



# Oklahoma Police Pension and Retirement System

## *Actuarial Assumption Experience Study July 1, 2007 to June 30, 2012*

February 20, 2013

**buck**consultants'

# *Agenda*

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- General
- Demographic Assumptions
- Economic Assumptions
- Actuarial Value of Assets
- Impact



# General

- Experience studies are performed to ensure the accuracy of actuarial assumptions
- When experience differs from assumptions, gains or losses occur
- Summary of liability gains and losses for experience period:

| <u>Year</u>  | <u>Gain/(Loss)<br/>(in \$Millions)</u> | <u>% of Actuarial<br/>Accrued Liability</u> |
|--------------|--|---|
| 2008         | (2.0)                                  | (0.1)%                                      |
| 2009         | 7.7                                    | 0.3%  |
| 2010         | 38.0                                   | 1.6%  |
| 2011         | 96.1                                   | 4.9%  |
| 2012         | <u>10.1</u>                            | 0.5%  |
| <b>Total</b> | <b>149.9</b>                           |   |



# *General*

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- Selection of Actuarial Assumptions:
  - Should consider a range of reasonable assumptions
  - Select the specific assumption from within the reasonable range
  - Use appropriate experience of the plan as well as relevant factors that may affect future experience.



# *Demographic Assumptions*

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- Demographic Assumptions
  - Mortality Rates
  - Retirement Rates
  - Disability Rates
  - Withdrawal Rates
  - Marital Status and Age Difference
- Generally more stable than economic assumptions
- Recommendations are generally fine tuning of assumptions



# Mortality

- Mortality rates studied for:
  - Pre-Retirement (Males Only)
  - Post-Retirement (Male and Female)
  - Disabled (Males only)

## Population Breakdown as of July 1, 2012

|        | <u>Active</u> | <u>Retirees and<br/>Beneficiaries</u> | <u>Disabled</u> |
|--------|---------------|---------------------------------------|-----------------|
| Male   | 4,079         | 2,210                                 | 116             |
| Female | <u>362</u>    | <u>800</u>                            | <u>22</u>       |
| Total  | 4,441         | 3,010                                 | 138             |



# Pre-Retirement Mortality - Male

| Age Range          | Experience 2002 - 2007 | Experience 2008 - 2012 | Current Assumption* | Proposed Assumption* |
|--------------------|------------------------|------------------------|---------------------|----------------------|
| 20 – 24            | 0.00%                  | 0.00%                  | 0.03%               | 0.03%                |
| 25 – 29            | 0.00%                  | 0.00%                  | 0.04%               | 0.04%                |
| 30 – 34            | 0.03%                  | 0.00%                  | 0.05%               | 0.04%                |
| 35 – 39            | 0.03%                  | 0.00%                  | 0.09%               | 0.09%                |
| 40 – 44            | 0.00%                  | 0.05%                  | 0.11%               | 0.11%                |
| 45 – 49            | 0.16%                  | 0.10%                  | 0.14%               | 0.13%                |
| 50 – 54            | 0.13%                  | 0.18%                  | 0.19%               | 0.17%                |
| 55 – 59            | 0.00%                  | 0.51%                  | 0.30%               | 0.27%                |
| 60 - 64            | 0.00%                  | 1.41%                  | 0.49%               | 0.53%                |
| 65 & over          | 0.00%                  | 0.00%                  | 0.64%               | 0.80%                |
| <b>A/E Deaths:</b> | <b>8</b>               | <b>14</b>              | <b>22</b>           | <b>20</b>            |



\*Rates projected to July 1, 2012.

# *Pre-Retirement Mortality*

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- **Summary**

- Current assumption is RP 2000 (Active rates before age 71, Annuitant rates after age 70), with generational mortality improvement
- Overall experienced less deaths per year than assumed
- Small sample sizes at some ages contribute to volatility

**Recommendation:** RP 2000 Combined Blue Collar with generational mortality improvement with four year set back



# Post-Retirement Mortality - Male

| <u>Age Range</u>   | <u>Experience 2002 – 2007</u> | <u>Experience 2008 – 2012</u> | <u>Current Assumption*</u> | <u>Proposed Assumption*</u> |
|--------------------|-------------------------------|-------------------------------|----------------------------|-----------------------------|
| Under 50           | 0.00%                         | 0.63%                         | 0.18%                      | 0.17%                       |
| 50 – 54            | 0.67%                         | 0.55%                         | 0.52%                      | 0.24%                       |
| 55 – 59            | 0.79%                         | 0.71%                         | 0.72%                      | 0.46%                       |
| 60 - 64            | 1.98%                         | 1.06%                         | 1.15%                      | 0.90%                       |
| 65 – 69            | 2.43%                         | 1.86%                         | 1.89%                      | 1.67%                       |
| 70 – 74            | 4.31%                         | 1.94%                         | 2.95%                      | 2.69%                       |
| 75 – 79            | 4.65%                         | 4.76%                         | 4.97%                      | 4.50%                       |
| 80 – 84            | 6.55%                         | 7.96%                         | 8.64%                      | 7.84%                       |
| 85 - 89            | 18.75%                        | 10.64%                        | 14.14%                     | 12.90%                      |
| 90 - 94            | 10.00%                        | 25.93%                        | 21.93%                     | 20.41%                      |
| 95 & Over          | 100.00%                       | 0.00%                         | 27.72%                     | 25.33%                      |
| <b>A/E Deaths:</b> | <b>172</b>                    | <b>178</b>                    | <b>196</b>                 | <b>168</b>                  |



\*Rates projected to July 1, 2012.

# Post-Retirement Mortality - Female

| <u>Age Range</u>   | <u>Experience<br/>2002 - 2007</u> | <u>Experience<br/>2008 - 2012</u> | <u>Current Assumption*</u> | <u>Proposed Assumption*</u> |
|--------------------|-----------------------------------|-----------------------------------|----------------------------|-----------------------------|
| Under 50           | 0.00%                             | 0.46%                             | 0.14%                      | 0.13%                       |
| 50 - 54            | 0.43%                             | 0.35%                             | 0.19%                      | 0.19%                       |
| 55 - 59            | 0.35%                             | 0.00%                             | 0.41%                      | 0.32%                       |
| 60 - 64            | 0.69%                             | 1.49%                             | 0.85%                      | 0.64%                       |
| 65 - 69            | 1.50%                             | 1.68%                             | 1.43%                      | 1.24%                       |
| 70 - 74            | 1.60%                             | 2.03%                             | 2.38%                      | 2.15%                       |
| 75 - 79            | 4.52%                             | 3.08%                             | 3.71%                      | 3.39%                       |
| 80 - 84            | 4.12%                             | 4.52%                             | 6.16%                      | 5.54%                       |
| 85 - 89            | 15.43%                            | 10.55%                            | 10.80%                     | 9.76%                       |
| 90 - 94            | 9.47%                             | 11.96%                            | 16.59%                     | 15.48%                      |
| 95 & Over          | 31.25%                            | 24.32%                            | 20.05%                     | 18.80%                      |
| <b>A/E Deaths:</b> | <b>86</b>                         | <b>96</b>                         | <b>105</b>                 | <b>94</b>                   |



\*Rates projected to July 1, 2012.

# *Post-Retirement Mortality*

- **Summary**
  - Current assumption is RP 2000 (Active rates before age 50, Annuitant rates after age 49) Blue Collar with generational mortality improvement and one year set forward
  - Overall experienced less deaths per year than assumed
  - Small sample sizes at some ages contribute to volatility

**Recommendation:** RP 2000 Combined Blue Collar with generational mortality improvement



# Post-Disability Mortality

| <u>Age Range</u>   | <u>Experience 2002 - 2007</u> | <u>Experience 2008 - 2012</u> | <u>Current Assumption*</u> | <u>Proposed Assumption*</u> |
|--------------------|-------------------------------|-------------------------------|----------------------------|-----------------------------|
| Under 50           | 0.73%                         | 4.21%                         | 0.57%                      | 0.36%                       |
| 50 – 54            | 2.11%                         | 0.00%                         | 0.76%                      | 0.50%                       |
| 55 – 59            | 0.00%                         | 0.00%                         | 1.23%                      | 0.94%                       |
| 60 - 64            | 1.23%                         | 6.45%                         | 2.03%                      | 1.76%                       |
| 65 – 69            | 4.05%                         | 1.35%                         | 3.34%                      | 2.93%                       |
| 70 – 74            | 10.77%                        | 1.67%                         | 5.34%                      | 4.77%                       |
| 75 – 79            | 6.15%                         | 3.92%                         | 8.95%                      | 7.82%                       |
| 80 – 84            | 13.79%                        | 13.89%                        | 15.10%                     | 12.64%                      |
| 85 - 89            | 22.22%                        | 12.50%                        | 22.62%                     | 19.64%                      |
| 90 - 94            | 11.11%                        | 50.00%                        | 31.85%                     | 28.39%                      |
| 95 & Over          | N/A                           | 50.00%                        | 36.29%                     | 33.02%                      |
| <b>A/E Deaths:</b> | <b>25</b>                     | <b>23</b>                     | <b>26</b>                  | <b>22</b>                   |



\*Rates projected to July 1, 2012.

# *Post-Disability Mortality*

- **Summary**
  - Current assumption is RP 2000 (Active rates before age 50, Annuitant rates after age 49) Blue Collar with generational mortality improvement and seven year set forward
  - Overall experienced less deaths per year than assumed
  - Small sample sizes at some ages contribute to volatility

**Recommendation:** RP 2000 Combined Blue Collar with four year set forward



# *Retirement*

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- Current retirement rates are based on a participant's service
- The System allows unreduced retirement after 20 years of service
- Deferred Option Plan members are currently considered to have retired when they enter the DOP
- Retroactive Deferred Option Plan members are considered to have retired when they leave active service



# Retirement

| <u>Years of Service</u>             | <u>Experience 2002 - 2007</u> | <u>Experience 2008 - 2012</u> | <u>Current Assumption</u> | <u>Proposed Assumption</u> |
|-------------------------------------|-------------------------------|-------------------------------|---------------------------|----------------------------|
| 20                                  | 11.11%                        | 14.94%                        | 25.00%                    | 20.00%                     |
| 21                                  | 6.72%                         | 4.86%                         | 10.00%                    | 6.00%                      |
| 22                                  | 6.00%                         | 5.11%                         | 10.00%                    | 6.00%                      |
| 23                                  | 9.11%                         | 5.23%                         | 15.00%                    | 6.00%                      |
| 24                                  | 17.12%                        | 10.94%                        | 20.00%                    | 10.00%                     |
| 25                                  | 25.31%                        | 17.02%                        | 30.00%                    | 20.00%                     |
| 26                                  | 14.63%                        | 7.94%                         | 15.00%                    | 10.00%                     |
| 27                                  | 13.30%                        | 7.50%                         | 15.00%                    | 10.00%                     |
| 28                                  | 13.29%                        | 11.47%                        | 15.00%                    | 10.00%                     |
| 29                                  | 21.74%                        | 12.74%                        | 25.00%                    | 15.00%                     |
| Over 29                             | 23.69%                        | 19.20%                        | 100.00%                   | 100.00%                    |
| <b>Actual/Expected Retirements:</b> | <b>525</b>                    | <b>475</b>                    | <b>1,205</b>              | <b>952</b>                 |



# Retirement

## ■ Summary

- Fewer retirements than expected
- Currently assume all members elect retroactive Deferred Option Plan benefits for the maximum allowable period
- Recent economic factors have led to fewer retirements than expected
- More retirements expected in the future

**Recommendation:** Modify retirement assumption to more closely match prior years' experience, with the anticipation of more retirements in the future.



# Disability

| <u>Age Range</u>                 | <u>Actual 2002 - 2007</u> | <u>Actual 2008 - 2012</u> | <u>Total Current Assumption*</u> | <u>Proposed Assumption*</u> |
|----------------------------------|---------------------------|---------------------------|----------------------------------|-----------------------------|
| 20 – 24                          | 0.00%                     | 0.00%                     | 0.02%                            | 0.02%                       |
| 25 – 29                          | 0.00%                     | 0.00%                     | 0.04%                            | 0.02%                       |
| 30 – 34                          | 0.09%                     | 0.00%                     | 0.08%                            | 0.04%                       |
| 35 – 39                          | 0.00%                     | 0.04%                     | 0.08%                            | 0.06%                       |
| 40 – 44                          | 0.12%                     | 0.08%                     | 0.12%                            | 0.08%                       |
| 45 – 49                          | 0.11%                     | 0.18%                     | 0.12%                            | 0.10%                       |
| 50 – 54                          | 0.06%                     | 0.19%                     | 0.12%                            | 0.12%                       |
| 55 – 59                          | 0.18%                     | 1.13%                     | 0.12%                            | 0.14%                       |
| <b>Actual/Expected Disabled:</b> | <b>14</b>                 | <b>11</b>                 | <b>15</b>                        | <b>11</b>                   |

\* Assumed that members becoming disabled have a 25% - 49% impairment.



# *Disability*

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## ▪ **Summary**

- Disability rates studied in total
- Incidence of disability is sparse
- Small sample size will cause volatility

**Recommendation:** Modify disability assumption to more closely match prior experience



# Withdrawal

| <u>Completed Years<br/>of Service</u>    | <u>Experience<br/>2002 - 2007</u> | <u>Experience<br/>2008 - 2012</u> | <u>Current<br/>Assumption</u> | <u>Proposed<br/>Assumption</u> |
|--|-----------------------------------|-----------------------------------|-------------------------------|--------------------------------|
| 0  | 19.81%                            | 33.53%                            | 15.00%                        | 20.00%                         |
| 1  | 13.90%                            | 12.95%                            | 12.00%                        | 13.00%                         |
| 2  | 8.72%                             | 8.43%                             | 8.50%                         | 8.00%                          |
| 3  | 7.74%                             | 6.07%                             | 7.00%                         | 6.00%                          |
| 4  | 7.31%                             | 6.47%                             | 6.00%                         | 6.00%                          |
| 5 – 9                                    | 4.67%                             | 3.63%                             | 4.00%                         | 4.00%                          |
| 10 – 14                                  | 1.79%                             | 2.01%                             | 1.50%                         | 1.50%                          |
| 15 - 19                                  | 1.04%                             | 1.35%                             | 1.00%                         | 1.00%                          |
| <b>Actual/Expected<br/>Terminations:</b> | <b>954</b>                        | <b>1,061</b>                      | <b>854</b>                    | <b>899</b>                     |



# *Withdrawal*

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- **Summary**

- Current withdrawal rates are based on a participant's service
- Fewer terminations than expected

**Recommendation:** Modify withdrawal assumption to more closely match prior experience



# *Marital Status and Age Difference*

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- **Current Assumption**

- 85% of participants are assumed to be married
- Husbands are assumed to be three years older than their wives

**Recommendation:** No change



# *Economic Assumptions*

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- **Economic Assumptions**
  - Inflation/Cost-of-Living Increases
  - Salary Increases
  - Investment Return
  - COLA
  - Rates of Return Deferred Option Plan



# *Inflation*

- Current inflation assumption is 3%

| <u>Period</u> | <u>Average Annual Inflation<br/>Rate for Period Ending<br/>June 30, 2012</u> |
|---------------|--|
| 10-Year       | 2.5%   |
| 20-Year       | 2.5%   |
| 30-Year       | 2.9%   |
| 40-Year       | 4.4%   |
| 50-Year       | 4.1%   |
| 60-Year       | 3.7%   |

**Recommendation:** No change



# *Real Salary Increases*

| <u>Service</u> | <u>Current Real Salary Increase Assumption</u> | <u>Proposed Real Salary Increase Assumption</u> |
|----------------|--|---|
| 0              | 16.00%   | 14.00%  |
| 1              | 12.00%   | 10.00%  |
| 2              | 6.75%  | 6.30%   |
| 3              | 6.25%  | 5.90%   |
| 4              | 5.75%  | 5.50%   |
| 10             | 3.70%  | 3.15%   |
| 15             | 2.70%  | 1.70%   |
| 20             | 2.00%  | 1.50%   |
| 25+            | 2.00%  | 1.50%   |



# *Real Salary Increases*

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- **Summary**

- Experienced merit/promotion/longevity based salary increases are much lower than expected

**Recommendation:** Lower salary increase assumption to more closely match prior experience



# Investment Return

- Current assumption – 7.5%

| <u>Asset Class</u>              | <u>Target Allocation</u> | <u>Expected Real Rate of Return</u> | <u>Weightings</u> |
|---------------------------------|--------------------------|-------------------------------------|-------------------|
| Equity                          |                          |                                     |                   |
| US Large Cap                    | 15.0%                    | 7.33%                               | 1.10%             |
| US Small/Mid Cap                | 5.0%                     | 9.71%                               | 0.49%             |
| Private Equity                  | 10.0%                    | 12.78%                              | 1.28%             |
| Long/Short/Low Volatility       | 25.0%                    | 7.31%                               | 1.83%             |
| International Developed         | 10.0%                    | 7.47%                               | 0.75%             |
| Emerging Markets                | 5.0%                     | 8.77%                               | 0.44%             |
| Fixed Income                    |                          |                                     |                   |
| Global                          | 15.0%                    | 1.88%                               | 0.28%             |
| Commodities                     | 5.0%                     | 6.14%                               | 0.31%             |
| Real Estate                     | 10.0%                    | 6.19%                               | <u>0.62%</u>      |
| Expected Real Rate of Return    |                          |                                     | 7.10%             |
| Inflation                       |                          |                                     | + 3.00%           |
| Expenses                        |                          |                                     | <u>+ (0.65%)</u>  |
| Expected Nominal Rate of Return |                          |                                     | 9.45%             |

**Recommendation:** No change in investment return assumption



# COLA

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- **Current Assumptions**

- No COLA assumed for annuitants
- Baker retirees get automatic increase of 1/3 to 1/2 of regular base pay changes that are assumed to increase at 3.0%

**Recommendation:** No change



# *Deferred Option Plan Rates of Return*

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- Deferred Option Plan provides “market less 2%” on member balances but not less than 7.50%
- Member may transfer DOP account to Deferred Option Payout Account upon retirement, but the 7.50% minimum does not apply

**Recommendation:** Assume Deferred Option Plan balances return 7.75%



# Cost Impact of Proposed Changes

Based on July 1, 2012 Valuation Results (*in Millions*)

|                             | <u>Before</u> | <u>After</u> | <u>Net Change</u> |
|-----------------------------|---------------|--------------|-------------------|
| Actuarial Accrued Liability | \$ 2,034.5    | \$ 2,031.8   | \$ (2.7)          |
| Normal Cost (Mid-Year)      | 56.2          | 52.4         | (3.8)             |
| Funded Ratio                | 90.2%         | 90.3%        | 0.1%              |
| Required State Contribution | \$ 44.9       | \$ 40.5      | \$ (4.4)          |

