

State of Minnesota

**Legislative Commission on Pensions
and Retirement**

**Review of Statewide Retirement Systems
2014-2018 Experience Studies and
Proposed Actuarial Assumptions**

Prepared by:

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Experience. Knowledge. Practical Advice.

April 17, 2020

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Minnesota Legislative Commission on Pensions and Retirement
55 State Office Building
100 Rev. Dr. Martin Luther King, Jr. Blvd.
St. Paul, MN 55155

Attn: Susan Lenczewski, Executive Director

Re: Review of Statewide Pension Plans' Experience Studies and Proposed Assumptions

Commission Members:

This report presents our review of the 2014-2018 actuarial experience studies for the following three statewide pension systems:

- Minnesota State Retirement System – State Employees Retirement Fund (MSRS SERF);
- Minnesota Public Employees Retirement Association – General Employees Retirement Plan (PERA GERP); and
- Minnesota Teachers Retirement Association (TRA).

These experience studies were prepared by each system's retained actuary to develop assumptions for the July 1, 2020 actuarial valuations. In each case, the proposed assumptions are based on a review of the system's experience during the four-year period from July 1, 2014 through June 30, 2018.

Each set of proposed assumptions has been approved by the system's Board, and each system has requested approval of its actuarial assumptions by the Legislative Commission on Pensions and Retirement (LCPR, or Commission) as required by Minnesota Statutes Section 356.215 Subd. 18.

We recommend the LCPR's approval of each system's proposed actuarial assumptions. The basis for our recommendation is shown in the rest of this report.

Purpose of the Study

This study was prepared at the request of the LCPR for the benefit and use of the LCPR and the State of Minnesota. Its sole purpose is to review the experience studies and proposed actuarial assumptions and methods used to value each system's actuarial liabilities. These liabilities are used by the systems to complete various computations for financial reporting and funding/contribution purposes.

This report may not be used for any other purpose, and Van Iwaarden Associates is not responsible for the consequences of any unauthorized use. Its content may not be modified, incorporated into or used in other material, or otherwise provided, in whole or in part, to any other person or entity, without our permission.

Data Used in the Analysis

The results and recommendations in this report are based on the 2014-2018 experience studies provided by MSRS SERF, PERA GERP and TRA.

Although we have reviewed the experience studies for reasonability, we have not audited the underlying data and are relying on its substantial accuracy. If any data supplied are not accurate and complete, the actuarial assumption recommendations may differ significantly.

Actuarial Certification

To the best of our knowledge, this report is complete and accurate and has been prepared in accordance with generally recognized and accepted actuarial principles and practices.

Upon receipt of the report, the LCPR should notify us if you disagree with any information contained in the report or if you are aware of any information that would affect the results that has not been communicated to us. The report will be deemed final and acceptable to the LCPR unless you immediately notify us otherwise.

The undersigned credentialed actuaries are members of the American Academy of Actuaries and meet the Academy's Qualification Standards to render the actuarial opinion contained herein. We are available to answer questions on the material contained in the report or to provide explanations or further detail, as may be appropriate. We are not aware of any financial interest or relationship that could create a conflict of interest or impair the objectivity of our work.

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Executive Summary

We recommend approval of the proposed actuarial assumptions for the following three statewide pension systems:

- Minnesota State Retirement System – State Employees Retirement Fund (MSRS SERF);
- Minnesota Public Employees Retirement Association – General Employees Retirement Plan (PERA GERP); and
- Minnesota Teachers Retirement Association (TRA).

Each set of proposed assumptions has been approved by the system’s Board for use in its July 1, 2020 actuarial valuation. In each case, the proposed assumptions are based on a review of the system’s experience during the four-year period from July 1, 2014 through June 30, 2018.

The subjective nature of experience studies and actuarial assumptions means that two actuaries can develop different recommendations, even when they are based on the same data. A case in point is price inflation: MSRS and PERA recommend lowering the assumption to 2.25% and TRA recommends keeping it at 2.50%. Both are reasonable.

None of the three systems has requested a change to its expected investment return assumption, a.k.a. the discount rate. This assumption was lowered to 7.5% for all three systems’ July 1, 2018 actuarial valuations, and it has a substantial effect on liability measurements and actuarially determined contributions. Given the funds’ investment mix, annual investment returns may be volatile and could differ substantially from expected results. We will comment on the reasonableness of the expected investment return assumption later in this report.

Experience related to other actuarial assumptions is much less volatile. Even before the proposed revisions, each system’s non-investment actuarial assumptions are quite good in the aggregate – and the revisions are just a matter of fine tuning. This can be seen by comparing the systems’ actual vs expected liabilities. We have made that comparison over the last five years, and every time the actual liabilities were within 1% of the expected liabilities. The table below shows the results:

% by which Actual Liabilities were Higher or (Lower) than Expected			
Valuation Date	MSRS SERF	PERA GERP	TRA
7/1/2019	0.1%	0.3%	(0.4%)
7/1/2018	(0.3%)	(0.1%)	(0.3%)
7/1/2017	(0.2%)	(0.5%)	0.3%
7/1/2016	0.4%	(0.1%)	(0.8%)
7/1/2015	0.2%	0.2%	(0.1%)

The rest of the report shows our comments for each actuarial assumption proposed by the systems and their retained actuaries.

Based on the available data and supporting information, we believe that the actuarial assumptions and methods recommended by the systems and their retained actuaries are reasonable estimates of future experience. We also believe that they are appropriate for determining the systems’ actuarial liabilities and calculating recommended contribution rates.

Executive Summary (continued)

Although we do not believe that any of the recommended assumptions and methods are unreasonable, we do have several recommendations for future consideration. These are summarized in the table below.

Assumption/Method Category	Additional Considerations
Economic Assumptions	<ul style="list-style-type: none"> ▪ Although different assumptions can be reasonable even when based on the same data, inter-system coordination on national assumptions like price inflation will be helpful. ▪ The 7.5% investment return assumption is still supported by long-term models but is higher than shorter term models. The system actuaries mention that both long-term and short-term returns are important for maturing pension plans like MSRS, PERA, and TRA. ▪ Reducing the price inflation assumption as proposed by MSRS and PERA but not the 7.50% nominal investment return implies that the “real” investment return (assumed return above inflation) is actually increasing from 5.00% to 5.25%.
Demographic Assumptions	<ul style="list-style-type: none"> ▪ None. In aggregate the demographic assumptions have been quite good, as indicated by the small differences between actual and expected liabilities. The systems’ requested changes are just a matter of fine tuning, and we believe they are reasonable.
Actuarial methods	<ul style="list-style-type: none"> ▪ We support the systems’ recommendations that <i>“the Minnesota Standards for Actuarial Practice be amended to be less prescriptive and more principle based so that the actuaries for the systems may use their best judgment to calculate contribution rates and liabilities in a mathematically consistent manner and in accordance with actuarial standards of practice.”</i> That recommendation will be considered in our separate review of the <i>Standards for Actuarial Work</i>. ▪ We also support the systems’ recommendations to consider¹ layered amortization of unfunded liabilities as an alternative to the current modified 30-year single amortization base: <ul style="list-style-type: none"> ○ A 30-year amortization period shifts pension costs to future taxpayers - especially when applied as a level % of payroll rather than a level dollar amount. ○ A single closed amortization period works well until the remaining years become short, at which time recommended contribution rates become volatile because any changes are spread over a shorter and shorter period.

¹ The layered option is a “recommendation to consider” not a “recommendation to change” from the actuaries.

Economic Assumptions

Economic assumptions play a significant role in determining both the estimated amount of projected retiree payments and the “present value” of those payments (i.e., the discounted actuarial liabilities).

Some of these assumptions are based on system-specific experience (e.g., salary merit increases), while others are based on general market expectations (e.g., price inflation). The most important economic assumption is the expected investment return, which is based on a set of capital market assumptions applied to a fund’s specific investment mix.

Guidance on selecting economic assumptions is provided by Actuarial Standards of Practice No. 27, Selection of Economic Assumptions for Measuring Pension Obligations (ASOP 27). When considering relevant economic assumption data, ASOP 27 outlines a recommended process for identifying and selecting reasonable assumptions. ASOP 27 also describes what it means for an assumption to be “reasonable”. This guidance is summarized below.

ASOP 27 Sections 3.2 and 3.3 Process for Identifying and Selecting Reasonable Assumptions	ASOP 27 Section 3.6 Assessing Assumption Reasonability ²
<ul style="list-style-type: none"> ▪ Consider the purpose of the measurement and the characteristics of the obligation being measured ▪ Consider the materiality of the assumption to the measurement ▪ Identify the components of the assumption ▪ Evaluate relevant data ▪ Consider factors specific to the measurement and other general factors 	<ul style="list-style-type: none"> ▪ Is it appropriate for the measurement’s purpose? ▪ Does it reflect the actuary’s professional judgement? ▪ Does it consider historical and current data that is relevant as of the measurement date? ▪ Is the assumption significantly optimistic or pessimistic? If so, for what purpose?

We believe that some of the most important economic assumption guidance is found in Section 3.4. It states that:

“...the actuary should review appropriate recent and long-term historical economic data. The actuary should not give undue weight to recent experience. The actuary should consider the possibility that some historical economic data may not be appropriate for use in developing assumptions for future periods due to changes in the underlying environment.”

This focus on forward-looking assumptions instead of solely historical data is consistent with how many investment advisory firms now develop their own capital market assumptions. It recognizes that the current and future economic environment may be significantly different than it was several decades ago when many pension plans were established.

We support relying on forward-looking data instead of purely historical experience. The latter often represents the economic conditions of a particular time period (the selection of which is subjective) and may not adequately reflect future expectations. Although forward-looking

² The characteristics of a reasonable assumption in ASOP 27, Section 3.6 are paraphrased as questions here.

Economic Assumptions (*continued*)

assumptions may also be subjective, we believe they provide a more realistic basis for developing economic assumptions.

Additional important ASOP 27 guidance includes:

- The economic assumption should be “based on the actuary’s estimate of future experience, the actuary’s observation of the estimates inherent in market data, or a combination thereof.”³
- There are a range of reasonable assumptions, and “different actuaries will apply different professional judgment and may choose different reasonable assumptions.”⁴

The remainder of this section provides a summary of each recommended economic assumption, along with our review and commentary on these proposals. These assumptions include:

- Price inflation
- Wage inflation / payroll growth
- Pay increases for merit and seniority
- Investment return

³ ASOP 27, Section 3.6.1

⁴ ASOP 27, Section 3.6.2

Economic Assumptions (continued)

Price Inflation

Price inflation is a building block for several of the other economic assumptions. Relevant guidance includes:

- ASOP 27 states that *“The actuary should review appropriate inflation data. These data may include consumer price indices, the implicit price deflator, forecasts of inflation, yields on government securities of various maturities, and yields on nominal and inflation-indexed debt”*.
- The 2010 LCPR actuarial standards require assumed price inflation to be disclosed by the retained actuary and that it should be consistent among the assumptions for which it is a component.

MSRS Price Inflation Assumption

System actuary’s recommendation: Reduce inflation assumption from 2.50% to 2.25%

System actuary’s rationale: Based on review of several data sources, including:

- Historical CPI-U data, both long-term and recent experience
- 2016 Asset Liability Study done by Callan for the SBI
- Review of capital market assumption sets from 14 investment consulting firms
- Survey of Professional Forecasters, maintained by the Federal Reserve Bank of Philadelphia
- Congressional Budget Office (CBO) publication of its Budget and Economic Outlook
- Social Security Trustees’ annual report and forecast of future CPI-W (for Urban Wage Earners and Clerical Workers)
- Comparing spreads between nominal U.S. Treasury bonds and inflation-indexed treasury securities (TIPS)

VIA review of MSRS price inflation assumption

We believe the recommended 2.25% price inflation assumption is reasonable based on the supporting information provided by the system actuary.

The system actuary cites many valid sources for their proposed reduction in long-term price inflation assumption. They take a holistic view of these data sources to inform their recommended assumption, instead of using a strictly formulaic approach.

Note that 2.25% inflation paired with the 7.50% investment return assumption implies a 5.25% future real return. See the investment return section for more details.

We believe that the system actuary’s development of the price inflation assumption meets the applicable Actuarial Standards of Practice and LCPR’s 2010 Standards for Actuarial Work. The July 1, 2018 appendix to the LCPR’s Standards for Actuarial Work will need to be amended to reflect the system’s recommendation.

Economic Assumptions (*continued*)

PERA Price Inflation Assumption

The retained actuary's Price Inflation analysis and assumption recommendation is identical to those for MSRS since they have the same retained actuary. As discussed in the prior section, we agree with their recommendation and the basis for this assumption.

TRA Price Inflation Assumption

System actuary's recommendation: No change to current 2.50% inflation assumption

System actuary's rationale: Based on review of several data sources, including:

- Historical observations of price and wage inflation statistics and investment returns
- Comparing spreads between nominal U.S. Treasury bonds and inflation-indexed treasury securities (TIPS)
- 2019 Social Security Trustees' annual report
- Future return expectations of the State Board of Investments (SBI) and their consultants
- 2018 Horizon Actuarial Services' survey of capital market assumptions
- Survey of Professional Forecasters, maintained by the Federal Reserve Bank of Philadelphia

VIA review of TRA price inflation assumption

We believe the recommended 2.50% price inflation assumption is reasonable based on the supporting information provided by the system actuary.

Similar to MSRS and PERA, the TRA retained actuary takes a holistic view of several data sources to inform their recommended assumption instead of using a strictly formulaic approach. Although this recommendation is different than MSRS and PERA, it is still a reasonable assumption and is based on a slightly different interpretation of the available data.

We believe that the system actuary's development of the price inflation assumption meets all relevant guidance.

The retained actuary also mentions that the price inflation assumption was recently reduced from 3.0% to 2.5% as part of a 2017 economic assumption review. It's understandable to not decrease this assumption again after such a short period of time.

However, it would be simpler if all three systems used the same price inflation assumption. Section I.B.(2) of the LCPR's standards for actuarial work notes that one of the standards' purposes is to *"establish sufficient uniformity of actuarial procedure that financial comparability of the retirement plans of the State of Minnesota is maximized"*. We recommend that the systems consider coordinating this assumption no later than the next quadrennial assumption review.

Economic Assumptions (*continued*)

Wage Inflation and Payroll Growth

The **wage inflation** assumption is developed by adding “real” wage inflation to price inflation. It’s used as a building block for the overall salary increase assumption.

The **payroll growth** assumption is important because it is used to amortize a plan’s unfunded liability as a level percent of payroll. If the assumption is too high, then pension costs for current workers will be shifted to future generations of taxpayers. If it’s too low and the intent is to budget as a level percent of payroll, then current taxpayers will be overcharged for pension costs⁵.

MSRS and PERA use identical wage inflation and payroll growth assumptions in all future years. TRA uses separate non-level wage inflation and level payroll growth assumptions.

Relevant guidance includes:

- ASOP 27 recommends that the actuary consider “*historical compensation increases and practices of the plan sponsor and other plan sponsors in the same industry or geographic area; and historical national wage increases and productivity growth*”.
- ASOP 27 also mentions that actuaries should use a payroll growth assumption “*that is consistent but typically not identical to the compensation increase assumption. One approach may be to ... reduce the compensation increase assumption by the effect of any assumed merit increases.*”
- The 2010 LCPR actuarial standards have no specific wage inflation or payroll growth guidance for the MSRS SERF, PERA GERP or TRA, other than a payroll growth definition in section VI.B.(3).

MSRS Wage Inflation / Payroll Growth Assumption

System actuary’s recommendation: Reduce wage inflation/payroll growth from 3.25% to 3.00%

System actuary’s rationale: Based on reviewing several data sources, including:

- Historical National Average Earnings and CPI-U, both long-term and recent data
- 2019 Social Security Trustees report
- Review of system wage increase data for long-service workers whose annual pay increases are driven almost entirely by wage inflation

⁵ Our commentary is specific to the level percent of payroll amortization method. Note that the level dollar amortization method is a reasonable alternative that effectively uses a 0% payroll growth assumption, but it has a significantly different cost pattern.

Economic Assumptions (continued)

VIA review of MSRS wage inflation / payroll growth assumption

We believe the recommended 3.00% wage inflation / payroll growth assumption is reasonable, based on the supporting information provided by the system actuary.

The system actuary cites valid sources for their proposed reduction in assumed long-term wage inflation. They recommend retaining the same 0.75% real wage growth as before, when combined with the reduced price inflation assumption.

Some retirement systems use separate wage inflation and payroll growth assumptions, but these are usually very similar and often identical. We believe the MSRS retained actuary's use of the same assumption for both purposes is reasonable and consistent with a stable population. It would be helpful to include a summary of the system's historical payroll growth in the next experience study for comparative purposes.

We believe that the system actuary's development of the wage inflation/payroll growth assumptions meets the applicable Actuarial Standards of Practice. The July 1, 2018 appendix to the LCPR's standards for actuarial work will need to be amended to reflect the system's recommendation.

PERA Wage Inflation / Payroll Growth Assumption

The retained actuary's wage inflation / payroll growth analysis and assumption recommendation is identical to those for MSRS since they have the same retained actuary. As discussed in the prior section, we agree with their recommendation and the basis for this assumption.

TRA Wage Inflation and Payroll Growth Assumptions

System actuary's recommendation: No change to current wage inflation or payroll growth assumptions:

- Wage inflation 2.85% through 2028, then 3.25%
- Payroll growth 3.00% for all years

System actuary's rationale: Based on review of several data sources, including:

- Historical National Average Earnings and CPI-U, both long-term and recent data
- Review of historical system wage increase data
- 2019 Social Security Trustees report

Economic Assumptions (continued)

VIA review of TRA wage inflation and payroll growth assumption

We believe the recommended wage inflation and payroll growth assumptions are reasonable based on the supporting information provided by the system actuary.

Similar to MSRS and PERA, the TRA retained actuary takes a holistic view of several data sources to inform their recommended assumptions instead of using a strictly formulaic approach. Although these recommendations are different than MSRS or PERA, they are still reasonable assumptions and are based on a slightly different interpretation of the available data. The use of separate wage inflation and payroll growth assumptions is also reasonable and supported by plan-specific data included in the report.

We believe that the system actuary's development of the wage inflation and payroll growth assumptions meets all relevant guidance.

The retained actuary also mentions that the wage inflation and payroll growth assumptions were recently reduced as part of a 2017 economic assumption review. It's understandable to not decrease this assumption again after such a short period of time.

Economic Assumptions (continued)

Pay Increases for Merit and Seniority

Pay increases for merit and seniority are in addition to price and wage inflation. It's an important assumption for all three statewide pension systems because members' benefits are based on final average salary at retirement or other termination of employment. Liabilities and contributions are based on members' projected benefits.

Assumed merit and seniority pay increases are much more system-specific than wage inflation assumptions. Relevant guidance includes:

- ASOP 27 recommends that, when developing compensation increase assumptions, the actuary should consider *“the plan sponsor’s current compensation practice and any anticipated changes in this practice; [and] current compensation distributions by age or service”*.
- The 2010 LCPR actuarial standards section VI.B.(2) provides specific guidance on how overall compensation increases should be analyzed (e.g., only measuring salary changes for members who are active on consecutive valuation dates). The implied merit and seniority factors can then be determined by subtracting the wage inflation assumption from the overall salary increase results.

MSRS Merit and Seniority Pay Increase Assumption

System actuary’s recommendation: Adjust the merit and seniority pay increase table to reflect 2014-18 experience. Proposed rates are about equal to current rates on average, with slightly lower increases for very short service members and slightly higher increases for long service members.

System actuary’s rationale: Proposed rates are adjusted from current rates to reflect observed experience:

- Gross salary increases, including wage inflation, were about 0.25% lower than expected.
- Assumed wage inflation is recommended to be reduced by about 0.25%.
- Net merit and seniority pay increases were about equal to expected, on average.
- Reallocate rates to reflect observed 2014-18 experience.

VIA review of MSRS Merit and Seniority Pay Increase assumption

We believe the recommended merit and seniority pay increase table is reasonable, based on the supporting information provided by the system actuary.

The system actuary cites valid sources for their proposed changes to the merit and seniority pay increase table. Net increase rates are about equal to current rates, on average. The retained actuary’s experience study contains a helpful chart on page C-4 illustrating the proposed adjustments.

We believe that the system actuary’s development of the merit and seniority pay increase table meets the applicable Actuarial Standards of Practice. The analysis is also consistent with the processes specified in the LCPR’s 2010 Standards of Actuarial Work. The July 1, 2018 appendix to the LCPR’s standards will need to be amended to reflect the system’s recommended changes.

Economic Assumptions (*continued*)

PERA Merit and Seniority Pay Increase Assumption

Although the overall pay increases for PERA members were slightly lower than for MSRS, the PERA retained actuary's recommended merit and seniority changes were based on a similar process and rationale. The proposed PERA rates are about equal to current rates on average, with slightly lower increases for very short service members and slightly higher increases for long service members. The retained actuary's experience study contains a helpful chart on page C-4 illustrating the proposed adjustments.

As discussed in the prior section, we agree with their recommendation and the basis for this assumption.

TRA Merit and Seniority Pay Increase Assumption

System actuary's recommendation: No change to current merit and seniority pay increase table.

System actuary's rationale: Actual gross pay increase rates were lower than expected over the 2014-18 observation period, by about the same margin by which inflation was lower than expected.

VIA review of TRA Merit and Seniority Pay Increase assumption

We believe the recommended merit and seniority pay increase table is reasonable, based on the supporting information provided by the system actuary. Their conclusions are supported and illustrated in a chart on page 35 of their report.

We believe that the system actuary's development of the merit and seniority pay increase table meets the applicable Actuarial Standards of Practice. The analysis is also consistent with the processes specified in the LCPR's 2010 Standards of Actuarial Work.

Economic Assumptions (*continued*)

Investment Return

The assumed investment return is one of the most important assumptions affecting the pension liability calculation. A high investment return assumption implies that higher investment returns (and lower contributions) will pay for future retiree benefits. A low investment return assumption implies that higher contributions are needed to fund future retiree payments.

If the assumed investment return is too high, then pension costs for current workers will be shifted to future workers, employers and taxpayers. If it's too low, then current workers and taxpayers will be overcharged for pension costs.

Relevant guidance includes:

- ASOP 27 provides substantial guidance on the data and statistical measures to be used when developing an investment return assumption. However, as mentioned earlier, we believe that some of the most instructive guidance is that

“...the actuary should review appropriate recent and long-term historical economic data. The actuary should not give undue weight to recent experience. The actuary should consider the possibility that some historical economic data may not be appropriate for use in developing assumptions for future periods due to changes in the underlying environment.”

- The LCPR's 2010 Actuarial Standards specify that *“The recommendation for the investment return assumption shall be based on analysis of the expected return in future years based on the target asset allocation and the capital market assumptions for each of those asset classes.”*

The Standards also state that *“The experience study report shall include capital market assumptions and expected return information provided by the State Board of Investment as well as other assumptions deemed appropriate by the Actuary. The recommendation for the investment return assumption shall disclose the underlying inflation assumption...”*

Investment Return Assumption

The SBI, systems and retained actuaries have all prepared thorough investment return analyses. The current 7.5% investment return assumption for all three plans is set by Minnesota statute.

Our models and those of the system actuaries indicate that, with the current 2.50% inflation assumption (or the proposed MSRS and PERA 2.25% inflation assumption), a 7.5% investment return assumption is near the median expected nominal return in the long term – and above median in the short term. **All the system actuaries mention that both long-term and short-term returns are important for maturing pension plans like MSRS, PERA, and TRA.**

When an investment assumption is at the median this means that there is a 50% likelihood that future returns will meet or exceed the assumption. When the assumption is “above median” this means that there is a less than 50% likelihood the assumption will be achieved over time.

Economic Assumptions (continued)

Reducing the price inflation assumption as proposed by MSRS and PERA but not the 7.50% nominal investment return implies that the “real” investment return (assumed return above inflation) is actually increasing from 5.00% to 5.25%.

None of the systems or actuaries have requested a change at this time, and we believe 7.5% still falls within a reasonable range. For now, we are comfortable with a 7.5% investment return assumption and believe it is supported by the information in the system actuaries’ reports.

We believe that the system actuaries’ rationale for the investment return assumption meets the applicable Actuarial Standards of Practice. Their analyses are also consistent with the process specified in section VI.B.(1) of the LCPR’s 2010 Standards of Actuarial Work.

Demographic Assumptions

Demographic assumptions play a significant role in determining the likelihood of projected retiree payments, when they will start and end, and the resulting “present value” of those payments (i.e., the actuarial liabilities).

Some of these assumptions are based on system-specific experience (e.g., retirement rates) while others are based on statistics for a larger group (e.g., disabled mortality), especially when the system’s data set over the study period isn’t large enough to be “credible” on its own. An important demographic assumption is healthy retiree mortality, which can be partially or fully based on system data for large groups like MSRS, PERA and TRA.

Guidance on selecting demographic assumptions is provided by Actuarial Standards of Practice No. 35, Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations (ASOP 35). When considering relevant demographic assumption data, ASOP 35 outlines considerations for identifying and selecting reasonable assumptions. ASOP 35 also describes what it means for an assumption to be “reasonable”. This guidance is summarized below.

ASOP 35 Sections 3.2, 3.3.1 and 3.3.2 Considerations for Identifying and Selecting Reasonable Assumptions	ASOP 35 Section 3.3.5 Assessing Assumption Reasonability ⁶
<ul style="list-style-type: none"> ▪ The purpose of the measurement ▪ The plan provisions that will affect the timing and value of benefit payments ▪ The contingencies that give rise to benefit payments ▪ The significance of each assumption ▪ The characteristics of the covered group ▪ The universe of available assumptions, e.g., published tables or system experience studies 	<ul style="list-style-type: none"> ▪ Is it appropriate for the measurement’s purpose? ▪ Does it reflect the actuary’s professional judgement? ▪ Does it consider historical and current data that is relevant as of the measurement date? ▪ Is the assumption significantly optimistic or pessimistic? If so, for what purpose?

Additional important ASOP 35 guidance includes:

- The demographic assumptions should reflect “the actuary’s estimate of future experience, the actuary’s observation of the estimates inherent in market data ..., or a combination thereof.”⁷
- There are a range of reasonable assumptions, and “different actuaries will apply different professional judgment and may choose different reasonable assumptions.”⁸

⁶ The characteristics of a reasonable assumption in ASOP 35, Section 3.3.5 are paraphrased as questions here.

⁷ ASOP 35, Section 3.3.5.d.

⁸ ASOP 35, Section 3.4

Demographic Assumptions (*continued*)

The remainder of this section provides a summary of each recommended demographic assumption, along with our review and commentary on these proposals. These assumptions include:

- Retirement rates
- Withdrawal (a.k.a. turnover, termination before retirement eligibility)
- Disability
- Mortality
- Other demographic/non-economic assumptions

Demographic Assumptions (*continued*)

Retirement

Retirement rates are a key assumption for all three statewide pension systems because they determine when members' benefits are expected to begin. That has a substantial effect on liabilities and contributions.

Retirement rates are entirely system-specific and heavily influenced by plan provisions. Relevant guidance includes:

- ASOP 35 recommends the actuary consider job-related factors, plan design and incentives, social insurance programs like Social Security and Medicare, and the availability of other employer plans like savings plans and postretirement health coverage.
- Section II.C.(2) of the 2010 LCPR actuarial standards requires retirement rates to be based on gender, age and/or years of service, or duration of eligibility unless experience shows otherwise. Section II.D.(4) requires that members active beyond the latest assumed retirement age are assumed to work one year beyond the valuation date.
- Section VI.C. of the 2010 LCPR actuarial standards specifies the process to be followed when the retained actuaries evaluate demographic assumptions.

MSRS Retirement Rates

System actuary's recommendation:

- Amend the LCPR actuarial standards to assume immediate retirement for members over age 70, rather than a one-year delay.
- Increase the rate of assumed unreduced retirements (i.e., Normal Retirement) at ages 66, 67 and 69.
- Lower the assumed Rule of 90 retirement rates at all ages except age 55 (slight increase) and age 57 (no change).
- Adjustments to early retirement rates for Tier 1 and Tier 2 members, generally resulting in fewer proposed early retirements.

System actuary's rationale: Proposed rates are adjusted from current rates to reflect observed 2014-18 experience. In general, proposed rates lie between current rates and observed experience. Measurement is on a liability-weighted basis, to reduce the (already small) gap between expected and actual retirement liabilities.

The system actuary also recommends no change to the retirement assumption for terminated vested members⁹. They provide commentary that the effect of this assumption is relatively minor since benefits are actuarially adjusted for any early retirements.

⁹ Current assumption is that these members will choose a refund of employee contributions if greater than the actuarial value of a deferred annuity. Those expected to elect an annuity are assumed to defer receipt until normal retirement age.

Demographic Assumptions (continued)

VIA review of MSRS Retirement Rates

We believe the recommended retirement rates are reasonable, based on the supporting information provided by the system actuary.

The system actuary has shown a thoughtful analysis of retirement rate experience. The proposed amendment to LCPR standards would allow implementation of best practices.

We believe that the system actuary's development of proposed retirement rates meets the applicable Actuarial Standards of Practice and the 2010 LCPR Actuarial Standards. However, the LCPR's standards for actuarial work will need to be amended to reflect the system actuary's immediate retirement assumption recommendation for members over age 70.

PERA Retirement Rates

System actuary's recommendation:

- Amend the LCPR actuarial standards to assume immediate retirement for members over age 70, rather than a one-year delay.
- Increase the rate of assumed unreduced retirements (i.e., Normal Retirement) at all ages.
- Slightly lower the assumed Rule of 90 retirement rates at ages 61 and 62.
- Slight adjustments to early retirement rates for Tier 1 and Tier 2 members.

System actuary's rationale: Proposed rates are adjusted from current rates to reflect observed 2014-18 experience. In general, proposed rates lie between current rates and observed experience. Measurement is on a liability-weighted basis, to reduce the (already small) gap between expected and actual retirement liabilities.

The retirement assumption for terminated vested members is the same as for MSRS, and the system actuary recommends no changes for the same reasons.

VIA review of PERA Retirement Rates

We believe the recommended retirement rates are reasonable, based on the supporting information provided by the system actuary.

The system actuary has shown a thoughtful analysis of retirement rate experience. The proposed amendment to LCPR standards would allow implementation of best practices.

We believe that the system actuary's development of proposed retirement rates meets the applicable Actuarial Standards of Practice and the 2010 LCPR Actuarial Standards. However, the LCPR's standards for actuarial work will need to be amended to reflect the system actuary's immediate retirement assumption recommendation for members over age 70.

Demographic Assumptions (*continued*)

TRA Retirement Rates

System actuary's recommendation: No change to current rates.

System actuary's rationale: Current rates have been fairly close to observed 2014-18 experience for Tier 1 unreduced retirements and Tier 2 early retirements. Although Tier 2 unreduced retirement and Tier 1 early retirement experience was lower than expected, the system actuary referenced other factors (e.g., liability-weighted results and the diminishing size of the Tier 1 group) as justification for keeping these assumptions unchanged. Because the TRA member group is fairly homogeneous, the measurements shown in the report are on a count-weighted rather than a liability-weighted basis.

The system actuary also recommends no change to the retirement assumption for inactive vested members¹⁰. They provide commentary that the effect of this assumption is relatively minor since benefits are actuarially adjusted for any early retirements.

VIA review of TRA Retirement Rates

We believe the recommended retirement rates are reasonable, based on the supporting information provided by the system actuary.

The system actuary has shown a thoughtful analysis of retirement rate experience. We believe that the system actuary's recommendations meet the applicable Actuarial Standards of Practice and the 2010 LCPR Actuarial Standards.

¹⁰ Current assumption is that these members will choose a refund of employee contributions if greater than the actuarial value of a deferred annuity. Those expected to elect an annuity are assumed to defer receipt until normal retirement age.

Demographic Assumptions (continued)

Withdrawal (a.k.a. turnover, termination before retirement eligibility)

Withdrawal rates are an important assumption because they determine the extent to which members are expected to stay in covered employment and become eligible for benefits. That has a substantial effect on liabilities and contributions.

Withdrawal rates are entirely system-specific and heavily influenced by plan provisions. Relevant guidance includes:

- ASOP 35 recommends that, when developing withdrawal rates, the actuary should consider plan provisions as well as job-related factors like occupation, employment policies, work environment, unionization, hazardous conditions, and location.
- Section II.C.(2) of the 2010 LCPR actuarial standards requires withdrawal rates to be based on gender, age and/or years of service, or duration of eligibility unless experience shows otherwise.
- Section VI.C. of the 2010 LCPR actuarial standards specifies the process to be followed when the retained actuaries evaluate demographic assumptions

MSRS Withdrawal Rates

System actuary's recommendation: Rates slightly lower than current rates during the first several years of employment and slightly higher in later years.

System actuary's rationale: Proposed rates are adjusted from current rates to reflect observed 2014-18 experience. In general, proposed rates lie between current rates and liability-weighted experience. Measurement is on a liability-weighted basis, to reduce the (already small) gap between expected and actual termination experience.

VIA review of MSRS Withdrawal Rates

We believe the recommended withdrawal rates are reasonable, based on the supporting information provided by the system actuary. Their continued use of separate gender-specific, service-based tables seems appropriate based on the data available.

The system actuary has shown a thoughtful analysis of withdrawal rate experience. We believe that the system actuary's development of proposed withdrawal rates meets the applicable Actuarial Standards of Practice and the 2010 LCPR Actuarial Standards.

PERA Withdrawal Rates

The PERA findings and rationale are similar to MSRS. As discussed in the prior section, we agree with their recommendation and the basis for this assumption.

Demographic Assumptions (continued)**TRA Withdrawal Rates**

System actuary's recommendation: Slightly reduce withdrawal rates in the first five years of employment.

System actuary's rationale: Proposed rates are adjusted from current rates to reflect observed 2014-18 experience. In general, proposed rates lie between current rates and count-weighted experience and are expected to slightly refine the very small gap between actual and expected experience.

VIA review of TRA Withdrawal Rates

We believe the recommended withdrawal rates are reasonable, based on the supporting information provided by the system actuary. Their continued use of separate gender-specific, service-based tables seems appropriate based on the data available.

The system actuary has shown a thoughtful analysis of withdrawal rate experience. We believe that the system actuary's development of proposed withdrawal rates meets the applicable Actuarial Standards of Practice and the 2010 LCPR Actuarial Standards.

Demographic Assumptions (continued)

Disability

Rates of disablement and disability recovery are significant assumptions for police, firefighters and other safety plans because incidence can be high and benefits are substantial. The rates determine the extent to which members are assumed to become and remain eligible for benefits.

For general plans like MSRS SERF, PERA GERP and TRA, disability incidence is lower and its effect on liabilities and contributions is small.

Relevant guidance for disability rates includes:

- ASOP 35 recommends that, when developing disability rates, the actuary should consider:
 - the plan's definition of disability, e.g. whether it's based on the Social Security definition or a less stringent standard, and
 - the potential for recovery. The probability of recovery may be reflected by assuming a lower incidence of disability than the actuary might otherwise assume.
- Section II.C.(2) of the 2010 LCPR actuarial standards requires disability rates to be based on gender, age and/or type of disability (occupational or not) unless experience shows otherwise. Disability rates are not included in the 2018 appendix.
- Section VI.C. of the 2010 LCPR actuarial standards specifies the process to be followed when the retained actuaries evaluate demographic assumptions.

MSRS Disability Rates

System actuary's recommendation: Rates slightly lower than current rates.

System actuary's rationale: Proposed rates are adjusted from current rates to reflect observed 2014-18 experience which was lower than expected. In general, proposed rates lie between current rates and observed experience.

VIA review of MSRS Disability Rates

We believe the recommended disability rates are reasonable, based on the supporting information provided by the system actuary. Their continued use of separate gender-specific tables also seems appropriate based on the data available

The system actuary has shown a thoughtful analysis of disability experience, and they acknowledge that disability rates have a very minor effect on the plan's liabilities. We believe that the system actuary's development of proposed disability rates meets the applicable Actuarial Standards of Practice and the 2010 LCPR Actuarial Standards.

Demographic Assumptions (*continued*)

PERA Disability Rates

The PERA findings and rationale are similar to MSRS. As discussed in the prior section, we agree with their recommendation and the basis for this assumption.

TRA Disability Rates

System actuary's recommendation: No change to current rates.

System actuary's rationale: Expected disabilities from the current rates were close to observed 2014-18 experience. With low disability incidence, some volatility is to be expected. They also state that they examined separate male/female experience but that the results did not support gender-specific results.

VIA review of TRA Disability Rates

We believe the recommended disability rates are reasonable, based on the supporting information provided by the system actuary.

Although the provided data demonstrate the very small effect of the disability assumption, it would be helpful if the system actuary's future experience studies included additional age-specific experience analysis similar to what's shown in Appendices C and D for the other demographic assumptions.

The system actuary has shown a thoughtful analysis of disability rate experience, and they acknowledge that disability rates have a very minor effect on the plan's liabilities. We believe that the system actuary's development of proposed disability rates meets the applicable Actuarial Standards of Practice and the 2010 LCPR Actuarial Standards.

Demographic Assumptions (continued)

Mortality

Mortality rates are an important assumption for all three statewide pension systems because they determine how long members' benefits are expected to last. That has a substantial effect on liabilities and contributions.

While mortality rates can be entirely system-specific for very large plans, most plans use a variation of published tables. Relevant guidance includes:

- ASOP 35 recommends that, when developing mortality rates, the actuary should consider:
 - the possible use of different assumptions before and after retirement,
 - the use of a different assumption for disabled lives,
 - the use of different assumptions for different participant subgroups and beneficiaries, and
 - the effect of mortality improvement both before and after the measurement date.
- Section II.C.(2) of the 2010 LCPR actuarial standards requires mortality rates (pre-retirement, post-retirement, and survivor) to be based on gender and age unless experience shows otherwise.
- Section VI.C. of the 2010 LCPR actuarial standards specifies the process to be followed when the retained actuaries evaluate demographic assumptions.

MSRS Mortality Rates

System actuary's recommendation: Change the base mortality table to the Pub-2010 General mortality table, with rates adjusted to better fit observed plan experience and with future improvement projected using scale MP-2018. The recommended table adjustments are gender-distinct and vary for the following participant groups:

- Active members (i.e., pre-retirement mortality)
- Healthy retirees (i.e., post-retirement mortality)
- Disabled retirees

System actuary's rationale: Proposed rates are adjusted from current rates to reflect observed 2014-18 experience. Healthy retiree deaths were slightly higher than expected for males at most ages, lower for females under 75 and higher for females over 75.

Disabled retiree mortality (both male and female) varied substantially above and below expectations for different age groups. However, volatility is expected since there are relatively few disabled retirees. Active member mortality for males was lower than expected but female mortality was generally higher than expected.

Measurement for retirees is on a benefit-weighted basis, to reflect the nationwide observation that longevity is highly correlated with income. Active member measurements are liability weighted. In general, proposed rates lie between current rates and observed experience.

Demographic Assumptions (continued)**VIA review of MSRS Mortality Rates**

We believe the recommended mortality rates are reasonable, based on the supporting information provided by the system actuary.

The system actuary has shown a thorough analysis of mortality rate experience. Although the proposed rates may not perfectly match the system's experience, they appear reasonable based on the available data and expected volatility. We also support their recommended generational mortality improvement scale and use of benefit- and liability-weighted analysis.

Separate beneficiary/survivor mortality tables were not recommended because of potential anti-selection bias and additional data needs outside the scope of the annual valuation process. We believe this is a reasonable justification, especially since survivors are a relatively small proportion of the plan population.

We believe that the system actuary's development of proposed mortality rates meets the applicable Actuarial Standards of Practice and the 2010 LCPR Actuarial Standards. The July 1, 2018 appendix to the LCPR's standards for actuarial work will need to be amended to reflect the system's recommendation. The plan's actuarial equivalence factors will also need to be amended to reflect the proposed mortality change.

Demographic Assumptions (*continued*)

PERA Mortality Rates

System actuary's recommendation: Change the base mortality table to the Pub-2010 General mortality table, with rates adjusted to better fit observed plan experience and with future improvement projected using scale MP-2018. Similar to MSRS, the recommended table adjustments are gender-distinct and vary for the following participant groups:

- Active members (i.e., pre-retirement mortality)
- Healthy retirees (i.e., post-retirement mortality)
- Disabled retirees

System actuary's rationale: Proposed rates are adjusted from current rates to reflect observed 2014-18 experience. Overall healthy male retiree deaths were close to expected, with variation at different age bands. Healthy female mortality was much lower under age 80 and much higher over age 80.

Disabled male retiree and active male member deaths were close to expected. Disabled female and active female member deaths were lower than expected.

Measurement for retirees is on a benefit-weighted basis, to reflect the nationwide observation that longevity is highly correlated with income. Active member measurements are liability weighted. In general, proposed rates lie between current rates and observed experience.

VIA review of PERA Mortality Rates

We believe the recommended mortality rates are reasonable, based on the supporting information provided by the system actuary.

The system actuary has shown a thorough analysis of mortality rate experience. Although the proposed rates may not perfectly match the system's experience, they appear reasonable based on the available data and expected volatility. We also support their recommended generational mortality improvement scale and use of benefit- and liability-weighted analysis.

Separate beneficiary/survivor mortality tables were not recommended because of potential anti-selection bias and additional data needs outside the scope of the annual valuation process. We believe this is a reasonable justification, especially since survivors are a relatively small proportion of the plan population.

We believe that the system actuary's development of proposed mortality rates meets the applicable Actuarial Standards of Practice and the 2010 LCPR Actuarial Standards. The July 1, 2018 appendix to the LCPR's standards for actuarial work will need to be amended to reflect the system's recommendation. The plan's actuarial equivalence factors will also need to be amended to reflect the proposed mortality change.

Demographic Assumptions (*continued*)

TRA Mortality Rates

System actuary's recommendation: For healthy retirees, no change to current rates based on RP-2014 white collar table with generational improvements. For disabled retirees, no change to current rates based on RP-2014 disabled lives table without generational improvements. For active members, higher mortality rates for males and lower rates for females.

System actuary's rationale: Current post-retirement rates have been fairly close to observed 2014-18 experience, and any adjustment would require a change in the optional benefit factors. The actuary also considered use of the new PubT-2010 Teacher mortality but chose not to use it because it did not produce better results than the current assumption.

The disabled retiree mortality assumption was not adjusted because of its small liability effect and the lack of meaningful data. The pre-retirement assumptions were slightly adjusted based on recent experience, but these have a small effect on plan liabilities. Because the TRA member group is fairly homogeneous, all measurements were on a count-weighted rather than a liability-weighted basis.

VIA review of TRA Mortality Rates

We believe the recommended mortality rates are reasonable, based on the supporting information provided by the system actuary. Although the RP-2014 mortality table may not appear as current as the PubT-2010 table, we support the actuary's evaluation and conclusion that the RP-2014 provides a better "fit" to the plan's experience. We also support their use of generational mortality improvement for non-disabled retirees, and their rationale for using a headcount-weighted analysis instead of a liability-weighted study.

Separate beneficiary/survivor mortality tables were not recommended because of limited available data. We believe this is a reasonable justification, especially since survivors are a relatively small proportion of the plan population.

The system actuary has shown a thorough analysis of mortality rate experience. We believe that the system actuary's development of proposed mortality rates meets the applicable Actuarial Standards of Practice and the 2010 LCPR Actuarial Standards. The July 1, 2018 appendix to the LCPR's standards for actuarial work will need to be amended to reflect the system's recommendation.

Demographic Assumptions (continued)

Other Demographic Assumptions

There are several other demographic assumptions used to calculate each system's actuarial liability, but they have less effect on costs than the assumptions previously discussed. MSRS, PERA, and TRA have recommended adjustments to several of these assumptions, to reflect observed 2014-18 experience.

The proposed changes have a fairly small effect on liabilities and the system actuary's recommendations are well supported. These assumptions and recommended actions are summarized in the table below.

Miscellaneous and Technical Assumptions ¹¹	MSRS	PERA	TRA
Marital status	Update	No change	No change
Beneficiary age	Update	Update	No change
Payment form	Update	Update	Update
Actuarial equivalence factors	Update	Update	No change
Miscellaneous assumptions			
Benefit service calculation	No change	No change	N/A
Decrement operation	No change	No change	N/A
Decrement timing	No change	No change	No change
Eligibility testing	No change	No change	N/A
Forfeitures/contribution refunds	No change	No change	No change
Contribution timing	No change	No change	N/A
Combined service annuity adjustments	No change	No change	No change
Pay increase timing	No change	No change	N/A
Service credit accruals	No change	No change	N/A
Missing data	N/A	N/A	No change

We have one small technical observation regarding the payment form assumptions in the MSRS and PERA experience studies. We noticed that some of the current payment form assumption rates shown on pages I-3 and I-4 of the MSRS and PERA reports are not consistent. The retained actuary confirmed that the male rates on page I-3 of the MSRS study are correct and that there are some typos in the page I-4 rates. They also confirmed that the current male and female rates on page I-4 of the PERA study are correct while those on I-3 are not. In both cases, the retained actuary confirmed that their recommended new rates are unaffected by these discrepancies.

¹¹ Assumptions marked with an "N/A" either did not apply to the valuation or were not specifically analyzed by the system actuary.

Actuarial Methods

The calculation of recommended contributions relies on several actuarial methods for determining the unfunded liability as well as developing an actuarial contribution that is intended to pay down (i.e., “amortize”) the unfunded liability. They include:

- Asset valuation method
- Actuarial funding method
- Unfunded liability amortization period and method
- Post-retirement benefit increases (PERA only¹²)
- Projected payroll

Most of these methods are prescribed by State Statute or the LCPR’s 2010 Actuarial Standards. Selecting some of these methods is also influenced by ASOPs or other guidance, including:

- ASOP 4, Measuring Pension Obligations and Determining Pension Plan Costs or Contributions
- ASOP 44, Selection and Use of Asset Valuation Methods for Pension Valuations
- The Society of Actuaries Report of the Blue Ribbon Panel on Public Pension Plan Funding
- Conference of Consulting Actuaries Public Plans Community - Actuarial Funding Policies and Practices for Public Pension Plans

Although the latter two documents are non-binding for the actuarial profession, they provide useful considerations when selection actuarial funding methods.

With two exceptions, each system’s actuary has recommended continuing the current methods. We agree. The exceptions are projected payroll and amortization of unfunded liabilities.

Projected payroll

The actuary for MSRS and PERA has noted that the LCPR’s 2010 Actuarial Standards prescribe a projected payroll calculation that is not consistent with best practices. We agree with this conclusion, and we also agree with the request that the standards be less prescriptive and more principles based. Our detailed comments on the standards will be included in a separate review.

¹² PERA’s post-retirement benefit increases are based on future Social Security Cost-of-Living Adjustments (COLAs), so an assumption is needed regarding what these future COLAs will be. MSRS and TRA have fixed COLAs.

Actuarial Methods (*continued*)

Unfunded liability amortization period and method

The actuaries for MSRS, PERA and TRA have all recommended considering¹³ “layered” amortization rather than amortizing unfunded liabilities over a single “closed” period ending in 2048. We agree because:

- A 30-year amortization period shifts pension costs for current workers to future taxpayers, especially when applied as a level percent of payroll rather than a level dollar amount. Modern actuarial funding policies generally target an amortization period of fewer than 30 years (e.g., 20 years).
- A single closed amortization period works well until the remaining years become short, at which time recommended contribution rates become volatile because any changes are spread over a shorter and shorter period.

With some notable exceptions, most public pension systems use a level percent of payroll method for paying down their unfunded liabilities. This can work well as long as actual payroll grows as fast as the assumption used to calculate the annual payment growth rate.

All of the systems’ retained actuaries recommend maintaining the level percent of payroll amortization method. However, the MSRS and PERA retained actuary advises closely monitoring actual plan payroll growth so that current payment levels aren’t set too low. We agree with maintaining the current amortization method as long as the assumed payment growth rate is supported by actual payroll growth experience and future expectations.

Adopting the layered amortization recommendation will require amending not only the LCPR’s Standards for Actuarial Work, but also Minnesota statutes. We understand that’s not simple, but this change will help to protect workers’ pensions and control costs for Minnesota taxpayers.

¹³ The layered amortization option is a “recommendation to consider” not a “recommendation to change” from the systems’ actuaries.

Cost Impact

Section VI.E. of the LCPR's 2010 Actuarial Standards specifies that the systems must measure the cost impact of any assumption change. The measurement must present the change in "*the dollar amount of the UAAL, the change in the Actuarial Liability Funded Ratio, the change in the normal cost rate and the change in the UAAL contribution rate.*"

The Standards are also very specific that the assumption changes be measured in the following order:

1. Mortality
2. Retirement
3. Termination of employment
4. Disability
5. Salary increases
6. Investment rate of return
7. Other
8. Payroll growth

MSRS Cost Impact

MSRS provided an assumption request letter to the LCPR dated February 14, 2020 which listed all the proposed changes¹⁴. They also provided a separate letter from the retained actuary dated July 12, 2019 which summarized the required cost impact measurements.

The cost calculations contained all the required items (e.g., change in funded ratio and normal cost rate) and were presented in the following order:

- Mortality
- Combined demographic assumptions: retirement, withdrawal, disability, marital statistics, and form of payment
- Combined economic assumptions: price inflation, wage inflation/payroll growth, and merit/seniority pay increases

Although the cost measurements aren't presented exactly as described in the LCPR's 2010 Actuarial Standards, we believe they provide enough information to evaluate the changes. It's reasonable to combine several of the assumption change cost impacts since most have a minor liability effect. The actuary mentions in Comment 6 of the letter that, upon request, they can provide additional information to specifically comply with the Actuarial Standards.

¹⁴ The list of changes in the letter omitted the merit/seniority pay increase rates, but these were included in the actuarial experience study and the cost impact analysis.

Cost Impact (continued)**PERA Cost Impact**

PERA provided an assumption request letter to the LCPR dated September 4, 2019 which listed all the proposed changes. It also included a separate letter from the retained actuary dated July 12, 2019 which summarized the required cost impact measurements.

Like the MSRS cost analysis, the PERA cost calculations contained all the required disclosure items but with some consolidation of the economic and demographic assumptions. Although the cost measurements aren't presented exactly as described in the LCPR's 2010 Actuarial Standards, they provide enough information to evaluate the changes and we believe it's reasonable to combine several of the assumption changes since most have a minor liability effect. The actuary mentions in Comment 8 of the letter that, upon request, they can provide additional information to specifically comply with the Actuarial Standards.

TRA Cost Impact

TRA provided an assumption request letter to the LCPR dated February 26, 2020 which listed all the proposed changes. Although the letter did not include a detailed cost analysis, page 5 of the experience study did present the estimated cost effect for the proposed changes.

The cost calculations contained most of the required items but did not include the change in funded percent. The results were presented for the combined assumption changes but not separately for the individual assumptions. Although the cost measurements aren't presented exactly as described in the LCPR's 2010 Actuarial Standards, we believe they provide enough information to evaluate the changes. It's reasonable to combine the assumption change cost results since they have a minor liability effect. Likewise, the change in funded percent can be determined from the available information.