

# Demographic Experience Study Preview

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$$\int x^2 \sqrt{x^2 \pm a^2} dx = \frac{x}{8} (2x^2 \pm a^2) \sqrt{x^2 \pm a^2} - \frac{a^2}{8} \ln|x + \sqrt{x^2 \pm a^2}| + C$$

The image features a blue background with various mathematical content. On the left, there are several integral formulas:
$$\int \frac{\sqrt{x^2 - a^2}}{x} dx = \sqrt{x^2 - a^2} - a \sec^{-1} \frac{x}{a} + C$$
$$\int x^2 \sqrt{x^2 \pm a^2} dx = \frac{x}{8} (2x^2 \pm a^2) \sqrt{x^2 \pm a^2} - \frac{a^2}{8} \ln|x + \sqrt{x^2 \pm a^2}| + C$$
$$\int \frac{x^e}{\sqrt{x^2 \pm a^2}} dx = \frac{x}{2} \sqrt{x^2 \pm a^2} \mp \frac{a^2}{2} \ln|x + \sqrt{x^2 \pm a^2}| + C$$
$$\int \frac{\sqrt{x^2 \pm a^2}}{x^2} dx = \frac{\sqrt{x^2 \pm a^2}}{x} + \ln|x + \sqrt{x^2 \pm a^2}| + C$$
$$\int \frac{dx}{\sqrt{x^2 \pm a^2}} = \frac{x}{a^2} \sqrt{x^2 \pm a^2} + C$$
$$\int \frac{dx}{(x^2 \pm a^2)^{3/2}} = \frac{-x}{a^2 \sqrt{x^2 \pm a^2}} + C$$
$$\int (x^2 \pm a^2)^{3/2} dx = \frac{x}{8} (2x^2 \pm 5a^2) \sqrt{x^2 \pm a^2} + \frac{3a^4}{8} \ln|x + \sqrt{x^2 \pm a^2}| + C$$

In the center, there is a 3D diagram of a cube with vertices labeled A through H. To the right, there are polar coordinate formulas:
$$x = p \cos \varphi$$
$$y = p \sin \varphi$$
$$|r| = p$$
$$r = \frac{p}{1 - e \cos \varphi}$$
$$-1 \leq x^2 + y^2 \leq -6y$$
$$-4 \sin \varphi \leq p - 6 \sin \varphi$$
$$2r = -6 \sin \varphi$$
$$|s| = \int \frac{dp}{\sqrt{p^2 - 4 \sin^2 \varphi}}$$
$$V = \frac{\pi r^2 h}{3}$$
$$4r^2 + h^2 = 60$$

Large numbers 3, 4, 8, and 0 are scattered throughout the background.



## Today's Presentation

- Background on experience studies
- Assumptions included in the Demographic Experience Study (DEXTER)
- Trends based on preliminary results
- Help prepare members to receive results in June
- No decisions required today



## What Are Experience Studies?

- Important component of systematic actuarial funding
- Prefunding of benefits is based on future projections
  - Those projections are based on assumptions
- Need to look back every so often and review
  - How close were assumptions to actual experience?
- Ensure assumptions remain reasonable
  - Reasonable assumptions contribute to reasonable funding

## Two Different Experience Studies Are Performed

- Economic Experience Studies (EES)
  - Focus is on economy
  - Mainly utilizes outside data sources, national trends, etc.
  - The Board sees results every two years
- DEXTER
  - Bigger than EES and with different emphasis and data
  - Largely plan-specific, looking at statistics of actual experience (people) in the plans
  - The Board sees results every six years



## Different Assumptions Are Reviewed Under Each Study

- Economic
  - Investment returns
  - Inflation
  - General salary growth
  - Growth in membership
- Demographic
  - Retirement rates
  - Mortality
  - Disability
  - Termination
  - Salary/merit scale
  - Several smaller (miscellaneous) assumptions

## Currently Performing The Demographic Experience Study

- Study conducted every six years
  - As directed by statute
- Review and recalculate *demographic* assumptions underlying the plans based on
  - Actual experience
  - Likely future trends
  - Actuarial Standards of Practice (ASOPs)
  - Professional judgment



## How Do We Perform An Experience Study?

- Data-driven, using 20+ years of experience in some cases
- Involves judgment
  - Past not always the best predictor of future
- Considers impact of any change
  - Reasonable conservatism
- Outside review and audit
  - Standard practice in Washington

## What Data Do We Use?

- As much reliable data as we can get
  - For this report, typically around 16 years
- Use professional judgment when eliminating data
  - Outliers
  - Short/long valuation years
  - Great recession

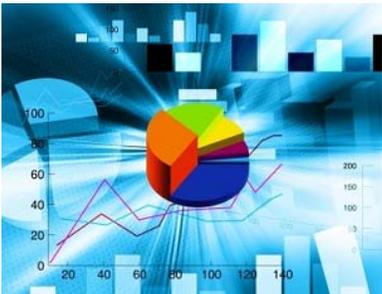


## Why Not Just Adopt Actual Experience?

- In other words, why might the new assumptions differ from actual experience?
- Use professional judgment
  - Which data to analyze, which data to exclude
  - Consider environment over period of data studied
  - Include expectations for future
  - Manage things like severity/shock of changes or “whipsaw”

## How Will DEXTER Be Used?

- New assumptions calculated in DEXTER will become underpinnings for future valuations and rate setting
  - Starting with June 30, 2013, Actuarial Valuation
- Assumptions help us estimate
  - When benefits are paid
  - How much is paid
  - How long they're paid



## Assumption Changes Impact Financing Costs

- Cost impacts are short term
  - Re-examined every six years
- Impact timing of plan costs → Financing
- Actual long-term costs determined by actual experience

## Retirement Rates

- Measures probability that an individual stops working and starts collecting their pension benefits in a given year
- Assumption helps gauge how much money will be paid from the trust fund each year in the future
- Retirement behavior may be impacted by
  - Plan design, such as normal and early retirement eligibility
  - Access to Social Security benefits
  - Access to/affordability of retiree medical benefits
  - Economic impact on personal savings



## Mortality

- Measures the probability of a member's death in a given year
- Used to estimate how long benefits will be paid, and whether or not the member will survive until retirement
- Also used to estimate how many members will receive death benefits
  - Including enhanced benefits due to line-of-duty deaths
- Outside studies/research are useful
  - Incidence of death is not influenced by plan provisions

## National Studies Show People Are Living Longer

Year	Life Expectancy at Birth
1900	47.3
1920	54.1
1940	62.9
1960	69.7
1980	73.7
2000	76.8
2010	78.8

Source: <http://www.census.gov/compendia/statab/2012/tables/12s0104.pdf>

## Disability

- Measures incidents of disability and selection of disability benefit option
- Used to estimate when members will be eligible for disability benefits
  - Non-duty disabilities
  - Duty disabilities
    - Occupational disabilities
    - Total (Catastrophic) disabilities



## Termination

- Measures incidents where members leave employment but have not yet retired
  - Members stop accruing service or growth in salary
- We use this measure to determine who might receive various forms of termination benefits
  - Return of contributions
  - Deferred retirement benefit

## We Model Two Types Of Salary Increases

- General salary increases
  - Inflation plus productivity
  - Same assumption for all service levels
  - Studied every two years as part of Economic Experience Study
- Service-based salary increases
  - All other forms of salary increases
  - Modeled by years of service credit
  - Studied every six years as part of Demographic Experience Study
- Both assumptions together estimate total salary growth



## Service-Based Salary/Merit Scale

- Used to estimate salary increases
  - Assumes increases so long as employee remains active
  - Includes step/merit/promotion/overtime increases
- The merit scale directly impacts
  - Future salary-based benefits
  - Value of future salary over which contributions will be collected
  - Expected refund amounts if members terminate and withdraw contributions

## Miscellaneous Assumptions

- Some miscellaneous assumptions impacting LEOFF 2 for this study include
  - Percent Vested
  - Ratio of Survivors Selecting Annuities
  - Percent of Duty-Related Deaths
  - Percent of Final Average Salary paid to Members with Total Disabilities

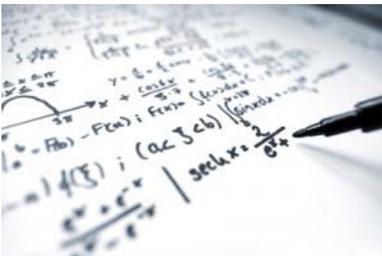


## Current Progress

- Preliminary analysis sent to auditor
- Concurrent audit in progress
  - Demographic assumptions
  - June 30, 2013, Actuarial Valuation
- Drafting text of report

## Retirement Rates – Preliminary Results

- Preliminary results show members are retiring later in life
- Delayed retirements generally decrease contribution rates
- When you assume later retirements
  - A larger benefit is paid over a shorter period of time
  - Future salary stream is larger/longer → more contributions collected
  - Both generally result in lower contribution rates



## Mortality – Preliminary Results

- Preliminary results show members are living longer (rates of mortality are decreasing)
- When members live longer
  - Annuity benefits are paid over a longer period of time
  - Contribution rates increase to pay for the longer stream of benefits

## Disability – Preliminary Results

- Preliminary results show fewer incidents of disability than current expectations
  - Assumptions for Percent Duty Disabilities and Percent Total Disabilities unchanged
- We expect contribution rates to increase slightly
- When incidents of disability decrease
  - More members remain in the system and are eligible to retire
  - Retirement costs increase by more than disability costs decrease



## Termination – Preliminary Results

- Preliminary results show an overall decrease in terminations
- When terminations decrease
  - More members stay employed to retirement
  - More members will receive annuity benefits as opposed to a refund of member contributions
  - Typically contribution rates would increase

## Service-Based Salary/Merit Scale – Preliminary Results

- Preliminary results show actual service-based salary
  - Decreased in early service years
  - Increased near end of career
- Contribution rates are expected to increase
- When you assume a lower merit scale
  - Annuity and return of contribution benefits decrease
  - Future salary stream is smaller → fewer contributions collected
  - Most likely results in a decrease in contribution rates



## Summary Of Preliminary Results

Assumption	Change in Assumption	Contribution Rate Impact
Retirement	↓	↓
Mortality	↓	↑
Disability	↓	↑
Termination	↓	?
Salary scale	↓↑	↑
Miscellaneous*	↑↓	?

*\*Most miscellaneous assumptions have small impacts on the overall costs of the plan.*

## Recap

- Reasonable assumptions contribute to reasonable funding
- Important part of systematic actuarial funding
- New assumptions will become underpinnings for future valuations and rate setting
  - First impacts 2015-17 contribution rates
- Assumption changes impact short-term budgets → Financing costs
- Actual plan costs come from actual benefits paid → Actual costs

## One Last Thing

- Members may want to review the [Funding Methods Presentation](#) from last year
- Next month's presentation will include new assumptions, as well as rate and budget impacts due to those assumptions
- An understanding of the Board's minimum rate policy will be helpful



## Next Steps

- Completion of analysis/audit
- OSA will present completed results in June along with 2013 Valuation results
- Board adopts 2015-17 contributions rates by July 31, 2014