



# Experience Study Overview

**Matt Smith, FCA, EA, MAAA**  
**State Actuary**



**Office of the State Actuary**

*"Securing tomorrow's pensions today."*

**July 25, 2007**

# Today's Presentation

---

- What is an experience study?
- Why do we do them?
- How do we do them?
- Next steps



# What is an Experience Study?

---

- Compares “actual to expected” experience over the study period
- Two types
  - Demographic
  - Economic
- Experience study period
  - A “look back” period
  - Five to six years for demographic
  - Thirty-plus years for economic



## Why do we do Them?

---

- Ensure actuarial assumptions remain reasonable
- What is a reasonable assumption?
  - Expected to appropriately model contingency being measured
  - Not anticipated to produce significant cumulative actuarial gains or losses over measurement period
- Reasonable assumptions and methods produce reasonable and adequate contribution rates



# Two Types of Assumptions

---

- Economic
  - Estimate amount of future pension payments
  - Mostly independent of underlying plan design
- Demographic
  - Estimate timing of future pension payments
  - “Plan population” and “plan design” specific



# Current Assumptions

---

## Economic

- Rate of investment return
- Rate of inflation
- Rate of general salary increases
- Growth in system membership (for amortizing the Plan 1 UAAL)
- All prescribed in statute

## Demographic

- Retirement
- Mortality
- Termination from employment
- Disability
- Election of optional forms of benefit payment
- Other non-economic assumptions
- Not prescribed in statute



# Selecting Economic Assumptions

---

1. Identify components, evaluate relevant data
2. Develop “best-estimate” range
3. Select specific estimate within range
4. Review all assumptions for consistency



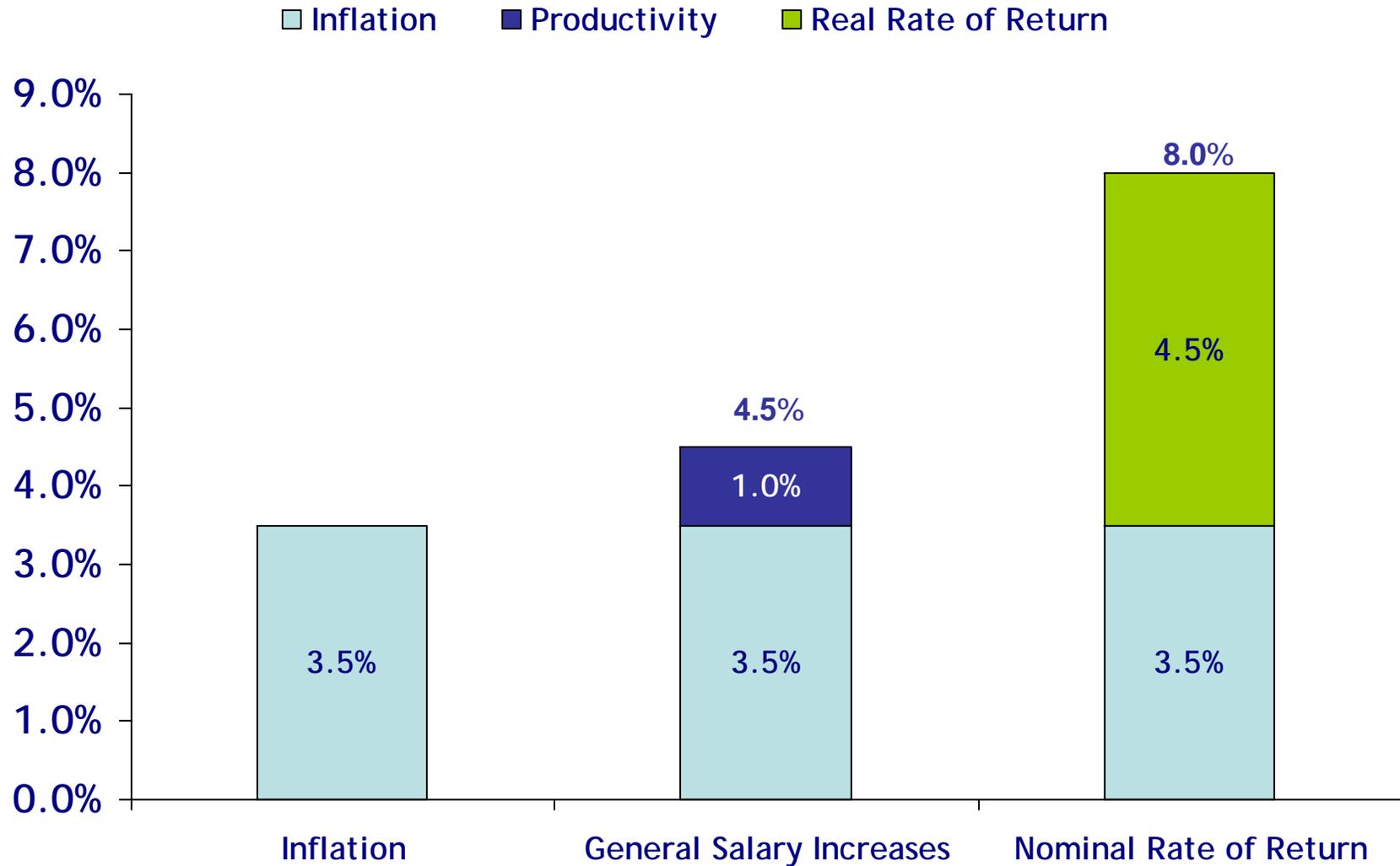
# Building Block Approach

---

- Start with inflation
- Inflation is a component of nominal rate of return and general salary increase assumptions



# Building Block Example - Current Assumptions



## Best Estimate Range

---

“The narrowest range within which the actuary reasonably anticipates that the actual results, compounded over the measurement period, are more likely than not to fall”



# Measurement Period

---

- Period after valuation date during which an assumption will apply for a given measurement
- Forward looking
- Typically, very long-term



## “More Likely Than Not”

---

- Output from a probability distribution function ranges from 0 to 1
- Median is the 50<sup>th</sup> percentile of the distribution
- Range from the 25<sup>th</sup> to the 75<sup>th</sup> percentile is called the “inter-quartile” range
- More likely than not, the results will fall within the inter-quartile range



## Best Estimate Range - Example

---

- Rate of return = [7%, 9%]
- Inflation = [2%, 5%]



## Selecting A Specific Estimate

---

- Ultimately, single-point estimate selected for each assumption
- Median is reasonable, but its selection is not required



## A Set of Economic Assumptions

---

- Review individual assumptions first
- Then review entire set of assumptions for reasonableness, consistency
- For example, lowering the inflation assumption, but not adjusting the general salary increase or rate of return assumptions could produce inconsistent economic assumptions



## Recap - Economic Assumptions

---

- Actuaries use professional judgment to estimate future economic outcomes based on past experience and future expectations
- An actuary's best estimate assumption is typically represented by a range
- Ultimately, actuary selects a single point estimate from the range for each assumption
- Entire set of economic assumptions should be consistent



# Selecting Demographic Assumptions

---

1. Inventory existing assumptions
2. Consider relevant “assumption universe” and specific considerations for each assumption
3. Select assumption format
4. Review other considerations
5. Select the specific assumption
6. Evaluate reasonableness



# Existing Demographic Assumptions

---

- Retirement
- Mortality
- Termination from employment
- Disability
- Election of optional forms of benefit payment
- Other non-economic assumptions



# What is the Assumption Universe?

---

- A universe of possible options an actuary might reasonably use for the specific assumption
- Examples
  - National experience tables and studies
  - Plan specific experience data and tables
- OSA has over 30 years of plan specific experience data
- Experience is incorporated in our current demographic assumptions
  - That is why the look-back period is shorter for our demographic studies in Washington



# Example of Plan Specific Experience Data (1995-2000)

Age	Actual	Current Assumption		New Assumption	
		Expected	Ratio	Expected	Ratio
-54	3	6	50%	4	75%
55-59	13	16	81%	11	118%
60-64	19	31	61%	22	86%
65-69	28	54	52%	41	68%
70-74	69	73	95%	60	115%
75-79	64	68	94%	59	108%
80-84	51	46	111%	42	121%
85-89	19	22	86%	22	86%
90-94	8	6	133%	7	114%
95-99	1	1	100%	1	100%
100+	0	0		0	
<b>Total</b>	<b>275</b>	<b>323</b>	<b>85%</b>	<b>269</b>	<b>102%</b>



## General Considerations

---

- Have recent plan design changes influenced future behavior?
- Use different assumptions for different participant subgroups?
  - Public safety and non-public safety
  - Within public safety, law enforcement vs. fire fighter
- Washington's retirement systems are generally split by occupation (more so than other states)



## Specific Considerations for Each Assumption (Examples)

---

- Retirement assumption
  - Does the availability of other employer-sponsored postretirement benefits influence retirement behavior (post-retirement employment; access to OPEB, etc.)?
- Termination from employment assumption
  - Does termination experience vary based on employer-specific or job-related factors?
- Mortality assumption
  - Use different mortality assumptions before and after retirement?
  - Consider likelihood and extent of mortality improvement in the future?
- Disability assumption
  - Include a recovery assumption?



# Assumption Format

---

- Form in which a particular demographic assumption will be used or expressed
- Examples
  - Table or single-point estimate
  - Table based on age only
  - Table based on age and gender (i.e., retirement, mortality)
  - Table based on years of service (i.e., termination from employment, merit increases)



## Other Considerations

---

- Materiality
  - Establish appropriate balance between refined methodology and materiality
- Cost effectiveness
  - Establish appropriate balance between refined methodology and cost effectiveness
- Combined effect of assumptions
  - Combined effect of all assumptions should be reasonable



## Selecting the Specific Assumption

---

- Ultimately, you must land on a specific assumption
- Selection made from the appropriate assumption universe
- Applied under the appropriate assumption format
- Includes both general and specific considerations for each assumption
- An exercise of professional judgment



## Evaluating Reasonableness

---

- Assumption should appropriately model the contingency being measured
- No significant cumulative actuarial gains or losses over the measurement period
- Combined effect of assumptions is also reasonable



## Recap - Demographic Assumptions

---

- Actuaries use professional judgment to estimate future economic outcomes based on past experience and future expectations
- Actuary should select reasonable demographic assumptions in light of particular characteristics of the plan
- A reasonable assumption is
  - expected to appropriately model the contingency
  - not anticipated to produce significant cumulative actuarial gains or losses over the measurement period



## Presentation Overview

---

- Experience study compares actual to expected experience
- Experience studies ensure actuarial assumptions/contribution rates remain reasonable
- Two types: economic and demographic
- Actuary's use professional judgment to estimate possible future outcomes
  - Based on blend of past experience and future expectations
- Actuaries select/recommend assumptions by applying professional judgment



# Missing Crystal Ball

---

- No one knows what the future holds
- The best an actuary can do is use professional judgment
- Estimation is based on past experience and future expectations
  - Significant data concerning the past
  - Past not necessarily the best indicator of the future



## What If You're Wrong?

---

- Natural consequences will follow
- For example, if you assume 8% rate of return and the fund earns more in the long-run, the plan will experience actuarial gains in the future
  - All else being equal, the plan will build a reserve if the assumption remains unchanged
- Opposite is true if fund earns less than assumed rate



## Why Not Just Remove The Risk?

---

- For example, comfortably assume a much lower rate of return and build up a reserve.
- Resulting higher contribution rates for members, employers, and the state (tax payers)
- An “overfunded” plan’s assets could be targeted for other purposes



# Balancing Act

---

- Ultimately, it's a risk management exercise which balances several factors
  - Actuarial science and standards of practice
  - Budget
  - Stakeholder interests



## Next Steps

---

- OSA recommendation to PFC on economic assumptions by September 1
- PFC may adopt changes to the economic assumptions by October 31
- LEOFF 2 Board may adopt changes at any time
- Preliminary analysis of demographic assumptions underway
  - Preview of analysis this interim?
- Demographic experience study will conclude in June/July of 2008

