PNYX

Memorandum

From: PNYX Group

To: Chair, Colorado Pension Review Subcommittee

Date: July 29, 2024

Subject: Summary of remarks by Dr Ethan Kra at the Pension Review Subcommittee session of July 26, 2024

At the Pension Review Subcommittee session of July 26, 2024, Dr Ethan Kra made an intervention regarding actuarial assumptions and associated matters as presented in the PNYX final draft report reviewing the assumptions used to model the financial situation of the Colorado Public Employees' Retirement Association (PERA), as well as in relation to points on those subjects raised by PERA and The Segal Group. The Chair of the Subcommittee requested that the Subcommittee be provided with a written summary of the points Dr Kra addressed in his intervention. This memo sets out that summary.

Estimate that actuarial accrued liabilities may be 10% higher than reported

Information was requested regarding background and calculations supporting the estimate that AAL may be 10% higher than reported.

This is a crude estimate based on the observation that over the three years of 2021, 2022, and 2023, the only three years for which we have reported experience under the most recently adopted sets of assumptions[1], the actuarial losses represented 3% of the plan's actuarial accrued liability. This was a consistent pattern of $528 million, $1.03 billion and $1.18 billion in three consecutive years.

Given a pattern like that, with consistent losses even after the adoption of new assumptions, it's reasonable to presume that there is a relatively high likelihood that those losses would continue into the future. On that basis, a differential of approximately 10% as a cumulative value over the horizon of the cash flows is not an unreasonable estimate.

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[1] While the December 31, 2020 Actuarial Valuation Report was prepared using the newly adopted Segal assumptions, the actuarial gains and losses reported in that report were developed by comparing experience during 2020 with the expected experience underlying the December 31, 2019 Actuarial Valuation Report, which had been based on the prior actuary's assumptions.

The data, the time or the information and budget that would be necessary to replicate and run a whole system and test that estimate were not available in the context of the PNYX report, and such analysis was not the intention of the report. The 10% estimate is a very high-level estimate based on the experience from the Segal reports taking them at their face value, and is flagged as a likely issue that merits follow-up investigation.

New entrants and pay increases

In relation to the question of the extra contributions from new entrants covering the corresponding losses, over the three-year period, the losses from pay increases were almost $1.5 billion over three years, in addition to losses totaling over $1 billion from new entrants. The total was about $2.5 billion. The extra contributions were under $800 million, still leaving about a $1.7 billion shortfall.

Regarding the degree to which extra contributions relating to pay increases offset the liabilities from those pay increases, they only offset a minuscule fraction. This is because if somebody gets a pay increase on a final average pay plan, that pay increase applies to all the years of back service. The plan receives higher contributions for the current year, but the plan does not receive concomitant higher contributions for all the years of back service. The extra contributions from unexpected pay increases cover a tiny fraction of the increased liabilities, resulting in a very large actuarial loss.

In relation to extra contributions with respect to new entrants, those were credited with reducing future contributions over a 25-year period, but the liabilities from these new entrants are being paid out over 30 years. This mismatch does not appear to make sense.

Regarding liabilities from new entrants, there is no doubt that for a pension valuation those liabilities would be excluded for traditional funding valuations. However, if the plan were to review long-term projections of financial status and there's a pattern of new entrant losses, it would be reasonable to put in an assumption for those new entrants, as they will be generating losses. This is because they will be generating future cash outflows from the plan that affects the cash flow positions, and the plan should consider the new entrants that are reasonably expected. We understand that changes of this kind are currently under process.

Buck report

With respect to the Buck Report, unfortunately that had not been forwarded to me at the time of the session of July 26, 2024. In that session I provided comments based on the purpose of this type of report (further comments following a review of the Buck Report are set out in a subsequent section of this memo). For context, I was the auditor overseeing the Office of the Actuary of the City of New York, five of the large pension funds, one of the largest public pension systems in the country.

That type of report will replicate what the actuary has done to show that the actuary did the work technically correctly, that the methods were followed, the assumptions were applied. As far as the actual assumptions, there is a range of reasonable assumptions and an audit report like that will typically note that the assumptions are in the range. They may not be the ones that the auditor would pick.

GRS highlighted in 2021 that when Segal was retained, the old assumptions had been established by the prior actuary. The method used by the prior actuary in analyzing the experience had a noted deficiency. Segal corrected that deficiency when they did the 2020 study. Segal did a much better job. However, Segal did not give full credibility to their (Segal's) results. In many instances, they gave about ⅔ credibility to the prior actuary's results and made a partial change, giving about ⅓ recognition to the results of the Segal study.

Had Segal adopted assumptions based on their study, or had they been accepted by the trustees, I think you would have had a much better picture of the fund. The Segal study was far superior, as reported by GRS, to the prior actuary study in setting up the assumptions. Segal should be commended for that.

I would hope that Segal would now, in their next study, look at the experience of their first study and their second study and, essentially, basically ignore the prior actuary's experience study and totally base future assumptions on experience that Segal has analyzed.

Risk

One of the items that was mentioned is that many of these asset-liability stochastic models show the odds of total fund running dry, total illiquidity, not even being able to pay benefits from the fund, and requiring a pay-as-you-go system as better than 1 in 20 over the next 25 years. That may be an acceptable level of risk or may be unacceptable risk, but, in any case, it should be recognised and understood.

In relation to long-term market performance and an assumption that over 25 to 30 years markets will reliably come back around, some counterexamples are notable. The Nikkei peaked in the late 80s. It took 25 years just to get back to where it had been at that peak. Tail events can happen and should be duly considered. Further highlighting this concern, consider the Dow Jones Industrial Index was about 660 in early 1962 and was only around 770 in early 1982. It increased by less than 17% over 20 years, or less than 0.8% per year compounded annually.

It should be noted that the investment return assumption currently used by Segal is 7.25%, **net of investment expenses.** I believe that the presentation last Friday noted that investment related expenses were about 0.3% of assets. That would imply an assumed gross rate of return of about 7.55%.

Buck Actuarial Audit Report

Since the Meeting of Friday July 26, 2024, I have been provided a copy of the Buck audit report. Following are some comments:

- The Buck report, prepared in 2022, makes no reference to the 2021 GRS report. Was a copy of the GRS report shared with Buck?
- The cover letter to the Buck report states:

> *"we believe the actuarial methods and assumptions used are reasonable for the purpose of the measurements in the report and the valuation reports comply with Actuarial Standards of Practice unless otherwise noted. We have summarized findings and recommendations that Segal and the Board of Trustees should consider for future actuarial valuations."*

- Page 7 of the Buck report states "*the current assumption of 7.25% is near the top of the range that we would consider to be reasonable.*"
- Following are five of the recommendations of Buck from page 8 of their report:
  - When recommending assumptions with respect to rates of termination of employment, we recommend giving more weight to recent experience in future experience studies, especially for larger divisions with more credibility in number of data observations.
  - We recommend careful review of the observations to ensure proper categorization of reduced or unreduced retirement during the next experience study. For example, careful review of age rounding methodology may result in more observed unreduced retirements.
  - We recommend that future experience studies review and describe the methodology of developing new entrant profiles for projections.
  - We recommend future valuation reports provide demographic summaries of the new entrant profiles used in the open group projections.
  - We recommend an additional statement in the valuation report that the actuaries who have performed the valuations meet the Qualification Standards "to render the statements of actuarial opinion presented in the report".
- Following are three recommendations from page 13 of the Buck report:
  - We recommend the assumed long-term rate of investment return assumption continue to be monitored as our results indicate the current assumption of 7.25% is near the top of the range that we would consider to be reasonable.
  - We recommend that Segal comment on the reasonability of the long-term rate of return assumption in future actuarial valuation reports.
  - We note the executive summary of the 2020 experience study report indicates that the assumed investment rate of return is net of investment expenses. However, we recommend future experience studies clarify this point more prevalently in the investment rate of return section of the report.

- The Buck report continued on to state (on page 15):

  "*Finally, with the exception of the DPS Division (PERA Benefit Structure), proposed rates of termination were the result of the weighted average of two-thirds of the existing assumed rates (i.e., those established on the basis of previous experience studies) and one-third of rates based on recent experience (i.e., the period under examination for the 2020 experience study).*"

  Buck went on to report on page 16 of their report:

  "*As noted above, Segal proposed rates of termination by weighting two-thirds based on the current assumption (i.e., previous experience studies) and one-third based on recent experience (i.e., the period under examination for the 2020 experience study). We recommend giving more weight to recent experience in future experience studies, especially for larger divisions with relatively greater credibility. Assuming more members terminate employment prior to retirement eligibility when actual experience suggests that a higher number of members actually reach retirement eligibility would likely result in actuarial losses in future valuations.*"

- In other words, ⅔ of the assumption was based on the prior actuary's analysis which GRS had already identified to having methodological shortcomings, and only ⅓ on the basis of the superior Segal assumption analysis of 2020.

- Regarding amortization periods, the Buck report stated on page 19:

  - The combination of the 30-year amortization period for most bases and the 3% assumed payroll growth assumption results in a negative amortization pattern. A negative amortization pattern means that for the first several years of the amortization period, the amortization payment drawing down the outstanding balance on the unfunded actuarial accrued liability does not exceed the interest on the unfunded actuarial accrued liability. Essentially, the unfunded actuarial accrued liability continues to grow for the first few years of the amortization period.

  - Longer amortization patterns exceed the average future service of active and therefore spreads the cost longer than while in active service. In order to balance intergenerational equity with volatility management, an amortization period closer to the average future service of active members should be considered.

  - We recommend reviewing the amount and duration of negative amortization occurring in each division and considering whether such pattern aligns with Colorado PERA's funding policy objectives.

Actuarial Certification

Dr. Ethan E. Kra prepared this memo. He is a credentialed actuary who meets the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein. He is not aware of any direct or material indirect financial interest or relationship, including investments or other services, that could create a conflict of interest or that would impair the objectivity of that work.

Dr. Kra's analysis is based on the documents listed in his portion of the PNYX report (being Part B of that report), supplemented by the Buck report cited above. Should additional materials become available, he reserves the right to revise and supplement his opinions. In the event that there are errors or omission in any of the information upon which he relied in preparing his analysis, he reserves the right to correct and/or modify his analysis, as appropriate. This analysis has been prepared at the request of the Chair of the Colorado Pension Review Subcommittee.

Dr Ethan Kra