# COMPREHENSIVE ACTUARIAL REVIEW OF THE 2018 EXPERIENCE STUDY OF THE PAROCHIAL EMPLOYEES' RETIREMENT SYSTEM
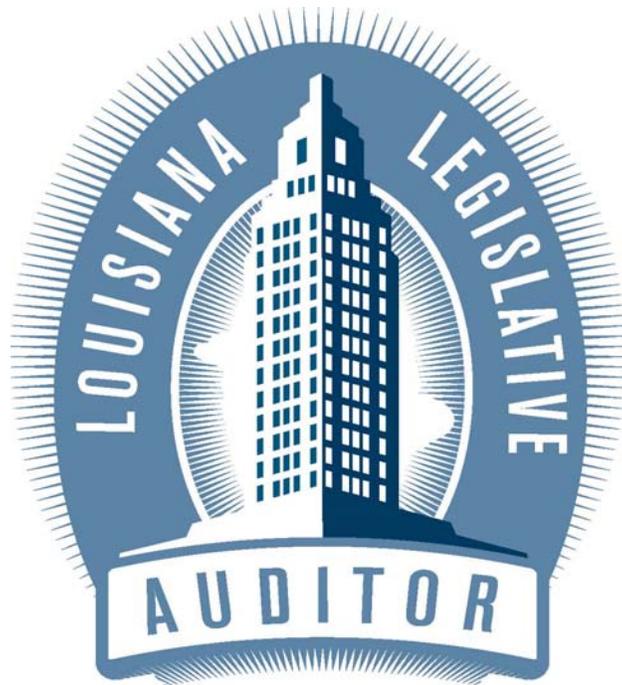


ACTUARIAL SERVICES
PRESENTED TO THE PUBLIC RETIREMENT SYSTEMS' ACTUARIAL COMMITTEE
AUGUST 2, 2019

July 17, 2019

Ms. Dainna S. Tully
Administrative Director
Parochial Employees' Retirement System
Post Office Box 14619
Baton Rouge, LA 70898

*Re: Comprehensive Actuarial Review of the 2018 Experience Study*

Dear Ms. Tully:

The Louisiana Legislative Auditor (LLA) has conducted a Comprehensive Actuarial Review (CAR) for the Parochial Employees' Retirement System (PERS).

The remainder of this letter contains the results of our comprehensive review of your December 31, 2018 Experience Study prepared by G.S. Curran & Company (GSC) and dated June 17, 2019. Specifically, we have evaluated for reasonableness the actuarial assumptions proposed by the system's actuary.

I would like to thank you and your staff for your cooperation and assistance with this review.

Sincerely,

Daryl G. Purpera, CPA, CFE
Legislative Auditor

DGP:JJR:LPG:ch

cc: G.S. CURRAN & COMPANY

LLA CAR OF PERS 2018 EXP STUDY

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## Scope of Review

The December 31, 2018 Experience Study Report for the Parochial Employee's Retirement System (PERS) was prepared by the actuary for PERS' retirement board, GSC, and dated June 17, 2019.

This Comprehensive Actuarial Review (CAR) of that report was prepared by James J. Rizzo of Gabriel, Roeder, Smith & Company, which serves as staff to the actuary for the Louisiana Legislative Auditor, and includes evaluations for appropriateness of certain methods and key actuarial assumptions recommended by PERS' actuary. This CAR should be considered in connection with another CAR prepared by Mr. Rizzo and the actuary for the LLA in review of the 2018 Actuarial Valuation report prepared by the PERS' actuary.

# Valuation Interest Rate

The methodology employed by PERS' actuary for developing the assumed rate of return (including the inflation assumption) appears to have followed an appropriate process. Furthermore, the actuary for the LLA considers the final return assumption recommended by PERS' actuary and adopted by PERS' board to be appropriate.

The 2018 Experience Study describes a methodology/process in general terms that includes the following elements:

1. Expectations of future investment performance (forward-looking forecasts)
2. Consideration as to the forecast-horizon of future expectations
3. Investment return and inflation forecasts from PERS' own investment consultant
4. Investment return forecasts from multiple independent consultants and investment firms
5. Inflation forecasts from multiple independent sources
6. Use of PERS' own asset allocation
7. Recognition of certain investment-related expenses
8. Use of the forecasters' expected geometric return
9. Average of multiple consultants and investment firms

### *Future investment performance (forward-looking forecasts)*

A forward-looking perspective should drive the determination of an assumed rate of return for pension actuarial valuations. PERS' actuary recommended an assumed rate of return based on forward-looking forecasts from multiple consultants and investment firms and applied them to the System's own characteristics

The past performance of the Fund was also reviewed, but only to provide insight and context to the assumed rate of return. Past performance is not an indicator of future performance. Surveys of other retirement systems' return and inflation assumptions were summarized for context, with an appropriate caveat not to put too much emphasis on other systems' assumptions. What others assume should not drive what a retirement system assumes for its own purposes.

### *Consideration as to the forecast horizon of future expectations*

PERS' actuary states that the investment returns expected by investment forecasters were those expected for a long time frame (i.e., 20 to 30 years). GSC states that the use of long term investment return assumptions is most appropriate for a pension fund situated like PERS.

We disagree for several reasons. A mid-term horizon is more appropriate for PERS, and for most other retirement systems. Currently, long-term expectations from reputable forecasting experts are generally higher than mid-term expectations, creating a pattern that actuaries sometimes call a select-and-ultimate expectation. A lower rate expected during the select period, followed by a higher rate for the ultimate period. Following are compelling reasons not to adopt a long-term forecast horizon:

1. *Underperformance in the mid-term is not sustainable.* Consider if the experts are right, and PERS adopts a higher long-term assumption for valuation purposes, while the next 10-15 years produce lower returns. PERS would regularly experience actuarial losses due to underperformance for the next 10-15 years, knowingly.

2. *Over-reliance on reversion to mean returns.*  Methodologies employed by forecasters for their long-term expectations are heavily influenced by "reversion to mean returns".  That does not make them useful, just makes them suspect.  "Reversion to mean returns" is valid only when the future is just like the past.  We know that will not be true.

3. *Return forecasts over a longer-term horizon are the less reliable*.  Many more unanticipated events in the economy can happen in 20 or 30 years than can happen in the next 10 years.  That makes 20-30 year forecasts less reliable, but not useless.

4. *PERS' own cash flow demands*.  It is fundamental in setting or defending actuarial assumptions to incorporate (explicitly so) a retirement system's own characteristics into the process.

   - The portfolio's target asset allocation, per section 3.8.3(a) of ASOP No. 27,  and
   - The plan's expected cash flows, per section 3.8.3(f) of ASOP No. 27.

   PERS' fund has been in a negative cash flow state (more expenses are leaving the fund than contributions coming in) for a number of years.  This is true of most public retirement systems.  For example, according to  PERS' 2018 actuarial valuation report, during 2018, benefits and administrative expenses leaving the PERS' fund were $221 mill, while contributions coming in were only $147 mill, requiring the use of current investment earnings just to pay current expenses rather then re-invest them to pay future benefits.

   We suspect the majority of PERS's current assets will be paid out during the next 10 years – and will not be there to enjoy a higher return expected in the later years.

These are compelling reasons not to simply use forecasters' long-term expectations to develop or defend a retirement system's return assumption.  The investment horizon should be a mid-term horizon, no more than 10 or 15 years.  A retirement system is not necessarily better-served by consistently setting their return expectations based on a long-term time horizon; in our opinion, it is better served by setting the horizon based on a mid-term time horizon for the four reasons described above.

### *Investment return and inflation forecasts from PERS' own investment consultant*

PERS' actuary rightly obtained a full set of capital market assumptions from PERS' own investment consultant, as did the actuary for the LLA.  That includes the expected rate of return, standard deviations and correlation coefficients for each asset class of the system's current target asset allocation. PERS' own investment consultant indicated their expected geometric return for a 20-year horizon recognizing the fund's own asset allocation but not its cash flows was 6.8%, without any stated adjustment for investment-related expenses.

Using those same capital market assumptions, the actuary for the LLA derived the $50^{th}$ percentile expectation of the compound return to be 6.85%, a validation of the investment consultant's calculations.  The 2018 Experience Study report indicates that PERS' actuary calculated the expected rate of return on the fund's investment portfolio (over the 20 years) to be 6.69%.  This calculation recognized the fund's own asset allocation and recognized a reduction of 0.02% for investment related expenses (6.71% prior to a reduction for any investment related expenses), but did not recognize the fund's cash flows.  All three of these calculations are close enough to be considered a validation of each other's methodologies.

However, using PERS's own investment consultant's capital market assumptions for a *10-year* horizon (more appropriate than 20 for the reasons stated), the actuary for the LLA derived the $50^{th}$ percentile expectation of the compound return to be 6.41%.  This calculation recognized the fund's own asset

allocation and its cash flows (represented by the 10-year horizon) but did not recognize any investment related expenses.

PERS' own investment consultant expects the annualized rate of inflation to be 2.0%, for all relevant horizons.

### *Investment Return Forecasts from multiple independent consultants and investment firms*

The 2018 Experience study indicates that PERS' actuary also gathered the same information from eight other consultants and investment firms making a total of nine. Three out of the nine do not appear among the largest 200 investment consultants or the 500 largest investment manager lists published by P&I. In our opinion, it is preferable to obtain capital market assumptions from independent firms that are national, reputable and large. Nevertheless, it is important to obtain forecasts and expectations from more than one expert, as PERS' actuary did.

All investment forecasters have different sets of asset classes, some with more than 50 and others with fewer than 20. Based on follow-up information provided, it appears that PERS' actuary created a standardized set of 19 asset classes. That internal process has two mapping steps:

1. There is no one-to-one mapping of each investment forecaster's asset classes to the standardized list of 19. An imperfect mapping of each investment consultant's asset classes into these 19 standard classes accounts for some of the 19 asset classes but leaves others empty. That causes the average for each asset class not to remain true to the original investment consultant's expectations. Furthermore, it leaves the averages calculated among fewer than all nine for some asset classes.

   The standardized mapping has more challenges when creating a single set of correlation coefficients for these 19 asset classes, because each of the nine firms has a whole set of its own correlation coefficients among its own set of asset classes.

   This is a source of what is called "mapping error" in the process. This does not mean there was a mistake made; it is a statistical modelling term, similar to the term "margin of error."

2. PERS' expression of its asset classes as identified in its own Investment Policy Statement and Performance Monitoring Reports is then mapped onto the 19 standardized asset classes. This is a second source of "mapping error."

Further details were not requested or provided in the 2018 Experience study or the follow-up information as to exactly how the mapping was accomplished. The combined effect of these two sources of "mapping error" for this process, however, is not considered substantial, but worth possibly 10-40 basis points in either direction (plus or minus).

The primary observation for this step, however, is that PERS actuary sought the professional opinions of several independent forecasters in formulating the recommended return assumption.

### *Inflation forecasts from multiple independent sources*

The assumed rate of future inflation is a component of the assumed return assumption and the salary increase assumptions. The 2018 Experience Study report indicates that inflation estimates were provided by the system's investment consultant (2.0% for all horizons) and the other eight investment consultants, making an average among all nine to be 2.22%.

In addition, the report indicates that other sources of inflation forecasts examined were "estimates from the Federal Reserve, the Social Security administration and various other forecasters" and were taken into account. The report states, "Note that estimates do vary by source, but virtually all long term estimates are in the 2.00% to 2.75% range." PERS' own investment consultant expects the annualized rate of inflation to be 2.0%, for all relevant horizons.

PERS' actuary ultimately recommended 2.40% as the assumed long-term rate of inflation.

The actuary for the LLA provides detailed support for an inflation assumption closer to 2.20% for a mid-term horizon (next 10-15 years). Refer to the Comprehensive Actuarial Review of the 2018 PERS Actuarial Valuation report for more details.

The actuary for the LLA does not find the use of 2.40% to be unreasonable, but finds 2.20% more appropriate.

Again, this goes back to the most appropriate forecast-horizon, and recognizing that PERS' own expected cash flow would drive the appropriate horizon to be mid-term rather than long-term. Disregarding PERS' own cash flow and trusting long-term forecasts over mid-term could justify a 2.40% inflation assumption for valuation purposes as being most appropriate. But for the compelling reasons discussed above, a mid-term horizon is clearly more appropriate than a long-term horizon.

### *Use of PERS' own asset allocation*

As mentioned above, it is fundamental in setting or defending actuarial assumptions to incorporate (explicitly so) a retirement system's own characteristics into the process.

- The portfolio's target asset allocation, per section 3.8.3(a) of ASOP No. 27, and
- The plan's expected cash flows, per section 3.8.3(f) of ASOP No. 27.

The 2018 Experience study indicated that PERS' actuary explicitly used the fund's own target asset allocation in developing the recommended return assumption.

### *Recognition of certain investment-related expenses*

Investment forecasters are seldom explicit about exactly whether and how their forecasted returns for each asset class are net or gross of investment related expenses. According to the 2018 Experience study report, PERS' actuary reduced the investment forecasters' expected returns by 0.02% to represent the assumptions as being "net of investment related expenses". This was considered an estimate of the fees for investment consulting and asset custody.

It might also be prudent to reduce the expected returns by the cost of passive investment management fees. If the forecasters' published expected returns are the expectation of each asset class in the broad market, there should be a cost required to achieve those broad market returns, namely, the cost of a passive or index strategy. Index funds or index managers would charge a nominal amount to track a designated index. However, omitting this component is not material.

*Use of the forecasters' expected geometric return*

The 2018 Experience Study report seems to advocate the use of the expected geometric return, rather than the higher arithmetic return. In our opinion, this is wholly appropriate of pension valuations for at least two reasons:

1. Theoretically speaking, the expected geometric mean is very close to the expected $50^{th}$ percentile of future compound returns over the given horizon. The $50^{th}$ percentile represents the rate that has a 50% chance of being achieved. The expected arithmetic mean has less than a 50% chance of being achieved. This is a compelling reason to embrace the expected $50^{th}$ percentile or the expected geometric mean for use in pension valuations.

2. Whenever past returns are analyzed, it is always the geometric average that is calculated and disclosed and seldom ever the arithmetic average. Audiences are used to measuring returns over time as the compound (or geometric) mean.

*Average of multiple consultants and investment firms*

Rather than rely on just one investment consultant, PERS' actuary followed conventional wisdom and tracked the average of nine investment consultants. It matters not whether the field of forecasting is for hurricanes, earthquakes, elections, or inflation and investment returns; an average or consensus of multiple investment firms has proven to be more accurate than any one of those experts. Use of the term consensus in forecasting does not imply various parties to coming to agreement; it simply means an averaging the various forecasts into a single number representing the central tendency of the group.

By using these results, PERS' actuary was able to produce average estimates for the long-term horizon expected geometric portfolio rate of return and to produce an alternate reasonable range for the long-term expected rate of return.

The 2018 Experience Study report states, "Based on the average real rates of return, standard deviations, and correlation coefficients from nine national consulting firms (including Segal Marco), and using an assumed rate of inflation of 2.40%, we have determined that the annual expected rate of return on the fund's investment portfolio is 7.01%." This 7.01% appears to be the average of expected <u>arithmetic</u> return, and is confirmed by the simulation. The report also indicates that the simulation determined the expected <u>geometric</u> return to be 6.48% over a 30-year period.

A consensus average, like PERS actuary prepared, is known to be the best procedure when provided several different forecasts methodologies. This makes for a reasonable process for setting, recommending or defending a return assumption for pension valuation purposes.

*Recommendation of PERS' actuary*

In arriving at a reasonable range of results, the following factors were considered by PERS' actuary, according to the last paragraph on page 10 of the 2018 Experience Study report:

1. Return estimates from the system's investment consultant
2. Return estimates from the other eight investment consultants
3. The stochastic trials

After selecting a range, the assumed rate of return was selected based on the following factors, according to the last paragraph on page 10 of the 2018 Experience Study report:

1. Protection of the benefit security of the participants
2. Recognition of the effects on the sponsor's budget
3. Recognition of possible asset allocation changes over time

PERS' actuary recommended 6.50% as the assumed rate of return.

### *Conclusion of the LLA's actuary*

We commend PERS and its actuary for following a robust and disciplined process, rather than setting the return assumption based on non-actuarial factors. We would like to have seen more details of work for a transparent disclosure of components and steps, e.g., inflation sources leading to 2.40%, mapping steps, etc.

Nevertheless, we consider 6.50% as an appropriate recommendation.

Refer to the LLA actuary's Comprehensive Actuarial Review of the 2018 PERS Actuarial Valuation report for more details on (a) a robust research and process for setting, recommending, evaluating or defending a return assumption for pension funding valuation purposes and (b) conclusions of what would be an appropriate return assumption for PERS' 2018 actuarial valuation.

# Rates of Salary Increase

For Plan A, the PERS' actuary recommended a reduction in the expected future salary increases from 5.25% to 4.75% per year regardless of age or years of service.  For Plan B, the recommendation was a reduction from 5.25% to 4.25% per year regardless of age or years of service.

Salary increase experience studies can be undertaken using a few approaches.  A robust and explicit approach is:

1.  The actuary can separate the actual raw salary increase rates:

    a.  By age during the experience period so that each age has its own actual raw salary increase rate and assumed rate, or
    b.  By years of service, without regard for age; a non-actuarial advantage of this separation prevents the salary increases from showing a decline as members age, or
    c.  By select and ultimate; this is built using separate rates by service for the first X years of service, then aggregated by age thereafter, or built using separate rates by age for the first X years of age, then aggregated by service thereafter, or
    d.  A single rate, regardless of ages or years of service.

    An actuarial analysis for deciding which of these three approaches is preferable would be to examine the least squares or other measure of statistical best-predictors, i.e., which method does the best job of predicting (back-testing) the actual raw rates with the least statistical error.  There may be other not-so-actuarial considerations.

    The first three methods require a minimum threshold number of members in each category for actuarial credibility.  PERS has a sufficiently large number of members to "slice and dice" these ways.

2.  For each year in the experience period, the actuary can separate the salary increases (under any of the four methods above) into two components:

    a.  The actual inflation rate for that given year and
    b.  The excess of the actual total rate over the actual inflation rate; this represents the "real salary increase rate", or the portion of the increase representing merit and productivity increase, under the theory that a workers' salary increases occur to keep up with inflation, promotions and improvements in personal skills, and general productivity in the workforce.

    By separating the total increases experienced into these two components, the actuary can (a) decide on the most appropriate salary scale for merit and productivity (b) then decide separately on an a future inflation component over a mid-term horizon of future working lifetimes that is consistent with the inflation component of the investment return assumption and any other inflation-related assumptions.

    In prior actuarial valuation reports, PERS' actuary indicated the salary scale assumption was a flat 5.25% per year, comprised of 2.75% merit and 2.50% inflation.  In the 2018 actuarial valuation report, PERS' actuary indicated the salary scale assumption was (A) a flat 4.75% rate for Plan A members, comprised of 2.35% merit and 2.40% inflation and (B) a flat 4.25% rate for Plan B member, comprised of 1.85% merit and 2.40% inflation

This 2018 Experience Study (covering the 2013-2017 experience period) analyzed the actual raw rates by service (approach 1b, above) for both Plan A and Plan B members. There was no mention of analyzing salary experience by age alone or by a select and ultimate scale. The resulting actual raw rates by service for the 2013-2017 experience period exhibited a fairly flat pattern after the first three years of service.

The previous 2015 Experience Study report covered the 2010-2014 experience period, with a slightly overlapping period. That Study also analyzed the actual raw rates by service (approach 1b, above) for both Plan A and Plan B members. The resulting actual raw rates by service for the 2010-2014 experience period also exhibited a fairly flat pattern after the first three or four years of service. In fact, the actual raw rates after three years of service for the 2010-2014 period are quite close to the rates for the 2013-2017 period, partly due to the overlapping period.

After the 2015 Experience Study (2010-2014), the board adopted the actuary's recommendation for a flat 5.25% per year salary increase assumption. And after the 2018 Experience Study (2013-2017), the board adopted the actuary's recommendation for a flat 4.75% per year salary increase assumption for Plan A and a flat 4.25% per year for Plan B.

The following graph illustrates the observations and recommendations for Plan A members presented in the actuary's two successive Experience Study reports.



**Salary Increase Rates**
**Actual Raw Rates and Assumed Rates**
**For Members of Plan A**

Legend:
- ●— Actual Raw Rates 2013-2017
- ●— Assumption Derived from 2013-2017
- ■— Actual Raw Rates 2010-2014
- ■— Assumption Derived from 2010-2014

X-axis: Completed Years of Service
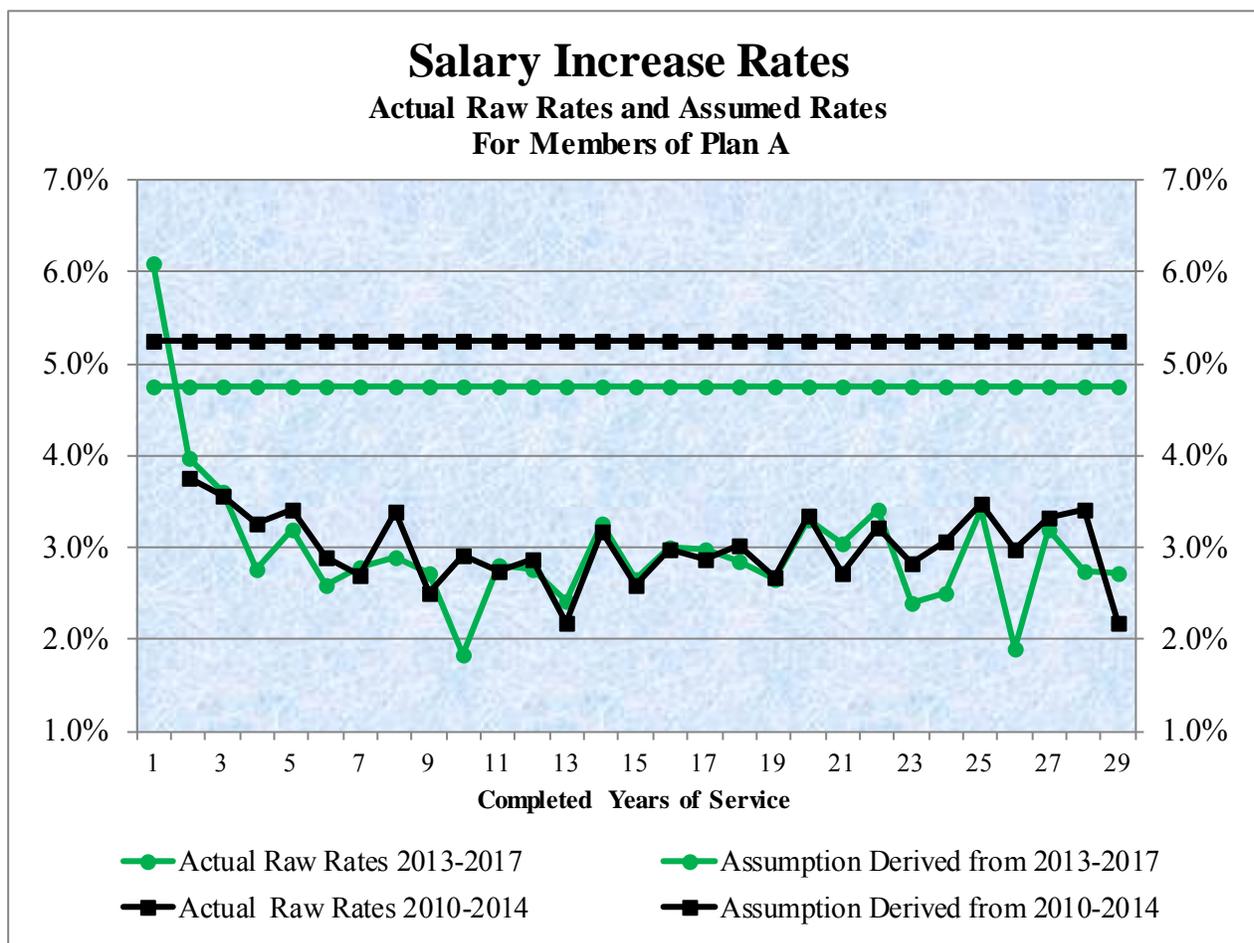
The black lines and squares represent the actual raw rates and the recommendation from the 2015 Experience Study (2010-2014), while the green lines and dots represent the actual raw rates and the recommendation from this 2018 Experience Study (2013-2017).

Notice how much higher the last assumption was (5.25%) over the 2010-2014 actual raw rates, and how much higher the current assumption is (4.75%) over the 2013-2017 raw rates. These represent a significant measure of conservatism in the assumptions (previously and currently).

Knowingly having one assumption significantly optimistic (aggressive) coupled with another assumption that is significantly pessimistic (conservative) is not consistent with the Actuarial Standards of Practice, unless the conservatism is to account for the potential for adverse deviations from otherwise expected values. Certainly, the assumptions need to be reasonable in the aggregate, but that does not allow a practice of being deliberately over on one assumption and under on another. Each assumption must stand as reasonable on its own, yet each assumption has a range of reasonableness.

Conclusion –

In our opinion most actuaries prefer to err on the side of conservatism. The consequences of understating a system's costs and liabilities by being overly aggressive in the actuarial assumptions are often thought to be worse than the consequences of being overly conservative in the assumptions. The salary increase assumptions seem high given the experience of these plans. If conservatism is desired for PERS, it would be better to achieve it by setting the investment return assumption closer to the consensus of mid-term forecasts or below it.

In the end, the actuary for the LLA considers that the approach and results for the rates of salary increase for Plan A and Plan B are not unreasonable.

# Mortality Rates

The methodology employed for developing the mortality assumption recommended by PERS' actuary in the experience study report is an improvement from the methodology employed in prior years. We commend this improvement by PERS' actuary, since the mortality assumption is now based on the most recently developed broad-based and relevant mortality tables and on reasonable applications of actuarial credibility principles.

*Credibility*

Actuarial credibility pertains to the statistical confidence in the results of an experience study for projecting future mortality rates.

For the purpose of the experience study, the credibility was assessed for the overall population with male mortality measured separately from female mortality. In order to be fully credible, the experience study for each group for which rates are developed is required to have at least 1,082 deaths during the exposure period. Furthermore, the required number of deaths for full credibility after adjusting for the system's benefit dispersion were determined to be 1,956 for males and 1,946 for females.

Based on the information in the experience study report, the data is insufficient to be fully credible since the number of deaths is 641 for males and 571 for females. This means the experience study results are only partially credible. The credibility factors were determined to be 57% for males and 54% for females.

*Base Pub-2010 Mortality Tables*

The Pub-2010 Public Retirement Plans Mortality Tables, the most recently developed broad-based mortality tables, were issued by the Retirement Plans Experience Committee (RPEC) of the Society of Actuaries. These were published in January 2019. These tables constitute the most recent and reliable standard reference tables available for purposes of national estimates of mortality for public pension plans.

The Pub-2010 mortality tables were used as the standard reference tables in determining the mortality assumption. We commend this decision by PERS' actuary. However, because Louisiana's mortality rates are higher than observed nationwide, the reference table was chosen to include a 15% load accounting for that higher state-specific mortality. Consequently the standard reference table was built by multiplying rates from the published Pub-2010 tables by 115%.

The experience study report presents the mortality information for active, annuitant, and disabled members separately. For active members, the Pub-2010 General Employee Tables were used as the standard reference tables. For annuitant members, the Pub-2010 General Healthy Retiree tables were used as the standard reference tables. For disabled retiree members, the Pub-2010 General Disabled Retiree Tables were used as the standard reference tables.

*PERS-derived adjustment factors*

PERS-derived adjustment factors to be applied to reference tables were calculated separately for the male and female annuitants (and the same factors were applied to the active members and disabled members). Due to the manner of data collection and retention, separate adjustment factors were not developed for active employees and disabled retirees.

The PERS-derived adjustment factors were developed by comparing the total observed number of deaths for the group from the experience study to the total number of deaths expected from application of the base reference mortality table for each subgroup projected to 2015, the central year of the experience study. Calculations were based on the following steps:

1. The dollar-weighted exposures at the beginning of the experience study period (January 1, 2013) were determined for each five-year age group.

2. Using the median age (for each five-year age groups), the probability of dying in the next five years was calculated using the mortality rates from the adjusted reference tables.

3. For each five-year age groups, the resulting probability (from step 2) was multiplied by the dollar-weighted exposures (from step 1) to determine the expected number of deaths.

4. The total expected number of deaths of all the age groups was then compared to the actual number of deaths over the experience study period.

5. Steps 2 through 4 were repeated several times for each gender separately by varying adjustment factors until the number of expected deaths fell within acceptable margin of the actual number.

6. Due to the plan's own experience being only partially credible, the preliminary adjustment factors from step 5 were blended with a 115% Louisiana-specific load using credibility factors of 57% for males and 54% for females. The final adjustment factors to be applied to the published Pub-2010 mortality tables and reflecting both the PERS own experience and the assumed state-specific load is <u>130%</u> for males and <u>125%</u> for females.

The Experience Study report did not include an exhibit comparing plan's experience to expectations derived using the prior assumptions. Based on data included in the report, we estimated the ratio of actual to expected number of death for the entire plan to be 98%. We were not able to independently verify all of the details pertaining to selection of the mortality table. However, based on the exhibits presented in the 2018 Experience Study report, these adjustment factors are deemed reasonable for use in actuarial valuations for the Parochial Employees' Retirement System.

*Mortality Improvement Scale*

The 2018 Experience Study report used the Society of Actuaries recommended approach – application of the generational mortality improvement scale MP-2018. We commend this decision by PERS' actuary. The improvement scale projects the mortality rates from the base year (2015) of the mortality table to future years to account for future improvement in the mortality rates. The MP-2018 improvement scale, released in October 2018, is the most recent improvement scale available as of the valuation date.

<u>Conclusion</u> -- The actuary for the LLA considers the approach and results for the mortality rates reasonable and appropriate.

# Rates of Disability

*Plan A*

The previous disability rates were those from the 21st valuation of the Railroad Retirement System for individuals with 10-19 years of service, but multiplied by 50%

In the 2018 Experience Study, disability rates were observed for both tiers (Tier 1 and Tier 2) combined. The actual disability rates during the 2013-2017 experience period were lower than the rates currently assumed. There were 134 actual disabilities while 186 were expected. PERS' actuary proposed that the multiplier be changed from 50% to 40%. The intention seems to be to lower the multiplier so that the expected disabilities come down from 186 to something closer to 134.

Page 17 of the 2018 Experience Study states that the current expected number of disabilities during the experience period is 186 (based on a 50% multiplier) while the proposed expected number of disabilities during the experience period would be 129 (based on a 40% multiplier).

- However, to obtain the actual 134 or the proposed 129 expected disabilities (for an "Expected Proposed Table"), the multiplier would need to be 36% or 35%, respectively.
- Said another way, a 40% multiplier would produce 149 expected disabilities during the experience period, not the 129 the report indicates (186 * 40% / 50%).

Conclusion – The actuary for the LLA considers the approach for the rates of disability for Plan B appropriate. In spite of the disconnect, a 40% multiplier is not unreasonable.

*Plan B*

The previous disability rates were those from the 21st valuation of the Railroad Retirement System for individuals with 10-19 years of service, but multiplied by 40%

The disability rates were observed for both tiers (Tier 1 and Tier 2) combined. The actual disability rates during the 2013-2017 experience period were lower than the rates currently assumed. There were 18 actual disabilities while 27 were expected

On page 30 of the 2018 Experience Study report the actuary proposes to lower the multiplier to 0.40.
- However, the multiplier is already at 40%.
- To obtain the actual 18 or the proposed 22 expected disabilities (for an "Expected Proposed Table"), the multiplier would need to be 27% or 33%, respectively.


Conclusion -- The actuary for the LLA considers the approach for the rates of disability for Plan B appropriate. However, the proposed multiplier should be lower than 40% to be consistent with the stated intent of PERS' actuary.

# Rates of Retirement and DROP Entry

As with most other decrements, rates of retirement from active employment can be undertaken using a few approaches. An entry to a Deferred Retirement Optional Plan (DROP) is a form of retirement as the eligibility for entering the DROP is often conditioned on meeting eligibility for retirement and, like retirement, it results in cessation of benefit accruals. Many retirement systems evaluate DROP entry and retirement together because they have similar effects on benefit accruals and liability buildup.

However, unlike many other systems outside Louisiana, PERS members are permitted to continue employment upon reaching the end of DROP period and to resume benefit accruals. For that reason, PERS' actuary has been separating rates of DROP entry from retirement and this practice is also employed for this experience study. This is a robust and explicit way to value costs and liabilities.

Retirements and DROP entry interact with each other to a much higher degree than any other decrements as many members are making a choice between these two types of retirement. It is important to develop rates for interacting decrements in a manner that is consistent with how they are being used in the valuation process. Documentation presented in the experience study report is insufficient to make a determination whether due care was taken to ensure such consistency. However, based on our prior discussions with the PERS' actuary we believe that this is the case.

As is the case with other decrements, studies of rates of retirement can be undertaken using a few approaches. A robust and explicit approach would start by determining which rate is most likely to be the best predictor of future experience, and by analyzing the rates:

1. By age, during the experience period, so that each age has its own actual raw retirement rate and assumed rate, or
2. By years of eligibility, without regard for age, or
3. By select and ultimate; this is built using separate rates by year of eligibility the first X years, then aggregated by age thereafter, or built using separate rates by age for the first X years of age, then aggregated by year of eligibility thereafter, or
4. A single retirement age, sometimes expressed in terms of eligibility for retirement (this approach is less and less common with advancements in valuation systems).

It appears that PERS' actuary focused attention on analyzing the plan retirement experience by age. Although the system actuary did not find any significant evidence for preference to retire at the first eligibility, we did not find any documentation of more extensive analysis of retirement pattern by year of eligibility.

### *Rates of Retirement – Plan A*

The retirement rates were analyzed separately for Tier 1 and Tier 2. The actual retirement rates during the experience period were generally lower for both tiers than the rates currently assumed. For Tier 1, there were 615 actual retirements while 776 were expected. For Tier 2, there were 635 actual retirements while 765 were expected. The proposed rates of retirement are lower at most ages for both tiers than the rates currently assumed.

In addition, the existing and proposed retirement rates vary based on the age without regard for the year of eligibility. Also, since there was no evidence of a preference to retire at first eligibility, no adjustments were made to age-specific retirement rates.

Conclusion -- The actuary for the LLA considers that the approach and results for the rates of retirement for Plan A are appropriate.

### *Rates of Retirement – Plan B*

The retirement rates were analyzed separately for Tier 1 and Tier 2. The actual retirement rates during the experience period were generally lower for both tiers than the rates currently assumed. For Tier 1, there were 132 actual retirements while 151 were expected. For Tier 2, there were 151 actual retirements while 162 were expected. The proposed rates of retirement are lower at younger ages and higher for older members for both tiers than the rates currently assumed.

In addition, the existing retirement rates vary based on the age and the proposed retirement rates also vary by age without regard for the year of eligibility. Also, since there was no evidence of a preference to retire at first eligibility, no multiplier was applied at the first retirement eligibility.

Conclusion -- The actuary for the LLA considers that the approach and results for the rates of retirement for Plan B are appropriate.

### *Rates of DROP Entry – Plan A*

The DROP entry rates were analyzed separately for Tier 1 and Tier 2. The actual rates during the experience period were generally lower for both tiers than the rates currently assumed. For Tier 1, there were 1,081 actual DROP entries while 1,280 were expected. For Tier 2, there were 939 actual DROP entries while 1,136 were expected. The proposed rates of DROP entry are lower at most ages for both tiers than the rates currently assumed.

The existing rates of DROP entry vary based on the age without regard for the year of eligibility and the system actuary proposed to continue this practice. Also, since there was no evidence of a preference to retire at first eligibility, no adjustments were made to age-specific retirement rates.

Conclusion -- The actuary for the LLA considers that the approach and results for the rates of DROP entry for Plan A are appropriate.

### *Rates of DROP Entry – Plan B*

The DROP entry rates were analyzed separately for Tier 1 and Tier 2. The actual rates during the experience period were generally close to those currently assumed for both tiers. For Tier 1, there were 137 actual DROP entries while 136 were expected. For Tier 2, there were 143 actual DROP entries while 141 were expected. The proposed rates of DROP entry have similar patterns to those currently assumed for both tiers.

The existing rates of DROP entry vary based on the age without regard for the year of eligibility and the system actuary proposed to continue this practice. Also, since there was no evidence of a preference to retire at first eligibility, no adjustments were made to age-specific retirement rates.

Conclusion -- The actuary for the LLA considers that the approach and results for the rates of DROP entry for Plan B are appropriate.

*DROP Participation – Both Plans*

It was previously assumed that all members entering the DROP would continue working for the maximum DROP period of three years and retire immediately after. However, some members retire before the end of the three-year DROP and some continue working as active employees as permitted after the three-year DROP. The DROP participation patterns were analyzed separately for Plan A and Plan B without separation by tier. The actual average participation period was found to be 2.69 years for Plan A and 2.74 years for plan B while 3 years were assumed for both plans. As a result, it was proposed to continue assuming that all members entering the DROP would participate for the full 3 years.

Furthermore, it was observed that 59% of Plan A DROP participants and 41% of Plan B DROP participants would retire upon completion of the 3-year period while the previous assumption was 100%. It was also found that non-retiring members of Plans A and B would, respectively, continue working for 2.87 years and 2.76 years after completing the DROP.

The proposed assumption for both plans is that all DROP entrants would stay in the program for the entire 3-year period, 50% of participants would retire at the conclusion of the 3-year period with the remaining 50% continuing for two more years.

Conclusion -- The actuary for the LLA considers that the approach and results for the DROP participation are appropriate.

*Rates of Post-DROP Retirement – Both Plans*

Members are permitted to continue working upon completion of the DROP period and accrue additional benefits. Some members elect to return to work upon separation and accrued additional benefits. PERS' actuary has been assuming different rates of retirement for this population than for members who did not previously retire. Rates of retirements for such members were analyzed for each plan separately but without separation by tier. The actual rates during the experience period were generally higher for Plan A members and slightly lower for Plan B. For Plan A, there were 413 actual DROP entries while 399 were expected. For Plan B, there were 37 actual DROP entries while 39 were expected. The proposed rates of Plan A post-DROP retirement are higher for younger members and lower for older ones than the rates currently assumed.

A flat rate of 24% was used for both plans prior to this experience study. However, emerging experience exhibited correlation to age. Consequently, the proposed rates vary by age for both plans.

Conclusion -- The actuary for the LLA considers that the approach and results for the rates of post-DROP retirements are appropriate.

# Rates of Withdrawal

*Plan A*

Withdrawal rate experience studies can be undertaken using a few approaches.  In a robust and explicit approach the actuary can separate the actual raw withdrawal rate:

    a.  By age during the experience period so that each age has its own actual raw withdrawal rate and assumed rate, or
    b.  By years of service, without regard for age, or
    c.  By select and ultimate; this is built using separate rates by service for the first X years of service, then aggregated by age thereafter, or built using separate rates by age for the first X years of age, then aggregated by service thereafter, or
    d.  A single rate, regardless of ages or years of service (this is rarely used for withdrawal rate assumptions).

An actuarial analysis for deciding which of these approaches is preferable would be to examine the least squares or other measure of statistical best-predictors, i.e., which method does the best job of predicting (back-testing) the actual raw rates with the least statistical error.  There may be other not-so-actuarial considerations.

The first three approaches require a minimum threshold number of members in each category for actuarial credibility.  PERS has a sufficiently large number of members to "slice and dice" these ways.

The Plan A withdrawal rates were observed for both tiers (Tier 1 and Tier 2) combined.  The actual withdrawal rates during the experience period were slightly lower than the rates currently assumed.  There were 5,922 actual withdrawals while 6,320 were expected.

In the 2018 Experience Study report, the proposed rates of withdrawal are the same as the current rates of withdrawal for most service durations.  However, the rates of withdrawal for some service durations were adjusted to better reflect the experience.


Conclusion -- The actuary for the LLA considers that the approach and results for the rates of withdrawal for Plan A are appropriate.

*Plan B*

The Plan B withdrawal rates were observed for both tiers (Tier 1 and Tier 2) combined. The actual withdrawal rates during the experience period were slightly lower than the rates currently assumed. There were 1,000 actual withdrawals while 1,063 were expected.

In the 2018 Experience Study report, the proposed rates of withdrawal are the same as the current rates of withdrawal for most service durations.  However, the rates of withdrawal for some service durations were adjusted to better reflect the experience.

Like the Plan A withdrawal assumptions, the immediately preceding and current 2018 actuarial valuation reports based the withdrawal rates on service alone (method b. above) for Plan B members.  The experience study report mentions that the withdrawal patterns were reviewed to determine if a

combination of age and service would be more appropriate.  However, PERS' actuary decided to continue to have the withdrawal rates vary by service durations without analysis or explanation.

Conclusion -- The actuary for the LLA considers that the approach and results for the rates of withdrawal for Plan B are appropriate.

# **Other Assumptions**

The 2018 Experience Study report also includes the following assumptions:

- Accumulated Leave Conversion (Plans A and B)
- Vesting Election Percentage (Plans A and B)

We reviewed the sections of the 2018 Experience Study report relating to the assumptions mentioned above and found them to be described with reasonable detail and careful recognition of relevant experience. Therefore, we find these assumptions mentioned appropriate.

## Actuarial Certification

This report is considered to be a Statement of Actuarial Opinion. Therefore, we make the following certification:

> I, James J. Rizzo, am a member of the American Academy of Actuaries, an Associate in the Society of Actuaries, an Enrolled Actuary, and I meet the Qualification Standards of the American Academy of Actuaries necessary to render the actuarial opinions contained herein.


_____          July 17, 2019
Janes J. Rizzo, ASA, MAAA                 Date
Senior Consultant and Actuary
Gabriel, Roeder, Smith & Company


> I, Lowell P. Good, am a member of the American Academy of Actuaries, an Associate in the Society of Actuaries, an Enrolled Actuary, and I meet the Qualification Standards of the American Academy of Actuaries necessary to render the actuarial opinions contained herein.


_____          July 17, 2019
Lowell P. Good, ASA, EA, MAAA             Date
Actuary for the Louisiana Legislative Auditor