

TENNESSEE CONSOLIDATED RETIREMENT SYSTEM

Experience Study
July 1, 2008 – June 30, 2012



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Justin C. Thacker, F.S.A.

Bryan, Pendleton, Swats & McAllister, LLC

Purpose

- Statutory Requirement
- Verify Accuracy of Valuation Assumptions
- Modify Assumptions if Needed

Effect of Actuarial Assumptions

- Plan costs are determined by actual experience of the plan
 - Benefits paid
 - + Expenses
 - Investment returnPlan Costs
- Actuarial assumptions dictate the incidence of contributions

Assumptions

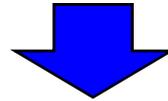
- Demographic
 - Post-retirement mortality
 - Pre-retirement mortality
 - Disability
 - Turnover
 - Retirement

Assumptions

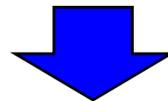
- Economic
 - Inflation
 - Cost of Living Adjustments
 - Investment Returns
 - Compensation Increases
 - Social Security Wage Base

Process

Data Collection



Expected Incidence
Exposure
Assumed Rate



Actual Incidence

Data Groupings

Teachers Group

Teachers

UT-TIAA with guarantees

Local Teachers

“Aged” Teachers

Group III

General State Group

General State

Political Subdivisions

Group II

Demographic Assumptions

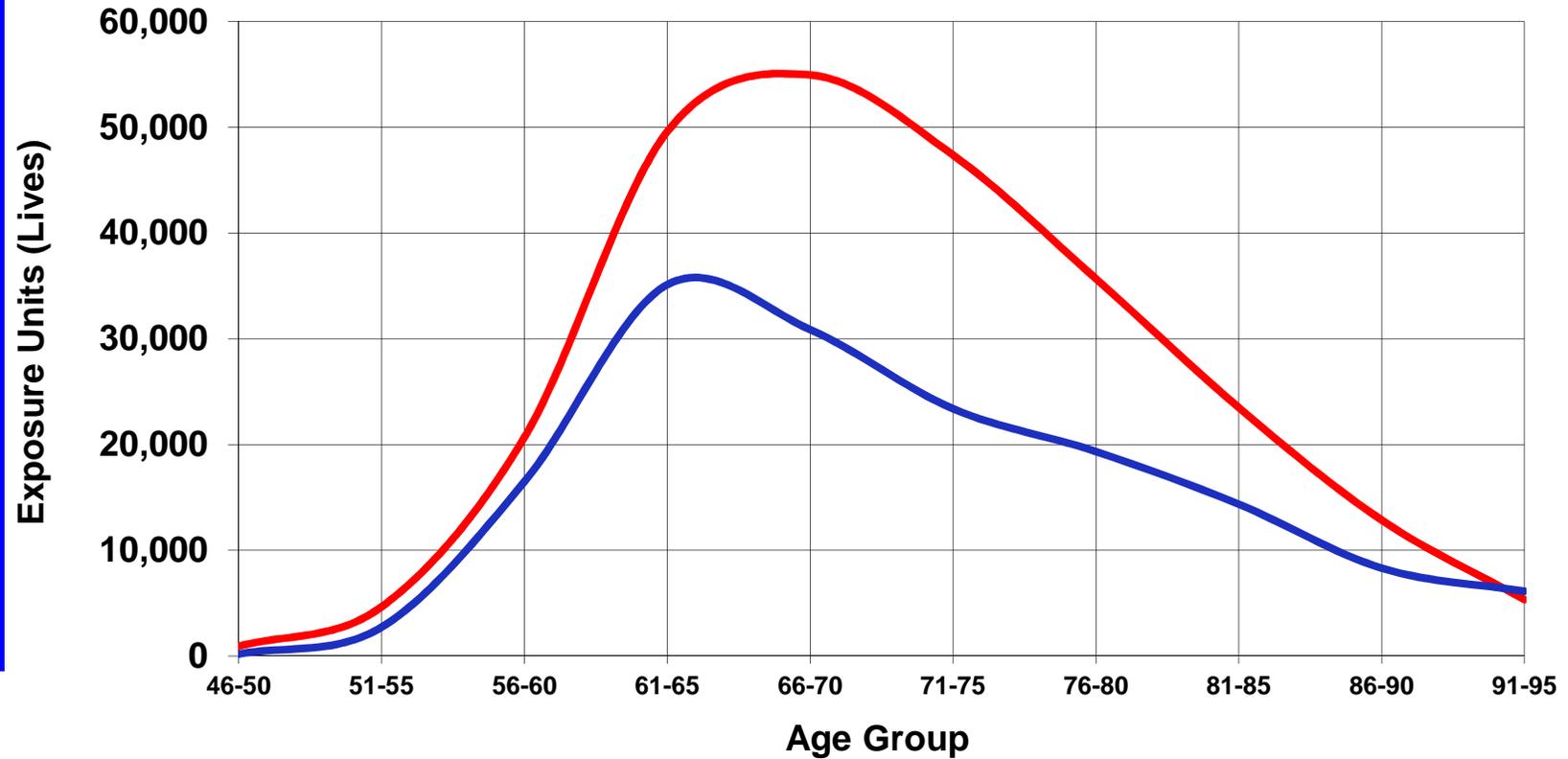
Demographic Assumption Principles

- Match experience
- Credibility
- Conform to standard
- Continuity
- Conservatism

Liability Weighting

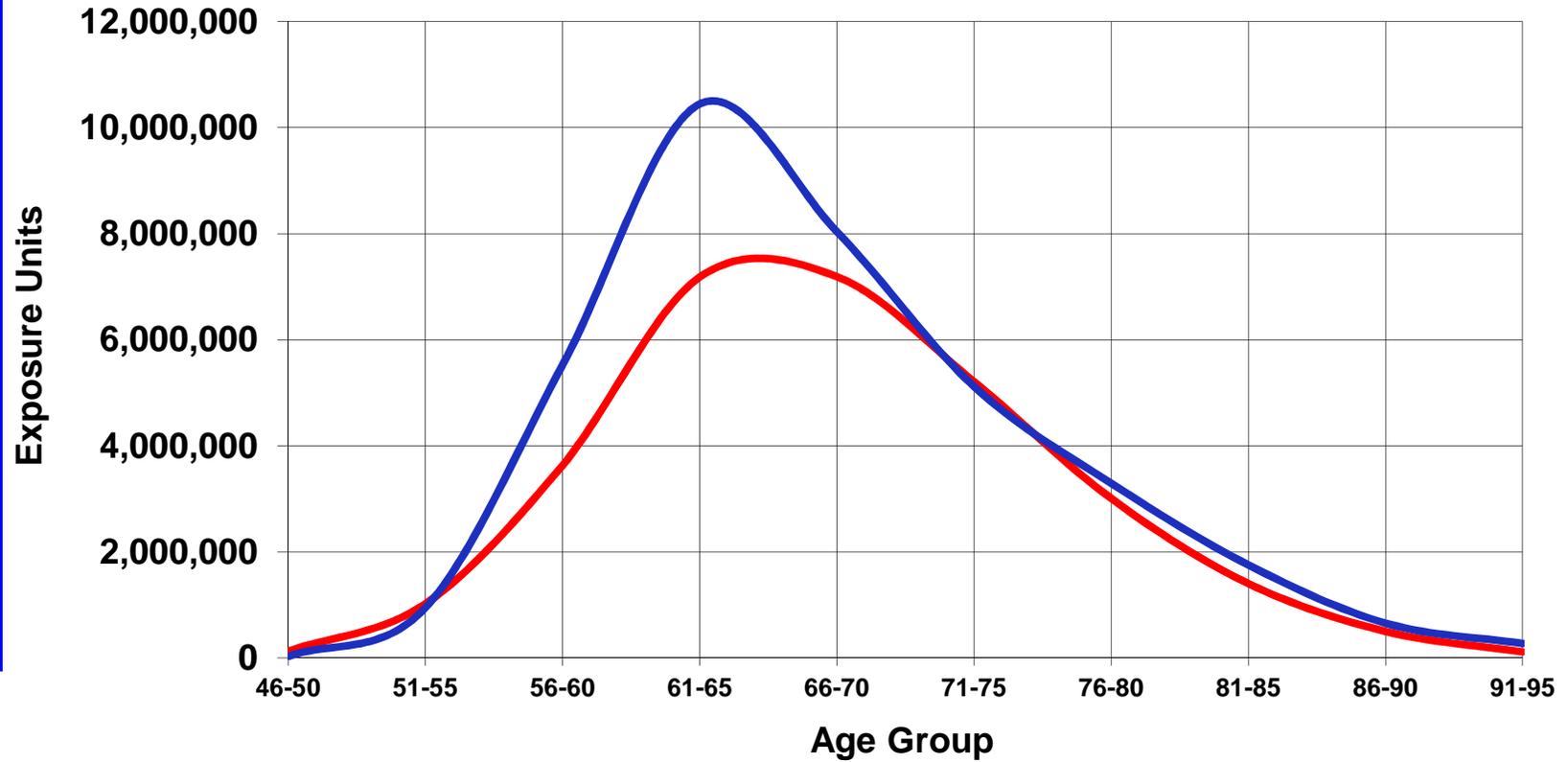
- Results not just based on number of participants
- Results weighted by benefit liability
- Consistent with biennial valuation results
- Significant impact on results

Retired Exposure Units (Unweighted)



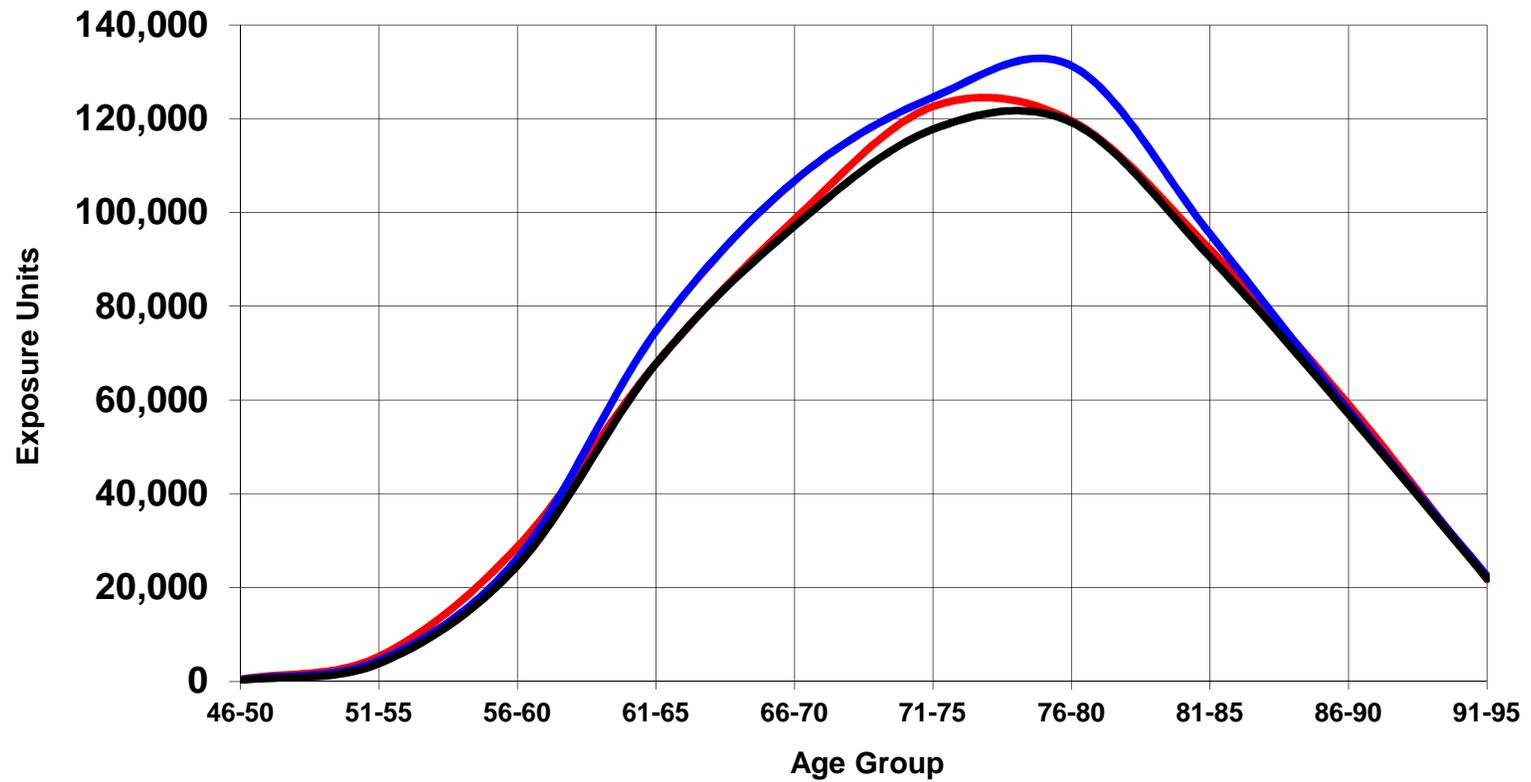
— General Govt and Political Sub — Teachers

Retired Exposure Units (Weighted)



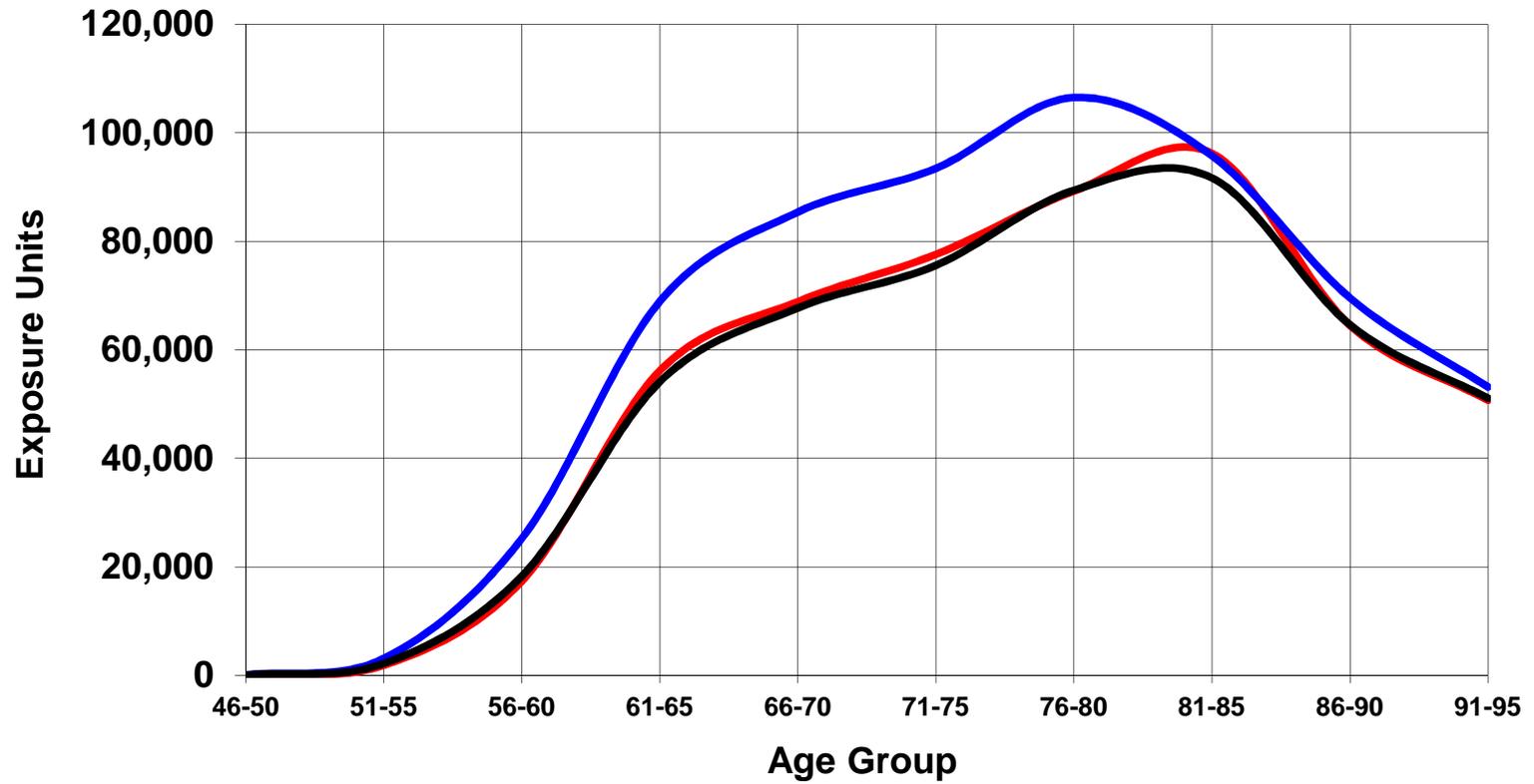
— General Govt and Political Sub — Teachers

General Government Post-Retirement Mortality



— Actual — Expected — Recommended

Teachers Post-Retirement Mortality



— Actual — Expected — Recommended

Recommendation: Post-Retirement Mortality

General State/Political Subdivisions

Male/Female:

Current — 2008 experience

Proposed — 2012 experience

(with 2-Year mortality projection)

Teachers

Male/Female:

Current — 2008 experience

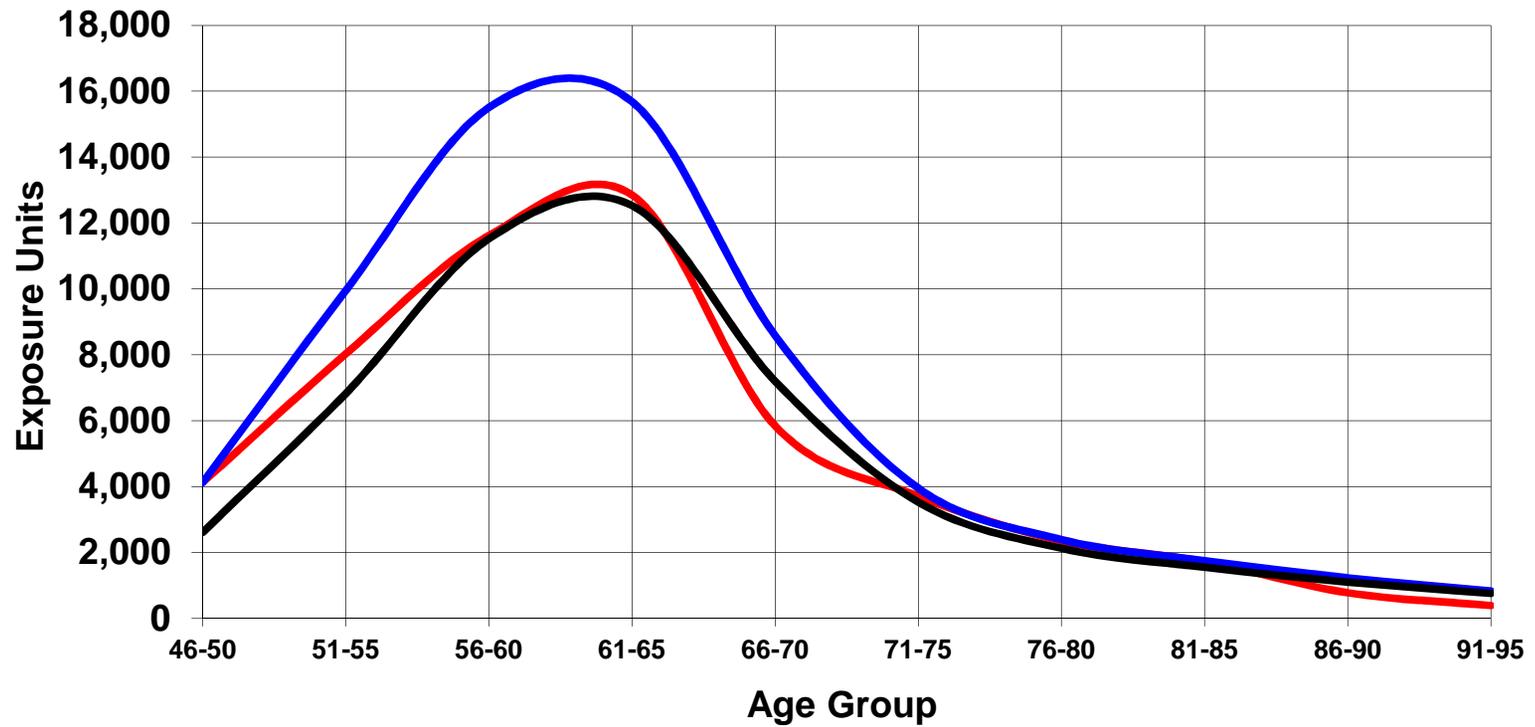
Proposed — 2012 experience

(with 2-Year mortality projection)

Additional Considerations: Post-Retirement Mortality

- Mortality improvements have continued
- Using only current mortality experience does not completely value future plan liabilities
- Alternatives:
 - Full projected mortality (not yet widely used)
 - Project post-retirement mortality for specific period (2 years) and continue to monitor

All Retirees Disability Mortality



— Actual — Expected — Recommended

Recommendation: Disability Mortality

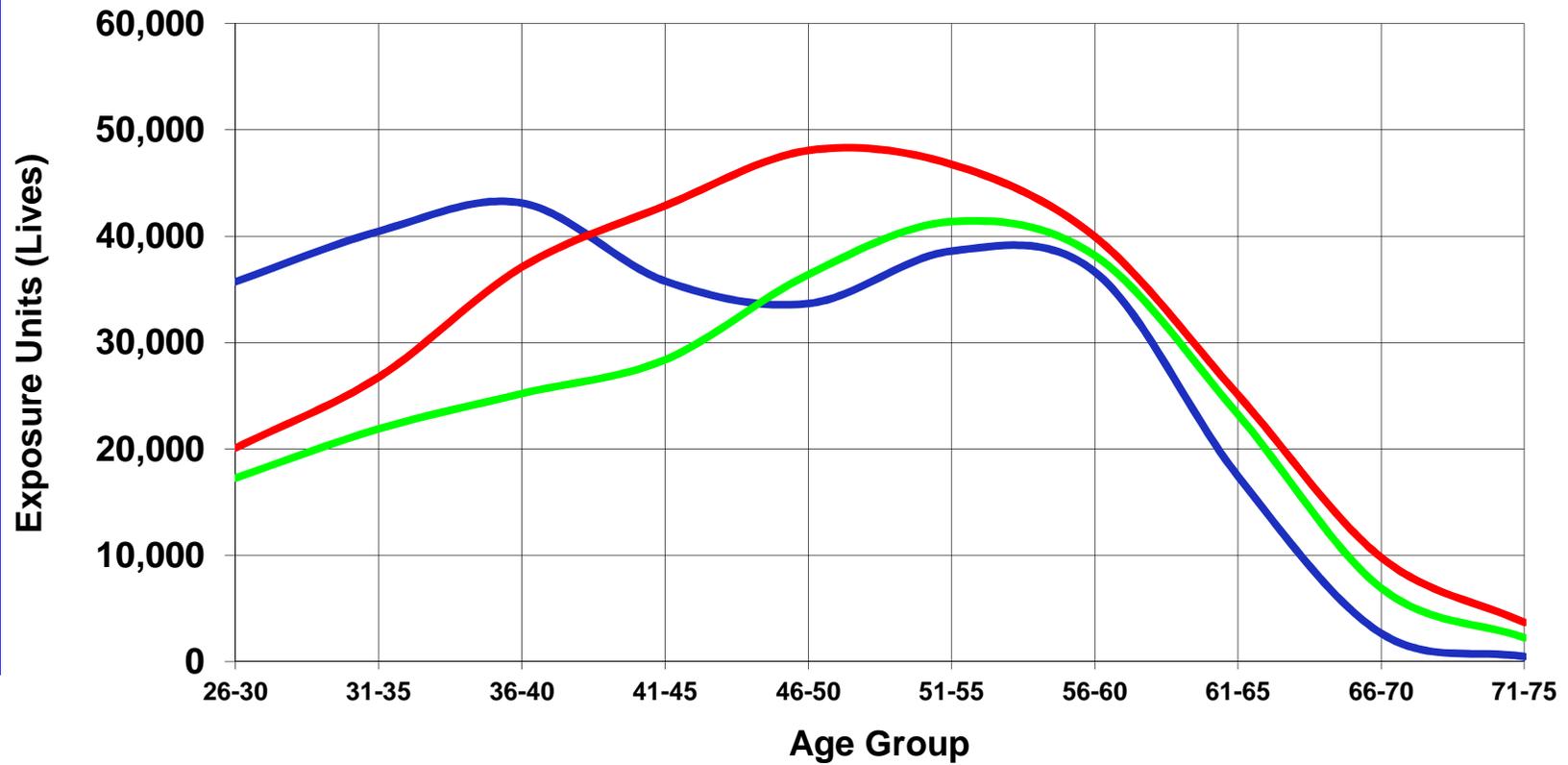
Teachers

Change to 110% of standard sex-distinct disability mortality table per RR 96-7 (no SS requirement)

General State/Political Subdivisions

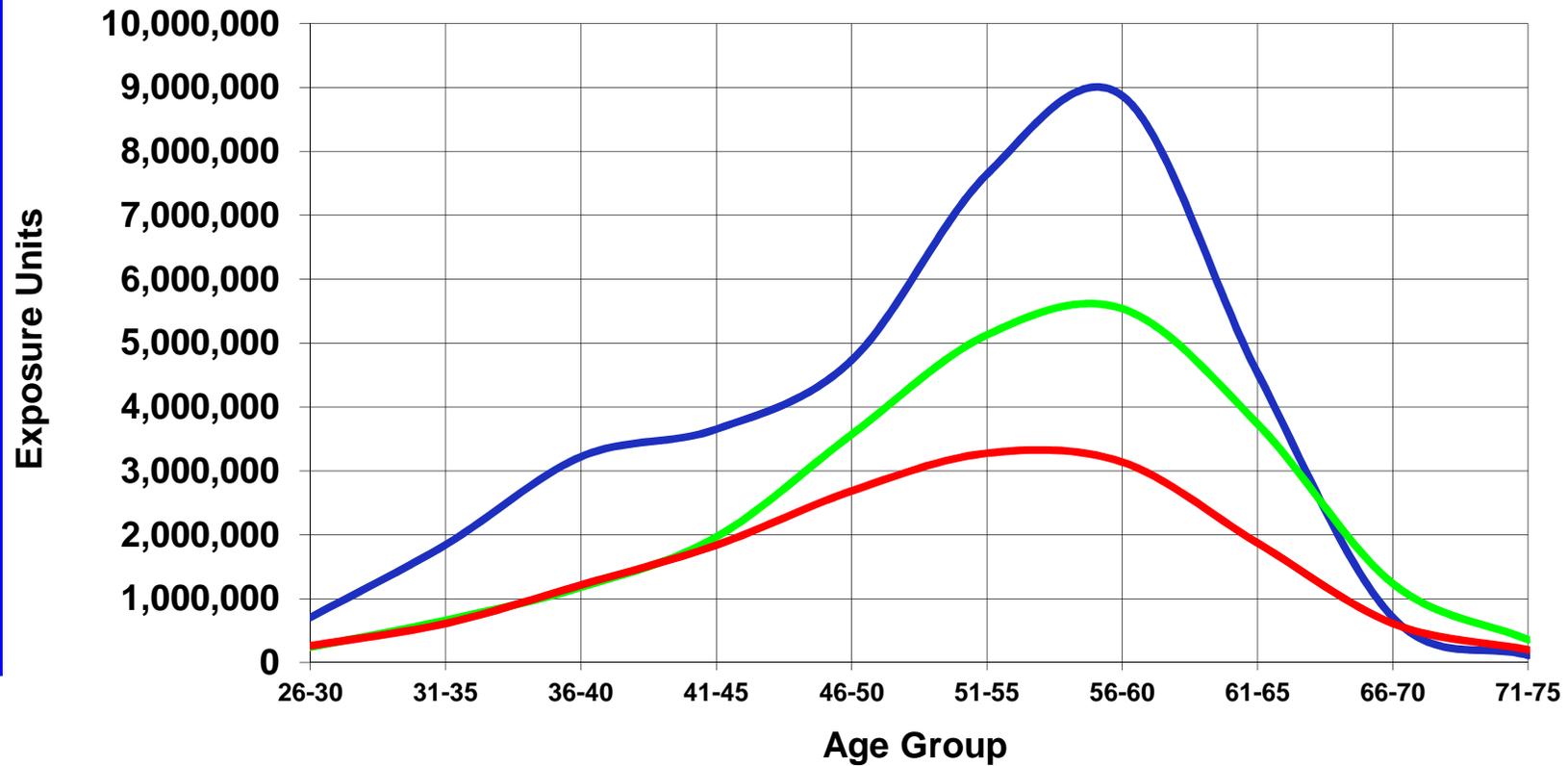
Change to 110% of standard sex-distinct disability mortality table per RR 96-7 (no SS requirement)

Active Employee Exposure Units (Unweighted)



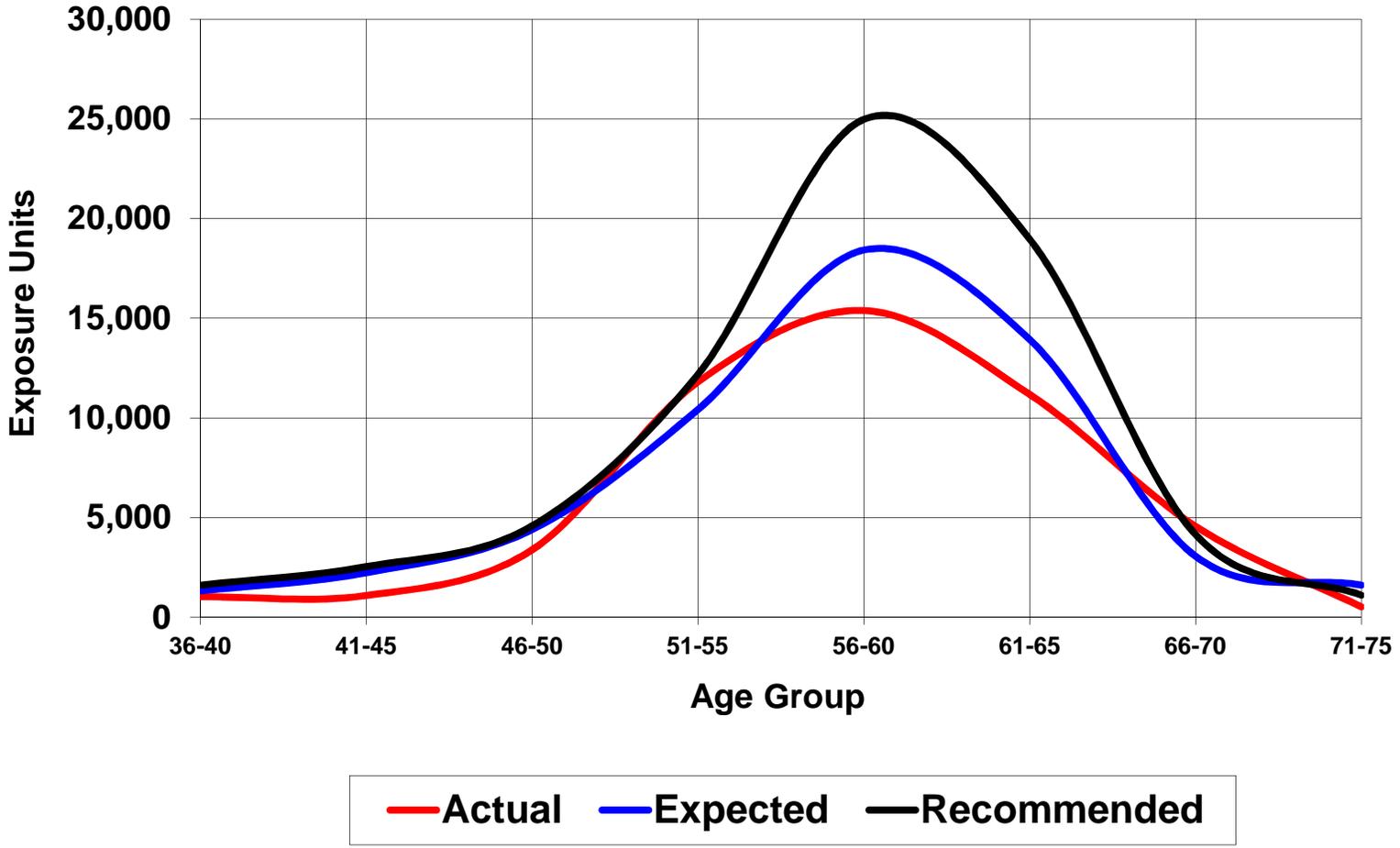
— Teachers — General Government — Polisub

Active Employee Exposure Units (Weighted)

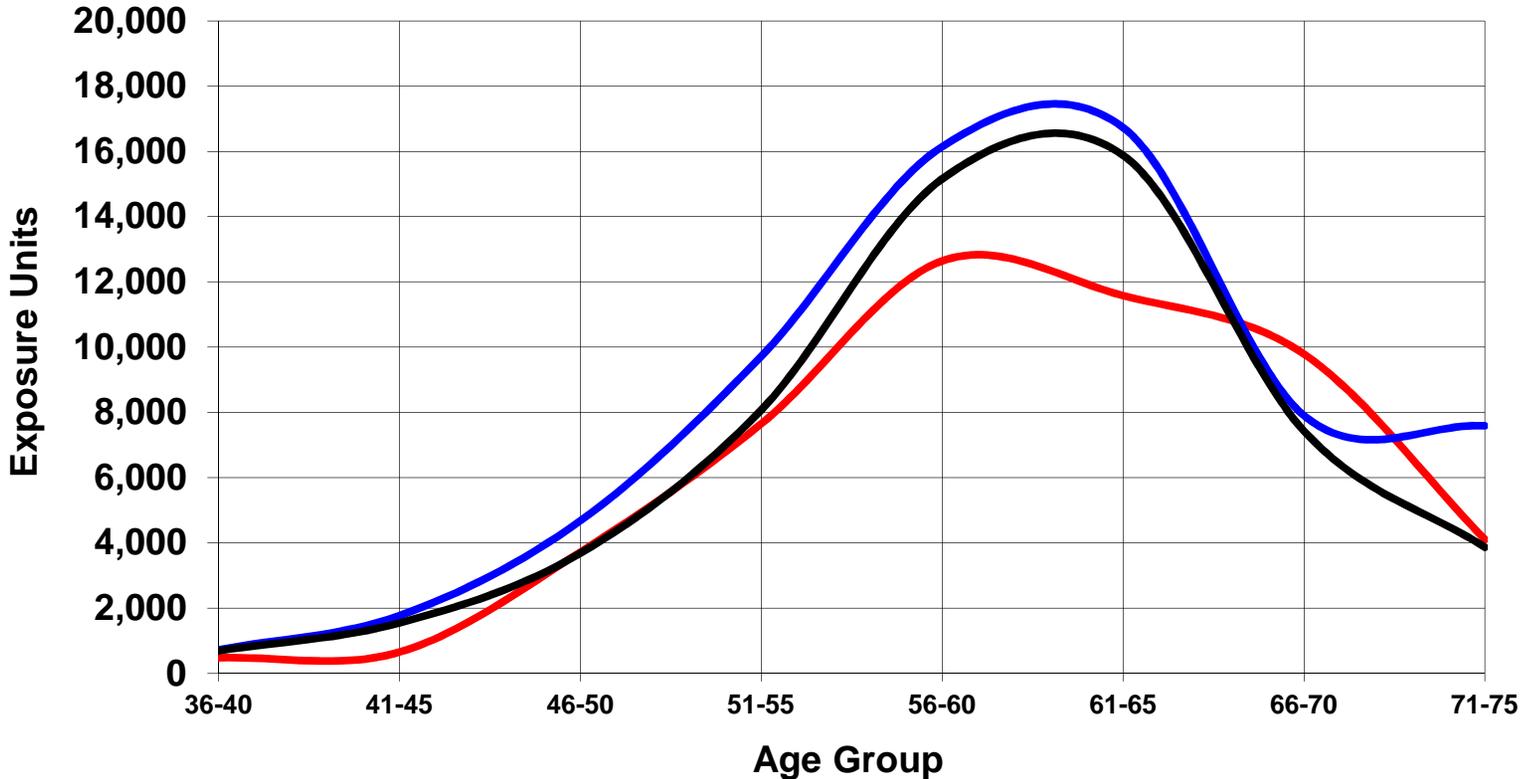


— Teachers — General Government — Polisub

Teachers Pre-retirement Mortality

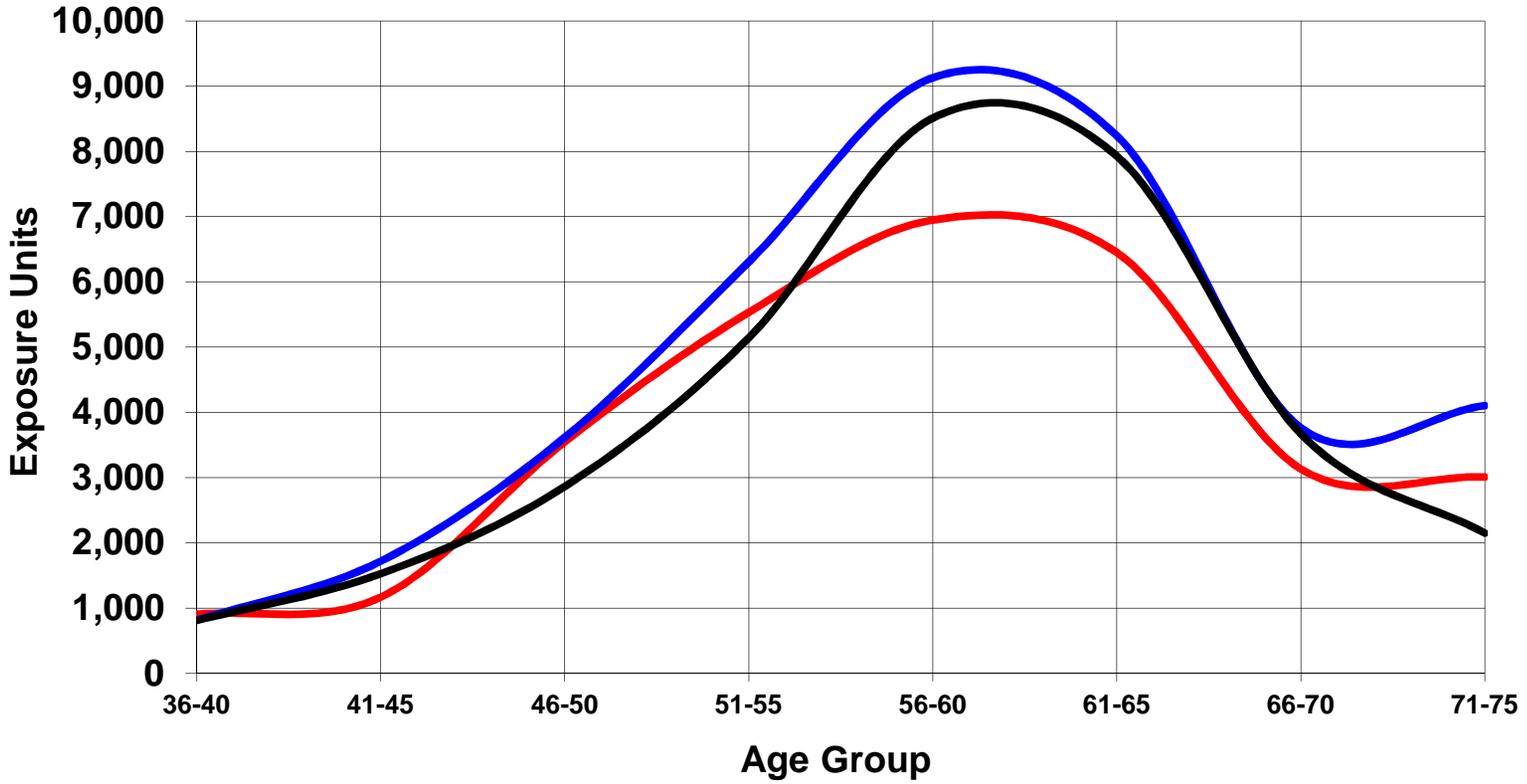


General State Pre-retirement Mortality



— Actual — Expected — Recommended

Political Subdivisions Pre-retirement Mortality



— Actual — Expected — Recommended

Recommendation: Pre-Retirement Mortality

Teachers

Male/Female: 2012 Static Non-Annuitant table published by the IRS for private sector plans (includes 15-year mortality projection)

General State/Political Subdivisions

Male/Female: 2012 Static Non-Annuitant table published by the IRS for private sector plans (includes 15-year mortality projection)



Other Active Assumptions

- Difficult economic environment between 2008 and 2012
- Economy likely impacted participant behaviors
- Certain data may not be credible for setting future assumptions
- No changes recommended for certain assumptions related to participant choice (turnover, retirement, etc.)

Recommendation: Disability Occurrence - No Change

Teachers

Blend of 2004 and 2008 experience

General State

Blend of 2004 and 2008 experience

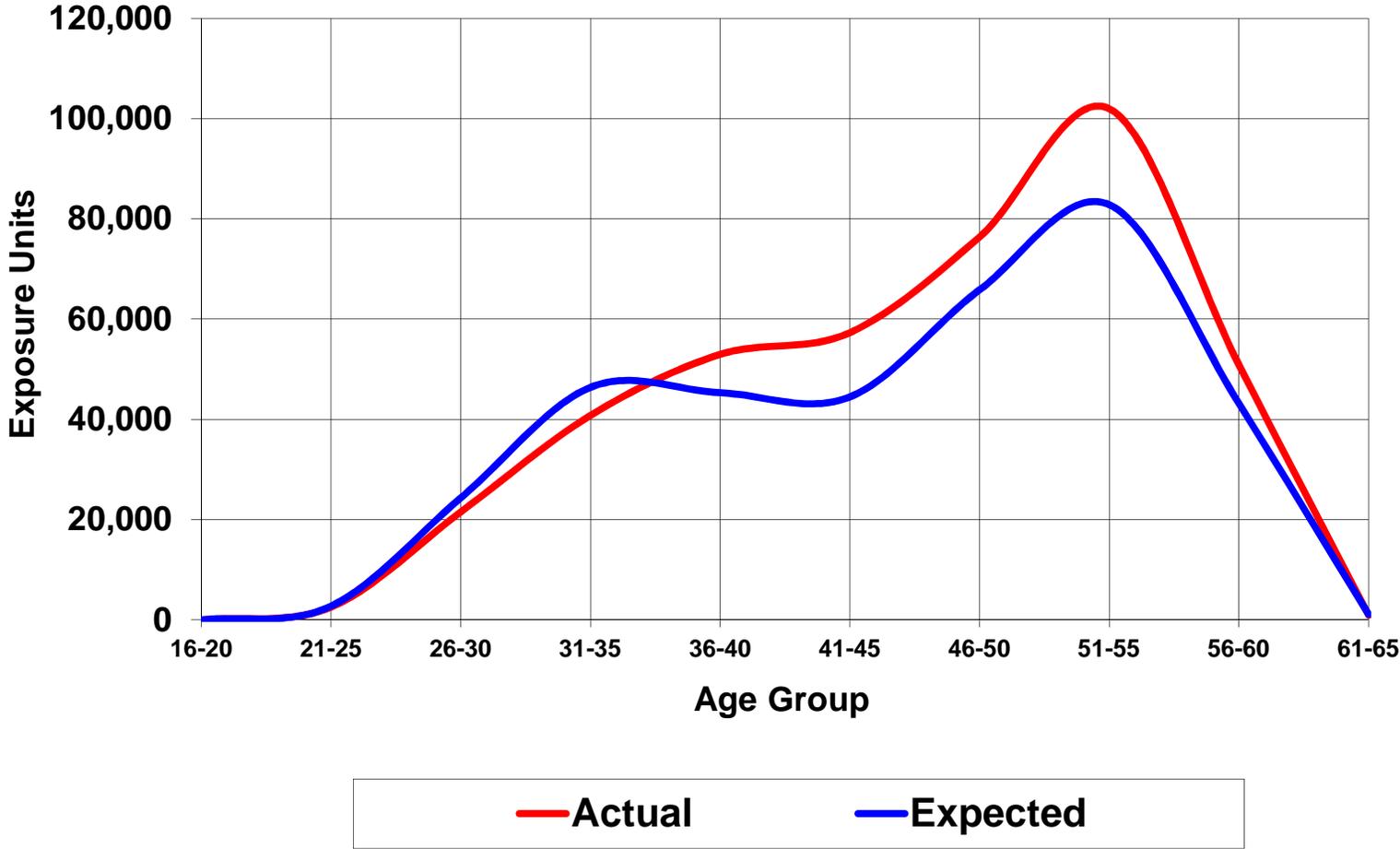
Political Subdivisions

Blend of 2004 and 2008 experience

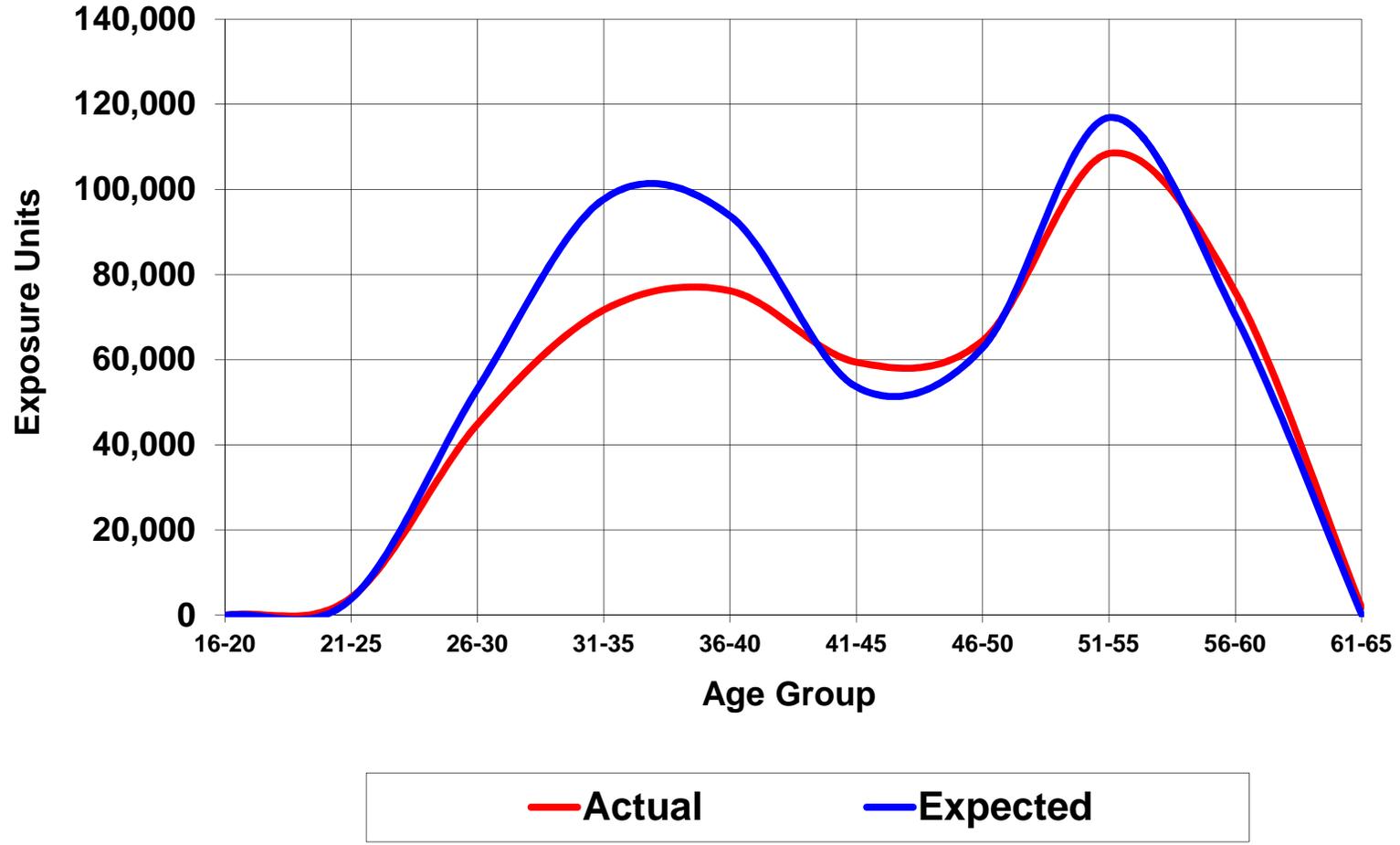
Turnover

- 1st year, 2nd year, and ultimate turnover assumptions used
- Distinction between retirement and withdrawal
 - Retirement (after service retirement age)
 - Turnover (all other)

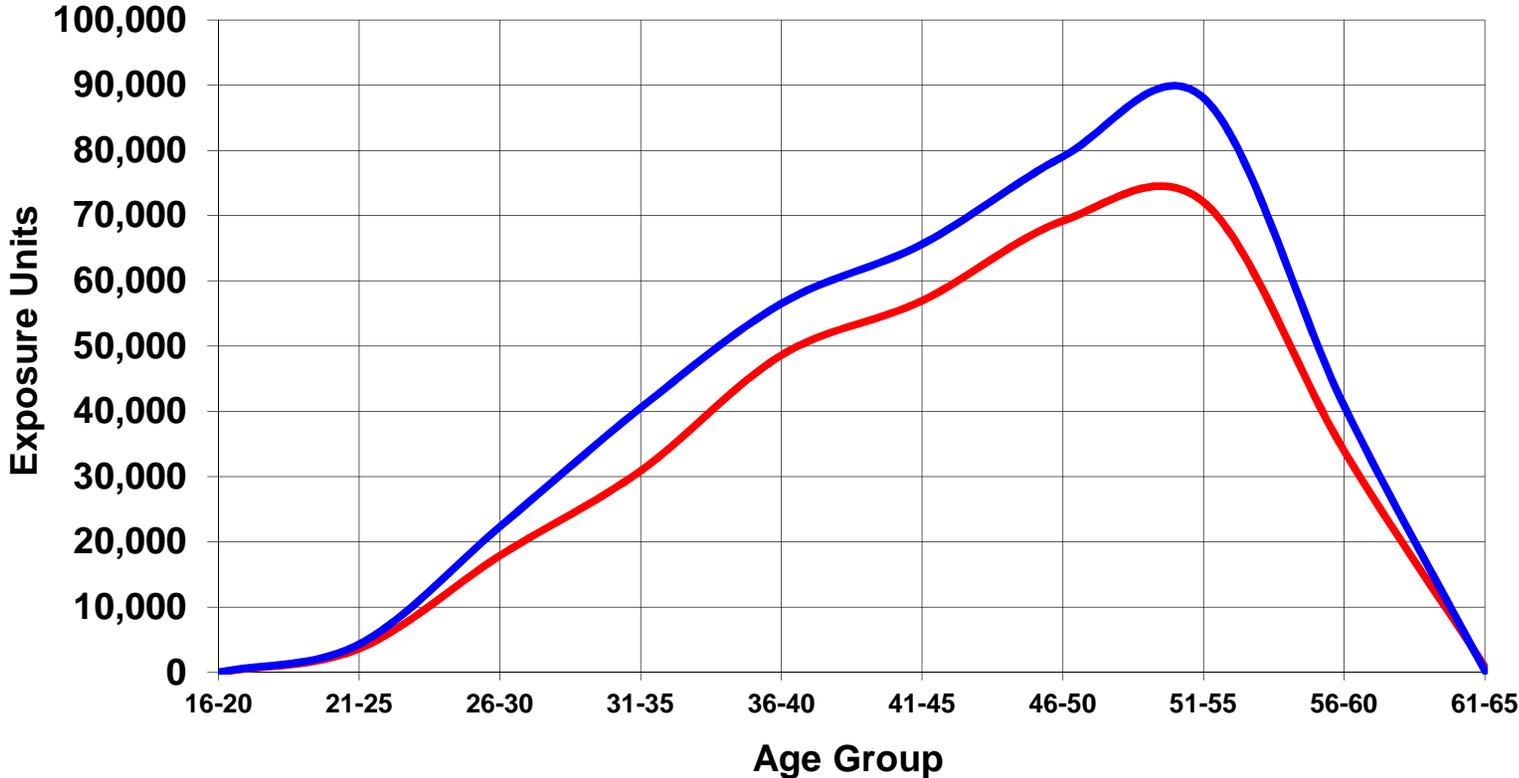
General State Ultimate Withdrawal



Teachers Ultimate Withdrawal



Political Subdivisions Ultimate Withdrawal



— Actual — Expected

Recommendation: Turnover – No Change

First and Second Year

All Groups - 2008 experience

Ultimate

General State –2008 experience

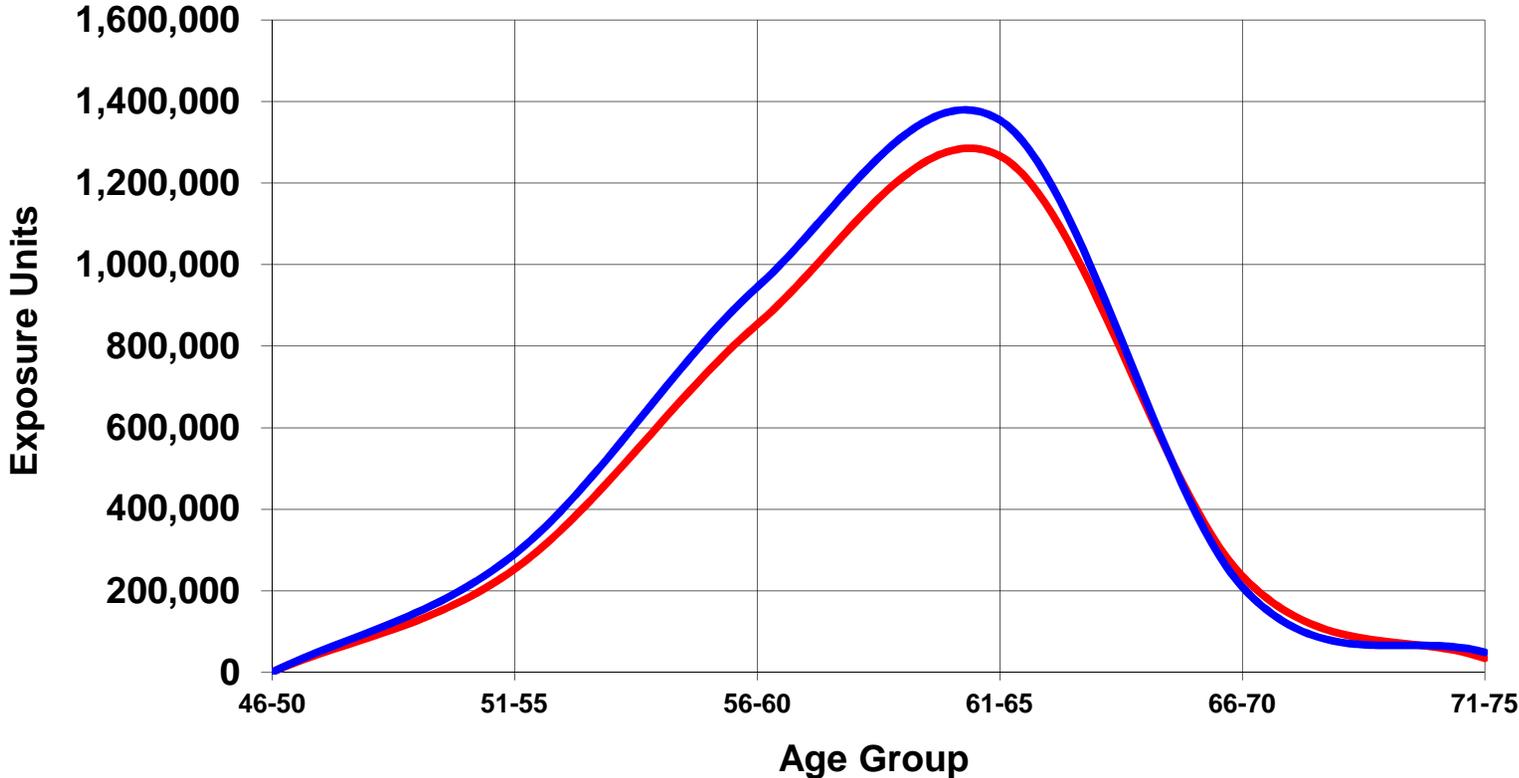
Teachers – 2008 experience

Political Subdivisions – Blend of 2004
and 2008 experience

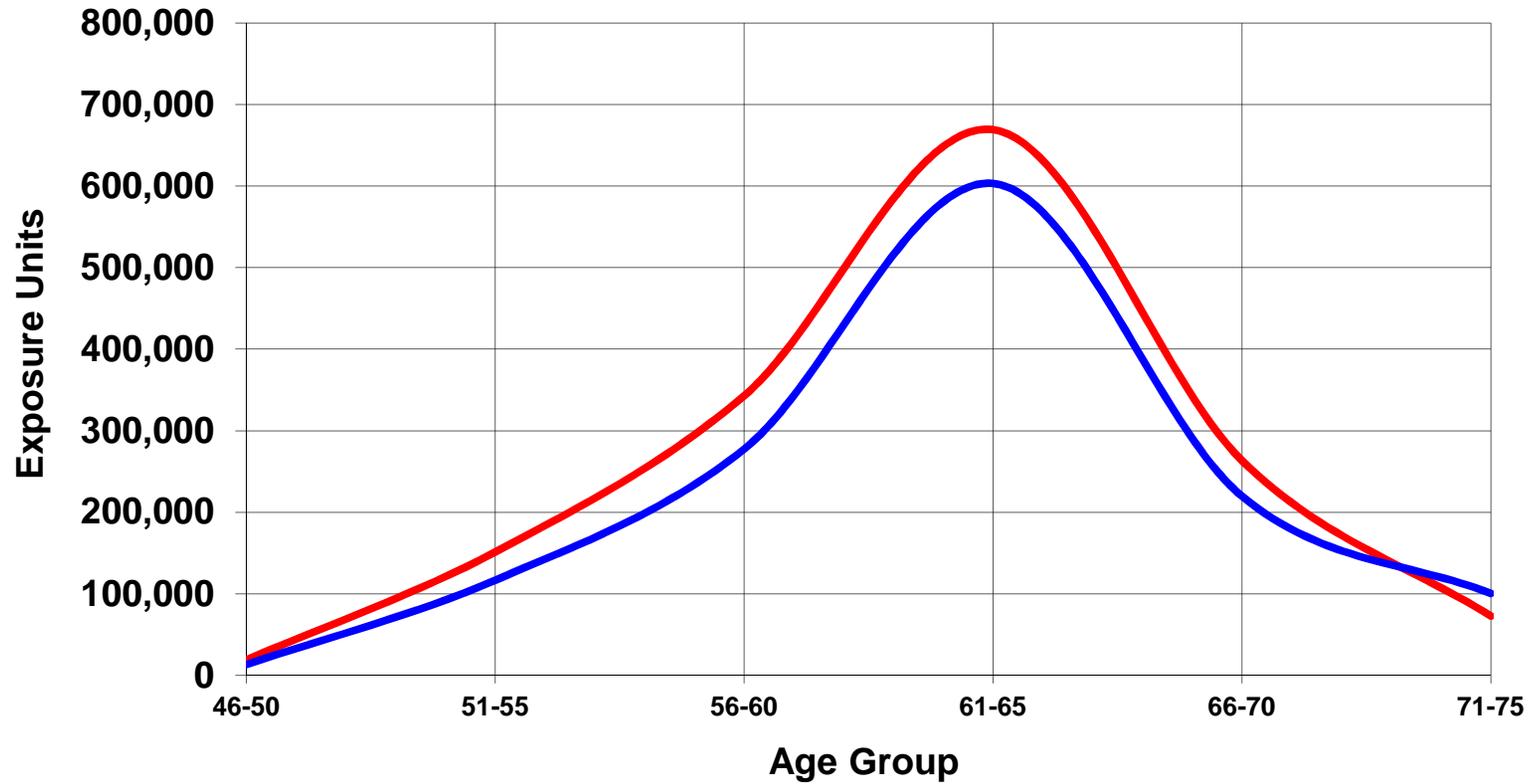
Retirement

- 2004 study observed a shift in retirement patterns (employees working longer)
- 2004 recommendation reflected only a portion of the observed change (monitored again in 2008)
- 2008 study showed continued shift in retirement patterns (employees working longer)
- 2012 data is not credible due to influences from the economy

Teachers Retirement

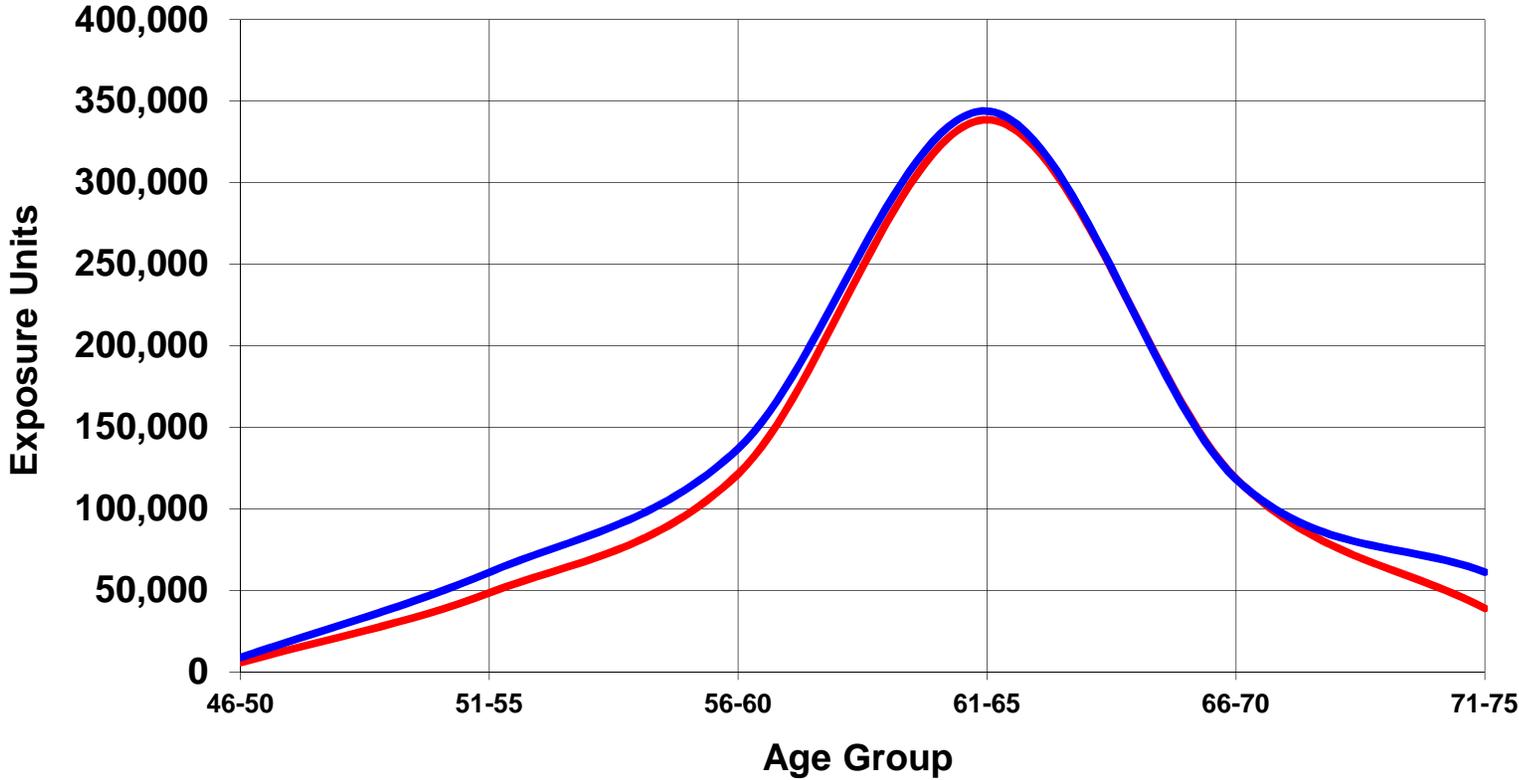


General State Retirement



— Actual — Expected

Political Subdivisions Retirement



— Actual — Expected

Recommendation: Retirement Age – no change

Teachers

2008 experience

Additional 8% after 15 years and 12.5% upon initial eligibility

General State

“Adjusted” 2008 experience

Additional 2% after 15 years and 7.5% upon initial eligibility

Political Subdivisions

2008 experience

Additional 2% after 15 years and 7.5% upon initial eligibility

Economic Assumptions

Inflation

- Component in all economic assumptions
- Background
 - 50 year average 4.1%
 - 30 year average 2.9%
 - 15 year average 2.4%
 - OASDI Trustees 1.8% - 3.8%
- Recommendation is 3.0% (No Change)

TCRS Retiree COLA

- Annual TCRS COLA limited to 3.0%
- Long-term inflation assumption of 3.0% is an average (some years less than 3.0% some years more)
- TCRS COLA may be less than 3.0% when inflation is low but will not exceed 3.0% when inflation is high
- Long-term COLA average will be less than 3.0%

TCRS Retiree COLA

- Inflation History (capped at 3.0% annually)
 - 50 year average 2.6%
 - 30 year average 2.5%
 - 15 year average 2.2%
- Recommendation is 2.5% (No Change)

Interest rate

- Components
 - Inflation
 - Risk free rate of return
 - Risk premium

TCRS Investment Return History

Fiscal Year	Rate of Return During Year	25-Year Average Annualized Rate of Return Through Given Year
2011-2012	5.6%	7.6%
2010-2011	19.6	7.8
2009-2010	10.2	8.1
2008-2009	(15.3)	8.7
2007-2008	(1.2)	9.3
2006-2007	13.2	10.7
2005-2006	6.9	10.4
2004-2005	7.3	10.2
2003-2004	9.3	10.3
2002-2003	4.9	10.2

TCRS Investment Policy

Asset Class	Minimum	Maximum	Target
Domestic Stocks	25%	50%	33%
Domestic Bonds	20%	60%	25%
Inflation Indexed Bonds	0%	15%	4%
Short-term Securities	0%	10%	1%
International Bonds	0%	10%	0%
International Stocks	5%	25%	17%
Emerging Markets Stocks*	0%	10%	5%
Private Equity & Strategic Lending	0%	10%	8%
Real Estate	0%	10%	7%

*Emerging Market Stocks are a subset of International Stocks; Maximum International Stocks and Emerging Market Stocks may not exceed 25%.

Historical Return

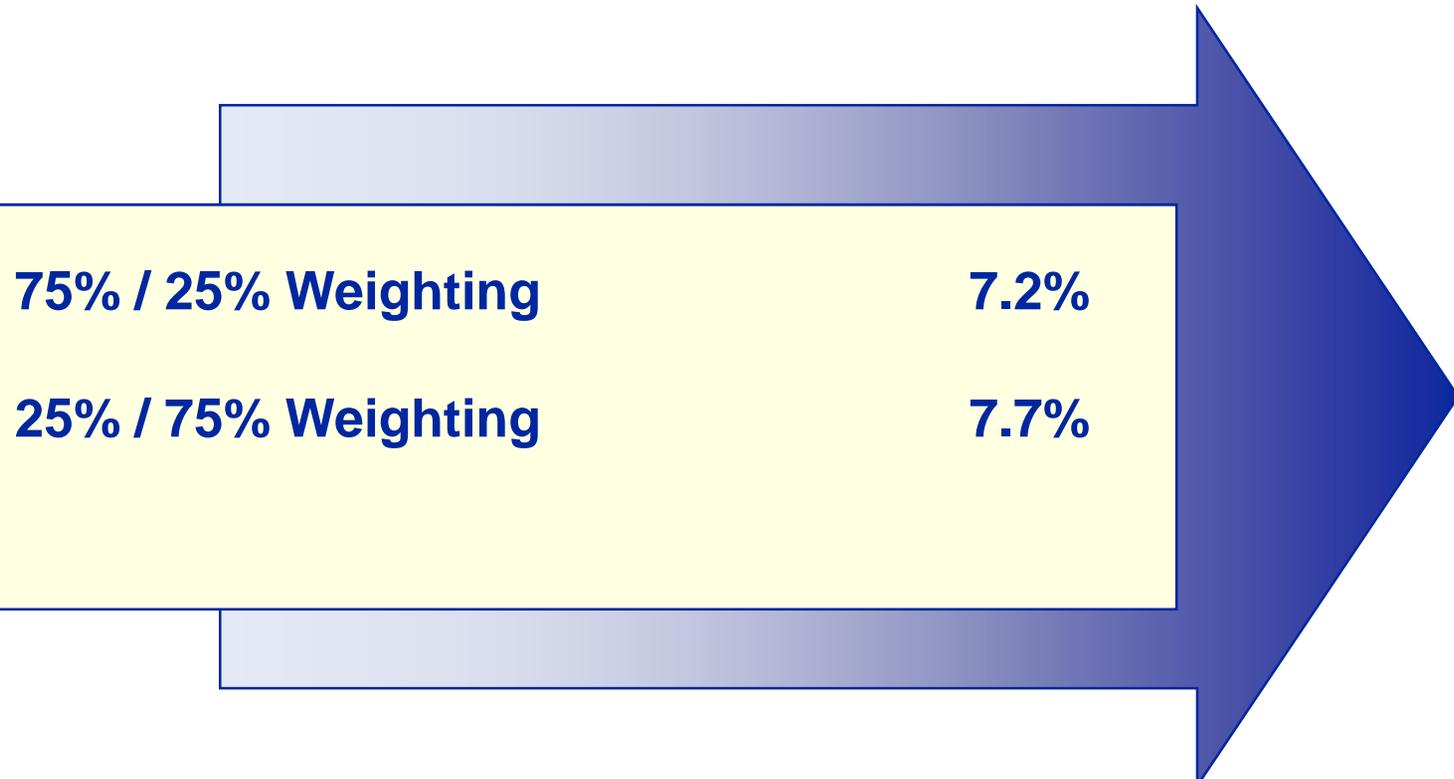
	Real Return	Assumed Inflation	Adjusted Total Return
TCRS Historical (25-Year)	4.68%	3.00%	7.68%
Historical Market Returns of Current Investment Policy (1926 -2012)	5.24	3.00	8.24
Average Historical Return	4.96%	3.00%	7.96%

Capital Market Projections

	<u>Real Return</u>	<u>Assumed Inflation</u>	<u>Adjusted Total Return</u>
Blended Capital Market Projections*	3.95%	3.00%	6.95%

*Capital market projections are typically forward looking for 10-15 years. A longer-term assumption is needed for the pension plan. Capital market projections were collected from various sources and averaged (SIS, Wells Fargo, Towers Perin, and JP Morgan).

Projected Composite Return Range



75% / 25% Weighting	7.2%
25% / 75% Weighting	7.7%

Interest Rate Comparison

- 2013 NASRA Issue Brief
 - Public Pension Plan Investment Return Assumptions
 - 118 public plans included
 - $i > 8.0\%$ 10% of plans
 - $i = 8.0\%$ 37% of plans
 - $7.5\% < i < 8.0\%$ 25% of plans
 - $i = 7.5\%$ 18% of plans
 - $i < 7.5\%$ 10% of plans
- TCRS
 - 7.5% interest rate assumption

Recommendation: Investment Return Rate

All Groups
7.5% per annum
(No Change)

Salary Scale

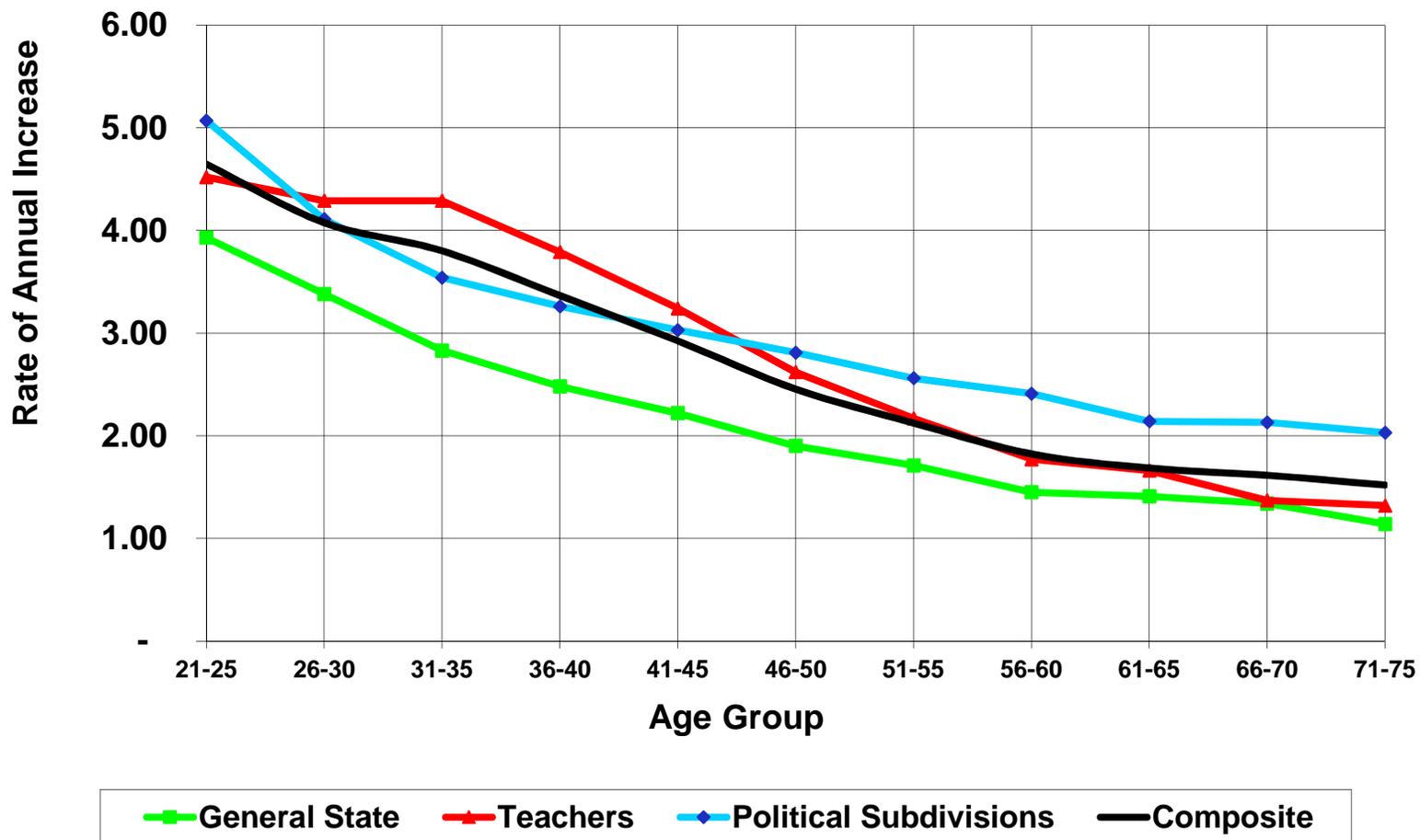
- Current rates generally between 4.5% and 5.0% for all groups
- Pattern declines with age
- Variance by year
- Related to inflation

Salary Scale

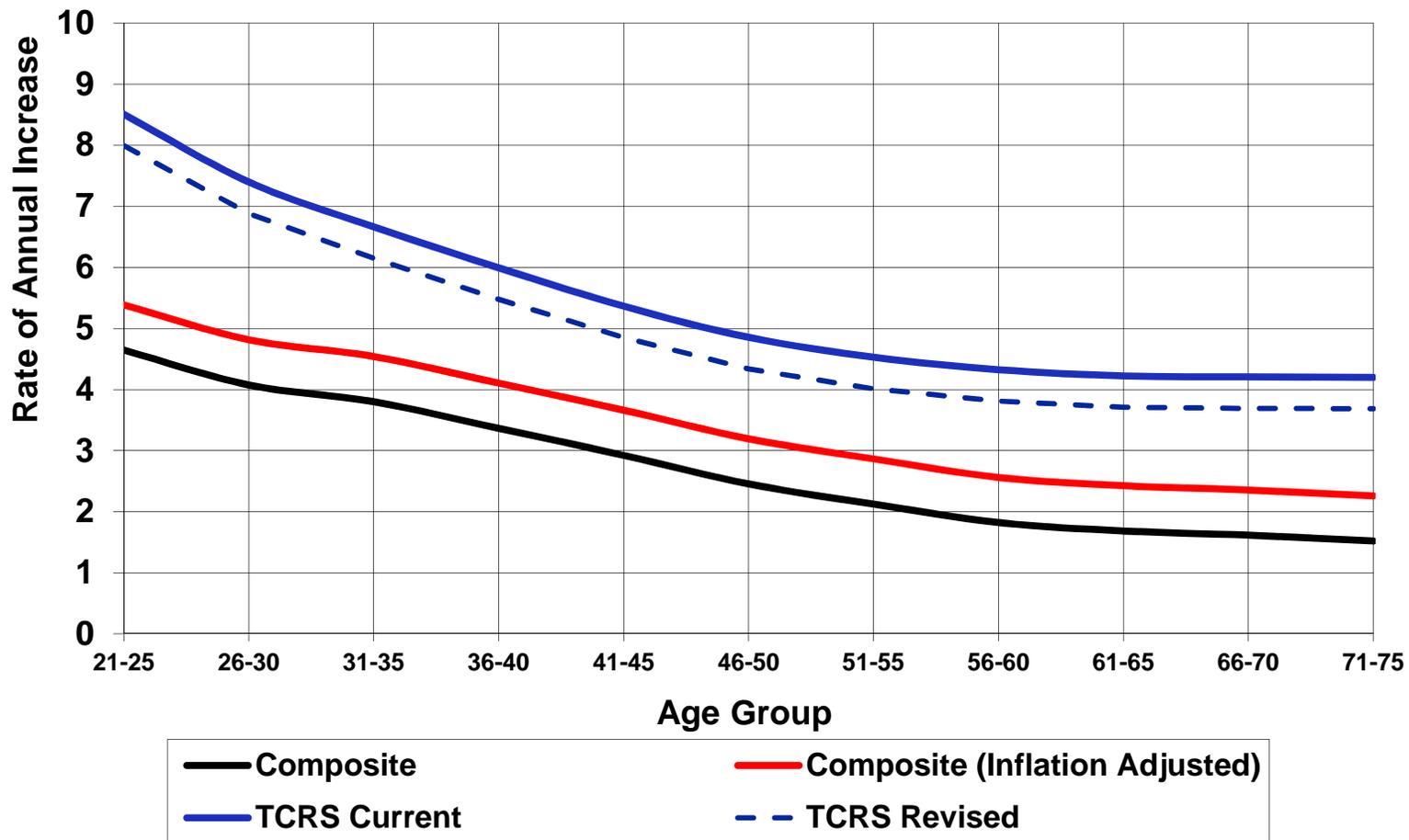
- Components include
 - Inflation 3.0%
 - Merit increase variable
 - National productivity increase 0.5%

TCRS

2008-2012 Average Salary Increase



TCRS Salary Scale



Recommendation: Salary Scale

All Groups Graded Scale

**9.0% at 20 to
3.7% at 70**

50 basis point drop from 2008 study.

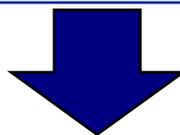
Reflects recent trends but more weight given to future expectations.

Social Security Wage Base

Related to inflation

Include national productivity gains

Generally 0.5% above inflation



Recommendation: 3.5% per annum
(Unchanged from 2008 Study)

Other Items

- New Hybrid Plan Effective 7/1/2014
 - Assumptions adopted with this study will be used for basis of new plan assumptions (with modifications as needed for retirement eligibility, projected mortality, etc.)
- TCRS Option Factors
 - Update to be performed based on new assumptions
 - Applicable to new Hybrid Plan and Legacy Plan