	2.42%
42	0.56%	0.91%
47	0.56%	1.36%
52	0.00%	0.09%
55+	0.00%	0.00%

Safety Withdrawal Rates – Proposed Rates

Service	All Ages
0	8.0%
1	5.0%
2	4.0%
3	4.0%
4	4.0%

Representative Rates for 5 – 19 Years of Service

Age	Withdrawal	Vested Termination / Transfer
22	0.00%	1.90%
27	0.00%	2.37%
32	0.00%	3.99%
37	0.00%	2.42%
42	0.00%	0.91%
47	0.00%	1.36%
50+	0.00%	0.00%

No withdrawals are assumed for participants with 5 or more years of service, and no vested terminations or withdrawals are assumed with 20 or more years of service.

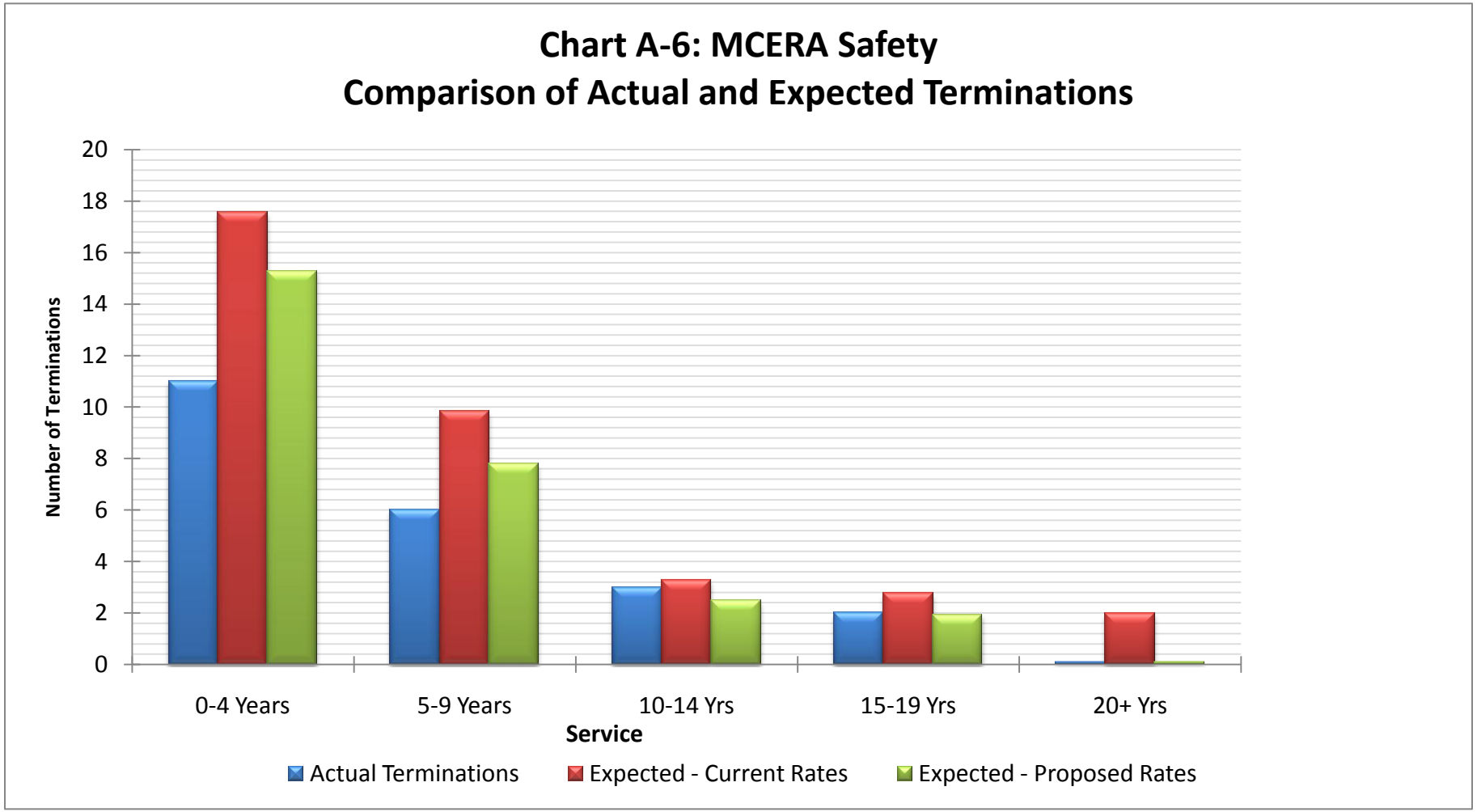


Chart A-6 shows the number of actual and expected terminations (including vested terminations, reciprocal transfers and withdrawals) by service for Safety members.

Disability (Miscellaneous & Safety)

Current Assumptions and Experience	Recommendation
• Members are eligible for non-service-connected disability retirement if they are permanently disabled at any age after earning five years of service. There is no service requirement for members to receive a service-connected disability. • Current assumptions are based on age, with separate rates for service-connected and non-service-connected disabilities. The rates for the safety members are higher than those for the miscellaneous members. • The disability data reported over the experience study period is extremely limited; there were only two reported disabilities among the miscellaneous members and three among safety members. However, there is frequently a substantial lag period between when a disability occurs and when a disability retirement is approved. • In addition, follow-up with Staff indicated that some members currently reported as service retirements may be disability retirements whose statuses have not yet been updated to reflect approved disabilities. • Finally, Staff has indicated that there could be as many as 30 disability cases reviewed before the end of the current calendar year.	• Because of the paucity and the uncertainty of the experience, we propose maintaining the current assumptions until the next experience study. At that time, the experience from the current period should have been clarified, and the pending disability cases should have been processed. • The experience of the current period can be combined with that of the next period to obtain a more robust sample from which to formulate conclusions.

Miscellaneous Disability Rates – Current Representative Rates

Age	Service-Connected	Non-Service-Connected
20	0.050%	0.000%
25	0.080%	0.005%
30	0.130%	0.010%
35	0.160%	0.015%
40	0.210%	0.025%
45	0.260%	0.045%
50	0.310%	0.090%
55	0.330%	0.155%
60	0.370%	0.255%

Safety Disability Rates – Current Representative Rates

Age	Service-Connected	Non-Service-Connected
20	0.121%	0.020%
25	0.165%	0.030%
30	0.396%	0.050%
35	0.605%	0.070%
40	1.298%	0.160%
45	1.254%	0.260%
50	1.408%	0.360%
55	4.290%	0.460%
60	0.000%	0.000%

Proposed Changes

No changes in assumed disability rates are proposed for either group.

Longevity and Promotion Pay Increases (Miscellaneous)

Pay increases consist of three components: Increases due to cost of living maintenance (inflation), increases related to non-inflationary pressures on base pay (such as productivity increases), and increases in individual pay due to merit, promotion, and longevity. Only increases due to merit (promotion and longevity) are considered here; increases due to cost of living and non-inflationary base pay factors are addressed in a later section of this report.

Current Assumption

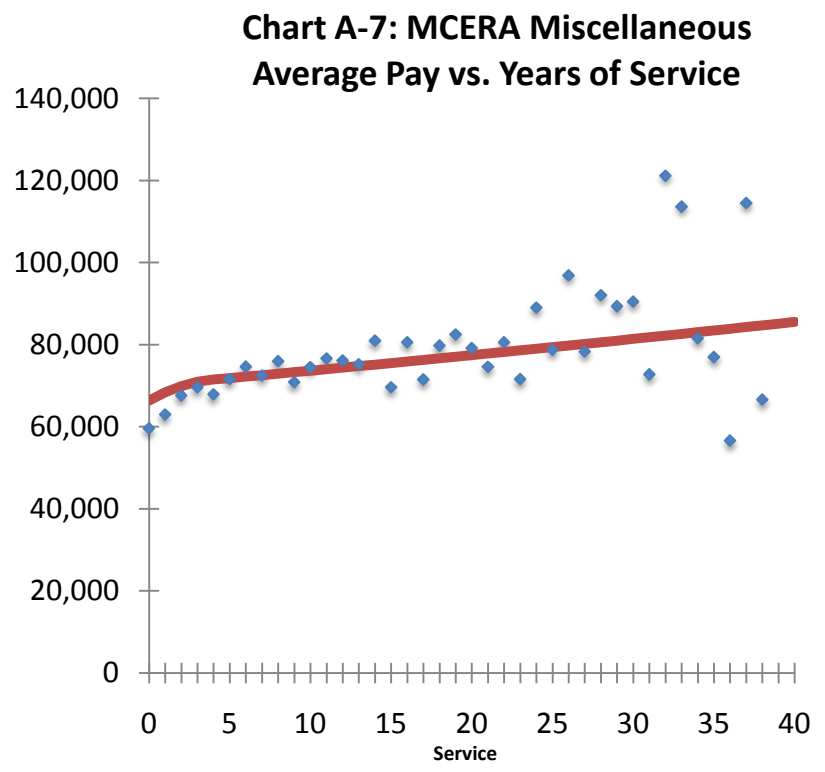
Years of Service	Assumed Increase
0	3.00%
1	2.25%
2	1.50%
3	0.75%
4+	0.50%

- In the charts below, the average pay of the active members as of June 30, 2008 has been plotted against service. For example, the average pay for members with 1 year of service is about $63,000.
- In addition, a line of best fit is applied to the average pay data, and this line is used to determine a pay increase due to merit.

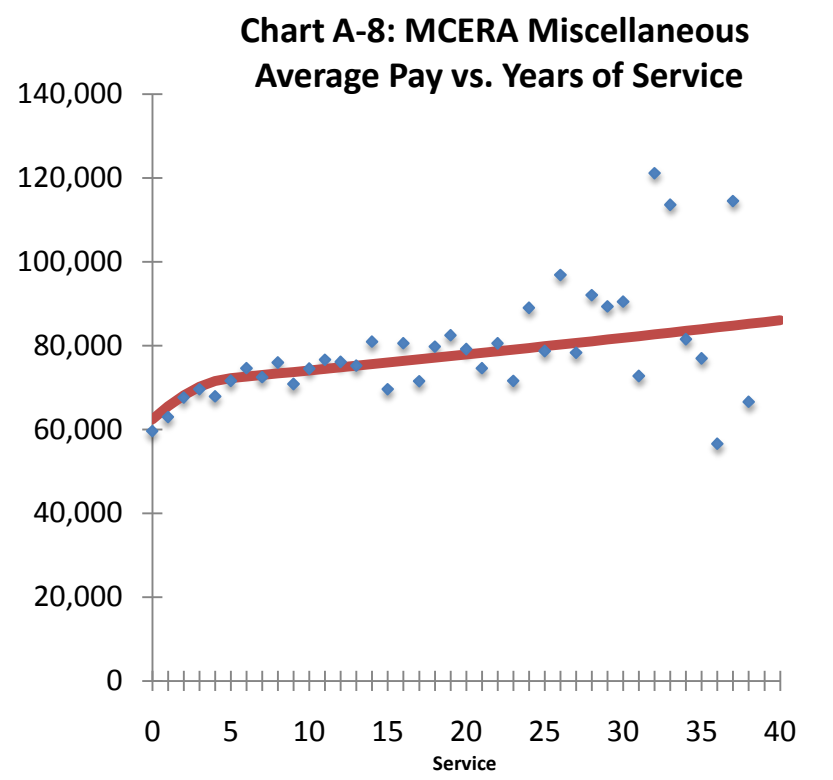
Recommendation

Years of Service	Assumed Increase
0	5.00%
1	4.00%
2	3.00%
3	2.00%
4	1.00%
5+	0.50%

- New rates have been proposed with slight adjustments to the rates in the first five years of service. This adjustment to the current rates makes the assumptions line up more closely with actual experience.
- The proposed rates continue the assumption that no merit increases occur after age 60.



Note: This is called a *transverse* study of longevity and promotion pay increases; for a more detailed description of this type of study and its benefits, see the methodology section at the end of this report.

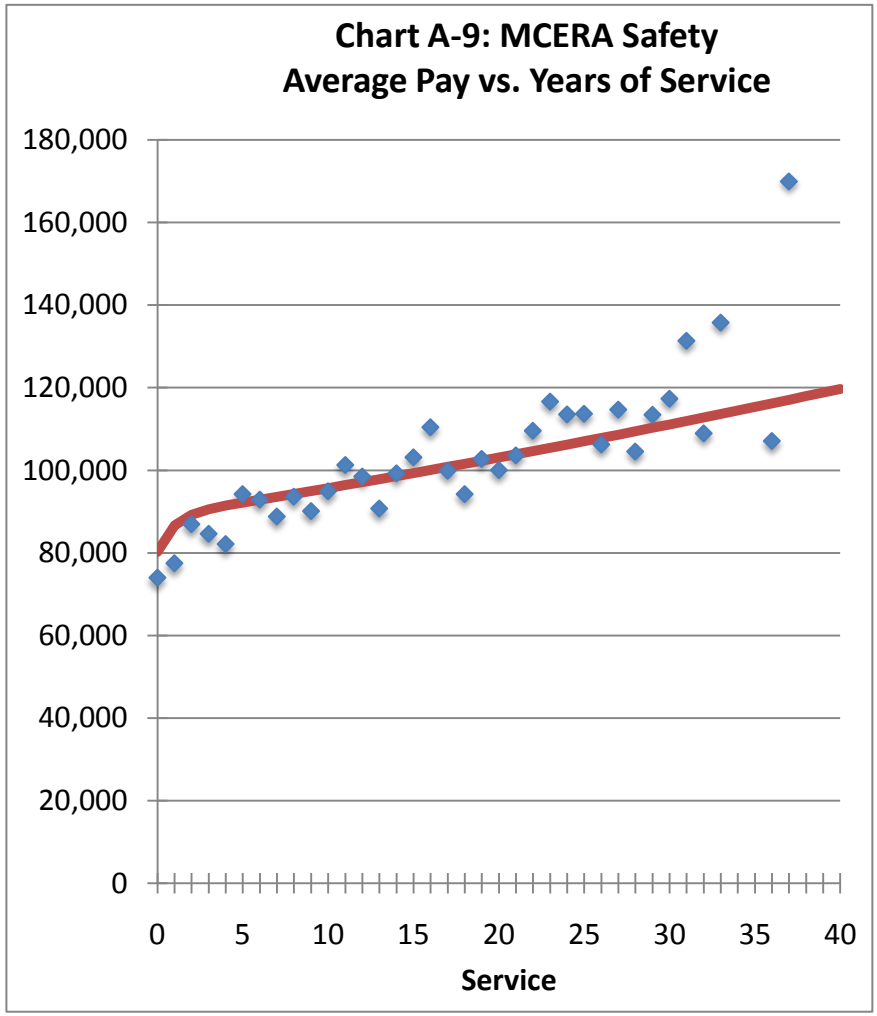


Longevity and Promotion Pay Increases (Safety)

Current Assumption

Years of Service	Assumed Increase
0	8.00%
1	3.00%
2	1.50%
3	1.00%
4+	0.75%

- Only increases due to merit (promotion and longevity) are considered here.
- The rates being used appear to provide a reasonable fit to actual experience. We recommend retaining these rates.



Mortality

Current Assumptions (Miscellaneous & Safety)

Summary of Experience versus Current Assumptions

ACTIVE	Eligible Exposure	Actual Deaths	Expected Deaths	Actual to Expected Ratio
Males	2,701	5	5.1	97.5%
Females	2,758	2	5.4	37.1%
Combined	**5,459**	**7**	**10.5**	**66.5%**

RETIRED & SURVIVING SPOUSES	Eligible Exposure	Actual Deaths	Expected Deaths	Actual to Expected Ratio
Males	1,516	39	41.2	94.7%
Females	2,223	61	64.3	94.8%
Combined	**3,739**	**100**	**105.5**	**94.8%**

DISABLED	Eligible Exposure	Actual Deaths	Expected Deaths	Actual to Expected Ratio
Males	432	5	8.1	62.1%
Females	207	6	4.0	151.3%
Combined	**639**	**11**	**12.1**	**91.5%**

ALL PARTICIPANTS	Eligible Exposure	Actual Deaths	Expected Deaths	Actual to Expected Ratio
Males	4,696	49	54.4	90.1%
Females	5,188	69	73.7	93.6%
Combined	**9,837**	**118**	**128.1**	**92.1%**

Proposed Assumptions (Miscellaneous & Safety)

Summary of Experience versus Proposed Assumptions

ACTIVE	Eligible Exposure	Actual Deaths	Expected Deaths	Actual to Expected Ratio
Males	2,701	5	4.4	112.8%
Females	2,758	2	4.9	40.6%
Combined	**5,459**	**7**	**9.3**	**74.8%**

RETIRED & SURVIVING SPOUSES	Eligible Exposure	Actual Deaths	Expected Deaths	Actual to Expected Ratio
Males	1,516	39	37.0	105.4%
Females	2,223	61	60.9	100.2%
Combined	**3,739**	**100**	**97.9**	**102.2%**

DISABLED	Eligible Exposure	Actual Deaths	Expected Deaths	Actual to Expected Ratio
Males	432	5	7.2	69.7%
Females	207	6	3.6	167.2%
Combined	**639**	**11**	**10.8**	**102.2%**

ALL PARTICIPANTS	Eligible Exposure	Actual Deaths	Expected Deaths	Actual to Expected Ratio
Males	4,696	49	48.6	100.8%
Females	5,188	69	69.4	99.5%
Combined	**9,837**	**118**	**118.0**	**100.0%**

- The current actuarial assumption is that members will experience mortality in accordance with the RP 2000 Combined Healthy Mortality Tables. An adjustment has been made to the age of each member; either setting their age forward or backward, based on whether the member is anticipated to higher or lower life expectancy, versus the RP 2000 Tables. For example, using a two year set-back indicates a longer life expectancy than using unadjusted rates.
- The following table summarizes these adjustments:

	Table	Active Members	Retired Members and Survivors	Disabled Members
Males	RP 2000 Male	3 year set back	1 year set back	3 year set forward
Females	RP 2000 Female	3 year set back	2 year set back	3 year set forward

- All deaths among active Safety members are assumed to occur in the line of duty. All deaths among active Miscellaneous members are assumed to be non-duty-related. We recommend retaining this assumption.
- The experience for Safety members is quite limited, especially among female members. We recommend retaining the same assumptions for Miscellaneous and Safety.
- Although experience has matched reasonably closely in aggregate under the current assumptions, there were fewer deaths than expected during the study period. Assuming more deaths than actually occur will lead to actuarial losses, because more benefits will be paid then projected.
- We generally prefer to have a positive margin between the actual number of deaths and the predicted number of deaths for two reasons:
  1. Overall mortality is expected to improve in future years.
  2. The RP2000 Tables were designed using benefit-weighted (rather than participant-weighted) data. This is because members with larger benefits tend to have lower mortality rates, at least at younger ages. Applying the tables on a participant basis, while accurately predicting the *number* of deaths, will tend to underestimate the liabilities.
- The RP 2000 Tables are the most current ones generally used for pension funding.. However, the Society of Actuaries suggested a methodology for projecting mortality improvements using these tables. Using a **Projection Scale AA**, the RP2000 Tables are adjusted for mortality improvements since the base year of the Tables (2000).
- We propose maintaining the use of the RP2000 Combined Healthy Tables, but projecting those tables from 2000 to 2010 using Projection Scale AA.
- We propose maintaining the current age adjustments..
- The proposed assumptions provide a small margin between the number of actual deaths and the number expected, at least for the retired members and beneficiaries. We will continue to monitor mortality experience, and determine if further projections may be needed in future years.

Beneficiaries

Rates of Marriage and Survivor Benefits	Recommendation
• A portion of each population is assumed to be married for the purpose of determining pre-retirement and post-retirement death benefit obligations. • The current assumption is that 80% of male members are married; for female members, this proportion is 50%. Males are assumed to be three years older than their spouses. • All members who are assumed to be married are also assumed to receive their service retirement or non-duty disability benefit in the unmodified 60% Joint and Survivor annuity form. All married duty-disabled members are assumed to receive an unreduced 100% Joint and Survivor annuity.	• We valued the inactive benefits (retirees, disabled members, etc.) using the actual benefit elections, beneficiary age and gender information for each member, and compared this to the results using the actuarial assumptions. The liabilities were within 0.5% under the two scenarios, indicating that the current assumptions are reasonable. Therefore, we recommend maintaining these assumptions.

Economic Assumptions

Introduction

Economic assumptions utilized in the development of actuarial liabilities and costs for a defined benefit plan include:

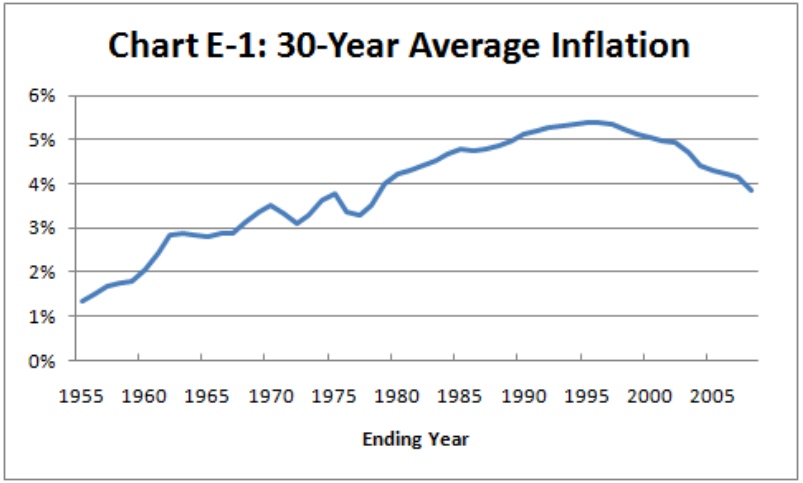
- The inflation assumption;
- The real investment return assumption;
- The real growth in pay relative to inflation; and
- COLA increases relative to inflation.

While we look to the past for indications of future economic behavior, we must also consider how the future may be expected to be different. In order to reflect the long-term nature of defined benefit plan funding in the development of these economic assumptions, it is appropriate to focus on long term trends.

Inflation

While historical trends are not entirely indicative of the future, they do often serve as a useful guide in determination of assumptions. However, there are elements of the future economic environment that may differ from the past due to structural changes. An important and fundamental case in point is the rate of inflation, which underlies each of the three elements of economic assumptions listed above.

Chart E-1 below shows the average rate of inflation over 30-year periods, with the earliest such period ending in 1955 and the latest ending in 2008. We note in the chart that inflation seemed to be increasing steadily until the 1990's when it leveled off and began to decrease. Examination of Chart E-1 may lead to an assumption that inflation is likely to be quite high, perhaps in the range of 4% to 5% annually.



However, there are a number of reasons to believe that future inflation levels will not be as high as Chart E-1 would seem to suggest.

- An important reason for the high rate of inflation in the averages above is the nine-year period 1973-81 when inflation averaged 9.2% per year.
- The years 1973-81 featured unprecedented levels of household formation. The demand for new houses, cars,

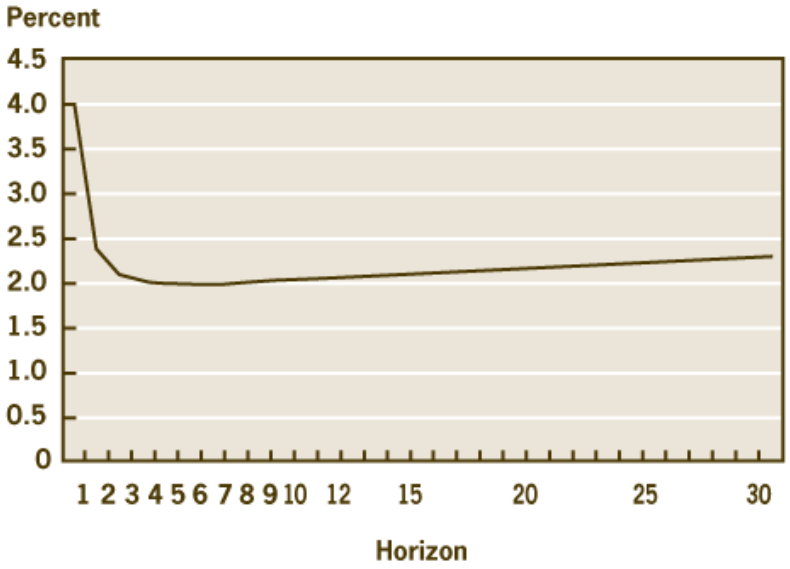
office space and equipment caused by the maturation of the post-war baby boom may have largely been responsible for the inflation during these years. Since 1982, increases have been in the range 0.1% to 4.6% with one exception (6.1% in 1990), averaging 3.0% per year.

- The population of the United States is aging, which implies a greater likelihood of low inflation in the future. This has been observed in other countries with aging populations, such as Japan.

- Currently, the Federal Open Market Committee has policies in place to control inflation, making future levels more likely to remain relatively low.

- The Survey of Professional Forecasters, a quarterly publication of the Research Department of the Philadelphia Reserve Bank, indicates that national inflation levels are expected to be in the 2.50% on average over the next ten years.

- Financial markets offer evidence of what investors expect inflation to be in future years. Various securities, such as Treasury inflation-protected securities (TIPS), provide the necessary data for these analyses. As an example, a recent publication by the Federal Reserve Bank of Cleveland attempts to incorporate some of this market data. It contained the following 30-year projection of expected inflation rates.



(Source: Joseph G. Haubrich, Cleveland Federal Reserve website. As of September 1, 2009) (http://www.clevelandfed.org/research/commentary/2009/0809.cfm#back2fn2)

An assumption of 2.5% to 3.0% may appear to match well with current market and professional expectations. However, the predictions of future inflation by experts are not unanimous. Some commentators note that the large current and expected future deficits increase the likelihood of higher levels of inflation in the future.

A change from the current 4% assumption to a 3% or lower assumption would represent a sudden and drastic change in the assumptions, which is not advisable. Therefore, we recommend reducing the inflation assumption from 4% to 3.5%, a moderate but

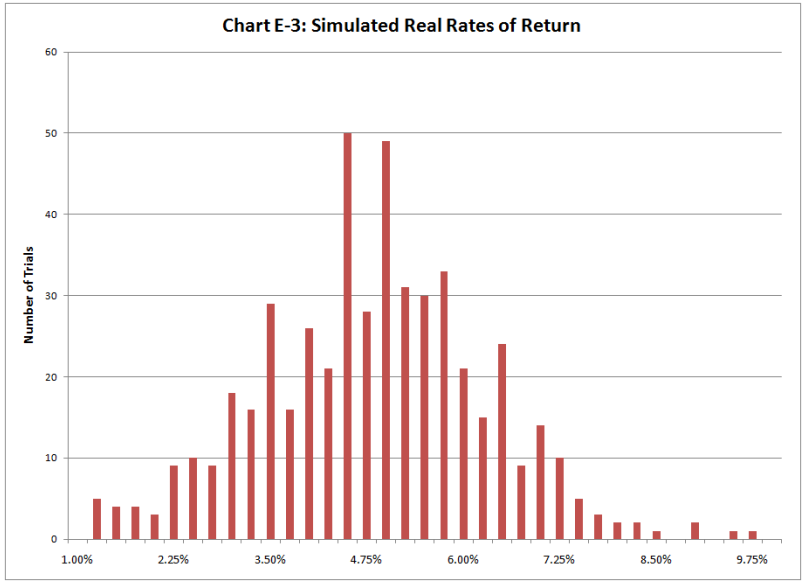
still significant reduction. If, at the time of the next experience study, the markets and forecasters continue to indicate lower expectations of future inflation, further reductions in the assumption could be considered.

Investment Return

The investment return assumption depends on the anticipated average level of inflation and the anticipated average *real rate of return.* The real rate of return is the investment return in excess of underlying inflation. The expected average real rate of return is heavily dependent on asset mix: The portion of assets in stocks, bonds, and cash. A typical asset allocation is about 60% in equities and 40% in fixed income securities.

In the Chart E-3 below, we have simulated the real return derived using MCERA's actual portfolio (as of June 30, 2009) of 40% domestic equity, 20% international equity, 25% fixed income, and 15% real estate. The simulated returns are derived by statistical re-sampling, using the following algorithm:

1. The period from 1970 through 2008 was selected as the re-sampling period.
2. 500 simulation trials are computed for the re-sampling period. The mean, median, top 25%, and bottom 25% rates of real return are determined.
3. For each simulation trial, 100 years of returns and inflation are selected randomly, with replacement, from the re-sampling period. The average real rate of return is then computed.
4. For each trial, the average rate of real return over the 100-year period is plotted in Chart E-3 below, after adjusting for investment expenses.



Investment expenses have averaged 0.58% of mean assets over the past three years. According to Article 31580.2 of the '37 Act, administrative expenses (excluding certain technology expenses) may not exceed 0.18% of the assets of the retirement system; over the past three years they have averaged nearly this level (0.17%). The simulated rates of return in Chart E-3 are reduced by 0.75% to allow for these expenses.

The mean and median returns from this simulation were both approximately 4.8%. This matches well with the expectations of the investment consultant; an examination of the 2009 Capital Market Projections by Callan Associates indicates a projected annual real rate of return of around 5.0%, based on the current asset allocation strategy of MCERA.

Most trials (the 25% - 75% percentile) fell within a range of 3.75 – 5.75%. Based on this data, we can find justification for real rates of return in the same range.

We noted above that a reasonable inflation assumption is around 3.5%. We recommend an increase in the real return assumption from 4.00% to 4.25%, and therefore, a nominal return assumption of 7.75%. The current real return assumption of 4.00% (8.00% – 4.00%) is also a reasonable assumption, though as can be seen above, a real return assumption of 4.00% lies near the bottom of our best estimate range, even after recognizing the negative market events of 2008.

The actuarial cost generated using a real return of 4.25% and an inflation assumption of 3.50% (nominal rate 7.75%) is very similar to that using a real return of 4.00% and an inflation assumption of 4.00% (nominal rate 8.00%). Therefore, the two sets of assumptions are equally conservative, from an actuarial cost perspective.

Payroll Growth

Components of the payroll growth assumptions are:

- Inflation, and
- Other payroll growth not offset by salary reduction caused by replacement of terminating employees by new entrants.

  Such increases are often attributed to productivity gains. Other factors contributing to non-inflationary base salary increases include growth in the active workforce, bargaining pressures, competition among local employers, and workforce demographic issues.

There is currently no assumed growth beyond the growth due to inflation. In general we recommend that long range gains due to productivity, the collective bargaining process or other pressures should be assumed to be zero or minimal. While productivity tends to increase in many sectors of the economy, any long-term assumption of salary growth beyond inflation carries with it an assumed improvement in *relative* standard of living.

Accordingly, EFI recommends maintaining the assumption that the annual expected increase in base payroll will be equal to inflation. This increase will be applied to all continuing active members, in addition to acting as the increase in starting pay for new entrants when projections of future populations are required.

COLA Growth

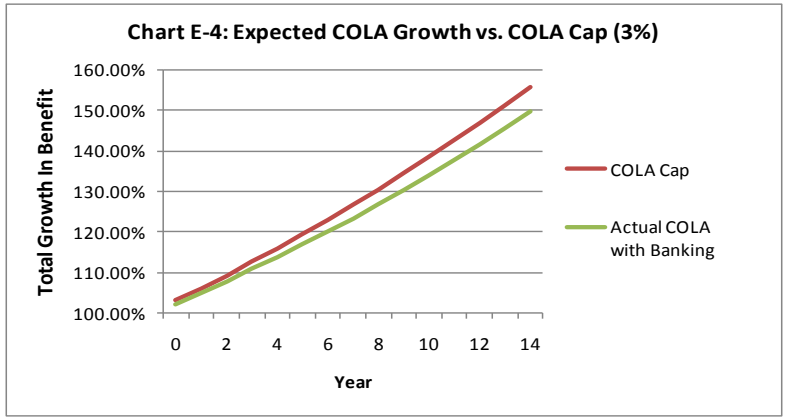
Most members of MCERA are eligible to receive automatic Cost of Living Adjustments (COLAs), based on the growth in the Bay Area Consumer Price Index (CPI) and reflecting various caps on the annual COLA increase. These caps depend on the Tier and bargaining group of the member, and can be 2%, 3%, or 4% annually. Any increase in the CPI above the maximum increase can be banked for future years in which the change in the CPI is below the maximum increase.

It is necessary to determine an assumed rate of COLA growth, reflecting both inflation (i.e. the growth in the CPI) and the

interaction of the CPI with the COLA maximum for each group. Currently, it is assumed that the COLA will grow by 3.8% for the group with the 4% maximum (given the current CPI assumption of 4.0%) and by the amount of the cap (2% or 3%) for the other groups.

We have produced statistical simulations of inflation, similar to our modeling of the investment return assumption, and then modeled how the COLA maxima and the banking process for each group interact with the changes in CPI.

Chart E-4 below demonstrates how the expected growth in the COLA is expected to be below the cap, even if the expected increase in the CPI (3.5% based on our earlier recommendation) is higher than the cap itself (3.0% in this example). This is because if there is not a significant bank already in existence (such as in the early years of retirement) and there are years in which inflation is below the cap, this shortfall will not be made up in future years.



The table below contains our recommended rates of assumed growth in the COLA, based on the CPI assumption and the COLA maximum:

	Recommended COLA Growth Assumption		
Assumed Annual CPI Increase	2% Maximum	3% Maximum	4% Maximum
3.0%	1.90%	2.60%	2.90%
3.5% (recommended)	**1.90%**	**2.70%**	**3.20%**
4.0% (current)	1.90%	2.80%	3.50%

Summary of Experience

In this section, we look at a summary of experience. This will provide a sense of how well the current demographic assumptions predicted experience in aggregate over the years studied. It will also give an indication as to how the assumption changes proposed within this study would have performed during the same time period.

Summary of Demographic Experience

			Current Assumptions		Proposed Assumptions	
Assumption	**Expo-sure**	**Actual**	**Expect**	**A/E Ratio**	**Expect**	**A/E Ratio**
Retirement	1,298	137	194	71%	142	96%
Termination & Withdrawal	5,459	216	220	98%	203	106%
Mortality[1]	9,837	118	128	92%	118	100%

Note: Disability experience for the current study period was perceived to be insufficient and unreliable for performing a conclusive analysis. The experience will be aggregated with the following study before any recommendations are made.

Methodology

Purposes of the Experience Study

The first goal of this Experience Study is to review the recent past demographic experience of the Plan. We seek to understand the behavior of the participating members so that we can recommend actuarial assumptions concerning future demographic experience.

The second goal of this Study is to recommend economic assumptions to be used in computing liabilities and costs. These economic assumptions include the expected rate of return on Plan assets and the anticipated rate of increase in the Consumer Price Index (CPI). These assumptions are determined based on the investment strategy adopted by the Plan and on the past behavior of the capital markets and the CPI, and on future expectations.

Once adopted, the assumptions recommended by this Study will be used to determine future liabilities and costs and for purposes of evaluating prospective changes in benefits, eligibility conditions, and other aspects of the Plan's operations.

Importance of Accurate Assumptions

The liabilities and costs calculated in actuarial valuations and cost studies are based on a projection of future conditions. The actuary makes assumptions concerning the rates of retirement, withdrawal, termination, disability, and death among plan members. In addition, the actuary must project future earnings on plan assets, inflation, and growth in the pay of active members.

The actuary sets assumptions based on future expectations. In setting demographic assumptions, such as rates of retirement, the past experience of the covered group of employees is often the best predictor of future behavior. When establishing economic assumptions, such as the expected return on plan assets, the historical behavior of the investment markets can serve as a guide.

Actuarial funding methods are designed so that, if the actuarial assumptions are met, plan costs will generally be a level percentage of member pay from year to year. If actual economic or demographic experience varies from that assumed, plan costs will rise or fall accordingly. Therefore, it is worth the effort to make our best estimate of future conditions so that the plan costs computed by the actuary will be as stable and predictable as possible.

Methodology (Demographic Assumptions)

One goal of this Study is to compute the probability of death, disability, retirement, withdrawal, or termination leading to a vested benefit at each age for active members and the probability of death at each age for inactive members.

To this end, we proceed as follows:

- We count the number of members leaving for each cause during the term of the Study. This is the number of decrements.
- We count the number of members who could have left for each cause during the Study. This is the exposure.

- When the exposure is sufficient, we divide the number of decrements by the exposure at each combination of age and service for an employee group to determine the probability of leaving due to the cause in question.

When there is insufficient exposure to derive statistically reliable rates by age and service, we may combine exposures and decrements for groups of ages and service. Alternatively, we may compare the total number of actual decrements with the total number of decrements predicted by a standard actuarial table, and adopt a table that predicts decrements, in total, reasonably close to those that have been observed.

Where the rate of decrement is low and the underlying causes of the decrement in question are not expected to change significantly with time (for instance, for non-duty Safety disability rates), we may combine the most recent experience with data from prior experience studies.

For the study of the merit (longevity and promotion) components of individual pay increases, we generally choose to use a *transverse* study. A reliable way to assess average increases in pay due to merit is to analyze average pay versus service for the current active members of a plan. With a homogeneous group of any size at all, the pattern of promotions and longevity increases during the career of an average employee is clearly visible in this analysis. This is a transverse study of longevity and promotion pay increases: The data is taken as of a particular point in time. *Longitudinal* studies, which use changes in pay collected over several years, are often unreliable due to the effects of inflation, collective bargaining, and management decisions during the term of the study.

Methodology (Economic Assumptions)

The Plan's economic assumptions are critically important in computing actuarial liabilities and costs. A careful determination of these assumptions requires an analysis of the past performance of the capital markets and the Plan's future investment outlook.

To this end, we proceed as follows:

- Based on a detailed analysis of recent past history and reasonable expectations for the future, a long term projection of the rate of inflation is determined.
- Based on the Plans' investment strategy and historical rates of return on various asset classes, the long term *real* rate of return on assets is projected. This is the return on assets in excess of inflation.
- The projected rate of inflation is combined with the assumption concerning merit pay increases to project future members' pay.
- The projected rate of inflation is combined with a model of the COLA provisions to project future growth in retiree benefits.
- The rate of inflation is combined with the estimated real return on assets to determine the overall return on assets.

Any estimate of future inflation and asset returns is difficult. Over time, there will be actuarial gains and losses as experience deviates from our assumptions.