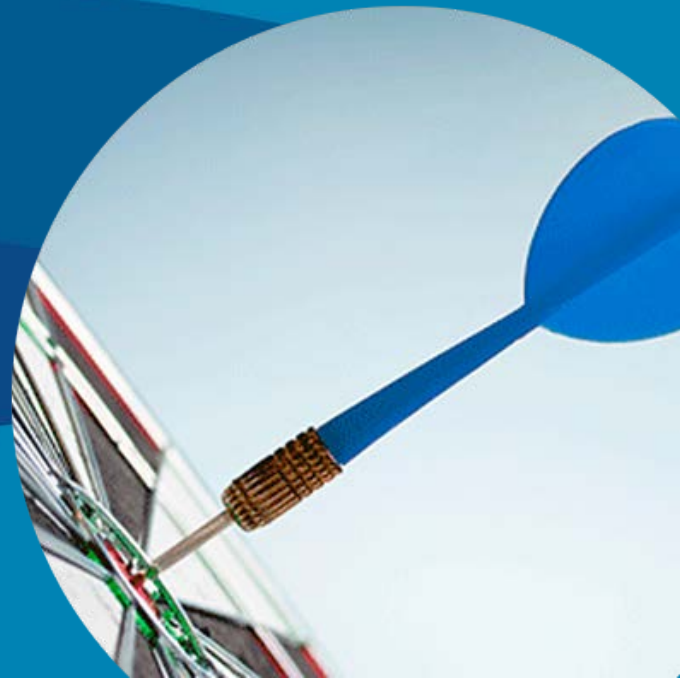


Bay County Employees' Retirement System

2011 – 2015 Experience Study
August 8, 2017



Agenda

- Background
- Demographic Assumptions
- Economic Assumptions
- Miscellaneous Assumptions/Methods
- Summary Results
- Conclusions

Background

- The Retirement System is a defined benefit plan
 - Benefits are defined in the statute
 - Benefits are paid at some future point in time when certain age and service requirements are met
- Actuary calculates the value of these benefits as of the valuation date
- Actuary must make assumptions about future events (investment return, wage inflation, withdrawal, disability, retirement, mortality, etc.)

Background

Primary Risk Areas

Demographic

Retirement

Withdrawal

Mortality

Disability

Economic

Price Inflation

Wage Inflation

Investment Return

Merit and Longevity

Background

- The assumptions must be reasonable individually and in the aggregate
- The assumptions should be reviewed periodically in light of recent plan experience and economic environment
- Understated liabilities/costs can lead to:
 - Inability to pay benefits when due, or
 - Sharp increases in required contributions in the future

Background

- Overstated liabilities/costs can lead to:
 - Benefit levels kept below the level that could be supported by the computed rate, or
 - Larger burden on the current generation of participants, employers and taxpayers
- A single set of assumptions is not suitable indefinitely
 - Things change, along with our understanding of things

Background

- Data was tabulated from the last five annual valuations.
- Generally, move rates about half way to observed rates over the most recent experience period.
- Philosophy: Don't overreact to results from any single experience period. It is better to make a series of small changes in the right direction, rather than a single large change that could turn out, with hindsight, to be very wrong.

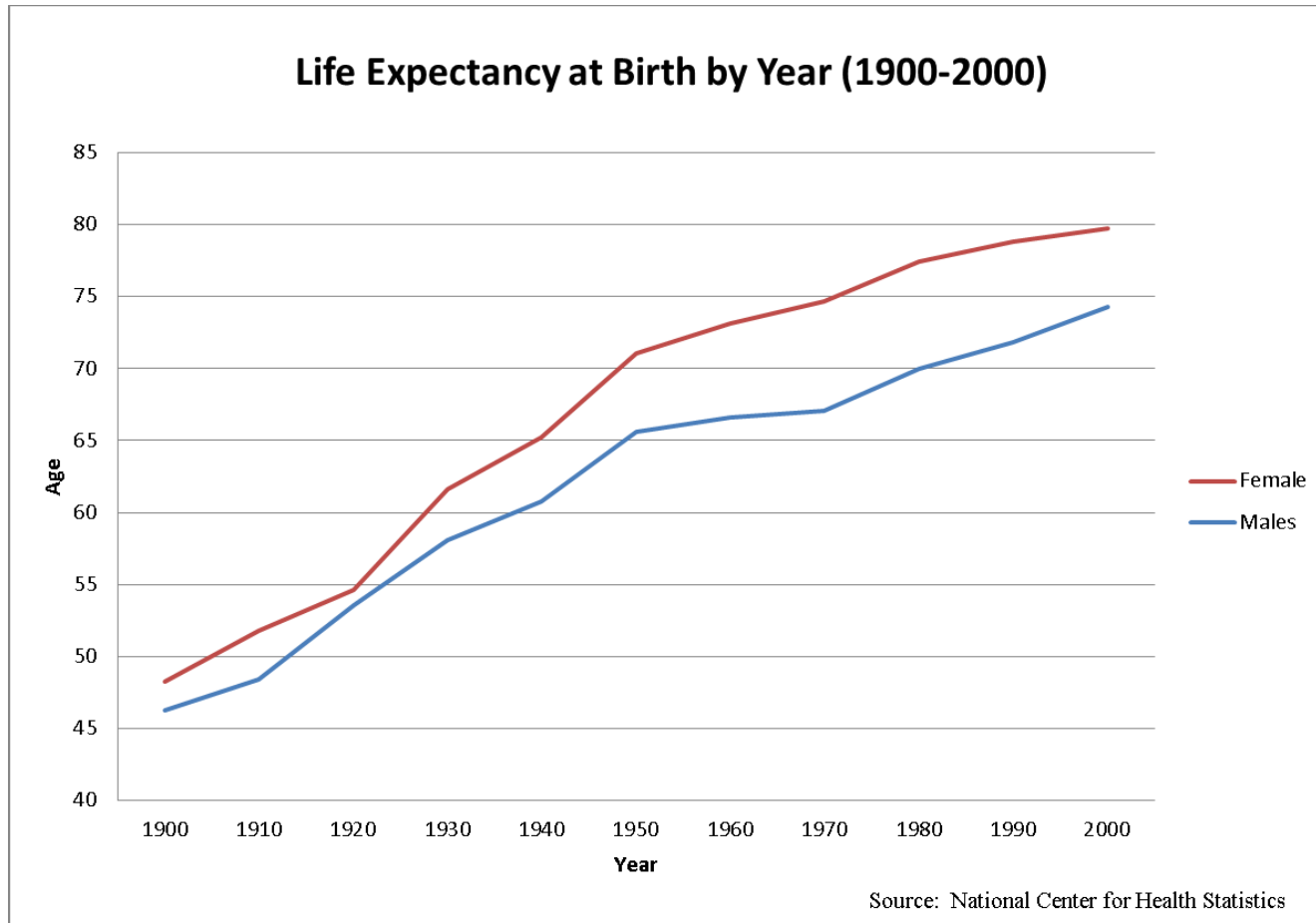
DEMOGRAPHIC ASSUMPTIONS

Mortality Discussion

Future Mortality Improvement

- Factors resulting in future mortality improvements
 - Persistent trend of last 100 years
 - Medical advances
 - Greater emphasis on disease management
 - Lifestyle changes
 - Higher education
- Factors resulting in leveling off of future mortality improvements
 - Diminishing returns on medical research
 - High cost or access to medical care
 - Possible emergence of new diseases
 - Obesity
 - Ultimate limits to human lifespan

Mortality Experience



Mortality Experience

- Why is it necessary to recognize future improvements in mortality?
 - Ensure adequate funding
 - Avoid liability losses
 - Need to comply with ASOPs
 - Failure to do so would shift costs to future generations

Mortality Experience

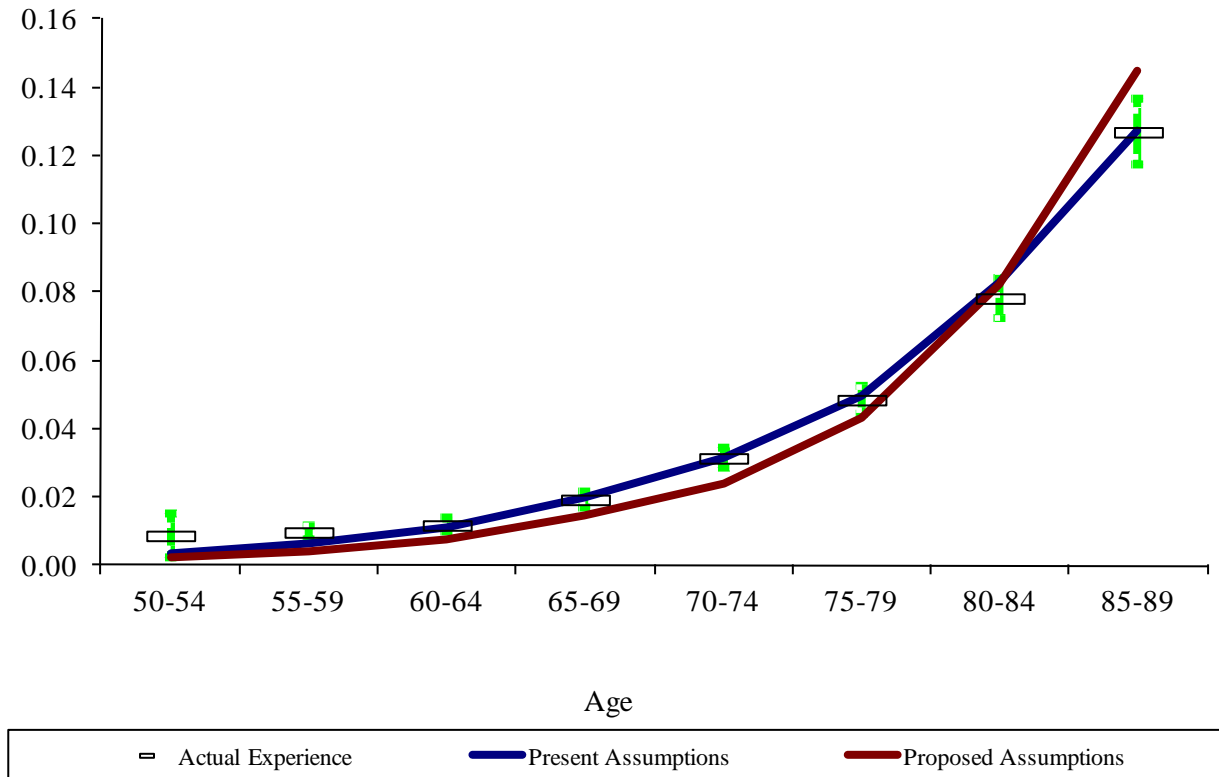
- Prior to last experience study, Actuarial Standards of Practice issued new guidance with regard to the mortality assumption
- Actuary must state provisions made for future mortality improvements
- Unlike other assumptions where we gradually adjust rates towards the actual experience, most demographers expect future mortality rates to continue to decrease (longer lives)
- Last experience study, we recommended a change to the most recent mortality table published by the SOA (RP-2000) projected 20 years with scale BB (x110% for males and females)

Mortality Experience

- October 2014: Society of Actuaries (SOA) released new RP-2014 mortality tables and MP-2014 projection scale
- Two methods to account for future improvements:
 - Static projection of improvement to some future year (one dimensional)
 - Fully generational table based on both age and year of birth (two dimensional)
- SOA (and actuarial community in general) strongly recommend ‘fully generational’ method
- So what does ‘fully generational’ look like?

Mortality Experience

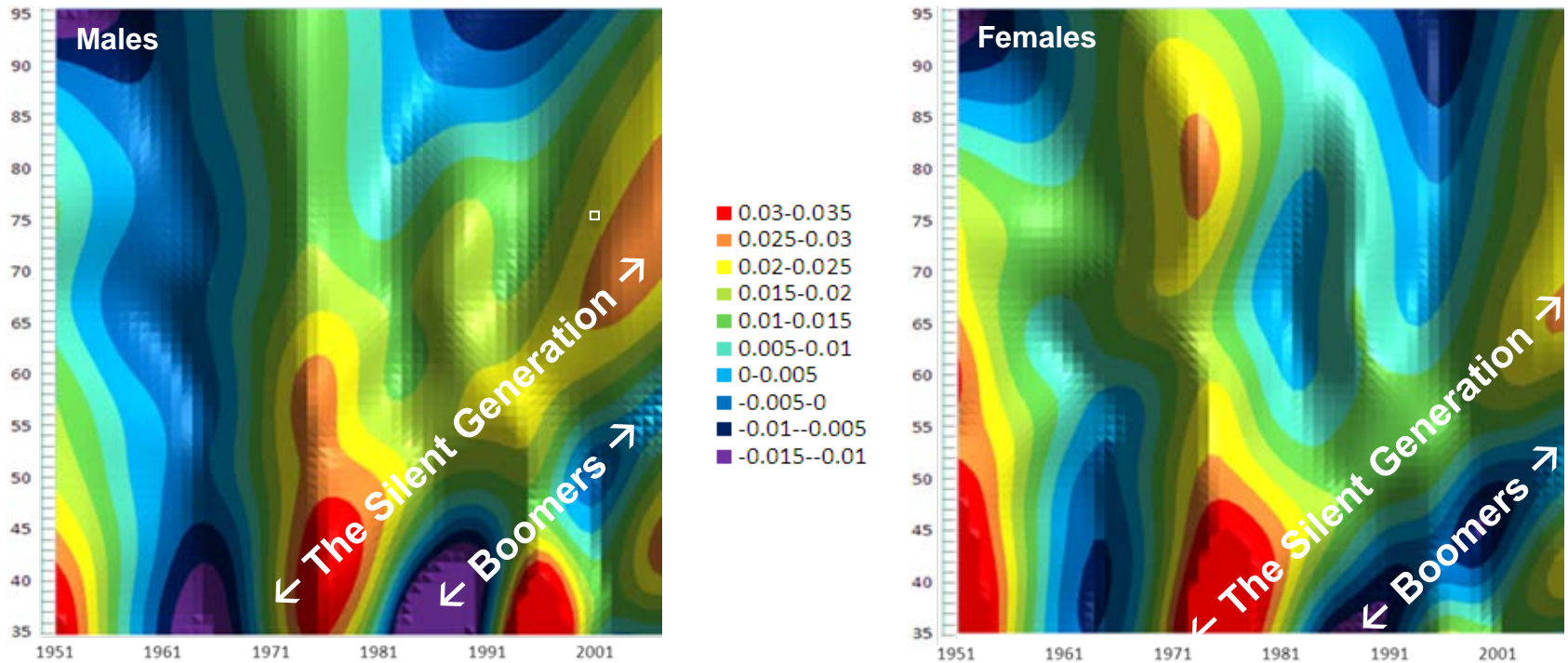
- Old tables looked like this:



Mortality Experience

New Tables look like this:

Historical MI rates developed from SSA mortality data

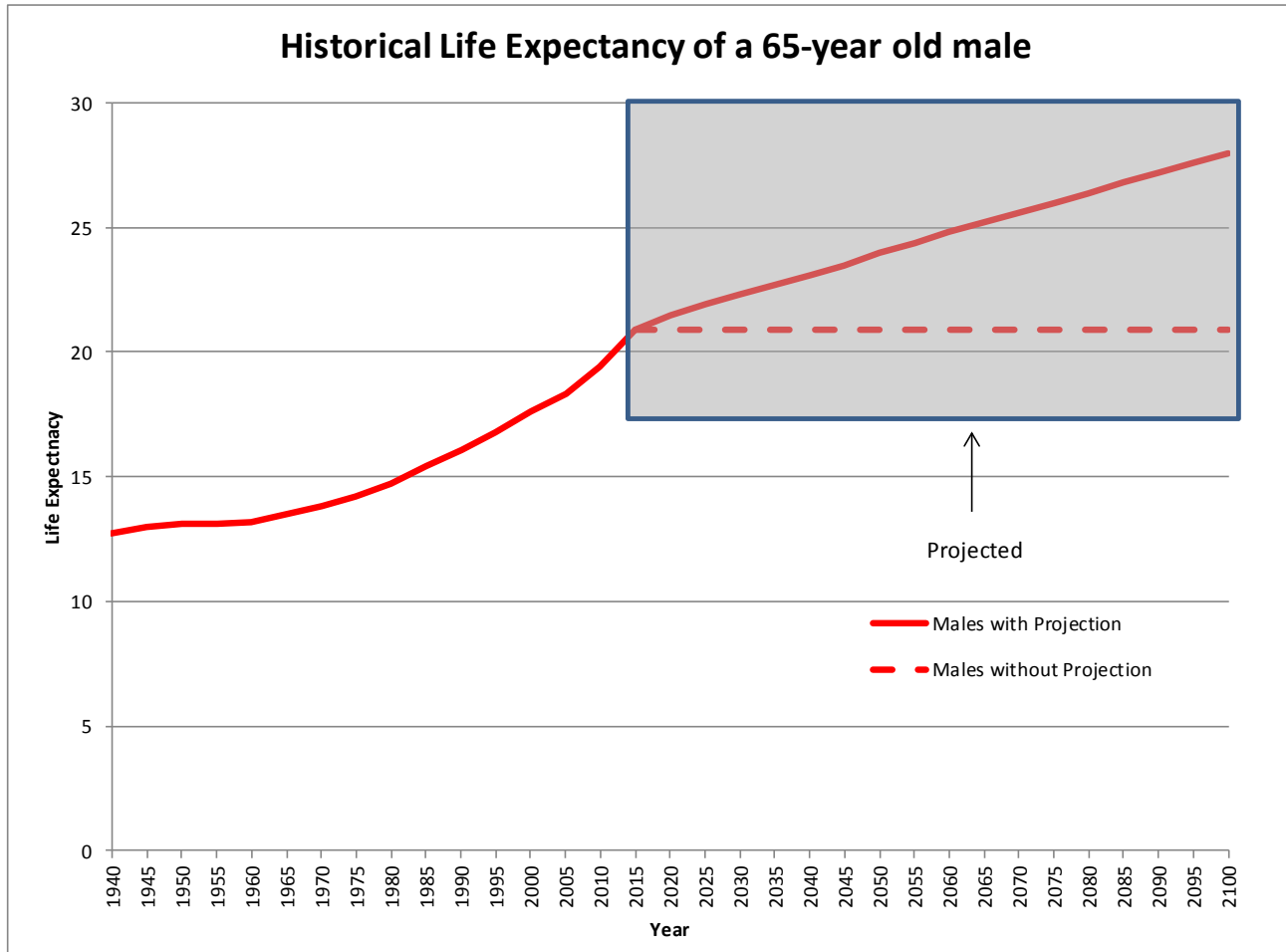


Mortality Experience – Example*

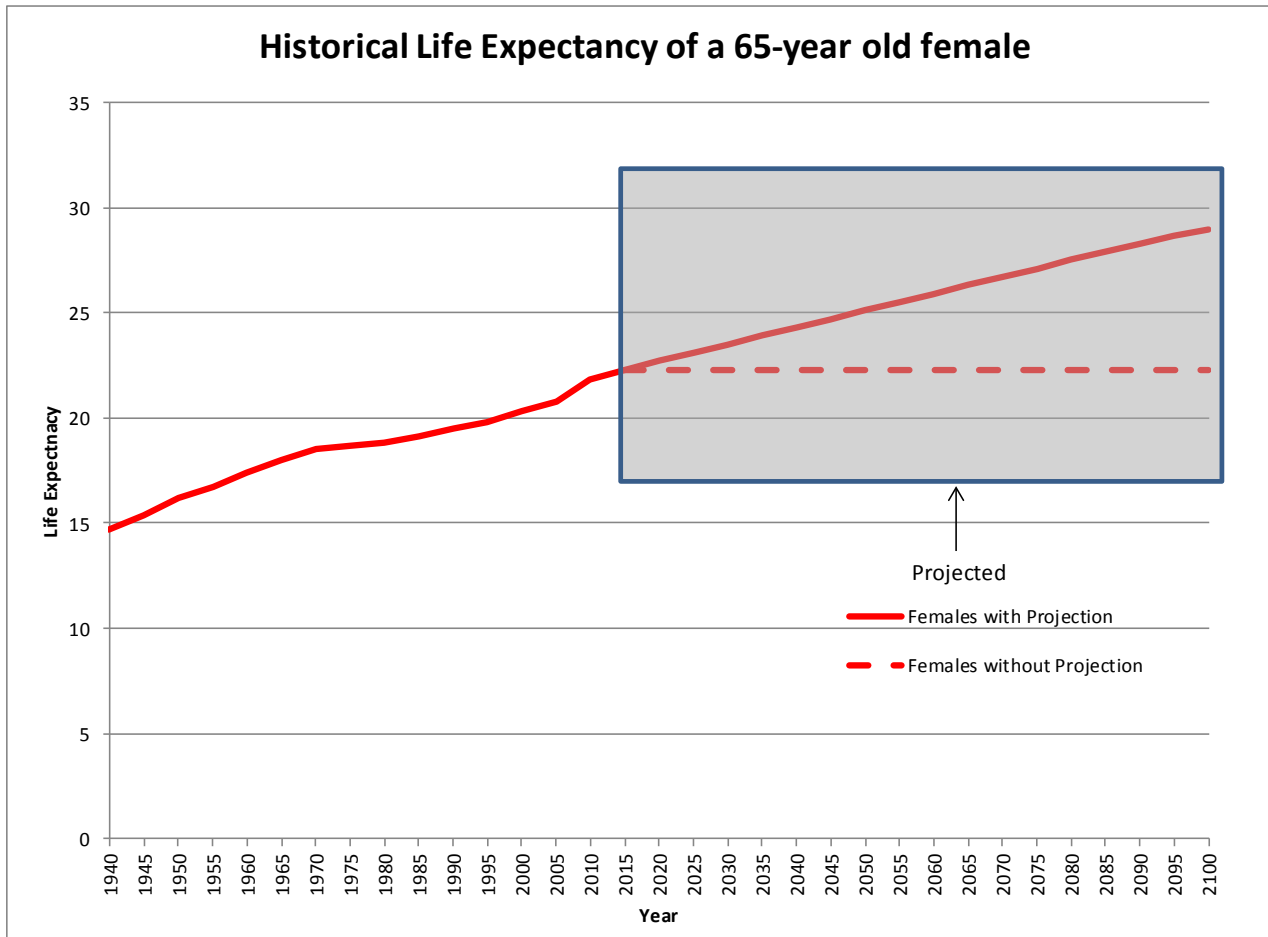
<u>Year of Retirement</u>	<u>Age</u>	Life Expectancy	
		<u>Male</u>	<u>Female</u>
2016	65	20.6	21.9
2026	65	21.2	22.5
2036	65	21.8	23.1
2046	65	22.4	23.7

** For illustrative purposes only.*

Mortality Improvement - Males



Mortality Improvement - Females



Summary of Demographic Experience

Assumption	Recommendation	Financial Impact
Turnover Rates	Higher Rates: BABH, MCF Lower Rates: DWS, Library	Decrease Increase
Disability Rates	Slightly Higher Rates	Increase
Retirement Rates	Higher Rates: Road Commission Lower Rates: General, Sheriff	Increase Decrease
Merit Increases	Lower Rates	Decrease
Mortality Rates	Lower Rates	Increase

ECONOMIC ASSUMPTIONS

Current Economic Assumptions

Price Inflation	2.75%
Wage Inflation	3.50%
Net Investment Return	7.50%

Comments on Economic Assumption Selection

- We are not investment experts, we look at the following items:
 - Historical trends
 - Forward expectations of investment consultants
 - Comparison to other systems
- Typically a Board decision with input from investment experts and actuary
- Actuary must comply with Actuarial Standards of Practice

Economic Assumptions – ASOP No. 27

- Guidance regarding the selection of economic assumptions is governed by Actuarial Standard of Practice (ASOP) No. 27
- ASOP No. 27 requires that the selected economic assumptions be consistent with one another
- That is, the selection of the investment return assumption should be consistent with the selection of the wage inflation and price inflation assumptions

Economic Assumptions – ASOP No. 27

- New Standard eliminates reasonable range (25th to 75th percentile)
- Actuary must select reasonable assumptions (best estimate)
 - Appropriate for purposes of measurement
 - Reflects actuary's professional judgment
 - Takes into account historical and current data
 - Reflects actuary's estimate of future experience
 - Has no significant bias except when provision for adverse deviation

Inflation History

Year	Annual Increase in		
	Prices (CPI-U)	Wages (NAE)	Change
1961-1970	2.9%	4.4%	1.5%
1971-1980	8.1%	7.3%	-0.8%
1981-1990	4.5%	5.3%	0.8%
1991-2000	2.7%	4.3%	1.7%
2001-2010	2.3%	2.6%	0.3%
2011-2016	2.3%	2.4%	0.1%
5-Year Avg	1.5%	2.8%	1.3%
10-Year Avg	1.9%	2.6%	0.7%
20-Year Avg	2.2%	3.4%	1.2%
30-Year Avg	2.6%	3.5%	0.9%
50-Year Avg	4.1%	4.8%	0.7%

Price Inflation

- Long term averages approach 4%, while shorter term averages range between 1.5% and 2.5%
- Investment consulting firm's expectations vary between 2% and 2.75%
- 2017 annual report of the Social Security Trustees uses 2.60% as the intermediate assumption
- **Recommend adopting long term price inflation of 2.5% (does not directly impact liabilities)**

Wage Inflation

- Long term national averages approach 5% while shorter term averages approach 3%.
- Results in a reasonable range of 3.00% to 3.75%.
- Average salaries for Bay County have increased approximately 2.1% since 1996. Statistic may be distorted by growth in population and other factors.
- **Recommend lowering wage inflation assumption from 3.50% to 3.25%.**
 - Note: wage growth assumption impacts amortization factors. Lower wage growth assumption results in higher contribution rates for plans <100% funded.

Library amortization factor not impacted by change.

Investment Return – Capital Markets

- GRS does not provide investment advice
- Looked at capital market assumptions from eight different investment consulting firms
- Based on history but incorporates forward looking assumptions
- Shorter term horizon than actuaries
- May be a little biased by current conditions

Investment Return – Target Asset Allocation

Asset Class	Target
Domestic Equity	48%
International Equity	20%
Broad Market Fixed Income	21%
Real Estate	7%
Alternatives	4%
Cash	0%

Investment Return

Investment Consultant	Investment Consultant Expected Nominal Return	Investment Consultant Inflation Assumption	Expected Real Return (2)–(3)	Actuary Inflation Assumption	Expected Nominal Return (4)+(5)	Standard Deviation of Expected Return (1-Year)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	6.58%	2.50%	4.08%	2.50%	6.58%	12.99%
2	6.28%	2.00%	4.28%	2.50%	6.78%	11.77%
3	6.61%	2.26%	4.35%	2.50%	6.85%	11.07%
4	7.04%	2.25%	4.79%	2.50%	7.29%	13.83%
5	7.06%	2.00%	5.06%	2.50%	7.56%	12.41%
6	7.39%	2.20%	5.19%	2.50%	7.69%	13.54%
7	8.00%	2.75%	5.25%	2.50%	7.75%	12.96%
8	7.64%	2.25%	5.39%	2.50%	7.89%	12.77%
Average	7.07%	2.28%	4.80%	2.50%	7.30%	12.67%

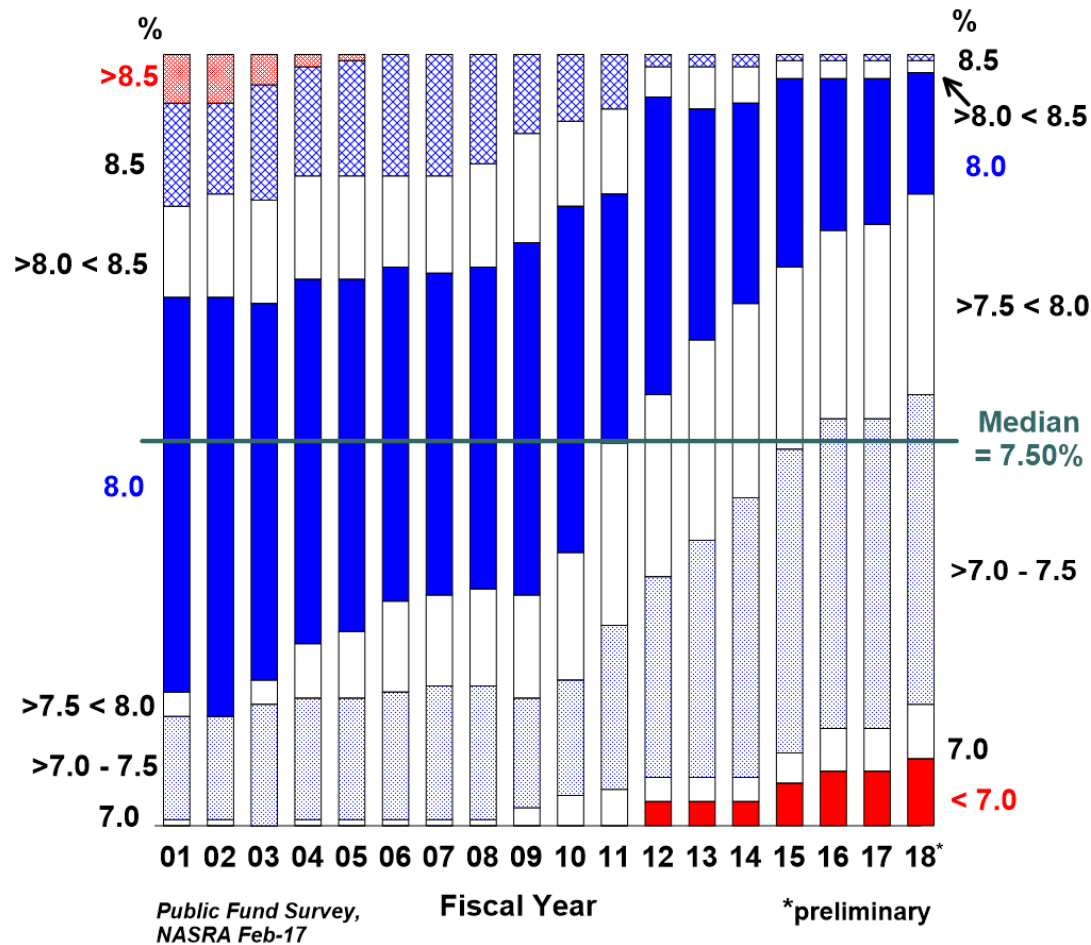
Investment Return

Investment Consultant	Distribution of 20-Year Average Geometric Net Nominal Return			Probability of exceeding 7.50%
	40th	50th	60th	
(1)	(2)	(3)	(4)	(5)
1	5.07%	5.80%	6.53%	27.79%
2	5.48%	6.14%	6.80%	30.16%
3	5.66%	6.28%	6.91%	31.10%
4	5.64%	6.41%	7.19%	36.14%
5	6.15%	6.85%	7.54%	40.62%
6	6.10%	6.85%	7.61%	41.43%
7	6.25%	6.98%	7.71%	42.78%
8	6.42%	7.14%	7.86%	44.91%
Average	5.85%	6.55%	7.27%	36.87%

Investment Return – Comments

- Consultants not in agreement
- Significant range of results
- Old ASOP standards produce reasonable range of 4.68%(25th percentile) to 8.46% (75th percentile)
- New ASOP standards require actuary to use best estimate:
 - 6.55% (geometric median)
 - 7.30% (arithmetic mean)

Public Pension Investment Return Assumptions: 2001 -2018



Investment Return Recommendation

- **Recommendation: lower the investment return assumption from 7.50% to 7.25%**
- Continue to monitor in light of performance and asset allocation changes

MISCELLANEOUS ASSUMPTIONS/METHODS

Miscellaneous Assumptions/Methods

Assumption/ Method	Recommendation	Plan Financial Impact
FAC Load – Sick Leave/Vacation	Lower Rates: General, MCF, Sheriff, Road Comm, BABH	Decrease
Administrative Expense Load	Increase from 0.4% to 0.5% of payroll	Increase
Early Retirement Reduction Factors	Update interest rate, mortality, adjust unisex mix	Minimal – actuarial equivalence
Option Factors	Update interest rate, mortality, adjust unisex mix	Minimal – actuarial equivalence
Amortization Policy	Lengthen period for amortizing overfunding credits to 20 years	Increase contribution for overfunded groups

5-Year Asset Smoothing Method is unchanged.

SUMMARY RESULTS

Summary Results – BCERS Excluding BABH

Hypothetical Results Based on 12/31/2015 valuation.

	Funded Percent (BCERS - Excluding BABH)			
	A	B	C	D
	Baseline	New Decrements with 3.25% Wage Inflation	New Decrements with 7.25% Interest and 3.25% Wage Inflation	New Decrements with 7.00% Interest and 3.25% Wage Inflation
General	116 %	115 %	112 %	109 %
DWS	82 %	81 %	79 %	77 %
Library	105 %	103 %	101 %	98 %
MCF	112 %	112 %	109 %	106 %
Sheriff	123 %	123 %	120 %	116 %
Road Commission	86 %	84 %	82 %	80 %
Total	109 %	108 %	105 %	103 %

Summary Results – BCERS Excluding BABH

Hypothetical
Results Based
on 12/31/2015
Valuation

	Employer Normal Cost Percent (BCERS - Excluding BABH)			
	A	B	C	D
	Baseline	New Decrements with 3.25% Wage Inflation	New Decrements with 7.25% Interest and 3.25% Wage Inflation	New Decrements with 7.00% Interest and 3.25% Wage Inflation
General	6.33 %	6.16 %	6.76 %	7.38 %
DWS	7.53 %	8.84 %	9.48 %	10.19 %
Library	\$117,940	\$135,287	\$145,212	\$156,026
MCF	6.63 %	5.92 %	6.51 %	7.17 %
Sheriff	10.05 %	9.61 %	10.52 %	11.49 %
Road Commission	10.17 %	10.22 %	11.07 %	11.97 %
Total	\$2,852,172	\$2,776,105	\$3,032,130	\$3,306,107

	Employer Contribution Rate (BCERS - Excluding BABH)			
	A	B	C	D
	Baseline	New Decrements with 3.25% Wage Inflation	New Decrements with 7.25% Interest and 3.25% Wage Inflation	New Decrements with 7.00% Interest and 3.25% Wage Inflation
General	0.00 %	0.00 %	1.75 %	3.77 %
DWS	12.83 %	14.66 %	16.01 %	17.42 %
Library	\$57,008	\$108,827	\$146,889	\$182,398
MCF	0.27 %	1.96 %	3.67 %	5.44 %
Sheriff	0.00 %	0.00 %	0.92 %	3.66 %
Road Commission	19.19 %	20.46 %	22.76 %	25.09 %
Total	\$1,088,320	\$1,411,895	\$2,068,841	\$2,855,883

Summary Results - BABH

Hypothetical Results Based on 12/31/2015 Valuation

	BABH			
	A	B	C	D
	Baseline	New Decrements with 3.25% Wage Inflation	New Decrements with 7.25% Interest and 3.25% Wage Inflation	New Decrements with 7.00% Interest and 3.25% Wage Inflation
Funded Percent	96 %	95 %	93 %	90 %
Employer Normal Cost Percent	7.47 %	7.28 %	7.88 %	8.55 %
Unfunded Accrued Liability ERIP*	1.28 %	1.30 %	1.28 %	1.27 %
Employer Contribution Rate	8.95 %	9.09 %	10.55 %	12.07 %

* Unfunded accrued liability associated with the Early Retirement Incentive Program (ERIP).

CONCLUSIONS

Conclusions

- GRS recommends adopting new assumptions for the December 31, 2016 valuations
 - Will first impact contribution rates for 2018
- Option factors and early retirement reduction factors usually revised to correspond to new interest and mortality assumptions
 - To allow time for administrative changes, adopt for retirements on or after January 1, 2019
 - Recommend legal counsel review any such change

Disclaimers

- This presentation is intended to be used in conjunction with the Experience Study report issued on August 1, 2017. This presentation should not be relied on for any purpose other than the purpose described in the report.
- This presentation shall not be construed to provide tax advice, legal advice or investment advice.

ACKNOWLEDGEMENT

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